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**Book section
(Accepted version)**

Original citation: Originally published in: Clark, Gordon L. and Feldman, Maryann P. and Gertler, Meric S. and Wójcik, Dariusz, (eds.) *The New Oxford Handbook of Economic Geography*. Oxford, UK : Oxford University Press, 2018

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Available in LSE Research Online: March 2018

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**Network geographies and geographical networks.
Co-dependence and co-evolution of Multinational Enterprises and space**

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1. Introduction

This chapter discusses some of the dramatic changes taking place in the relationship between Multinational Enterprises (MNEs) and geographical space, highlighting implications for both theory and empirical research. Over the last decades, geographical specificity at the sub-national and sub-regional level has become increasingly important for the strategy, organisation and performance of MNEs, and in turn MNEs have become progressively more significant for local and regional economic development (Iammarino & McCann 2013). Such a bilateral and mediated relationship, in principle valid for any kind of business firm, is particularly important and effective in the case of multinational firms. In the modern phase of globalisation MNEs have experienced much faster and deeper transformations than other firm types (i.e. small- and medium-sized or large multi-plant uni-national firms) due to their bridging role across diverse geographical, technological and institutional systems.

The growing interdependence of geographical specificity and MNE behaviour and organisation has rendered problematic some of the theoretical constructs traditionally applied in international economics and business studies of MNEs, and at the same time poses serious challenges for empirical investigation. In order to understand such difficulties and to better grasp the contemporary geographical features of multinational firms, it is necessary both to reflect on the traditional models and to update them in the light of the current realities. This is the aim of this chapter, which is divided into six sections. Section 2 discusses the substantial absence of geographically specific characteristics in the main analytical multidisciplinary framework of MNE studies. Section 3 highlights the limitations that have arisen with respect to the use of typical dichotomies such as *home versus host* and *determinant versus impact* in the investigation of MNE operations and their interactions with different economic actors and contexts. Section 4 revises the distinction between *horizontal versus vertical integration* of corporate activities across geographical and institutional boundaries and argues that different geographies have emerged in relation to new types of firm integration. As a result, the dichotomy *hierarchy versus network* has lost most of its contrasting power, as both are forms of governance of production and innovation simultaneously applicable at the corporate and spatial level. This is discussed in Section 5, which highlights the increasing co-dependence and co-evolution of corporate and geographical networks and hierarchies in the international division of labour. Section 6 offers brief concluding remarks.

2. MNEs and space: the theory and the real world

For now almost four decades the eclectic Ownership-Location-Internalisation (OLI) paradigm – originally formulated by John Dunning (e.g. 1977, 1981) and subsequently updated and adapted by

Dunning himself (e.g. 2001, 2009) and a number of other scholars – has provided a broad analytical framework for examining both the growth of multinational activity and its changing patterns over time. The OLI paradigm has had the capacity to accommodate and compare different major economic, business and managerial theories aimed at explaining Ownership (O) advantages, i.e. *why* firms become multinational; Location (L) advantages, i.e. *where* firms go to internationalise their activities; and Internalisation (I) advantages, i.e. *how* firms carry out their multinational experience. In spite of the criticisms that the OLI has encountered regarding its explanatory power, it has consistently been demonstrated that the approach is still suitable for interpreting the complexity of MNE expansion, particularly in a historical perspective (e.g. Cantwell and Narula 2001; Dunning 1995, 2001).

In contrast, the OLI paradigm's ability to effectively integrate both micro and macro perspectives of the MNE phenomenon does not translate well when we look at the issue of geographical space. The reason for this failure does not reside only in the OLI itself, but also in the limitations of the main theories that are subsumed into the paradigm. In effect, although strongly micro-founded, both traditional economic theory, with its focus on international production and product/market dimensions, and the international business and management literature, which concentrates on the business firm, have mostly treated geography at a highly stylised and unspecific macro level. This is typically that of the country, if not of the macro-region or in some cases even of the continent. Geography has therefore been intended as an *international geography* rather than as a *subnational space* (McCann and Mudambi 2004) in which geographical issues are treated primarily in terms of MNE affiliates or subsidiaries being located either in a home or parent country versus being in a foreign or overseas country. Moreover, the definition of what is understood as being *home* or *foreign* is largely treated as being independent of scale, such that a foreign country could be either small or large. While some papers and some research programmes within international business sought to deal with these issues in a more detailed manner and to provide more nuance on these issues than others, the basic fact remains that the traditional notion of geographical space within economics and international business studies tends to be vague and undefined, and it does not go beyond simple locational definitions of being located on either one side or the other of a national border.

