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### **Abstract**

The phenomenon of fast-growing business activities of multinational corporations around the world has generated much interest in understanding its implications for the development of the world economy as well as the relationships among national economies. By analyzing the world's top 2000 firms published by Forbes Magazine (the Forbes Global 2000), this article first investigates the contents and structural evolution of these giant multinational firms and their relationship with national foreign direct investment (FDI). We then adopt the method of clustering analysis to investigate FDI and trade networks within and among regions through which the development of regional economic integration are revealed.

*Keywords:* trade bloc, FDI bloc, flying geese paradigm, regional economic integration.

*JEL Classification:* F15; F21; F23

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## 1. Introduction

The increasing prominence of multinational corporations (MNCs) in today's world economy has drawn much attention not only from international organizations and national government agencies but also from local citizens. Through merging, procuring and setting up new establishments, they have operated businesses throughout the world, by which they mobilize resources, develop vertical and horizontal production networks and penetrate all kinds of markets across borders. These acts have changed the operations of a national economy as well as the relationships among them. Willingly or not, national economies have been joined together and become interdependent with one another. As a result, regional economic integration has been brought forth into existence and the process of globalization intensified.

Thanks to the openness of global trade and foreign investments advocated by WTO and responded by national authorities, together with the advancement of transportation and communication technologies, MNCs are able to rapidly expand with much less obstacles than before. According to the survey of the Global 2000 firms by the *Forbes*, the overall sales of the top 2000 firms in the world market has grown 36.63% from \$21.9 trillion to \$30.0 trillion, with an annual growth rate of 6.44% greater than the annual growth rate of 6.26% in world trade. The value of assets has grown 53.72% from \$80.7 trillion to \$124.0 trillion between 2004 and 2009 with an annual growth rate of 8.98%<sup>1</sup> greater than that of 6.07% in world capital assets<sup>2</sup>. Gabel and Bruner (2003) also claim that among the world 100 largest economies, at least 53 are MNCs. They command more resources and exert a stronger influence than nearly three fourths of all national states.

The effects of MNCs' investments on trade have also been noticed. Bonturi and Fusakaku (1993) found that the significant growth of intra-industry trade in the 1980s is mainly induced by FDI; and the intra-firm trade accounts for about 35 to 40% of the total US trade. UNCTAD (2002) pointed out that foreign affiliates of

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<sup>1</sup> The total sales of the Global 2000 firms decreased from US\$31.5 trillion in 2008 to US\$30.0 trillion in 2009 due to the global financial crisis. The growth rate between 2004 and 2008 was 43.7% greater than that between 2004 and 2009. They consist of both domestic and foreign sales, which may reflect the scale of their operations in the global economy as a whole. On the other hand, the assets value continued to grow despite the impact of the financial crisis.

<sup>2</sup> For the world capital assets, we refer to the table of "domestic market capitalization, main and parallel market", published by World Federation Exchanges at:  
<http://www.world-exchanges.org/statistics/annual/2008/equity-markets-0>

MNCs accounted for 35% of world trade in 2001. Feenstra (1999) divided the MNCs' trading into intra-MNC (parent-affiliate and affiliate-affiliate) trade and arm's length transactions (between MNCs and unaffiliated firms), and found that 34% of total US exports and 43% of total US imports were intra-MNC trade in 1992. Feenstra also pointed out the statement of Graham (1996, p. 14) that "intrafirm trade by MNCs accounted for almost 50 percent of US exports and well over 50 percent of US imports of merchandise in 1991" should have included the above two types of MNCs trading. In either case, these numbers of magnitude show that MNCs have been key players in global trade.

With the importance of MNCs in trade, the nature of MNCs' exports has been reconsidered. In the negotiations of US-China trade disputes, the representatives of China have repeatedly pointed out that a large portion of its exports to the U.S. was produced and traded by the MNCs of other countries in China and should be treated as the exports of these FDI source countries.<sup>3</sup> The trade balances based on ownership should be a better revelation of trade relationship among countries. This point of view was recognized by the United States. Since 1995, the U.S. Bureau of Economic Analysis has annually published the report of *An Ownership-based framework of the U.S. Current Account*, taking foreign MNCs' sales in the U.S. as the extended exports of the MNC source countries to the U.S. and the sales of the U.S. MNCs in foreign countries the extended U.S. exports. In this definition, the MNC activities are henceforth considered the extension of the economic activities of the source countries, and the U.S. trade deficits are largely reduced.

Who, then, are the top MNCs in the global economic arena? Where do these MNCs come from and what businesses are they doing? When MNCs invest overseas, where does the investment go? How have all these MNC activities changed the development of regional economies?

This article tries to answer these questions by first analyzing the structure of the top 2000 firms in the global market. Starting from 2003, The *Forbes* has published the list of the top 2000 firms around the world as "the Global 2000".<sup>4</sup> The ranking is made based on a composite index considering profits, sales, assets

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<sup>3</sup> This claim was also asserted by Japan representatives in US-Japan trade negotiations in the 1980s.

<sup>4</sup> The data is available at

[http://www.forbes.com/2010/04/21/global-2000-leading-world-business-global-2000-10\\_land.html](http://www.forbes.com/2010/04/21/global-2000-leading-world-business-global-2000-10_land.html)

and market value.<sup>5</sup> The operation of these firms has gone beyond the boundary of their motherland and spread across borders. The structural change of these firms may largely stand for the development of the MNCs in the global economy.

Then we relate the top MNCs' activities with national FDI to find out whether the countries with more large MNCs invest more outwardly and at the same time attract more investment from abroad. By decomposing the regional distribution of national FDI and adopting the method of clustering analysis, we are able to depict the FDI networks and test whether there are regional concentration phenomena. Finally, we compare the structure of FDI networks with that of trade networks to trace the evolution of regional economic integration, especially that in the East Asia.

The rest of the article is organized as the following. The next section provides the descriptive statistics of the Global 2000 firms and analyzes the development trend. The third section describes the method of clustering analysis and presents the empirical results to see whether the regional investment blocs exist and the development of regional trading blocs. The fourth section summarizes our findings and gives conclusion.

## **2. Multinational corporations and FDI**

### **2.1 Who are the top MNCs and what are they doing?**

In the appendix 1, we list the top 10 MNCs among the Global 2000 firms in 2009, and in the appendix 2, the top 10 manufacturing MNCs. It shows that the largest firms are the ones conducting finance and energy exploration and drilling. As for the top manufacturing firms, their businesses are more diversified, ranging from nondurable consumer goods, drugs and chemicals, technological equipment to semiconductors. In either case, the U.S. MNCs have occupied half of the places of the two top 10s. Though the U.S. has remained as the largest investor in the world, the ranking and allocation of the countries owning the Global 2000 firms has continued to change. As shown in Table 1, during 2002-2009, the U.S. and Japan have kept the positions of the 1<sup>st</sup> and 2<sup>nd</sup> largest source countries owning the most of

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<sup>5</sup> We take the Global 2000 firm data as that of the year previous to the publishing year, so that the data published in 2003 is treated to reflect the performance of the firms in 2002. The Forbes magazine published the first three editions every two years between 2003 and 2007. After 2007, the data was published every year. The first edition published in 2003 only included the rankings but not values of firm profits, sales, etc. The industry classification, the magnitude of profits, sales, assets and market value are added to the later editions.

the Global 2000 firms, though the share and the number of firms have been declining. The most significant change should be the rapid climbing-up of China and India. In 2002, China and India were ranked the 21<sup>st</sup> and 16<sup>th</sup> owning only 13 and 20 firms in the Global 2000. Yet in 2008, they became the 3<sup>rd</sup> and 8<sup>th</sup> owning 113 and 55 firms respectively. Keeping the same ranking in 2009, the numbers of firms they own continue to increase. In only five years, China surpassed the technologically advanced and capital abundant countries such as UK, France, Canada and Germany, gaining a leading stand in the world investment race. In addition to China and India, the Asia NIEs (newly industrial economies), including South Korea, Hong Kong and Taiwan, have remained steadily in the list of the top 15 countries throughout the period.

[Place Table 1 here]

If measured by sales, the ranking of the emerging Asian countries is modestly falling behind. As shown in Table 2, China was ranked the 6<sup>th</sup> and South Korea the 8<sup>th</sup> in 2009. At the same time, India, Hong Kong and Taiwan are listed as the 16<sup>th</sup>, 17<sup>th</sup> and 18<sup>th</sup>. It reflects that although these emerging Asian countries have aggressively invested overseas, the size of their business operation or their share of global sales are relatively smaller. In 2009, the total sales of Chinese Global 2000 firms are US\$1.3 trillion, about one third of the total sales of Japanese firms and one seventh of that of the U.S. firms.

