Exploring Patterns of Upstream Internationalization: The Role of Home-region 'Stickiness'

Alan Muller and Rob van Tulder

ERIM REPORT SERIES RESEARCH IN MANAGEMENT	
ERIM Report Series reference number	ERS-2005-084-ORG
Publication	December 2005
Number of pages	35
Persistent paper URL	
Email address corresponding author	rtulder@rsm.nl
Address	Erasmus Research Institute of Management (ERIM)
	RSM Erasmus University / Erasmus School of Economics
	Erasmus Universiteit Rotterdam
	P.O.Box 1738
	3000 DR Rotterdam, The Netherlands
	Phone: + 31 10 408 1182
	Fax: + 31 10 408 9640
	Email: info@erim.eur.nl
	Internet: www.erim.eur.nl

Bibliographic data and classifications of all the ERIM reports are also available on the ERIM website:
www.erim.eur.nl

ERASMUS RESEARCH INSTITUTE OF MANAGEMENT

REPORT SERIES
RESEARCH IN MANAGEMENT

ABSTRACT AND KEYWORDS	
Abstract	Recent work has emphasized the importance of regional strategies downstream, adding new depth to the debate on 'globalization'. This paper adds to the debate by exploring the regional dimension upstream for a sample of Triad-based Fortune 500 firms. We find support for our hypothesis that MNEs with higher levels of value-added upstream are relatively constrained in their ability to shift that activity outside the home region due to its strategic significance to home-region stakeholders.
Free Keywords	Internationalization, Home-region Stickiness, Region-based Strategies, Upstream Activities, MNEs
Availability	The ERIM Report Series is distributed through the following platforms: Academic Repository at Erasmus University (DEAR), DEAR ERIM Series Portal Social Science Research Network (SSRN), SSRN ERIM Series Webpage Research Papers in Economics (REPEC), REPEC ERIM Series Webpage
Classifications	The electronic versions of the papers in the ERIM report Series contain bibliographic metadata by the following classification systems: Library of Congress Classification, (LCC) LCC Webpage Journal of Economic Literature, (JEL), JEL Webpage ACM Computing Classification System CCS Webpage Inspec Classification scheme (ICS), ICS Webpage

Exploring patterns of upstream internationalization:
The role of home-region 'stickiness'

Alan Muller*
Assistant Professor
Department of Business Studies, room E5.33
Faculty of Economics and Econometrics
University of Amsterdam
Roetersstraat 11
1018 WB AMSTERDAM
The Netherlands
Tel: +31-20-525-7359
Fax: +31-20-525-4182
A.R.Muller@uva.nl

Rob van Tulder
Professor
Department of Business-Society Management
Rotterdam School of Management
PO Box 1738
3000 DR ROTTERDAM
The Netherlands
Tel: +31-10-408-1923
Fax: +31-10-408-9012
rtulder@rsm.nl

*corresponding author

Abstract

Recent work has emphasized the importance of regional strategies downstream, adding new depth to the debate on 'globalization'. This paper adds to the debate by exploring the regional dimension upstream for a sample of Triad-based Fortune 500 firms. We find support for our hypothesis that MNEs with higher levels of value-added upstream are relatively constrained in their ability to shift that activity outside the home region due to its strategic significance to home-region stakeholders.

Introduction

In recent work, Rugman and Verbeke (2004, 2005) show that regionally oriented strategies predominate among the world's largest MNEs and thus that the regional component of MNE strategy and structure deserves more attention. In seeking explanations for strategies that defy the apparent 'logic' of global strategies, they suggest that the factors that shape location choices and geographic diversification strategies must have a regional character (Rugman and Verbeke, 2005).

Such factors have essentially been introduced as location advantages that exist at the regional level and emerge when firms can more easily exploit their own advantages throughout the region as a consequence of similar culture and tastes, or low geographic, economic, administrative and institutional distance (Ghemawat, 2001). As a result, gains can be captured when linking investments can be made at the regional level to meld existing firm-specific competitive advantages and foreign-location advantages. Together these factors pose a wealth of barriers to entry for 'regional outsider' firms, and, conversely, their absence within regions pose advantages for 'regional insider' firms.

In addition, Rugman and Verbeke (2004) argue that such barriers for regional outsider firms are greater for activities at the 'customer end' (branding, marketing and retail) than activities at the 'back end' (sourcing and production) for two reasons. First, they argue that firm advantages related to upstream activities are less 'location-bound' than firm advantages related to downstream activities. Second, the costs incurred to develop firm-specific advantages at the customer-end are 'one-sided', meaning that the firm makes such investments without any certainty of commitment from the customer, while such investments at the back-end are relatively 'many-sided' (i.e., spread out over multiple actors such as suppliers, contractors or venture partners). Both arguments suggest that upstream activities should be more geographically dispersed than downstream activities. In more recent work,

however, Rugman and Verbeke (2005) suggest that some evidence does exist for the importance of home-region production networks on the upstream side. This picture will only become clearer if the analysis is 'unbundled into upstream and downstream components' (Rugman and Verbeke, 2004: 14).

Critically evaluating the 'region-boundedness' of upstream activities centers on understanding the importance of those activities to home-region stakeholders. We argue that the 'many-sidedness' of upstream investments in the *home* region constrains MNEs in their ability to relocate those activities outside the home region, particularly where those activities involve high levels of value added. While knowledge-intensive activities and vertically integrated production are increasingly faced with the potential for greater global mobility, they remain vitally important to home-region stakeholders such as governments, suppliers labor and research institutes. In such cases, relocation decisions are seen as a threat to the 'many-sided' investments shared by those stakeholders. This type of 'stickiness' (cf. Markusen, 1999) is rooted in the MNE's accountability to home-region stakeholders (Kolk, 2005) and is largely the result of co-evolutionary processes, particularly through regional integration (Volberda and Lewin, 2003; Rugman, 2005).

We explore the issue of stickiness by considering the knowledge intensity of upstream activities and the MNE's ability to substitute those activities across regions based on the potential for cross-border vertical integration. With respect to knowledge intensity, Benito *et al.* (2003) argue that in particular higher value-added activities such as R&D are stickier than lower value-added activities as a result of the 'linkages with suppliers, customers and domestic institutions' (p. 445), which have likely taken many years to evolve. With respect to the potential for cross-border integration, we argue that a firm's ability to arbitrage across regions is determined in large part by its ability to conduct vertical FDI, particularly in response to labor cost differentials (Ghemawat, 2003). As such 'stickiness', and the

4

unbundling of the region-boundedness of upstream versus downstream activities, depends on the motives for and nature of extra-regional activity.

The paper is organized as follows. First, we discuss the regional dimension of strategy and structure as addressed by the international business and strategy literature, focusing on the co-evolutionary processes at the regional level. We then formulate hypotheses on the relationship between knowledge intensity, vertical integration and the 'region-boundedness' of upstream activities relative to downstream activities. These hypotheses also have implications for the intra-versus extra-regional dimensions of firm structure, which leads to additional hypotheses on the way in which MNEs organize their subsidiary networks both inside and outside their home region. These hypotheses are tested for a sample of 155 Fortune Global 500 firms using data on the geographic spread of sales and production, as well as data on the location of each firm's subsidiaries and each subsidiary's place in the corporate hierarchy.

