

Organising regional production networks in Southeast Asia: implications for production fragmentation, trade, and rules of origin

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Abstract

The globalisation of economic activities has fundamentally reshaped the relationships between production and trade. The cross-border production activities of transnational corporations (TNCs) have not only deepened spatial divisions of labour, but also complicated our understanding of international trade patterns. The development of intricate regional production networks by global corporations has major implications for production fragmentation, international trade, and rules of origin in the global economy. Empirically grounded in a study of regional production networks controlled by Singapore-based TNCs, this paper aims to make a modest contribution to the emerging literature on production fragmentation and rules of origin. Based on an analysis of empirical data from a survey of 63 parent Singapore-based manufacturing TNCs that have cross-border operations in Southeast Asia, I found that their spatial production fragmentation is rather limited. Most of their Southeast Asian subsidiaries cater to local markets, or manufacture components/parts for the regional production facilities of their major global corporation customers. I also consider the implications for business strategies and public policies in relation to production fragmentation and rules of origin in Southeast Asia.

Keywords: production fragmentation; networks; regional development; international trade

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1. Introduction

The globalisation of economic activities has fundamentally transformed the relationships between international production and international trade (see Dunning, 1993; Dicken, 1998; UNCTAD, 1998; Held et al., 1999). The cross-border production activities coordinated by transnational corporations (TNCs) have not only deepened spatial divisions of labour, but also complicated our understanding of international trade patterns. Some researchers have argued that the rapid growth of foreign direct investment (FDI) worldwide is producing a disintegrated global production system and an integrated global trading system (Feenstra, 1998; Venables, 1999). Other empirical studies of the geography of international production, however, have shown that recent FDI patterns have taken place within a regional, rather than global, context (Morrison et al., 1991; Lévy, 1995; Poon and Pandit, 1996; Poon, 1997; Kozul-Wright and

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Rowthorn, 1998; Mucchielli et al., 1998; Poon et al., 2000). TNCs have increasingly organised their production activities within specific regions of the global economy. To a large extent, this regionalisation of international production is explained by the emergence of regions as an important nexus of global competition (Storper, 1997; Porter, 1998; Scott, 1998). The development of intricate regional production networks by TNCs therefore has major implications for our understanding of the inter-relationships between production fragmentation and international trade in today's global economy.

In the theoretical literature on urban and regional development, three perspectives are particularly influential in explaining the spatial divisions of labour encapsulated in the emergence of regional production orchestrated by TNCs: (1) the new international division of labour perspective (e.g. Fröbel et al., 1980); (2) the global commodity chain approach (e.g. Gereffi and Korzeniewicz, 1994; Gereffi, 1996, 1999); and (3) the regional production networks perspective associated with the 'flying geese model' (see Hatch and Yamamura, 1996). These perspectives have been applied to explaining the rise of Asia as a major centre of global production and trade. In their early phases of economic development, Asian economies were largely seen as net recipients of labour-intensive FDI from developed countries in North America, Western Europe, and Japan. With the exception of Japan, Asia was then serving the global market through exports of labour-intensive manufacturing products. Since the maturing of Asian newly industrialised economies (NIEs) in the late 1970s, we have begun to witness a centrifugal force in which emerging TNCs from these Asian 'tigers' are investing abroad to tap into foreign markets and cost advantages in other host Asian countries. While not denying the continual importance of FDI from developed countries and Japan in Asia, I argue that TNCs from the Asian NIEs, in particular Hong Kong, Singapore, and Taiwan, play a significant role in Asia today (e.g. in China and Southeast Asia; see Dicken and Yeung, 1999; Yeung, 1999a). Indeed, NIEs together are the major investor in China and virtually all Southeast Asian countries (except Singapore). Moreover, these NIE TNCs tend to engage in intra-regional FDI. The nature and extent of regional production networks controlled by these TNCs from Asian NIEs has important implications for business strategies and public policies in relation to production fragmentation and rules of origin in host Asian countries.

Drawing upon insights from the above theoretical perspectives, I aim to examine empirically in this paper the nature and organisation of regional production networks controlled by 63 Singapore-based manufacturing TNCs (SINTNCs). Given the important and yet complex interrelationships between international production networks and international trade regimes (as expressed in differential rules of origin), the paper then focuses on the major implications of the Southeast Asian operations by these SINTNCs for our understanding of international trade and rules of origin. More specifically, I argue that the organisation of the Asian operations of these manufacturing SINTNCs is still emerging and lacks spatial and functional integration similar to that of American, British, and Japanese TNCs. Most foreign subsidiaries or affiliates of these manufacturing SINTNCs are engaged in activities to serve the local markets. In other words, these subsidiaries tend to be embedded in local production networks rather than wider regional production networks controlled and coordinated by parent companies headquartered in Singapore. Though these SINTNCs are engaged in spatial fragmentation of production, they are at best classified as 'horizontal' TNCs in which 'at least some of the firms' activities are replicated in two places' (Venables, 1999, p. 936;

see also Shatz and Venables, 2000). These activities are typically downstream production to meet the demand in each host country. Although SINTNCs are unlikely to be able to organise complex regional production networks in the near future, any major policy change in rules of origin and international trade regulations will still have a significant impact on their regional activities, particularly because many of them are key suppliers to the regional production networks controlled by global corporations in Southeast Asia.

The paper is organised into four sections. Section 2 reviews different theoretical perspectives on spatial divisions of labour and draws some theoretical implications for our understanding of regional production networks by SINTNCs. I then analyse empirical data from a survey of 63 parent Singapore-based manufacturing TNCs¹ that have cross-border operations in Southeast Asia. The fourth section considers some implications for business strategies and public policies in relation to production fragmentation and rules of origin in Southeast Asia. The concluding section assesses some future research agenda and challenges.