[Place Table 2 here]

Even with modest size, the rapid growth of MNCs of the emerging Asian countries has changed the dominance of the global economy. As shown in Figure 1, the Herfindahl concentration index based on the shares of the source countries owning the Global 2000 firms, either measured by firm number or by sales, has declined over time. It may imply that the rise of emerging Asia has made the distribution of global economic power decentralized and spread more evenly among the three continents of Europe, Americas and Asia.

[Place Figure 1 here ]

Table 3 shows the types of businesses these 2000 giant firms are doing. Using the average data of 2004-2009 to avoid single year bias, we found that they have evenly covered all different aspects of industries similar to the industrial structure of a well-developed country. Among them, the finance firms occupy the share of 28.7% and form the largest sector. It is reasonable that financial support is essential for investment, especially foreign investment. Manufacturing firms take the second largest share of 22.9%, reflecting that commodity production is one of the main purposes for overseas investment and that the production fragmentation networks, either vertical or horizontal, have multiplied across countries. The services (other than financial services) firms hold the third stand or 18.9%, covering market access, production services as well as consumption services. The resources-related and public facility firms own the share of 17.8% and 11.7% respectively. This structure reflects that through MNCs' investment and activities, a global business framework has largely formalized to constantly facilitate a freer flow of capital, goods, services and resources.

[place Table 3 here]

In each of these industries, The U.S. and Japan maintained their lead and ranked as the first and second, while the emerging Asian countries play different roles. In the finance industry, as shown in Table 4, China and India have quickly promoted from the rank of the 17<sup>th</sup> and 13<sup>th</sup> in 2004 to the 3<sup>rd</sup> and 4<sup>th</sup> in 2009. Due to the high saving rates, rapid accumulation of capital and government policy incentives encouraging outward investment<sup>6</sup>, they have significantly advanced in financial business and through which support their overseas investment. They even excelled in firm number the countries of UK and Switzerland who are much more mature in financial development. Hong Kong, as the traditional East Asian financial center, held the position of the 8<sup>th</sup> in 2009 while Taiwan and South Korea were out of the top 10 and ranked as the 13<sup>th</sup> and 16<sup>th</sup>. The finance firms also traded and changed national identity most frequently compared to the firms in other industrial sectors.

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<sup>6</sup> About China's "going out" policy, see Chen and Lin (2008).

[place Table 4 here]

In the manufacturing sector, the U.S. owned 146 firms among all 458 manufacturing firms in the Global 2000 of 2009. The number is equivalent to the sum of the next four countries in the rank. (see Table 5) In addition, the sales of these 146 US-based firms are 33.3% of all 458 manufacturing firms. The strong lead of the U.S. in manufacturing shows that even though the U.S. economy has transformed into a service-sector-dominated economy, it has remained the leading force of the global manufacturing production.

On the other hand, the performance of the East Asian countries in manufacturing is stronger than that in overall aspect. Japan, China and Taiwan are consecutively ranked as the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup>, followed by South Korea as the 7<sup>th</sup>, Hong Kong the 11<sup>th</sup> and Singapore the 16<sup>th</sup>. (see Table 5) The list can be pictured as the presence of the leading goose (Japan) with the first ladder of follower geese (the 4 Asian NIEs) and the newly joined goose (China), as described by the East Asian flying geese paradigm.<sup>7</sup> The production fragmentation networks among them have well established and continued to intensify notwithstanding the 1997 Asian financial crisis. The rise of China and the absence of the ASEAN4 countries<sup>8</sup> in large scale foreign direct investment have triggered the discussion of China's catching-up and even outpacing them in the sequence of industrial development order.<sup>9</sup>

[place Table 5 here]

In contrast to their advantage in manufacturing, the performance of the emerging Asian economies is comparatively weaker in the services industry. As shown in Table 6, in 2009, only Hong Kong was among the top 5. South Korea, India and China, by owning a handful number of firms, listed between 6<sup>th</sup> and the 10<sup>th</sup>, reflecting the relatively backward trend in their development of the services sector.

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<sup>7</sup> The flying geese paradigm was originally brought out by Akamatsu (1962) and has triggered profound discussion about the pattern of industrial development of the East Asian countries. See Chen and Huang (2009), Fujita and Hill (1997), Kwan (2002), Ozawa (1999, 2000, 2001a, 2001b, 2003) for more discussion of the East Asian flying geese formation and development, the impacts of 1997 Asian financial crisis and the importance of foreign direct investment in forming the flying geese pattern.

<sup>8</sup> The ASEAN4 (the 4 founding members of the Association of South-Eastern Asian Nations) are also called the four tigers. They are Malaysia, Indonesia, Thailand and Philippines.

<sup>9</sup> See also the literature in footnote 6.



The focus of their investment and industrial development is still in the field of manufacturing production.

[place table 6 here]

Among all the source countries where the Global 2000 firms are based<sup>10</sup>, the top 10 countries hold a lion share of all sales, illustrating high concentration of the global businesses in handful countries, though the degree of concentration is slowly declining. As shown in Figure 2, the sales shares of the top 10 countries in all industries had decreased from 86% in 2004 to 78% in 2009; and for each different industry, the concentration rate has remained over 75%. Among all, the other services and manufacturing industries hold the highest concentration that the rate of the former remained at 90% and the latter 87% in 2009 despite the declining trend. These two industries are also the ones with the most stable top 10 members with the least turnover.

[place fig.2 here]

## **2.2 MNCs and FDI**

How are these MNC activities related to national foreign direct investment? Do more large MNCs activate constant higher outward investment? On the other hand, do large MNCs act as an attraction for inward investment? To answer these questions, we calculate the correlation coefficients between the number of the Global 2000 firms and national FDI, including inward and outward FDI flows and stocks. As shown in Figure 3, the high scores of the coefficients prove that large MNCs are highly connected with the volume of national FDI. It is most significant for the stocks of both inward and outward FDI that the coefficients remained above 0.8 in all sample years. The scenario may imply two tendencies. First, large MNCs have dominated the total volume of FDI. The overseas investment of small and medium enterprises is either joining the investment of large MNCs to form industrial clusters or staying minor in the picture. Second, it seems that the countries with more large MNCs tend to attract more foreign investment. Most probably they tend

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<sup>10</sup> The Global 2000 firms were based on 47 different source countries in 2002. The number of source countries increased to 58 in 2004, 63 in 2006, 66 in 2007, and 68 in 2008 and 2009. This increasing trend is also an indicator of economic decentralization.

to invest in each other and shape the investment relationship similar to the gravity model of trade.<sup>11</sup> Would the gravity of investment be affected by regional factors and form a structure of regional FDI blocs? If so, how are the FDI blocs compared with the trade blocs? In the next section, we develop the clustering analysis to find out the answers.

[place Figure 3 here]

### **3. Examining FDI regional blocs using clustering analysis**

#### **3.1 Methodology**

With the development of regional economic integration, academic studies on trading blocs and regionalism have flourished. For example, Eichengreen and Irwin (1995, 1996) apply the gravity model on the 1928 data to investigate the effect of trading blocs and currency blocs on the flows of trade. Grant et al. (1993) points out that the regional bloc phenomena seem to grow even faster after World War II. Also using the gravity model, Frankel (1992) demonstrates that Japan has formed a Yen-bloc in the East Asian and Pacific Basin in the 1980s through intensive intra-regional trade. Huang et al. (2006) derives from the (geographical) distance term of the gravity model to develop the concept of economic distance and measures the distance as the inverse of the relative trade intensity. That is, the larger the share of the bilateral trade to the total world trade of a pair of countries, the higher the bilateral trade intensity and the shorter economic distance between them. The pair with the shortest distance among all countries is first identified as a potential inner core of a trade bloc. The inner core is then treated as a single joint economy and the bilateral trade intensities are recalculated for each pair of economies. By repeating the process, a sequence of economies with high trade intensity to the inner core will be identified and added to it, and a trade bloc emerges with different layers, indicating the economic distance from the nearest to the farther away. By applying the method to the bilateral trade of textile products, it is found that there are two trade blocs for the textile industry. One is composed of the Asia-Pacific countries and the other EU countries. While the former continued to expand, the latter tended to shrink during the last four decades of the 20<sup>th</sup> century. As for the automatic data

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<sup>11</sup> The Gravity model has been used by many authors to investigate the determinants of FDI. See Bevin and Estrin 2004; Egger and Pfaffermayr 2004, Dee and Gali2005 for some examples.

processing industry, there is only one trade bloc with the core countries gradually switching from Europe and the US to East Asia.

