

16. CLUSTER ANALYSIS OF MARKET POTENTIAL IN EMERGING MARKETS: A DYNAMIC RESEARCH BASED ON MARKOV CHAIN¹

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Abstract

The emerging economy is playing an important role in the global market. Market potential of emerging markets is also a determinant in a wide range of market decisions of the global managers. For the reason that the market potential consists of a number of different factors across different countries, this research divides the emerging market countries into different clusters, and analyzes their different attributes by cluster analysis. Also, the network relationships between the emerging markets and their attributes across different clusters are further researched. It is found that countries at a higher level of market potential also show a higher level of economic freedom, commercial infrastructure, market intensity and market consumption capacity.

With the development of their economies, the emerging markets have experienced different transitions. This research further estimates the switching probabilities across different clusters by a Markov chain model. Future ratios of different country clusters in the emerging markets are also forecasted. This research will be helpful to the global managers and cross-border investors in developing a further understanding of future changes in market potentials of different emerging markets.

Keyword: market potential, emerging market, cluster analysis, Markov chain

JEL Classification: F23, M31, F47

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1. Introduction

Vernon (1966) pointed out that production in the developed countries can be shifted to the developing countries by foreign direct investment. At this point, the market selection is of great importance to global marketers and investors. Rugman and Verbeke (1992) pointed out that location-related factors have an important influence on the firm-specific resources of multinational companies. Dunning (1993) pointed out that location advantage is one of the three determinants for investors to choose their target markets. Therefore, the market potential of the emerging markets is always a key factor that influences the decisions of cross-border investors from the developed countries.

With the further development of emerging economies, a large number of countries in emerging markets have improved their market power in global competition, such as China and India. It is not only the trade between developed countries and emerging markets that has increased; it was also registered an increase in the trade among the emerging markets. Buckley *et al.* (2007) pointed out that market size, geographic proximity, inflation and market openness, which show the location characteristics, are important determinants to the investment decisions of FDI outflows such as China. Market potential in the emerging markets has also become an important factor for a growing number of investors from the emerging economies.

Concerning the rising importance of the emerging markets in the global economy, and the key function of market potential to global marketers and cross-border investors, both from developed countries and emerging markets, it is necessary to analyze the attributes of market potential across different emerging markets, so that global strategies and investment decisions can be made effectively, targeting different country clusters. This research also estimates the future ratios of different clusters of emerging markets by Markov chains, so that global marketers and investors can have a deeper understanding of the changes in market potential across different countries.

2. Literature Review

Putler *et al.* (1996) used market potential as important geodemographic information to evaluate the sales potential and consumer expenditure in segment markets. Perks *et al.* (2013) found that market potential has a higher level of importance, especially in the performance of multinational companies in small-size emerging markets. Market potential is of great importance to global marketers and investors.

(1). Market potential is an important factor to moderate the international involvement of companies across different cultures. Malhotra *et al.* (2009) found that the market potential is an important factor that mediates the relationship between geographic and cultural distances of different markets in cross-border acquisition. Malhotra and Sivakumar (2011) further pointed out that market potential, interacting with cultural distance, is an important factor of companies' international involvement, and it has a curve linear effect on the level of equity participation.

(2). Market potential is also a determinant to entry mode decisions. Williamson *et al.* (2005) pointed out that exporters make their market entry decisions based on the trade-off between the market potential and the competitiveness of importing countries.

(3). Market potential plays a key role in cross-border investment decisions. Waheeduzzaman and Rau (2006) pointed out that market potential is an important index to determine the competitiveness of countries in the emerging markets, and the emerging markets have been targeted by increasing foreign direct investment due to their growing market potential. It is found that market openness, market growth, market capacity and infrastructure are important factors of market potential and contribute significant explanatory power to the cross-border investment decisions.

In market decisions across countries in emerging economy, understanding of different characteristics of market potential has always been a factor of success. Dou *et al.* (2010) pointed out that the global professional service companies need to be adaptive to the local clients in emerging markets due to their different characteristics, so that the companies can better satisfy their clients in such markets. Alon (2006) pointed out that companies need their fitted models in emerging markets to address their different market potentials. It is of great importance to analyze the characteristics of different emerging markets, and knowing the differences of market potential across different countries is critical for investment consultants in making their targets.