2. Theoretical perspectives on spatial divisions of labour

At the broader global and regional scale, the political economy of production networks in Asia underscores the importance of such extra-national forces as global capital and regional factor endowments. One influential theoretical perspective explaining such spatial reorganisation of global capital is the *New International Division of Labour* (NIDL) thesis.² In a major contribution to the study of the NIDL, Hymer (1979) discusses the spatial inter-relationship between the international division of labour and the corporate division of labour. He argues that ‘a new world economy based on multinational corporations would in fact tend to produce a hierarchical division of labor between geographical regions corresponding to the vertical division of labor within the corporations’ (Hymer, 1979, p. 143). He emphasises four dimensions in this

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- 1 Empirical data analysed in this paper are derived from a larger set of very detailed firm-level database on the globalisation of 204 Singapore-based transnational corporations (SINTNCs). This database is developed on the basis of a large-scale research project conducted between November 1997 and January 1999. At the initial stage of this project, we compiled basic corporate information of some 1,246 Singapore TNCs into the database. This information was gathered from various business directories and company reports between November 1997 and January 1998. Of these 1,246 companies, 340 companies had only correspondence information in China. As such, they could not be used for our survey in Singapore. Moreover, the database included 84 foreign TNCs in Singapore which were subsequently discarded in accordance with the requirements of the research project. Together, only 822 companies in our database fulfilled the preliminary requirements of being Singapore-incorporated TNCs. At the end of the survey in Singapore in January 1999, another 34 companies were disqualified because either they had been closed down ($n = 11$) or had no foreign subsidiaries and investments ($n = 23$). This means an *effective* population of 788 Singapore TNCs for our corporate survey in Singapore through which we have successfully interviewed 204 parent companies, representing a 25.9% response rate. Some 77 of these 204 parent companies (38%) are manufacturing SINTNCs and 63 of them (31%) have operations in Southeast Asia.
 - 2 Although the NIDL thesis has been popularised by Frobel et al. (1980), the earliest recognition of a ‘new international division of labour’ can be found in Hymer’s (1972) examination of the extent of internationalisation and ‘the law of increasing firm size’. In their biography of Hymer, Cohen et al. (1979) note that Hymer spent several months in 1973 working with Frobel et al. at the Max-Planck-Institute at Starnberg, West Germany. It is not surprising that Frobel et al. (1980) might draw some insights from Hymer’s work, although they did not explicitly cite his work.

international division of labour that 'keeps the head separate from the hand, and each hand separate from every other' (Hymer, [1972] 1979, p. 88): (1) the expansion of the firm itself; (2) the creation of a world hierarchy of classes; (3) the conflict between the international capitalist class and the working class; and (4) the internationalisation of production. TNCs are conceptualised as 'elaborate corporate superstructures to unite labor in production, but divide it in power' (Hymer, [1972] 1979, p. 86). Capital can maintain control (via the TNC) through the division of labour in a number of ways: horizontal, vertical, spatial, and temporal. The TNC not only sets up a hierarchy in the international economy that parallels the internal division of labour within the firm, it also utilises such a structure to divide and rule.

In a subsequent empirical work, Frobel et al. (1980) identify two qualitative differences between the new and the old international division of labour. First, an increasing production of manufacturing goods competitive on the world market is now situated in developing countries. This contrasts sharply with the earlier international division of labour in which core industrialised countries specialised in manufacturing production, and natural resources and factors of production were exploited in peripheral countries. Second, there has been an increasing subdivision and fragmentation of commodity production to capitalise on uneven spatial distribution of factor costs through a correct combination of labour and capital. Different parts of the labour process may now be spatially separated so that labour intensive production can be relocated to developing countries to take advantage of the 'cheap labour' there. Other researchers also identify some pertinent trends in the NIDL. The 'free' application of peripheral labour power applied to specific labour processes in the cores is one distinctive trend. By virtue of producing in developing countries, capitalists from the core now gain access to peripheral labour power (Henderson, 1986a; 1986b; Hudson, 2001). There is also a growth of new economic phenomena such as corporate services, financial services and 'growth poles' that are associated with the emergence of the NIDL (Cohen, 1981). The last and foremost important ingredient of the NIDL is the increasing globally integrated production under the common ownership of TNCs (Shachar, 1990; Dunning, 1993; Dicken, 1998). The growth of intra-firm trade and transfer pricing is a by-product of this phenomenon in which the TNC is empowered as the manager of the NIDL.

What then are the specific mechanisms through which production in developing countries is linked to the global economy via TNCs? Gereffi and Korzeniewicz (1994) and Gereffi (1996; 1999) proposes the global commodity chain (GCC) approach originating from comparative sociology which defines commodity chains as 'a network of labour and production processes whose end result is a finished commodity' (Hopkins and Wallerstein, 1986, p. 159). To Gereffi et al. (1994, p. 2), a GCC is a specific configuration of 'sets of interorganisational networks clustered around one commodity or product, linking households, enterprises, and states to one another within the world-economy. These networks are situationally specific, socially constructed, and locally integrated, underscoring the social embeddedness of economic organisation'. The GCC approach claims to be historical and comparative and links both macro-historical concerns with structural changes in the global economy and micro-organisational issues of production and distribution (cf. Whitley, 1996, 1998; Raikes et al., 2000; Dicken et al., 2001). In particular, two types of GCCs can be identified: (1) buyer-driven commodity chains and (2) producer-driven commodity chains. In buyer-driven commodity chains, large retailers and brand-named merchandisers and trading

companies play a pivotal role in setting up decentralised production networks in a variety of exporting countries, typically in developing countries. They are commonly found in labour-intensive consumer goods industries that are organised by OEM (original equipment manufacturing) arrangements. In producer-driven commodity chains, TNCs play a central role in controlling the production systems in capital and technology-intensive industries. These TNCs usually belong to global oligopolies characterised by high barriers to the entry of new firms.

In a recent empirical analysis, Dicken and Hassler (2000) attempt to explain the network organisation of the Indonesian clothing industry by examining its inter-connections to global commodity chains of apparel products. They observe that the Indonesian clothing industry is embedded in buyer-driven global commodity chains which connect domestic producers with international networks of production and distribution, particularly those organised by South Korean, Taiwanese, American, and European firms. The shape and the drivers of these production chains, however, are highly dependent upon the geographical markets of individual clothing firms. Whereas clothing firms exporting to Europe tend to depend on the representative offices of European retailers and wholesalers, American clothing companies tend to work with Asian agents to source for their supplies. To Gereffi (1999), this ability to establish close linkages with a diverse array of lead firms in global buyer-driven chains is the key to success in East and Southeast Asian industrialisation. Through active involvement in these commodity chains, Asian firms are able to 'move from the mere assembly of imported inputs (traditionally associated with export-processing zones) to a more domestically integrated and higher value-added form of exporting known alternatively as full-package supply or OEM (original equipment manufacturing) production' (Gereffi, 1999, p.38).

