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Geography of Domestic Mergers and Acquisitions (M&As): Evidence from Matched Firm-level Data

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BÖCKERMAN P. and LEHTO E. (2006) Geography of domestic mergers and acquisitions (M&As): evidence from matched firm-level data, *Regional Studies* **40**, 847–860. This paper explores domestic mergers and acquisitions (M&As) from the regional perspective. The Finnish evidence reveals that geographical closeness is a characteristic of great importance for domestic M&As. Thus, a great number of M&As occur within narrowly defined regions. Interestingly, domestic M&As reinforce the core–periphery dimension. The results from the matched firm-level data show that larger companies can overcome geographical boundaries more easily and domestic M&As are more likely to occur in regions that contain a great number of companies. In addition, the results reveal that a strong ability by an acquiring company to monitor the target (measured by the knowledge embodied in human capital or in research and development stock) can support M&As that occur across distant locations.

Mergers Acquisitions Mergers and acquisitions (M&As) Monitoring Agglomeration

BÖCKERMAN P. et LEHTO E. (2006) La géographie des F&A nationales; des preuves provenant des données auprès des entreprises à niveaux correspondants, *Regional Studies* **40**, 847–860. Cet article cherche à examiner sur le plan régional les fusions et acquisitions (F&A) nationales. Les preuves finlandaises laissent voir que la proximité géographique est une caractéristique non-négligeable pour ce qui est des F&A nationales. Par la suite, nombreuses sont les F&A qui ont lieu au sein des régions rigoureusement délimitées. Il est à noter que les F&A nationales renforcent la notion de centre–périphérie. Les résultats provenant des données auprès des entreprises à niveaux correspondants montrent que les plus grandes entreprises peuvent surmonter plus facilement les frontières géographiques et qu'il est plus probable que les F&A nationales ont lieu dans les régions où le parc d'entreprises s'avère important. En plus, les résultats laissent voir que la capacité d'un acquéreur de surveiller l'entreprise ciblée (mesuré en termes de la connaissance incarnée dans le stock de capital humain ou de R & D) peut soutenir les F&A qui ont lieu à travers des pays lointains.

Fusions Acquisitions F&A Surveiller Agglomération

BÖCKERMAN P. und LEHTO E. (2006) Die Geographie der im Inland durchgeführten Fusionen und Übernahmen: Beweise von Daten gleichwertiger Firmen, *Regional Studies* **40**, 847–860. Dieser Aufsatz untersucht im Inland durchgeführte Fusionen und Übernahmen (*mergers and acquisitions* = M&A) aus regionaler Sicht. Die finnischen Beweise zeigen, dass geographische Nähe von größter Wichtigkeit für im Inland durchgeführte M&As ist. So finden eine hohe Anzahl M&As innerhalb genau umschriebener Regionen statt. Iinteressanterweise bestärken im Inland vorgenommene Fusionen und Übernahmen die Dimension vom Kern zur Peripherie. Die Ergebnisse der Daten auf Firmenebene zeigen, dass es größeren Gesellschaften eher gelingt, geographische Grenzen zu überwinden, und dass M&As innerhalb eines Landes eher in Regionen stattfinden, in denen eine große Anzahl Firmen ansässig ist. Darüber hinaus zeigen die Ergebnisse, dass eine überzeugende Fähigkeit der Übernehmergesellschaft, das Ziel zu überwachen (gemessen an den Kenntnissen, die in Menschenkapital oder in Forschungs- und Entwicklungskapital verkörpert sind), im Stande ist, Fusionen und Übernahmen über weite Entfernungen hinweg zu unterstützen.

Fusionen Übernahmen M&As Überwachung Ballung

BÖCKERMAN P. y LEHTO E. (2006) Geografía de las FyA nacionales: el ejemplo de datos comparativos entre empresas, *Regional Studies* **40**, 847–860. En este artículo se analizan las fusiones y adquisiciones (FyA) nacionales a partir de una perspectiva regional. El caso de Finlandia demuestra que la proximidad geográfica es una característica de vital importancia para las FyA nacionales. Un gran número de FyA ocurren en regiones bien definidas de extensión limitada. Es interesante observar que las FyA nacionales refuerzan la dimensión entre periférica y centro. Los resultados de los datos comparativos de las empresas indican que las compañías más grandes son más capaces de superar las limitaciones geográficas y es más probable que las FyA nacionales ocurran en las regiones donde hay un alto número de empresas. Además, los resultados

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indican que si las empresas compradoras tienen la capacidad de controlar el objetivo (medida por el conocimiento personificado en capital humano o en existencias de I + D) podrán dar su apoyo a las FyA que ocurren en lugares más alejados.

Fusiones Adquisiciones FyA Control Aglomeración

JEL classifications: G34, R12

INTRODUCTION

Companies have a key role in the reallocation of resources. A part of that process involves changing the boundaries of existing firms. There is a largely neglected regional aspect in this restructuring of the economic landscape. The geography of mergers and acquisitions (M&As) in Finland is particularly interesting because regional disparities are sharp. As the European Union average (for 15 member countries) is standardized as 100, the level of gross domestic product (GDP) per capita is 141 in the province of Uusimaa, which includes the region around the Helsinki metropolitan area in Southern Finland, where roughly one-third of the total economic activity is located. In contrast, by using the same measure, the level of GDP per capita is 75 in Eastern Finland (BEHRENS, 2003). Domestic M&As are, therefore, interesting from the regional policy perspective in Finland because M&As may have implications on regional economic performance, among other things.

This paper investigates the previously unexplored regional pattern of domestic M&As in Finland during the last decade. It contributes to the literature on regional domestic M&As by assembling matched firm-level data. This means that the results are based on the comprehensive public data on domestic M&As that are matched to the firm-level data sources maintained by Statistics Finland (SF) in order to obtain variables that characterize the companies involved. In particular, the paper estimates models in which the geographical closeness of domestic M&As is explained by the characteristics of the companies involved. By doing this, it is possible to disentangle firm-level factors that have an influence on the geography of M&As. Importantly, there is very little earlier empirical evidence on the role of firm-level factors, because research in this strand of the literature has usually used aggregate data sources that contain information solely on regional features. The focus on the firm-level factors is well grounded because firms, not regions, are actors in M&As.

The paper is organized as follows. The second section discusses theoretical foundations for the importance of geographical closeness in domestic M&As. The third section includes a survey of the earlier empirical literature that has investigated the regional pattern of domestic M&As. The fourth section contains a description of the matched firm-level data that are used to address the issues at hand. In addition, this section contains discussion about the expected impacts of the explanatory variables for the geographical closeness based on the section on theory. The fifth section documents in several ways the fact that geographical closeness is a matter of great importance for domestic M&As. The sixth section reports the estimation results about the firm-level factors that have an influence on the geography of M&As. The last section concludes.

