

Chapter 3

The social network analysis of Chinese cross-border mergers and acquisitions

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It is well known that the dynamic development of emerging market economies has had a significant impact on the shape of contemporary international economic relations. People's Republic of China (PRC) plays a particularly significant role among the developing countries of the world. The growth of the Chinese economic power continues to take place on many levels. One of them is the growing activity of China's enterprises in the field of foreign direct investment (FDI) in the global mergers and acquisitions (M&As) market. It is associated with, among others, the implementation of the 'Go Global' strategy, the Chinese accession to the World Trade Organization (WTO)¹ and the possession of vast foreign exchange reserves that need to be invested in alternative ways.

The purpose of this part of the monography is to assess the geographical and industrial structure of Chinese cross-border mergers and acquisitions (CBM&As) between the years 2000 and 2017. The study is carried out using social network analysis (SNA). In this chapter the network nature of cross-border business combination, in which the acquiring company is a Chinese firm and the target company is from a country other than China, is presented. The research sample consists of business sectors in which companies are involved in cross-border transactions on the global M&As market.

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1 From 2001 its participation in WTO has created not only opportunities for Chinese companies to expand their trade but also intensive competition between local and foreign enterprises within the domestic market.

3.1. The network analysis as the M&A's research tool

Network analysis (based on SNA) gives the scientists the opportunity to explore statistical data from a new point of view. SNA is an interdisciplinary research method having a wide range of applications in biology, informatics, math, sociological, and physics. Increasingly, it is also used in economics to study business networks, economic networks, and trade networks. For instance, De Benedictis et al. have analysed the centrality and importance of individual countries in the world trade network.²

Academic literature that uses network analyses to study international financial flows is gradually increasing, although its application to the analysis of foreign investment is still relatively incipient. Some studies have focused on analysing international financial crises (Elliott et al.),³ and the shareholding structures of transnational enterprises (Vitali and Battiston).⁴ Some contemporary research on CBM&As using SNA tools has also been carried out, among others, by Sánchez Díez et al.⁵ or Mirc.⁶

In the SNA, the network as a research object is defined by a set of nodes and the relations between them. Thus, two main elements forming a network can be distinguished:

1) nodes – entities included in the system;

2) edges – relationships that reflect interactions between entities in the system.

Networks are often presented in the form of graphs. Graphically, the node (vertex) is presented as a point (circle) and the edge (connection) as a straight line linking two nodes.⁷

The literature emphasizes that SNA measures can be considered both from the perspective of the entire network and individual entities. The first group of measures includes, among others:⁸

- 2 L. De Benedictis, S. Nenci, G. Santoni, L. Tajoli, C. Vicarelli [2014], *Network analysis of world trade using the BACI-CEPII dataset*, "Global Economy Journal", vol. 14 (3/4), pp. 287–343.
- 3 M. Elliott, B. Golub, M.O. Jackson [2014], *Financial networks and contagion*, "American Economic Review", vol. 104 (10), pp. 3115–3153.
- 4 S. Vitali, S. Battiston [2014], *The community structure of the global corporate network*, "PLoS ONE", vol. 9 (8), e104655, pp. 1–13.
- 5 A. Sánchez Díez, P. Galaso Reca, J.M. García de la Cruz [2017], *Mergers and acquisitions carried out by Spanish firms in Latin America: a network analysis study*, "CEPAL Review", vol. 2016 (120), pp. 51–69.
- 6 N. Mirc [2015], *Merging networks – contributions and challenges of social network analysis to study mergers and acquisitions*, in: A. Risberg, D. King, O. Meglio (eds.), *Routledge Companion on Mergers and Acquisitions*, Routledge, London, pp. 259–271.
- 7 S. Mazurek [2016], *Identyfikacja sieci w gospodarce*, "Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu", vol. 448, p. 168.
- 8 K. Fuks, A. Kawa, B. Pierański [2014], *Zastosowanie mierników SNA w analizie sieci przedsiębiorstw*, "Marketing i Rynek", vol. 5 (CD), p. 49.

- density;
- diameter;
- clustering coefficient;
- small world effect.

In this chapter, only the density as part of the measures relating to the entire Chinese CBM&As network will be determined. This indicator refers the proportion of possible ties among the members of a network.