Apart from the influence of global capital and foreign TNCs, regional factor endowments also play an influential role in the spatial organisation of production networks by Asian firms, in particular Japanese firms (see a recent theoretical model in Markusen and Venables, 2000). This observation has led to the rise of the so-called 'flying geese model' which postulates a nested pattern of regional production networks centred on Japanese firms. The formation of Japanese regional production networks is explained by changing factor endowments in individual host countries and the technological superiority of Japanese firms. The model reflects the creation of dynamic comparative advantages that potentially allow host countries to catch up with the leading 'goose' (Japan in this case). In practice, the model has been extensively criticised (see Bernard and Ravenhill, 1995; Hatch and Yamamura, 1996; Hill and Fujita, 1996; Hart-Landsberg and Burkett, 1998). Contrary to the predictions of the model, there is little evidence of a real catching-up process cascading through the various economies of the Asian region. Rather, the situation is one in which 'Japan is actually flying further and further ahead of the regional flock. The division of labour in Asia, based on the technological capacity of each nation, is becoming more – not less – vertical' (Hatch and Yamamura, 1996, p.28). Situated within this pessimistic assessment of the applicability of the flying geese model to analyse Japanese production networks and regional development in Asia, Edgington and Hayter (2000) recently call for a more nuanced use of the metaphor and the model. But they have also made an observation that '[a]s a metaphor for understanding Japanese FDI [foreign direct investment] in Asia, [the] flying geese [model] usefully and insightfully intimates an underlying political economy and captures the sense of broad sectoral and geographical patterns' (Edgington and

Hayter, 2000, p.285). Similarly, Tsui-Auch's (1999) recent comparative analysis of regional production networks in Hong Kong and South China reveals that the flying geese model helps distinguish the developmental role of Japanese capital in Asia. The pattern of regional development, however, reflects the persistence of unequal power relationships rather than 'multiple catch-up' or narrowing of gaps in technological and economic capabilities of individual countries (cf. the GCC approach).

To sum up the theoretical insights of these three complementary perspectives, the fragmentation of production processes and the organisation of regional production networks by firms within the home region can be determined by a set of three important factors: (1) cost structures; (2) needs of global buyers, and (3) organisational and technological capabilities. It should be noted here that these three factors are inter-related and often operate simultaneously in shaping firms' production networks. First, spatially uneven cost structures of different host countries in the home region create opportunities for firms from the more developed and high cost country to fragment and to relocate their lower-end production processes (see the NIDL thesis). These firms often retain their key production functions (e.g. R&D, sourcing, marketing, and finance) in the home country for control and coordination of their regional production facilities. Second, the needs of global buyers are highly influential when domestic firms are involved in buyer-driven global commodity chains (see the GCC approach). In this case, global buyers may require the lowest cost supply of their OEM products which accentuates the need to search for cheaper production locations within the home region. For strategic and diversification reasons, these buyers may also require their suppliers to have production facilities in different host countries. The establishment of regional production networks by supplier firms becomes imperative if they are to secure orders from their global buyers. In other words, the market orientation of domestic firms has a significant bearing on the nature and organisation of their regional production networks (see empirical evidence in the next section). Third, the likelihood of domestic firms in establishing regional production networks is highly contingent on their organisational and technological capabilities. The organisational capabilities of Japanese *sogo shosha* and the technological superiority of Japanese *keiretsu* significantly explain the extensive presence of Japanese production networks in East and Southeast Asia. Other recent studies have also examined the organisation of regional production networks by TNCs from Hong Kong (Magretta, 1998; Yeung, 1998a), Taiwan (Chen, 1998; Hobday, 1998; Hsing, 1998; Li, 1998; Mathews and Snow, 1998; McDermott, 1998), South Korea (Kim, 1998; Oh et al., 1998; van Hoesel, 1999) and Asia in general (Dicken and Yeung, 1999; Yeung, 1999a). In the next section, I examine the case of Singapore-based TNCs and their regional production networks in Southeast Asia.

3. Organising regional production networks: Singaporean firms in Southeast Asia

This section begins by briefly tracing the nature and extent of outward investment from Singapore. I have examined elsewhere the recent regionalisation programme launched by the Singapore government through which Singaporean firms are encouraged to venture abroad and to establish an 'external wing' for the national economy (Yeung, 1998b, 1999b, 2001). Some statistics are presented to identify the general trends in Singapore's trade and investment relationships with other Southeast Asian countries. In the second sub-section, I present an analysis of firm-level data collected from a recent

survey of Singapore-based manufacturing transnational corporations. Through this analysis, I aim to shed light on the nature and organisation of regional production networks by Singaporean firms in Southeast Asia.

3.1. Outward investment from Singapore

Since its independence in 1965, Singapore has been transformed from a labour-intensive export-oriented manufacturing platform in the 1960s and the 1970s to a leading destination for global corporations in electronics and chemical industries in the 1980s and the 1990s. To sustain its competitiveness in the global economy, the city-state has implemented national development strategies in favour of promoting high tech and high value-added manufacturing and business services (Rodan, 1989; Ho, 1993, 1994; Chiu et al., 1997; Brown, 1998; Perry and Tan, 1998; Mathews, 1999; Wang and Yeung, 2000). By the early 1990s, Singapore had been transformed into a regional coordination centre capable of significant R&D activities and management functions (Perry et al., 1998a, 1998b; Yeung, 1998c; Yeung et al., 2001).

The Department of Statistics (1991) estimates that at the end of 1976, foreign direct investment (FDI) from Singapore was slightly above S\$1 billion. As shown in Table 1, this figure had grown to S\$1.7 billion by 1981, S\$13.6bn by 1990, and S\$55.7bn by 1996 (Department of Statistics, 1999). By the end of 1997, Singapore's investments abroad surged by another 27% to S\$70.6bn, despite the economic uncertainty engulfing the Asian region during that year (*The Straits Times*, 8 September, 1999). Today, Singapore has become one of the major sources of FDI among the Asian NIEs. It should be noted, however, that the ownership of outward FDI from Singapore is rather complex and different from other NIEs. Because of heavy foreign presence in its domestic economy, a large proportion of Singapore's FDI originates from companies majority- or wholly-owned by foreign firms (Ramstetter, 1996; Low et al, 1998). During the 1980s, wholly- or majority-local owned companies in Singapore accounted for more than half of total outward FDI, but by the 1990s, foreign-owned companies in Singapore accounted for more than 56% of total FDI from Singapore. The sampled TNCs in my survey, however, are all headquartered in Singapore and represent indigenous FDI from Singapore. In 1996, foreign-controlled companies accounted for 46.8% of Singapore's total direct investment abroad (Department of Statistics, 1998).