Theory development and hypotheses

The regional dimension of strategy and structure

Recent explanations for the cause of a predominant home-region orientation under the world's largest MNEs have thus far centered on extra-regional entry barriers, a lack of capabilities at the firm level, or even the possibility of economic optimality being obtained at the home regional level and not the global level. Host-region barriers to entry are rooted in the relatively greater geographic, economic, administrative, institutional and cultural distance (Ghemawat, 2001; Kostova and Zaheer, 1999) between Triad regions than within Triad regions, or an MNE's inabilities to exploit firm-specific advantages (FSAs) across multiple regions (Rugman and Verbeke, 2005). Similarly, if firms do not possess the strategic

advantages required to exploit their firm specific advantages in a host region, strategies aimed at the home region can be economically more viable than 'global' strategies (Rugman, 2005; Schlie and Yip, 2000).

A broad range of literature addresses the regional dimension of strategy and structure both implicitly and explicitly. Differences across Triad regions underpin many studies of strategy (Prahalad and Doz, 1987; Bartlett and Ghoshal, 1989) and internationalization (Ohmae, 1985; Rugman, 2000; Geringer *et al*., 1989). Organizational characteristics such as coordination and control are often compared at the Triad level (Hodgetts and Greenwood, 2001; Yeh and Sagafi-nejad, 1987). It has also been noted that firms tend to look for capital primarily within their home regions (Rugman and Verbeke, 2005), and that firm directorates have been shown to 'interlock' within the home region (Ruigrok *et al*., 1999). The literature on regional-level convergence in 'business systems' (Whitley, 1999) and Triad-level differences in 'industrial complexes' (Ruigrok and Van Tulder, 1995) highlight regional differences in the configurations of stakeholders within which firms are embedded.

More recently, it has been suggested that the role of 'co-evolution' in shaping firm strategies has taken on an increasingly regional character, particularly as a result of regional integration initiatives in the early 1990s (Rugman, 2005; Benito *et al*., 2003). The theory of co-evolution argues that firms face structural inertia when confronted with challenges of strategic renewal (Volberda and Lewin, 2003). As strategy evolves over time and in conjunction with multiple stakeholders such as governments, labor, suppliers, customers, and financiers, the strategies of the MNE and such stakeholders become interwoven and thus interdependent, which reduces the firm's strategic latitude.

Originally, these relationships form the foundations of an MNE's competitive advantage. Yet over time, MNEs and the stakeholders around them become increasingly locked into this web. The more companies are 'coupled to a prevailing organizational

template', the less likely they are to seek change (Flier *et al*., 2003: 2166). The web of relationships in which firm strategies evolve can thus be seen as a source of structural inertia that constrains firms in their room to maneuver geographically and represent forces that are distinct both from purely economic incentives to stay, as well as extra-regional barriers to entry. This inertia can be understood as a form of 'stickiness' that prevents hyper-mobility in an increasingly 'slippery production space' (Markusen, 1999).

The 'stickiness' of production space and technology space

Production space is considered increasingly 'slippery' under the assumption that the motive to internationalize is a given (cf. Tallman and Yip, 2001) and that MNE production strategies, and thus strategies for adding value, are relatively homogenous. Yet MNEs internationalize due to various reasons: access to new markets, access to natural resources, potential efficiency gains through e.g. cheap labor or proximity to strategic assets such as knowledge (Dunning, 1993). As more and more countries link in to the global economy and try to attract FDI through cost advantages (UNCTAD, 1998), in particular efficiency-seeking investments are increasingly faced with a potentially slippery space.

The increasing availability of knowledge and higher skill levels in a larger number of host countries is also linked to the rapid growth of strategic asset seeking FDI exemplified by the growing dispersion of R&D (Rugman and Verbeke, 2003). Therefore, not only production space, but also technology space is increasingly slippery as know-how is more readily available in host locations, leading to enhanced possibilities for tapping into new knowledge, improving local responsiveness, developing an international division of labor with respect to R&D and costs-sharing across multiple locations (Contractor *et al*., 2003; Cheng and Bolon, 1993). The traditional view, on the other hand, has held that R&D activities remain centralized due to their potential for economies of scale (Rugman, 1981).

More recently, Benito *et al*. (2003) argue that in particular higher value-added activities (such as R&D) are 'stickier' than lower value-added activities due to the 'linkages with suppliers, customers and domestic institutions' (p. 445), which have likely taken many years to evolve. From this it follows that the 'many-sidedness' of investments discussed by Rugman and Verbeke (2004) is perhaps not so much a strictly 'upstream' phenomenon, but rather a reflection of the strategic significance of particular value-adding activities for not only the MNE, but also for the stakeholders in its co-evolutionary web.

That strategic significance of adding value can be linked to a firm's motives for inter-regional FDI, and whether that FDI *substitutes for* or *complements* existing home-region activity (cf. Slaughter, 2003). For example, efficiency seeking and strategic-asset seeking can be linked to *substitutive* investment strategies, by which value added activities are shifted through geographic space (e.g. shifting production or R&D in the home region to a low-cost site offshore). Market seeking and natural resource seeking strategies, on the other hand, can be linked to *complementary* investment strategies where value-adding activities are expanded through geographic space. This is because investment is more likely to be 'horizontal', by which the firm's activities in the host location are essentially a replication, and thus expansion, of existing activities (Slaughter, 2003; Markusen and Maskus, 2001; Caves, 1996).

A shift of production abroad in response to low-cost labor or the ability to offshore knowledge-intensive R&D jeopardizes the many-sided investments made by the home-region stakeholders to whom the rents of that production accrue. Labor, suppliers, cluster partners and governments are all affected by the 'leak' of jobs, tenders, tax revenue and technology outside the region (Ruigrok and Van Tulder, 1995). Expanding production abroad (to service local markets or to tap into location-bound resources such as oil) tends to complement, and not substitute for, existing activities. Complementary investment strategies may in fact

increase the value of existing home-region investments by spreading fixed costs (Contractor *et al.*, 2003) and increasing returns to capital (Slaughter, 2003), and thus be encouraged by home-region stakeholders.

To illustrate, if an MNE in e.g. the computer industry closes down chip plant C in California and shifts production to China, plant C is unlikely to be replaced with another and the redundant workers in Palo Alto may not shift seamlessly into new employment. The computer manufacturer's decision, regardless of its efficiency-based logic, still poses a problem for employees, governments, local communities, suppliers and other location-bound stakeholders affected by spillovers. In e.g. retail, on the other hand, internationalization is related to investment motives that do not necessarily compromise the interests of home-region stakeholders or affect home-region supply and demand relationships (Slaughter, 2003). Market seeking and natural resource seeking investments are less likely to substitute for commitments at home, and are at the same time more likely to be 'one-sided' investments made by the MNE alone (Rugman and Verbeke, 2004).

Stickiness and the unrealized potential for geographic dispersion upstream

The multi-stakeholder investments associated with higher value-added activities, which reflect the human, physical and financial capital embedded in those activities, are implicitly devalued when existing higher value-added activities in the home region are substituted with activities outside the region. Conversely, such stickiness may be tempered in cases where extra-regional investment is perceived as complementary to existing investments. Paradoxically, therefore, it seems that precisely those industries in which upstream activities theoretically have the most to gain from 'slipperiness' are subjected to the highest levels of home-region stickiness, and thus most constrained in their ability to arbitrage effectively by substituting activities between regions.