The second group of measures include centrality⁹ indicators which are necessary to analyse the position of a given entity in the network. There are four basic types:¹⁰

- degree centrality;
- closeness centrality;
- prestige centrality;
- betweenness centrality.

The interpretation of these indicators should be adapted to the type of considered network. Due to the specifics of this study, only the value of the first three of them will be calculated.

The degree centrality allows to specify the number of connections of a given node with other vertices.¹¹ In this study, this indicator reflects the number of M&As between industries. If an industry is directly connected to many other industries, then its degree centrality is high and it is at the centre of the whole network. Therefore, this coefficient determines the relative importance of particular industry in CBM&As transactions that are undertaken by Chinese businesses. For the directed network¹² additional parameters can also be designated:¹³

- out-degree centrality – its level is determined on the basis of connections pointing away from the given node. In this chapter, this indicator allows identifying the main sectors from which the Chinese enterprises are expanding their activities through CBM&As;
- in-degree centrality – its level is determined on the basis of connections towards the inside of a given node. In this study, this indicator allows identifying the main industry sectors in which Chinese enterprises invest abroad through CBM&As.

9 Centrality – is a mathematical concept present in graph and network theory. This indicator allows determining the relevance of a particular vertex in the considered graph.

10 S. Yang, F.B. Keller, L. Zheng [2017], *Social network analysis: methods and examples*, Sage Publications, Los Angeles, CA, p. 61.

11 A. Sánchez Díez *et al.* [2017], *op. cit.*, pp. 57–58.

12 The directed network – is a network that is made up of a set of nodes connected by edges, where the edges have a direction associated with them.

13 H. Lee, I. Sohn [2016], *Big Data w przemyśle. Jak wykorzystać analizę danych do optymalizacji kosztów procesów?*, Wydawnictwo Naukowe PWN, Warszawa, p. 103.

Another essential indicator determining the position of a node in the system is the closeness centrality, which measures the average length of the shortest paths between nodes on the graph. It refers the average distance from a given node to all other nodes in the network. The high value of this measure indicates that it has an impact on the closest entities. Therefore, it can be stated that in this study, a high closeness centrality allows identifying business sectors that are key in the cross-industrial expansion of Chinese enterprises and participate in conglomerate M&As.

Finally, the prestige centrality, that is also known as eigenvector centrality, indicates the relative importance of a node in a network based on the node's connections. It refers which vertices are associated with the most related nodes forming the network.¹⁴ The node's eigenvector measures the closeness of an entity to other 'central' entities, therefore the central location of a given business sector depends on the centrality of the main industries in the network.¹⁵ This indicator is used to identify the most prestigious vertices, including flagship entities. It determines the quality of connections between nodes. The high value of the eigenvector centrality indicates that the nodes are leaders in the network, because they have many relations with other entities that hold a significant position in the system.

3.2. Chinese cross-border mergers and acquisitions

The integration of developing and transition economies with the global market has resulted in a huge inflow of FDI to their countries. However, in recent years, a growing share of these countries in international capital flows as capital exporters in the form of CBM&As has been recorded.¹⁶ In the last two decades, CBM&As carried out by emerging market companies have grown tremendously and played a significant role at the global level. According to UNCTAD, emerging market corporations conducted 22% of the world's CBM&As in the period 2015–2017, against only 8% between 2000 and 2002 (table 3.1.).

According to the data presented in table 3.1., it can be seen that during the period 2015–2017 China became a net investor for the first time. The outflow of direct investments from this country was higher than the inflow. Furthermore, between 2000 and 2017 the share of Chinese FDI (including CBM&As) in global transactions was systematically increasing. Particularly noteworthy is the fact that during

14 H. Lee, I. Sohn [2016], *op. cit.*, p. 111.

15 C. Aller, L. Ductor, M.J. Herreras [2015], *The world trade network and the environment*, "Energy Economics", vol. 52, p. 59.

16 E. Radomska [2018], *Chińskie bezpośrednio inwestycje zagraniczne w Unii Europejskiej – kontrowersje i wyzwania*, "KNUV", vol. 2 (56), p. 85.