THEORETICAL CONSIDERATIONS

There are three theoretical reasons for the relevance of geographical closeness as a characteristic of domestic M&As. The first explanation is based on the consequences of product differentiation in spatial price competition. The second statement of the reason for the relevance of geography relies on asymmetric information and the capacity to monitor, which is the preferred explanation. In particular, it has been argued that acquirers cannot distinguish a good target from an average target from a distant location. This gives an advantage for the potential acquirer who is located close to the target firm. The third explanation relies on the framework in which firms that are located close to each other can jointly take advantage of a common asset.

Spatial price competition

The distance between a client and a firm is an important component of product quality or a firm's costs in many service industries. Because firms' locations with respect to customers vary in space, products become differentiated. In the spatial competition models the impact of geographical closeness on M&As depends on the way in which the other firms respond to changes in the output of the firm considered. Cournot competition implies no response in terms of output. In Bertrand competition firms compete in setting prices, and then output responses diverge. LEVY and REITZES (1992) show that a merger of nearby companies – which eases price competition between them – increases the merged firms' profits in Bertrand competition. As a result, there is a strong economic incentive for nearby companies to conduct M&As in spatial price competition. This provides an explanation for the geographical closeness in domestic M&As. In contrast, MATSUSHIMA

(2001) shows that a merge of nearby companies produces a decline in the merged companies' profits in the standard non-cooperative Cournot competition. For this reason, there are no incentives for nearby companies that are engaged in Cournot competition to merge with each other. The implications of geography on M&As cannot, therefore, be solved by theoretical reasoning based solely on the traditional frameworks of industrial organization.

Asymmetric information and capacity to monitor

The literature on knowledge spillovers stresses that the tacit and human-embodied nature of knowledge has a crucial role in knowledge transfers (e.g. NONAKA and TAKEUCHI, 1995; MORGAN, 2004).[1] The transmission of tacit knowledge presumes face-to-face contact or other mechanisms that require spatial proximity (VON HIPPEL, 1994; MORGAN, 2004). Accordingly, there is a great amount of evidence that points out that knowledge and technology flows are dampened by geographical distance (e.g. JAFFE *et al.*, 1993; KELLER, 2002; MAURSETH and VERSPAGEN, 2002; GREUNZ, 2003). GRÜNFELD (2002) stresses that one interpretation of this regularity is that more resources are needed to enable learning from innovations that are undertaken at a greater geographical distance. According to this, a firm's possibilities to absorb knowledge from regions that are located far away is difficult. In the context of M&As, this means that it becomes more difficult to evaluate the value of a target when it is in a distant location from an acquirer. Indeed, in the empirical literature it has often been argued that the geographical closeness between an acquirer and potential target companies improves monitoring or at least decreases the monitoring costs (e.g. GREEN, 1990; ASHCROFT *et al.*, 1994).[2] Based on that argument, geography should matter a great deal for domestic M&As.

There is a strand of theoretical literature that has analysed these issues in the context of international asset flows. GEHRIG (1993) considers a situation in which domestic risk-averse investors observe the payoffs of domestic firms with higher precision than risk-averse foreign investors. A foreign investment is riskier because it has a larger variance around the expected return. Therefore, risk-averse investors prefer domestic investments for any given level of the expected return. This model for cross-border equity transfers explains the so-called home bias puzzle, according to which the amount of investments abroad is empirically observed to be much less than the optimal diversification of investment portfolios would suggest.[3] Concerning M&As, the decision-makers are firms, not individual investors. For this reason, the assumption that the actor is risk-averse is no longer particularly well founded.[4] Interestingly, GORDON and BOVENBERG (1996) explain the home bias puzzle in a setting in which risk-neutral foreign investors buy shares from risk-neutral domestic owners. They rely on the assumption that firm-specific output shock arises, which only domestic owners learn about afterwards. This gives an advantage for domestic investors and explains the fact that foreign assets are underweighted in investment portfolios. LEHTO (2004) shows that this reasoning can be extended to a situation in which there are two or three potential bidders for a target in the context of domestic M&As. It turns out that it is highly unlikely that an uninformed bidder that is in a distant location from a potential target will eventually buy the target.

The long distance between a target and an acquiring company may also imply that there are communication problems and that these firms do not 'share the same language' in the sense defined by BRESCHI and LISSONI (2001).[5] This would seriously restrict the opportunities to internalize the potential synergies from M&As, and give one explanation for the home bias in M&As. Firm characteristics should matter in this. For instance, the high educational level of an acquirer's staff can improve the possibilities to understand each other and provide the means to overcome problems that are associated with economic relationships across distant locations.

Sharing common assets

A common motivation for M&As is that the parties may jointly use assets that the new parent firm possesses after the merger.[6] Owing to this, the scope for profitable M&As may widen. Theoretical analysis can be based on a framework that resembles the model analysed by PERRY and PORTER (1985).[7] It is useful to assume that the inverse of the demand function is linear in output and that the technology is determined by the Cobb–Douglas production function. This implies that:

$$q_k = \sqrt{L_k K_k}$$

where q_k is firm k's output, K_k is firm k's capital input and L_k is firm k's labour input. Unlike PERRY and PORTER (1985) or FARRELL and SHAPIRO (1990), it is convenient to assume that capital input is also a decision variable. Further assuming that the joint use of K_k lowers capital costs, the prospects for profitable mergers widen. Then, not only in duopoly as in SALANT *et al.* (1983), but also in the market of several firms, there arise opportunities for profitable M&As.

To obtain costs savings through an M&A in this theoretical setting requires that an M&A does not remove the pre-merger production sites. The distant location between the merged firms may hinder the use of these common assets. The location of depots, warehouses, and various supporting activities can seriously limit the geographical scope of cooperation in wholesale trade and transport industries and in other services. These boundaries apply to network

industries, where the location of fixed tangible assets that belong to the network may determine the area in which the joint utilization of the network is possible. After an M&A, the utilization of human capital – and the technological and managerial knowledge that is incorporated in human capital – can also to some extent be shared by those production sites that were independent firms before the M&A.

PREVIOUS RELATED STUDIES

There is a large literature on the effects of M&As on regional economies (e.g. ASHCROFT and LOVE, 1993), but there are few studies that aim to characterize the factors that have an influence on domestic M&As from the regional perspective.[8] ELLISON and GLAESER (1997) observe that a small portion of the total geographic concentration is attributable to intra-firm agglomeration in US manufacturing. This implies that there is an important role for domestic M&As in the concentration of economic activity within industries. GREEN and CROMLEY (1984) and GREEN (1987, 1990) investigate the US pattern in takeovers across regions. These studies discover that distance is an essential factor in the determination of regional M&As, as suggested by the famous gravity equation of interregional interaction.