Benito *et al*. (2003) point out in this regard that managers, in addition to being boundedly rational, are cognizant of the substantial costs involved in relocation. In their reluctance to pursue radical change, firms may maintain a theoretically sub-optimal status quo. At a higher level of aggregation, that sub-optimal status quo at the firm level translates into the state of 'semi-globalization' observed by Ghemawat (2003). The proposed stickiness of knowledge-intensive and vertically-integrated activities upstream[1] leads to the following hypotheses:

> *Hypothesis 1a: Upstream activities in knowledge-intensive MNEs are*
>
> *more region-bound than the upstream activities of MNEs*
>
> *characterized by lower levels of knowledge intensity.*

> *Hypothesis 1b: Upstream activities in highly vertically integrated*
>
> *MNEs are more region-bound than the upstream activities of MNEs*
>
> *characterized by lower levels of vertical integration.*

Upstream stickiness can be seen as a form of 'unrealized potential' for geographic dispersion in relation to the existing higher geographic dispersion of downstream activities. As firms expand the geographic scope of their activities (either upstream or downstream), they gain international experience, develop new managerial capabilities, and tap into networks of local stakeholders. The greater that dispersion, the greater the firm's opportunities to capitalize on that dispersion and enhance performance (Goerzen and Beamish, 2003). This successful deployment of firm-specific advantages means that firms are able to make the linking investments needed to meld firm advantages and location advantages (Rugman and Verbeke, 2005). A greater geographic dispersion of downstream activities

should help lay the groundwork for a greater geographic dispersion of upstream activities, and thus the former provides a 'benchmark' against which the latter can be measured.[2]

This supposition could be countered by the argument that upstream location advantages are more location-bound than downstream location advantages (Rugman and Verbeke, 2004). Yet if firms from each Triad region are able to build coherent and successful upstream networks in their own respective regions, this suggests that upstream location advantages are present in all regions and could therefore theoretically be tapped into by firms from other regions as well. From the stickiness perspective, this extra-regional potential is underutilized not because the location advantages are not present or because firms do not possess the firm-level advantages necessary to develop those upstream activities outside the home region. It remains underutilized because firms are locked in to upstream networks at home (or, conversely, are 'locked out' of those extra-regional networks for the same reasons).

Over time, firms can develop such advantages in the form of managerial capabilities and the ability to make the linking investments required to tap into extra-regional upstream networks. As these advantages are developed, firms will be more successful in shifting higher value-adding activities outside the home region. The more this occurs, the less dependent firms become on their home region and, consequently, the less locked in they will be to the interests of home-region stakeholders. We argued above that for firms in non-sticky industries, the dispersion of upstream activities can more closely mirror the dispersion of downstream activities because the extra-regional deployment of such activities is not seen as a threat to existing home-region activities. Here we argue that the same is likely to hold for MNEs in sticky industries which have already proven successful at developing upstream activities outside the home region. From this we hypothesize the following:

> *Hypothesis 2a: The gap between the home-region boundedness of*
>
> *upstream and downstream activities of firms in knowledge intensive*

industries is smaller when upstream activities are more extra-regional.

Hypothesis 2b: The gap between the home-region boundedness of upstream and downstream activities of firms in vertically integrated industries is smaller when upstream activities are more extra-regional.

Stickiness and MNE structure

Even though higher levels of extra-regionality can reduce the constraints formed by home-region stakeholders, knowledge intensity and vertical integration will, *ceteris paribus*, always be associated with a greater gap between extra-regionalization upstream and extra-regionalization downstream. If upstream activities are in all cases relatively region-bound for knowledge intensive and vertically integrated MNEs, this must have implications for MNE structure. Rugman and Verbeke (2004) argue that setting up upstream activities in host locations is facilitated by the investments of local stakeholders such as governments and suppliers (i.e., 'many-sidedness'). We propose that this many-sidedness should be reflected in higher host-location embeddedness. This means that firms that are constrained in the relocation of higher value-adding activities outside the home region will necessarily be less embedded in host locations outside the home region.

Bruinsma *et al.* (1998) have argued in this same vein that relocation-based (i.e., substitutive) internationalization strategies are linked to lower host-country embeddedness levels. Similarly, local responsiveness pressures (Prahalad and Doz, 1987) are best reflected in horizontal FDI patterns, by which both upstream and downstream activities are situated in the host location in order to link production to local needs. From the local responsiveness

argument follows that embeddedness should be higher for 'multidomestic' (i.e., 'multinational') strategies, where competitive advantage rests on exploiting the downstream, than for 'global' strategies based on segmented, rationalized and integrated internationalization of upstream activities (Harzing, 2000; Bartlett and Ghoshal, 1992).

Harzing (2002) tied knowledge intensity, vertical integration and embeddedness together in research on international entry modes. She demonstrated that 'global' (i.e. integrated / vertical) MNEs are more likely to enter host markets through greenfield investments, while 'multidomestic' (i.e. locally responsive / horizontal) MNEs are more likely to acquire existing firms. When existing firms are acquired, they are generally afforded higher autonomy levels, which can be seen as part of the local responsiveness strategy of 'multidomestic' MNEs. An existing firm is more likely to have long-established ties to its local economy, and thus be considered more locally embedded, than a subsidiary established through greenfield investment. Harzing (2002) further showed that R&D intensity was related to a preference for greenfield investments over acquisition of existing local firms, from which follows that both knowledge intensity and vertical integration are negatively related to local embeddedness, despite evidence that MNE affiliates are now more deeply embedded in host country innovation systems (Rugman and Verbeke, 2003). As a result, we hypothesize the following:

> *Hypothesis 3a: Knowledge-intensive MNEs will exhibit lower levels of host-region embeddedness than less knowledge intensive MNEs.*

> *Hypothesis 3b: Highly vertically-integrated MNEs will exhibit lower levels of host-region embeddedness than less vertically-integrated MNEs.*

Methodology

Data and design

To test the hypotheses developed above, we collected data (for the year 2001/2002) on the geographic dispersion of sales, assets as well as all the majority-controlled subsidiaries for 147 manufacturing firms. The sample represents all Triad-based firms from the top 200 of the Fortune Global 500, excluding financial service firms and firms with no identifiable extra-regional assets, sales or subsidiaries. Given the home-region emphasis of the study, the decision to analyze only Triad firms was taken to reduce potential 'noise' from a relatively small group of non-Triad firms spread across different home regions. The firms in the final sample were evenly spread across the triad, with 43 based in North America, 56 in Europe and 48 from Asia. Together these 147 firms controlled 36,776 subsidiaries worldwide (majority owned) and accounted for over $6 trillion in assets and sales.

The analysis is built up in two steps. In the first step we use a limited OLS regression model (N=124) to explore the relationship between knowledge intensity, vertical integration and the relative region-boundedness of upstream versus downstream activities (Hypotheses 1a and 1b, and 2a and 2b). The reduced N in the first stage is the result of log-transforming the RND variable (see below), by which all cases with a '0' value in the original RND variable returned as undefined after transformation. Using the predicted values generated by the first regression, we estimate an additional regression model to explore the relationship between our 'stickiness' proxy and host-region embeddedness levels (Hypotheses 3a and 3b). Since the results of the first step show that stickiness has an explicit sector-specific character, we also cluster firms by sector to distinguish between industries subject to high stickiness levels and those subject to low stickiness levels. A regression using a sector-specific, dichotomous stickiness variable ('high' or 'low') is also used in the second step as a dummy

variable to explore the relationship between stickiness and embeddedness for the full sample (N=147).

Variables and methods

The measures are based on the geographic decomposition of assets and sales, drawn from company annual reports, and subsidiary data drawn from the Dun & Bradstreet 'Who Owns Whom' Database for the year 2002. All three are commonly used to develop indicators of internationalization at the firm level (Sullivan, 1994; Goerzen and Beamish, 2003; Ruigrok and Wagner, 2003; Delios and Beamish, 2005). Since geographic segmentation differs across firms, the segmentation of assets and sales data as reported in the annual report was reconfigured to reflect a division between sales and assets in the home region and those outside the home region. This reconfiguration was used to measure extra-regionality of upstream and downstream activities.