The substantial absence of any *actual* geography in the international business literature ironically parallels the criticisms made by international business scholars of both the so-called new trade theories and the New Economic Geography (NEG) with respect to their largely abstract treatment of space (see, for instance, Dunning 1998; Buckley and Ghauri 2004; Ietto-Gillies 2012). Yet, one of the main merits of the basic NEG framework has been the demonstration of the critical tensions which exist between *cores* and *peripheries*, reviving academic interest in the atavistic contrast between central and more marginal regions, and the role which firm location plays in these tensions. Some seminal work in economic geography (e.g. Feldman 1994; Audretsch and Feldman 1996), which partly builds on and also extends the issues raised by NEG models, addresses the crucial role of knowledge flows across space and the extent to which the location of firms also shapes how these flows are themselves subject to core and periphery patterns. These issues have subsequently become central themes in the research agendas of urban economics, regional science and economic geography, and international business has recently been striving to make an impact on these research progresses.

Part of the explanation for the surprising delay in acknowledging the role of space in MNE behaviour lies in the fact that most of the international economics and business emphasis has been on either the macroeconomics of international production or on the characteristics of the internal

processes of the firm. Prior to the advent of the modern era of globalisation in the early 1990s, both of these lines of enquiry were motivated primarily by historical contingency (Dunning 2001), in the sense that the priorities of foreign investment decisions made by MNEs were perceived as being far more related to national and international differences than to regional (sub-national) heterogeneity. Even more fundamentally, the theory of the MNE has developed along the lines of a sharp distinction between firms, as organisations subject to centralised control, and markets, treated as environments characterised by independent actors engaged in full arm's length transactions. Although both of these lines have deeply evolved over time and remain theoretically valid and useful in today's economic analysis, they also still represent the major constraints to the full integration of a real spatial dimension within the study of MNEs. Indeed, it is not accidental that the criticisms to the traditional organizational dichotomy *market versus hierarchy*, and the elaboration of more relevant heuristic models incorporating the *network* as the prevailing form of economic coordination in contemporary economic systems, have used geographical specificity to illustrate the power of the network governance (e.g. Powell 1990).

Amongst the first generation of scholars involved in developing the early classical model of the MNE, both Stephen Hymer and Raymond Vernon are crucial contributors, being the first two commentators implicitly or indirectly aware of the long-run evolution of the relationships between multinational firm organisation and economic geography. Vernon's notion of the product life-cycle (Vernon 1963, 1966), which has since played such a key part in the international business literature, was originally understood as a phenomenon operating at the sub-national level, in which core cities and regions played different roles from peripheral regions (Vernon 1959). Vernon understood that a close mapping between technological and geographical structures was likely to be a natural outcome of the investment choices that a multi-plant firm must make, and that this logic applied even more to the MNE as a type of multi-plant firm. Meanwhile, Hymer's visionary perspective (Hymer 1970, 1972) was that the hierarchical geography of multinational headquarters and knowledge activities will map closely on to the future global urban hierarchy, with higher-order functions taking place in higher-order cities. Hymer's long-run insight that there must be a close mapping between organisational hierarchies and geographical hierarchies is all the more remarkable given that, at the time of his writing, modern globalisation as we understand it today seemed a distant and far-fetched notion.

These insights of Hymer and Vernon, linking technological, organisational and geographical hierarchies were largely overlooked in the international business literature during the following three or four decades, with instead other intuitions by these two scholars being afforded much greater significance. Given the historical context this is partly understandable. Yet, even now after two decades of rethinking the role played by multinationals in economic geography, these key insights and how they link to the current world still remain largely underexplored (Iammarino and McCann 2015).