2015–2017, the share of Chinese FDI outflows accounted for 39% of developing economies' outflow transactions, against 6% during 2000–2002. What is more, taking into account the net value of CBM&As, between 2015 and 2017 China held:

- second place in the world with 12% share, after United States (14%), followed by Canada (9%), Japan (8%) and United Kingdom (8%);
- first place among developing economies with 54% share, ahead of Hong Kong (11%), Singapore (8%) and United Arab Emirates (4%).

Table 3.1. Basic statistics on Chinese FDI in the period 2000–2017

	2000–2002	2003–2005	2006–2008	2009–2011	2012–2014	2015–2017
	1	2	3	4	5	6
FDI (mln USD)						
Outflow FDI from China	3 440	6 871	33 349	66 665	106 256	166 702
Inflow FDI to China	46 778	62 180	88 183	111 240	124 497	134 461
FDI outflows (%)						
Share of developing economies' FDI outflows in global transactions	8.0	11.0	15.0	24.0	31.0	28.0
Share of Chinese FDI outflows in global transactions	1.0	1.0	2.0	5.0	8.0	11.0
Share of Chinese FDI outflows in developing economies	6.0	8.0	13.0	21.0	26.0	39.0
number of net cross-border M&As by purchaser (%)						
Share of Chinese CBM&As number in global transactions	0.0	1.0	1.0	2.0	4.0	5.0
Share of Chinese CBM&As number in developing economies	5.0	7.0	7.0	14.0	20.0	28.0
value of net CBM&As by purchaser (%)						
Share of developing economies' CBM&As value in global transactions	8.0	12.0	16.0	25.0	41.0	22.0

Table 3.1 (cont.)

	1	2	3	4	5	6
Share of Chinese CBM&As value in global transactions	0.0	1.0	3.0	8.0	13.0	12.0
Share of Chinese CBM&As value in developing economies' transactions	1.0	7.0	15.0	32.0	32.0	54.0

Source: own elaboration based on: UNCTAD, *World Investment Report: Annex Tables 2019*, www.unctad.org/fdistatistics (accessed: 16.09.2019)

Between 2000 and 2017 the overseas expansion of Chinese enterprises was closely related to the pro-investment policy implemented by the PRC authorities. In this policy, the 'Go Global' initiative launched in 1999 and adopted as part of the 10th Five Year Plan (2001–2005), played a crucial role. Gu and Reed emphasize that the 'Go Global' policy had three main purposes:¹⁷

- it was to alleviate the pressure to the Renminbi (RBM) appreciation;
- it was to sustain the sufficient resources for China's growth;
- it was to improve Chinese companies competitiveness through the assimilation of modern business practices and the appropriation of foreign technology.

One major element of the 'Go Global' strategy was to promote the overseas mergers and acquisitions by providing incentives and loosening the control over outward investments¹⁸ made by Chinese companies.¹⁹ The 'Go Global' policy has particularly encouraged resource-related companies to acquire businesses abroad that could secure energy and other natural resources for China's growth over the medium to long term. For this reason, acquisitions carried out by resource-related bidders have been more likely to be supported politically and financially by the central government than those in any other industry.²⁰

In 2006, the Chinese government reinforced the 'Go Global' policy in its 11th Five-Year Plan the years 2006–2010, aiming to bring the corporate sector in line with China's globalization. Then the 12th Five-Year Plan (2011–2015) has introduced clear targets in the strategy, including a 17% increase in overseas investment by 2015.²¹

17 L. Gu, W.R. Reed [2013], *Chinese overseas M&A performance and the go global policy*, "Economics of Transition", vol. 21 (1), pp. 162–163.

18 Outward investment requires approval by China's Ministry of Commerce, with concomitant foreign currency approval from the State Administration of Foreign Exchange (SAFE).

19 L. Gu, W.R. Reed [2013], *op. cit.*, p. 162.

20 N. Hu, Y.I. Zhang, S. Tan [2016], *Determinants of Chinese cross-border M&As*, "Annals of Economics and Finance", vol. 17 (1), p. 210.

21 *Ibidem*, p. 213.