Upstream activities are proxied by assets, with extra-regional upstream activities (XUP) defined as the percentage of total assets outside the home (geographic) region. The location of a firm's assets forms an indication of the location of a firm's productive capacity (UNCTAD, 1997). Downstream activities are proxied by sales by destination, with extra-regionality of downstream activities (XDOWN) defined as the percentage of sales outside the home (geographic) region. The location of sales by destination is a measure of the location of market penetration, or the locus of consumption (Rugman and Verbeke, 2004). The difference in extra-regionality upstream and downstream (BOUND), representing the stickiness-induced region-boundedness of upstream activities, is calculated as XDOWN minus XUP, such that a higher positive value implies that upstream activities are more region-bound than downstream activities. BOUND is intended to proxy the 'unrealized potential' for extra-regionalization upstream.

Knowledge intensity (RND) is measured as the ratio of R&D expenditure to sales (cf. Kotabe *et al.*, 2002). Vertical integration (DVI) at the firm level was measured as the share of intra-firm sales in a firm's total sales (Harzing, 2000; Kobrin, 1991). For R&D expenditure we used data from 2002, and for DVI by taking the average intra-firm sales-to-total sales ratio for each firm for all years available in the period 1990 to 2002. Since neither R&D expenditure nor intra-firm sales are universally reported in annual reports due to cross-country differences, firm-level discretion and changes over time in accounting regulations (Nobes and Parker, 2000), we used sector averages where values were missing. Sectors were defined comparable to Kolk (2005); the Fortune Industry codes clustered under each sector can be found in the Appendix. As the Appendix shows, there is a high coincidence between the number of firms reporting per sector and the average value of those firms per measure.

The Dun & Bradstreet data in the form of 'corporate trees' allows not only for a geographic decomposition of the subsidiary base, but also the relationships between subsidiaries. Since many subsidiaries are themselves parents to further subsidiaries, each layer of parent-subsidiary relationships within the overall corporate tree can be identified. A longer chain of parent-subsidiary relationships among subsidiaries (and thus a higher number of levels) in a given host country or region is assumed to reflect a higher level of local embeddedness (due to a greater within-organization distance from headquarters and a higher likelihood of local linkages). Extra-regional embeddedness is therefore measured as the average level in the corporate tree of all extra-regional subsidiaries (XEMBED), with high values reflecting higher levels of embeddedness.

We also add a number of controls. We include two size variables based on total sales (SIZE_sales) and the total number of subsidiaries (SIZE_#subs). We consider the average number of subsidiaries per extra-regional host country (SUBPXHOST) to control for the possibility that embeddedness in a given host country is solely a function of the number of

16

subsidiaries in that country (as opposed to a function of the way in which they are organized). To capture the extra-regional dimension using firms' corporate trees, we use the number of subsidiaries outside the home region as a percentage of total subsidiaries (XSUB). The share of extra-regional to total subsidiaries was preferred over alternate measures such as the entropy index used by Delios and Beamish (2005), since the entropy index is weighted for the number of subsidiaries per host country. As such it is too much of a composite variable, being highly correlated with the total number of subsidiaries, the embeddedness measure and the number of subsidiaries per host country. Triad-region dummies were included to account for differences by region of origin. No sector dummies were included since the knowledge intensity and vertical integration measures capture the relevant sector effects. Where variables exhibited non-normality, they were transformed either through log-transformation (XEMBED, SIZE_sales, SIZE_#subs) or by taking the square root (XSUB, SUBPXHOST).[3] Descriptives and correlations for the sample are given in Table 1.

TABLE 1

Results

In the first step of the analysis, the gap between extra-regionality upstream and downstream (BOUND) was regressed on the degree of vertical integration (DVI) and knowledge intensity (RND) to test Hypotheses 1a and 1b. Since the correlation matrix and the Appendix show that DVI and RND are themselves correlated, an interaction effect was included to reflect the assumption that the highest stickiness levels are found when DVI and RND levels are both high. Two home-region dummies were included for Europe and Asia, with North American MNEs being the reference category. The extra-regionalization of upstream activities (XUP) was included to test Hypotheses 2a and 2b. We mean-centered the interactor variables (DVI and RND) before calculating the interaction in order to minimize the risk of multicollinearity

(Murray *et al.*, 2005). The regression was performed blockwise in order to best assess the contribution of different variables as well as possible multicollinearity problems (Law *et al.*, 2003). The results are given in Table 2.

TABLE 2

Table 2 shows that the coefficients remain stable as each block is added and the increases in explanatory power are significant at each block. Variance Inflation Factors (VIFs) and condition index are low (ranging from 1.2 to 1.7 and below 20, respectively), indicating no problems of multicollinearity. The residuals were normally distributed and showed no signs of heteroscedasticity. We also ran the model controlling for size using the SIZE_sales variable (not shown here), which itself was insignificant and led to identical results; moreover, it appeared to share its variance with the intercept, generating condition index values well above the acceptable level of 30. Further, the two regional dummies are highly non-significant, indicating that the relationship between upstream home-boundedness on the one hand, and knowledge intensity and vertical integration on the other, is not region specific.

The main effects of vertical integration and knowledge intensity in particular are significant and positively related to the relative home-boundedness of upstream activities. The interaction effect further substantiates the main effects, indicating that the upstream activities are the most home-region bound in relation to downstream activities for firms that are both highly knowledge intensive and vertically integrated. These results support Hypotheses 1a and 1b. Additionally, XUP has the opposite sign as BOUND and was highly significant, meaning that the more extra-regional an MNE's upstream activities become, the smaller the extra-regionalization gap between the upstream and the downstream. This provides support for Hypothesis 2a and 2b. Although it could be argued that as both XUP and

XDOWN approach 100 percent, their potential maximum difference in relative terms decreases, the descriptives in Table 1 show that mean XUP values are below 25 percent with a standard deviation of less than 20 percent, and BOUND averaged at just over three percent, leaving considerable room for high home-region boundedness even at the higher end of XUP values among firms in the sample. Our explanation is that as firms become more successful in shifting upstream activities outside the home region, the constraint formed by home-region stickiness declines.

Not only are knowledge intensity and vertical integration correlated, they are largely a reflection of sector characteristics. A plot of sector means (based on ranks) shows that sectors associated with efficiency-seeking, potentially substitutive vertical FDI (automotive, computers & electronics; chemicals & pharmaceuticals) are the same sectors with high home-boundedness of upstream activities relative to downstream activities (Figure 1). Meanwhile, sectors such as fast-moving consumer goods, retail, utilities and construction, with low levels of R&D and vertical integration, show little to no difference in the extra-regional character of their upstream and downstream activities. Not only does this reflect a lack of stickiness per se; it also reflects high local responsive pressures (often in combination with the production of non-tradeables) that necessitate expansive, horizontal strategies. Petroleum and trading, on the other hand, exhibit above average levels of vertical integration but relatively low levels of knowledge intensity which, according to the model in Table 2, is the more crucial factor in relative upstream home-boundedness. This, in combination with the expansive character of natural resource seeking and market seeking investment, leads to below-average stickiness and hence below-average BOUND values.

FIGURE 1

The characteristics of 'sticky' sectors versus 'non-sticky' sectors as indicated in Table 2 and Figure 1 already suggest support for earlier research that non-sticky (i.e., 'multidomestic') industries, with their relatively low levels of upstream home-region boundedness, are more likely to locate a broader spectrum of value-added levels in host locations and are therefore more locally embedded (Harzing, 2000; Harzing, 2002; Bruinsma *et al*., 1998). We tested this (Hypotheses 3a and 3b) formally through a series of regression models, with extra-regional embeddedness (XEMBED) as the dependent variable (Table 3).