Modern globalisation, which began to emerge in the final years of the 1980s and the early 1990s, has been characterised by various key features (Iammarino and McCann 2013). First, the share of developing and emerging economies on global FDI inflows has grown steadily and, for the first time in history, accounted for more than a half of the world total in 2012, confirming a massive transformation in the global geography of foreign investment (UNCTAD 2014). Second, much of these flows are characterised by cross-border mergers and acquisitions as well as by greenfield investments, and again some two-thirds of FDI inflows are in services, with the remaining one third involving manufacturing sectors. Third, the majority of these cross-border flows span neighbouring or even adjacent countries, rather than genuinely global transactions. The result is that groups of

bordering economies are becoming ever more integrated economically into what are known as *global regions* (Kohn and Brouwer 2014; Guy 2015). Global regionalism is also characterised by a slicing up and recombination of global value-chains, in which establishments and groups of activities are *unbundled* (Baldwin 2011) primarily across groups of neighbouring economic systems. At the core of these global regions are *global cities*, which house most of the power functions of large corporations (Iammarino and McCann 2015).

The nature and scale of modern globalisation has been far beyond what anyone in the 1960s and 1970s could have imagined, but the ideas of Hymer and Vernon already touched on the interdependence of global organisational, technological and geographical hierarchies in the long-run firm-geography trajectories. Much of the available real world evidence points to a growing importance of new types of structures and forms of economic coordination which go well beyond the traditional distinction between the firm and the market. These structures include networks, value chains and quasi-market relationships of various kinds that have grown exponentially in importance (Guy 2009). Such massive, profound and on-going changes have obviously affected both the nature and configuration of the O-L-I advantages and their interactions. Although the latter are very difficult to disentangle *bilaterally*, we argue that the changes in the global institutional and technological environment have had important repercussions for the balance of the “three-legged stool” of the OLI (Dunning 1998 and 2009, p. 5), affecting in particular the centrality of Location and its interaction with both Ownership and Internalisation advantages.

3. The dichotomies *host versus home* and *determinant versus impact*

Ownership advantages (O-advantages) have been historically exploited largely via internalisation and vertical integration (I-advantages). Growing multinationality generates new O-advantages through experience and capability accumulation, which can then be exploited by both internal and external means (Castellani and Zanfei 2004, 2006), giving rise to positive cumulative causation mechanisms that reinforce such advantages. The growing internationalisation of one of the major, if not the primary, MNE O-advantages – its technological competence and innovative capacity – has resulted in a renewed questioning of the rather narrow role conferred upon MNE units (i.e. affiliates and subsidiaries) by Vernon’s highly influential Product Life Cycle (PLC) model. The aim to redefine MNE units as key creators of innovation and technological knowledge was originally suggested by Dunning (1970) and later developed by Cantwell (1989) and Fors (1998) among others, building on the seminal work of Edith Penrose (1956, 1959). The MNE is then defined as a *bundle of productive resources and competencies* – physical, human and technological – which are idiosyncratic to each specific enterprise and represent the firm’s major competitive advantage.

Two of the major criticisms to the PLC explanation of international production have important implications in geographical terms. First, on the basis of the evolution of the contemporary world economy, O-advantages are to be attributed to firms, rather than countries, thus making the *geographical origin* of MNEs much less predetermined by the national level. This point, seemingly captured in Vernon’s original framework, has been highlighted by both regional economists (e.g. Taylor 1986, 1987) and international business scholars (e.g. Cantwell 1995), who attribute the limitations of the PLC model to an inadequate conceptualization of both the firm and technological progress. Second, observation suggests that agglomeration forces have attracted MNE activities – especially high-value added ones – to particular locations in both advanced and emerging economies, thus making the *geographical destination* of MNEs progressively less dependent on purely cost-based and relative endowment considerations. Indeed, this latter observation points

precisely to the geographical specificity of knowledge O-advantages acquisition: capability and innovation accumulation processes are ever more reliant on sources that are external to any single firm (however large and multinational it may be) and are highly spatially situated (Storper 1997, 2013).

