Research Policy xxx (2013) xxx–xxx

Contents lists available at ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals

Peter J. Buckley[a,1], Niron Hashai[b,*]

[a] Centre for International Business, Leeds University Business School, University of Leeds, Maurice Keyworth Building, Leeds LS2 9JT, United Kingdom
[b] Jerusalem School of Business Administration, The Hebrew University of Jerusalem, Mount Scopus, Jerusalem 91905, Israel

ARTICLE INFO

Article history:
Received 29 March 2012
Received in revised form 16 October 2013
Accepted 5 November 2013
Available online xxx

Keywords:
Emerging country based MNCs
Technological catch up
Domestic growth
Global system view
Location choice

ABSTRACT

The paper presents a model that evaluates how upgraded technological capabilities of emerging country based multinationals (EMNCs) and an increase in the domestic market size of large emerging countries affect value chain location choices and the competitiveness of emerging country based firms versus advanced country based ones. The model shows that, even without possessing a competitive advantage in terms of technology and/or brands, EMNCs from large or rapidly technologically advancing countries can become dominant players in the global system. The model highlights the central role of firm level technological intensity and product differentiation in determining the location of value chain activities as well as defining organisational boundaries. Empirical analysis of the location choices of the world's top multinationals from large advanced and emerging countries in 2010 supports the model's predictions.

1. Introduction

Post World War II globalisation, in terms of Foreign Direct Investment (FDI) and international trade, has been dominated by large advanced country based multinationals (AMNCs). Such hegemony was facilitated by technological advantages, well recognised brands, superior managerial practices and production efficiency, coupled with the existence of large domestic markets as a major source of demand for products and services (Dunning, 1988, 1993; Vernon, 1966, 1971).

However, the accelerated development of countries such as Brazil, India, China and Russia has resulted in a growing number of emerging country based multinationals (EMNCs) beginning to play an important role in today's global system. The increased salience of EMNCs has been widely documented in the extant literature (e.g. Bonaglia et al., 2007; Buckley et al., 2007; Dunning, 2006; Duysters et al., 2009; Goldstein, 2007; Lall, 1983; Luo and Tang, 2007; Mathews, 2002, 2006; Niosi and Tschang, 2009; Ramamurti and Singh, 2009; Sauvant, 2008; Wells, 1983).

A recurring question in this stream of literature is how can one explain the rise of EMNCs, and especially their ability to engage in FDI in advanced countries, given that many emerging country based firms lack firm-specific competitive advantages? (Amsden and Chu, 2003; Goldstein, 2007; Mathews, 2006; Nolan, 2004; Ramamurti, 2009a; Rugman, 2009). According to Dunning's Ownership-Location-Internalisation paradigm (Dunning, 1977, 1988) the possession of firm specific advantages, mainly in technological advance and brands, is a necessary condition for the emergence of the multinational corporation (MNC). This is because such advantages are needed to compensate for the liabilities of foreignness (Hymer, 1976), which imply a higher cost of doing business abroad for foreign firms. Hence, in the absence of such advantages, the rise of EMNCs seems to contradict extant explanations for the existence of MNCs.

Several answers were provided to this question, including: the superior ability of EMNCs to operate in harsh institutional environments in other developing countries (Cuervo-Cazzura and Genc, 2008; Dunning and Lundan, 2008), greater capability to adapt products to the specific demands of import protected developing markets (Lall, 1983; Wells, 1983), the leverage of home country advantages such as natural resources and cheap labour (Rugman, 2009; Cantwell and Barnard, 2008; Williamson and Zeng, 2009), access to cheap capital because of imperfections in the domestic capital market (Buckley et al., 2007) and the desire to engage in "knowledge asset seeking" in foreign markets (Dunning, 2006; Dunning et al., 2008; Goldstein, 2007; Hoskisson et al., 2000; Luo and Tang, 2007; Mathews, 2002). Yet, it still remains unclear if and under what conditions EMNCs are likely to compete successfully with AMNCs on a global scale (Ramamurti, 2009b).

The current paper utilises the global system view model (Buckley and Hashai, 2004; Casson, 2000) to postulate the conditions under which EMNCs will close the gap vis-à-vis AMNCs in

* Corresponding author. Tel.: +972 0 2 5883110; fax: +972 0 2 5881341.
E-mail addresses: pjb@lubs.leeds.ac.uk (P.J. Buckley), nironh@huji.ac.il (N. Hashai).
[1] Tel.: +44 0113 343 4646; fax: +44 0113 343 4754.

0048-7333/$ – see front matter © 2013 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.respol.2013.11.004

terms of dominance in serving global markets and foreign direct investment. More specifically, the model formally analyses how upgrading the technological capabilities of EMNCs and a substantial increase in domestic market size of emerging countries, are likely to project EMNCs versus AMNCs in terms of the worldwide location and ownership of Research and Development (R&D), production and marketing activities. The model specifically highlights the role of technology intensity and product differentiation in the comparative statics of a global system comprised of EMNCs and AMNCs.

The model predicts a novel phase of globalisation where EMNCs from countries where lower production costs are maintained, and that encounter rapid technological progress or possess a large and growing domestic market become dominant competitors for AMNCs. It shows that value chain location for AMNCs and EMNCs is likely to be quite different, where AMNCs are expected to locate R&D and marketing activities primarily in advanced countries, EMNCs are expected to locate R&D and production activities primarily in emerging countries. The model further shows that greater technological intensity increases the propensity of AMNCs to locate production in advanced countries, while increasing the propensity of EMNCs to locate marketing activities in emerging countries. Greater technology intensity and product differentiation further increase the propensity of both AMNCs and EMNCs to integrate activities in-house, rather than outsource them. Empirical analysis of the location choices of the world's top MNCs from large developed and developing countries in 2010 (in Gross Domestic Product terms) shows support to these value chain location and integration predictions.

A key insight of the model is that even without possessing firm specific advantages in R&D and marketing, EMNCs from large and rapidly technology advancing countries may become dominant players in the global system. Once emerging country based firms catch up on technology (while not achieving a competitive advantage) and once their domestic market size increases sufficiently (making the interaction with consumers less costly) they become able to successfully compete with advanced country based firms.

In the next section we briefly present the literature on the rise of EMNCs. In Section 3 we build on the "global system view" perspective and present a simple model that predicts the outcome of EMNCs versus AMNCs competition in terms of value chain location and integration. Section 4 presents our data, measures and methods, and results are presented in Section 5. Insights from the model and the structure of the resulting emergent global system are discussed in the concluding sections.

2. The globalisation of EMNCs

The global system at the end of the 20th century started to emerge after the Second World War (Obstfeld and Taylor, 2002).[2] This system has been characterised by the dominance of the US, Europe and Japan in terms of military power, political influence and technological advance. Foreign investments were the engine of this globalisation phase where integrated capital markets absorbed FDI outflows led by AMNCs, reaching a peak of over US$ 2 trillion in 2007 (UNCTAD, 2009).

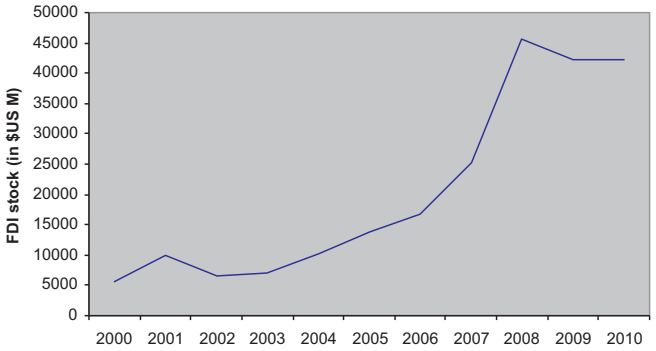

Fig. 1. Outward FDI from the BRIC countries to the United States, Japan, Germany and the United Kingdom..
Source: OECD.Stat. –

Yet, already 30 years ago a new type of multinational had emerged: emerging country based multinationals.[3] The rise of this type of multinational initially was explained by their superior ability to substitute imports in protected emerging countries in terms of scale, labour costs, skill and adapted materials (Wells, 1983). It was further argued that EMNCs often use outdated and simpler adapted technology in other emerging countries going down the ladder of the product life cycle to even less advanced countries (Ghymn, 1980; Lall, 1983). In many aspect EMNCs are still believed to enjoy the advantages of experience of operating in harsh institutional environments (Cuervo-Cazzura and Genc, 2008; Dunning and Lundan, 2008) and data indeed shows that such firms mainly establish foreign operations in other emerging countries, most often in their home region (Rugman, 2008, 2009). All in all this pattern of EMNCs investing in other emerging countries seemed to fall within the boundaries of extant FDI theories (Dunning et al., 2008).

Yet, as Fig. 1 illustrates, the outward FDI stock from large emerging countries such as Brazil, Russia, India and China (BRIC) into major advanced countries, such as Germany, Japan, the US and the UK, has increased almost tenfold in the last decade. While in terms of share out of inward FDI, FDI from emerging countries into advanced ones is still modest (about 1.2% in 2010) it is clear that a growing number of EMNCs are establishing operations in advanced countries. Multiple pieces of anecdotal evidence such as Lenovo's takeover of IBM's PC business, Tata Steel's takeover of the Anglo-Dutch Corus Steel, Jaguar, Land Rover and Tetley Tea, Cemex's takeover of large cement companies in Australia, the UK and the US provide further evidence for the growing dominance of EMNCs vis-à-vis AMNCs.

The fact that many EMNCs establish foreign operations in advanced countries seems to contradict extant international business theories. One would expect EMNCs to possess competitive advantages in terms of technology, brands or superior managerial practices (Dunning, 1977, 1988) that will compensate for their liability of foreignness (Hymer, 1976) when operating in more advanced countries. Given that many EMNCs often lack firm specific competitive advantages (Amsden and Chu, 2003; Goldstein, 2007; Nolan, 2004; Mathews, 2006; Ramamurti, 2009a,b; Rugman, 2009) alternative explanations to the rise of EMNCs were sought.

One important explanation refers to the establishment of foreign operations in advanced countries as a vehicle for knowledge

[2] Of course this process is not unique as the following quotation about ancient Rome illustrates. ". . .trading with Empires, picking up new farming techniques from them, receiving their diplomatic subsidies, copying their weaponry and ideologies, and organising yourself to fend off the worst excesses of domination, all pushed forward the sequential emergence of more developed economies and larger state structures in the Germanic and Slavic worlds in the two halves of the first millennium. . . particular groups in the periphery are able to take advantage of the opportunities opened up by the range of new contracts with an imperial neighbour, and this is precisely what we now call a globalization" (Heather, 2013: 294).

[3] The exact definition of EMNCs is not trivial (Goldstein, 2007, Section 2.1). In this paper we refer to multinationals that are managed from an emerging country headquarters as "EMNCs". We acknowledge the fact that this definition may not include all multinationals originating in emerging countries yet it captures the vast majority of such multinationals.

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

asset seeking (Buckley et al., 2007; Cantwell and Barnard, 2008; Dunning, 2006; Dunning et al., 2008; Goldstein, 2007; Luo and Tang, 2007; Mathews, 2002). In other words, EMNCs do not go abroad to exploit existing firm specific advantages but rather to explore new ones (Hoskisson et al., 2000). By establishing a presence in advanced countries, EMNCs gain greater proximity to advanced country firms as means to facilitate the acquisition of superior technological knowledge, marketing advances, or managerial practices. Yet, given the inherent assumption that EMNCs are disadvantaged relative to AMNCs, this explanation falls short in explaining exactly how EMNCs suddenly become able to efficiently absorb the superior capabilities of AMNCs, acquire and in some instances outcompete them.