A number of factors have been developed to identify different levels of market potential across the emerging markets.

(1). Market size has always been assessed as a factor of market potential. Mahajan (1993) pointed out that the size of emerging markets is an important indicator in the decisions of market entry.

(2). Economy growth rate is another important factor, reflecting the market potential of the emerging markets. Ayodeji (2012) pointed out that the venture capital has an important impact on the economy growth, which indicates the development of emerging economies.

(3). Development of infrastructure has also a key role in the market potential. Tiwari *et al.* (2003) pointed out that the emerging markets, such as China, have highly invested in infrastructure, such as highway systems and seaports, and this also facilitates the transportation in the emerging markets. Lee (2003) pointed out that the channel intensity of emerging markets is an important factor to the distribution decisions of investors.

(4). Country risk is also widely considered as a factor to evaluate the market potential. Malhotra *et al.* (2009) also pointed out that there is a need to balance the trade-off between risk and return in market, and thus the country risk is included as an indicator of the market potential in the emerging markets. Baena (2012) pointed out that traditional companies may prefer to reduce risk and invest in the developed countries. As the developed countries are more saturated, investors are more interested in the emerging markets with lower level of uncertainty avoidance.

The International Business Center at Michigan State University has developed the market potential index consisting of eight different factors, including market size, market growth rate, market intensity, market consumption capacity, commercial infrastructure, economic freedom, market receptivity, and country risk. This research analyzes the different characteristics of countries across the emerging markets based on the market potential index from the International Business Center at Michigan State University. Cluster analysis is used to analyze the attributes of market potential across different countries, and a 2-Mode network is developed to visualize the relationship

between country nodes and their attributes. The switching probabilities of different clusters are further estimated by a Markov chain model and the future trend of market potential attributes in the emerging market are forecasted.

3. The Research Method

3.1. Data Source

The market potential index is obtained from the International Business Center, Michigan State University, at <http://globaledge.msu.edu/mpi>. Annual data of market potential index in the emerging markets from 2000-2013 are researched, with missing values in 2006 and 2012 excluded. Sample countries include Singapore, Hong Kong, China, South Korea, Czech Republic, India, Israel, Poland, Hungary, Turkey, Brazil, Mexico, Argentina, Malaysia, Chile, Peru, Indonesia, Thailand, Russian Federation, Egypt, Saudi Arabia, Philippines, Colombia, Pakistan, Venezuela and South Africa. The market potential index consists of eight different variables, including market size, market growth rate, market intensity, market consumption capacity, commercial infrastructure, economic freedom, and country risk. The data sources are originally collected from the World Bank, the Euromonitor Database, and the U.S. Census Bureau *et al.*

3.2. Cluster Analysis of the Market Potential Index

Countries in the emerging markets are divided into 8 clusters by cluster analysis. The market potential index and the eight variables above are used as dimensions to identify the cluster of different countries. Each variable is standardized with mean 0 and standard deviation 1. The SAS 9.2 program is used to perform the cluster analysis. Furthermore, the network relationship between different countries and their market potential attributes are also analyzed by Ucinet 6. The market potential index in 2013 is transformed into binary data by the threshold of average value in each variable. The variable 'HighPotential' is equal to 1 if sample value is higher than average. Otherwise, it is equal to 0. In the same manner, the rest of the variables are transformed into binary data. Relationships between different nodes and attributes are visualized by a 2-Mode network.