GREEN and MCNAUGHTON (1989) and ALIBERTI and GREEN (1999) provide empirical evidence from Canada. They conclude that the acquisition process across regions reinforces the core–periphery nature of Canada's urban system. Domestic merger activity is heavily concentrated in four major concentrations of economic activity: Toronto, Montreal, Vancouver and Calgary. GREEN and LISLE (1991) investigate the interregional merger flows in Canada by using the Markov chain models. There is evidence for the distance decay effect. ASHCROFT *et al.* (1994) discover that the estimation of the gravity equation provides an appropriate framework for the study of regional takeover activity in the UK. Recently, RODRIGUEZ-POSE and ZADEMACH (2003) concluded that M&As have resulted in a concentration of firms and economic activity in the main German metropolitan areas. The study is based on aggregated data about the characteristics of the German regions.

THE DATA

Records of M&As

The data on M&As is gathered from *Talouselämä* magazine, which is published on a weekly basis. The magazine reports all M&As in which either the acquiring or the acquired firm is a Finnish one, or in which either the acquiring or the acquired firm is owned by a Finnish company.[9] The data are, therefore, comprehensive for domestic M&As. Owing to the fact that some variables are not available from 2001, most of the analysis covers the period 1989–2000. The total number of M&As is 5126 (including non-domestic M&As) during this period (Table 1). Domestic M&As cover around 58% of all M&As.[10] The sub-population of M&As listed by *Talouselämä* magazine that consists of the cases where existing companies change their organizational form without the involvement of other companies is excluded from the study of domestic M&As because there is no discrepancy in location in those cases.

Definitions of geographical closeness

Talouselämä magazine reports the geographical location of targets classified in terms of Finnish municipalities. This is a plant-level measure that can then be aggregated into various geographical divisions of Finland (including the so-called NUTS regions by the European Union).[11] In contrast, the geographical location of acquiring companies is obtained from the Business Register by SF, as it contains the home municipality of all Finnish companies. Most acquiring companies have only one site. In those cases the definition of location is unambiguous. When acquiring companies with many sites, the location is defined according to the site that has the largest number of personnel. Two measures are used herein for the geographical closeness of M&As. First, geographical closeness is defined as a case when the acquiring and the acquired company are located in the same region. Second, geographical closeness is measured as a distance between the acquiring and the acquired company. The distance is measured in kilometres based on the location of the acquiring and the acquired company at the municipality level.[12]

Explanatory variables for geographical closeness and corresponding hypotheses

Matched data are assembled to obtain firm-level variables that have a potential influence on the geographical

Table 1. *Data about mergers and acquisitions (M&As) in Finland, 1989–2000*

Definition	Number of M&As
All M&As listed by the magazine, 1989–2000	5126
Acquiring company is located in a foreign country	880
Target company is located in a foreign country	685
Internal reorganization of a domestic firm	589
Domestic M&As used in the analysis	2972

Source: Talouselämä magazine.

closeness of M&As. Therefore, models are estimated in which the geographical closeness of domestic M&As is explained by the characteristics of the companies involved. These firm-level factors capture aspects that were described in the section on theory. In particular, most of the explanatory variables for the geographical closeness of M&As can be interpreted from the perspective of available information for potential acquirers and the capacity to monitor targets. In addition, some variables reflect the possession of assets whose common use may face serious geographical restrictions, as discussed in the section on theory.

The variables and their sources are described in detail in Table 2; and Appendix (section a) contains descriptive statistics of the variables used in the estimation of the models.[13] The most interesting expected impacts of the explanatory variables on the geography of M&As are described in the following. An acquirer that is older is expected to be more likely involved in distant M&As because it has accumulated the facilities to monitor potential targets and gained experience in financial deals over its existence. The age of a target company is closely related to the available information for potential acquirers. Older firms are often listed and there is more public information available about them. This means that in the light of theoretical considerations based on monitoring, domestic takeovers of younger firms should be more common within the same regions.

The feature that an acquirer consists of several establishments should loosen the importance of geographical closeness, because multi-establishment companies can gather and process information from a broader geographical scope. In contrast, it is more difficult to monitor multi-establishment companies as potential targets because they have a more complex structure. Therefore, it is expected that takeovers of multi-establishment companies are more likely to occur within the same regions. In addition, large companies equipped with better monitoring capacity may be able to overcome geographical boundaries more easily than small companies. In contrast, the ease of monitoring a target is impaired when the size of the target company increases, because large companies have a more complex structure that requires much costly monitoring. This suggests that the takeovers of large firms should be more likely within the same region, other things being equal.

Financial matters are important for M&As. According to JENSEN (1988), better performing companies – measured by indebtedness or by profitability – are more willing to acquire. It is interesting to see whether there is any spatial dimension in this respect. In particular, one can investigate whether better performing acquirers are more likely to be involved in distant M&As. The fixed tangible assets of the companies involved are included among the explanatory variables to capture the possibilities to take advantage of common assets. It is expected that these possibilities can be utilized across distant locations because monitoring is often relatively easy with them. On the other hand, a distant location may hinder the common use of fixed tangible assets after an M&A.

Based on the section on theory, it can be argued that the education structure of the companies involved is an important factor for the spatial structure of M&As. In particular, it is reasonable to expect that an acquiring company that consists of highly educated workers or is characterized otherwise by extensive knowledge capital is better equipped to monitor targets. This should downplay the importance of geographical closeness and support domestic M&As that occur across distant locations. In contrast, monitoring is more difficult when the personnel of the target company consist of highly educated workers with specific skills, because knowledge embodied in highly educated workers is largely tacit and hard to communicate without substantial costly investments that are devoted to monitoring efforts. Therefore, it is expected that M&As that consist of target companies with highly educated workers are more likely to occur within the same region.

One way to approximate the knowledge capital of companies is the possession of patents. The ease with which to monitor the quality of a patent from a distant location and the good opportunities to utilize the content of a patent – which a target possesses – despite the considerable distance suggests that the possession of patents may lengthen the distance between an acquirer and a target. On the other hand, owing to the tradability of patents and the opportunities to make licence agreements on them, there may be more convenient mechanisms for acquirers and potential target firms to transfer the knowledge incorporated in patents than M&As.[14] Thus, it is not expected that the possession of patents on either side of a M&A would necessarily have a substantial impact on the geography of M&As.