The merit of the method of clustering analysis is that it requires no presumption of the existence of regional blocs and their potential members but lets the blocs emerge directly from the bilateral trade intensity. The multi-layer structure and the structural change over time also provide a good source of information in discovering the evolvement of the trade blocs.

We apply the method to the bilateral FDI to test whether there are regional investment bloc phenomena. The database we use is “A Global Multi-sector Multi-region Foreign Direct Investment Database for GTAP” published by the GTAP (Global Trade Analysis Project) research center of Purdue University,<sup>12</sup> which provides the bilateral FDI flows and stocks among 113 regions for each of the 57 industrial sectors in 2004.<sup>13</sup> We first calculate for the top 40 outward FDI countries the bilateral FDI intensity with each other. The pair with the highest intensity is treated as a potential inner core of a FDI bloc. Then we calculate again the bilateral FDI intensity for each pair of 39 components (i.e., the 38 countries and the core). The pair with highest FDI intensity is again taken as a core or extended layer of the existed inner core. The calculation goes on until all countries are included in a global cluster. To better present the results in a tree diagram, we remove the countries with comparatively low intensity to most of the cores/countries. The process is conducted for the total FDI stock as well as the manufacturing FDI stock to see whether the regional structure of the FDI for the commodity production purpose differs from that of overall FDI.

### **3.2 FDI Clustering Analysis**

The empirical results of the total FDI clusters and manufacturing FDI clusters are shown in Figure 4 and 5. In Figure 4, we present a tree diagram of 25 countries that are adopted into the cluster structure after 25 iterations of calculation and leave out the rest of the 15 countries, which are usually ranked lower in outward FDI stock and have invested in and received investment more evenly from the rest of the countries. Figure 4 shows that there are two large blocs for the overall FDI with the

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<sup>12</sup> For the details of the database, see Lakatos and Walmsley (2010).

<sup>13</sup> Unfortunately, this database provides the bilateral FDI data only for 2004. Therefore, we cannot follow the structure change in the later years.

features of geographical proximity and historical origins. One bloc is composed of European and North American countries, and the other East Asian countries. The European-American bloc consists of two main clusters. One evolves from the most inner core of USA, UK (GBR) and France, and then extends to include Germany (DEU), Switzerland (CHE), the pair of Italy and Spain, the pair of Canada and Ireland, and Austria in sequence. The second cluster connects 3 pairs of countries, mainly in the middle and north Europe. They are the pair of Belgium and Luxemburg, Denmark and Norway, as well as that of Finland and Sweden. The two clusters are ultimately connected with each other into one bloc.

[Place Figure 4 here]

The East Asian bloc is clearly separable from the European-American bloc. It consists of only 5 countries, with Japan and South Korea forming one inner core, and Taiwan and Hong Kong the other. The latter is extended to include Singapore before the two cores connect with each other and become one bloc. The East Asian bloc and EU-American bloc do not link with each other until very later and form the outermost connection among all the clusters.

As starting FDI later than the European and North American countries, the investment intensity among these East Asian countries is obviously less imminent than that of the two European-American clusters. Yet the diagram conveys a structure that, through intensive bilateral investment, the East Asian countries, especially Japan and the 4 NIEs have established close ties with one another and formed a regional bloc.

We then test the regional bloc phenomena for the manufacturing FDI stock. Figure 5 shows that the regional bloc structure of the manufacturing FDI is about the same as that of the overall FDI. It remains the structure of 2 large blocs, one in the European-American region and the other East Asian region. The 2 main clusters within the European-American bloc also remain, except that Australia (AUS) was left out and Portugal (PRT) added to the cluster in the West Europe-North American region. These differences make the factor of geographical proximity even more vivid.

[Place Figure 5 here]

The East Asian bloc incorporates the two inner cores as that in the overall FDI, one in the North Asia (Japan and Korea) and the other in the South Asia (Taiwan, Hong Kong and Singapore). At the same time, it connects with the EU-American bloc with much more close relationship (or shorter distance) compared with that of the overall FDI. The high consistency in Figure 4 and 5 may imply that FDI as a whole serves mainly the purpose of production division. It is through MNC's coordination, that the geographical dispersion in production processes (from R&D, multi-stage manufacturing, to consumer services, etc.) has been laid out and the comparative advantages of each location in different production fragments revealed. While the European-American countries' MNCs invested in the East Asian region with more focus on manufacturing, they established a production network with it, integrating the economic resources and production capacities into one corporate system, and shortened the economic distance between the two regions.

As the GTAP database provides a complete global bilateral FDI matrix for only one year, we are not able to follow up the structural change of FDI network for later years. At the same time, while FDI pushes forward production division within and among regions, it should have caused more frequent intra and inter-industrial trade. In the following section, we conduct the cluster analysis for bilateral trade during 2000-2008 to see whether there are bloc phenomena and the evolution of the bloc structure.

### **3.3 Regional Clustering Analysis of Trade**

The empirical results of the clustering analysis of trade for the period of 2000-2008 are presented in Figure 6 to Figure 10.<sup>14</sup> As shown in these figures, there are three regional trade blocs with robust hierarchical layers throughout the period with only minor adjustments. They are blocs of EU, NAFTA, and East Asia. We first analyze the broad relationship among the three blocs, and then turn our focus on the structure of the East Asian bloc.

[Place Figures 6-10 here]

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<sup>14</sup> For the clustering analysis of trade in this section, we choose the top 25 exporters of each sample year and calculate the trade intensity for each pair of countries. The iterations continue until all the countries are included in one global trade bloc.

By observing the trade blocs during the first decade of the 21<sup>st</sup> century, we find that there is a clear structural change before and after 2004 for either the broad relationship among the three blocs or the inner structure of the East Asian bloc. Before 2004, as shown in Figures 6 and 7, NAFTA bloc and East Asian bloc revealed a closer relationship by joining together with each other before they connect with the EU bloc. But after 2004, the NAFTA bloc showed a closer relationship by joining with EU before they connect with the East Asian bloc. It is probably due to the oil price surge and the high oil dependence of the East Asian countries on the supply of the Persian Gulf countries. One of the evidence is that, starting from 2004, Saudi Arabia had appeared to be one of the world's top 25 exporters. It linked with the East Asian bloc before the broad East Asian bloc connected with the joint EU-NAFTA bloc.

The structure of the East Asian trade bloc has also experienced some subtle changes. In 2000 and 2002, the East Asian bloc comprises two inner cores, namely the pair of China and Hong Kong and the pair of Japan and Taiwan. The two cores are connected with each other in the second layer and then extended to include South Korea, followed by the core of Singapore and Malaysia, and then Thailand. (see Figure 6 and 7.) This structure well includes the key members of the East Asian flying geese paradigm, as Japan the leading goose, followed by the 4 Asian NIEs of Hong Kong, Taiwan, South Korea and Singapore, and the two of the ASEAN4: Malaysia and Thailand. The configuration of the structure provides further intuition of the East Asian economic integration. By comparing the trade blocs with the FDI and manufacturing FDI bloc, we find that, up to the early years of 2000s, the intensive bilateral investment between Taiwan and Hong Kong, which composed of the innermost core of the East Asian FDI bloc, had played a key role in integrating the rising China into the East Asian economic cooperation system. They expanded and deepened the bilateral economic cooperation by first building up cross-border intra-firm labor division and then duplicating and extending the local industrial clusters of Taiwan to Hong Kong, which later moved into the east coast of mainland China. With such development, more frequent trading evolved. The cooperation framework went upstream to link with Japan as Japan had been one of the important foreign investors and key provider of parts and components to Taiwan. This development fits well in the structure of East Asian trade bloc of 2000 and 2002

which consists of the inner core of China and Hong Kong and that of Japan and Taiwan, and the connection between the two.

