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Knowledge transfer considerations and the future of the internalization hypothesis

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ABSTRACT

The paper demonstrates how the scope of the internalization hypothesis can be extended by an explicit consideration of knowledge transfer costs and requirements. The paper outlines three important routes for advancing the internalization hypothesis: one is by adding a dynamic dimension to the internalization decision, the other is by adding more complexity to internalization decisions and the third is by taking a global system view rather than the traditional single firm view. The paper finally calls for a dynamic modeling of the complexities in knowledge transfer costs within a global competitive setting as a way to further advance the scope of the internalization hypothesis.

1. Introduction

The internalization hypothesis, first introduced in Buckley and Casson's (1976) book "The Future of the Multinational Enterprise" is undoubtly one of the most influential hypotheses in international business research. Yet, while an extremely large bulk of studies has built on the insights of the internalization hypothesis as proposed by Buckley and Casson (1976) or by other variations of the hypothesis (Hennart, 1982, 1993; Rugman, 1981, 1986; Williamson, 1975, 1985) relatively few attempts have been made to expand the scope of the internalization hypothesis. In other words, most extant literature is focused on studying what are the specific cases where market imperfection leads internationalizing firms to internalize their overseas operations and become multinational enterprise (MNEs), while little theoretical advance of the theory itself is offered (see Buckley, 2007, 2009; Chen, 2005 for recent exceptions).

The aim of the current paper is to propose three major directions for the extension of Buckley and Casson's (1976) internalization hypothesis by focusing on the role of knowledge transfer requirements, costs and efficiency. The significance of knowledge transfer efficiency in explaining the emergence MNEs is at the heart of the 'internalization school' which advocates that the failure of external markets to transfer proprietary knowledge motivates firms to establish or acquire wholly owned foreign subsidiaries (Buckley & Casson, 1976; Dunning, 1988; Rugman, 1981, 1986). Furthermore, one of the important contributions of the Buckley and Casson's (1976) book is the opening of the firm's 'black box' and explicitly referring to "intra-firm" and "inter-firm" knowledge and semi-product flows between R&D, production and marketing activities as well as "extra-firm" knowledge and final product flows between the firm and its customers (Adler & Hashai, 2007).

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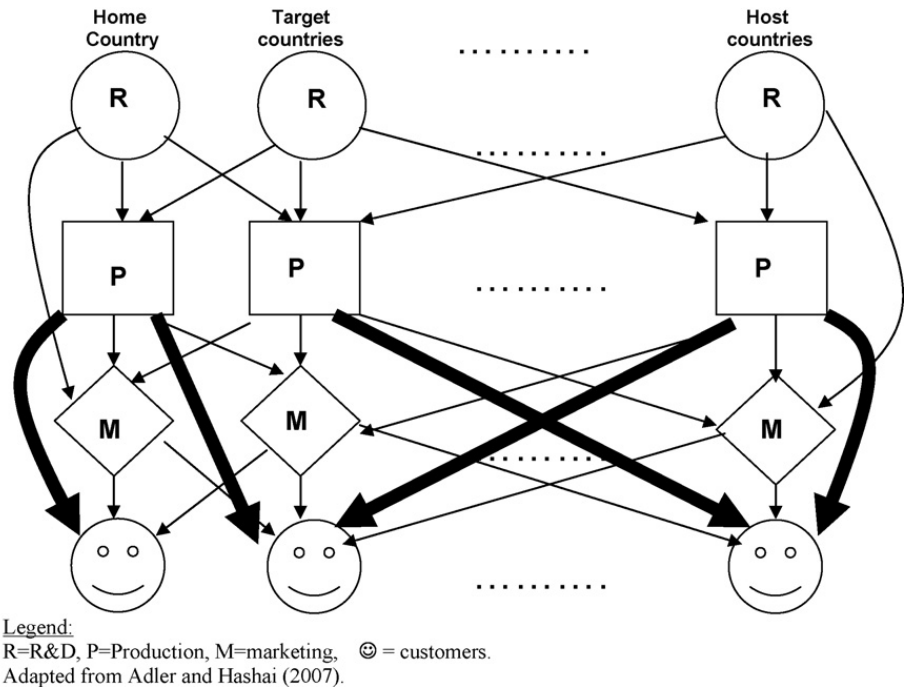

Fig. 1. The MNE as an integrated network in home, target and host countries. Adapted from Adler and Hashai (2007).