Other scholars argue that EMNCs build on their country specific advantages such as natural resources or cheap labour. Since access to such production factors in emerging countries is often limited and controlled, EMNCs that are granted privileged access to these factors may build on such resources to create a competitive advantage (Cantwell and Barnard, 2008; Dunning et al., 2008; Rugman, 2009; Williamson and Zeng, 2009). Access to cheap capital because of subsidies, deficiencies in the domestic banking system, family finance or conglomerate cross-subsidisation may also enable the internationalisation of EMNCs (Buckley et al., 2007). While this argument is plausible it has more to do with the ability of EMNCs to compete with AMNCs in emerging markets rather than in advanced ones, and is much less applicable to industries where technology and marketing brands are dominant determinants of competitive advantage.

Other explanations for the rise of EMNCs include: the fact that international operations provide an opportunity to diversify risks and improve flexibility especially in the case of emerging country based business groups (Amsden and Hikino, 1994; Lawrence, 1993; Ramamurti, 2009a), the greater entrepreneurial spirit of EMNCs as compared to more bureaucratic management practices of AMNCs (Amsden, 2009) and late mover advantages when operating in mature mid-tech industries (Ramamurti, 2009b). These explanations, while probably making a good case for specific EMNCs, are hardly generalisable to capture the phenomenon of increased EMNC growth in the advanced country markets.

It follows therefore that the plethora of explanations for the rise of EMNCs does not provide an adequate answer to the questions: *To what extent EMNCs are able to successfully compete with AMNCs?*; and *under which conditions are they able to do that?* In order to answer these questions one has to take into account two major phenomena that have been observed in some of the emerging countries in the recent decade: technological catch up (Perez, 2002) and the growth of domestic markets.

2.1. Technological catch up and domestic market growth in large emerging countries

The accelerated globalization of the last half century in terms of FDI and foreign trade coincided with a technological revolution: the "information revolution" (Perez, 2002). This revolution was led, from its emergence in the early 1970s, by the United States (Perez, 2002). However, in the last decade some emerging countries, such as Brazil, India, China and Russia, have gone through a rapid process of catching up in terms of their share in the world's high technology production and technological advance (Borensztein and Ostry, 1996; Mahmood and Singh, 2003; Naughton, 2007). This has not only resulted from intensive efforts for technology assimilation (Nelson and Pack, 1999) but also from innovation by EMNCs themselves and the establishment of R&D sites in these countries (Athreye and Cantwell, 2007). Large governmental spending on higher education, coupled with legal and economic reforms aimed at increasing competition and securing an effective system of property rights (Peng et al., 2008; Yang, 2003; Yang et al., 2008) are some of the prominent reasons for this catching up process. In many cases, it was the improved technological and macro-economic infrastructure led by the incoming FDI of AMNCs that facilitated this technological catch up (Amsden and Hikino, 1994; Cantwell and Barnard, 2008; Goldstein, 2007; Khanna and Palepu, 2006; Rugman and Doh, 2008).

Table 1 lists the global capabilities (GloCap) index of technological advance (Filippetti and Peyrache, 2011) for selected emerging and advanced countries. The GloCap index is comprised of various technological indicators including: business innovation (patents, business R&D expenditures), knowledge and skills (number of researches, scientific articles published, public R&D expenditures) and infrastructure (number of PCs, internet users, broadband subscribers).[4] The Index relates to the year 2007 and the table also reports its growth rate between 1995 and 2007. Table 1 clearly reveals that while the GloCap index is lower for the selected emerging countries, its average annual growth rate in the 1995–2007 period is significantly higher than that of advanced countries.[5] Indeed, recent data (National Science Board, 2012) reveal that the rate of real growth in R&D expenditures is the highest for Asian countries, headed by China. Asian countries have actually matched the level of R&D expenditures of the US, with overall annual expenditures of about US$ 400 billion.

This catching up process is also one of the triggers for the rapid increase in the income per capita of several large emerging countries, making their domestic markets central in the world's goods markets (Cantwell and Barnard, 2008). Indeed, the differences in income per capita between advanced and emerging countries remain significant (World Bank, 2012), yet the increase in income per capita in large population countries, such as China or India, results in an overall significant increase in such countries Gross Domestic Product (GDP). Table 1 further lists 2010 GDP data (in absolute terms) and GDP growth between 2000 and 2010 for selected advanced and emerging countries. China's Gross Domestic Product (GDP) is second to the US reaching over US$ 5.9 trillion, Brazil is seventh in its ranking with a GDP of over US$ 1.7 trillion (World Bank, 2010).[6]

This trend implies that several emerging economies became attractive for foreign and local investors not only due to their relatively cheap resources but also due to their growing domestic markets. This trend has intensified following the recent financial crisis that virtually led to a halt in GDP growth in advanced countries, while only marginally slowing down the growth rate of emerging countries such as China and India (UNCTAD, 2009). Just as the large domestic markets of advanced countries have been one of the sources for the dominance of such countries' multinationals in the last half century, larger domestic markets are becoming a source of growth to EMNCs. In fact, some scholars predict that Asia's share of the world's total GDP will increase from about 23% in 1970 to 50% in 2050 (Sachs, 2008).

Given the technological catch up of large emerging countries and the growth of domestic markets, a potentially important question is therefore to what extent these factors can explain the

[4] The GloCap index is based on the principles guiding the construction of the ArCo index (Archibugi and Coco, 2004, 2005) but is updated.

[5] In fact, assuming that the average annual growth rates of the listed emerging and advanced countries do not change, one can estimate the time period by which the gap in the GloCap index is to be closed, via the equation: $0.117 \times (1+0.354)^n = 0.604 \times (1+0.069)^n$. In this case $n=7$ (years) represents the timeframe where the GloCap index of the BRIC countries surpasses that of advanced countries, indicating technological catch up.

[6] Assuming that the average annual rates of GDP growth will be retained, the equation $1.7 \times (1+0.074)^n = 2.2 \times (1+0.017)^n$ reveals that the domestic market size of India, for instance, will surpass that of the UK in 5 years.

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

Table 1
Technological capabilities and Gross Domestic Product (GDP) for BRIC and advanced countries.

	GloCap Index (2007)	Average annual change in GloCap Index (1995–2007)	GDP US$ trillions (2010)	Average annual GDP growth rate (2000–2010)
BRIC countries				
Brazil	0.130	30.3%	2.1	3.7%
Russia	0.182	9.5%	1.5	5.3%
India	0.039	38.1%	1.7	7.4%
China	0.078	63.8%	5.9	10.3%
Average	0.117	35.4%	2.8	6.7%
Advanced countries				
US	0.632	6.2%	14.6	1.8%
Japan	0.659	5.8%	5.5	0.9%
Germany	0.605	7.1%	3.3	1.2%
United Kingdom	0.520	8.3%	2.2	1.7%
Average	0.604	6.9%	6.4	1.4%

Sources: Filippetti and Peyrache (2011) and World Bank (2010).

rapid development of EMNCs from large emerging countries in the last two decades (Ramamurti and Singh, 2009; Sauvant, 2008) and how it affects their global value chain location and organisational boundaries.

3. Theoretical framework – global system evolution

The potential outcome and characteristics of globalisation led by EMNCs because of their technological catch up and increase in domestic market size are next demonstrated by introducing a simple model of an economic system producing products that differ in their technological intensity and differentiation. The model builds on the "global system view" perspective (Buckley and Hashai, 2004, 2009; Casson, 2000, chapter 3) and predicts the evolving dominance of advanced versus emerging country origin multinationals as well as the shifting location of R&D, marketing and production activities. Applying a global system view to the theory of internationalisation, the world is modelled as a grid of locations for value chain activities (e.g. R&D, production, and marketing) that are interconnected through knowledge flows. The basic notion of the global system view dates back to Coase's (1937) transaction cost theory. Essentially, each value adding activity can be located in any location and coordinated within a firm or through a market exchange. The number of firms that eventually exist, their location and their organisational boundaries (in terms of value chain activities) is expected to minimise the overall cost of the system as well as the cost for each firm. Equilibrium will not be achieved as long as there is a profit opportunity somewhere in the system that enables actors within it to reduce costs. At one extreme there would be as many firms as the number of potential locations multiplied by the number of relevant value chain activities. At the other extreme, a single multinational would exist and would internalise the whole world system.

The global system model, presented below, analyses optimal location and internalisation choices in the global system before and after technological catch up and a substantial increase in the domestic market size of emerging countries. It enables the prediction of the outcome in the changing dominance of advanced versus emerging country multinationals and their location and internalisation choices across the value chain.

3.1. Specification of the model

Consider an economic system that produces consumer goods. The system is comprised of an advanced country (AD) and an emerging country (EM). Four types of value chain activities are involved: Headquarters (HQ), R&D (R), Production (P)[7] and Marketing (M). AD is assumed to be comparatively abundant with skilled labour; and hence according to the Hecksher–Ohlin–Samuelson (H–O–S) theory it is expected to have a comparative advantage in value chain activities that are "skilled labor" intensive. EM is comparatively abundant with unskilled (or cheap) labour and hence has a comparative advantage in value chain activities that are "unskilled labour" intensive[8] (Ramamurti, 2009b).

The value chain activities are linked to one another by flows of knowledge (denoted by K). Four main types of linkage are identified: K_{HQ-R} – flow of knowledge between the firm's headquarters and R&D, reflecting the role of managerial discretion. K_{R-P} – flow of know-how between R&D and production, K_{M-R} – flow of knowledge between marketing and R&D and K_{M-C} – flow of knowledge between the marketing entity and customers (C). All knowledge flows are two-way. This is because there is always feedback in knowledge flows between different value adding activities. Consistently with extant global system view models (Buckley and Hashai, 2004; Casson, 2000, chapter 3) the flow of knowledge between headquarters, production and marketing is entirely intermediated by R&D.

The location of headquarters (either in AD or EM) represents the origin of the firm (Goldstein, 2007). Each of the other value chain activities (R, P and M) can be located either in AD or EM, hence may be thought of as representing the major bulk of R&D, production or marketing activity taking place in the system. This implies 16 (2^4) alternative location options that are depicted in Fig. 2. Each location option (hereinafter – location configuration) represents a potentially optimal system that includes headquarters, R&D, production and marketing activities, connected via knowledge flows (marked in arrows), that can be located either in AD or EM. Each location configuration may include a maximum of four firms (assuming each activity is performed by an independent firm) and a minimum of one firm (assuming one multinational internalises all value chain activities).

The various cost components of the model are as follows.

3.1.1. R&D costs

The output of an R&D laboratory is an intangible good (such as a patent or technological specification) that can be transferred

[7] Production costs may be considered as "operation" costs making the model also suitable to relate to service (rather than product) providers.

[8] Labour is assumed to be internationally immobile whereas capital is assumed to be internationally mobile and thus has little or no impact on comparative advantage (Casson, 1985).