3.3. Forecasting by Markov Chain

Finally, the switching probabilities of different countries into different clusters are analyzed by the Markov chain model. This is a powerful forecasting tool that predicts the movement of different states from the current state. The Markov chain model has been widely used in economics, finance, marketing, and tourism forecasting researches. Lu and Kuo (2006) used the Markov chain model to predict the default probability of bank loans in Taiwan. Otter (2006) used the Markov chain model to support targeting decisions of households for direct marketing. Fukuhara and Saruwatari (2007) used the Markov chain to forecast the currency risk in the emerging markets. Netzer *et al.* (2008) used the Markov chain model to analyze the latent customer relationship dynamics. Bode and Nunnenkamp (2011) used the Markov chains to analyze the influence of FDI on regional development. Lipták (2011) used

4. Results

4.1. Cluster Analysis of Market Potential

Table 1 shows the initial seeds of different variables. From Table 1 we can find that countries are divided into eight different clusters by market potential index and other eight variables representing different factors of market potentials in the emerging markets. Table 2 shows the means of different variables in each cluster, and Table 3 further shows the standard deviation of variables in each cluster. From Table 2 it is found that countries in the emerging markets have a higher level of market potential in Cluster 4 (mean=1.425), Cluster 7 (mean=1.860), and Cluster 8 (mean=2.049). The average level of countries in Cluster 5 is also positive (mean=0.491). Among the countries with higher level of market potential, in Cluster 4 is China, which is also high in market size, market growth rate, but relatively low in market intensity and economic freedom. On the other hand, countries in Clusters 7 and 8 are high in market intensity, economic freedom, commercial infrastructure, and market receptivity, but are lower in market size with a higher level of country risk, such as Singapore.

It is also found from Table 2 that countries in Cluster 2 (mean= -0.841) and Cluster 6 (mean= -0.864) have a lower level of market potential. Countries in Cluster 1 (mean= -0.236) and Cluster 3 (mean= -0.138) are also low in the market potential index. Countries in Cluster 2 have a fast market growth rate, but are lower in market intensity, economic freedom, and market receptivity. Countries in Cluster 6 have a lower country risk, but also low market growth, consumption capacity, commercial infrastructure, and market receptivity. Countries in Cluster 3 have a higher level of market intensity and economic freedom, but are lower in market receptivity. Countries in Cluster 1 are lower in consumption capacity, commercial infrastructure and market receptivity.

Table 4 is the summary of cluster analysis. The overall R-square is 0.377, and the Pseudo F statistics is 88.6. Countries in the emerging markets are concentrated into Cluster 1 (frequency=94), Cluster 5 (frequency=69), and Cluster 6 (frequency=88). From Table 4, it is found that both Cluster 5 and Cluster 6 are closely related to Cluster 1. Cluster 7 is closely related to Cluster 5, while Cluster 4 is closely related to Cluster 1. Also, Cluster 2, Cluster 3 and Cluster 8 are closely related to each other. Table 5 shows the clusters where each country is involved in different years.

4.2. Relationships between Country Nodes and Attributes

The relationships between different country nodes and their attributes are further visualized in a 2-Mode network (Figure 1). Figure 1 shows that higher level of market potential in the emerging markets is closely related to higher level of market intensity, market growth rate, market receptivity, market consumption capacity, and economic freedom, but also to a higher level of country risk. It is also found that lower level of market potential in the emerging markets is closely related to lower level of market receptivity, market intensity, market commercial infrastructure, economic freedom, market consumption capacity, but also to a lower level of country risk.

Figure 2 shows the network of different countries and clusters in 2013. The relationship between countries and their clusters are generated from data in 2013. The

relationship between different clusters is generated from N_{ij} . It is found that Cluster 1, Cluster 5 and Cluster 6 are in the central position of the network. Cluster 1 is closely related to countries such as India and Brazil. Cluster 5 is closely related to countries such as Hungary and Poland. Cluster 6 is closely related to countries such as Russian Federation and Thailand. Furthermore, Cluster 3 and Cluster 7, such as Hong Kong and Singapore, are in the position between Cluster 1 and Cluster 5, and Cluster 8 is usually transformed into Cluster 7, while Cluster 2 is only closely related to Cluster 6. As a special case, China is the only country involved in Cluster 4, and it is independent from other clusters.

To understand further the transformation of countries from one cluster to another in the emerging markets, the Markov chain model is performed to analyze the switching probabilities between different clusters. Figure 3 further reveals the network of different clusters switching from each other in the emerging markets and the centrality degree of different cluster. It is found that Cluster 1 is at a top level of centrality, while Cluster 6 and Cluster 5 are also in central positions. In addition, the relationships between different clusters can be further visualized in Figure 3.