In this paper we therefore refer to internationalizing firms as a network composed of three major value chain activities: R&D, production and marketing (see Fig. 1). These activities may be located in the *home* country of the firm, *target* countries where the firm's main markets exist and resource abundant *host* countries where both skilled and unskilled labor costs are expected to be the cheapest (Dunning, 1988, 1993). Intra- and inter-firm knowledge flows between value chain activities include: data on product design, manufacturing instructions and production costs, the transfer of state of the art technological knowledge to the sales personnel, feedback from the sales personnel regarding product design and competitors' technology, information regarding defects in products, competitors' moves, delivery obligations (timing and quantities), production capacity and cost considerations (Buckley, 2007, 2009; Casson, 2000; Kogut & Zander, 1993; Martin & Salomon, 2003). Extra-firm knowledge transfer includes: instruction on specific product attributes, data on tailor-made customer specific utilities, technical support, customers' requests for changes in product specifications and so forth (Almor, Hashai, & Hirsch, 2006; Buckley, 2007, 2009; Hirsch, 1989; Simonin, 1999). All knowledge flows are assumed to flow from upstream to downstream value adding activities and then to customers.

The proposed extensions to the internalization hypothesis are threefold. First, by marrying the literature on knowledge transfer cost and efficiency (Buckley & Casson, 1976; Kogut & Zander, 1993; Martin & Salomon, 2003) with the literature on the impact of fixed and variable cost considerations on the decision whether to export, license or open a foreign production facility (Aliber, 1970; Buckley & Casson, 1981), the paper adds a dynamic perspective to the internalization hypothesis. Next, the paper demonstrates how multiple insights can be garnered into the internalization hypothesis once the operations costs of R&D, production and marketing entities as well as knowledge and product transfer costs are being explicitly modeled. Building on the work of Adler and Hashai (2007) we show how a location allocation model (Daskin, 1995) enables to determine the location as well as internalization of the MNE's value adding activities. Finally, following Casson (2000) and Buckley and Hashai (2004) the paper emphasizes the importance of taking a global system view in internalization decisions by seeking to minimize the costs of all MNEs operating within the system rather than those of a single MNE.

The paper concludes by arguing that future extension of the internalization hypothesis should combine dynamic modeling of knowledge transfer flows within a global competitive setting in order to advance our knowledge on the complex issue of firms' internalization motivations.

2. Adding dynamics to internalization decisions

Over time internationalizing firms are required to decide *where* to locate their R&D, production and marketing activities and which activities to *internalize* or to *externalize* (i.e. – perform outside the firm boundaries through arms-length transactions, licensing or outsourcing). These decisions are expected to be the ones that minimize overall operations, transportation and knowledge transfer costs (Buckley & Casson, 1976; Buckley & Casson, 1998; Hirsch, 1976; Martin & Salomon, 2003; Rugman, 1981). Two major factors are expected to affect the location and internalization decisions: knowledge transfer costs and the ratio of fixed to variable costs.

As noted by Buckley and Hashai (2005a) internalization typically requires up-front investment, which implies high fixed costs, combined with low variable costs, leading to a high fixed to variable costs ratio. By contrast, externalization appears to

be associated with a combination of high variable and low fixed costs (Aliber, 1970; Buckley & Casson, 1981). This difference is expected to hold for R&D (establishing or acquiring an R&D facility usually requires high fixed costs whereas licensing technology often involves the payment of per unit royalties) production (establishing/acquiring a plant vs. outsourcing of production) and marketing (opening a sales office vs. paying commission to agents). Thus, other things being equal, cost minimization considerations are expected to lead firms with low output and sales volumes to favor externalization and firms with high output and sales volumes to favor the internalization of their activities.

