The Theory of the Multinational Enterprise from a Supply Chain Perspective

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Abstract

This paper offers an integrated analysis of out-sourcing, off-shoring and foreign direct investment within a systems view of international business. This view takes the supply chain rather than the firm as the basic unit of analysis. It argues that competition in the global economy selects supply chains that maximise the joint profit of all the firms in the chain. The systems view is compared with the firm-centred view commonly used in strategy literature. The paper shows that a firm's strategy must be embedded within an efficient supply chain strategy, and that this strategy must be negotiated with, rather than imposed upon, other firms. The paper analyses the conditions under which various supply chain strategies - and by implication various firm-level strategies - are efficient. Only by adopting a systems view of supply chains is it possible to determine which firm-level strategies will succeed in a volatile global economy.

Keywords

International, Strategy, Supply Chain, Off-Shoring, Out-Sourcing, Coordination

1. Introduction

There are two main perspectives on international business (IB) strategy in the literature. The first view is firm-centred; it focuses on the competitive advantages of an individual firm, and the way that these advantages influence its strategy and structure. Building on Dunning's eclectic theory (Dunning and Lundan, 2008), the firm-centred view addresses issues of strategic alliances, cross-cultural management, subsidiary autonomy, and so on (Cantwell and Mudambi, 2005). The second view is the systems view, which focuses on the firm's environment as well as on the firm itself (Casson, 1990; Buckley and Hashai, 2004). The unit of analysis is the global production system. Building on internalisation theory (Buckley and Casson, 1998; Rugman, 1981), the system view examines how far linkages within the global system will be coordinated by multinational enterprises (MNEs) rather than markets. The system view highlights the strategic importance of interactions between product flow and knowledge flow (Adler and Hashai, 2007). It identifies the characteristics of technologies, products and locations that stimulate the emergence of MNEs and encourage the flows of foreign direct investment (FDI) associated with them.

The evolution of global supply chains is an important development of the last twenty years (Buckley and Ghauri, 2011), but it is not always recognised that this

phenomenon appears rather different from these two points of view. From a systems perspective, international supply chains are the basic building blocks of the global production system; an individual supply chain for a particular product is a microcosm of the system as a whole. Within a supply chain, the strategies of individual firms are inter-dependent; firms compete when they plan to control the same part of the chain, and co-operate when they plan to control different parts of the chain. Thus one firm's strategy may be dictated, at least in part, by another firm's strategy. If neither firm is dominant then strategy may have to be negotiated rather than imposed. If one firm is dominant then, according to the systems view, the structure of the supply chain will influence which firm this is likely to be.

By contrast, the firm-centred view typically takes the strategies of other firms as given. It suggests that the dominant firm will normally be the firm with the greatest advantage. Contrary to this, the systems view suggests that advantages are context-dependent. According to the systems view, the way that firms in a supply chain behave is determined by the structure of the chain, while the firm-centred view suggests that the structure of the chain is dictated by the strategies of the firms.

The firm-centred view is useful for business school teaching and strategy consulting, because the theory is developed from the perspective of a manager of an individual firm. The systems view, however, is more appropriate for addressing long-term global issues of concern to managers of all firms of whatever type. The systems view takes a more detached and distant view that embraces the entire global economy. It focuses, not on any individual firm, but on the entire population of firms – both existing firms and potential firms – that interact through competition and cooperation to coordinate the global economy. According to the systems view, existing types of firm can disappear, and new types of firm emerge, in response to radical changes in global conditions; the firm-specific view, by contrast, focuses on more incremental adjustments made by existing firms.

The systems view is best explained through economic modelling. Formal modelling is the only way to analyse the interactions within a supply chain in a transparent and rigorous manner. This paper summarises recent work on this topic and considers its implications for the theory of the MNE.

2. Principle of supply chain coordination

According to Coase (1937), firms emerge because of the cost of using the market. If there were no cost of using the market then there would be no firms. The existence of firms, on this view, cannot be merely assumed, but must be analysed as an institutional response to the costs of the market. Management is a response to transaction costs. As a result, the number, size and scope of firms are endogenous.