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

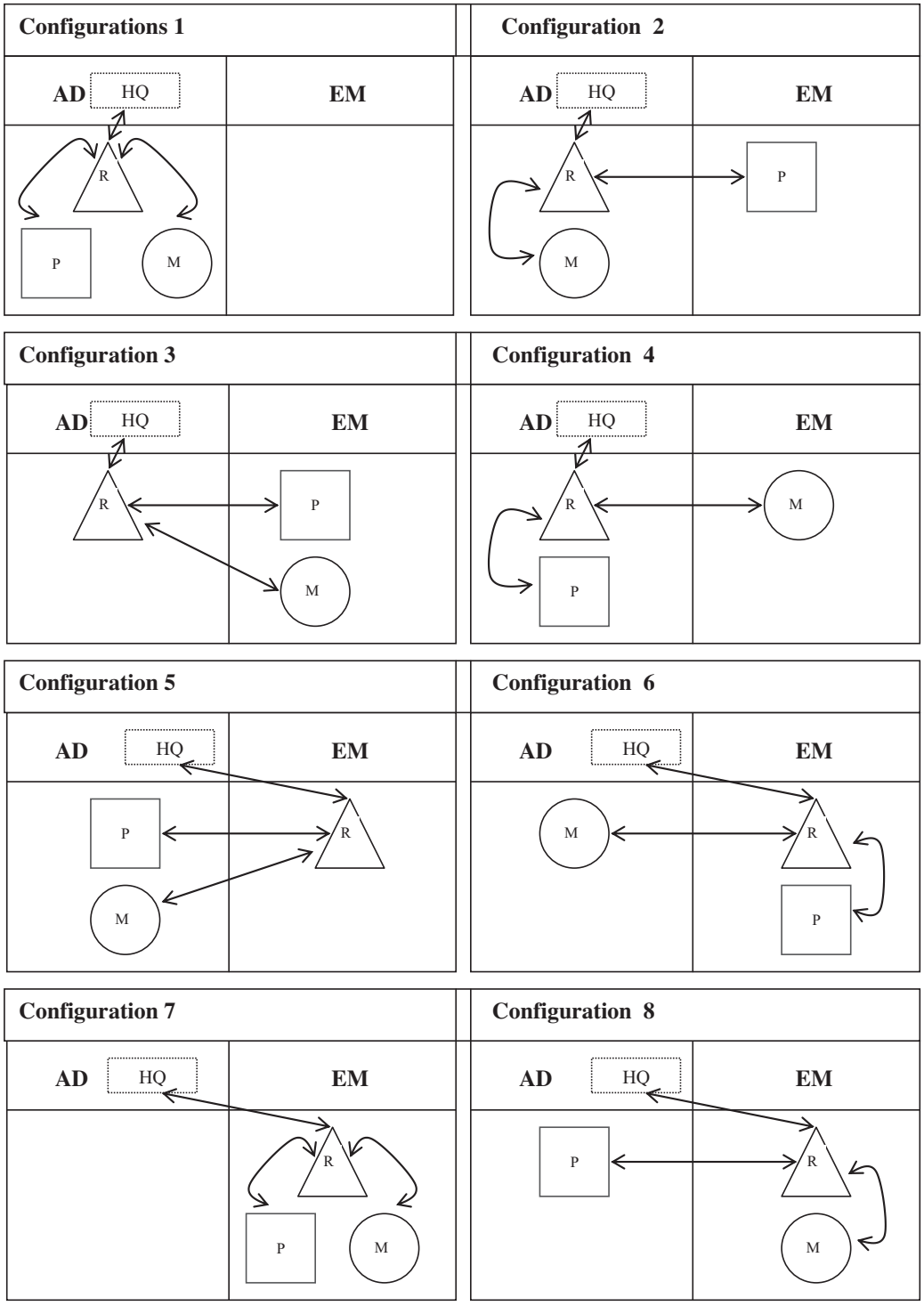

Fig. 2. Alternative location configuration.

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

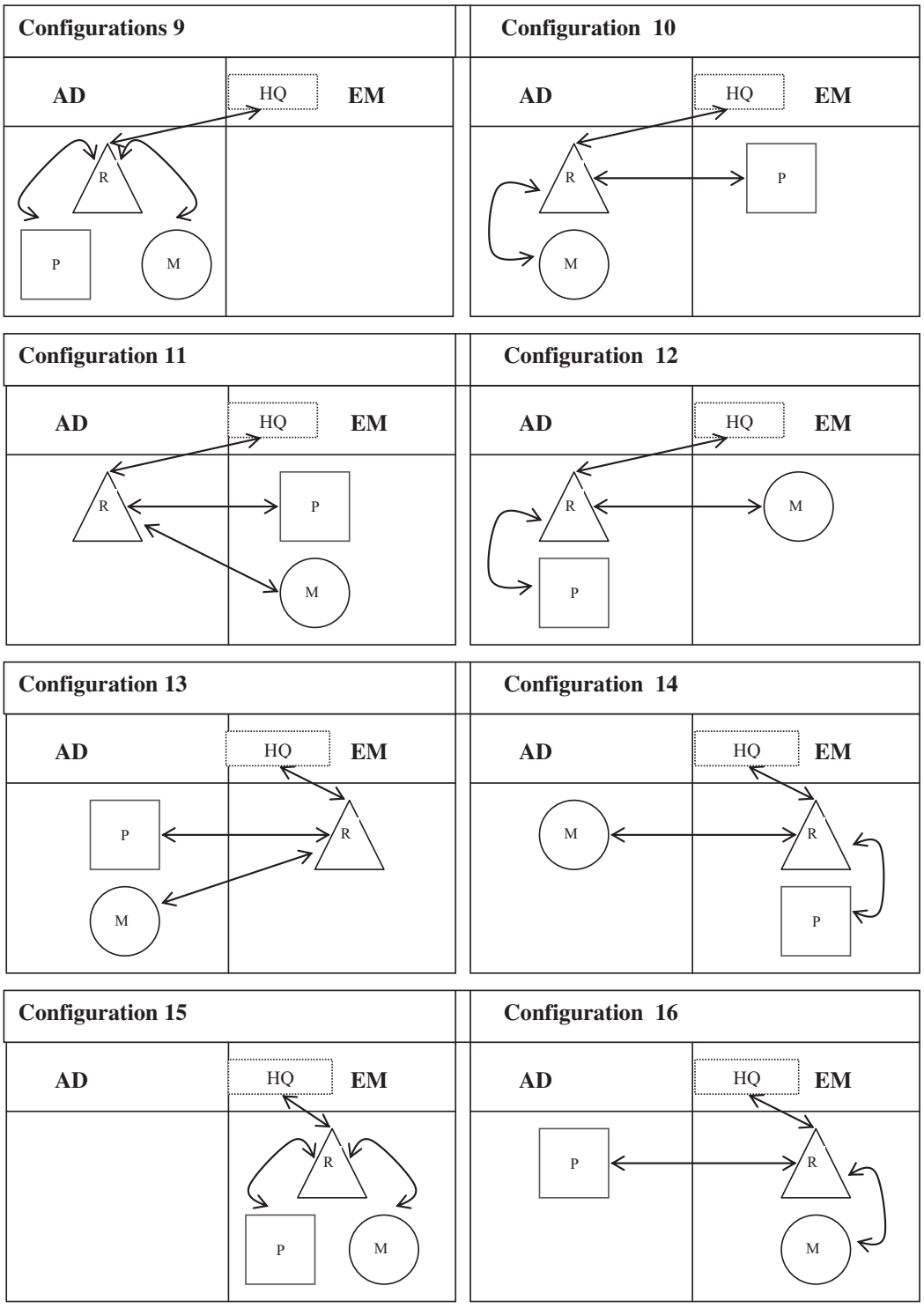

Fig. 2. (*Continued.*)

via K_{R-P} to production sites around the globe. Following Buckley and Hashai (2004) and Adler and Hashai (2007), R&D activities are assumed to incur only a fixed cost. In addition since AD is comparatively abundant with skilled labour it is expected to have a comparative advantage in high value adding activity such as R&D (Mudambi, 2008). Hence, we assume that for a given level of technological output $C_{R,AD} < C_{R,EM}$ (C_R = R&D cost).[9] This assumption is consistent with recent findings on R&D location choices in advanced and emerging countries (Demirbag and Glaister, 2010).

3.1.2. Production costs

Production cost is made up of variable production cost, that is determined by the variable cost of producing and shipping one product unit to end customers (V_i, i = AD, EM), and fixed production costs (F). More specifically, one can determine that: $C_{P,i} = F_i + V_i \times x$; ($C_P$ = cost of production, i = AD, EM, x = number of produced units). Since EM is comparatively abundant with unskilled labour it has a comparative advantage in low value adding activities such as production (relative to R&D, for instance) indicating that: $C_{P,EM} < C_{P,AD}$ (Mudambi, 2008). This implies that, by and large, the cost of producing at EM and shipping products from EM to AD is expected to be lower than the cost of producing at AD and shipping products domestically (Hirsch, 1976). The latter assumption stems from the large production cost differences between AD and EM countries coupled with the sharp decline in international transportation costs and tariff barriers in the few last decades (Adler and Hashai, 2007; Aulakh et al., 2000; Hummels, 2007).

3.1.3. Marketing costs

The cost of marketing is specifically defined as the costs of the interface between the marketing personnel and consumers as well as the cost of supplying post-sale services (including travelling costs and on-going market research cost). Like production costs, marketing costs are a function of fixed and variable costs, as: $C_{M,i} = F_i' + V_i' \times x'$ (C_M = cost of marketing, F' – fixed costs, V' – variable costs, i = AD, EM, x' = number of units sold) where fixed costs include the baseline costs of operating sales offices and customer support centres, while the variable costs represent the fact that the larger the sales volume, the larger the number of employees that will be enrolled in marketing activities. As in the case of R&D, the fact that AD is comparatively abundant with skilled labour indicates that AD has a comparative advantage in high value adding activity such as marketing (Mudambi, 2008). Hence, we assume that $C_{M,AD} < C_{M,EM}$ (C_M = marketing cost). This assumption is consistent with classic views of the comparative advantage of developed countries in the international business and economics literatures (Dunning, 1988, 1993; Flam and Helpman, 1987; Matsuyama, 2000; Volrath, 1991).

3.1.4. Costs of knowledge flows

Geographic boundaries. Knowledge flow costs include communication costs and transaction costs, thus they might be viewed as fixed costs that are higher within the advanced (or emerging) country than across them (Casson, 2000: 67–70; Teece, 1977) because of the effect of liability of foreignness and cultural differences between countries (Contractor, 1990; Hofstede, 1980; Hymer, 1976; Kogut and Singh, 1988). Hence, if we let α denote within country knowledge flow cost and β denote across country knowledge flow cost, we assume that $\alpha < \beta$.

Organisational boundaries. Where firm boundaries are concerned we follow Kogut and Zander (1993), Martin and Salomon (2003) and many others to assume that the more complex products are, the greater the difference between intra-firm and inter-firm knowledge transfer costs. Transaction costs are further likely to increase inter-firm knowledge transfer costs the more technology intensive and differentiated products are due to frequency and specificity effects (Williamson, 1985). On the other hand, specialisation of firms in specific value adding activities as well as the reduction of agency costs through externalisation may reduce inter-firm knowledge transfer costs for low-technology intensive and non-differentiated products (Buckley and Casson, 1976, 1998; Casson, 1994, 2000; Williamson, 1985). Letting, γ denote intra-firm knowledge flow cost and δ denote inter-firm knowledge flow cost, it therefore follows that $\gamma < \delta$ for knowledge flows related to high technology intensive and/or differentiated products and $\gamma > \delta$ for knowledge flow costs related to low-technology intensive and/or non-differentiated products.