But in 2004, Hong Kong disappeared from the trade bloc and the two major inner cores were reorganized and became one hierarchical cluster with Japan and China in the innermost core and extended in sequence to include Korea, Taiwan, the core of Singapore and Malaysia, and Thailand. This new structure remains steady up to 2008.<sup>15</sup> The disappearance of Hong Kong and marginalization of Taiwan from the inner core echo the findings of Ng and Tuan (1997) and Yang and Lin (2009) that the outward FDI has caused industrial restructuring and worsened the manufacturing productivity of Hong Kong and Taiwan, and hence their export performance. On the other hand, the aggressiveness of both inward and outward FDI of China may have strengthened its production capacity and trade competitiveness. (Chen and Lin, 2008) The more direct and intimate trade linkages between Japan and China and their joining into the sole inner core and driving force of the East Asian Trade bloc signify the change of the traditional East Asian flying geese pattern with Japan alone as the leading goose. The rise of China and its outpace of the follower geese of the 4 NIEs and the ASEAN4 countries to be the closest trade partner of Japan has shown the difference of its development route from its predecessors. Chen and Huang (2009) found that the pattern of industrial catching-up and inheritance of the East Asian countries can be depicted as the sequence of Japan → Asian NIEs → ASEAN4 → China that the Asian NIEs caught up with Japan and inherited its sunset industries of textiles, clothing and household appliance in the 1980s, which were passed over to the ASEAN4 and China in 1990s. But if the sample period is extended to 1970-2002, by using the RCA (revealed comparative advantage) sequential index method to the total 742 SITC 4-digit industries to compare the industry inheritance pattern of the ASEAN4 and China, it is found that among the 569 industries that China revealed the comparative advantages, 174 (or 31%) were inherited directly from the US and Japan, 219 (38%) were from the Asian NIEs and only 176 (31%) were from the ASEAN4. With more than a half of these industries that China stepped ahead of ASEAN4 to achieve its comparative advantages, China has broken the rank of flying

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<sup>15</sup> In 2000 and 2002, Australia and India were added to the East Asian bloc and formed a large Asia Pacific bloc. But in 2004, due to oil price surge, it is Saudi Arabia and Indonesia that were added to the East Asian Bloc. Australia reentered and stayed in the outer layer of the large Asian bloc in 2006 and 2008, while India joined the large Asian bloc again in 2006 but not 2008. On the other hand, Saudi Arabia had remained in the large Asian bloc ever since 2004. See Figures 6-10 for details.

formation and laid out a new era of development. As a leaping frog described by Brezis et al. (1993), China fulfills the conditions required for technological leaping and the shift of positions from lagging to leading. On one hand, its much lower wages for skilled and unskilled workers set an excellent stage for MNCs to experiment the new technology which has the features of that it initially seems to be inferior to the old technology; its application requires no experience of the old technology; and that it ultimately produces substantial productivity improvement over the old technology. On the other hand, its abundant labor force and huge market promise the opportunity to support the development of both supply and demand of the product. In line with the structural change of the East Asian trade bloc that China has come forward from the outer layer to innermost core and closely bonded with Japan, the leapfrogging theorem may provide an explanation.

It is worth noticing that the global financial crisis of 2008-2009 had only minor impacts on the cluster structure within each trade bloc, but significantly enlarged the distance between the two major trade blocs. By comparing the 2006 trade bloc diagram with that of 2008, we find that the inner cores of the three regional trade blocs remained closely bonded. Only the outer layers are altered by either being detached away from the original cluster or being reorganized into a different cluster. At the same time, while the major exporters in EU and NAFTA became united even closer, the distance between the joint bloc of EU and NAFTA and the East Asian bloc became farther away. This phenomenon may be explained by the differences between the intra-regional trade of the East Asian and its inter-regional trade with the rest of the world. Athukorala (2008) found that while the contents of intra-regional trade in the East Asia are mainly parts and components, those between the East Asian countries and the rest of the world are mostly final goods. In other words, while the trade within the East Asia is driven by cross-borders production processing, the most part of the finished goods are shipped to the advanced countries in Europe and North America to meet their final demand. With the global financial crisis inflicting heavily these advanced economies and decreasing their purchasing power, the exports of the East Asian to them were drastically reduced and their trade partnership weakened. In contrast, the rising domestic demand in the region, especially the household consumption in China, became the rescue of the East Asian countries in the global recession. The trade integration within the region became closer, the interdependence more condensed. This phenomenon is expected to



remain as Europe and North America require some time to re-regulate and re-establish their financial system before they can recover from the financial crunch.

#### **4. Concluding Remarks**

The phenomenon of fast-growing business activities of multinational corporations around the world has generated much interest in understanding its implications for the development of world economy as well as the relationship among national economies. By analyzing the world top 2000 firms published by the Forbes (the Forbes Global 2000), this article first investigates the contents and structural evolution of these giant multinational firms, and their relationship with national FDI. Then we adopt the method of clustering analysis to investigate the FDI and trade networks within and among regions through which the development of regional economic integration are revealed. The main findings are as the following.

First, the sales of the Forbes Global 2000 firms have been progressing in a rate faster than international trade, and the growth of their assets value outpaced that of world capital stock during the sample period of 2004-2009. In parallel with their expeditious growth, the industrial allocation of their investment has evolved in a balanced pattern, distributing quite evenly among the sectors of finance, manufacturing, services, resources and public facilities. The degree of concentration of these MNCs, according to the countries they are based on, is declining due to the rapid increase of aggressive investment from the Asian emerging countries, especially China and India. In consequence, the rise of the Asian emerging countries has altered the geographical distribution of the top MNCs and has made them spread more evenly throughout the continents of Europe, North America and Asia.

Second, the countries owning more large MNCs tend to invest more externally. At the same time, they attract more FDI inflow. By applying the clustering analysis developed by Huang et al. (2006) to the world bilateral FDI stocks, we discover that the large outward FDI countries are inclined to invest in each other more frequently in a regional manner. The empirical results show that both the overall FDI and manufacturing FDI share a similar structure of two multi-layer regional blocs. One bloc is composed of the countries of EU and North America, the other is of the East Asian countries. Though similar in structure, the distance between the EU-North America bloc and the East Asian bloc, measured by the inverse of the bilateral FDI intensity, is much smaller for the manufacturing FDI. It may imply a closer

investment relationship for production purpose between the two regions.

By applying the same method to the global bilateral trade flows, the empirical results show that there exist three trade blocs of EU, NAFTA and East Asia, which basically remained stable throughout the period of 2000-2008. But the relationship among them had some variations. Before 2004, the NAFTA bloc and East Asian bloc revealed a closer relationship by joining together with each other before they connect with the EU bloc. But after 2004, the NAFTA bloc showed a closer relationship by convergence with EU before they connect with the East Asian bloc. The scenario is probably caused by the oil price surge. At the same time, the cluster structure of the East Asian bloc had some modifications. Before 2004, there appeared two inner cores for the East Asian bloc, while after 2004 the two inner cores were rearranged and became one, with Japan and China consisting of the sole inner core of the East Asian bloc. The more direct and intensive trade relationship between Japan and China, together with the quickly moving forward of China's ranking in the Forbes Global 2000, may imply the appearance of leapfrogging described by Brezis et al. (1993). By fulfilling the conditions of leaping in technology and switching in position from lagging to leading, China may have become from a follower goose to a joint leading goose with Japan in the new East Asian flying geese paradigm.

In addition, the 2008-09 financial crisis seemed not to have much impact on the cluster structure of each trade bloc, but obviously enlarged the distance between the EU-North American bloc and the East Asian bloc. It may be caused by the reduction of purchasing power of the EU and North American countries. The rising demand from the Asian emerging countries, especially the strong household consumption demand in China, not only became the rescue of the East Asian countries in the world recession, but also integrated the regional economy more intensively.

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**Table 1. The source countries owning the Global 2000 firms**  
(ranked by firm number)

source country	2009	2008	2007	2006	2004	2002
United States	1 ( 536)	1 ( 526)	1 ( 598)	1 ( 659)	1 ( 711)	1 (776)
Japan	2 ( 270)	2 ( 290)	2 ( 259)	2 ( 291)	2 ( 326)	2 (331)
China	3 ( 113)	3 ( 111)	4 ( 70)	9 ( 44)	17 ( 21)	21 (13)
United Kingdom	4 ( 86)	4 ( 87)	3 ( 116)	3 ( 123)	3 ( 131)	3 (132)
France	5 ( 64)	5 ( 66)	5 ( 67)	4 ( 66)	6 ( 61)	4 (67)
Canada	6 ( 62)	7 ( 57)	6 ( 59)	5 ( 61)	4 ( 67)	7 (50)
Germany	7 ( 57)	6 ( 62)	7 ( 59)	6 ( 57)	5 ( 63)	5 (64)
India	8 ( 56)	8 ( 55)	10 ( 48)	15 ( 34)	15 ( 30)	16 (20)
South Korea	9 ( 51)	9 ( 54)	8 ( 52)	7 ( 52)	8 ( 41)	6 (55)
Hong Kong/China	10 ( 49)	10 ( 48)	12 ( 39)	8 ( 45)	12 ( 32)	13 (30)
Switzerland	11 ( 48)	11 ( 47)	13 ( 37)	14 ( 36)	9 ( 37)	10 (36)
Australia	12 ( 44)	12 ( 43)	9 ( 49)	12 ( 41)	11 ( 35)	9 (37)
Taiwan	13 ( 39)	14 ( 40)	11 ( 42)	10 ( 42)	10 ( 35)	12 (32)
Italy	14 ( 38)	13 ( 40)	14 ( 37)	11 ( 42)	7 ( 45)	8 (42)
Brazil	15 ( 33)	15 ( 34)	15 ( 34)	19 ( 22)	19 ( 19)	22 (13)
Spain	16 ( 29)	16 ( 32)	17 ( 29)	13 ( 36)	13 ( 30)	14 (29)
Russia	17 ( 28)	17 ( 26)	16 ( 29)	20 ( 20)	24 ( 13)	35 (6)
Sweden	18 ( 27)	18 ( 26)	18 ( 29)	17 ( 28)	16 ( 28)	15 (26)
South Africa	19 ( 23)	20 ( 23)	22 ( 17)	22 ( 16)	21 ( 17)	17 (18)
Netherlands	20 ( 22)	22 ( 19)	20 ( 24)	16 ( 28)	14 ( 30)	11 (32)