TABLE 3

Given that high knowledge intensity and vertical integration appear to go hand in hand, we no longer distinguished between the two in our investigation of extra-regional embeddedness. The first three models in Table 3 were constructed using the stickiness values predicted by the model in Table 2 (n=124), where the relative home-region boundedness of upstream activities is proxied by a continuous variable. In Model 1 we included all the variables, including home region effects, size (the total number of subsidiaries), the extra-regional share of the total number of subsidiaries and the average number of subsidiaries per extra-regional host country as moderators of overall embeddedness levels. Model 1 shows that Asian MNEs exhibit significantly lower embeddedness levels than European and North American MNEs, and that neither size nor the extra-regional dispersion of the subsidiary base are significant with respect to embeddedness. As might be expected, the number of subsidiaries per extra-regional host country shows a significant positive relationship with the number of levels in the extra-regional subsidiary tree. Even taking that effect into account, the predicted stickiness variable is significant and negative relative to extra-regional embeddedness, supporting the hypothesis that sticky industries are less embedded outside the host region.

20

Models 2 and 3 are reduced versions of Model 1 in order to eliminate any potential effects arising from the moderate bivariate correlations between size, the extra-regional dispersion of subsidiaries and the number of subsidiaries per extra-regional host country shown in Table 1 (even though the VIFs and condition indices were well within acceptable bounds). As a result of removing the variable for subsidiaries per extra-regional host country, both extra-regional subsidiary share and the size variable become significant, as well as the EU dummy, indicating that European MNEs have the highest number of subsidiaries per host country, all else being equal. The Asia dummy shows that Asian firms, on the other hand, have smaller subsidiary bases and fewer subsidiaries per host country outside the home region than both North American and European MNEs. Finally, the home-region boundedness of upstream activities is negatively related to extra-regional embeddedness levels, even in the case of the full model (model 1), in support of Hypotheses 3a and 3b. Models 4 through 6 are new estimations using the dummy-coded variable for stickiness based on the sector split shown in Figure 1, by which the full sample of 147 firms could be analyzed.[4] The results are nearly identical to the results in Models 1 through 3, with significant model values, high R-squared values and satisfactory diagnostics.

Discussion and conclusion

In this paper we have tried to shed new light on the discussion surrounding the apparent prevalence of region-based strategies. Earlier work (Rugman and Verbeke, 2004) has shown that MNEs are relatively region-bound in their downstream activities due to various forms of distance which negatively impact the MNE's ability to fully exploit its firm-level advantages. Others have emphasized the current state of 'semiglobalization' (Ghemawat, 2003), by which incomplete integration actually facilitates arbitrage strategies, i.e. greater spread of vertically-integrated production (upstream) across borders, in response to factor price differentials.

We have argued that in general, upstream activities are less likely to be extra-regional than downstream activities. Our argument centers on the 'many-sidedness' of existing upstream investments by home-region stakeholders as a source of stickiness that constrains the globalization of upstream activities. We contend that such stickiness arises when upstream activities are perceived as strategically sensitive by home-region stakeholders (e.g. governments, suppliers, financiers and labor). We link this sensitivity to knowledge intensity on the one hand, and to the MNE's ability to relocate production abroad through cross-border vertical integration on the other. By relocating knowledge-intensive (high value-adding) activities, firms can spread fixed costs. By relocating production, firms can attain higher efficiency levels. Yet in both cases the shift of such activities abroad can compromise the existing investments in those activities by home-region stakeholders. Additionally, we contend that when firms are constrained in their ability to relocate high value-adding activities outside their home region, they will necessarily be less embedded in extra-regional host locations.

We used regression models to investigate these relationships on a sample of the largest Triad-based MNEs from the Fortune Global 500. Although the data set is relatively small, it encompasses the well-known MNEs at the heart of the globalization debate in both the academic literature and the media, and is compensated for to some extent by its depth, covering in addition to sales and production a combined total of more than 36,000 subsidiaries spread around the globe. The results showed that lagging 'globalization' of upstream activities relative to downstream activities was strongly related to both knowledge intensity and vertical integration, and that the distinction was largely sector-based. As a result the highest levels of relative upstream home-region boundedness were found among firms with high levels of both knowledge intensity and vertical integration, namely in Computers & Electronics, Chemicals & Pharmaceuticals and the Automotive industries. Conversely, the

lowest levels of relative upstream region-boundedness were found among industries associated with lower levels of knowledge intensity and vertical integration, such as Retail, Fast-Moving Consumer Goods and Utilities.

The results also show that even in sticky industries, some MNEs succeed in escaping, to some degree, the stickiness of their home-region stakeholders. This reduced dependency on the home region facilitates the MNE's ability to relocate upstream activities outside the home region, thereby reducing the gap between extra-regionalization upstream and downstream. Yet no matter how successful the MNE is in dispersing its upstream activities in the face of stickiness, knowledge-intensive and vertically integrated MNEs will necessarily be less embedded in host-region locations than MNEs that can increase the dispersion of upstream activities more freely in conjunction with the dispersion of downstream activities.

Our results complement the discussion of host-region factors that induce MNEs to remain focused on their home regions. In addition to economic arguments for a regional orientation, that orientation emerges in part because MNEs are beholden to the interests of home-region stakeholders such as supply chain partners, labor and governments. Such stakeholders, which at the national level have traditionally been (and to some extent remain) sources of competitive advantage, have themselves co-evolved with MNEs, particularly through regional integration over the past two decades. By linking their fates to that of their related MNEs and thus MNE strategies, their strategic perspectives co-evolve with that of the MNE. It is important to recognize that for the MNE strategist, the home-region web of stakeholder relationships may define the 'conceptual box' in which the manager formulates strategy while at the same time forming the 'geographic box' which defines the boundaries of a firm's competitive space, irrespective of the purely economic rationale for a regional orientation.

Firms may be able to develop managerial capabilities to help them step outside the box of their co-evolutionary stickiness. As a consequence, it may in fact be that strategists of long-established MNEs that develop the managerial capabilities to overcome 'institutional idiosyncrasies' (Henisz, 2003) between regions are able to derive new sources of competitive advantage that amount to arbitrage of such idiosyncrasies. More in-depth research is needed to isolate and explore these potential and realized capabilities further. In the same vein, the analysis of the home region component may further unravel the internationalization – performance debate, since the mixed results may have to do with not only the intra- versus extra-regional components of internationalization, but also in relation to stickiness levels. Similarly, if some knowledge-intensive, vertically integrated MNEs succeed to some extent in escaping the gravitational pull of home-region stakeholders, it may be possible to identify some 'threshold' before which upstream activities remain relatively constrained, and after which the upstream-downstream 'globalization gap' begins to close.

Since we argue that regional integration processes are a key driver behind the regional orientation of firms, one might expect the spatial organization of multinational enterprises prior to the rise of the 'new regionalism' (Mansfield and Milner, 2000) to be less regionally oriented, with internationalization strategies over the past 15 years aimed primarily at the home region. If the 'current state' is the result of co-evolution in response to regional integration, this begs the question how internationalization patterns would have looked for this same set of firms in 1990; i.e., more or less globalized? A longitudinal exploration would also shed more light on how and when MNEs in sticky industries are able to breach the stickiness 'threshold', since in the current study that ability is only inferred based on our analysis of current levels of extra-regional dispersion.