3.2. Optimal location and control configurations

3.2.1. Initial global system

A global system is determined by the location of value adding activities (location configuration) and the combination of internalised or externalised activities comprising it (referred to as the control configuration). An *optimal* global system is one that minimises the cost of operations and knowledge flows relative to all other potential systems (Casson, 2000: 65). This view corresponds with the 'economic school' view of internationalisation, explaining patterns of investment in foreign markets is explained by rational economic analysis, according to which firms choose their optimal structure by evaluating the cost of economic transactions (e.g. Buckley and Casson, 1976; Dunning, 1977, 1988, 1993; Hirsch, 1976; Morck and Yeung, 1992; Rugman, 1986), but also extends it to a global system where cost minimisation pertains to the *whole* system and not to a *single* firm (Casson, 2000: 62–63, Buckley and Hashai, 2004, 2009).

According to the above assumptions, the global system is comprised of sixteen alternative location configurations (labelled configuration 1–16 in Fig. 2).[10] Consistently with Fig. 2, configurations 1–8 include headquarters in AD while configurations 9–16 include headquarters in EM.

The total cost of each location configuration can be calculated by summing up the relevant costs of operation (for R, P and M activities) in AD or EM and the relevant knowledge flows between value chain activities and to customers. The configuration(s) with the lowest operation and knowledge flow costs represents the solution of the global system in terms of location optimality. Once the location configuration is determined, the appropriate firm boundaries (or control configuration) may also be determined according to the difference between intra- and inter-firm knowledge flow costs for high and low technologically and differentiated/non-differentiated products (Casson, 2000: 62–63, Buckley and Hashai, 2004). The origin of each firm in the system is mostly determined based on the location of headquarters (either in AD or EM). Yet, possible solutions of the system allow the separation of headquarters from value chain activities, reflecting externalisation (or outsourcing) of specific activities. In this case the location of such value chain activities identifies their home origin.

The easiest way to understand the general properties of the solution is to eliminate the configurations that are dominated by others (i.e. involve higher costs). Initially, we identify the optimal configurations for a global system where a preponderance of the world's market is assumed to be located in AD (as a base case). Taking the year 2000 as our point of departure, and given the sharp differences

[9] Formally, comparative advantage in this case implies that, for instance, relative to production: $C_{R,AD}/C_{P,AD} < C_{R,EM}/C_{P,EM}$ (C_R = R&D cost; C_P = production cost).

[10] Knowledge flows to customers in AD and EM are not shown in Fig. 2.

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

in GDP between advanced in emerging countries in this point of time (World Bank, 2000) the market in AD can be assumed to be considerably larger than that of EM.[11] In the next subsection we compare these configurations to the optimal configurations emerging after a technological catch up on behalf of EM and a substantial increase in its domestic market size have occurred. Table A1 spells out the costs of all operation and knowledge flow costs. Specifically, given that in the initial global system the market in AD is substantially larger than that of EM, in the last column of Table A1 we distinguish between knowledge flow between marketing to customers in the AD larger market (denoted by α or β) and similar knowledge flows to customers in the EM smaller market (denoted by α' or β'). Due to the substantial differences in market size it is taken that in the initial stage significantly less knowledge needs to be transferred to EM, implying that: $\alpha' \ll \alpha$ and $\beta' \ll \beta$.

Based on the assumptions made earlier on operation and knowledge flow costs, we can calculate which configurations dominate other configurations. This domination can be easily calculated from Table A1. For instance, the total cost of configuration 1 equals: $C_{R,AD} + C_{P,AD} + C_{M,AD} + 4\alpha + \beta'$. The total cost of configuration 4 equals: $C_{R,AD} + C_{P,AD} + C_{M,EM} + 2\alpha + 2\beta + \alpha'$. Given that $C_{M,AD} < C_{M,EM}$ and given that $\alpha < \beta$ and that $\alpha' \ll \alpha$ and $\beta' \ll \beta$, the total cost of configuration 1 is lower than that of configuration 4, which in turn implies that configuration 1 dominates configuration 4. The total costs of all the configurations are calculated in a similar fashion revealing that configurations 4, 5, 8, 9, 12, 13, 14 and 16 are dominated by configuration 1, and that configurations 3, 6 7, 10, 11 and 16 are dominated by configuration 2. Thus, we are left with configurations 1 and 2 as two dominant solutions of the initial global system.

The levels of technological intensity and product differentiation determine the organisational boundaries for these location configurations in terms of internalisation and externalisation due to their effect on the relative magnitude of γ and δ as discussed above. For products that are high technology intensive either a domestic AD firm with boundaries spanning $\{HQ_{AD}, R_{AD}, P_{AD}, M_{AD}\}$ for configuration 1 or an AMNC with production activities in EM for configuration 2 $\{HQ_{AD}, R_{AD}, P_{EM}, M_{AD}\}$ emerge as optimal solutions of the system. For products that are differentiated (but low technology intensive) three AD originating firms emerge, with the following boundaries: *firm i*: $\{HQ_{AD}\}$, *firm ii*: $\{R_{AD}, M_{AD}\}$, and *firm iii* which can be either $\{P_{AD}\}$ for configuration 1 or $\{P_{EM}\}$ for configuration 2. Finally for products that are both low-technologically intensive and non-differentiated four AD originating firms, each conducting only a single activity, emerge. These firms have the following boundaries: *firm i*: $\{HQ_{AD}\}$, *firm ii*: $\{R_{AD}\}$, *firm iii* which can be either $\{P_{AD}\}$ for configuration 1 $\{P_{EM}\}$ for configuration 2 and *firm iv*:$\{M_{AD}\}$. The latter configurations represent AD entrepreneur(s) coordinating three different value adding activities where *firm ii* supplies technology to an independent producer (*firm iii*) and *firm iv* markets the product. In all cases, the global system solutions imply that AD based firms translate the comparative advantage of AD in high technology intensive and/or differentiated products into competitive advantages (Mudambi, 2008; Porter, 1990) thus outcompeting EM based firm across the board.

3.2.2. Newly emerging global system

As discussed above two fundamental shifts are likely to change the initial global system. One is the technological catch up on behalf of EMNCs and the other is the increase in the domestic market size of large emerging countries, as a result of the increase in the standard of living in such countries coupled with their large population. In terms of our model, the significant development of technological capabilities in EM implies that EM neutralises AD's comparative advantage in R&D, hence we assume that: $C_{R,EM} = C_{R,AD}$. This assumption is supported by the literature documenting the vast increase in R&D activities in emerging countries in the recent decade (Demirbag and Glaister, 2010; Lewin et al., 2009). Yet, it is noteworthy that this technological catch up does not imply that EM has a comparative advantage in R&D activities nor do EM based firms possess a competitive advantage in product development.

The increase in the relative size of the market in EM relative to that in AD, implies that we can no longer assume that $\alpha' \ll \alpha$ and $\beta' \ll \beta$. This implies that the knowledge flow costs, of both AMNCs and EMNCs, with consumers in EM, become similar to the knowledge flow costs to AD consumers. While in the longer term the increase in the standard of living in emerging countries may also affect the comparative advantage of AD in marketing and that of EM in production, we maintain that these effects are currently still less substantial, as evident from the sharp differences in the income per capita of emerging and advanced countries (World Bank, 2012) and the much larger number of brands possessed by advanced country based firms (Brandz, 2010; WIPO, 2012). We therefore keep our baseline assumptions regarding these value chain activities.

Repeating the comparison of total costs of all configurations, as above, one can note that, in the newly emerging global system, the following configurations are dominated by others: configurations 3, 6, 10 and 11 (by configuration 2), configurations 4, 5, 8, 9, 12 and 13 (by configuration 1) and configurations 7 and 16 (by configuration 15). Thus, we are left with configurations 1, 2, 14 and 15 as optimal solutions of the global system.

The organisational boundaries of configurations 1 and 2 remain identical to those in the initial global system. For the EMNCs (configurations 14 and 15) the levels of technological intensity and product differentiation determine organisational boundaries. For products that are high technologically intensive an EMNC with the following value chain activities: $\{HQ_{EM}, R_{EM}, P_{EM}, M_{AD}\}$ for configuration 14 (where the firm is engaged in FDI in marketing) emerge as the optimal solution of the global system. Alternatively, a domestic EM firm with boundaries spanning $\{HQ_{EM}, R_{EM}, P_{EM}, M_{EM}\}$ for configuration 15, may also emerge as the optimal solution of the system. For products that are differentiated (but low technology intensive) three EM originating firms emerge, with the following boundaries: *firm i*: $\{HQ_{EM}\}$, *firm ii:* $\{P_{EM}\}$ and *firm iii* which can be either $\{R_{EM}, M_{AD}\}$[12] for configuration 14, or $\{R_{EM}, M_{EM}\}$ for configuration 15. Finally, for products that are both low-technologically intensive and non-differentiated four EM originating firms emerge, each conducting only a single activity emerge, with the following boundaries: *firm i*: $\{HQ_{EM}\}$, *firm ii*: $\{R_{EM}\}$, *firm iii*: $\{P_{EM}\}$ and *firm iv* which can be either $\{M_{AD}\}$ for configuration 14, or $\{M_{EM}\}$ for configuration 15. In all cases, the global system solutions imply that EM based firms serve their domestic markets as well as export to the AD countries as competition to the AD based firms FDI in EM. All in all, the global system that emerges, due to the change in relative market size of EM and AD and in the comparative advantage in R&D, is mainly characterised by the addition of EM based firms to the optimal solutions for the global system that was previously relatively more dominated by AD based firms.

3.2.3. Value chain location and control characteristics in the new global system

Our model is quite specific in its predictions regarding the location and control configurations in the newly emerging global

[11] Take for instance the US economy in 2000 with a GDP of US$ 10 trillion, relative to the Chinese economy in that year with a GDP of US$ 1 trillion.

[12] It is noteworthy that this in the only configuration for which the model cannot predict the firm's origin.

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

system. In terms of value chain location, the prediction is that very specific location configurations will dominate others, where AMNCs and EMNCS are expect to differ in their configurations. For AMNCs, the model predicts a continuous dominancy in the location of R&D and marketing activities in advanced countries. In addition, our model predicts that high technological intensity (increasing K_{R-P}) increases the propensity of locating production activities in advanced countries as means to reduce these costs. The main idea here is that AMNCs are likely to face lower liabilities of foreignness due to lower cultural distance and lower differences in technological advance when operating in advanced countries (Hofstede, 1980; Hymer, 1976; Kogut and Singh, 1988; Teece, 1977). This implies that the more technology intensive AMNCs are, the more likely they are to prefer configuration 1 over configuration 2.

For EMNCs our model predicts dominancy in the location of R&D and production activities in emerging countries. In addition, high technological intensity increases the propensity of locating marketing activities in emerging countries, as means to reduce R&D-marketing knowledge transfer costs. The lower liabilities of foreignness EMNCs are expected to face when operating in other emerging countries are likely to drive this prediction. This implies that the more technology intensive EMNCs are, the more likely they are to prefer configuration 15 over configuration 14.

Technology intensity and product differentiation are further expected to substantially impact the control configuration (or organisational boundaries) of both AD and EM based firms. Greater technology intensity is expected to lead to fully integrated firms conducting R&D, production and marketing activities in house. Greater product differentiation is expected to increase the propensity for the emergence of firms with integrated R&D and marketing activities and outsourced production activities.

4. Empirical analysis

4.1. Data

We test the predictions for location and control configuration on data pertaining to the world's largest MNCs from large advanced and large emerging countries for the year 2010 (UNCTAD, 2011). This source contains two separate lists of the top 100 largest MNCs in general and the 100 largest TNCs originating in emerging countries. Given that a central feature of our model relates to domestic market size, we have first screened out from the two lists all MNCs that originate from countries that are not included in the world's top 15 countries in terms of GDP (World Bank, 2012). This has resulted with a list of 139 firms, 79 from advanced countries and 60 from emerging countries.