In addition to patents, acquirer's knowledge capital can be measured by accumulated research and development (R&D) investments. As stressed by LEHTO and LEHTORANTA (2004), large R&D stock seems to strengthen the acquirer's absorptive capacity and, as a result, increase the likelihood of acquisitions. Thus, the acquirer's R&D stock reflects, to some extent, the acquirer's ability to monitor potential targets and, therefore, it should increase the likelihood of distant M&As. In contrast, substantial R&D stock owned by the target company makes it, in principle, more difficult to monitor. Using that as a basis, one can expect that takeovers of those companies are more likely to occur within the same regions. On the other hand, it is possible that post-merger utilization of knowledge capital embodied in R&D stock does not easily meet geographical limits. Thus, it is an empirical matter which of these two opposing effects dominates.

Table 2. Description of the variables

Variables	Definition/measurement
Dependent variables (i.e. measures of geographical closeness)	
PROXIMITY	Acquiring and acquired companies are located in the same NUTS region = 1; otherwise 0. *Source: Talouselämä* magazine and Business Register by Statistics Finland (SF)
DISTANCE	Distance is defined as a distance (km) between acquiring and acquired companies at the municipality level. *Source:* SF based on Geographic Information Systems (GIS)
Explanatory variables	
Firm-level features (A–C)	
(A) Financial status of companies:	
VINTAGE	Age of a firm is measured in years. The variable is the employment-weighted average of the ages of firm's plants. *Source:* Business Register by SF
MULTI	Company consists of several establishments = 1; otherwise 0. *Source:* Business Register by SF
TURNOVER	Logarithm of the turnover of a firm. *Source:* Business Register by SF
DEBTS	Short- and long-term debts divided by the total assets of a firm. *Source:* Financial Statements Data by SF
PROFITS	Gross margin divided by the turnover of a firm. *Source:* Financial Statements Data by SF
FIXED	Logarithm of fixed tangible assets. *Source:* Financial Statements Data by SF
(B) Personnel of companies:	
EDU1	Share of the highly educated with technical qualifications of the total number of employees in a firm. *Source:* Employment Statistics by SF
EDU2	Share of the highly educated (excluding the number of highly educated with technical qualifications) of the total number of employees in a firm. *Source:* Employment Statistics by SF
(C) Knowledge capital:	
PATENTS1	Number of domestic patents that a firm owns currently. *Source:* National Board of Patents and Registration of Finland
PATENTS2	Number of US-registered patents that a firm owns currently. *Source:* National Board of Patents and Registration of Finland
R&D	Logarithm of research and development (R&D) stock of a company that is estimated based on the previous R&D expenditures. *Source:* R&D surveys by SF (for details, see LEHTO and LEHTORANTA, 2004)
(D) Regional features:	
AGGLOMERATION	Agglomeration is measured by ln(number of firms whose turnover is over FIM3 million in the region divided by the surface area of the region, expressed in km^2). The limit of FIM3 million is the same as the one used by *Talouselämä* magazine in its listings of M&As. The variables are separately calculated for the locations of acquiring and target companies. The variable is available for NUTS4 and NUTS3 regions. *Source:* Business Register by SF and National Land Survey of Finland
SIZE	Absolute size of the regions is measured as a logarithm of the surface area of the region, expressed in km^2. The variables are separately calculated for the locations of acquiring and target companies. The variable is available for NUTS4 and NUTS3 regions. *Source:* National Land Survey of Finland
(E) Additional variables:	
YEARS	12-1
SAMEINDU	Acquiring company and target companies are in the same two-digit industry = 1; otherwise 0. *Source:* Business Register by SF

Along with firm-level factors that are mostly related to the available information and the capacity to monitor, agglomeration of economic activity and the (absolute) size of the regions as regional features should matter for the geography of domestic M&As. The amount of geographical agglomeration is measured herein by the number of firms located in the same region divided by the surface area of the region expressed in square kilometres. It is expected that M&As are more likely within regions that contain a great number of firms, given the surface area of the region. The reason for this is that there are more potential M&A partners for each randomly chosen firm. An additional control variable for the (absolute) size of the regions is included because the sizes of the Finnish regions differ a lot from each other. It is expected that M&As are more likely within large regions, given the level of agglomeration. In other words, the present models take into account two aspects of regional heterogeneity. Finally, a dummy variable is included that captures M&As in which the acquiring

company and the target are in the same industry. Thus, it is possible to investigate the connection between geographical closeness and proximity across industries that is not often pursued in the literature.

Creation of matched firm-level data

Talouselämä magazine lists the names of the companies that have been involved in M&As. It is, therefore, possible to link the firm codes manually to the names of the companies listed by the magazine. The information about domestic M&As is linked to the Business Register and Financial Statements Data by using these firm codes. The VINTAGE, the MULTI, the TURNOVER, the PROFITS, the DEBTS, and the FIXED variables are obtained from the Business Register and Financial Statements Data by SF.

These matched data are then linked to Employment Statistics, also maintained by SF, which compiles information on the economic activity of individuals and their background characteristics (such as education). Employment Statistics contains a piece of information (i.e. the firm code) on the employee's employer in the last week of each year. As a result, it is possible to link Employment Statistics to other data sources maintained by SF. The variables that capture the educational structure of the companies involved originate from Employment Statistics.

The number of patents that capture an aspect of knowledge capital is obtained from the comprehensive registers of the National Board of Patents and Registration of Finland. R&D expenditures used to calculate the R&D stock of companies are taken from R&D surveys of Finnish companies for 1989 and 1991–2000.[15] Matching is made possible by the fact that R&D surveys by SF contain the same unique firm codes as the Business Register, Financial Statements Data and Employment Statistics.

RELEVANCE OF GEOGRAPHY

The geographical pattern of domestic M&As is interesting.[16] Table 3 shows that a great number of domestic M&As occur within narrowly defined regions. For instance, around 50% of the total number of domestic M&As occur within the same provinces. In contrast, roughly 31% of domestic M&As occur within the same industry when the two-digit industry classification by SF is used. The Kernel density estimate of the distance decay function further underlines the important role of geographical closeness (Fig. 1).[17] There is evidence that the volume of domestic M&As substantially declines, as there is an increase in the distance between the acquiring company and the target company on condition that a domestic M&A has occurred in the first place. The number of interregional domestic M&As drops almost to zero when the distance between the acquiring company and the target company is more than 600 km. This shows that geography sets restrictions for M&As.

Geographical closeness seems to be a characteristic of great importance for domestic M&As. However, this pattern may arise because most firms are located in the Helsinki metropolitan area (a NUTS4 region) – which is a part of the Uusimaa province (a NUTS3 region) – or in a few other NUTS4 regions. To take into account the density of firms in various subregions, the actual share of intra-regional M&As and the hypothetical probability of intra-regional M&As were compared in a situation in which the acquiring firm chooses the target firm randomly, given the existing locations of firms in Finland. This probability is denoted by $p(n)$. Its derivation is presented in the Appendix (section b). $p(n)$ was computed by using the data on the number of firms in various subregions. (The firms' turnover has to be above FIM3 million for those included in the Business Register by SF.) The share of actual intra-regional M&As of all M&As and computed $p(n)$ for the NUTS4 regions are presented in Fig. 2. The share of actual

Table 3. *Share of domestic mergers and acquisitions (M&As) in which the acquiring and the target companies are located in the same region of Finland, 1989–2000 (i.e. the means of the PROXIMITY variable)*

Regional division	Share (%)
NUTS5 regions (446 regions)	27.8
NUTS4 regions (85 regions)	44.4
NUTS3 regions (20 regions)	53.3

Sources: Talouselämä magazine and Business Register by Statistics Finland (SF).