Geographically, Singapore's outward FDI has been concentrated in the Asian region (see Table 1). During the 1981–1997 period, more than 50% of Singapore's outward FDI went to Asian countries. In 1997, Malaysia, China, Hong Kong and Indonesia were the largest Asian recipients of outward FDI from Singapore. In Europe and North America, the UK emerged as the largest host country, receiving some S\$7.7bn or 5.2% of total direct investment from Singapore. It is also ranked as the third largest recipient of Singapore's foreign investment. In cumulative terms, Singapore is also one of the largest foreign investors in many Asian economies (*The Sunday Times*, 13 April, 1997):

1. ranked first in Myanmar (1989–1997) and Vietnam (1991–1997)
2. ranked second in Malaysia (1975–1997)
3. ranked fourth in Indonesia (1967–1997)
4. ranked fifth in China (1979–1997)

Of this Asian-focus of Singapore's outward FDI, Malaysia has always been the most important destination country. Although its lion share in Singapore's outward FDI has

Table 1. Outward direct investment from Singapore by country, 1981–1997 (in S\$million)

Country	1981	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Asian Countries	1289.9	1721.4	1836.5	1908.5	1963.6	1968.4	7013.3	7401.5	9209.3	11480.0	17358.0	21511.0	32389.0	–
ASEAN	1078.5	1133.3	1155.8	1180.5	1216.0	1138.4	3567.1	3995.6	4896.7	5933.8	9680.0	12467.0	18022.6	–
Brunei	3.7	52.9	50.0	54.2	57.4	56.6	66.2	69.4	88.5	91.2	77.0	37.0	88.8	–
Indonesia	39.5	65.0	67.7	58.6	59.8	53.3	224.8	267.3	328.1	517.3	1997.0	3448.0	3914.9	5722
Malaysia	1006.9	971.8	985.6	1008.4	1030.8	971.6	2790.1	3121.1	3916.5	4656.7	6500.0	7305.0	10753.0	8974
Philippines	18.4	22.4	22.5	14.3	22.5	22.8	97.7	89.7	106.3	230.6	382.0	521.0	1073.4	–
Thailand	10.0	21.2	30.0	45.0	45.5	34.1	388.4	448.1	457.4	438.1	723.0	860.0	1558.7	–
Hong Kong	181.8	460.7	497.9	539.9	545.2	581.4	2266.2	2368.6	3051.1	4025.6	4940.0	5089.0	6326.5	7257
Japan	0.3	5.0	6.0	16.1	16.7	33.9	51.8	73.5	75.8	109.4	171.0	382.0	482.7	–
China	–	57.6	93.8	101.4	79.1	47.4	239.7	220.0	282.6	444.1	1533.0	2445.0	5339.6	8960
South Korea	–	–	–	–	14.8	15.9	–	–	–	–	–	–	–	–
Taiwan	12.9	32.9	37.8	26.0	54.3	86.0	494.8	287.0	349.5	354.5	496.0	530.0	594.5	–
Others	16.2	31.9	45.2	44.6	37.5	65.4	393.7	456.7	553.6	612.7	1034.0	1128.0	2257.5	–
European countries	50.7	89.3	167.2	358.2	303.4	203.4	1095.4	1397.6	1480.2	1549.7	2200.0	3844.0	6736.1	–
Australasia	62.6	176.9	175.6	217.8	166.1	138.3	1889.0	1957.3	1969.1	1867.9	999.0	1116.0	4025.6	–
Canada	–	17.6	17.6	17.6	29.0	73.4	–	–	–	–	–	–	–	–
United States	31.8	66.1	65.4	69.3	107.7	160.0	689.7	1303.9	1589.5	1755.1	1681.0	2036.0	2851.1	2963
Other countries	242.9	185.9	335.4	390.1	424.1	400.2	2934.3	3123.6	3493.1	4587.4	7527.0	8359.0	9710.6	36724
Total	1677.7	2257.2	2597.7	2961.5	2993.9	2943.7	1362.7	15183.8	17741.3	21240.2	29765.0	36866.0	55712.4	70600

Note: Data from 1981–1989 refer to direct investments abroad (D1) which are the amount of paid-up shares of overseas subsidiaries and associates held by companies in Singapore. Data from 1990–1995 refer to direct equity investments (D2) which are direct investment (D1) plus the reserves of the overseas subsidiaries and associates attributable to these companies. For overseas branches, the net amount due to the local parent companies is taken as an approximation of the magnitude of direct investment. Data for 1996 refer to total direct investment abroad (D3) which are D2 plus loans granted to affiliates. Direct equity investment (D2) data for 1996 are not available in Department of Statistics (1998).

Sources: Department of Statistics (1991), *Singapore's Investment Abroad, 1976–1989*. Singapore: DOS, Department of Statistics (1996), *Singapore's Investment Abroad, 1990–1993*. Singapore: DOS, Department of Statistics (1998), *Singapore's Investment Abroad, 1996*. Singapore: DOS, *The Straits Times*, 8 September 1999.

been declining over time from 60% in 1981 to 6.1% in 1997, Malaysia was still the single largest recipient country absorbing S\$8.97bn FDI from Singapore (Table 1). This significant decline can be readily explained by the recent 1993 regionalisation drive by the Singapore government through which more investment opportunities in China and Southeast Asia are being opened to Singapore companies. Singapore's investment in China and Indonesia has grown significantly over the 1993–1997 period. This growth is in line with the Singapore government's heavy involvement in developing large industrial estates and infrastructural projects in China and Indonesia (e.g. see Yeung, 2000a). A large amount of Singapore's investment in China is also channelled through Hong Kong, explaining why Hong Kong's figures look rather impressive.

These trends of FDI from Singapore indicate the growing importance of Singaporean firms in the Asian region. The importance of selected Southeast Asian countries (e.g. Malaysia and Indonesia) as destinations for Singapore's FDI hints at the early emergence of Southeast Asian regional production networks controlled by headquarters in Singapore. To confirm these FDI trends at the macro-economic level, I put together Singapore's recent trade statistics in Table 2. The first observation is that the US, Japan, and Malaysia have been Singapore's major trading partners throughout the period. Although total trade between Singapore and Malaysia is comparable to Singapore-US or Singapore-Japan trade, Malaysia is much less significant as a destination for Singapore's domestic exports. Trends in Table 2 indicate that a large amount of Singapore's exports to Malaysia were re-exports of goods and services originating from outside Singapore. A significant portion of Singapore-Malaysia trade is clearly transshipment in nature. On the other hand, Singapore's exports (including domestic exports) to the US and Europe were significantly greater than imports in 1998. During the same year, Singapore's imports from Japan were significantly greater than its exports to Japan. In addition, inward FDI data show that the US and Japan are Singapore's largest investors in the manufacturing sector in 1998 (Department of Statistics, 1999, Table 8.14).