4.3. Estimation of Switching Probabilities in Different Clusters

The numbers of countries that switch from Cluster i to Cluster j are as follows:

$$N_{ij} = \begin{pmatrix} N_{c_1c_1} & N_{c_1c_2} & \dots & N_{c_1c_8} \\ N_{c_2c_1} & N_{c_2c_2} & \dots & N_{c_2c_8} \\ \vdots & \vdots & \ddots & \vdots \\ N_{c_8c_1} & N_{c_8c_2} & \dots & N_{c_8c_8} \end{pmatrix} = \begin{pmatrix} 50 & 0 & 0 & 0 & 3 & 12 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 2 & 0 & 0 \\ 1 & 0 & 3 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 9 & 0 & 0 & 0 & 0 \\ 2 & 0 & 0 & 0 & 45 & 1 & 0 & 0 \\ 15 & 1 & 0 & 0 & 1 & 51 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 11 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 2 & 5 \end{pmatrix}$$

The switching probabilities matrix of countries in emerging market, $P_{(switch)}$, is:

$$P_{(switch)} = \begin{pmatrix} P_{c_1c_1} & P_{c_1c_2} & \dots & P_{c_1c_8} \\ P_{c_2c_1} & P_{c_2c_2} & \dots & P_{c_2c_8} \\ \vdots & \vdots & \ddots & \vdots \\ P_{c_8c_1} & P_{c_8c_2} & \dots & P_{c_8c_8} \end{pmatrix} = \begin{pmatrix} 0.758 & 0 & 0 & 0 & 0.046 & 0.182 & 0.015 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0.167 & 0 & 0.5 & 0 & 0.333 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0.042 & 0 & 0 & 0 & 0.938 & 0.021 & 0 & 0 \\ 0.221 & 0.015 & 0 & 0 & 0.015 & 0.75 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0.083 & 0 & 0.917 & 0 \\ 0 & 0 & 0 & 0 & 0.125 & 0 & 0.25 & 0.625 \end{pmatrix}$$

The frequency and probabilities of different clusters in 2013, $P_{(2013)}$, is:

$$N_{(2013)} = N_{(c_1, c_2, \dots, c_8)} = (10 \ 0 \ 0 \ 1 \ 6 \ 5 \ 2 \ 0)$$

$$P_{(2013)} = N_{c_i} / \sum N_{c_i} = (0.417 \ 0 \ 0 \ 0.042 \ 0.25 \ 0.208 \ 0.083 \ 0)$$

The estimation of probabilities in different clusters for 2014, $P_{(2014)}$, is:

$$P_{(2014)} = P_{(2013)} * P_{(switch)} = (0.372 \ 0.003 \ 0 \ 0.042 \ 0.263 \ 0.237 \ 0.083 \ 0)$$

The estimation of probabilities for different clusters in a stationary distribution is:

$$P_{(stationary)} = (\pi_1, \pi_2, \pi_3, \pi_4, \pi_5, \pi_6, \pi_7, \pi_8) = (0.295 \ 0.004 \ 0 \ 0.042 \ 0.347 \ 0.259 \ 0.054 \ 0)$$

It is also found that Cluster 4 is a stable group and the data sources in this cluster are from China. The data sources of Cluster 4 will be excluded in forecasting the probabilities of clusters in the ergodic condition, as China always remains the only country in Cluster 4 without any switching. After the probability index is generated, the sample size of each year is averaged as 26. Therefore, China will be added back to the sample group as Cluster 4, with the constant probability in 2013 and 2014 as 0.042. The probability of the rest of clusters will be modified by the parameter 0.958. The final estimation result of probabilities in a stationary Markov chain are solved as $P_{(stationary)}$.