Knowledge transfer costs are expected to vary according to three major factors: knowledge complexity, distance and firm boundaries. Firms are engaged in the transfer of knowledge that is at different levels of knowledge complexity and innovativeness. The ratio of both intra- and extra-firm knowledge transfer costs to overall costs for firms transferring relatively more complex and innovative knowledge is expected to substantially exceed that of firms transferring relatively simple, codifiable and teachable knowledge (Almor et al., 2006; Hirsch, 1989; Kogut & Zander, 1992; Kogut & Zander, 1993; Martin & Salomon, 2003; Simonin, 1999). Consequently, it follows that the ratio of operation costs to overall costs of latter group is substantially higher than that of the former implying that one crucial difference between the two types of firms is that knowledge transfer costs considerations are likely to dominate the location and internalization decisions of the former whereas operations cost considerations are expected to dominate those of the latter.

Knowledge transfer cost is further expected to be positively related to distance, especially when cross-border transfer is required (Buckley & Casson, 1976; Galbraith, 1990; Hirsch, 1976; Kogut & Zander, 1993; Teece, 1977, 1981). This expectation is based on the fact that the co-location of activities as well as proximity to the firm's customers are more likely to facilitate formal and non-formal knowledge transfer. Their separation is likely require extensive travelling, involve intensive inter-site communications, incur higher control costs and be exposed to misinterpretations and mistakes (Buckley & Carter, 2004; Casson, 1994, 2000; Galbraith, 1990; Martin & Salomon, 2003; Teece, 1977, 1981; Van den Bulte & Moenaert, 1998).

Finally, inter-firm knowledge transfer costs are likely to exceed intra-firm transfer especially when the knowledge involved is complex and innovative (e.g. Buckley & Casson, 1976; Buckley & Hashai, 2005b; Kogut & Zander, 1992; Kogut & Zander, 1993; Martin & Salomon, 2003; Rugman, 1981). In general, intra-firm organizational bonds are expected to reduce the cost of complex knowledge transfer. Externalization of such knowledge is likely to result in knowledge dissipation costs associated with the misappropriation of transferred knowledge and higher control and monitoring costs to protect firm specific knowledge as well as in higher negotiation and litigation costs (Martin & Salomon, 2003).

It follows then that geographic and organizational boundaries are likely to tax more heavily firms which are engaged in the transfer of relatively complex and innovative knowledge than firms transferring relatively simple knowledge (Kogut & Zander, 1993; Martin & Salomon, 2003). As depicted in Fig. 2, contrary to firms engaged in the transfer of simple knowledge, firms transferring complex knowledge are expected to internalize their activities even at low sales volumes.

Based on the above notions we can portray a dynamic internationalization and internalization model for the two types of firms. During the earliest phase of internationalization of firms transferring relatively complex and innovative knowledge where foreign sales volumes are still low the interaction with foreign customers is limited and so is extra-firm knowledge transfer. On the other hand, intra-firm knowledge transfer, comprised of technological, managerial, production and marketing knowledge (e.g. changes in product specifications to improve the performance of products or to reduce costs), is expected to be intensive (Almor et al., 2006; Vernon, 1966). Hence, in this phase the relative intensity of intra-firm knowledge transfer costs is expected to be higher than that of extra-firm transfer costs. The relative higher intensity of intra-firm knowledge transfer compared to extra-firm knowledge transfer coupled with the high cost of cross-border knowledge transfer costs create pressures to internalize all value chain activities and locate them at home. These knowledge transfer cost considerations are expected to outweigh any location advantages (Buckley, 2007, 2009; Dunning, 1988, 1993) that might exist in locating activities abroad. Over time, when foreign sales grow the relative share of extra-firm knowledge transfer costs in overall costs is expected to increase gradually. This would create pressures to move marketing activities to