Evolutionary views of technological change applied to MNE behaviour and strategy have contemplated the interactions between O and L, providing grounds for some significant advances in the field. O-advantages are increasingly dependent on the ability to explore and select among a wide range of knowledge and innovation sources (e.g. Cantwell and Iammarino 1998, 2003; Cantwell and Piscitello 1999). Mostly intangible L-advantages are highly concentrated within specific regions, cities and local systems, and contribute to enhancing firm-specific O-advantages, which in turn strengthen those of the many locations where the MNE is present. Thus, when competitive advantages are seen through the lens of a fine-grained economic geography and perceived as simultaneously firm-specific and place-specific, the *host-home* categories – mainly based on the direction of FDI (Letto-Gillies 2012) – cease to be analytically useful. Instead, the sources of knowledge, both intra- and extra-firm, and the overall openness, or connectivity, of the firm with its surrounding environment become far more relevant issues.

It is worthwhile to stress the difference between simple *connectedness*, defined in terms of the architecture of transport and communications infrastructure, and the much broader concept of *connectivity*, which is a behavioural concept incorporating the capability of individuals, organizations and institutions to interact and engage across geographical space and within networks. Connectivity emphasizes the degree of two-way (inward and outward) openness of regions, and also of firms and actors there located, in terms of many behavioural and organizational dimensions of knowledge connectedness. The identification of the MNE's spatial behaviour is thus a result of complex interactions between firm(s), industry, organizational and knowledge characteristics. The simple nation-based *host-home* dichotomy therefore becomes largely meaningless, particularly in relation to knowledge flows. Indeed, core regions are those places where *host* and *home* actually overlap to a great extent, and the direction of such flows is eminently bi- or multi-lateral.

The blurring of *host/lending origin versus home/borrowing destination* is even more relevant when looking at the economic impact of MNEs. As seen above, the major research questions have focused on the determinants of MNE behaviour – i.e. *why*, *where* and *how* firms become multinationals – and the OLI is by construction primarily a paradigm for understanding the causes of multinationality. On the other hand, the effects of MNE operations, though considered within the OLI, are undoubtedly not treated with the same systematic approach. In the OLI framework, each particular activity performed across geographical boundaries is seen as a consequence of the specific advantages of the MNE itself.

When it comes to the evaluation of MNEs' effects, the centrality of the micro level as a unit of analysis is obviously less clear-cut. The impact of MNE activity can operate simultaneously at different levels: that of the firm, of the industry, of the region, of the country and also of the global level. Trying to disentangle them has proved to be extremely tricky, if not impossible. As Letto-Gillies (2012) points out, the assessment of MNE effects is intrinsically associated with the explanations of why, how and where the multinational enterprise operates. The critical relevance of geographical specificity (the *where exactly?*) has made it virtually impossible to separate the questions on the determinants from those on the impacts of MNEs in relation to different actual *places*. For instance, the examination of the growth effect of an MNE's location choice on the firm itself is seen to be a function of the number and variety of knowledge sources and accumulation that the MNE derives

from that particular region *among many others*. Similarly, the development impact on the region in which an MNE locates depends on the number and variety of knowledge exchanges between the MNE and the surrounding territory and its economic actors, and particularly local firms (including other MNEs). Mutually reinforcing MNE-environment knowledge exchange is to be two-way in order to foster sustained local learning, innovation rates, externalities and knowledge spillovers (Crescenzi et al. 2015).

The major focus of the conceptual and empirical literature on the effects of MNEs has been on localised externalities. The widespread difficulty of directly observing externalities, allied with a fuzzy notion of the L (e.g. Dunning 1981, 1988; Blomstrom 1989; Kokko 1992; Lall 1993), have largely limited the consideration of externalities to one particular type and to only one direction, namely that of spillovers transmitted from MNEs to the host location (e.g. Blomström and Persson 1983; Blomström and Kokko 1998; Javorcik 2004; Javorcik and Spatareanu 2008), disregarding the critical link that goes from region-specific L-advantages to the growth of the MNE itself.