In comparison of results between $P_{(2013)}$ and $P_{(2014)}$, the ratio of countries in Cluster 1 is expected to decrease, and the ratios of countries in Cluster 5 and Cluster 6 are expected to increase. In comparison between $P_{(2013)}$ and $P_{(stationary)}$, the ratio of countries in Cluster 1 is expected to decrease further in the long-run, and the ratio of countries in Cluster 5 and Cluster 6 will further increase. But the degree of increase in Cluster 5 can be expected to be higher than in Cluster 6. Additionally, the ratio of Cluster 7 will also be expected to decrease. It is also found that Cluster 3 has switched to Cluster 1 in early 2000s, such as Argentina and South Korea, or shifted to Cluster 5, such as Portugal in 2000. Cluster 8 has also transformed into Cluster 7 in early 2000s, such as Hong Kong and Singapore.

5. Conclusion

With the development of economies, the emerging markets have shown different characteristics of their market potential. This research divides different countries of emerging markets into eight different clusters by their market potential indexes and eight market factors representing different characteristics of countries in the emerging markets. The market potential index database from International Business Center at Michigan State University is researched in this study.

This research identifies that clusters with higher level of market potentials include Cluster 4, Cluster 7, Cluster 8 and Cluster 5. The country in Cluster 4 is China, with larger market size and fast market growth rate, but a lower level of economic freedom. The countries in Cluster 7 and Cluster 8 have a smaller market size, but a higher level of commercial infrastructure and economic freedom. On the other hand, Cluster 1, Cluster 2, Cluster 3, and Cluster 6 have relatively lower market potential. Cluster 1 is lower in commercial infrastructure, consumption capacity, and market receptivity. Cluster 2 is high in growth rate, but low in market intensity and economic freedom. Cluster 3 is high in market intensity and economic freedom, but low in market receptivity. Cluster 6 is low in market growth, commercial infrastructure, and market receptivity.

It is also found that Cluster 5 and Cluster 6 are closely related to Cluster 1. Cluster 1 is at a top centrality position of this market potential cluster network, and there are transformations between Cluster 1 and Cluster 5, such as Poland and Mexico. There are also transformations between Cluster 1 and Cluster 6, such as India and South Africa, or there can be a transformation among these three clusters, such as Malaysia. However, most frequently, these three clusters hold stable to their own clusters. On

the other hand, Cluster 8 is frequently transformed into Cluster 7, such as Hong Kong and Singapore. Cluster 3 is likely to be transformed into Cluster 1 or Cluster 5, while Cluster 2 usually switches to Cluster 6. Notably, China is a special case and also the only country that is involved in Cluster 4, always remaining stable in a relatively independent position. A 2-Mode network is developed to visualize the relationship of countries and their market potential attributes. It is also found that a higher level of market intensity, market growth rate, market receptivity, consumption capacity, and economic freedom is closely related to a higher level of market potential in the emerging market, but also accompanied by a higher level of country risk. A lower level of market receptivity, market intensity, commercial infrastructure, and economic freedom is closely related to a lower level of market potential in the emerging markets. This research further estimates the switching probability between different clusters in the emerging market by using the Markov chain model. By estimating the switching probability of countries in different clusters across emerging markets from 2000 to 2011, the probability of each cluster in 2014 is forecasted based on the market potential database in 2013. In comparison, it is found that the ratio of countries in Cluster 1 is expected to decrease, while the ratios of countries in Cluster 5 and Cluster 6 are expected to increase. By further estimating probabilities of each cluster in a long-term stationary Markov chain, it is found that the ratio in Cluster 1 can further decrease, and ratios in Cluster 5 and Cluster 6 can further increase, but the increasing rate of Cluster 5 can be higher than the rate of Cluster 6. The ratio of countries in Cluster 7 is expected to decrease in long-term estimation as well.

Table 1

Initial Seed of Clusters in the Emerging Markets

Clus	Size	Grow	Intens	Consum	Infrastr	Freedom	Receptivity	Risk	Potential
1	-0.485	1.739	0.951	-0.427	-1.223	1.092	-0.335	0.966	-0.397
2	-0.342	0.518	-2.327	4.030	-0.018	-1.541	-0.248	0.633	-0.882
3	-0.294	-1.352	1.551	4.030	-0.055	1.129	-0.680	-1.199	-0.519
4	4.188	1.892	-2.327	-0.192	-1.478	-2.060	-0.507	-1.074	0.450
5	-0.056	-0.933	0.120	-0.368	0.128	0.276	2.860	0.175	0.208
6	1.804	-1.696	-1.265	-0.273	0.237	-0.725	-0.464	-1.907	-0.962
7	-0.532	1.319	2.244	-0.255	1.807	1.314	3.594	1.716	2.428
8	-0.532	-0.322	0.720	4.030	1.369	0.869	3.594	0.217	2.226