For these firms, UNCTAD (2011) includes data on total and foreign assets, total and foreign sales and total and foreign employees. We have collected additional data from multiple secondary sources, including: the DataStream and WorldScope databases, web pages and financial reports of the firms, press announcements from Lexis Nexis academics (pertaining to outsourcing and alliance announcements for the time period 2005–2010), United States Patent and Trademark Office (USPTO) (for patent data) and WIPO Global Brands database.

These sources enable us to get detailed data at the MNC level regarding: the prime locations of R&D, production and marketing activities, the extent of outsourcing R&D, production and marketing activities, R&D expenses and number of patents (as two alternative proxies for technological intensity), selling, general and administrative costs and number of brands (as two alternative proxies for product differentiation) and firm age.

4.2. Measures

4.2.1. Dependent variables

In testing predictions regarding location configurations, we use dummy variables for each MNC's main R&D facility, the location of the main production site and the main location of marketing activities. Each such variable receives a value of "0" if it represents location in an advanced country and "1" if it represents location in an emerging country.[13] For testing hypotheses regarding the location of all three value chain activities we use a three cell vector which combines the three variables.

In testing predictions regarding the externalisation or outsourcing of value chain activities, we also use a set of dummy variables for R&D, production and marketing activities. Each dummy variable receives the value "0" if a specific value chain activity (R&D, production or marketing) is mostly conducted in house and "1" if there is an extensive outsourcing or alliance activity in this value chain. Extensive outsourcing and alliance activity is defined as cases where MNCs conduct major parts of a specific value chain activity with a significant partner and/or where MNCs have at least three partners with which they are conducting their activities in a specific value chain activity.

4.2.2. Independent variables

Given the focus of the study on advanced versus emerging country MNCs, we use a dummy measure to indicate whether a given firm originates from an emerging country (receiving the value "0") or an advanced country (receiving the value "1"). The origin of each MNC was determined based on UNCTAD (2011) classifications cross checked against the location of the MNC headquarters to be consistent with our theoretical model.

Our main measure for *technological intensity* is the total number of patents of each firm. The main measure for *product differentiation* is the number of brands it possesses. We further use GDP (2010 data) as a rough proxy for *domestic market size*.

4.2.3. Control variables

We use three control variables that may affect firms' location and control configurations. The first is *firm size*, for which our main measure is the overall assets of the MNCs. The second control variable is firm level of internationalisation, as reflected by the level of *foreign assets* and the third control variable is firm *age*.

4.3. Analysis

In order to test the predictions of our model we conduct several analyses. First we compare the unconditional probabilities for occurrence of configurations 1 and 2 for the AMNCs and configurations 14 and 15 for the EMNCs. Next, we conduct a Probit analysis to determine whether the choice of different locations for R&D, production and marketing activities is correlated with the MNC origin (advanced or emerging country). We further test whether *technological intensity* and *domestic market size* affect such locations, as per our predictions. Finally, we conduct a separate Probit analysis to determine the correlation between *technological intensity* and the probability of MNCs to have fully integrated operations (i.e. internalising R&D, production and marketing) as well as the correlation between *product differentiation* on the probability of MNCs to internalise R&D and marketing activities, but outsource production.

[13] Generally speaking the locations of main value chain activities were determined based on the firms' own reports and represent the locations where the largest number of employees and/or assets exist. Clearly, both AMNCs and EMNCs usually have multiple sites for each value chain activity.

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

Table 2
Descriptive statistics – top AMNCs and EMNCs, 2010 (US$ million).

	AMNCs mean (SD)	EMNCs mean (SD)
N	79	60
Assets	126,855 (104,570)	48,304 (90,369)
Foreign assets	79,952 (76,345)	12,562 (13,747)
Sales	85,311 (78,258)	29,113 (42,850)
Foreign sales	52,956 (48,187)	13,500 (19,384)
Employees (number)	167,125 (254,096)	102,998 (207,189)
Foreign employees (number)	91,361 (103,015)	32,254 (56,015)
Average GDP ($ billions)	4084 (4460)	2101 (1711)
R&D expenses	1888 (2479)	269 (1077)
Patents granted in the US (number)	18,504 (43,949)	3727 (13,995)
Sales, general and administration and expenses	14,082 (12,535)	2833 (4827)
Brands (number)	1896 (2925)	97 (300)
Age (years)	81 (58)	53 (43)

5. Results

Table 2 presents descriptive statistics of the advanced country- and emerging country MNCs. The table reveals that AMNCs are, on average larger and more international than EMNCs in terms of assets, sales and employees. Further, AMNCs are more technology intensive and more products differentiated than EMNCs and are also older.

Table 3 reports the propensity of the analysed AMNCs and EMNCs to choose specific location configuration from the 16 possible configurations detailed in Fig. 2. In order to do so, we have looked separately on the advanced- and emerging country MNCs. The table indicates that the vast majority of AMNCs choose configuration 1 (73%), while the second largest group of firms chooses configuration 2 (10%). Table 3 further indicates that the vast majority of EMNCs choose configuration 15 (66%), while the second largest group of firms chooses configuration 14 (12%). Taken together these results show support to the predictions of the model that configurations 1 and 2 are the most likely to be chosen for AMNCs whereas configurations 14 and 15 are the most likely to be chosen for EMNCs. Table A2 details the breakdown of our MNCs sample based on their chosen location configuration.

To further test the propensity of MNCs to locate their value chain activities according to the predictions of our model, Table 4 analyses the factors affecting the choice of each location configuration for AMNCs relative to EMNCs while also taking into account technological intensity, domestic market size and product differentiation and controlling for firm size, level of internationalizations and age. The eight models in Table 4 represent the 2^3 possibilities for locating R&D, production and marketing activities in advanced versus emerging countries. The AMNC dummy represents the location of these firm's headquarters and tests it against the probability to choose a specific location configuration for R&D, production and marketing. Models 1 and 2 in Table 4 support our prediction that AMNCs are more likely than EMNCs to locate their R&D and marketing activities in advanced countries while locating their production activities either in advanced or emerging countries more than EMNCs. This can be observed by the positive and significant coefficient of the AMNC dummy variable and implies that AMNCs are significantly more likely to choose location configuration 1 or 2. Models 6 and 7 in Table 4 support the view that EMNCs are more likely than AMNCs to locate their R&D and production activities in emerging countries while locating their marketing activities either in advanced or emerging countries (i.e. choose location configuration 14 or 15), as indicated by the negative and significant sign of the AMNC dummy for these models. We did not find any significant differences between location configurations of AMNCs and EMNCs for any of the other configurations.

Models 1 and 2 in Table 4 further show that technological intensity (as measured by the number of patents) is positively and significantly correlated with production location in advanced countries (model 1) and negatively correlated with production location in emerging countries (model 2). Taken together with our previous observations, these results imply that technology intensive AMNCs are the more likely to locate their production activities in advanced countries, as per our predictions. A similar analysis of models 6 and 7 (where firms differ only in the location of their marketing activities) shows that greater technological intensity is expected to lead to the location of marketing activities in emerging countries, while less technological intensity increases the probability of locating marketing activities in advanced countries. Together with the previous result that EMNCs are more likely to choose the relevant location configurations that these models represent, it follows that knowledge intensive EMNCs are more likely to locate their marketing activities in emerging countries than other EMNCs. In addition, models 1, 2 and 7 show that domestic market size is positively associated with the probability of choosing the respective configurations. Given that AMNCs are more likely to choose the location configurations represented by models 1 and 2 and that EMNCs are more likely to choose the configuration represented by model 7, we can see the domestic market size is important for the emergence of MNCs, even within a sample consisting of large countries at the first place. It is noteworthy that domestic market size is insignificant for the second largest group of EMNCs (represented by model 6). EMNCs belonging to this group apparently rely more on export markets, making domestic market size less significant for them. These results are consistent with our predictions showing that both technological intensity and domestic market size are positively affecting the probability of firms from emerging countries to become MNCs. In terms of the control measures Table 4 shows that the firm size, level of internationalisation and firm age are correlated with the probability to choose some loca-

Table 3
Location configuration distribution of the top AMNCs and EMNCs, 2010.

Configuration no.	AMNCs (*N* = 79)	Configuration no.	EMNCs (*N* = 60)
1 (HQ_{AD}, R_{AD}, P_{AD}, M_{AD})	73%	9 (HQ_{EM}, R_{AD}, P_{AD}, M_{AD})	3%
2 (HQ_{AD}, R_{AD}, P_{EM}, M_{AD})	10%	10 (HQ_{EM}, R_{AD}, P_{EM}, M_{AD})	2%
3 (HQ_{AD}, R_{AD}, P_{EM}, M_{EM})	8%	11 (HQ_{EM}, R_{AD}, P_{EM}, M_{EM})	5%
4 (HQ_{AD}, R_{AD}, P_{AD}, M_{EM})	5%	12 (HQ_{EM}, R_{AD}, P_{AD}, M_{EM})	2%
5 (HQ_{AD}, R_{EM}, P_{AD}, M_{AD})	0%	13 (HQ_{EM}, R_{EM}, P_{AD}, M_{AD})	8%
6 (HQ_{AD}, R_{EM}, P_{EM}, M_{AD})	3%	14 (HQ_{EM}, R_{EM}, P_{EM}, M_{AD})	12%
7 (HQ_{AD}, R_{EM}, P_{EM}, M_{EM})	1%	15 (HQ_{EM}, R_{EM}, P_{EM}, M_{EM})	65%
8 (HQ_{AD}, R_{EM}, P_{AD}, M_{EM})	0%	16 (HQ_{EM}, R_{EM}, P_{AD}, M_{EM})	3%

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

Table 4
Probit Analyses for value chain location configurations ($N = 139$).

Probability of:	$\{R_{AD}, P_{AD}, M_{AD}\}$ Model 1	$\{R_{AD}, P_{EM}, M_{AD}\}$ Model 2	$\{R_{AD}, P_{EM}, M_{EM}\}$ Model 3	$\{R_{AD}, P_{AD}, M_{EM}\}$ Model 4	$\{R_{EM}, P_{AD}, M_{AD}\}$ Model 5	$\{R_{EM}, P_{EM}, M_{AD}\}$ Model 6	$\{R_{EM}, P_{EM}, M_{EM}\}$ Model 7	$R_{EM}, P_{AD}, M_{EM}\}$ Model 8
AMNC	.290**	.074**	.185	.012	n.a.	−.057**	−.173**	n.a.
Number of patents	.011*	−.021*	−.032	.120	.008	−.014*	.084**	−.075
Number of brands	.064	.009	.012	.192	.312	.415	−.022	−.081
Domestic market size	.125**	.011*	.003	.005	.061	.012	.134*	.004
Assets	.212*	.018	.005*	.128*	.025*	.052*	.112*	018*
Foreign Assets	.013	.200*	.101*	.079*	.163*	.130	.046	.010*
Age	.016	.022*	.003*	.013*	.020*	.024	.013	.022*
Log likelihood	−71.33	−75.25	−57.76	−59.11	−58.19	−72.66	−77.33	−58.20

Legend: R = R&D; P = production; M = marketing; AD = location in advanced country; EM = location in emerging country. n.a. – variable unavailable (no AMNCs with this configuration).
* Significant at 5%.
** Significant at 1%.

Table 5
Probit analyses for control configurations ($N = 139$).