Recent empirical literature has suggested the need for a more comprehensive approach in modelling the emergence of positive externalities as a two-way relationship, rather than as a unilateral pipeline. In this vein, a rediscovery of the role of domestic firms as more than simply passive recipients of foreign capabilities and technologies has gained momentum. The obvious problem arising here, which is particularly serious in empirical research, is the inherent endogeneity of the causal relationship between MNE investment and local firms' innovation and growth. Some of these contributions have tried to deal more efficiently with such concerns, either by taking advantage of the novel availability of panel data or by controlling for the endogeneity of the regressor of interest (e.g. Benfratello and Sembenelli 2006; Driffield 2006; Haskel et al. 2007; Crespo et al. 2009; Crescenzi et al. 2015). Conflicting results on MNEs' impact may also stem from unobserved firm heterogeneity on both sides; however, this dimension has so far been qualified mainly with respect to MNE characteristics, whilst scant attention has been devoted to domestic and localised firms' features (Crescenzi et al. 2015).

Finally, the search for often unspecified spillovers in the economic literature has somewhat hidden the effects of MNEs on capabilities development, particularly in developing economies. One effective application of the OLI paradigm has been on development issues, through the concept of *investment development path* (IDP), always applied at national or broader geographical scale (e.g. Dunning 1981, 1988, 2001; Dunning and Narula 1996; Narula 1996). The main IDP tenet is that as a country develops, the configuration of the OLI advantages facing both MNEs and domestic firms changes, as do their interactions, eventually reversing the directionality of foreign investment. This is clear in the recent impressive surge of outward FDI from developing and emerging locations.

All in all, the circularity unsolved by the traditional analytical categories – home versus host, determinant versus impact – need to be addressed, both theoretically and empirically, by future research efforts.

4. The dichotomy *horizontal versus vertical integration*

What is also rather surprising is how the reciprocal interactions between Internalisation and Location have so far been almost entirely ignored. Instead, a major focus of theoretical and empirical research has been on firm growth as a consequence of the increasing intensity of Ownership and Internalisation. This is particularly interesting if we take into account the recent major transformation in corporate integration and organisation.

Caves's work (1971) was the first to introduce the ground-breaking distinction between horizontal and vertical integration of MNE operations across national boundaries. Horizontal FDI (HFDI) implies the production of the same good or service produced at home in a new foreign location, thus replicating identical production processes across countries. Vertical FDI (VFDI) instead involves the shift abroad of some stages of the production process, either backward (upstream), forward (downstream), or both, thus fragmenting the MNE production process vertically across countries. Caves also allowed for the possibility of MNEs carrying out foreign production that is neither horizontally nor vertically integrated, but of "conglomerate diversification" (Caves 1971, p. 3). In the case of HFDI the ownership advantages are possessed by MNEs operating in industries characterised by oligopolistic structure and substantial product differentiation, and particularly those with the most considerable knowledge- or research-intensive activities. The major advantages of VFDI relate to the structural features of the markets in which MNEs are active: in particular, to where there are incentives to eliminate oligopolistic uncertainty for input supplies and to raise barriers to entry by vertically integrating the stages of production across national boundaries.

The subsequent Knowledge Capital Model (KCM) (e.g. Markusen 1984, 2002; Markusen and Venables 1998; Venables 1999; Carr et al. 2001) rests on the main idea that MNEs are intensive in the use of knowledge-based assets. The approach combines both horizontal integration associated with the proximity to demand, and vertical integration associated with the search for lower costs, as determinants of MNE location and investment activities. Drawing extensively upon Caves' work, although curiously seldom acknowledging it, the KCM splits multinational firms into two types: horizontally integrated firms known as type-h firms, and vertically-integrated firms known as type-v firms (Markusen 2002). One of the main assumptions of the KCM model is that the firm's knowledge assets are basically a public good within the firm, whose costs of supply to the firm's foreign plants are very low.

Whether the firm decides to supply foreign and overseas markets directly via exports or via local supply from foreign affiliates depends on the balance between domestic production economies of scale and international trade or transport costs (e.g., Markusen 2002; but also Caves 1971, 1982). In general, high trade and transport costs encourage FDI as firms seek to gain easier access to a foreign market, while low trade costs encourage domestic production and exporting. Similarly, high economies of scale encourage single site production and exporting, whereas low economies of scale encourage the establishment of different facilities in different locations. Regarding the patterns of FDI, type-h MNEs tend to dominate when the markets in both the origin and host locations are large and similar in terms of their local labour skills' endowments, whereas type-v MNEs tend to dominate when the markets differ substantially in terms of their size and the endowment of local labour skill.