The most recent five-year plan for the years 2016–2020, adopted in March 2016 by the People's National Assembly of China, has also pointed out the crucial role of outward FDI for the development of Chinese economy. It has indicated that enterprises should invest abroad and increase deliveries of Chinese equipment and services to foreign projects. It has also expected that Chinese companies would increase cooperation with foreign partners in order to acquire technology.²²

What is more, Radomska indicates that the increase in Chinese overseas investment activity in the form of CBM&As can be explained by the rise in foreign exchange reserves resulting from the current account surplus with a simultaneous positive balance in capital account. The importance of the 'Made in China 2025' strategy that was adopted in 2015 by the Chinese government is also emphasised. This strategy is focused on raising innovation and competitiveness of the Chinese economy. It assumes to raise the country to a leading position in terms of technology, among others, through investments in the international mergers and acquisitions market.²³

Furthermore it is worth emphasizing that in China a significant proportion of CBM&As is undertaken by state-owned enterprises (SOEs) which are potentially managed differently from typical companies in a market-oriented economy. Therefore, it could be concluded that government plays an important role in the business activities of Chinese firms and actively supports enterprises in their internationalization process. Some Chinese corporations receive a lot of support from the PRC authorities in acquiring foreign entities, since these transactions are related to achieving the long-term goals of the entire economy.²⁴ It is worth noting that for Gu and Reed that additional support has come in the form of preferential treatment for outward-investing Chinese companies in matters such as tax benefits, direct grants, low- or no-interest loans and access to foreign exchange.²⁵

Research findings available in the literature point out that between 2000 and 2017 Chinese CBM&As were motivated primarily by the desire to increase their market share in the global market. On one hand, Boateng et al. indicate that these transactions carried out in the period 2000–2004 enabled Chinese entities to speed up the entry into new markets, promote diversification and obtain foreign advanced technology and other resources.²⁶

On the other hand, Klimek emphasizes that in the period 2013–2015 the most significant motive of Chinese enterprises' overseas expansion was to bring strategic

22 A. Klimek [2016], *Cross-border mergers and acquisitions by Chinese state-controlled enterprises*, "Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu", vol. 447, pp. 150–151.

23 E. Radomska [2018], *op. cit.*, p. 95.

24 A. Klimek [2013], *Efekty międzynarodowych fuzji i przejęć dokonanych przez korporacje transnarodowe z Chin*, "International Journal of Management and Economics", vol. 38, p. 38.

25 L. Gu, W.R. Reed [2013], *op. cit.*, p. 162.

26 A. Boateng, W. Qian, Y. Tianle [2008], *Cross-border M&As by Chinese firms: An analysis of strategic motives and performance*, "Thunderbird International Business Review", vol. 50 (4), p. 259.

assets to the headquarters and at the same time to home economy. Chinese FDI, carried out in the form of CBM&As, were meeting the objectives of the Chinese government and the strategy of development in the coming years. CBM&As were also designed to increase the level of Chinese companies' internationalization, but at the same time to strengthen the global position of China's economy.²⁷

3.3. The results of the Chinese CBM&As network study using SNA indicators

In an attempt to use social network analysis indicators to study Chinese FDI, CBM&As network consisting of nodes (i.e. business sectors) and edges (reflecting mergers and acquisitions) was used. For the purposes of the survey, Thomson Reuters database was used, where 2626 of such connections were identified between 2000 and 2017.

The visualization of the cross-industry network of connections was presented in the form of a directed graph, where the edges go from the acquirer industry to the target industry. On figure 3.1. and figure 3.2. the Chinese CBM&As network in 2000 and 2017 respectively was presented. The size of the node depends on the value of its centrality degree. Nodes that are not connected by edges with other vertices indicate that only intra- industry connections occurred in a given year.