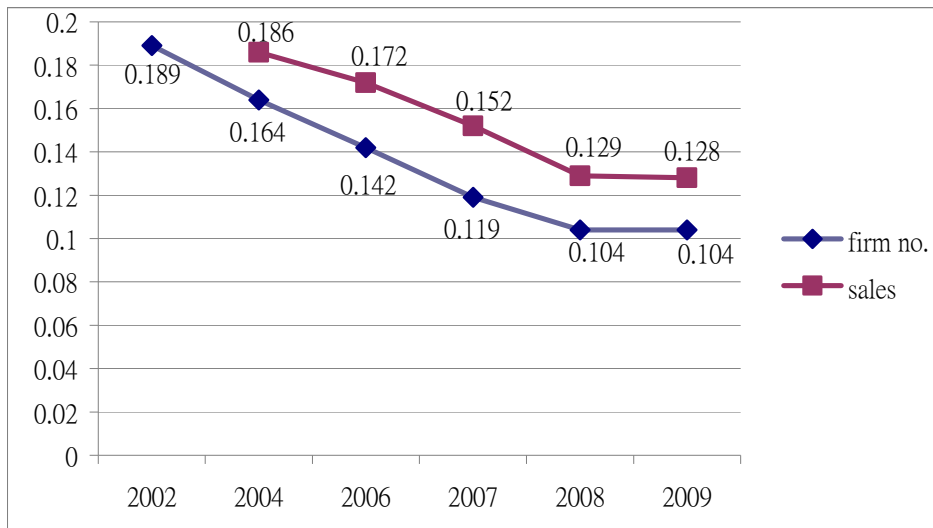
\*: firm number in parenthesis.

Source: the Global 2000, the Forbes.

**Table 2. The rankings of the source countries of the Global 2000 firms  
(by firm number and sales, 2009)**

country	The ranking by sales volume ( \$ billions )	The ranking by firm number (no. of firms )
United States	1 (8957.33)	1 ( 536)
Japan	2 (4240.14)	2 ( 270)
France	3 (2007.44)	5 ( 64)
UK	4 (1921.80)	4 ( 86)
Germany	5 (1771.44)	7 ( 57)
China	6 (1308.44)	3 ( 113)
Netherland	7 (851.97)	20 ( 22)
South Korea	8 (842.54)	9 ( 51)
Italy	9 (827.60)	14 ( 38)
Switzerland	10 (714.54)	11 ( 48)
Canada	11 (657.46)	6 ( 62)
Spain	12 (566.91)	16 ( 29)
Brazil	13 (476.27)	15 ( 33)
Russia	14 (470.50)	17 ( 28)
Australia	15 (458.51)	12 ( 44)
India	16 (382.82)	8 ( 56)
Hong Kong/China	17 (347.49)	10 ( 49)
Taiwan	18 (341.76)	13 ( 39)
Sweden	19 (275.66)	18 ( 27)
Belgium	20 (258.43)	30 (12)

Source: the Global 2000, the Forbes.



Source: The Global 2000, the Forbes.

\*: The data of sales is not available for 2002.

The Herfindahl concentration index =  $\sum_{\text{all Global 2000 source countries}} \left[ \frac{\text{country i's Global 2000 firm number}}{2000} \right]^2$  and

$$\sum_{\text{all Global 2000 source countries}} \left[ \frac{\text{total sales of country i's Global 2000 firms}}{\text{total sales of all Global 2000 firms}} \right]^2$$

**Figure 1. The Herfindahl concentration index based on the shares of the source countries owning the Global 2000 firms**



**Table 3. Industrial distribution of the Global 2000 firms\***

Industry		percentage (%)	
Finance	Banking	15.44	28.71
	Diversified financial	7.90	
	Insurance	5.36	
Manufacturing	Capital goods	7.62	22.93
	Intermediate goods	6.44	
	Consumption goods	8.87	
Other services	Market access	6.47	18.88
	Production services	6.22	
	Consumption services	6.19	
Resources-related	Material	6.20	17.82
	Oil and gas	5.76	
	Utilities	5.86	
Public facilities	Transportation	4.16	11.70
	Communications	3.48	
	Construction	4.06	

Source: the Global 2000, the Forbes.

\*: average of 2004-2009, counted by firm number.

**Table 4. The source countries owning the finance firms in the Global 2000  
(ranked by firm number)**

source country	2009	2008	2007	2006	2004
United States	1 ( 117)	1 ( 110)	1 ( 135)	1 ( 159)	1 ( 160)
Japan	2 ( 79)	2 ( 83)	2 ( 84)	2 ( 92)	2 ( 107)
China	3 ( 28)	3 ( 28)	5 ( 22)	13 ( 13)	17 ( 8)
India	4 ( 21)	4 ( 21)	7 ( 18)	12 ( 14)	13 ( 10)
United Kingdom	5 ( 20)	6 ( 19)	3 ( 30)	3 ( 32)	3 ( 26)
Italy	6 ( 18)	5 ( 20)	6 ( 18)	4 ( 22)	3 ( 26)
Switzerland	7 ( 17)	9 ( 15)	11 ( 14)	8 ( 15)	6 ( 16)
Hong Kong/China	8 ( 16)	9 ( 15)	8 ( 15)	6 ( 17)	10 ( 12)
Australia	8 ( 16)	8 ( 16)	4 ( 23)	5 ( 18)	8 ( 14)
Bermuda	8 ( 16)	7 ( 17)	13 ( 13)	10 ( 14)	15 ( 9)
Canada	11 ( 15)	13 ( 13)	8 ( 15)	7 ( 16)	8 ( 14)
France	12 ( 14)	12 ( 14)	13 ( 13)	14 ( 13)	10 ( 12)
Taiwan	12 ( 14)	9 ( 15)	8 ( 15)	10 ( 14)	7 ( 15)
Germany	14 ( 13)	13 ( 13)	15 ( 12)	14 ( 13)	5 ( 17)
Spain	15 ( 12)	13 ( 13)	17 ( 9)	14 ( 13)	13 ( 9)
South Korea	16 ( 11)	16 ( 11)	11 ( 14)	8 ( 15)	12 ( 10)
United Arab Emirates	17 ( 9)	17 ( 9)	16 ( 10)	—*	—*
Saudi Arabia	18 ( 8)	22 ( 7)	19 ( 7)	40 ( 2)	—*
Sweden	19 ( 8)	19 ( 8)	19 ( 7)	18 ( 7)	16 ( 8)
Greece	20 ( 7)	23 ( 6)	19 ( 7)	18 ( 7)	18 ( 7)

Source: the Global 2000, the Forbes.

\*: No financial firms listed in the Global 2000 in the year.