Together, these trends in Singapore's inward FDI and trade hint at the possibility that Singapore serves as an export production platform for American and Japanese TNCs. This observation is partially consistent with the New International Division of Labour thesis examined earlier. Within this NIDL, Singapore plays a role as a manufacturing hub for products demanded by markets in North America and Western Europe. Some foreign TNCs also use Singapore as a regional control centre to coordinate their regional production networks in Southeast Asia. In certain industries (e.g. electronics; see Chia, 1997; Perry and Tan, 1998), foreign TNCs import from home countries (e.g. Japan) or manufacture key components in Singapore, source parts and assemble the product in other Southeast Asian countries, and finally export the products via Singapore to the rest of the world. This phenomenon follows the predictions of the flying geese model quite well. The model, however, only explains the regionalisation of Japanese production networks within the Southeast Asian region, not their developmental outcomes in respective Southeast Asian countries.

Second, with the exception of Malaysia, Singapore's intra-ASEAN trade is relatively weak vis-à-vis its trade with the rest of the world. Compared to a relatively significant role of Indonesia in Singapore's outward FDI statistics, Singapore's trade with Indonesia is small (Department of Statistics, 1999). Although Singapore had substantial investments in Indonesia at S\$3.9bn in 1996 (see Table 1), much of these investments might have been invested in non-manufacturing sectors that offered little trade propensities. In other words, these FDI flows from Singapore are not made to develop

Table 2. Singapore's trade with Southeast Asian countries, 1988, 1993 and 1998 (in S\$million)

Area/country	1988			1993			1998			
	Import	Export	Domestic exports	Import	Export	Domestic exports	Import	Export	Domestic exports	
Asia	57,244	41,285	21,967	98,529	89,837	36,513	105,062	101,177	50,196	206,239
Japan	19,365	6,828	4,876	26,192	30,111	5,802	28,434	12,090	6,947	40,524
(%)	(21.9)	(8.6)	(9.8)	(15.7)	(21.9)	(7.7)	(16.7)	(6.6)	(6.6)	(11.4)
Malaysia	12,929	10,721	3,986	23,650	22,670	8,009	26,252	27,999	12,641	54,251
(%)	(14.7)	(13.6)	(8.0)	(14.1)	(16.5)	(10.6)	(15.5)	(15.2)	(11.9)	(15.3)
Philippines	529	1,045	492	1,573	813	1,173	4,002	4,120	2,012	8,122
(%)	(0.6)	(1.3)	(1.0)	(0.9)	(0.6)	(1.6)	(2.4)	(2.2)	(1.9)	(2.3)
Thailand	2,386	4,311	2,753	6,698	5,676	3,975	8,118	7,037	3,534	15,156
(%)	(2.7)	(5.4)	(5.6)	(4.0)	(4.1)	(5.3)	(4.8)	(3.8)	(3.3)	(4.3)
America	15,191	20,764	16,836	35,955	24,168	21,218	34,130	40,574	30,408	74,704
Europe	13,082	12,193	7,979	25,275	19,718	14,255	26,995	33,008	21,386	60,003
Oceania	2,068	3,027	1,952	5,095	2,741	2,385	2,546	6,566	2,941	9,112
Africa	641	1,783	822	2,424	1,139	1,023	1,131	2,438	987	3,569
Total	88,227	79,051	49,555	167,278	137,603	75,394	169,864	183,763	105,918	353,627

Source: Department of Statistics (1999, Tables 12.3–12.5).

intra-firm production networks. As shown in Table 2, Singapore's trade balance with the Philippines and Thailand was positive in 1988. But this favourable trade position for Singapore was reversed in 1998 when Singapore experienced a trade deficit with Thailand (and almost with the Philippines). To a certain extent, these deficits may result from the impact of the 1997/1998 Asian economic crisis (see Radelet and Sachs, 1998; Henderson, 1999).

3.2. The organisation of regional production networks in Southeast Asia by Singapore-based TNCs

The above sub-section has presented some general trends in FDI and trade between Singapore and other Southeast Asian countries. From these statistics, we know that (1) slightly less than 50% of Singapore's outward FDI is accounted for by foreign TNCs in Singapore; (2) many of these foreign TNCs, particularly those from the US and Japan, use Singapore as an export production platform and a regional control centre; (3) the regional presence of indigenous Singaporean TNCs in Southeast Asia remains limited to Malaysia and Indonesia; and (4) intra-ASEAN trade, with the exception of Malaysia, is not as important for Singapore. These trends tend to indicate that the organisation of regional production networks through production fragmentation and spatial divisions of labour by SINTNCs is still emerging rather than well established. This macro-economic finding is surprising, given that the Singapore-Indonesia-Malaysia Growth Triangle has been in existence for over a decade now (Perry, 1991; Ho and So, 1997; Grundy-Warr et al., 1999). One would imagine that significant manufacturing complementarities should exist in these three countries and regional production networks coordinated by SINTNCs should be able to tap into these complementarities. Based on a general analysis of the survey data, my aim in this sub-section is to examine this intra-firm organisation of 63 sampled manufacturing SINTNCs operating in Southeast Asia (see Table 3).

From Table 3, several important observations can be made in relation to (1) the geography of Southeast Asian operations; (2) the market and strategic orientations of Southeast Asian subsidiaries; (3) the functions of Southeast Asian subsidiaries, and (4) the role of the Singapore headquarters in marketing, sourcing, technology, and finance. First, it is clear that the geography of these 63 manufacturing SINTNCs in Southeast Asia is heavily biased towards Malaysia and Indonesia, a reflection no doubt of the general trends in FDI from Singapore. Respectively 87% and 40% of these 63 SINTNCs have established at least one operation in Malaysia and Indonesia. About 55% of the total 213 subsidiaries have been found in Malaysia and another 24% in Indonesia. In these two host countries, each SINTNC has over two subsidiaries on average. These data tentatively indicate that whereas SINTNCs tend to be inactive in other Southeast Asian countries, there may be a significant degree of intra-firm organisation of production activities within the Singapore-Malaysia-Indonesia manufacturing triangle. There may even be a case for arguing that the regional production networks of these SINTNCs begin to mimic that of Japanese TNCs, as postulated in the flying geese model of international investment and trade.