The boundaries of firms within a given economy must be consistent with each other. The ownership and location of different firms must be maintained in an institutional equilibrium. When the boundaries of one firm change, the boundaries of other firms must adjust. While these interdependencies are recognised in the literature they have

never been formally analysed at an industry level. This paper provides a step in this direction.

In Coase's view the business system comprises a complex set of inter-related activities. Individual activities are created by a division of labour, in which a given production process is split into many stages, so that final product is delivered to customers through a supply chain. Within an advanced economy there are numerous supply chains, each converting specific types of raw material into specific types of good.

Supply chains must be coordinated either by managers or markets, or a combination of the two. Competition will select the most efficient mix of modes, in which inefficient combinations of modes are driven out by the most efficient one. When transaction costs are high an entire supply chain may be coordinated by a single vertically integrated firm, whereas when markets are efficient the supply chain may be coordinated entirely by arm's length trade between independent firms, each of which controls just a single stage of production. When transaction costs are greater at certain stages of the chain than others, the stages with high transaction costs will be internalised within vertically integrated firms, and arm's length trade will be confined to stages with low transaction costs where the integrated firms at adjacent stages trade with each other.

When different stages of production are located in different countries, international supply chains are created. The more sophisticated the division of labour, the greater will be the degree of specialisation, the proliferation of activities, and the number of locations at which activities can be carried out. An MNE is created when activities based in different locations are integrated within the same firm. On this view, MNEs emerge to coordinate particular portions of supply chains, and they emerge at the same time as other firms which coordinate other parts of the same supply chain. These other firms may be single-country firms, or they may be MNEs as well. Firms controlling one part of a supply chain will have to negotiate with firms controlling adjacent parts of the supply chain, since neither can operate successfully without the other.

Coase's analysis therefore poses a major challenge to scholars who propose to analyse either the global economy or an individual supply chain in terms of the strategies of individual firms. Modern IB literature normally examines supply chain coordination from the perspective of a single dominant firm (the 'channel leader') that either owns and controls the entire chain or subcontracts selected stages to passive subcontractors. From a Coasian perspective it is the supply chain as a whole, rather than the individual firm, that is the appropriate unit of analysis.

It might be thought that focusing on the supply chain as a whole rather than on the participating firms would diminish the practical relevance of the theory, but the reverse is actually the case. Supply chain analysis can enrich understanding of the behaviour of individual firms because it examines interactions between them – unlike conventional theory, which often takes the environment of each firm as a given.

3. Modelling supply chains: general observations

Within a supply chain the ownership of different activities is interdependent, for bringing different activities under common ownership affords economies of internalisation. Locations are interdependent too; relocating an intermediate activity closer to an upstream activity may make it further from a downstream activity and vice versa. For any given activity, ownership and location are interdependent, because relocating an activity can change a domestic owner into a foreign owner and vice versa. Interdependencies may be quite complex; if an intermediate stage is sandwiched between an upstream stage and a downstream stage owned by different firms, then the upstream linkage cannot be internalised without externalising the downstream linkage, and vice versa, unless ownership of the upstream and downstream activities are themselves combined.

Casson and Wadeson (2012a) (CWa hereafter) have recently analysed these issues within in a simple context: a supply chain comprising just R&D, production and a set of customers. Their analysis reveals that the set of strategies available for international supply chain coordination is wider than supposed. Conventional theory identifies three strategies: exporting, import-substituting FDI and licensing. Supply chain analysis identifies a fourth strategy - 'off-shore licensing' - which involves a firm licensing to a foreign-owned production plant located in its home country. CWa argue that this strategy appears perverse only because strategic decisions are typically analysed from a licensor's point of view. When the same situation is analysed from a licensee's point of view, licensing can be interpreted as an asset-seeking strategy.

A major weakness of the CWa model is its simplistic supply chain. This paper summarises the results obtained from a more general model (Casson and Wadeson, 2012b – hereafter CWb). This model identifies the most efficient way of organising a supply chain that serves a given market. The efficient supply chain strategy maximises the total profit earned by firms within the supply chain. This allows each firm to maximise its own profit conditional on the profit accruing to the other firms. If the chosen strategy did not do this it would pay the firms to agree to replace it with one that did.