Trade theorists have recently noted an apparent conflict between the KCM explanation of MNE activity and the trends observed in current globalisation. As Neary (2009) argues, if transport and trade costs fall, which has indeed been the case in recent decades, then according to the KCM one would expect that HFDI will decrease, as exporting from a domestic location should become more attractive. However, HFDI and multinationalism have increased dramatically over recent decades, thereby producing outcomes that appear to be counterintuitive to the KCM main tenet.

One way to reconcile these observations is to assume that the set-up costs of individual foreign establishments have fallen over time. Indeed, building plants and establishing new turnkey production facilities is becoming increasingly sophisticated, thereby pointing to the conclusion that set-up costs of overseas establishments are falling. However, plant set-up costs may well also involve issues related to labour knowledge, skills and training, and there is very little evidence to

suggest that these costs have decreased. Alternatively, we could assume that the location-specific economies of scale have actually become less important over recent years, and that their decline has been even greater than that in transport and trade costs. Yet, there is growing evidence that the geography of many production systems and input-output chains is becoming more spatially fragmented (e.g. Parr et al. 2002; Klier and Rubenstein 2008). In addition, the suggestion that location-specific economies of scale have fallen over time appears to be at odds with the fundamental assumptions of the NEG and with the wealth of evidence on the increasing worldwide importance of agglomeration effects (e.g. OECD 2006; World Bank 2009; McKinsey 2013). A third attempt at reconciling theory and observation is to suggest that, as transport costs fall, the potential profits of foreign acquisitions systematically favour the acquiring firms, thereby promoting outward FDI based on M&A (Neary 2009): this insight is in fact consistent with the experience of the European Union.

Thus, the dichotomy between *horizontal versus vertical* integration seems to be no longer suitable for reflecting the main organisational forms of MNE international operations. This has been acknowledged by KCM scholars, who recognise that MNEs follow *complex integration strategies* rather than those in one or either category (e.g. Grossman, et al. 2003; Yeaple 2003; Neary 2009). MNEs are mostly both horizontally and vertically integrated, mixing up different strategies including that of the international diversification across products and space firstly described by Caves (1971, 1982). In the words of Neary (2009, p. 215) “[...] the distinction between horizontal and vertical FDI is useful for pedagogic purposes but otherwise not very helpful”. More research efforts to better grasp the increasing complexity of MNE strategies are becoming urgent.

5. The dichotomy *hierarchies versus networks* and the interdependence between MNEs and geographical space

Globalisation, in the context of the creation and expansion of strategically-planned worldwide networks of investment, production, sales of goods and services underpinned by worldwide movements of people, money, knowledge and ideas, dates back to the fifteenth and sixteenth centuries. More than four centuries of global expansion were interrupted by the two world wars, the 1930s Depression and the Bretton-Woods systems, each of which contributed to a global retrenchment of economic activities into primarily national or transatlantic networks of relations (Iammarino and McCann 2013). This longstanding retrenchment was overturned again in the last decade of the twentieth century, driven by technological, institutional and organisational changes. The advent of the modern Internet provided for a common platform on which communications, management control and analytical technologies could be integrated. At the same time, institutional transformations were leading to falls in international trade and investment barriers associated with the movement towards macro-areas of free trade and economic integration such as the EU Single Market, NAFTA, MERCOSUR, ASEAN and CER. These trends were overwhelmingly driven and spearheaded by MNEs, building on both the new communications technologies and institutional changes, that seized the new opportunities for outsourcing and offshoring in order to reconfigure and redesign the spatial and organisational logic of their global activities.