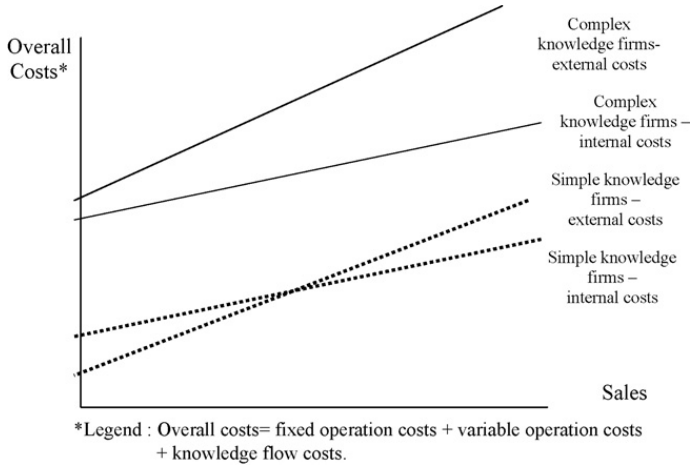

Fig. 2. The impact of operation and knowledge transfer costs on the internalization decision. Adapted from Buckley and Hashai (2005a).

the target country in order to minimize extra-firm knowledge transfer costs (Almor et al., 2006; Buckley, 2007, 2009; Hirsch, 1989; Simonin, 1999). We postulate that at a certain point, where the firm's foreign sales are high enough, the excess costs of separating marketing activities from R&D and production activities become lower than the cost premium which results from the distance between marketing activities and the firm's customers. At this point firms transferring highly complex and innovative knowledge are expected to move marketing activities into target countries. The high knowledge transfer costs of such firms are expected to lead to the internalization of these activities even in case where their sales volume is relatively low (see Fig. 2).

As the foreign sales of firms transferring highly complex and innovative knowledge continue to grow, the intensity of intra-firm transfer costs will increase since marketing, sales and distribution personnel need to transfer customer's feedback to the employees in R&D and production activities. This implies that the separation between marketing activities (located in target countries) and R&D and production (located at home) incurs high intra-firm knowledge transfer costs. In turn, cost pressures will be created to locate R&D and/or production activities in target countries. Once again the cost of transferring such knowledge across firm boundaries implies that such firms are likely to internalize these activities.

In contrast, for firms transferring relatively simple knowledge, operations cost considerations rather than knowledge transfer costs ones are expected to dominate the internationalization process from its inception. Hence, resource seeking considerations (Dunning, 1993), reflected by the relative cost of performing R&D, production and marketing activities across the globe is likely to dominate the location and internalization decisions of such firms. In the earliest phases of internationalization, where the foreign sales volume of this type of firms is still low, the relative importance of production costs is expected to exceed that of marketing and R&D activities. Hence at the earliest phases of their internationalization firms transferring simple knowledge are likely to locate their production activities in host countries where production factors are expected to be the cheapest. Since the knowledge transfer cost of such firms across organizational boundaries is not expected to dramatically exceed intra-firm knowledge transfer cost (Martin & Salomon, 2003), as long as foreign sales are low, foreign production activities are likely to be externalized in order to save on fixed costs. Once the foreign sales volumes of such firms grow, they are expected to internalize their foreign production activities as the relative share of variable costs outweighs fixed costs. In addition, as sales grow, the relative importance of marketing activities is expected to increase and thus these activities are also likely to be internationalized. The relocation of marketing activities to host countries would be facilitated by the relative low cost of labor in these countries (e.g. for the operation of Customer Relation Management (CRM) and customer support centers). The low extra-firm knowledge transfer costs of firms transferring simple knowledge makes the location of marketing activities in target countries less important. Once again, depending on the ratio of fixed to variable costs marketing activities are expected to be first externalized and then internalized. Finally a similar process will occur for R&D activities that are likely to be conducted in host countries (Buckley, 2007, 2009), first in an externalized manner and then internally.