It must also be emphasized here that our measure of upstream, as well as our conceptualization of upstream as representing the actual productive activities undertaken by

the MNE itself, excludes outsourcing. When sourcing is included in upstream activities, it may more likely to point towards 'globalization'. But the question remains in that regard whether it is the MNE itself that has become more 'global', or if it is in fact the supplier that has expanded its geographic reach. Even as a case of increased supplier internationalization, the internationalization of outsourcing (cf. Kotabe and Murray, 2004) is worth studying because as MNE stakeholders, suppliers influence stickiness over time through their own strategies.

Finally, stickiness has to be operationalized and measured. Here it is only theorized and empirically inferred through observed differences in internationalization patterns and configurations between two types of firms. The suggestion is that regional integration strengthens stickiness at the regional level by raising the stakes of internationalization for all stakeholders. Yet regional integration processes differ, with European integration the most advanced and Asian integration not yet truly developed. At the same time, the data show that Asian MNEs remain the most home-region bound of all, suggesting a negative relationship between regional integration and home-region stickiness. A further exploration of stickiness and its sources must, therefore, take into consideration differences in home regions.

In the debate on global and regional strategies at the firm level, it is tempting to assume that a regional solution, in the face of the apparently undeniable logic of 'globalization', must therefore be related to some form of economic optimality. In macro-level debates on the optimality of free trade versus protection and other market distortions, it has long been acknowledged that the political reality of vested interests leaves a cognition gap between the real world and our notions of an economically ideal ('globalized') world. Ghemawat (2003) has already pointed out that complete globalization would render the MNE superfluous and obsolete. In that sense, putting the brakes on 'globalization' may very well be in the interest of MNE strategists. As such the predominance of regional strategies may

simply be a reflection of the same geopolitical concerns that play out at the macro level, only

this time at the level of individual firms and their web of relationships.

Notes

---

[1] We consider the decision to internationalize R&D to be distinct from the decision to internationalize production, much as do Markusen and Maskus (2001) in their 'Knowledge-Capital Model' of the MNE.

[2] From incremental perspectives on internationalization such as the Uppsala school and the PLC of Vernon, sales should initially be more international than production until production catches up. From the perspective of Rugman and Verbeke (2004), however, the geographic dispersion of sales forms a conservative benchmark since in their view upstream activities should be even more dispersed than sales.

[3] The natural log transformation, which takes the root of the value of e (roughly 2.7), can overcompensate when a variable is only moderately skewed. In such cases a square-root transformation (which is the root at 2) can produce a superior normal distribution.

[4] The 23 firms omitted in the first step of the analysis all had R&D values of 0 and correspondingly low levels of vertical integration, as a result of which they all fall into the 'low' stickiness category.

References

Bartlett, C. and S. Ghoshal (1989) *Managing Across Borders: The Transnational Solution*, Boston, MA: Harvard Business School Press.

Benito, G., B. Grøgaard and R. Narula (2003) 'Environmental Influences on MNE Subsidiary Roles: Economic Integration and the Nordic Countries', *Journal of International Business Studies*, **34**(5): 443-456.

Bruinsma, F.R., C. Gorter and P. Nijkamp (1998) 'Nomadic firms, Market Change and Infrastructure', Research Memorandum 0026, Free University Amsterdam.

Caves, R. (1996) *Multinational Enterprise and Economic Analysis* (2nd ed), New York: Cambridge University Press.

Cheng, J. and D. Bolon (1993) 'The Management of Multinational R&D: A Neglected Topic in International Business Research', *Journal of International Business Studies*, **24**: 1-18.

Delios, A. and P. Beamish (2005) 'Regional and Global Strategies of Japanese Firms', *Management International Review*, Special Issue: **45**(1): 19-36.

Dunning, J. (1993) *Multinational Enterprises and the Global Economy*, New York: Addison Wesley.

Flier, B., F. Van den Bosch and H. Volberda (2003) 'Coevolution in Strategic Renewal Behavior of British, Dutch and French Financial Incumbents', *Journal of Management Studies*, **40**(8): 2163-2187.

Geringer, J., P. Beamish and R. DaCosta (1989) 'Diversification Strategy and Internationalization: Implications for MNE Performance', *Strategic Management Journal*, **10**(x): 109-119.

Ghemawat, P. (2001) 'Distance Still Matters: The Hard Reality of Global Expansion', *Harvard Business Review* **79**(8) (September): 137-47.

Ghemawat, P. (2003) 'Semiglobalization and International Business Strategy', *Journal of International Business Studies* **34**(2): 138-152.

Goerzen, A. and P. Beamish (2003) 'Geographic Scope and Multinational Enterprise Performance', *Strategic Management Journal*, **24**(13): 1289-1306.

Harzing, A-W (2002) 'Acquisitions versus Greenfield Investments: International Strategy and Management of Entry Modes', *Strategic Management Journal*, **23**: 211-227.

Harzing, A-W. (2000) 'An Empirical Test and Extension of the Bartlett and Ghoshal Typology of Multinational Companies', *Journal of International Business Studies*, **31**(1): 101-120.

Henisz, W. (2003) 'The Power of the Buckley and Casson Thesis: The Ability to Manage Institutional Idiosyncracies', *Journal of International Business Studies*, **34**(2): 173-184.

Hodgetts, R. and R. Greenwood (2001) 'Organizational Structure', in Rugman, A. and Brewer, T. (eds.), *The Oxford Handbook of International Business*. Oxford: Oxford University Press.

Kolk, A. (2005) 'Environmental Reporting by Multinationals from the Triad: Convergence or Divergence?', *Management International Review*, 2005/1: 145-166.

Kobrin, S. (1991) 'An Empirical Analysis of the Determinants of Global Integration', *Strategic Management Journal*, **12**: 17-31.

Kostova, T. and S. Zaheer (1999) 'Organizational Legitimacy under Conditions of Complexity: The Case of the Multinational Enterprise', *Academy of Management Review*, **24**: 64-81.

Kotabe, M. and J. Murray (2004) 'Global Sourcing Strategy and Sustainable Competitive Advantage', *Industrial Marketing Management*, 33: 7-14.

Law, K., D. Tse and N. Zhou (2003) 'Does Human Resource Management Matter in a Transitional Economy?', *Journal of International Business Studies*, **34**(3): 255-265.

Mansfield, E. and H. Milner (2000) 'The New Wave of Regionalism', *International Organization*, **53**(3): 589-627.

Markusen, A. (1999) 'Sticky Places in Slippery Space: A Typology of Industrial Districts', *Economic Geography*, **72**(3): 293-313.

Markusen, J. and K. Maskus (2001) 'A Unified Approach to Intra-Industry Trade and Direct Foreign Investment', NBER Working Paper no. 8335.

Murray, J., M. Kotabe and J. Nan Zhou (2005) 'Strategic Alliance-based Sourcing and Market Performance: Evidence from Foreign Firms Operating in China', *Journal of International Business Studies*, **36**(2): 187-208.

Nobes, C. and R. Parker, eds., 2000, *Comparative International Accounting* (6th ed.). London: Prentice Hall.

Ohmae, K. (1985) *Triad Power: The Coming Shape of Global Competition*. New York: The Free Press.

Prahalad, C.K. and Y. Doz (1987) *The Multinational Mission: Balancing Local Demands and Global Vision*, New York: Free Press.

Rugman A. and A. Verbeke (2005) 'Regional Multinationals: the New Research Agenda', in: Peter J. Buckley (ed.), *What is International Business?* Houndmills, UK: Palgrave-MacMillan, pp 110-132.

Rugman, A. (2005) 'Rethinking International Management in a World of Regional Multinationals' in: A. Verbeke (ed.), *Internalization, international diversification and the Multinational Enterprise. Essays in honor of Alan M. Rugman*, Oxford: Elsevier.