The model shows that the efficient strategy is governed by the values of nine key parameters. Changes in the global environment change the values of these parameters and therefore change the supply chain strategies employed by firms. Parameter values may vary between industries, thereby generating industry-specific forms of supply chain coordination. Parameter values may also change over time, guiding the evolution of the international economy by changing the supply chain strategies used in individual industries.
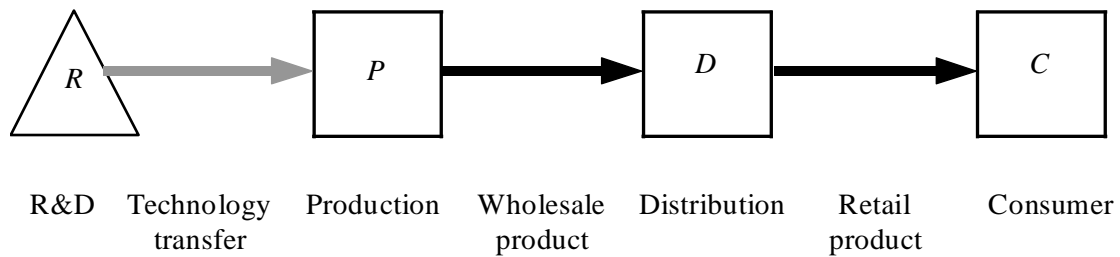
4. The model

This section outlines the model. There are three activities - production, distribution, and R&D - each carried out in a separate facility: a plant, warehouse and laboratory respectively. The consumers are at the end of the chain, and all are located in a single host market. The model is illustrated schematically in Figure 1. R&D, represented by

the triangle R, feeds knowledge (represented by a grey line) into production, represented by the square P. Product, (represented by a black line) is then consigned to distribution, represented by the square D, from whence it is despatched to consumers, represented by the square C.

There are just two countries: country 1 in which R is based and country 2 in which C and D are based. Production P may be located in either country. There is one firm in each country: firm 1 is headquartered in country 1 and firm 2 in country 2. Activities cannot be subcontracted to other domestic firms. Potentially the two firms compete with each other to control the supply chain, but they can also collaborate with each other, e.g. one firm can license technology from the other, or act as its sales and distribution agent.

It is assumed that the size of the market is fixed. The price is also fixed, either by competitive conditions, government regulation, or consumers' refusal to pay more than some maximum acceptable price. Since both price and market size are fixed, total reve-

Figure 1: Simple supply chain system

| R&D | Technology transfer | Production | Wholesale product | Distribution | Retail product | Consumer |

nue is fixed as well. Thus the maximisation of profit implies the minimisation of cost. It is assumed that revenue is sufficiently large that costs are always covered, and so production always takes place.

Some of the costs are incurred by the facilities in which the activities are carried out, and some by the linkages between these facilities. Each facility involves a stock of assets - physical and human - which are employed to transform inputs into outputs. Their costs include wages, interest and depreciation. Linkages channel flows of resources between the facilities, and incur transport costs, knowledge transfer costs, etc.

Resource flows must be coordinated, either by firms or markets, or a combination of the two. Coordination applies to both linkages (i.e. inter-plant coordination) and facilities (i.e. intra-plant coordination). This generates the two-way classification of supply chain costs presented in Table 1. The first dimension (corresponding to the columns) concerns whether the costs are incurred by the operation of a facility or a linkage. The second dimension (corresponding to the rows) concerns whether the costs relate directly to expenditure on resources or to the coordination of resource use.