Dependent variable = probability of:	R&D externalisation (Model 1)	Production externalisation (Model 2)	Marketing externalisation (Model 3)
AMNC	.012	.167	.115
Number of patents	−.325**	−.121**	−.215**
Number of brands	−.101**	−.022	−.089**
Domestic market size	.011	.017	.015
Assets	−.139**	−.225**	−.009*
Foreign assets	−.067*	−.035*	−.012*
Age	−.023	−.005*	−.031
Log likelihood	−82.11	−79.17	−80.23

* Significant at 5%.
** Significant at 1%.

tion configurations. Overall, all the models presented in Table 4 are highly significant in terms of their log likelihood ($p < 0.1\%$).

Finally, Table 5 tests our predictions regarding the outsourcing of value chain activities. Models 1–3 in Table 5 show that *technological intensity* significantly decreases the probability of externalising R&D, production and marketing activities while product differentiation (measured through the number of brands each firm possesses) significantly decreases the probability of externalising R&D and marketing activities. In contrast to the case of value chain activity location, domestic market size does not have a significant effect on the internalisation decision of the analysed MNCs. These results are once again consistent with our predictions. In terms of the control measures, Table 5 shows that the firm size and the level of internationality generally decrease the probability of externalising value chain activities. All three models presented in Table 5 are highly significant in terms of their log likelihood ($p < 1\%$).

We have conducted several robustness tests to the analyses above. First, we have used R&D expenditures as an alternative proxy for *technological intensity*. Second, we have used sales, general and administration costs as an alternative proxy for *product differentiation*. We have further used MNC sales volume and the number of employees as alternative proxies for firm size. Foreign sales and the number of foreign employees were likewise used as alternative internationalisation measures. In all cases results remained unchanged in terms of the factors affecting MNCs' location and control configurations.

6. Discussion

The study analyses the impact of technological catch up on behalf of large emerging countries and an increase in the domestic market of such countries on the relative dominance of EMNCs versus AMNCs. This analysis is based on the observation that the global system is currently in the midst of a technological revolution – the information revolution, where large emerging countries are closing the technological gap with more advanced countries while rapidly increasing their domestic market growth. This phase is particularly interesting given that, despite these changes, emerging countries are still far behind advanced ones in terms of their income levels, hence allegedly preserving their cost based comparative advantages in production.

To present this point of view, we introduce a model, which is empirically tested and verified, that predicts the location of value adding activities and their organisational boundaries in a world comprised of advanced and emerging countries, where the latter experience technological catch up and substantial growth of their domestic market. Essentially, the model predicts that technological catch up and/or an increase in emerging country domestic market size leads to more intensive competition for AMNCs from emerging country based firms. Overall, technological catch up and increase in the domestic market size of emerging countries result in the emergence of quite a different global system than the global system that has dominated since the Second World War – where advanced country based firms had clear hegemony. This system is jointly shared by AMNCs and EMNCs, where the latter mostly cater other advanced and emerging countries through exports.

Given this rise of EMNCs, the model predicts a greater probability of locating R&D and marketing activities in emerging market countries. In this respect, our model supports recent observations that the world's production is gradually moving to emerging countries at the expense of more advanced countries. Yet, the model further shows that an even more important trend might be the greater propensity of locating high value adding activities such as R&D and marketing in emerging countries (Gassmann and Hann, 2004; Li and Zhong, 2003; Von Zedtwitz, 2004).

In terms of firm boundaries, the model predicts that technological intensive firms are likely to choose more internalised configurations, whereas product differentiated firms will prefer to integrate R&D and marketing activities while outsourcing production. This is why we predict that that the newly emergent global system will be centred on focal brand owners that may be termed "the global factory" (Buckley, 2009; Buckley and Ghauri, 2004).

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

Such brand owners will either originate in advanced countries which are expected to preserve their comparative advantage in marketing differentiated products, with strong, familiar brands or they may originate in emerging countries that will enjoy advantages in the marketing of "weaker" brands.

6.1. Main contributions of the model

While the model presented in this paper is extremely simple, it is rich in its predictions regarding the newly emergent global system. In industrial organisation terms, the model allows for the emergence of monopolies (single firm configurations) and competition (multiple firm configurations). In terms of value chain activities the model allows for fully integrated firms (conducting all value chain activities), partially integrated firms (conducting some of the value adding activities) and specialising firms (conducting only a single value adding activity). The model further acknowledges the existence of multiple types of domestic and foreign operations, including: domestic firms serving their own markets and export markets (e.g. configurations 1 and 15 for integrated firms), FDI in production activities (e.g. configuration 2 for an integrated MNC), FDI in marketing activities (e.g. configuration 14 for an integrated MNC), as well as domestic and foreign outsourcing and licensing of technology to third parties (for instance, in control configuration where each value chain activity is conducted separately).

An important insight stemming from our results is that the predicted increased dominance of emerging country based firms in the global system is achieved neither with the possession of a competitive advantage in R&D nor in marketing. This insight implies that even without gaining a competitive (or ownership) advantage (Dunning, 1988, 1993; Porter, 1990) based on technology or brands, firms from large emerging countries where technological catch-up takes place can successfully compete with advanced country based firms. This is an important observation given the fact that many scholars are sceptical regarding the ability of emerging country firms to outcompete advanced country ones because of their lack of ownership advantages (Amsden and Chu, 2003; Cuervo-Cazzura and Genc, 2008; Goldstein, 2007; Nolan, 2004; Ramamurti, 2009a; Rugman, 2009). In practical terms, our model implies that emerging country based firms become able to compete successfully with advanced country based firms when they reach a similar level of technological capability or when their domestic market size increases sufficiently and becomes another important growth source for such firms. Both phenomena do not imply a competitive advantage on behalf of emerging country based firms. Yet, as our results show, this will lead to a global system with an increased dominance of emerging country based firms.

The model presented in this paper demonstrates that while the cost advantages existing in different locations are available to domestic and foreign firms, the difference between international and domestic knowledge transfer costs and that between intra- and inter-firm knowledge transfer costs is the main factor that shapes the organisational and geographical boundaries of firms. Once emerging country based firms catch up on technology (while not achieving a competitive advantage) and once their domestic market size increases sufficiently, making the knowledge transfer from marketing activities located in emerging countries to consumers less costly, they are much better able to compete with advanced country firms. The centrality of knowledge flow costs in determining firm boundaries and competitive advantage is consistent with the view of the internalisation school (Buckley and Casson, 1976; Rugman, 1986), the view of firms as entities that are more efficient in the transfer of complex knowledge (Kogut and Zander, 1993; Martin and Salomon, 2003) and observations regarding the costly cross border flow of knowledge (e.g. Adler and Hashai, 2007; Casson, 2000: 67–70; Fisch, 2004; Hirsch, 1976; Teece, 1977).

In a broader sense, the privileged access that EMNCs have to their home markets relative to AMNCs is also consistent with the predictions of Teece (1986) who, among other things, addressed privileged market access as a central pre-condition for gaining competitive advantage. In fact, to the extent that specific industrial policy measures in emerging countries, such as high tariffs, local content requirements or any other discriminatory measure in favour of EMNCs, are in force, we expect EMNCs originating from emerging countries with large domestic markets to be even more likely to emerge and gain dominancy when competing with AMNCs.

In that respect it is noteworthy that one can reasonably argue that EMNCs may build on their technological catch up to successfully compete with AMNCs, even in cases where their domestic markets are small, by serving foreign markets through exports. Indeed, Lee et al. (2013) show that small-size markets (e.g. Taiwan) may also grow successful MNCs. In terms of our model and empirics, we essentially argue that the ability to cater large domestic markets is complementary to firms' level of technological advance and is not a necessary condition for the emergence of EMNCs. EMNCs from smaller domestic markets will likely require the possession competitive advantages in terms of technology or brands to outcompete AMNCs. On the other hand, EMNCs originating in countries with larger markets may not require possessing such advantages, in order to outcompete AMNCs, due to their relatively more privileged access (e.g. in terms of knowledge exchange with local consumers) to their home markets.

The originality of this modelling as compared to other global system view models is twofold. First, by adding the headquarters function, the current modelling attributes specific origins to firms (in our case advanced versus emerging countries). This allows us to be more specific in our predictions regarding their relative dominance as well as empirically test these predictions. Second, the model goes beyond previous models of the global system (Buckley and Hashai, 2004, 2009; Casson, 2000) by adopting improved predictions on technological intensity and differentiation of products and their comparative statics in terms of location and control configurations.

Given that three out of the four dominant location configurations that the model identifies as dominant configurations indicate serving markets via exports,[14] our model further implies that the emerging global system is likely to be mostly based on foreign trade where exports from emerging country firms are likely to replace or compete with current FDI activities of AMNCs. This insight is important as it indicates a dramatic change in two central global phenomena: (1) the trade balance of advanced countries with emerging ones is likely to become more negative; (2) outgoing FDI from advanced countries to emerging ones is expected to significantly reduce. Taken together the two phenomena may indicate the emergence of a new equilibrium where foreign trade rather than FDI dominates.

The predicted global system is expected to be the basis for a new wave of emerging countries-led globalisation. In order to evaluate which emerging countries are likely to become the leaders, several factors should be considered. One important factor is the institutional environment in such countries. In this respect we expect that emerging countries' institutional environments that promote technological advance and intellectual property rights will be

[14] Note that only configuration 2 indicates FDI in production.

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

Table A1
Costs of alternative location configurations.

Configuration no.	Knowledge flow HQ–R&D	R&D	Production	Knowledge flow R&D–production	Marketing	Knowledge flow R&D–marketing	Knowledge flow marketing–customers
1	α	$C_{R,AD}$	$C_{P,AD}$	α	$C_{M,AD}$	α	$\alpha+\beta'$
2	α	$C_{R,AD}$	$C_{P,EM}$	β	$C_{M,AD}$	α	$\alpha+\beta'$
3	α	$C_{R,AD}$	$C_{P,EM}$	β	$C_{M,EM}$	β	$\beta+\alpha'$
4	α	$C_{R,AD}$	$C_{P,AD}$	α	$C_{M,EM}$	β	$\beta+\alpha'$
5	β	$C_{R,EM}$	$C_{P,AD}$	β	$C_{M,AD}$	β	$\alpha+\beta'$
6	β	$C_{R,EM}$	$C_{P,EM}$	α	$C_{M,AD}$	β	$\alpha+\beta'$
7	β	$C_{R,EM}$	$C_{P,EM}$	α	$C_{M,EM}$	α	$\beta+\alpha'$
8	β	$C_{R,EM}$	$C_{P,AD}$	β	$C_{M,EM}$	α	$\beta+\alpha'$
9	β	$C_{R,AD}$	$C_{P,AD}$	α	$C_{M,AD}$	α	$\alpha+\beta'$
10	β	$C_{R,AD}$	$C_{P,EM}$	β	$C_{M,AD}$	α	$\alpha+\beta'$
11	β	$C_{R,AD}$	$C_{P,EM}$	β	$C_{M,EM}$	β	$\beta+\alpha'$
12	β	$C_{R,AD}$	$C_{P,AD}$	α	$C_{M,EM}$	β	$\beta+\alpha'$
13	α	$C_{R,EM}$	$C_{P,AD}$	β	$C_{M,AD}$	β	$\alpha+\beta'$
14	α	$C_{R,EM}$	$C_{P,EM}$	α	$C_{M,AD}$	β	$\alpha+\beta'$
15	α	$C_{R,EM}$	$C_{P,EM}$	α	$C_{M,EM}$	α	$\beta+\alpha'$
16	α	$C_{R,EM}$	$C_{P,AD}$	β	$C_{M,EM}$	α	$\beta+\alpha$'

more likely to achieve accelerated technological catch up (Peng et al., 2008; Perez, 2002; Yang, 2003; Yang et al., 2008). In addition, countries that promote economic reforms that will lead to an increase in the purchasing power of consumers in such countries (Peng et al., 2008) are more likely to be the source for global firms that become dominant players in the newly emergent global system. Importantly, is its noteworthy that a key argument here is that large domestic market size of emerging countries is a fundamental condition for these countries' EMNCs to become dominant players in the newly emerging global system.