Rugman, A. and A. Verbeke (2004) 'A Perspective on Regional and Global Strategies of Multinational Enterprises', *Journal of International Business Studies*, **35**(1): 1-15.

Rugman, A. and A. Verbeke (2003) 'Extending the Theory of the Multinational Enterprise: Internalization and Strategic Management Perspectives', *Journal of International Business Studies*, **34**(2): 125-137.

Ruigrok, W. A. Pettigrew, S. Peck and R. Whittington (1999) Corporate Restructuring and New Forms of Organizing: Evidence from Europe. *Management International Review*, Special Issue (2): 41-64.

Ruigrok, W. and H. Wagner (2003) 'Internationalization and Performance: An Organizational Learning Perspective', *Management International Review*, **43**(1): 63-83.

Ruigrok, W. and R. Van Tulder (1995) *The Logic of International Restructuring*, London: Routledge.

Schlie, E. and G. Yip (2000) 'Regional Follows Global: Strategy Mixes in the World Automotive Industry', *European Management Journal*, **18**(4):343-354.

Sullivan, D. (1994) 'Measuring the Degree of Internationalization of a Firm', *Journal of International Business Studies*, **2**: 325-342.

Tallman, S. and G. Yip (2001) 'Strategy and the Multinational Enterprise', in A. Rugman (ed.) *Oxford Handbook of International Business*, Oxford: Oxford University Press.

UNCTAD (1997) *World Investment Report*, Geneva

Volberda, H. and A. Lewin (2003) 'Co-evolutionary Dynamics Within and Between Firms: From Evolution to Co-evolution', *Journal of Management Studies*, **40**(8): 2111-2136.

Whitley, R. (1999) Divergent Capitalism: *The Social Structuring and Change of Business Systems*, Oxford: Oxford University Press.

Yeh, R. and T. Sefagi-nejad (1987) 'Organizational Characteristics of American and Japanese Firms in Taiwan', *National Academy of Management Proceedings*: 113.

APPENDIX 1

	Fortune Industry Codes	N	% reporting RND	Mean value (to total sales)	% reporting DVI	Mean value (to total sales)
COMP		23	100%	7.7%	83%	-19.4%
CHEM		11	100%	7.1%	82%	-11.5%
AUTO		24	100%	3.9%	63%	-17.9%
FOOD		12	75%	1.4%	33%	-5.1%
UTIL		20	55%	1.1%	20%	-5.7%
PETR		16	75%	0.8%	63%	-10.0%
CONST		8	75%	0.8%	63%	-3.8%
TRADE		13	46%	0.4%	92%	-13.9%
RETAIL		20	45%	0.0%	20%	-2.1%
Total		147	76%	3.5%	56%	-13.1%

TABLE 1: Descriptives and correlations

Correlations			1	2	3	4	5	6	7	8	9	10	11	12
	Mean	StD	BOUND	XUP	XDOWN	EU_ DUM	ASIA_ DUM	SUBPX HOST	DVI	RND	SIZE_ SUB	XSUB	XEMBED	SIZE_ SALES
1	3.2%	11.0%	1											
2	24.7%	18.9%	0.11	1.00										
3	27.9%	20.8%	-0.43 ***	0.85 ***	1.00									
4	0.38	0.49	0.01	0.32 ***	0.28 ***	1.00								
5	0.33	0.47	0.00	-0.18 *	-0.17 **	-0.55 ***	1.00							
6	1.18	0.66	0.03	0.40 ***	0.35 ***	0.25 ***	-0.03	1.00						
7	0.30	0.13	-0.34 ***	0.31 ***	0.46 ***	0.13	0.09	0.19 **	1.00					
8	-3.95	1.16	-0.53 ***	0.13	0.42 ***	-0.05	-0.10	0.03	0.44 ***	1.00				
9	5.13	0.97	-0.02	0.42 ***	0.40 ***	0.47 ***	-0.24 ***	0.63 ***	0.32 ***	0.03	1.00			
10	0.51	0.20	-0.15 *	0.47 ***	0.51 ***	-0.29 ***	-0.02	0.43 ***	0.28 ***	0.34 ***	0.16 *	1.00		
11	0.84	0.38	0.01	0.30 ***	0.27 ***	0.45 ***	-0.48 ***	0.54 ***	-0.03	-0.02	0.51 ***	0.19 **	1.00	
12	10.34	0.76	0.04	0.15 *	0.12	0.12	-0.23 ***	0.23 ***	0.10	0.02	0.29 ***	0.06	0.27 ***	1.00

*** , ** ; * Correlation is significant at the 0.01, 0.05 and 0.10 levels, respectively (2-tailed).

TABLE 2: OLS regression results for BOUND (n=124)

BOUND

	Block 1	+Block 2	+Block 3	+Block 4
(Constant)	0.05 (0.02) **	0.17 (0.05) ***	0.24 (0.05) ***	0.20 (0.05) ***
EU_DUM	-0.01 (0.03)	0.00 (0.02)	0.01 (0.02)	0.01 (0.02)
ASIA_DUM	-0.01 (0.03)	0.01 (0.02)	0.00 (0.02)	0.00 (0.02)
DVI		0.14 (0.08) **	0.18 0.08) **	0.18 (0.08) **
RND		0.05 (0.01) ***	0.05 (0.01) ***	0.04 (0.01) ***
XUP			-0.14 (0.04) ***	-0.15 (0.04) ***
DVI x RND				0.15 (0.07) **
Model F	0.146	13.009 ***	13.501 ***	12.534 ***
Adjusted R^2	-0.01	0.28	0.34	0.36
ΔR^2		0.30	0.06	0.03
ΔF		25.813	11.068	5.260
Significance of change		***	***	**

Coefficients are unstandardized

Standard errors in parentheses

***, **, * significant at 0.001, 0.05 and 0.01, respectively

FIGURE 1: Sectors by average R&D and DVI rankings (N=147)
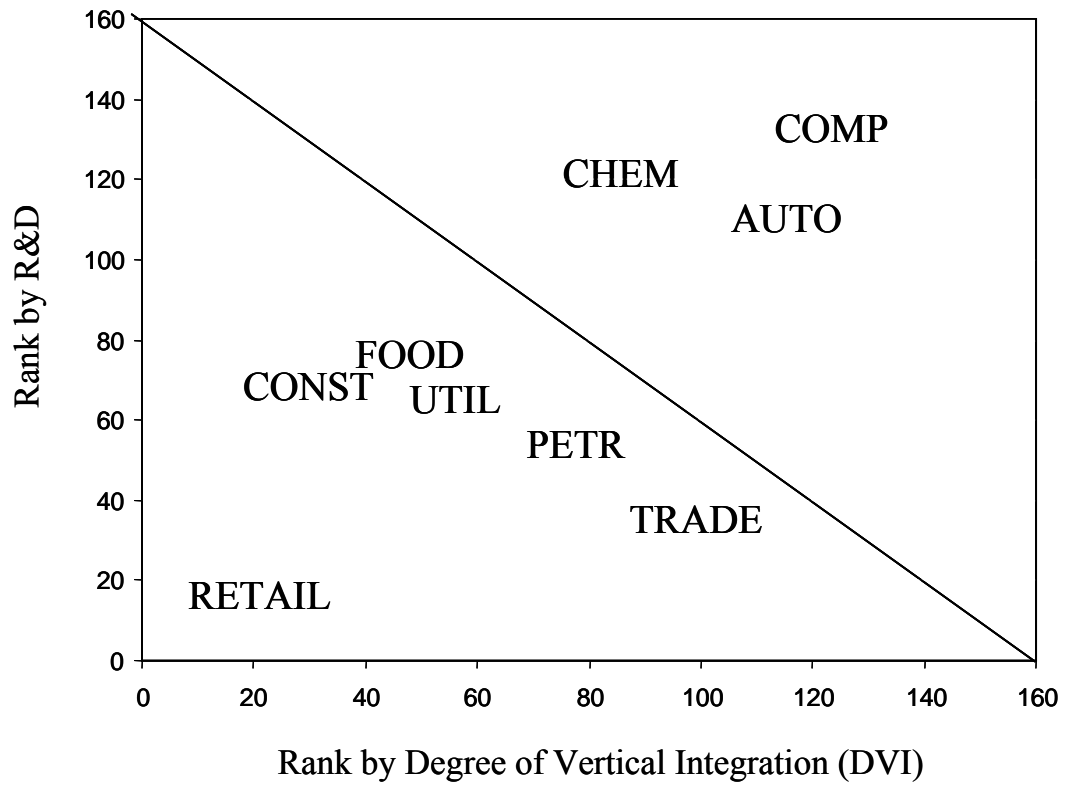
The role of stickiness in MNE structure