The interplay of these two dimensions generates four categories of cost. These costs vary according to the ownership and location of the facilities involved. Some costs depend on whether two facilities have the same owner or the same location, and others on whether the owner is based in the same country as the facility. The table lists the various components of cost; all have been identified from mainstream IB literature (Kotabe and Mol, 2006). Facilities costs are represented by plant production costs, whilst linkage costs are represented by transport costs and technology transfer costs. Coordination costs relating to facilities are represented by the cost of foreign production, which is the additional cost incurred in owning and managing a plant or warehouse from a foreign location, and the cost of managing foreign R&D, which is at least as great as the cost of foreign production; these costs are sometimes referred to as the 'costs of doing business abroad' due to 'liability of foreignness', and include an allowance for the risk of expropriation. Coordination costs relating to linkages are particularly important: licensing costs relate to the cost of coordinating a flow of knowledge when R and P are owned by different firms; costs of arm's length trade are incurred when P and D are owned by different firms; while foreign marketing costs are incurred when D is owned by a foreign firm based in country 1. Linkage costs are assumed to be symmetrical – i.e. where reverse flows occur, the same costs apply in both directions.

With a two-country model there are two possible locations of each facility and two possible nationalities of ownership. There are three facilities which can be owned by either firm, and one facility – production – whose location is variable. Since each ownership and location decision can in principle be made independently of the others, there are 2x2x2x2 = 16 potential supply chain strategies.

Table 1: Classification of costs in the model

		Type of activity	
		F	Linkage
Type of cost	Resource	*Cost of local production* in countries 1 and 2, c_1, $c_2 > 0$	*Trade costs*: Transport, tariff and compliance costs incurred by exports or imports (symmetrical by country), $t \geq 0$ *Technology transfer cost* from country 1 to country 2, $x \geq 0$
	Coordination	*Cost premium of foreign ownership of production or distribution* (symmetrical by country), $f \geq 0$ *Cost premium of foreign ownership of R&D*, $g \geq f \geq 0$	*Cost of arm's length trade*: the internalisation benefit for wholesale market, $k > 0$ *Cost of licensing*: the internalisation benefit for knowledge transfer foregone, $n > 0$ *Differential marketing cost*: Cost to a distributor owned in country 1 of selling in country 2, $m \geq 0$

5. Solution of the model

Despite the number of alternative strategies involved, the CWb model can be solved in five easy steps

Step 1: Itemise the available strategies and specify their cost functions. The sixteeen strategies and their cost functions are itemised in Table 2. The numbering of strategies in this table is used throughout the remainder of the paper.

Table 2: Ownership decisions for R&D, production and distribution facilities, coupled with a location decision for a production facility

Strategy: number and descriptor	Location of prod'n	Own'ship of R&D	Own'ship of prod'n	Own'ship of distr'n	Cost
1. Export to sales subsidiary	1	1	1	1	$C_1 = c_1 + t + m + f$
2. Export to sales agent	1	1	1	2	$C_2 = c_1 + t + k$
3. FDI in distribution with subcontracting to foreign-owned local plant	1	1	2	1	$C_3 = c_1 + t + k + n + m + 2f$
4. Offshore licensing	1	1	2	2	$C_4 = c_1 + t + n + f$
5. Export to sales subsidiary with subcontracting to local foreign-owned R&D facility	1	2	1	1	$C_5 = c_1 + t + n + m + f + g$
6. Host-country MNE subcontracts off-shore production	1	2	1	2	$C_6 = c_1 + t + k + n + g$
7. FDI in distribution with out-sourced production and R&D	1	2	2	1	$C_7 = c_1 + t + k + m + 2f + g$
8. Fully integrated host-country MNE off-shores production and R&D	1	2	2	2	$C_8 = c_1 + t + f + g$

9. Import-substituting FDI in production and sales	2	1	1	1	$C_9 = c_2 + x + m + 2f$
10. Import-substituting FDI in production with sales agent	2	1	1	2	$C_{10} = c_2 + x + k + f$
11 FDI in sales with subcontracted production to foreign-owned local plant	2	1	2	1	$C_{11} = c_2 + x + k + n + m + f$
12. Licensing	2	1	2	2	$C_{12} = c_2 + x + n$
13. Host-country firm licenses a source-country firm	2	2	1	1	$C_{13} = c_2 + x + m + n + 2f + g$
14. Host-country MNE subcontracts production in host country to foreign firm	2	2	1	2	$C_{14} = c_2 + x + k + n + f + g$
15. Host-country MNE subcontracts distribution to foreign firm	2	2	2	1	$C_{15} = c_2 + x + k + m + f + g$
16. Fully integrated host country MNE off-shores R&D	2	2	2	2	$C_{16} = c_2 + x + g$

Notes: C_j denotes the cost of strategy j $(j = 1,..., 16)$. c_1: cost of production in country 1; c_2: cost of production in country 2; t: trade-related cost; x: technology transfer cost; n: licensing cost; k: cost of arm's length trade; m: cost of foreign marketing; f: cost of foreign ownership of production; g: cost of foreign ownership of R&D.