Finally, it should be noted that the current model is limited in its key assumptions. When using the global system view, the model does not take into account possible institutional hurdles to the development of EMNCs such as the need to develop a welfare system, build a stronger intellectual property protection system and be more environmentally friendly (Dunning, 2006; Naughton, 2007). These challenges may well affect the relative costs of conducting R&D, production and marketing in emerging versus advanced countries and hence may affect the predictions of our model. Furthermore, our model assumes that since the costs of cross border transportation and tariff barriers have been reduced significantly relative to the cost of production, in the vast majority of products the cost of production in emerging countries remains lower than the cost of production in advanced countries even after overseas transportation costs and tariff barriers are taken into account. To the extent that this assumption does not hold for specific product categories the predictions of our model should be taken with caution. Our model is also limited in its predictions to firms where R&D activities are central in the intermediation of knowledge between production and marketing activities. This view is perfectly consistent with the extant global system modelling literature (Buckley and Hashai, 2004; Casson, 2000), and further acknowledges the importance of R&D activities in a high technology economy. However, it is noteworthy that different location and control configurations are likely to emerge for firms with no R&D activities or for firms where either production or marketing activities serve as such intermediators.[15] The model and empirical analysis also do not take into account the "knowledge asset seeking" activities of many EMNCs, that locate some of their R&D activities in advanced countries as means to absorb knowledge there (Buckley et al., 2007; Cantwell and Barnard, 2008; Dunning, 2006; Dunning et al., 2008; Goldstein, 2007; Luo and Tang, 2007; Mathews, 2002). While many EMNCs are likely to retain their main R&D activities at home, future studies may expand the current model and take into account new knowledge acquisition in advanced countries as means to gain a more fine grained picture of the global dispersion of R&D (and other value chain activities) of EMNCs.

7. Conclusion

Casual empiricism suggests that emerging countries are beginning to approach advanced countries in terms of shares of world trade, FDI and technological dominance. This paper models the effects of upgraded technology and increases in relative market size of large emerging countries on the emergence of dominant MNCs based in emerging countries. The global system view is shown to be an excellent framework for the analysis of these potentially radical changes in the world economy. This application of model has profound implications for policy in both emerging and advanced countries. As long as emerging countries enjoy comparative advantages in production AMNCs need to specialise more in technologically intensive and highly differentiated products in order to compete with the newly powerful EMNCs. Emerging countries should work to attract R&D and seek to upgrade their marketing capabilities to further increase their global dominance. This paper has utilised the global system view model to trace the impact of upgrading of technological competence and increased market size in large emerging economies on ownership and location in the future global economy. Such a model enables us to take a nuanced and differentiated view of the impact of rising firms from emerging countries in contrast to straight line projections of their growth and potential power. It explains how, even without obtaining a competitive advantage in R&D and marketing, such firms are likely to become dominant players in the global system.

Acknowledgments

We wish to thank Mark Casson, Editor Keun Lee and two anonymous reviewers for comments on earlier drafts.

Appendix.

See Tables A1 and A2.

[15] We wish to thank an anonymous reviewer for raising this point.

Table A2
Classification of MNCs into location configurations.

Configuration 1 (HQ_{AD}, R_{AD}, P_{AD}, M_{AD})	WPP PLC	**Configuration 14 (HQ_{EM}, R_{EM}, P_{EM}, M_{AD})**
General Electric Co	Hitachi Ltd	Lukoil OAO
BP plc	Renault SA	Samsung Electronics Co., Ltd.
Vodafone Group Plc	The Coca-Cola Company	Yue Yuen Industrial Holdings Ltd
Toyota Motor Corporation	Alstom S.A.	Rusal
Volkswagen Group	Barrick Gold Corporation	TPV Technology Limited
EDF SA	BAE Systems plc	CITIC Group
E.ON AG	Pernod-Ricard SA	Shangri-La Asia Ltd
Enel SpA	**Configuration 2 (HQ_{AD}, R_{AD}, P_{EM}, M_{AD})**	**Configuration 15 (HQ_{EM}, R_{EM}, P_{EM}, M_{EM})**
Siemens AG	Royal Dutch Shell plc	Vale SA
Deutsche Telekom AG	Exxon Mobil Corporation	Hyundai Motor Company
Honda Motor Co Ltd	Total SA	China Ocean Shipping (Group) Company[e]
Iberdrola SA	GDF Suez	América Móvil SAB de CV
Pfizer Inc	Chevron Corporation	Tata Steel Ltd
ConocoPhillips	Eni SpA	Jardine Matheson Holdings Ltd
Daimler AG	Schlumberger Ltd	Noble Group Ltd
Ford Motor Company	Alcoa Inc	Petroleo Brasileiro SA
Johnson & Johnson	**Configuration 3 (HQ_{AD}, R_{AD}, P_{EM}, M_{EM})**	Gerdau SA
Mitsubishi Corporation	SABMiller PLC	China National Petroleum Corporation
Sony Corporation	Telefonica SA	Tata Motors Ltd
Wal-Mart Stores Inc	Lafarge SA	New World Development Ltd
EADS N.V.	British American Tobacco PLC	Hindalco Industries Ltd
General Motors Co	Caterpillar Inc	First Pacific Company Ltd
Nissan Motor Co Ltd	AES Corporation	Sinochem Group
France Telecom S.A.	**Configuration 4 (HQ_{AD}, R_{AD}, P_{AD}, M_{EM})**	CLP Holdings Ltd
BMW AG	Rio Tinto PLC	Axiata Group Bhd
RWE AG	Unilever PLC	Fomento Economico Mexicano SAB
Mitsui & Co Ltd	BHP Billiton Group Ltd	POSCO
Procter & Gamble Co	Japan Tobacco Inc	China Resources Enterprises Ltd
International Business Machines Corporation	**Configuration 6 (HQ_{AD}, R_{EM}, P_{EM}, M_{AD})**	Severstal Group Holdings
Hewlett-Packard Co	Linde AG	China National Offshore Oil Corp
Kraft Foods Inc	BG Group plc	Sun Hung Kai Properties Ltd
GlaxoSmithKline PLC	**Configuration 7 (HQ_{AD}, R_{EM}, P_{EM}, M_{EM})**	VimpelCom Ltd
Veolia Environnement SA	Anglo American plc	Swire Pacific Ltd
BASF SE	**Configuration 9 (HQ_{EM}, R_{AD}, P_{AD}, M_{AD})**	Mechel OAO
Ferrovial SA	Suzlon Energy Ltd	Lenovo Group Ltd
Compagnie de Saint-Gobain SA	Techtronic Industries Co Ltd	Sime Darby Bhd
Carrefour SA	**Configuration 10 (HQ_{EM}, R_{AD}, P_{EM}, M_{AD})**	MMC Norilsk Nickel
Deutsche Post AG	Hutchison Whampoa Limited	China Railway Construction Corporation Ltd
AstraZeneca PLC	**Configuration 11 (HQ_{EM}, R_{AD}, P_{EM}, M_{EM})**	ZTE Corp
ThyssenKrupp AG	Petronas – Petroliam Nasional Bhd	Galaxy Entertainment Group Ltd
Fiat S.p.A.	Evraz Group SA	Mobile TeleSystems OJSC
Vivendi SA	Skyworth Digital Holdings Ltd	Reliance Communications Ltd
Tesco PLC	**Configuration 12 (HQ_{EM}, R_{AD}, P_{AD}, M_{EM})**	Lee & Man Paper Manufacturing Ltd
National Grid PLC	Cemex S.A.B. de C.V.	TMK OAO
Merck & Co	**Configuration 13 (HQ_{EM}, R_{EM}, P_{AD}, M_{AD})**	Tata Chemicals Ltd
Schneider Electric SA	Li & Fung Ltd	Sistema JSFC
Dow Chemical Company	Ternium SA	Oil and Natural Gas Corp Ltd
Repsol YPF SA	Tata Consultancy Services	**Configuration 16 (HQ_{EM}, R_{EM}, P_{AD}, M_{EM})**
Sanofi-Aventis SA	Esprit Holdings Ltd	Genting Bhd
Liberty Global Inc	Doosan Corp	Grupo Bimbo SAB de CV

References

Adler, N., Hashai, N., 2007. Knowledge flows and the modelling of the multinational enterprise. Journal of International Business Studies 38 (4), 639–657.

Amsden, A.H., 2009. Does firm ownership matter? In: Ramamurti, R., Singh, V.S. (Eds.), Emerging Multinationals in Emerging Markets. Cambridge University Press, Cambridge, UK.

Amsden, A.H., Hikino, T., 1994. Project execution capability, organizational know-how and conglomerate corporate growth in late industrialization. Industrial and Corporate Change 3 (1), 111–147.

Amsden, A.H., Chu, W.W., 2003. Beyond late Development: Taiwan's Upgrading Policies. MIT Press, Cambridge, MA.

Archibugi, D., Coco, A., 2004. A new indicator of technological capabilities for developed and emerging countries (ArCo). World Development 32 (4), 629–654.

Archibugi, D., Coco, A., 2005. Measuring technological capabilities at the country level: a survey and a menu for choice. Research Policy 34, 175–194.

Athreye, S., Cantwell, J.A., 2007. Creating competition? Globalization and the emergence of new technology producers. Research Policy 36 (2), 209–226.

Aulakh, P.S., Kotabe, M., Teegan, H., 2000. Export strategies and the performance of firms from emerging economies. Academy of Management Journal 43 (3), 342–361.

Bonaglia, F., Goldstein, A., Mathews, J.A., 2007. Accelerated internationalization by emerging markets' multinationals: the case of the white goods sector. Journal of World Business 42 (4), 369–383.

Borensztein, E., Ostry, J.D., 1996. Accounting for China's growth performance. American Economics Review 86 (2), 224–228.

Brandz, 2010. Top 100 Most Valuable Global Brands 2010. Millward, Brown, Optimer.

Buckley, P.J., 2009. The impact of the global factory on economic development. Journal of World Business 44 (2), 131–143.

Buckley, P.J., Casson, M., 1976. The Future of the Multinational Enterprise. Macmillan, London.

Buckley, P.J., Casson, M.C., 1998. Models of the multinational enterprise. Journal of International Business Studies 29 (1), 21–44.

Buckley, P.J., Clegg, L.J., Cross, A.R., Zheng, P., Voss, H., Liu, X., 2007. The determinants of Chinese outward foreign direct investment. Journal of International Business Studies 38 (4), 499–518.

Buckley, P.J., Ghauri, P.N., 2004. Globalisation, economic geography and the strategy of multinational enterprises. Journal of International Business Studies 35 (2), 81–98.

Buckley, P.J., Hashai, N., 2004. A global system view of firm boundaries. Journal of International Business Studies 35 (1), 33–45.

Buckley, P.J., Hashai, N., 2009. Formalizing internationalization in the eclectic paradigm. Journal of International Business Studies 40 (1), 58–70.

Cantwell, J., Barnard, H., 2008. Do firms from emerging markets have to invest abroad? Outward FDI and the competitiveness of firms. In: Sauvant, K.P. (Ed.), The Rise of Transnational Corporations from Emerging Countries – Threat or Opportunity? Edward Elgar, Cheltenham, UK.