	Stickiness as a continuous variable			Stickiness as a dichotomous variable		
	(predicted values, n=124)			(HI/LO, n=147)		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
EU_DUM	0.036	0.173 *	0.343 ***	0.082	0.216	0.421 ***
	(0.376)	(1.691)	(3.410)	(0.901)	2.296	(4.936)
ASIA_DUM	-0.481 ***	-0.303 ***	-0.328 ***	-0.393 ***	-0.272 ***	-0.234 ***
	(-5.488)	(-3.405)	(-3.455)	(-5.161)	-3.502	(-2.868)
SIZE_SUB	0.043	0.335 ***		0.108	0.324 ***	
	(0.473)	(4.231)		(1.293)	4.260	
XSUB	-0.062	0.183 **	0.265 **	0.040	0.263 ***	0.372 ***
	(-0.713)	(2.291)	(3.188)	(0.467)	3.371	(4.768)
SUBPXHOST	0.488 ***			0.439 ***		
	(5.162)			(4.895)		
STICKY (predicted)	-0.097	-0.123 *	-0.153 **			
	(-1.588)	(-1.822)	(-2.140)			
STICKY (HI/LO)				-0.110 *	-0.174 **	-0.164 **
				(-1.684)	(-2.530)	(-2.255)
F	26.77 ***	21.94 ***	20.08 ***	26.52 ***	23.24 ***	21.87 ***
R^2	0.56	0.46	0.39	0.51	0.43	0.36

Publications in the ERIM Report Series Research* in Management

ERIM Research Program: "Organizing for Performance"

2005

Continuous versus Step-Level Public Good Games
Susanne Abele and Garold Stasser
ERS-2005-015-ORG
http://hdl.handle.net/1765/1937

Collective Consuming: Consumers as Subcontractors on Electronic Markets
Wilfred Dolfsma
ERS-2005-020-ORG
http://hdl.handle.net/1765/1932

Appropriability in Services
Wilfred Dolfsma
ERS-2005-021-ORG
http://hdl.handle.net/1765/1926

Is China a Leviathan?
Ze Zhu and Barbara Krug
ERS-2005-031-ORG
http://hdl.handle.net/1765/6551

Information Sharing and Cognitive Centrality
Susanne Abele, Garold Stasser and Sandra I. Vaughan-Parsons
ERS-2005-037-ORG
http://hdl.handle.net/1765/6664

Virtual Enterprises, Mobile Markets and Volatile Customers
Ferdinand Jaspers, Willem Hulsink and Jules Theeuwes
ERS-2005-039-ORG
http://hdl.handle.net/1765/6728

No Black Box and No Black Hole: from Social Capital to Gift Exchange
Rene van der Eijk, Wilfred Dolfsma and Albert Jolink
ERS-2005-040-ORG
http://hdl.handle.net/1765/6665

Boards in Agricultural Cooperatives: Competence, Authority, and Incentives
G.W.J. Hendrikse
ERS-2005-042-ORG
http://hdl.handle.net/1765/6883

Finding Team Mates who are not prone to Sucker and Free-Rider effects: The Protestant Work Ethic as a Moderator of Motivation Losses in Group Performance
Susanne Abele and Michael Diehl
ERS-2005-053-ORG
http://hdl.handle.net/1765/6990

Organization and Strategy of Farmer Specialized Cooperatives in China
Yamei Hu, Zuhui Huang, George Hendrikse and Xuchu Xu
ERS-2005-059-ORG
http://hdl.handle.net/1765/6995

The Influence of Employee Communication on Strategic Business Alignment
Cees B. M. van Riel, Guido Berens and Majorie Dijkstra
ERS-2005-060-ORG
http://hdl.handle.net/1765/6996

The Tsunami's CSR Effect: MNEs and Philanthropic Responses to the Disaster
Gail Whiteman, Alan Muller, Judith van der Voort, Jeroen van Wijk, Lucas Meijs and Cynthia Piqué
ERS-2005-062-ORG
http://hdl.handle.net/1765/6994

Bridging Structure and Agency: Processes of Institutional Change
Wilfred Dolfsma and Rudi Verburg
ERS-2005-064-ORG
http://hdl.handle.net/1765/7014

Accounting as Applied Ethics: Teaching a Discipline
Wilfred Dolfsma
ERS-2005-065-ORG
http://hdl.handle.net/1765/7021

Institutions, Institutional Change, Language, and Searle
John Finch, Robert McMaster and Wilfred Dolfsma
ERS-2005-067-ORG
http://hdl.handle.net/1765/7109

Reflexivity in Teams: A Measure and Correlates
Michaéla C. Schippers, Deanne N. den Hartog and Paul L. Koopman
ERS-2005-069-ORG
http://hdl.handle.net/1765/7117

The Role of Team Leadership in Enhancing Team Reflexivity and Team Performance
Michaéla C. Schippers, Deanne N. den Hartog, Paul L. Koopman and Daan van Knippenberg
ERS-2005-070-ORG

The Psychological Benefits of Superstitious Rituals in Top Sport
Michaéla C. Schippers and Paul A.M. Van Lange
ERS-2005-071-ORG
http://hdl.handle.net/1765/7118

The Impact of New Firm Formation on Regional Development in the Netherlands
André van Stel and Kashifa Suddle
ERS-2005-075-ORG
http://hdl.handle.net/1765/7131

Allocation and Productivity of Time in New Ventures of Female and Male Entrepreneurs
Ingrid Verheul, Martin Carree and Roy Thurik
ERS-2005-082-ORG

Internationalization and Performance: The Moderating Role of Strategic Fit
Fabienne Fortanier, Alan Muller and Rob van Tulder
ERS-2005-083-ORG

Exploring Patterns of Upstream Internationalization: The Role of Home-region 'Stickiness'
Alan Muller and Rob van Tulder
ERS-2005-084ORG

The Search for Synergy between Institutions and Multinationals: Institutional Uncertainty and Patterns of Internationalization
Alan Muller and Rob van Tulder
ERS-2005-086-ORG

Is China a Leviathan? (revised)
Ze Zhu and Barbara Krug
ERS-2005-087-ORG

China's Emerging Tax Regime: Local Tax Farming and Central Tax Bureaucracy
Ze Zhu and Barbara Krug
ERS-2005-087-ORG

Explaining Female and Male Entrepreneurship at the Country Level
Ingrid Verheul, André van Stel and Roy Thurik
ERS-2005-089-ORG