Second, to ascertain the above claim, we need to examine the market orientation of Southeast Asian subsidiaries by SINTNCs. If most of these subsidiaries are oriented towards the global market, their existence can then be deemed to be related to the needs of global buyers (as explained in the GCC approach) and the organisational capabilities

Table 3. Intra-firm organisation of 63 manufacturing SINTNCs in Southeast Asia (percentage of total 63 responses in parentheses)

Intra-firm organisation	Indonesia	Malaysia	Philippines	Thailand	Other SEA countries	Total
1. Country of operations	25 (40)	55 (87)	10 (16)	8 (13)	15 (24)	63 (100)
2. Number of subsidiaries	51 (24)	116 (55)	13 (6)	13 (6)	20 (9)	213 (100)
3. Market orientation of SEA subsidiaries						
(1) serving local markets	17 (77)	36 (69)	5 (50)	4 (57)	14 (93)	
(2) serving regional markets	1 (5)	6 (12)	—	—	—	—
(3) serving the global market	2 (9)	5 (19)	1 (10)	1 (14)	—	—
(4) serving the parent firm in Singapore	2 (9)	4 (8)	2 (20)	1 (14)	—	—
(5) others	—	1 (2)	2 (20)	1 (14)	1 (7)	—
4. Functions of SEA subsidiaries						
(1) to supply raw materials and resources to the parent firm	5 (23)	8 (15)	1 (10)	1 (14)	—	—
(2) to serve local markets with local products	15 (68)	32 (62)	6 (60)	4 (57)	12 (800)	—
(3) to take advantage of lower costs	—	4 (8)	2 (20)	1 (14)	—	—
(4) to export to Europe and America	—	—	—	—	—	—
(5) to coordinate and manage other subsidiaries/affiliates	—	1 (2)	—	—	—	—
(6) to build up relations with local firms/governments	—	2 (4)	1 (10)	1 (14)	—	—
(7) to serve global/regional customers	2 (9)	5 (10)	—	—	3 (20)	—
5. Marketing in SEA subsidiaries						
(1) central marketing department in the HQs	—	—	—	—	15 (24)	—
(2) local marketing department in subsidiaries	—	—	—	—	41 (66)	—
(3) others	—	—	—	—	6 (10)	—
6. Sourcing in SEA subsidiaries						
(1) central corporate sourcing from the HQs	—	—	—	—	—	30 (49)
(2) local sourcing department in subsidiaries	—	—	—	—	—	29 (48)
(3) others	—	—	—	—	—	2 (3)
7. Technology sources in SEA subsidiaries						
(1) direct transfer of product technology developed by parent companies	—	—	—	—	—	14 (23)
(2) direct transfer of process technology developed by parent companies	—	—	—	—	—	36 (58)
(3) others	—	—	—	—	—	12 (19)
8. Sources of capital in SEA subsidiaries						
(1) internal capital from parent companies	—	—	—	—	—	55 (90)
(2) others	—	—	—	—	—	6 (10)

Source: author's survey

of their parent SINTNCs (as explained in the regional production networks perspective). In the survey, 67.7% of the 63 SINTNCs agreed that they are a major regional company based on the relative market position of their main products, whereas another 22.6% thought that they are a major global company. Almost 80% of the sampled SINTNCs have an annual sales value of over S\$10 million. Survey data in Table 3 show that over 50% of the subsidiaries in each Southeast Asian host country are oriented towards serving the local market. This tendency is particularly pronounced in the subsidiaries of SINTNCs in Other Southeast Asian countries (93%), Indonesia (77%), and Malaysia (69%). Another 9% to 19% of SINTNCs in Southeast Asia manufacture in the host country for the global market. Less than 20% of SINTNCs establish their Southeast Asian subsidiaries to serve the parent firms in Singapore. As an indicator of the extent of production fragmentation through spatial divisions of labour, this implies that Southeast Asian subsidiaries of SINTNCs are responsible for certain, often downstream assembly, segments of the production chain. The finished products are then sent back to Singapore ready for exports to major markets in the global economy.

Third, the functions of Southeast Asian subsidiaries of SINTNCs appear to confirm the above findings. Table 3 shows that the function of a majority of the Southeast Asian subsidiaries of SINTNCs (> 57%) is to serve local markets with local products. Only 10% to 23% of these subsidiaries function as suppliers of raw materials and resources to their parent companies in Singapore. This finding indicates that few SINTNCs have fully integrated production networks within Southeast Asia such that their local subsidiaries tap into resource-abundant host countries for downstream high value-added manufacturing operations in Singapore. Moreover, none of the subsidiaries in Southeast Asia export directly to markets in Western Europe and North America, another reflection of the lack of regional integration of production processes. If many SINTNCs manufacture key components or intermediate products in Singapore and establish downstream labour-intensive packaging or assembly operations in the Southeast Asian host countries, we would expect at least some of these local subsidiaries to export directly to foreign markets in Europe and North America. The complete absence of this export function among Southeast Asian subsidiaries confirms the insignificant role of regional production networks among SINTNCs and the lack of integration of their Southeast Asian production into specific global commodity chains. As a related point, it is unlikely that many SINTNCs use Singapore as a re-export platform for products manufactured through their production networks in Southeast Asia. This is because Singapore has become too expensive as a location for final assembly or packaging. It is much more logical for manufacturing SINTNCs to export their finished products abroad directly from a third country in Southeast Asia. A tentative conclusion here seems to be in favour of the New International Division of Labour thesis in that SINTNCs establish Southeast Asian manufacturing operations to tap into host country cost advantages and market access.