International MNE networks have represented the strategic integration of geographically distinct paths of both production and innovation activity (Cantwell 1989). The stable relationship between ownership and control, which has long been understood as problematic when looked at from the divide between investor and executives, has been disturbed both along the supply chain and within the corporation (Ietto-Gillies 2012). In outsourcing strategies, ownership may change,

but control of value chain activities is largely retained by MNEs through various means of pressure on the suppliers and their competitive bidding (e.g. narrow transfers of technology, strict product specifications, tight supplying schedules, etc.) (UNCTAD 2013). Conversely, in integration and offshoring strategies, ownership is not altered, but the distribution of control within the MNE can vary greatly. Different degrees of autonomy of affiliates and subsidiaries can lead to intra-firm competition and even to various degrees of restraint in the control of the central MNE headquarters (e.g. Birkinshaw and Hood 1998, 2000; Birkinshaw et al. 2005).

In these network structures, international trade, production and knowledge creation occur both *within* the individual MNE and also *within* networks, some of which are highly spatially concentrated and some of which largely aspatial. The actual geographical and organisational configurations depend on the specific patterns of unbundling (Baldwin 2011) of enterprises and activities, which in turn depend on how the global value-chains are being sliced up, reconfigured and recombined (Gereffi and Korzeniewicz 1994). This implies a revision of the role and activities played by individual establishments within the overall MNE structure.

Indeed, the location of corporate headquarters of large MNEs has nowadays little geographical connection with the location base for specific business units and operations. Rather, different configurations are employed by different MNEs depending on their industries, technologies, knowledge assets, and also the nature of the interactions they undertake with potential suppliers and customers. For many MNEs, the role of subsidiaries and affiliates has transformed from the previously largely passive recipients of knowledge and instructions from parent country-based headquarters to highly autonomous localised centres of knowledge creation and exploitation that feed back into the global MNE knowledge network system. This role of knowledge generation often implies the affiliate becoming increasingly independent and heavily embedded in its local context by building on local human capital and knowledge networks, as well via the more traditional buyer-supplier pecuniary linkages.

Such organisational changes have had major implications for the location choices and advantages of MNEs, which are increasingly dependent on the balance between technological competencies and capabilities *within* and *outside* the firm, or on the integration of various sources of knowledge that are both internal and external to the firm. Different geographies have emerged in relation to different types of MNE integration, (de-)centralisation of firm control, unbundling of headquarters and core functions, smoothing of organisational structures (McCann and Mudambi 2005; Iammarino and McCann 2013, 2015). Such changes have highlighted the fuzziness of the notion of *hierarchy as a corporate structure versus networks as a form of spatial coordination*. Increasingly, the empirical evidence points to the intersubstitutability of space and organisations into the two typical forms of governance, and to the prevailing heterogeneity of both MNEs and specific geographical contexts.

Nowadays, MNEs' multiple locations are best understood by referring to specific sub-national areas – such as regions, cities or industrial clusters – where a firm locates its main functions, including strategic decision-making, research and development, and other core production activities. Each different MNE function tends to favour different spatial characteristics, thus pushing towards the dispersion of functions across various (subnational) locations. Opposing this dispersion force are linkages between different stages in the production chain which can encourage firms to co-locate different activities in the same location (Defever 2006). Indeed, recent evidence on the economic geography of MNEs indicates that, in the cross border co-location of the different stages of the value chain of MNE affiliates in the context of the European Union, MNE headquarters do not display any pull effect over the location of any other corporate function

(Defever 2006; Ascani et al. 2015). Goerzen et al. (2013) have shown that “competence-exploiting” and “competence-creating” (Cantwell and Mudambi 2005) activities of MNEs follow very different spatial patterns: while the former tend to agglomerate in global or core locations, the latter – far more valuable for local economic development – tend to concentrate in other metropolitan (or rather less core) regions, giving rise to geographical hierarchies based on functions rather than on firm counts or industry. These differing patterns also suggest that the relationships between MNE affiliates and the geography of knowledge networks and spillovers are likely to be far more varied and nuanced than the simple stylised linkages popularised in the traditional regional and urban economics and economic geography literature.