We may therefore portray a dynamic internationalization model based on the logic of the internalization hypothesis coupled with the impact of fixed and variable operations costs. Most firms engage both in the transfer of complex/innovative and simple knowledge and their location and internalization decisions are likely to reflect the relative share of the two types of knowledge. We are therefore likely to see multiple combinations of the two processes portrayed above. Firms that are relatively more engaged in the transfer of complex and innovative knowledge are expected to start out with a concentrated and internalized configuration at home due to their high intra-firm knowledge transfer costs. Over time, when the sales of such firms grow, pressures for externalization are expected to reduce (since the share of variable costs in total operation costs increases) and reinforce internalization pressures created by intra-firm knowledge transfer costs. However, extra-firm knowledge transfer costs are also expected to rise due to the need to interact with an increasing number of customers, leading to the gradual location of all value chain activities in foreign *target* countries.

On the other hand, externalization pressures as a result of high fixed costs when foreign sales are low are expected to exceed those of intra- and extra-firm knowledge transfer costs for firms engaged in the transfer of relatively simple knowledge, leading them to start out with an externalized configuration. Low knowledge transfer costs are expected to lead such firms to internationalize their production activities in their early internationalization phase, and then internationalize marketing activities and finally R&D to the least cost host countries. Over time internalization pressures are expected to increase, as foreign sales grow and the share of variable costs increases, leading to an internalized operation of all value chain activities in *host* countries.

3. Adding complexity to internalization decisions

While the previous section has demonstrated how extant internalization literature can be extended by referring to specific value chain activities and their location and internalization configurations within a setting of home, target and host countries, there is also a clear need to increase the complexity of such decisions. Firms may operate in multiple countries, choose different internalization modes in such countries and hence face considerably complex decisions as to where to locate each of their value chain activities and whether to internalize them or not.

A major step in the direction of adding complexity into location and internalization decisions of MNEs has been recently made by Adler and Hashai (2007). Adler and Hashai introduce an operations research location allocation model (Daskin, 1995) that permits an evaluation of a relatively large number of location and internalization decisions and identifies optimal configurations, based on a specific treatment of intra-, inter- and extra-firm knowledge transfer costs, in addition to other

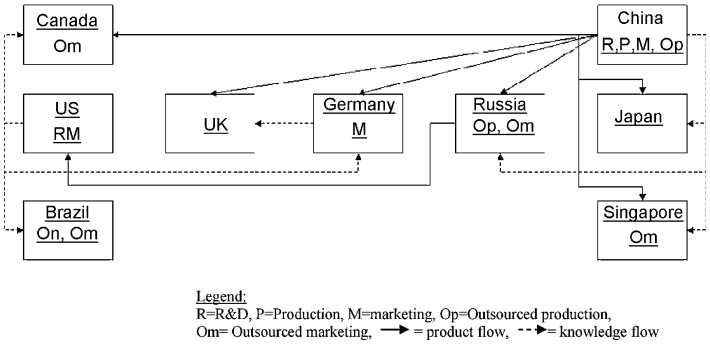

Fig. 3. Location and internalization configuration. Adapted from Adler and Hashai (2007).

costs. Through the integration of knowledge transfer costs into a location allocation model, Adler and Hashai (2007) were able to simultaneously evaluate a large number of variables, yielding optimal location and internalization configurations.

Adler and Hashai (2007) have looked for solutions that allow for the minimization of the MNE overall costs as means of profit maximization (Buckley & Casson, 1976; Hennart, 1982, 1993; Hirsch, 1976; Martin & Salomon, 2003; Rugman, 1981). Analyzing a world comprised of nine countries located in three continents (United States, Canada and Brazil in America, United Kingdom, Germany and Russia in Europe and China, Japan and Singapore in Asia) Adler and Hashai were able to demonstrate the impact of knowledge transfer costs on location and internalization configurations of MNEs. By using macro level data several computational experiments were conducted, yielding multiple insights in terms of the location and internalization contingencies faced by MNEs (see Fig. 3 for one of the location and internalization scenario portrayed in the model). Given the input data used by Adler and Hashai (2007) Fig. 3 demonstrates a specific location and internalization configuration which specifics in which countries Should R&D, production and marketing activities be located and whether these should be internalized or outsourced.