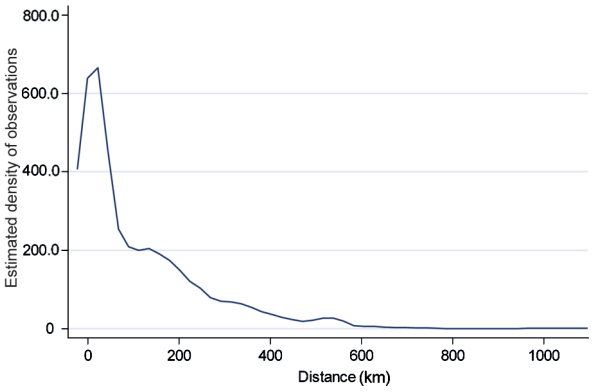

Fig. 1. *Estimated distance decay function based on the distances between acquiring and target companies in the Finnish regions, 1989–2000*
The estimated density of observations is shown on the vertical axis; the horizontal axis indicates the geographical distance (km) between acquiring and target companies at the municipality level. *Source:* Statistics Finland (SF) based on Geographic Information Systems (GIS)

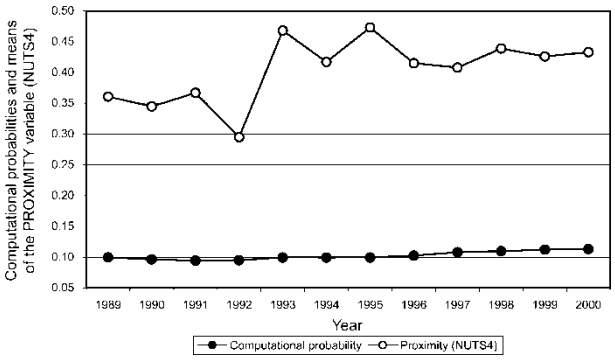

Fig. 2. Computational probability of intra-regional mergers and acquisitions (M&As) and the share of domestic M&As in which acquiring and target companies are located in the same NUTS4 region (i.e. the means of the PROXIMITY variable for the NUTS4 regions), 1989–2000
The computational probabilities and the means of the PROXIMITY variable are shown on the vertical axis. The calculation of computational probability is explained in the Appendix (section b). *Sources: Talouselämä* magazine and Business Register by Statistics Finland (SF)

intra-regional M&As is clearly above $p(n)$. This confirms the fact that acquiring firms tend to be located geographically close to target firms.

The share of the Finnish provinces of the total volume of takeover activity by acquiring companies shows the overwhelming dominance of Uusimaa, where a substantial part of the economic activity is located (Fig. 3). Although the share of Uusimaa of the total volume of takeover activity by target companies is also high, it is definitely not as high as the share of takeover activity by acquiring companies.[18] Thus, firms located in the province of Uusimaa are gradually gaining control of firms located in the rest of the country in net terms by conducting domestic M&As. The losers of control seem to be fairly evenly distributed across the other NUTS3 regions, including provinces such as Varsinais-Suomi, Pohjois-Savo and Pohjois-Pohjanmaa. This means that domestic M&As reinforce the core–periphery dimension of Finnish economic geography.

EXPLAINING GEOGRAPHICAL CLOSENESS

The basic estimation results are reported in Table 4. (Additional results are reported in the Appendix, sections c and d.) A number of interesting patterns emerge despite the fact that a non-trivial number of observations are lost in the construction of the matched firm-level data. There is not much evidence that the age of companies involved has any significant influence on the geography of M&As (Table 4, models 1–3). However, the likelihood that a domestic M&A will occur within the same region clearly decreases as the turnover of the acquiring company

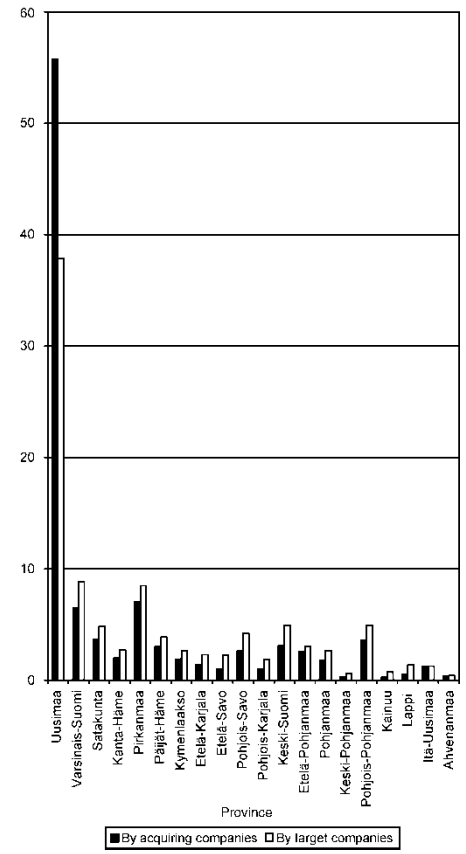

Fig. 3. Share of the Finnish provinces of the total volume of domestic mergers and acquisitions (M&As) by acquiring and target companies, 1989–2000.
Source: Talouselämä magazine

increases (Table 4, models 1–3). This means that larger companies can overcome the geographical boundaries more easily.

The variables that capture patents of the companies involved are not statistically significant at the standard 5% level (Table 4, models 1–3). The possession of patents is, therefore, not an important determinant of the geographical pattern of M&As. In contrast, agglomeration matters a great deal for the geography of domestic M&As (Table 4, models 1–3). Thus, M&As are more likely to occur within regions that contain a great number of companies, given the surface area of the region. In addition, there is some evidence that an increase in the (absolute) size of the region increases the likelihood of M&As within the region (Table 4, models 1 and 2).