Table 2

Cluster Means of Countries in Emerging Markets

Clus	Size	Grow	Intens	Consum	Infrastr	Freedom	Receptivity	Risk	Potential
1	-0.085	0.625	-0.114	-0.292	-0.578	0.086	-0.248	-0.158	-0.236
2	-0.246	1.033	-1.104	4.030	-0.438	-0.929	-0.313	0.009	-0.841
3	-0.294	0.076	1.254	4.030	0.071	0.880	-0.477	-0.033	-0.138
4	4.188	1.542	-2.212	-0.218	-0.590	-2.017	-0.507	0.088	1.425
5	-0.409	-0.657	0.364	-0.146	0.992	0.889	0.060	0.676	0.491
6	0.018	-0.494	-0.342	-0.275	-0.534	-0.842	-0.489	-0.923	-0.864
7	-0.501	0.185	1.492	-0.232	1.606	0.949	2.868	2.010	1.860
8	-0.503	0.694	1.101	4.030	1.424	0.934	2.574	1.555	2.049

Table 3

Cluster Standard Deviation of Countries in Emerging Markets

Clus	Size	Grow	Intens	Consum	Infrastr	Freedom	Receptivity	Risk	Potential
1	0.543	0.775	0.793	0.120	0.608	0.714	0.454	0.556	0.534
2	0.135	0.729	1.730	0.000	0.594	0.865	0.092	0.883	0.057
3	0.187	1.289	0.540	0.000	0.867	0.517	0.239	1.311	0.754
4	0.000	0.697	0.303	0.036	0.442	0.093	0.104	0.427	0.705
5	0.170	0.722	0.676	0.108	0.553	0.431	0.460	0.393	0.607
6	0.652	0.741	0.684	0.107	0.684	0.637	0.202	0.671	0.468
7	0.135	0.932	0.869	0.072	0.273	0.334	0.966	0.244	0.629
8	0.067	0.775	0.892	0.000	0.413	0.304	1.230	0.692	0.450

Table 4

Summary of Cluster Analysis in Emerging Markets

Cluster	Frequency	RMS Std Deviation	Max Dist from Seed	Nearest Cluster	Dist Btwn Clust Centr
1	94	0.598	3.059	6	1.793
2	2	0.777	1.649	3	3.246
3	7	0.771	3.048	2	3.246
4	12	0.405	1.675	1	5.552
5	69	0.500	2.868	1	2.536
6	88	0.581	3.348	1	1.793
7	18	0.598	3.042	5	3.730
8	8	0.655	2.569	3	4.347

Variable	Total STD	Within STD	R-Square	RSQ/(1-RSQ)
Size	1	0.481	0.774	3.432
Growth	1	0.774	0.415	0.708
Intensity	1	0.730	0.480	0.924
Consumption	1	0.106	0.989	90.498
Infrastructure	1	0.603	0.645	1.820
Freedom	1	0.588	0.662	1.963
Receptivity	1	0.470	0.784	3.638
Risk	1	0.575	0.677	2.095
Potential	1	0.550	0.705	2.391
OVER-ALL	1	0.571	0.681	2.139

Table 5

Summary of Cluster Analysis in the Emerging Markets

CY	Year	C	CY	Year	C	CY	Year	C	CY	Year	C	CY	Year	C
ARG	2000	3	BRA	2000	6	CHI	2000	1	CHN	2000	4	CZE	2000	5
ARG	2001	3	BRA	2001	6	CHI	2001	1	CHN	2001	4	CZE	2001	5
ARG	2002	3	BRA	2002	6	CHI	2002	1	CHN	2002	4	CZE	2002	5
ARG	2003	3	BRA	2003	1	CHI	2003	1	CHN	2003	4	CZE	2003	5
ARG	2004	1	BRA	2004	1	CHI	2004	1	CHN	2004	4	CZE	2004	5
ARG	2005	6	BRA	2005	6	CHI	2005	1	CHN	2005	4	CZE	2005	5
ARG	2007	6	BRA	2007	6	CHI	2007	5	CHN	2007	4	CZE	2007	5
ARG	2008	6	BRA	2008	6	CHI	2008	5	CHN	2008	4	CZE	2008	5