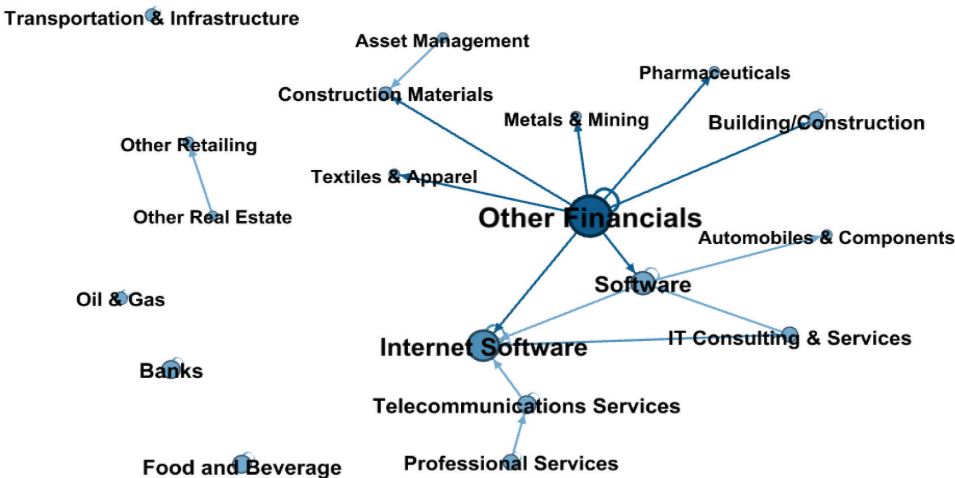


Figure 3.1. The network diagram of Chinese cross-industry CBM&As in 2000
Source: own elaboration in the Gephi program

27 A. Klimek [2016], *op. cit.*, p. 147.



Figure 3.2. The network diagram of Chinese cross-industry CBM&As in 2017

Source: own elaboration in the Gephi program

Table 3.2. Average values of basic statistics for Chinese CBM&As networks in 2000–2017

	2000-2002	2003-2005	2006-2008	2009-2011	2012-2014	2015-2017
	1	2	3	4	5	6
Network density (%)	7	6	6	6	6	8
Number of nodes	25	29	81	53	55	65
Number of edges	38	52	90	175	177	316
Number of cross-industry connections	18	27	31	98	116	235
Share of cross-industrial edges in total connections (%)	47	55	52	56	65	74
Value of CBM&As transactions (mln USD)	1 248	2 934	8 928	31 012	29 815	59 001

Table 3.2 (cd.)

		1	2	3	4	5	6
Number of countries in which Chinese entities carried out CBM&As		11	16	36	39	39	48
Share of particular forms of M&As in the structure of Chinese capital outward expansion	Acquisition of interests (%)	38	33	33	38	36	33
	Acquisition of assets (%)	53	42	38	37	45	43
	Mergers (%)	9	24	29	25	19	23

Source: own elaboration

Table 3.2. summarizes the overall results of the Chinese CBM&As network analysis during the period 2000–2017. The examined network is characterized by relatively low density (not exceeding 10%) over the entire analysed period. However, from the perspective of the directional nature and specificity of these transactions, this value is sufficient to carry out a more detailed analysis of individual nodes.

The data provided in table 3.2. shows the vast scale of overseas expansion of Chinese enterprises in the global market, since between 2000 and 2017 both the number of nodes and the edges in the considered CBM&As network have significantly increased. This is also confirmed by the visualization presented in figure 3.1. and figure 3.2. Moreover, there has been a dynamic increase in the value of Chinese foreign investments since 2005. Between 2015 and 2017 the average value of Chinese CBM&As was over 20 times higher than in the period 2003–2005.

In addition, it should be noted that during the considered period the share of M&As by Chinese firms, which were involved in economically unrelated business activities (they belonged to different industries) in total mergers and acquisitions systematically improved. Between 2000 and 2002 conglomerate M&As has represented on average about 47% of all CBM&As transactions, while in the period 2015–2017 this percentage has increased to about 74%. Therefore, it might be argued that Chinese companies not only have enlarged their presence on the international markets, but also diversified their activities in order to meet competition from foreign enterprises.

During the years 2000–2017 acquisitions of foreign entities were the dominant form of Chinese capital overseas expansion. Over the considered period, their share in the Chinese CBM&As market represented on average 78%. However, it is worth emphasizing that since 2002 the share of Chinese firms mergers with foreign enterprises has increased (table 3.2.).

What is more, based on the data in table 3.2., it can be seen that Chinese companies have been constantly expanding their business activities to other countries. From the beginning of the 21st century, the number of countries, in which CBM&As were carried out by Chinese firms, has been steadily increasing. While in 2000 Chinese enterprises made investments in only 9 countries (including three non-Asian, i.e. Australia, Canada and the United States), in 2016 Chinese corporations entered the markets of 51 countries.