Last but not least, the lack of significant spatial divisions of labour is evident in the organisation of production chains in local subsidiaries. In the area of marketing, some 41 SINTNCs (66%) market their products through local marketing departments in the host country subsidiaries. Only 15 of them (24%) show some degree of organisational integration of marketing activities through central marketing departments in the Singapore headquarters. In terms of sourcing of production supplies, technology, and capital, parent companies in Singapore seem to be playing a more active and significant role. Almost 50% of SINTNCs adopt central corporate sourcing practice for their

Southeast Asian subsidiaries. This points to the exploitation of economies of scale through central purchasing and sourcing by parent SINTNCs. Furthermore, it demonstrates the important role of Singapore as a major location for international sourcing because of its excellent information and telecommunication facilities, and world-class transport and logistics systems. The strong influence of parent SINTNCs is also reflected in the area of technology transfer and sources of capital. Some 50 SINTNCs (81%) noted that their Southeast Asian subsidiaries rely on direct transfer of product or process technology originally developed by parent companies in Singapore. Another 55 SINTNCs (90%) financed the establishment of their Southeast Asian subsidiaries through internal capital from parent companies, an indication of the lack of access to financial and capital markets in the Southeast Asian host countries and the role of Singapore as a regional financial centre (see also Wu and Duk, 1995; Wu, 1997). Taken together, it is clear that the Southeast Asian subsidiaries of SINTNCs rely heavily on their parent companies for technology and capital. Most of them market their manufactured products locally and many of them source locally as well. These findings illustrate the local orientation of SINTNC subsidiaries in Southeast Asia and the lack of significant intra-firm organisation of production networks.

To explain these intra-firm organisational characteristics of SINTNC subsidiaries in Southeast Asia, we need to understand their rationale of establishment. Together, four motives account for an overwhelming 81% of total responses: (1) regional coverage of operations (23%); (2) Southeast Asia as an important growth region in the industry (22%); (3) serving local/region or global clients (21%), and (4) economising production costs (16%). With the exception of the fourth motive of establishing Southeast Asian subsidiaries, all the other three motives are critically important for market-driven manufacturing SINTNCs, particularly those serving as lead suppliers to global corporations. To these supplier SINTNCs, the limited domestic market in Singapore has driven them to search for alternative markets. Very often, they are compelled to establish manufacturing subsidiaries in the host countries where their major customers have significant operations. For example, a component-supplier SINTNC may need to set up a plant in Malaysia to serve its major Japanese or American customer(s) which manufactures electronics products in Malaysia. Today, many global corporations are more willing to offer supplier contracts to companies that are capable of serving them wherever they go. As global competition is increasingly embedded in specific regions and clusters or agglomeration economies are more relevant for global competition (Ellison and Glaeser, 1999; Ivarsson, 1999; Maskell and Malmberg, 1999; Schmitz and Nadvi, 1999; Yeung, 2000b), having a regional presence becomes imperative for these SINTNCs to serve their global corporation customers and to secure first-tier supplier status. The spatial behaviour of these supplier SINTNCs can be well explained within the theoretical frameworks of buyer-driven commodity chains and regional production networks in Asia. For those SINTNCs primarily oriented towards the local market in Southeast Asia, lower production costs can be achieved through direct presence in the host countries. The cost-driven behaviour of these SINTNCs also fits well into the NIDL thesis. It appears that the three complementary theoretical perspectives reviewed in Section 2 have varying degrees of relevance to our understanding of the spatially differentiated organisation of Southeast Asian manufacturing operations by SINTNCs.

In short, the above findings reflect the weak intra-firm organisation of regional production networks by SINTNCs in Southeast Asia. Most of these SINTNCs have established local subsidiaries in Southeast Asia either to provide finished products to

the local markets or to serve their global corporation clients with local intermediate products. Very few SINTNCs have fragmented their production processes and relocated their lower-end downstream manufacturing activities to other low-cost Southeast Asian countries. Their Southeast Asian subsidiaries are mostly branch plants, resembling a multi-domestic structure rather than an integrated regional or global matrix structure (see Dunning, 1993; Dicken, 1998). Given this regional organisation of production networks by manufacturing SINTNCs, what then are the policy implications for our understanding of rules of origin and the complex inter-relationships between international trade and FDI?

4. Implications for rules of origin

Today, rules of origin have been developed into strategic trade policy instruments whereby the importing countries, often in North America and Western Europe, use rules of origin as the legal justification for imposing trade restrictions on exports from developing countries. This is known as the ‘asymmetric incidence’ of rules of origin (Hirsch, 1998). These restrictions have significant impact on international trade and investment flows, as clearly evident in the Multi-Fibre Agreement and its impact on the geography of textiles and garments production (Dicken, 1992, 1998; see also Satapathy, 1998a). Others have argued that rules of origin in integrated circuits and photocopying machines in the European Union were designed specifically to protect domestic producers from competing Japanese producers (James, 1997, p.119). According to Vermulst (1992, p.61), the *raison d’être* for rules of origin is ‘the existence of differentiated restrictions on international trade’. He suggested three factors for the growing importance of rules of origin in international trade: (1) the surge in selective contingency protectionist measures; (2) the regionalisation of the global economy through creation of trading blocs; and (3) the establishment of positive discriminatory measures, i.e. the Generalised System of Preferences (GSP). The last factor is important because most trading countries practise preferential trade policies. It becomes crucial to determine whether certain products originate in a preference-receiving country and therefore can qualify for preferential treatment. This need for rules of origin is predicated on the fact that manufacturing goods are often produced in more than one country and this problem is exacerbated by the trend in TNC activities towards the regionalisation of production networks. Most researchers in international trade tend to agree that the product will have the origin of the last country where substantial transformation took place. But determining the extent of transformation in a product remains a thorny issue (see Vermulst, 1992; Hoekman, 1993; Falvey and Reed, 1998). There are also many differences in the criteria and tests used by importing countries to determine the country of origin of a product.

In Southeast Asia, the GSP is extended to selected member countries of the Association of South East Asian Nations (ASEAN). For example, the US accepts full and regional cumulation from Indonesia, Malaysia, Thailand, and the Philippines with the exception of Brunei and Singapore, whereas the EU accepts cumulation from all ASEAN member countries (Vermulst, 1992, Tables 6–7). Regional cumulation refers to the granting of preferential treatment to materials and/or goods produced in cumulative processes within certain specific regions. For example, products manufactured by SINTNCs in the above ASEAN countries are granted preferential treatment under the GSP preferential-origin rules under which materials produced in ASEAN or other

beneficiary countries (Australia and Canada) can be cumulated. Whether the ASEAN production of manufactured goods by TNCs from Singapore and outside ASEAN (e.g. Japan or South Korea) constitutes third-country circumvention of rules of origin remains to be determined by respective importing countries. The ultimate country of origin of manufacturing facilities in these ASEAN countries becomes an important issue. Insofar as my survey is concerned, all SINTNCs are incorporated and headquartered in Singapore. They are therefore not qualified for the GSP preferential-origin rules if the substantial transformation in the manufacturing processes of their products for exports is located in Singapore. My empirical finding that most SINTNCs have limited organisation of regional production networks in Southeast Asia becomes less critical for Singapore's exports on the basis of the non-preferential rules of origin or, in the case of the US, the specially enacted third-country circumvention provisions.