Geographical closeness and proximity across industries are not related based on the evidence (Table 4, models 1–3). Interestingly, the result that geographical closeness and proximity across industries are not related is in contrast with theoretical considerations based on spatial price competition. This conclusion arises because competition within industries should be more intensive than that between industries producing stronger economic incentives for companies to ease price competition by means of M&As when companies

Table 4. Estimation results, 1989–2000

	Model 1		Model 2		Model 3	
	Probit model (dependent variable: PROXIMITY for NUTS4 regions)	*t*-Statistics	Probit model (dependent variable: PROXIMITY for NUTS3 regions)	*t*-Statistics	Tobit model (dependent variable: DISTANCE)	*t*-Statistics
VINTAGE (acquirer)	0.006*	1.80	0.005	1.45	−1.53	−1.65
VINTAGE (target)	−0.003	−0.96	−0.003	−1.03	0.604	0.68
MULTI (acquirer)	−0.021	−0.44	−0.045	−0.91	36.257**	2.70
MULTI (target)	−0.066	−1.48	−0.082*	−1.84	17.937	1.50
TURNOVER (acquirer)	−0.054**	−4.22	−0.030**	−2.40	8.407**	2.50
TURNOVER (target)	0.014	1.44	0.003	0.22	−2.010	−0.62
EDU1 (acquirer)	−0.249*	−1.74	−0.233	−1.56	100.184**	2.53
EDU1 (target)	0.134	0.92	0.105	0.68	28.859	0.70
EDU2 (acquirer)	−0.063	−0.26	0.153	0.57	−115.732	−1.59
EDU2 (target)	0.312	1.31	0.328	1.30	−127.236*	−1.80
PATENTS1 (acquirer)	0.001	0.08	−0.001	−0.38	0.409	0.47
PATENTS1 (target)	0.024	0.65	0.001	0.25	0.034	0.03
PATENTS2 (acquirer)	−0.022	−1.17	−0.006	−0.54	−0.989	−0.51
PATENTS2 (target)	−0.007	−0.96	−0.004	−0.49	−0.716	−0.37
AGGLOMERATION (acquirer)	0.089**	5.83	0.096**	4.63	−10.547**	−2.73
AGGLOMERATION (target)	0.154**	10.86	0.248**	12.11	−46.120**	−12.51
SIZE (acquirer)	0.310**	7.15	0.279**	5.51	17.877	1.49
SIZE (target)	0.031	0.67	0.225**	4.60	−14.771	−1.43
SAMEINDU	−0.001	−0.03	−0.045	−1.26	3.514	0.37
Pseudo-R^2	0.36		0.24		0.03	
Log-likelihood	−448.49		−551.61		−5384.10	
χ^2 from the Wald test	511.02**		357.84**		–	
χ^2 from the Likelihood ratio test	–		–		306.77**	
Number of observations	1057		1057		1056	
Number of left-censored observations	–		–		244	

Notes: **(*) Indicates that the parameter estimate is statistically significant at the 5(10)% significance level. Reported *t*-statistics are based on robust standard errors that are heteroscedasticity-corrected. The results for Probit models are reported as marginal effects. All models include year dummies and a constant, which are not reported. Log-likelihood is a value of the log likelihood function. The Wald test is a test of the joint significance of the independent variables. The Likelihood ratio test is reported for the same purpose for a Tobit model. These tests are χ^2 distributed. The number of left-censored observations (i.e. the number of zeros) is reported for a Tobit model.

are in the same industry. This gives a prediction that incidents of proximity across regions and industries should be positively related with each other.[19]

Importantly, the findings from the model in which distance is explained reveal that the high share of highly educated employees with technical qualifications in an acquiring company can support M&As that occur across distant locations (Table 4, model 3).[20] The explanation for this pattern is that those acquiring companies have more capacity to monitor target companies. In particular, one can argue that highly educated employees with technical qualifications are better equipped to monitor potential targets, because innovative companies that are often potential targets carry out highly complex research efforts that are difficult to evaluate and monitor without specific technical knowledge. In other words, the EDU1 variable is, therefore, a better measure for ability to monitor than the EDU2 variable, which does not contain employees with technical qualifications.[21] Our reading of this evidence is that the difficulties of monitoring target companies tend to compress the distance between the acquiring company and the target company, as pointed out in the section on theory.

There is some evidence for the view that geographical closeness is less a characteristic for acquiring companies that consist of a number of establishments (Table 4, model 3). An explanation for this is that multi-establishment companies can gather and process information from a broader geographical scope more easily. This may allow them to be involved in distant M&As.

The results from the estimation of models that include financial variables are reported in the Appendix (section c). The indebtedness (DEBT) of the acquiring firm or the target firm seems to have no impact on the geography of domestic M&As (see the Appendix, section c, models 1–3). The results concerning the

impact of the PROFITS variable give some evidence that those targets that are in good shape in terms of profitability are acquired across distant locations (see the Appendix, section c, models 1–3). An important finding is that the fixed tangible assets of the target firm (FIXED) negatively contribute to the likelihood of geographical closeness in M&As (see the Appendix, section c, models 1 and 2). This result may arise because it is relatively easy to monitor the quality of fixed tangible assets across distant locations. Thus, the estimated effect of fixed tangible assets on the geographical closeness of M&As does not support the hypothesis that a distant location seriously hinders the use of common assets in a post-merger situation that was discussed in the section on theory.

Finally, the impact of R&D stock on the economic geography of domestic M&As is considered (see the Appendix, section d). The number of observations substantially decreases owing to the size of R&D surveys conducted by SF. The most interesting finding is that the acquirer's large R&D stock decreases the likelihood of M&As that occur within the same region (see the Appendix, section d, models 1–3). This may reflect the strengthened monitoring capacity of acquiring companies. In addition, it may hint at the fact that in these cases acquiring firms possess knowledge capital whose joint utilization is not geographically restricted after an M&A.

CONCLUSIONS

This paper investigated M&As from the regional perspective. The Finnish evidence reveals that geographical closeness is a characteristic of great importance for domestic M&As. This means that a great number of M&As occur within narrowly defined regions. There is, therefore, a strong home bias even in domestic M&As; companies prefer to seek partners from their home regions. Interestingly, domestic M&As reinforce the core–periphery dimension. It was shown that firms in the province of Uusimaa, where most of the economic activity is located, are gradually gaining control of firms located in the rest of the country in net terms by conducting M&As. By this means, domestic M&As contribute to the redistribution of control power over regions.

The firm-level factors that have a potential influence on the geography of M&As were explored by using matched data. The results show that larger companies can overcome geographical boundaries more easily, and domestic M&As are more likely to occur in regions that contain a great number of companies. The most interesting result that flows from matched firm-level data is that strong ability by an acquiring company to monitor the target (measured by the knowledge embodied in human capital or in R&D stock) can support M&As that occur across distant locations. This result is consistent with the theoretical considerations based on asymmetric information and the capacity to monitor as key determinants of the observed geographical closeness of M&As.