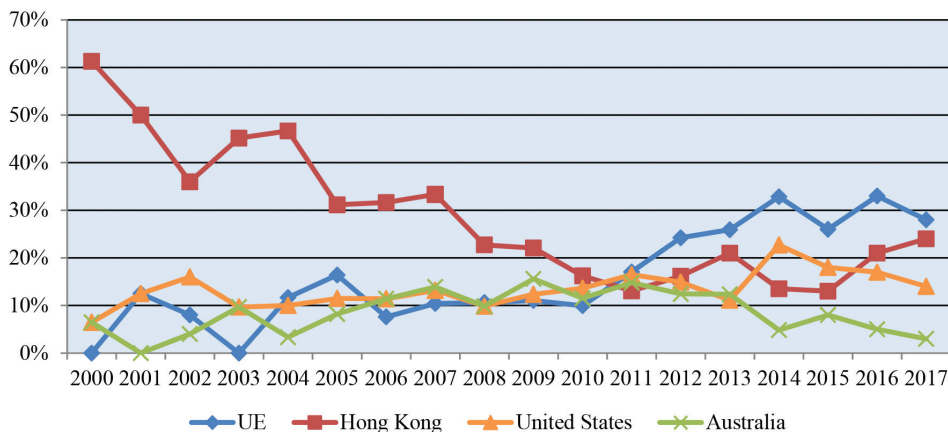


Figure 3.3. Main target regions of Chinese CBM&As in 2000–2017 (percentage share)

Source: own elaboration

As the figure 3.3. shows, the main direction of Chinese CBM&As was the Asian market until 2010. During 2000–2010 approximately 36% of mergers and acquisitions were carried out in Hong Kong. However it was a downward trend. Since 2010 Chinese companies have increased their activity, among others, in the Member States of the European Union (EU) and the United States. In 2016, more than half of China's outward FDI in the EU was performed in the so-called Big Three, i.e. Germany, United Kingdom and France.²⁸ These information might confirm that the implementation of 'Go Global' policy allowed the Chinese government to use foreign investment as a means of extending its political influence in strategic countries.

Throughout the entire considered period, the highest value of the degree centrality (figure 3.4.) was typically recorded in the sector of other financials (i.e. excluding banks and insurance institutions) and mining, and to a lesser extent in energy, machinery and automobiles sectors. Between 2000 and 2017, the largest number of CBM&As have taken place in these sectors. Thus, from a global perspective, they are at the centre of the network since they maintain the majority of relationships with all entities participating in the system.²⁹

²⁸ E. Radomska [2018], *op. cit.*, p. 88.

²⁹ A. Sánchez Díez *et al.* [2017], *op. cit.*, p. 60.

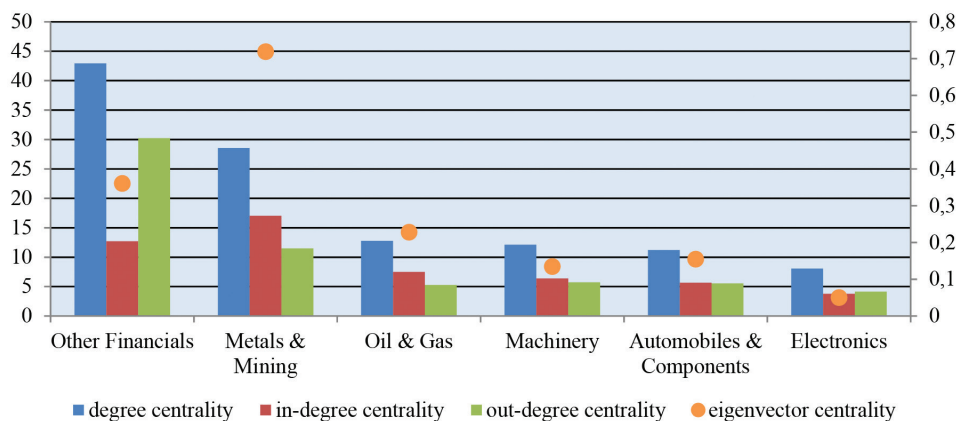


Figure 3.4. The average level of degree and eigenvector centrality for the main nodes forming the Chinese CBM&As network in the period 2000–2017

Source: own elaboration

The assessment of the out-degree centrality shows that mainly Chinese companies which were assigned to the other financials business sector have expanded their activities through CBM&As in the analysed period. In turn, based on the in-degree centrality, it can be stated that between 2000 and 2017 Chinese enterprises have located their activities abroad mainly in the metals and mining businesses, which was in line with the ‘Go Global’ strategy adopted by the Chinese government.