CY	Year	C	CY	Year	C	CY	Year	C	CY	Year	C	CY	Year	C
ARG	2009	6	BRA	2009	6	CHI	2009	5	CHN	2009	4	CZE	2009	5
ARG	2010	6	BRA	2010	1	CHI	2010	5	CHN	2010	4	CZE	2010	5
ARG	2011	1	BRA	2011	1	CHI	2011	5	CHN	2011	4	CZE	2011	5
ARG	2013	1	BRA	2013	1	CHI	2013	5	CHN	2013	4	CZE	2013	5
H.K.	2000	8	HUN	2000	5	IND	2000	1	INA	2000	6	ISR	2000	5
H.K.	2001	8	HUN	2001	5	IND	2001	6	INA	2001	6	ISR	2001	5
H.K.	2002	8	HUN	2002	5	IND	2002	6	INA	2002	6	ISR	2002	5
H.K.	2003	7	HUN	2003	5	IND	2003	1	INA	2003	1	ISR	2003	5
H.K.	2004	7	HUN	2004	5	IND	2004	1	INA	2004	1	ISR	2004	5
H.K.	2005	7	HUN	2005	5	IND	2005	1	INA	2005	6	ISR	2005	5
H.K.	2007	7	HUN	2007	5	IND	2007	1	INA	2007	6	ISR	2007	5
H.K.	2008	7	HUN	2008	5	IND	2008	6	INA	2008	6	ISR	2008	5
H.K.	2009	7	HUN	2009	5	IND	2009	6	INA	2009	6	ISR	2009	5
H.K.	2010	7	HUN	2010	5	IND	2010	1	INA	2010	1	ISR	2010	5
H.K.	2011	7	HUN	2011	5	IND	2011	1	INA	2011	1	ISR	2011	5
H.K.	2013	7	HUN	2013	5	IND	2013	1	INA	2013	1	ISR	2013	5
MAS	2000	1	MEX	2000	1	PHI	2000	1	POL	2000	1	RUS	2000	6
MAS	2001	1	MEX	2001	1	PHI	2001	1	POL	2001	1	RUS	2001	6
MAS	2002	1	MEX	2002	1	PHI	2002	6	POL	2002	5	RUS	2002	6
MAS	2003	1	MEX	2003	1	PHI	2003	1	POL	2003	1	RUS	2003	6
MAS	2004	1	MEX	2004	1	PHI	2004	1	POL	2004	5	RUS	2004	6
MAS	2005	1	MEX	2005	1	PHI	2005	6	POL	2005	5	RUS	2005	6
MAS	2007	1	MEX	2007	5	PHI	2007	6	POL	2007	5	RUS	2007	6
MAS	2008	5	MEX	2008	5	PHI	2008	6	POL	2008	5	RUS	2008	6
MAS	2009	5	MEX	2009	5	PHI	2009	6	POL	2009	5	RUS	2009	6
MAS	2010	6	MEX	2010	5	PHI	2010	6	POL	2010	5	RUS	2010	6
MAS	2011	5	MEX	2011	1	PHI	2011	6	POL	2011	5	RUS	2011	6
MAS	2013	1	MEX	2013	1	PHI	2013	6	POL	2013	5	RUS	2013	6
SIN	2000	8	RSA	2000	1	S.KOR	2000	3	THA	2000	1	TUR	2000	2
SIN	2001	8	RSA	2001	1	S.KOR	2001	1	THA	2001	1	TUR	2001	6
SIN	2002	8	RSA	2002	1	S.KOR	2002	1	THA	2002	1	TUR	2002	1
SIN	2003	8	RSA	2003	1	S.KOR	2003	7	THA	2003	1	TUR	2003	1
SIN	2004	7	RSA	2004	1	S.KOR	2004	5	THA	2004	1	TUR	2004	1
SIN	2005	7	RSA	2005	1	S.KOR	2005	5	THA	2005	1	TUR	2005	1
SIN	2007	7	RSA	2007	1	S.KOR	2007	5	THA	2007	1	TUR	2007	1
SIN	2008	7	RSA	2008	1	S.KOR	2008	5	THA	2008	6	TUR	2008	6
SIN	2009	7	RSA	2009	6	S.KOR	2009	5	THA	2009	6	TUR	2009	1
SIN	2010	7	RSA	2010	1	S.KOR	2010	5	THA	2010	6	TUR	2010	1
SIN	2011	7	RSA	2011	6	S.KOR	2011	5	THA	2011	1	TUR	2011	1
SIN	2013	7	RSA	2013	1	S.KOR	2013	5	THA	2013	6	TUR	2013	1
VEN	2000	1	COL	2002	6	EGY	2002	6	PER	2002	1	PAK	2007	6
VEN	2001	6	COL	2003	6	EGY	2003	1	PER	2003	1	PAK	2008	6
VEN	2002	6	COL	2004	6	EGY	2004	1	PER	2004	1	PAK	2009	6
VEN	2003	6	COL	2005	6	EGY	2005	1	PER	2005	1	PAK	2010	6
VEN	2004	6	COL	2007	6	EGY	2007	6	PER	2007	6	PAK	2011	6
VEN	2005	6	COL	2008	6	EGY	2008	6	PER	2008	6	PAK	2013	6
VEN	2007	6	COL	2009	6	EGY	2009	6	PER	2009	1	SAR	2007	6
VEN	2008	6	COL	2010	6	EGY	2010	6	PER	2010	1	SAR	2008	2
VEN	2009	6	COL	2011	1	EGY	2011	6	PER	2011	1	SAR	2009	6
VEN	2010	6	COL	2013	1	EGY	2013	6	PER	2013	1	SAR	2013	1
VEN	2011	6	GRE	2000	3	POR	2000	3	TWN	2007	8			
VEN	2013	6	GRE	2001	5	POR	2001	5	TWN	2008	5			