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APPENDIX

(a) Descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum
Dependent variables				
PROXIMITY (for NUTS4 regions)	0.444	0.497	0	1
PROXIMITY (for NUTS3 regions)	0.533	0.499	0	1
DISTANCE	109.841	138.478	0	1053.593
Explanatory variables				
VINTAGE (acquirer)	11.617	6.164	1	26
VINTAGE (target)	11.893	6.213	1	26
MULTI (acquirer)	0.352	0.478	0	1
MULTI (target)	0.625	0.484	0	1
TURNOVER (acquirer)	16.525	2.163	9.213	22.738
TURNOVER (target)	15.283	2.137	7.323	22.406
DEBTS (acquirer)	0.604	0.274	0	5.000
DEBTS (target)	0.647	0.440	0	6.474

(Table continued)

Appendix (a). Continued

Variable	Mean	Standard deviation	Minimum	Maximum
PROFITS (acquirer)	−0.154	3.304	−78.854	1.256
PROFITS (target)	−0.127	2.664	−60.667	1.544
FIXED (acquirer)	15.013	2.545	6.111	22.018
FIXED (target)	13.539	2.816	5.925	22.176
EDU1 (acquirer)	0.072	0.131	0	1
EDU1 (target)	0.061	0.124	0	1
EDU2 (acquirer)	0.038	0.090	0	1
EDU2 (target)	0.026	0.073	0	1
PATENTS1 (acquirer)	0.664	5.611	0	133
PATENTS1 (target)	0.365	3.769	0	91
PATENTS2 (acquirer)	0.253	2.567	0	57
PATENTS2 (target)	0.153	1.891	0	58
R&D (acquirer)	0.971	1.396	0	7.543
R&D (target)	0.744	1.336	0	6.706
AGGLOMERATION for NUTS4 regions (acquirer)	−0.480	1.427	−5.574	2.670
AGGLOMERATION for NUTS4 regions (target)	−0.890	1.495	−5.866	2.670
AGGLOMERATION for NUTS3 regions (acquirer)	−0.968	1.366	−4.973	0.505
AGGLOMERATION for NUTS3 regions (target)	−1.340	1.382	−4.973	0.505
SIZE for the NUTS4 regions (acquirer)	7.964	0.505	2.485	9.931
SIZE for the NUTS4 regions (target)	7.904	0.541	2.485	10.377
SIZE for the NUTS3 regions (acquirer)	9.023	0.517	7.331	11.440
SIZE for the NUTS3 regions (target)	9.118	0.594	7.331	11.440
SAMEINDU	0.521	0.500	0	1

(b) Computational probabilities of intra-regional M&As

Suppose there are N firms in the whole country and that the number of firms in the subregion i is n_i. Then $\sum_i n_i = N$. The number of intra-regional combinations of two firms in subregion i is $\binom{n_i}{2}$, which is denoted by $c(n_i)$. The total number of combinations in the population is $\binom{N}{2}$. This figure is denoted by $c(N)$. The computational probability, denoted by $p(n)$, for such random M&As in which both parties are located in the same subregion, can be approximated by the formula:

$$\frac{\sum_{i=1}^{k} c(n_i)}{c(N)}$$

$p(n)$ has been calculated annually. The larger the number of subregions and the more symmetrically the firms are distributed over the subregions, the lower is $p(n)$. At the highest $p(n)$ approaches 0.5 (when there are only two subregions of equal size and the number of firms is large). Calculating $p(n)$, all those firms whose turnover exceeds FIM3 million in all subregions of Finland have been taken into account based on the Business Register by Statistics Finland (SF). This is the same limit as that used by *Talouselämä* magazine in its listings of M&As.

(c) Estimation results, 1989–2000

	Model 1		Model 2		Model 3	
	Probit model (dependent variable: PROXIMITY for NUTS4 level)	*t*-Statistics	Probit model (dependent variable: PROXIMITY for NUTS3 level)	*t*-Statistics	Tobit model (dependent variable: DISTANCE)	*t*-Statistics
MULTI (acquirer)	−0.052	−1.22	−0.093**	−2.22	35.107**	2.92
MULTI (target)	−0.031	−0.77	−0.039	−0.98	18.216	1.65
TURNOVER (acquirer)	−0.053**	−3.90	−0.041**	−3.13	9.203**	2.45
TURNOVER (target)	0.039**	2.80	0.039**	2.85	−9.794**	−2.51
DEBTS (acquirer)	−0.045	−0.65	−0.120*	−1.72	−1.032	0.05
DEBTS (target)	−0.035	−0.81	−0.010	−0.26	10.477	0.94
PROFITS (acquirer)	−0.003	−0.73	−0.001	−0.13	−0.546	−0.44

(*Table continued*)

Appendix (c). Continued

	Model 1		Model 2		Model 3	
	Probit model (dependent variable: PROXIMITY for NUTS4 level)	*t*-Statistics	Probit model (dependent variable: PROXIMITY for NUTS3 level)	*t*-Statistics	Tobit model (dependent variable: DISTANCE)	*t*-Statistics
PROFITS (target)	−0.078**	−2.04	−0.071*	−1.81	3.476*	1.74
FIXED (acquirer)	0.015	1.29	−0.012	−1.17	−3.670	−1.24
FIXED (target)	−0.026**	−2.53	−0.024**	−2.43	4.716	1.63
AGGLOMERATION (acquirer)	0.045**	4.26	0.059**	3.38	4.277	1.23
AGGLOMERATION (target)	0.193**	13.97	0.258**	14.95	−61.539**	−18.30
SIZE (acquirer)	0.285**	7.66	0.234**	5.23	−4.538	−0.49
SIZE (target)	−0.01	−0.22	0.173**	4.33	3.422	0.30
Pseudo-R^2	0.34		0.26		0.03	
Log-likelihood	−592.59		−681.80		−6707.41	
χ^2 from the Wald test	608.21**		475.59**		–	
χ^2 from the Likelihood ratio test	–		–		420.86**	
Number of observations	1330		1330		1330	
Number of left-censored observations	–		–		330	

Notes: **(*) Indicates that the parameter estimate is statistically significant at the 5(10)% significance level. Reported *t*-statistics are based on robust standard errors that are heteroscedasticity-corrected. The results for Probit models are reported as marginal effects. All models include year dummies and a constant that are not reported. Log-likelihood is a value of the log likelihood function. The Wald test is a test of the joint significance of the independent variables. The Likelihood ratio test is reported for the same purpose for a Tobit model. These tests are χ^2 distributed. The number of left-censored observations (i.e. the number of zeros) is reported for a Tobit model.