Overall, in terms of location Adler and Hashai (2007) show that: (1) high knowledge transfer cost and high knowledge intensity increase the dispersion of activities relative to low knowledge transfer costs; (2) MNEs in growing industries have a more concentrated configuration than those operating in mature industries which are in turn much more regional in scope (Rugman & Verbeke, 2004); (3) China is not only an attractive location for production but also for R&D, while Russia has the potential to attract R&D activities, due to its skilled labor abundance; (4) the location configuration of Japanese MNEs is less affected from China's dominancy compared to American or European MNEs. In terms of internalization configurations Adler and Hashai (2007) show that: (1) outsourcing enables MNEs to be more dispersed due to lower costs; (2) relatively high knowledge transfer costs increase internalization of activities within the MNE (Gupta & Govindarajan, 2000; Kogut & Zander, 1993; Martin & Salomon, 2003) and (3) relatively small knowledge intensive firms gain global presence through outsourcing albeit their limited budget.

The framework of Adler and Hashai (2007) advances the modeling of MNEs within international business literature as it offers a coherent platform to test and confront different theoretical perspectives and empirical observations regarding the location and internalization configurations of MNEs. This modeling approach enables to explore directions that we otherwise could not. More specifically, the location allocation model of the MNE proposed by Adler and Hashai (2007) enables a much more rigorous and complex, but still solvable, analysis of the location and internalization dilemmas facing MNEs. Such modeling enables to step outside the box of conventional home/host country models and combine market-, resource-, knowledge- and efficiency-seeking (Dunning, 1988, 1993) motivations within a single conceptual model. It handles the difficult task of simultaneously analyzing the impact of a substantial number of location and internalization configurations, with a special emphasis on intra-, inter-, and extra-firm knowledge flows, in order to obtain a complete picture of MNEs' location and internalization strategies.

4. Adopting a global system view

The basic notion of the global system view dates back to Coase's (1937) transaction cost theory. Essentially, each value adding activity portrayed in Fig. 1 can be located in any location. The number of firms that would eventually exist, their location and their organizational boundaries (in terms of the value adding activities) is expected to minimize the overall cost of the system as well as the cost of each firm. This means that one should not refer to the decision of a specific firm whether to internalize a given value adding activity or not (as implied by the work of Dunning, 1988, 1993; Williamson, 1975, 1985), but rather that there is a system that aims to minimize its costs and thereby determine the organizational boundaries of the firms operating within the system. At one extreme there would be as many firms as the number of potential locations multiplied by the number of relevant value adding activities (each firm performs one activity in one location). At the other extreme, a single MNE would exist and would internalize the whole world.

As noted by Casson (2000), few attempts have been employed to incorporate a global system view in the location configuration of firms (i.e. the location of various value adding activities) and in their internalization configuration (i.e. the mode of control exerted for each value activity). This has probably resulted from the fact that applying the global system

view to the internalization hypothesis is complex, as the number of possibilities tends to 'combinatorically explode' (Casson, 2000). Nevertheless, as demonstrated by Casson (2000) and Buckley and Hashai (2004) several simplifying assumptions, that do not affect outcomes, enable the global system view to be employed and yield predictions regarding the location and internalization configuration of a system of firms given specific product characteristics such as relative transportation costs to overall costs, knowledge intensity and economies of scale (Buckley & Hashai, 2004).