Step 2: Identify and eliminate dominated strategies that always afford lower profitability than some other strategy. Dominance arises for two reasons: it never pays firm 2 to employ firm 1 as a sales agent when firm 2 owns production, or firm 1 to subcontract R&D to firm 2. Eliminating the dominated strategies leaves eight undominated strategies, which are listed in Table 3. These only involve foreign ownership where

significant economies of internalisation are available. Three of them are familiar from conventional IB theory: exporting to a sales agent (strategy 2), import substituting FDI in production

Table 3: The eight undominated strategies

Strategy	Scope of firm's operations	
	Firm 1	Firm 2
1. Export to sales subsidiary	Fully integrated MNE exports to a wholly-owned distribution facility	
2. Export to sales agent	Single-country firm exports to an independent foreign distributor	Single-country foreign distributor imports from country 1
4. Offshore licensing	Single-country firm licenses a foreign firm	MNE acquires foreign technology under license and exports to a wholly-owned foreign distribution facility
8. Fully-integrated host-country MNE off-shores production and R&D		Fully integrated MNE undertakes both production and R&D overseas
9. Import-substituting FDI in production and sales	Fully integrated MNE produces and sells abroad	
10. Import-substituting FDI in production with sales agent	MNE produces abroad and distributes through an independent foreign firm	Single-country firm distributes product acquired from local foreign-owned plant
12. Licensing	Single-country firm licenses a foreign firm	Single-country firm licenses a technology used in local production and distribution
16. Fully-integrated host-country MNE off-shores R&D		Fully integrated MNE undertakes R&D abroad and produces and sells locally

and sales (strategy 9) and licensing (strategy 12). One is a variant of strategy 2 in which distribution is controlled through a foreign sales subsidiary, and another is a variant of strategy 9 in which distribution is subcontracted to a host-country firm.

The remaining three strategies are less familiar, because they all involve foreign investment by the host-country firm (firm 2) rather than the source-country firm (firm

1). Strategy 4 (offshore licensing) is a variant of conventional licensing (strategy 12) in which the licensee locates production in the source country rather than the host country. Since the licensee already owns a distribution facility, this represents offshore backward integration by the licensee. Strategy 8 (fully integrated off-shoring by a host-country MNE) is a variant of exporting (strategy 1) in which firm 2 takes over the ownership role of firm 1. Firm 2 integrates backwards, not only into production but also into R&D; in this respect strategy 8 represents an expanded version of offshore licensing (strategy 4). Strategy 16 (a fully-integrated host-country MNE offshores R&D) is an analogue of strategy 9 (import-substituting FDI in production and sales) with firm 2 replacing firm 1; it can also be understood as a variant of strategy 8 in which production is in country 2 rather than country 1.

In Dunning's (1981) terminology, the three unfamiliar strategies are examples of asset-seeking FDI. They are unfamiliar because asset-seeking appears in the present context as a solution to a 'market-seeking' problem. The interpretation of off-shore licensing (strategy 4) as asset-seeking was explained by CWa. The host-country firm (firm 2) seeks access to a new technology generated in country 1; it licenses the technology from firm 1, produces locally in country 1, and exports to its home country 2. Strategies 8 and 16 reflect a similar motivation, although in both cases R&D is internalised rather than out-sourced as before; under strategy 8 production remains located in country 1, whilst under strategy 16 it is relocated to country 2.

Step 3: Express the costs of the efficient strategies relative to a suitable baseline cost.

Step 4: Compare costs by constructing cost differentials between each pair of strategies.

Step 5: Derive the solution from the pairwise cost comparisons. This identifies the precise conditions under which each of the eight undominated strategies is chosen – for details see the CWb paper.