(d) Estimation results, 1989–2000

	Model 1		Model 2		Model 3	
	Probit model (dependent variable: PROXIMITY for NUTS4 level)	*t*-Statistics	Probit model (dependent variable: PROXIMITY for NUTS3 level)	*t*-Statistics	Tobit model (dependent variable: DISTANCE)	*t*-Statistics
VINTAGE (acquirer)	0.005	1.27	0.000	0.05	−2.539**	−2.11
VINTAGE (target)	−0.008**	−2.30	−0.009**	−2.40	1.654	1.54
MULTI (acquirer)	−0.038	−0.63	−0.136**	−2.17	25.228*	1.73
MULTI (target)	−0.075	−1.49	−0.136**	−2.53	47.943**	2.73
TURNOVER (acquirer)	−0.023	−1.39	0.004	0.21	2.008	0.42
TURNOVER (target)	0.030**	2.12	0.021	1.35	−7.381*	−1.73
R&D (acquirer)	−0.067**	−3.56	−0.077**	−3.96	16.140**	3.17
R&D (target)	−0.043**	−2.09	−0.039*	−1.83	6.481	1.12
AGGLOMERATION (acquirer)	0.085**	5.15	0.069**	2.88	−10.805**	−2.41
AGGLOMERATION (target)	0.161**	9.97	0.247**	10.08	−51.230**	−11.46
SIZE (acquirer)	−0.054	−1.19	0.170**	3.04	6.804	0.57
SIZE (target)	0.245**	5.60	0.192**	3.61	18.122	1.39
SAMEINDU	−0.022	−0.52	−0.071	−1.57	18.867	1.52
Pseudo-R^2	0.38		0.26		0.03	
Log-likelihood	−269.15		−345.24		−3624.73	
χ^2 from the Wald test	327.56**		236.35**		–	
χ^2 from the Likelihood ratio test	–		–		216.59**	
Number of observations	678		678		678	
Number of left-censored observations	–		–		130	

Notes: **(*) Indicates that the parameter estimate is statistically significant at the 5(10)% significance level. Reported *t*-statistics are based on robust standard errors that are heteroscedasticity-corrected. The results for Probit models are reported as marginal effects. All models include year dummies and a constant that are not reported. Log-likelihood is a value of the log likelihood function. The Wald test is a test of the joint significance of the independent variables. The Likelihood ratio test is reported for the same purpose for a Tobit model. These tests are χ^2 distributed. The number of left-censored observations (i.e. the number of zeros) is reported for a Tobit model.

NOTES

1. Note that knowledge as a concept is different from information. One either possesses information about something or does not. If one party is aware of a piece of information of which the other party is ignorant, information is asymmetric according to the conventional definition (e.g. MACHO-STADLER and PEREZ-CASTRILLO, 1997). Tacit knowledge is asymmetric by its nature in the sense that tacitness excludes some parties from the information source. According to MORGAN (2004), tacit knowledge, as being person-embodied and context-dependent, is 'sticky' by its location and, therefore, it is not reachable across distant locations. This means that tacitness leads to informational asymmetry in the traditional sense.
2. In the case of the so-called 'merger of equals', monitoring can be considered to be mutual.
3. Interestingly, by focusing on domestic M&As, one can draw strong conclusions about the role of geographical proximity in M&As because there are a number of factors that have an influence on non-domestic M&As such as trade barriers, currency fluctuations and restrictions on foreign investments that support the home bias. Importantly, these obstacles for distant M&As are (largely) absent in domestic transactions. Using that as a basis, one could a priori expect that geographical proximity is not a relevant factor in the determination of domestic M&As.
4. Firms are usually regarded as risk-neutral actors in the economic literature.
5. M&As accomplished by investment banks' intervention may not be based on anything but publicly available data. However, this point is not particularly relevant in the present case because investment banks are not usually involved in the conduct of domestic M&As in Finland.
6. MARKUSEN (2002) presents similar ideas in the context of multinational firms.
7. BÖCKERMAN and LEHTO (2003) present a theoretical model along these lines.
8. There is a separate literature within economics that deals with international investments and the behaviour of multinational firms (e.g. MARKUSEN, 2002), which does not consider the regional pattern of domestic M&As.
9. The only major restriction is that *Talouselämä* magazine does not keep a record of M&As in which either the acquirer's or the target's turnover is less than FIM3 million.
10. There is a practical reason to focus on domestic M&As. SF does not maintain records for foreign companies. This means that the empirical analysis of non-domestic M&As based on firm-level data is impossible within the current Finnish context.
11. The regional divisions of Finland are based on the various NUTS regions stipulated by the European Union. Three kinds of NUTS regions are used in this paper. The NUTS5 regions correspond to the Finnish municipalities. (The total number of these regions is 446.) The so-called NUTS4 regions consist of commuting areas. The number of these regions is 85. In addition, there are NUTS3 regions that correspond to the provinces of Finland. The number of these regions is 20. The estimation results for the NUTS5 regions are not reported because the AGGLOMERATION variable is not available for the NUTS5 regions. The results for the NUTS5 regions, however, are reported in a working paper version (BÖCKERMAN and LEHTO, 2003).
12. The point of location of a firm within a municipality is based on the concentration of economic activity within that particular municipality as defined by SF. For this reason, for instance, the distance between the municipalities of Vantaa and Helsinki in Southern Finland is 12 km, despite the fact that these municipalities are located near to one another and they share elements of common borders.
13. The descriptive statistics for the AGGLOMERATION variable and the SIZE variable may differ for acquiring and target companies because acquirers and targets are not symmetrically distributed across regions.
14. As stressed by LEHTO and LEHTORANTA (2004), M&A is an appropriate mean to transfer knowledge when trading or contractual mechanisms are ruled out.
15. The procedure to calculate the R&D stock variable is explained in detail by LEHTO and LEHTORANTA (2004).
16. GRINBLATT and KELOHARJU (2001) report that geographical distance matters for stockholding in Finland. Thus, investors prefer to hold and trade stocks headquartered in nearby locations to those in more distant locations.
17. The kernel density estimate is a non-parametric histogram presentation of the distribution. The Epanechnikov is the applied kernel density estimate. It has the property of being the most efficient in minimizing the mean integrated squared error. The non-parametric smoothing of the observations by the Kernel density estimate explain the small negative values for the distance observed on the left-hand side of the figure. DINARDO and TOBIAS (2001) provide a survey of non-parametric density and regression estimation.
18. *Talouselämä* magazine reports a plant-level measure of targets. However, the unreported results based on the firm-level measure obtained from the Business Register by SF carry the same conclusions.
19. This conclusion refers to Bertrand competition.
20. Tobit models are estimated to take into account the fact that there are many zeros in the DISTANCE variable. These are the cases in which the acquiring and the target companies are located in the same municipality.
21. The variable that captures the share of highly educated employees (excluding the number of highly educated with technical qualifications) suggests the opposite impact (Table 4, Model 3), but it is, however, not statistically significant at the standard 5% level.

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