The basic notion of the global system view is that the location and internalization decisions of firms are the outcome of equilibrium in two competitive markets—the market for capital and the market for managers (Casson, 2000; Coase, 1937). The success of entrepreneurs in bundling resources into firms will be determined by their success to raise funds. The capital market will allocate funds only to firms that are believed to have the "right" boundaries. Thus, entrepreneurs will have to widen or narrow the boundaries of their firms according to the capital market signals. Similarly, if managers' incentives are tied to profit maximization, they will aim to maximize the profit of their firm by determining its optimal boundaries. Otherwise they may lose their jobs to mangers that will do so. Hence, the competition for funds and managers will eventually be the driving force that determines firms' location and internalization decisions.

While Buckley and Casson's (1976) book explicitly refer to the global system view as the major vehicle by which the geographic and organizational boundaries of firms are determined, subsequent work in this area (e.g. Dunning, 1977; Dunning, 1988; Rugman, 1986) focuses only on the firm's individual decision of its operations' location and internalization, while ignoring the fact that such decisions are actually driven by powerful external sources—the discipline to the markers for capital and managers. Moreover, the global system view approach requires referring to a grid of interconnected value adding activities (as depicted in Fig. 1) rather than treating the firm as a "black box". Pertaining only to a single firm point of view may lead to misleading predictions regarding internalization decisions as it neglects some of the potential outcomes. For instance, as noted by Buckley and Hashai (2004) taking a single firm point of view, relatively small technology based firms face the dilemma whether to externalize operations by selling core technology to indigenous firms in target markets or to internalize operations and focus on a small market niche where their size constraint makes them less disadvantaged compared to larger firms. Nevertheless, in many cases such firms simply seek to be bought out by larger firms. This strategy is driven by the capital market (either venture capital funds or stock exchanges) that rewards firms for such a strategy by enabling them to raise required funds. It is further driven by the market for managers that rewards managers for being able to sell their firm successfully (e.g. by bonuses or by the fact that the value of shares or options they hold will increase once their firm is sold out). Thus, contrary to a single firm point of view, adopting the global system view is likely to reveal that the activities of such firms should be internalized within the operations of another firm.

5. Discussion and conclusion

This paper highlights three major directions in which the role of knowledge transfer costs and requirements may help to extend the insights of the internalization hypothesis: one by making it dynamic, the other by increasing the complexity of analysis and the third by adopting a global system view.

In terms of dynamics the choice between alternative boundaries is argued to be the outcome of a systematic evaluation of fixed and variable operation and knowledge transfer costs, seeking to minimize the costs of internationalizing firms. Not only does this approach enable to step out of the conventional static notion of the internalization hypothesis, but it also goes beyond extant models of internationalization (e.g. the stages model, Johanson & Vahlne, 1977; Johanson & Vahlne, 1990) in several directions. First, it relates to three types of countries: a home country, foreign target countries and host countries. Hence, the proposed approach enables to capture a more realistic view of the dilemmas facing internationalizing firms than those of extant models which usually only consider the home and target markets of an internationalizing firm, thereby neglecting resource seeking motivations for internationalization (Dunning, 1993). Second, by focusing on the impact of knowledge transfer costs and fixed and variable costs one can identify the triggers that allow a firm to move from one stage of internationalization to another, whereas the traditional stages model (Johanson & Vahlne, 1977; Johanson & Vahlne, 1990) is often criticized for not identifying such triggers (Andersen, 1993, 1997). According to this view, changes in the magnitude of fixed and variable operation costs and in intra- and extra-firm knowledge transfer costs, as the foreign market of an internationalizing firm grows, are dominant determinants of the dynamics in the location and internalization decisions of such firms. Third, the proposed approach highlights the difference in the internationalization process of firms in light of the knowledge complexity and innovativeness of their product portfolio, distinguishing between the pattern of internationalization of firms engaged in the transfer of relatively complex and innovative knowledge and firms transferring relatively simple knowledge. The differences in the relative magnitude of knowledge transfer costs and operations costs of the two types of firms trigger different dynamics in their location and internalization decisions, leading to less deterministic internationalization patterns than that proposed by the stages model.