The solution identifies a series of regimes, in each of which one of the undominated strategies prevails. It prevails because it maximises the total profit that can be derived from the supply chain. Each regime is defined by a series of linear inequalities relating to the various cost components shown in Table 1. The solution provides a comprehensive account of how the entire supply is structured under each regime, and not just an account of the behaviour of one particular firm within the chain. It explains in detail how the supply chain will be restructured in response to any given change in cost conditions

The solution shows that ownership and location of production within an international supply chain is governed by three key trade-offs:

- *Alternative forms of internalisation*: whether it is better to internalise technology transfer between R&D and production or to internalise the link between

production and distribution; and whether any form of internalisation is worth the cost of foreign ownership involved.

- *Alternative location strategies*: whether it is worthwhile to produce in a foreign country where production costs are lower when costs of foreign ownership may be incurred.

- *Use of alternative firms to effect internalisation*: whether internalisation is best effected by a source-country firm (based in the county where R&D is located) or by a host-country firm (based in the country where the market is located).

Whilst the first two trade-offs are recognised in the IB literature, the third trade-off is not. Furthermore, these trade-offs are usually considered separately in the IB literature whereas under the systems view they are considered together. This is significant because in practice all three trade-offs are important and all three are related.

6. Implications of the solution for the theory of the MNE
The endogeneity of firms

As indicated above, the solution of the model does not merely specify the boundaries of a given firm, as in conventional theory, but the ownership and location of all the firms involved in the supply chain. The model ensures that all these boundaries are consistent with each other, and that together they maximise the profit generated by the firm as a whole. The model also reveals the internal structure of each firm. This internal structure is adapted to the internal structures of the others. Thus solving for the supply chain structure as a whole ensures that the configurations of the different firms are compatible with each other. In particular, it ensures that they trade with each other in a well-defined set of external markets.

Within this model there are just two possible boundary locations: the market for technology linking R and P, and the market for output linking P and D. In principle both boundaries could exist simultaneously, but in practice they will not because the relevant configurations are never efficient.

The relationship between out-sourcing and off-shoring

Off-shoring involves procuring an input from, or supplying an output to, a foreign country. Out-sourcing involves the procurement of an input from, or the supply of an output to, an independently owned facility (di Gregorio, Musteena and Thomas, 2009; Mol, 2007). With just two firms in the model, each based in a different country, out-sourcing is always international, i.e. involves partnering with a foreign-owned firm.

The relationship between out-sourcing and off-shoring is summarised in Table 4. It shows that R&D can be off-shored and out-sourced at the same time, and that the same is true of distribution. However, R&D is never off-shored when distribution is out-sourced, and distribution is never off-shored when R&D is outsourced. Conversely,

R&D is never out-sourced when distribution is off-shored, and distribution is never out-sourced when R&D is off-shored. Either distribution or R&D is always off-shored, but in four of the eight cases there is no out-sourcing of either activity.

These results reflect the basic economic logic of out-sourcing and off-shoring. Out-sourcing foregoes the benefits of internalisation, whereas off-shoring does not. Off-shoring is a logical response to cost differentials between locations and it is efficient to exploit such differentials whether internalisation is used or not. Some of the specific results, however, also reflect the strict assumptions made about the number of different activities (only three) and the number of countries (only two).

Table 4: Analysis of out-sourcing and off-shoring strategies

Strategy	Out-source		Off-shore	
	R&D	Distribution	R&D	Distribution
1. Export to sales subsidiary				F
2. Export to sales agent		F		F
4. Offshore licensing	D		D	
8. Fully-integrated host-country MNE off-shores production and R&D			D	
9. Import-substituting FDI in production and sales				D
10. Import-substituting FDI in production with sales agent		D		D
12. Licensing	F		F	
16. Fully-integrated host-country MNE off-shores R&D			F	
Total of dominating strategies	2	2	4	4
Total of dominated strategies	6	6	4	4
Total	8	8	8	8

Note: D: Domestic linkage; F international linkage (involving export or import)

The relationship between inward and outward FDI

FDI occurs when a facility is owned by a foreign-headquartered firm, and multinationality when a firm owns facilities in more than one country. Supply chain analysis reveals, however, that the relationship between FDI and multinationality is not quite so simple as often supposed. A firm that undertakes FDI is not necessarily multinational because it may invest in a single foreign country and operate no domestic facil-

ity - in other words, it may be a 'free-standing firm' (Wilkins, 1988). Free-standing firms appear naturally in supply chain models because there is no restriction that a firm must own a facility in the country in which it is headquartered.