When analysing in detail the network presented in figure 3.1. and figure 3.2. with regard to the degree centrality of individual nodes, it can be noticed that there has been a change in the direction of Chinese FDI in 2017 compared to 2000. While in 2000, a lot of Chinese CBM&As took place in other financials and IT sectors, in 2017 the largest number of cross-border connections occurred outside the other financial sector, i.e. in the metals and mining, machinery, automobiles and components sectors.

Additionally, between 2000 and 2017 the high average value of the eigenvector centrality (figure 3.4.) for the metals and mining and the other financials confirms that entities operating in these business sectors have occupied a flagship place in the examined CBM&As network. The relatively high value of the prestige centrality also characterized machinery, automobiles and electronics. The indicated business sectors should be classified as key in the network in question, since they have obtained many connections with other entities holding important positions in the network.

In addition, during the period 2000–2017 the financial, IT, automobiles, electronics, energy, real estate and other consumer products sectors were characterized by a relatively high average closeness centrality (figure 3.5.). The level of this

indicator signals that in the analysed period these nodes could reach other industries in the shortest possible time and occupy a relatively central position in the Chinese cross-industrial network CBM&As. Therefore, it can be assumed that the indicated business sectors have belonged to the key investment directions of Chinese enterprises through conglomerate M&As.

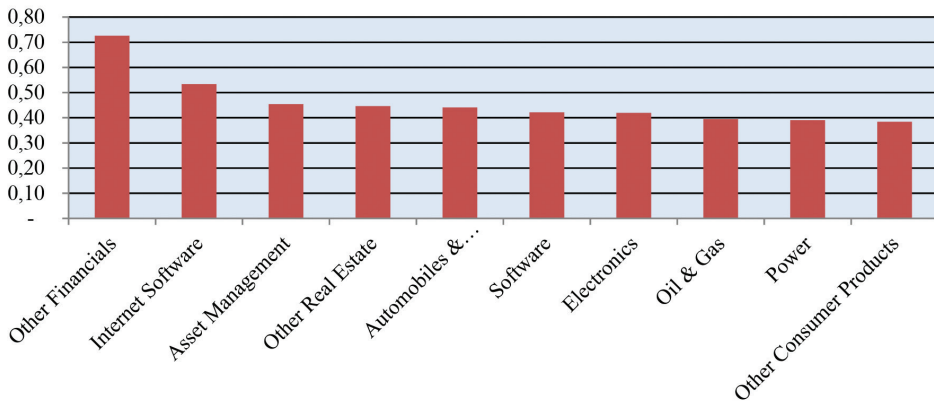


Figure 3.5. The average level of closeness centrality for the main nodes forming the Chinese CBM&As network in the period 2000–2017

Source: own elaboration

Conclusions

To summarise, from the beginning of the 21st century the share of Chinese companies in the global economy has increased significantly, which is mainly associated with a growing share in the FDI. They have aspired to be very active participants in the international mergers and acquisitions market. In particular, between 2000 and 2017:

- Chinese enterprises have significantly increased their investment activity in non-Asian countries;
- Chinese CBM&As have showed a tendency to diversify their investment directions;
- Chinese companies from sectors of the other finance, energy, automobiles and electronics have played an important role in CBM&As, they have occupied a central place in the examined network.

Conclusions of chapter 3 are connected with the changes that have taken place in the largest Asian transnational corporations, energy sector and banking sector. These issues are expanded in the chapter 2, chapter 4 and chapter 6 of this book.

The growing scale of CBM&As carried out by Chinese entities has shown the PRC's efforts to develop and strengthen its position in the global market. The obtained results confirm that the outward direct investments have been one of the keystones of the Chinese government policy. It should be expected that in the near future China will strengthen its position as one of the largest foreign investors in the global economy. However, these issues require further in-depth research.