**Table 5. The source countries owning the manufacturing firms  
in the Global 2000 (ranked by firm number)**

Country	2009	2008	2007	2006	2004
United States	1 ( 146)	1 ( 144)	1 ( 157)	1 ( 161)	1 ( 177)
Japan	2 ( 85)	2 ( 98)	2 ( 79)	2 ( 90)	2 ( 95)
China	3 ( 29)	3 ( 29)	9 ( 11)	11 ( 8)	23 ( 2)
Taiwan	4 ( 20)	5 ( 21)	3 ( 22)	4 ( 20)	6 ( 15)
Germany	4 ( 20)	4 ( 22)	3 ( 22)	4 ( 20)	3 ( 22)
France	6 ( 19)	6 ( 20)	3 ( 22)	3 ( 21)	4 ( 20)
Switzerland	7 ( 13)	7 ( 14)	7 ( 13)	8 ( 12)	8 ( 13)
South Korea	7 ( 13)	8 ( 13)	7 ( 13)	7 ( 14)	7 ( 14)
United Kingdom	9 ( 12)	9 ( 12)	6 ( 17)	6 ( 18)	4 ( 20)
Sweden	10 ( 9)	10 ( 9)	10 ( 11)	9 ( 10)	9 ( 9)
Hong Kong/China	11 ( 8)	11 ( 8)	37 ( 1)	—**	—**
Brazil	12 ( 7)	12 ( 7)	15 ( 4)	27 ( 2)	25 ( 2)
Canada	12 ( 7)	13 ( 6)	11 ( 7)	10 ( 8)	9 ( 9)
India	14 ( 6)	13 ( 6)	13 ( 5)	13 ( 5)	13 ( 5)
Italy	14 ( 6)	13 ( 6)	13 ( 5)	13 ( 5)	13 ( 5)
Saudi Arabia	16 ( 5)	16 ( 5)	25 ( 2)	29 ( 1)	—**
Singapore	16 ( 5)	16 ( 5)	15 ( 4)	18 ( 3)	22 ( 2)
Netherlands	16 ( 5)	20 ( 3)	12 ( 6)	12 ( 8)	11 ( 7)
Mexico	19 ( 4)	20 ( 3)	23 ( 3)	15 ( 4)	12 ( 6)
Australia	19 ( 4)	18 ( 4)	15 ( 4)	15 ( 4)	17 ( 4)

Source: the Global 2000, the Forbes.

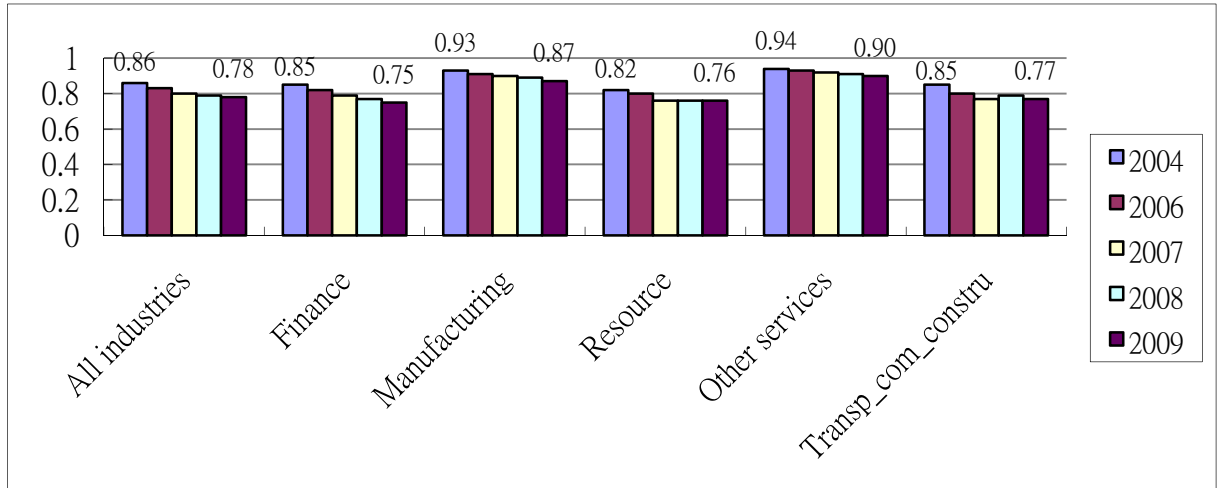
\*: No manufacturing firms listed in the Global 2000 in the year.

**Table 6. The source countries owning the other services firms  
in the Global 2000 (ranked by firm number)**

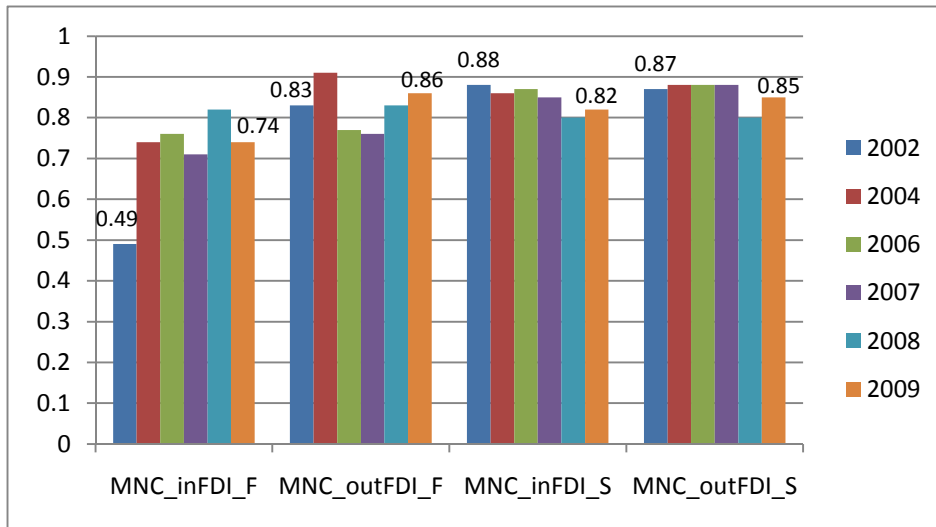
Country	2009	2008	2007	2006	2004
United States	1 ( 156)	1 ( 149)	1 ( 157)	1 ( 181)	1 ( 210)
Japan	2 ( 41)	2 ( 42)	3 ( 36)	2 ( 45)	2 ( 55)
United Kingdom	3 ( 27)	3 ( 28)	2 ( 39)	3 ( 41)	3 ( 45)
France	4 ( 14)	4 ( 14)	4 ( 14)	4 ( 14)	4 ( 13)
Canada	5 ( 11)	7 ( 10)	6 ( 11)	6 ( 10)	5 ( 12)
Hong Kong/China	5 ( 11)	6 ( 11)	7 ( 9)	6 ( 10)	9 ( 5)
South Korea	7 ( 10)	7 ( 10)	7 ( 9)	8 ( 8)	8 ( 6)
Germany	7 ( 10)	5 ( 12)	5 ( 12)	5 ( 11)	6 ( 11)
Australia	9 ( 7)	9 ( 7)	9 ( 8)	10 ( 6)	9 ( 5)
India	10 ( 6)	10 ( 6)	11 ( 6)	12 ( 4)	18 ( 3)
Mexico	10 ( 6)	10 ( 6)	11 ( 6)	10 ( 6)	11 ( 5)
China	10 ( 6)	10 ( 6)	13 ( 4)	34 ( 1)	--**
Switzerland	10 ( 6)	10 ( 6)	16 ( 3)	12 ( 4)	12 ( 4)
Ireland	14 ( 5)	17 ( 3)	29 ( 1)	21 ( 2)	--**
Brazil	14 ( 5)	14 ( 4)	24 ( 2)	34 ( 1)	--**
South Africa	16 ( 4)	14 ( 4)	13 ( 4)	12 ( 4)	12 ( 4)
Netherlands	16 ( 4)	17 ( 3)	10 ( 7)	9 ( 7)	6 ( 11)
Sweden	16 ( 4)	17 ( 3)	16 ( 3)	16 ( 3)	15 ( 3)
Singapore	16 ( 4)	14 ( 4)	16 ( 3)	22 ( 2)	19 ( 2)
Belgium	20 ( 3)	21 ( 3)	16 ( 3)	16 ( 3)	19 ( 2)

Source: the Global 2000, the Forbes.

\*: No services firms other than financial firms listed in the Global 2000 in the year.



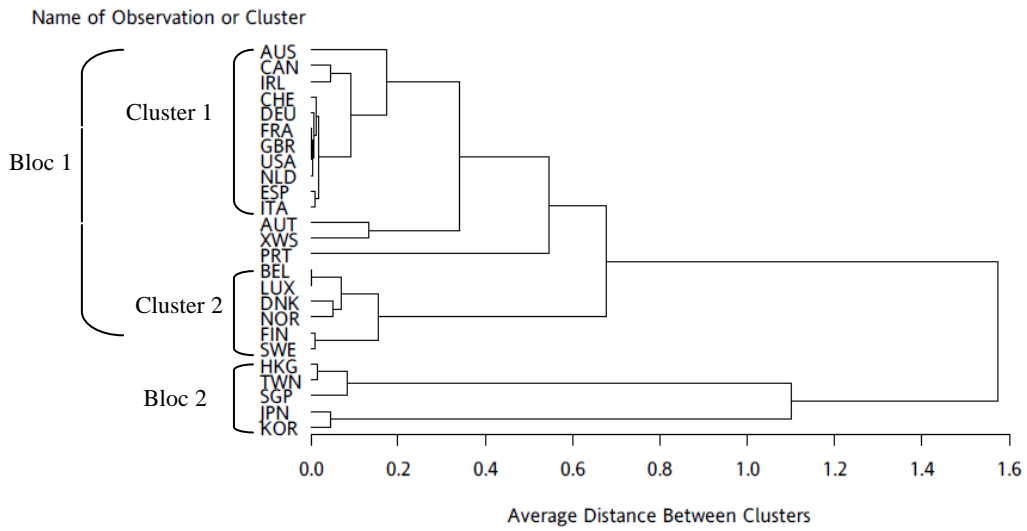
**Figure 2. Sales concentration ratio of the top 10 Global 2000 source countries**