The patterns of FDI are analysed in Table 5. The first two columns indicate which activity is foreign-owned, and the source country in which the investor is headquartered. Six of the eight strategies involve some form of FDI. Each firm undertakes FDI on three occasions: thus there is no bias in the model towards firm 1 undertaking the FDI. This is in marked contrast to popular expositions of FDI theory, which suggest that it is the norm for firm 1 to undertake FDI. In the light of the previous discussion, it could be said that 'asset-seeking' FDI is, in principle, just as efficient as 'market-seeking' FDI in serving a foreign market. There are two strategies which involve no FDI: exporting to a sales subsidiary (strategy 2) and licensing (strategy 12); in these cases supply chain coordination is undertaken entirely by domestic firms.

Table 5: Analysis of FDI stocks and MNE operations

Strategy	FDI		MNE	
	Firm 1	Firm 2	Firm 1	Firm 2
1. Export to sales subsidiary	D		R P D	
2. Export to sales agent				
4. Offshore licensing		P		P D
8. Fully-integrated host-country MNE off-shores production and R&D		R P		R P D
9. Import-substituting FDI in production and sales	P D		R P D	
10. Import-substituting FDI in production with sales agent	P		R P	
12. Licensing				
16. Fully-integrated host-country MNE off-shores R&D		R		R P D
Total of dominating strategies	3	3	3	3
Total of dominated strategies	7	7	3	3
Total	10	10	6	6

Note: In columns 1 and 2 D, P R denote FDI in distribution, production and R&D respectively. Blank cells indicate no FDI. In columns 3 and 4 D, P, R denote the activities owned and controlled by an MNE. Blank cells denote no MNE.

The two firms never undertake FDI at the same time, so there are no cross-flows of investment. The last two columns show that FDI is always undertaken by an MNE. With only three activities to coordinate, both firms cannot be MNEs at the same time. In some cases the MNE owns the entire chain and in other cases only a part of it. Where an MNE partly owns a supply chain, it integrates either upstream – R and P – or downstream – P and D – but never just the beginning, R, and the end, D.

Dualistic descriptions of supply chain strategy

Several of the supply chain strategies can be described in more than one way. Where two firms participate in the same supply chain, strategy can be described from either firm's point of view. Only with full integration, where only one firm is involved, is the description of strategy unambiguous. For example, if firm 1 exports to its own distribution subsidiary (strategy 1) then 'exporting' is obviously the strategy. But if firm 1 exports to an independent sales agent, namely firm 2, then firm 2's strategy is to import from an integrated foreign supplier. The arguments in favour of firm 1's perspective is that firm 1 undertakes the FDI, it is the only firm to internalise, and it undertakes the R&D. The argument in favour of firm 2's perspective is that it is based in the host country and owns a distribution facility there, and therefore knows the market best.

In many cases the ambiguity is more serious. Consider, for example, licensing (strategy 12). From firm 1's point of view, the strategy is to enter a foreign market by licensing to firm 2, whilst from firm 2's point of view it is to out-source and off-shore R&D. The argument for firm 1's point of view is that it owns R&D, while the argument for firm 2's point of view is that it is the only firm to internalise (it integrates production and distribution) and it is based in the market being served. Appealing to FDI is indecisive because neither firm undertakes FDI. In favour of firm 1, it could be argued that as it owns R&D it controls the development of the technology and hence determines the technology that is licensed, but in favour of firm 2 in could be said that it knows the market best and can therefore specify the technology that must be developed; it therefore controls the development of the technology through the terms of the licensing agreement, in which it pre-purchases the specific technology that it requires.