Standard arguments in urban economics assume that firms locating in larger, or global, cities benefit the most from the learning, sharing and matching opportunities locally available (e.g. Duranton and Puga 2004). However, in the light of the issues raised here, the potential advantages for MNEs associated with learning and sharing in large cities are not so obvious. First, the MNE generates advantages via the sharing of place-specific assets, knowledge and know-how *within* the corporate geographical network – in the revisited OLI this would reflect the interaction between O, L and I. The rationale for the MNE in leveraging these internalised assets and organisational advantages to some extent precludes the potential benefits available from locating in global cities. Second, while the potential knowledge inflows gained by locating in cities due to spillovers may appear *prima facie* to be attractive to MNEs, the danger of experiencing knowledge outflows via unintended knowledge leakages outside the firm may be at least as significant as any possible inflow benefits (Mudambi and McCann 2005; Iammarino and McCann 2013). The fact that MNEs place so much emphasis on knowledge internalisation – even more so in their present network structures – suggests that knowledge-related functions will often be located somewhat away from large cities. This may be particularly relevant where high levels of secrecy are required.

Following the same line of argument but from a different perspective, in the “world city hypothesis” (Friedmann 1986) and much of the “global city network” (GCN) literature, the bulk of the connections between global cities or *core cities in core regions* – where large MNEs are mostly headquartered – and more peripheral regions of the global economy are argued to take place through *regional articulators*, or *core cities in peripheral regions* (e.g. Beaverstock et al. 1999). While this may be true for some large MNEs approaching peripheral regions from the top down and with certain market-seeking strategies, the same may not necessarily apply to businesses in *peripheral cities of peripheral regions* interacting with the global economy from the bottom up. Recent research suggests that firms in peripheral regions often bypass these *regional articulators*, instead seeking to plug into business networks, either in global cities directly or in *peripheral cities within core regions* (Datu 2014; Crescenzi et al. 2016). In other words, those firms form what we may call *inter-peripheral* networks, thus bypassing the core cities within their respective periphery more often than what implied by the literature. This suggests that, while the *global city-regional articulator-global periphery* model implied in much of the GCN literature may be appropriate for the most global MNEs, other models may be required to understand the behaviour of emerging MNEs or MNEs from emerging places (Datu 2014; Crescenzi et al. 2016), prompting new theoretical and empirical challenges for future research agendas.

6. Conclusions

As Dunning (1977) observed within the eclectic OLI framework, MNE location behaviour – the L – has become increasingly intertwined with both Ownership and Internalisation. The links between

technological, organisational and geographical hierarchies first outlined by Vernon (1959) and Hymer (1972) have often evolved into flatter networks and are much more complex, richer and heterogeneous than their representation in theoretical models, which have not been able to keep up with actual changes. Corporate geographical networks of functions determine spatial hierarchies, and network geographies between core and peripheral locations in both core and peripheral regions influence the integration patterns of MNEs, particularly from emerging economies. This implies that when a multinational relocates or invests in new subsidiaries, this geographical choice itself changes the internal organisational and internalisation logic of the MNE. If the (re)location involves important functions, then the additional O- and I-advantages may be quite significant, thereby altering the relative positioning and roles of units within the corporate network. Similarly, the location of an MNE function in a locality by definition re-shapes both the technological and connectivity features of the region. O, I and L ought all to be seen as interacting at every stage of the MNE location decision, and hierarchies and networks across space are to be seen as being continually reshaped along with the technological and organisational changes within corporations.

As such, while many aspects of the traditional location theory toolkit have proved being still relevant for analysing the spatial dimension of MNEs, there are additional crucial issues which need to be considered that draw from literatures other than economic geography or urban economics. We are still some way off from a comprehensive and integrated spatial theory framework for the modern MNE, and tackling the analytical and empirical challenges associated with specific geography remains the main arena in which progress ought to be made. This is important because, while concepts such as *pipelines* – or, as seen in another chapter of this Handbook, *highways* – are currently popular in geography, the overwhelming majority of international movements of tangible and intangible resources are undertaken within MNEs and their internal and external networks, implying a multi-lateral directionality of flows. Economic geography, international business and management, and regional and urban economics need to make far more joint progress in understanding the co-dependence and co-evolution of MNEs and geographical space in order to develop a more sophisticated narrative of modern globalisation.

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