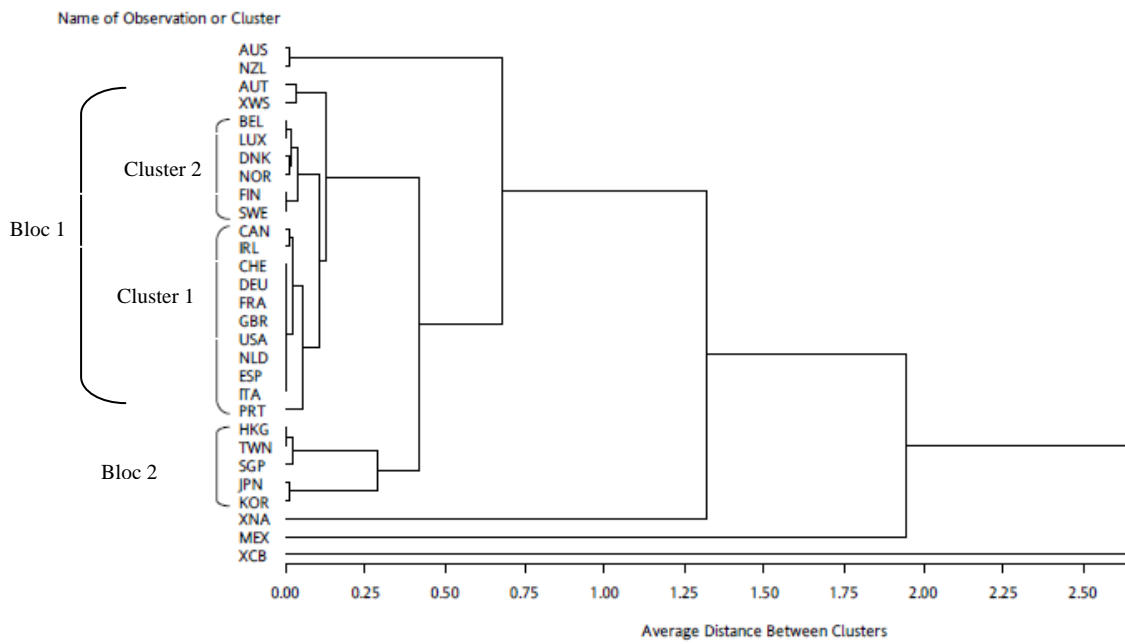
\*: MNC\_inFDI\_F presents the correlation coefficients between firm number and inward FDI flows; MNC\_ourFDI\_F the correlation coefficients between firm number and outward FDI flows; MNC\_inFDI\_S the correlation coefficients between firm number and inward FDI stocks; and MNC\_outFDI\_S the correlation coefficients between firm number and outward FDI stocks.

Source: 1. the Global 2000, the Forbes. 2. World Investment Report, IMF, various years.

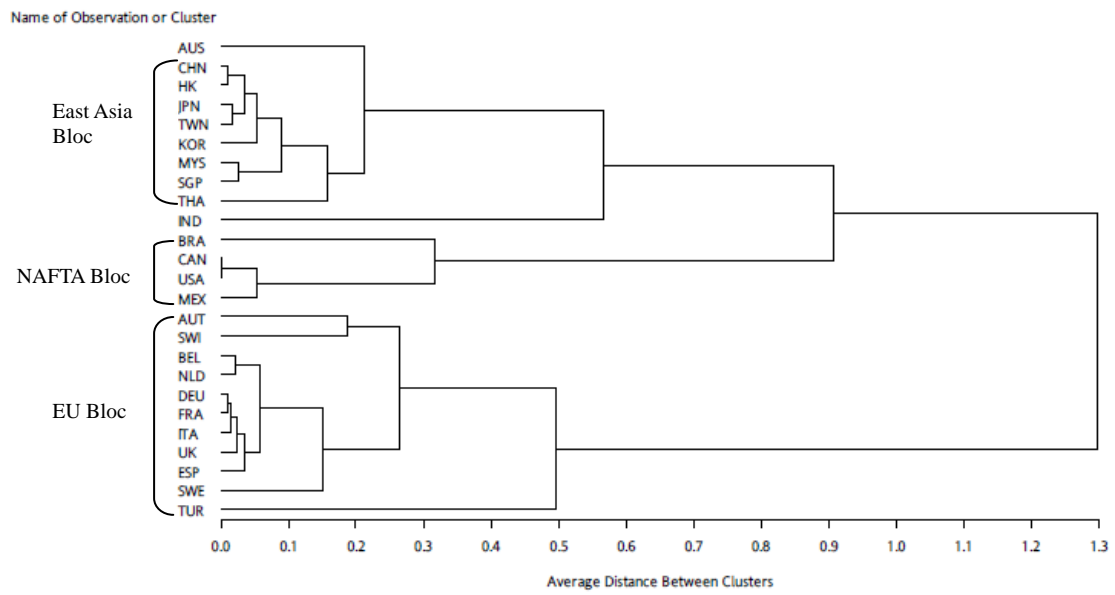
**Figure 3. The correlation coefficients between Global 2000 firm number and national FDI**



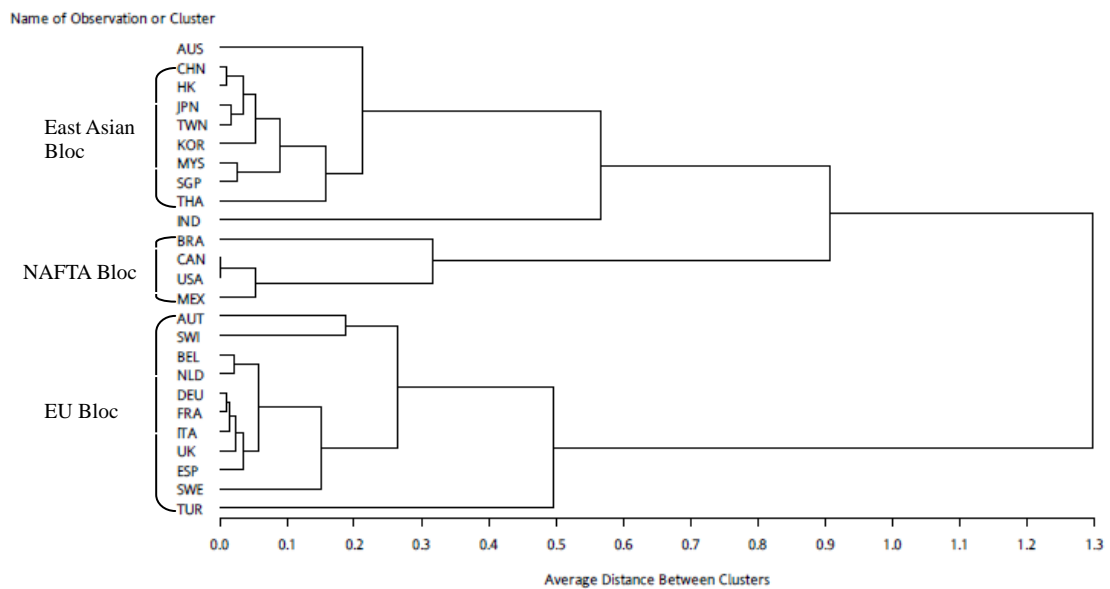
**Figure 4. The tree diagram of the overall FDI blocs (2004)**