Which firm is responsible for strategy formation when two or more firms are involved in the same chain?

No consistent view of strategy formation can be found in the IB literature. Innovation theorists tend to argue that strategy formation is linked to ownership of R&D, and marketing theorists that proximity to the customer is key, thereby placing strategy formation at opposite end of the supply chain (Buckley and Casson, 2011). Dunning's eclectic theory suggests that strategy formation is linked to FDI, and presents licensing as a less strategic option, while internalisation theorists tend to regard internalisation as the most pro-active strategy even if FDI is not involved.

While supply chain analysis highlights these issues, it takes no particular view on them. By assuming that the overall profit of the chain is maximised, it leaves open the question of how profit is divided. While all the monopoly profit may well be appropriated by the firm that formulates the strategy, no assumption is made about which firm that will be. While it predicts the total profit generated by the chain, the theory does not predict how the profit will be divided, either between participating firms or particular stages of the chain. The distribution of profit will reflect the terms of the contracts negotiated between participating firms, which are not predicted by the model.

7. Conclusions

This paper has presented a model of supply chain coordination based on a systems view. It affords a rigorous analysis of the role of MNEs within global supply chains, and within the world economy as a whole. It liberates IB theory from the constraints of a purely firm-centred approach to IB strategy. It introduces a formal model in involving four strategic decisions that are interdependent: the ownership of three activities - R&D, production and distribution - and the location of one of them - production. It is shown that under plausible cost conditions only half of the possible supply chain strategies are viable.

The circumstances that govern the emergence of firms are captured by the basic parameters of the model. There are nine parameters altogether, grouped into four sets, and between them they govern the resource costs and communication costs of the system. Ownership structures depend mainly on coordination costs and location strategies mainly on resource costs. There are interdependencies, however, which arise because of the costs of foreign ownership; the lower these costs, the more separable the ownership and location decisions become.

Where partnerships between firms develop, the terms of the partnership will reflect the negotiating strategies of the firms, and the outcome of these negotiations will determine the distribution of profit between the firms. The firm with a monopoly of the relevant technology has the greatest bargaining power, but this is not necessarily the firm that carries out the R&D. Where technologies are easy to specify and there are competing R&D facilities, a firm that is close to the market and alert to opportunities (e.g. a host-country firm) may acquire the technology at cost and thereby appropriate the rents.

Although the model is context specific, it is easily adapted. Instead of footloose production, for example, footloose R&D can be introduced instead. The model can also be generalised to three locations rather than two – e.g. to analyse Triad effects, or linkages between countries at different stages of development. While the basic principles of the model will remain unchanged in each case, altering the context will change the specific predictions.

The systems view is not intended to replace the firm-centred view, but rather to complement it. The firm-centred view has intuitive appeal for business students and business managers because it focuses on issues of immediate concern to them. It fits well with the notion that IB theory exists to advise managers about devising and implementing strategies - whether for growth, diversification or globalisation. The firm–centred view, however, affords only a partial and localised view of the firm's environment that is predicated on given market opportunities, given cost conditions, and given competitive rivalries.

The systems view, by contrast, analyses long-run global issues rather than short-run local issues. It takes very little as given. In the long run certain types of firm may no longer be viable, because of changes in the global system, and for such firms the only question may be to optimise their exit strategy. The threat that these firms face may come, not from their existing competitors, but from future competitors, including

firms that have not yet been founded. Unlike the firm-centred view, the systems view can identify opportunities for new types of firm. The key strategic decisions relating to these firms will be taken by start-up entrepreneurs before their firms have even been founded, but the legacy of these decisions may live on within the corporate cultures of the successful start-up firms.

Where existing firms survive, they may find that in future their roles are radically changed – e.g. they may become subcontractors to firms to which they previously subcontracted. While they may wish that they could continue to hold the initiative, competitive conditions may dictate otherwise, and the only alternative to accepting a subordinate role may be to fail altogether. The systems view can help such firms to understand the economic logic of their altered circumstances, and to make the necessary adjustments before it is too late. Using the systems view, it is possible to analyse, not only responses to given changes in the environment, but to analyse the fundamental drivers of change itself.

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