In terms of increasing the complexity of the internalization hypothesis, the proposed modeling approach seems to offer a rich arena for empirical research comparing the actual location and internalization configurations chosen by MNEs to the ones predicted by the model. The main challenge in this case would be to collect data on knowledge transfer costs, since such intangible data is usually not documented by firms. Nevertheless, some attempts have been made to collect data on knowledge flows and knowledge transfer costs at the firm level (Galbraith, 1990; Sosa, Eppinger, Pich, McKendrick, & Stout, 2002; Teece, 1977; Van den Bulte & Moenaert, 1998), looking at telephone communications, e-mails, face to face communications and travelling costs, thus this is certainly not an impossible task. Naturally, there is a wide range of

potential additional possibilities to increase the complexity of the internalization decision. For instance, the model of Adler and Hashai (2007) can be easily extended to relate to more than three value adding activities (Porter, 1985). Similarly, specific activities may be broken into independent sub-activities to represent phenomena such as the division of labor during different production stages (Buckley, 2007, 2009) and hence also include the impact of tariffs and exchange rates on production costs at each country. Another extension to the proposed model would be to incorporate horizontal knowledge and product flows between value adding activities of the same type, in addition to the vertical ones already included.

Adopting the global system view approach does not only lead to more accurate internalization predictions but also highlights one of the shortcomings of extant internalization literature. The point of departure of most extant internalization literature focuses on cost minimization considerations of an individual MNE as means for profit maximization. This focus opposes the basic notion of the global system view which argues that in order to reach equilibrium it is the costs of the global system that have to be minimized and not the costs of a single MNE. Moreover, all extant internalization research including studies adhering to the global system view take the stand of cost minimization. The cost minimization assumption views firms as "price takers" in the sense of Cournot-type competition whereas in reality firms aim to maximize profits where prices and quantities of production may be set in parallel.

This implies that cost minimization is not always a necessary and sufficient condition for profit maximization and that a more explicit modeling of MNEs' location and internalization decision in light of their competition should be done in order to advance our knowledge on the various determinants of these decisions. The competition between different types of MNEs aims to satisfy consumer utility, in terms of price and quality, in terms of country of origin preferences, in terms of service provision efficiency and so forth. This competition is likely to affect the survival probability of MNEs and their performance. Hence such competition may directly affect location and internalization decisions. Furthermore, since different prices and locations may affect consumer utility, it is unlikely that competitors' decisions can be ignored when making their location and internalization decisions. Adding game theoretic models to the location allocation models sued by Adler and Hashai (2007) seems to be the most promising way to explicitly model the impact of competition between MNEs on their location and internalization decisions. Given multiple players in the market, such game theoretic modeling should be able to show how MNEs choose in the first stage whether to play or not and in the second stage, the optimal quantities and prices of products and where they should be produced and marketed. The sub-game perfect Nash entry equilibrium derived from such modeling should be able to predict which of the competing MNEs are likely to survive in the market and their respective location and internalization decisions. The model should be capable of simultaneously assessing multiple location, allocation and internalization decisions, while taking into account the impact of competition on these variables.

Once an explicit modeling of competition and its affect on location and internalization decisions of MNEs is derived, the next stage should probably be to add extend the internalization hypothesis by combining the three major directions proposed in this paper. This means introducing a *dynamic* model that captures the *complexity* of MNEs' location and internalization decisions in a global *competitive* setting. This would require adding the game theoretic and location allocation modeling discussed above dynamics considerations. Such considerations would be to refer to sequential periods where in each period competing MNEs need to maximize their profits by selecting the optimal location and internalization configurations and taking into account, in addition to all the parameters detailed above, the costs of opening up new facilities and shutting down old ones and the costs of entering new modes of operation or existing from such modes as a function of changes in demand, operation costs and so forth in subsequent periods. This approach would probably involve solving a repeated game which would be substantially more complicated to develop and analyze and also probably lead to a considerable number of potential equilibria solutions. Thus, much remains to be done to promote our understanding of the role of knowledge transfer considerations in the refinement of the internalization hypothesis.

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