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004

Casson, M.C., 1985. Multinational monopolies and international cartels. In: Buckley, P.J., Casson, M. (Eds.), The economic theory of the multinational enterprise. Macmillan, London.
Casson, M.C., 1994. Why are firms hierarchical. Journal of the Economics of Business 1 (1), 47–76.
Casson, M.C., 2000. Enterprise and Leadership: Studies on Firms, Networks and Institutions. Edward Elgar, Cheltenham.
Coase, R.H., 1937. The nature of the firm. Economica 4, 386–405.
Contractor, F.J., 1990. Ownership patterns of US joint ventures abroad and the liberalization of foreign government regulations in the 1980s: evidence from the benchmark surveys. Journal of International Business Studies 21 (1), 55–73.
Cuervo-Cazzura, A., Genc, M., 2008. Transforming disadvantages into advantages: emerging countries MNEs in the least developed countries. Journal of International Business Studies 39, 957–979.
Demirbag, M., Glaister, K.W., 2010. Factors determining offshore location choice for R&D projects: a comparative study of developed and emerging regions. Journal of Management Studies 47 (8), 1534–1560.
Dunning, J.H., 1977. Trade, location of economic activity and the multinationals. In: Ohlin, B., Hesselborn, P., Wijkman, P. (Eds.), The International Allocation of Economic Activity. Macmillan.
Dunning, J.H., 1988. Changes in the level and structure of international production: the Last One Hundred Years. In: Dunning, J.H. (Ed.), Exploring International Production. Unwin Hyman, London, pp. 71–119.
Dunning, J.H., 1993. Multinational enterprises and the global economy. Addison Wesley, Wokingham.
Dunning, J.H., 2006. Comment on dragon multinationals: new players in 21st century globalisation. Asia Pacific Journal of Management 23, 139–141.
Dunning, J.H., Kim, C., Park, D., 2008. Old wine in new bottles: a comparison of emerging-market TNCs today and developed-country TNCs thirty years ago. In: Sauvant, K.P. (Ed.), The Rise of Transnational Corporations from Emerging Countries – Threat or Opportunity? Edward Elgar, Cheltenham, UK.
Dunning, J.H., Lundan, S.M., 2008. Multinational Enterprises and the Global Economy, 2nd edition. Edward Elgar, Cheltenham.
Duysters, G., Jacob, J., Lemmens, C., Jintian, Y., 2009. Internationalization and technological catching up of emerging multinationals: a comparative case study of China's Haier group. Industrial and Corporate Change 18, 325–349.
Filippetti, A., Peyrache, A., 2011. The patterns of technological capabilities of countries: a dual approach using composite indicators and data envelopment analysis. World Development 39 (7), 1108–1121.
Fisch, J.H., 2004. Allocating innovative activities in international R&D with fuzzy logic. Management International Review 44 (3), 147–166.
Flam, H., Helpman, E., 1987. Vertical product differentiation and north-south trade. American Economic Review 77 (5), 810–822.
Gassmann, O., Hann, Z., 2004. Motivations and barriers of foreign R&D activities in China. R&D Management 34 (4), 423–437.
Ghymn, K.L., 1980. Multinational enterprises from the third world. Journal of International Business Studies 11, 118–122.
Goldstein, A., 2007. Multinational Companies from Emerging Economies. Palgrave Macmillan, London.
Heather, P., 2013. The Restoration of Rome: Barbarian Popes and Imperial Pretenders. Macmillan, London.
Hirsch, S., 1976. An international trade and investment theory of the firm. Oxford Economic Papers 28, 258–270.
Hofstede, G., 1980. Culture's Consequences: International Differences in Work Related Values. Sage Publications, Beverly Hills.
Hoskisson, R.E., Eden, L., Lau, C.M., Wright, M., 2000. Strategy in Emerging Economies. Academy of Management Journal 43, 249–267.
Hummels, D., 2007. Transportation costs and international trade in the second era of globalization. Journal of Economic Perspectives 21 (3), 131–154.
Hymer, S., 1976. The International Operations of National Firms: A Study of Direct Foreign Investment. MIT Press, Cambridge, MA.
Khanna, T., Palepu, K., 2006. Emerging giants: building world class companies in emerging countries. Harvard Business Review 84 (1), 60–69.
Kogut, B., Singh, H., 1988. The effect of national culture on the choice of entry mode. Journal of International Business Studies 19 (3), 411–432.
Kogut, B., Zander, U., 1993. Knowledge of the firm and the evolutionary theory of the multinational corporation. Journal of International Business Studies 4, 625–645.
Lall, S. (Ed.), 1983. The New Multinationals: The Spread of Third World Enterprises. John Wiley, Chinchester, UK/New York.
Lawrence, R.Z., 1993. Japan's low levels of inward investment: the role of inhibitions on acquisitions. In: Froot, K. (Ed.), Foreign Direct Investment. University of Chicago for NBER, Chicago.
Lee, K., Kim, B.Y., Park, Y.Y., Sanidas, E., 2013. Big businesses and economic growth: identifying a binding constraint for growth with country panel analysis. Journal of Comparative Economics 31, 561–582.
Lewin, A., Massini, S., Peeters, C., 2009. Why are companies offshoring innovation? The emerging global race for talent. Journal of International Business Studies 40, 901–925.
Luo, Y., Tang, R.L., 2007. International expansion of emerging countries enterprises: a springboard perspective. Journal of International Business Studies 38, 481–498.
Li, J., Zhong, J., 2003. Explaining the growth of R&D alliances in China. Managerial and Decision Economics 24, 101–105.
Mahmood, I.P., Singh, J., 2003. Technological dynamism in Asia. Research Policy 32 (6), 1032–1054.
Martin, X., Salomon, R., 2003. Knowledge transfer capacity and its implications for the theory of the multinational corporation. Journal of International Business Studies 34 (4), 356–373.
Mathews, J.A., 2002. Dragon Multinational: A New Model for Global Growth. Oxford University Press, Oxford/New York.
Mathews, J.A., 2006. Dragon multinationals: new players in 21st century globalisation. Asia Pacific Journal of Management 23, 5–27.
Matsuyama, K., 2000. A Ricardian model with a continuum of goods under non-homothetic preferences: demand complementarities, income distribution, and north-south trade. Journal of Political Economy 108 (6), 1093–1120.
Morck, R., Yeung, B., 1992. Internalization: an event study test. Journal of International Economics 33 (1–2), 41–56.
Mudambi, R., 2008. Location, control and innovation in knowledge-intensive industries. Journal of Economic Geography 8 (5), 699–725.
National Science Board, 2012. Research and Development, innovation and the science and engineering workforce. National Science Foundation, Arlington, Virginia.
Naughton, B., 2007. The Chinese Economy: Transitions and Growth. MIT Press Book.
Nelson, R.R., Pack, H., 1999. The Asian miracle and modern growth theory. The Economic Journal 109, 416–436.
Niosi, J., Tschang, F.T., 2009. The strategies of Chinese and Indian software multinationals: implications for internationalization theory. Industrial and Corporate Change 18 (2), 269–284.
Nolan, P., 2004. China at the Crossroads. Polity Press, Cambridge, UK.
Obstfeld, M., Taylor, A.M., 2002. Globalization and capital markets. NBER working paper 8846. National Bureau of Economic Research, Cambridge, MA.
Peng, M.W., Wang, D.Y.L., Jiang, Y., 2008. An institution-based view of international business strategy: a focus on emerging economies. Journal of International Business Studies 39 (5), 920–935.
Perez, C., 2002. Technological Revolutions and Financial Capital, The Dynamics of Bubbles and Golden Ages. Edward Elgar, Cheltenham, UK.
Porter, M.W., 1990. The Competitive Advantage of Nations. Free Press, New York.
Ramamurti, R., 2009a. Why study emerging country multinationals? In: Ramamurti, R., Singh, V.S. (Eds.), Emerging Multinationals in Emerging Markets. Cambridge University Press, Cambridge, UK.
Ramamurti, R., 2009b. What have we learned about emerging market MNEs? In: Ramamurti, R., Singh, V.S. (Eds.), Emerging Multinationals in Emerging Markets. Cambridge University Press, Cambridge, UK.
Ramamurti, R., Singh, V.S. (Eds.), 2009. Emerging multinationals in emerging markets. Cambridge University Press, Cambridge, UK.
Rugman, A.M., 1986. New theories of the multinational enterprise: an assessment of internalization theory. Bulletin of Economic Research 38 (2), 101–119.
Rugman, A.M., 2008. Theoretical aspects of MNEs from emerging economies. In: Ramamurti, R., Singh, V.S. (Eds.), Emerging Multinationals in Emerging Markets. Cambridge University Press, Cambridge, UK.
Rugman, A., 2009. How global are TNCs from emerging countries? In: Sauvant, K.P. (Ed.), The Rise of Transnational Corporations from Emerging Countries – Threat or Opportunity? Edward Elgar, Cheltenham, UK.
Rugman, A.M., Doh, J., 2008. Multinationals and Development. Yale University Press, New Haven, CT.
Sachs, J.D., 2008. The rise of TNCs from emerging markets: the global context. In: Sauvant, K.P. (Ed.), The Rise of Transnational Corporations from Emerging Countries – Threat or Opportunity? Edward Elgar, Cheltenham, UK.
Sauvant, K.P. (Ed.), 2008. The Rise of Transnational Corporations from Emerging Countries – Threat or Opportunity? Edward Elgar, Cheltenham, UK.
Teece, D.J., 1977. Technology transfer by multinational corporations: the resource cost of transferring technological know-how. Economic Journal 87, 242–261.
Teece, D.J., 1986. Profiting from technological innovation: implications for integration, collaboration, licensing and public policy. Research Policy 15, 285–305.
UNCTAD, 2011. World Investment Report, Geneva.
UNCTAD, 2009. Assessing the Impact of the Current Financial and Economic Crisis on Global FDI Flows. United Nations Publication, New York/Geneva.
Vernon, R., 1966. International investment and international trade in the product cycle. Quarterly Journal of Economics 80, 190–207.
Vernon, R., 1971. Sovereignty at Bay. Basic Books, New York.
Volrath, T.L., 1991. A theoretical evaluation of alternative trade intensity measures of revealed comparative advantage. Weltwirtschaftliches Archiv 130, 265–279.
Von Zedtwitz, M., 2004. Managing foreign R&D laboratories in China. R&D Management 34 (4), 439–452.
Wells, L.T., 1983. Third World Multinationals – The Rise of Foreign Investment from Emerging Countries. MIT Press, Cambridge, MA/London.
Williamson, O.E., 1985. The Economic Institutions of Capitalism. The Free Press, New York.
Williamson, P.J., Zeng, M., 2009. Chinese multinationals: emerging through new global gateways. In: Ramamurti, R., Singh, V.S. (Eds.), Emerging Multinationals in Emerging Markets. Cambridge University Press, Cambridge, UK.
WIPO, 2012. Global Brands Database.
World Bank, 2000, 2010, 2012. World Development Indicators Database, Washington, DC.
Yang, D., 2003. The development of intellectual property in China. World Patent Information 25 (2), 131–142.
Yang, D., Fryxell, G., Sie, A.K.Y., 2008. Anti-piracy effectiveness and managerial confidence: insights from MNCs in China. Journal of World Business 43 (3), 321–339.

Please cite this article in press as: Buckley, P.J., Hashai, N., The role of technological catch up and domestic market growth in the genesis of emerging country based multinationals. Res. Policy (2013), http://dx.doi.org/10.1016/j.respol.2013.11.004