In addition, the GSP preferential-origin rules practised by the US require substantial transformation and local direct cost-added of 35% of the appraised value, compared to 50% and 60% respectively by Australia and Canada (Vermulst, 1992, Table 6, p. 85). The impact of these rules on the exports by SINTNCs via other ASEAN countries is relatively insignificant because of several reasons. First, most manufacturing activities by sampled SINTNCs in other Southeast Asian countries are either oriented towards the local markets or engaged in substantial local sourcing. None of the Southeast Asian subsidiaries of the SINTNCs in my survey function to export directly to markets in Western Europe or North America. Few of them are therefore subject to the GSP preferences and rules. Second, the relative lack of significant regional integration of production networks controlled by SINTNCs implies a concomitant lack of third-country circumvention of rules of origin. The ASEAN manufacturing subsidiaries of SINTNCs are organised as multi-domestic firms in the host countries, rather than as well integrated networks of production (cf. Japanese TNCs in Southeast Asia; see Weinstein, 1976; Steven, 1988; Pongpaichit, 1990; Lijima, 1993; Aoki, 1995; Hatch and Yamamura, 1996).

5. Conclusion

This paper has examined the organisation of Southeast Asian regional production networks by Singapore-based manufacturing transnational corporations and shown the relevance of the three theoretical perspectives for explaining the regionalisation of SINTNCs. Although my findings show the current weak intra-firm organisation of SINTNC production networks in Southeast Asia, they do point to possible future evolutionary emergence of these SINTNCs. This is particularly so as more SINTNCs continue to regionalise their manufacturing operations and many of them are beginning to move beyond OEM production to become original brand manufacturers (OBM). The desire of many manufacturing SINTNCs to exploit Singapore's R&D, financial, and logistics positions, and to tap into the abundance of labour and resources in regional economies is expected to fuel the development of more complex and intricate regional production networks in the future. The challenges posed by these corporate developments in Singapore and the Southeast Asian region are immense in the context of greater trade and investment integration within the ASEAN and APEC initiatives whereby more cross-border economic activities are likely in the new millennium. Whether this evolutionary pattern of development in the regional production networks of SINTNCs conforms to the prediction of the flying geese model remains an empirical issue that requires significantly more future research.

In this concluding section, I want to consider two major challenges: (1) geography and ownership of international production and (2) restrictive trade practices. First, in an era of accelerated globalisation and regionalisation, it becomes extremely difficult, if not futile, to track the national ownership of firms and production. This is clearly evident in the debate between Reich (1991) and Tyson (1993) in the early 1990s about the merits of Japanese investments in the US. As argued by James (1997, p.130), 'nationality of ownership of firms is an increasingly abstract notion just as country of origin of manufactured products is'. The geography and ownership of international production are more divorced today than used to be true in the 19th century. The methodological challenges to researchers in international trade and investment activities are to re-examine restrictive regulations which are based on our traditional conceptions of trade and investments as economic activities primarily bound within specific national territories.

Second, the formation of the World Trade Organisation has not led to the end of restrictive trade policies. The prevalent use of rules of origin as protectionist devices today, for example, can hardly be disputed. There are therefore certain unresolved issues in international trade and investment flows. In the first place, rules of origin remain an unsettled agenda in international trade regimes and negotiations. Writing in the early 1990s, Vermulst concluded that:

Until a few years ago, rules of origin were an obscure area of law in which legal processes were by and large absent, and government officials agreed in *in camera* sessions upon both policy formulation and policy implementation. Discussions about rules of origin were felt to be a government affair in which private companies, let alone foreign companies, had no standing. The lack of interest was fuelled by the widespread perception of rules of origin as technical rules applied by technicians on the basis of technical considerations. (1992, p.92)

On the other hand, the discriminatory practice of non-preferential rules of origin at the policy implementation level continues to be a critical issue. In practice, these rules are capable of influencing the spatial distribution of FDI away from those countries restricted by non-preferential rules to those benefiting from preferential rules. As Vermulst (1992, p.94) noted, these discriminations and disparities in rules of origin are 'an expression of nepotism fashioned to foster foreign investment in certain countries rather than others'. Moreover, implementing the complete harmonisation of rules of origin, as agreed during the Uruguay Round of GATT, continues to be a daunting task for policy makers in international trade. Some even went so far to complain that it is unwise 'to spend so much time in trying to harmonize rules that will never be used in practice' (Keizer, 1997, pp.149–50). The argument here is that most manufacturing firms found it relatively straightforward to determine the country of origin where last substantial transformation has taken place. The practical focus should therefore be on only a limited number of cases where a real problem with origin interpretation between countries arises. Others have argued that the considerable amount of time invested in such negotiations to harmonise rules of origin means that it is unlikely that the international community will accept a partial harmonisation (see Satapathy, 1998b). The debate clearly shows the tensions and dissatisfaction of members in the process of harmonising rules of origin.

Whether or not these issues revolving around rules of origin can be finally settled in a globalising world, the trend towards closer integration of production and trade orchestrated by transnational corporations is indisputable. Production fragmentation and spatial divisions of labour are expected to become more complex and, perhaps,

incomprehensible to policy makers. A related phenomenon of international trade flows is also likely to follow that of international production. There is a much more significant role to be played by academic researchers in conceptualising and understanding these inter-woven trends of global trade, investment and production activities. In doing so, we need to go beyond macro-economic analysis and to embrace an organisational perspective which seeks to explain the empirical patterns in the global economy through an examination of such major actors as transnational corporations and their worldwide web of activities. This difficult task clearly requires research efforts from more than any single academic disciplines, as evident in the recent awakening of economists and business scholars to the role of economic geography in shaping the changing mosaic of global economic landscape (Krugman, 1991, 1998; Porter, 1998; cf. Martin and Sunley, 1996; Martin, 1999; Clark et al., 2000). As the boundaries of national economies are getting increasingly porous in a globalising world, the same phenomenon should be observed in the academic world. We need more inter-disciplinary collaboration to complement the shortcomings of the narrow pursuit of individual disciplines.

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