**Figure 5. The tree diagram of the manufacturing FDI blocs (2004)**

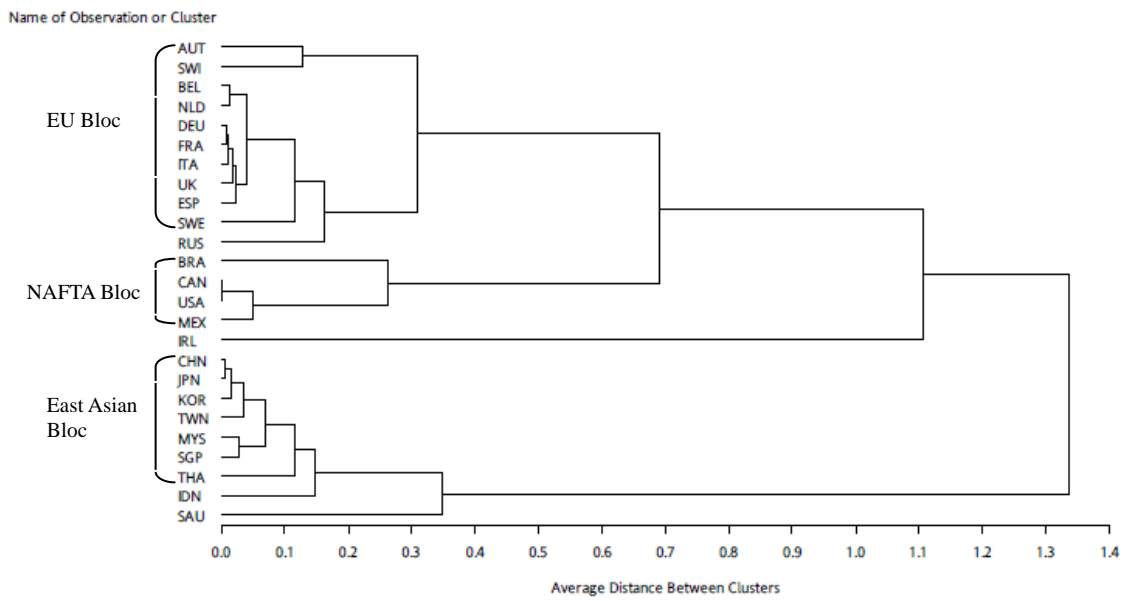


**Figure 6. The tree diagram of the trade blocs in 2000**

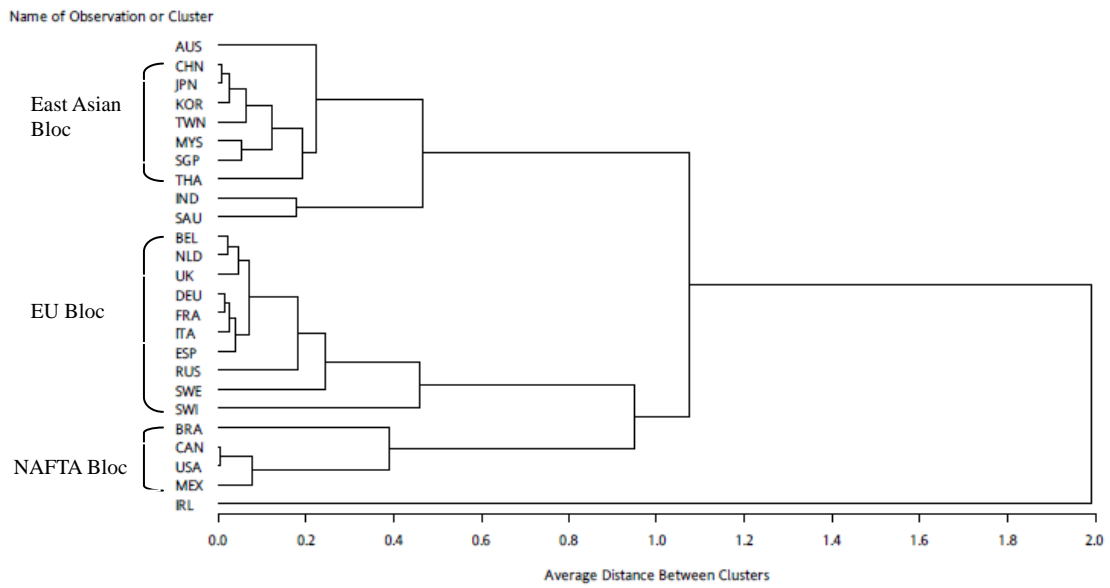


**Figure 7. The tree diagram of the trade blocs in 2002**

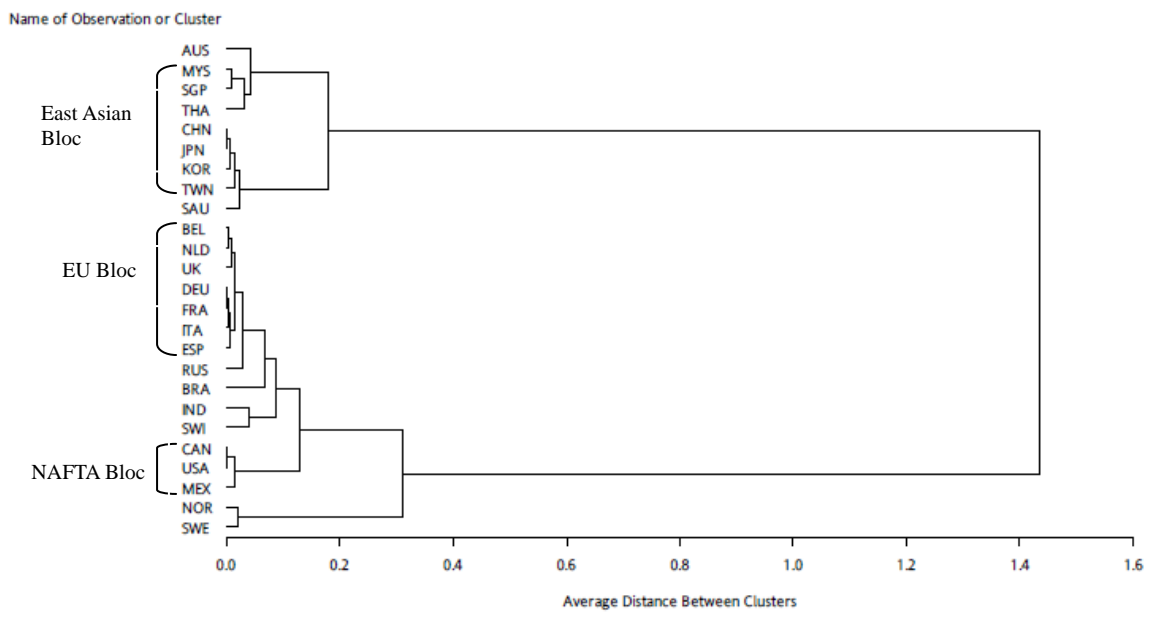




**Figure 8. The tree diagram of the trade blocs in 2004**



**Figure 9. The tree diagram of the trade blocs in 2006**



**Figure 10. The tree diagram of the trade blocs in 2008**

### Appendix 1: The top 10 firms of the Global 2000 (2009)

Rank	Company	Country	Industry	Sales (\$bil)	Profits (\$bil)	Assets (\$bil)	Market Value (\$bil)
1	JPMorgan Chase	US	Banking	115.63	11.65	2031.99	166.19
2	General Electric	US	Conglomerates	156.78	11.03	781.82	169.65
3	Bank of America	US	Banking	150.45	6.28	2223.3	167.63
4	ExxonMobil	US	Oil & Gas Operations	275.56	19.28	233.32	308.77
5	ICBC	China	Banking	71.86	16.27	1428.46	242.23
6	Banco Santander	Spain	Banking	109.57	12.34	1438.68	107.12
7	Wells Fargo	US	Banking	98.64	12.28	1243.65	141.69
8	HSBC Holdings	UK	Banking	103.74	5.83	2355.83	178.27
8	Royal Dutch Shell	Netherlands	Oil & Gas Operations	278.19	12.52	287.64	168.63
10	BP	UK	Oil & Gas Operations	239.27	16.58	235.45	167.13

## Appendix 2: The top 10 manufacturing firms of the Global 2000 (2009)

Rank	Company	Country	Industry	Sales (\$bil)	Profits (\$bil)	Assets (\$bil)	Market Vaue (\$bil)
1	Procter & Gamble	US	Household & Personal Products	76.78	13.05	135.29	184.47
2	Hewlett-Packard	US	Technology Hardware & Equip	116.92	8.13	113.62	121.33
3	Nestlé	Switzerland	Food, Drink & Tobacco	97.08	10.07	105.16	173.67
4	Pfizer	US	Drugs & Biotechnology	50.01	8.64	212.95	143.23
5	Johnson & Johnson	US	Drugs & Biotechnology	61.90	12.27	94.68	174.9
6	Samsung Electronics	S. Korea	Semiconductors	97.28	4.43	83.30	94.48
7	Sanofi-aventis	France	Drugs & Biotechnology	41.99	7.54	114.85	98.07
8	Ford Motor	US	Consumer Durables	118.31	2.72	194.85	41.80
9	Novartis	Switzerland	Drugs & Biotechnology	44.27	8.40	90.89	126.22
10	Roche Holding	Switzerland	Drugs & Biotechnology	47.35	7.51	69.64	146.19