Figure 1. Network of Country Nodes and Attributes in the Emerging Markets in 2013

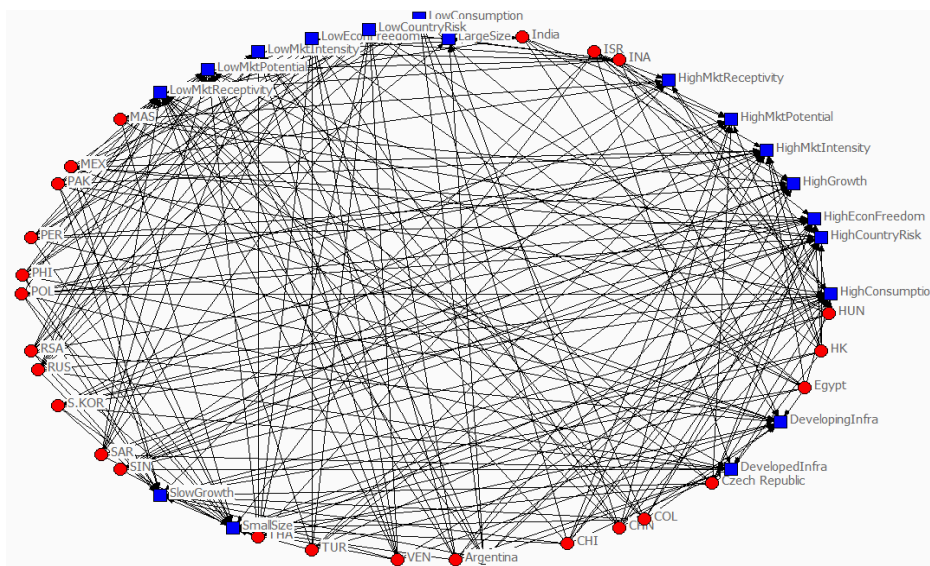


Figure 2. Network of Country Nodes and Clusters in the Emerging Markets in 2013

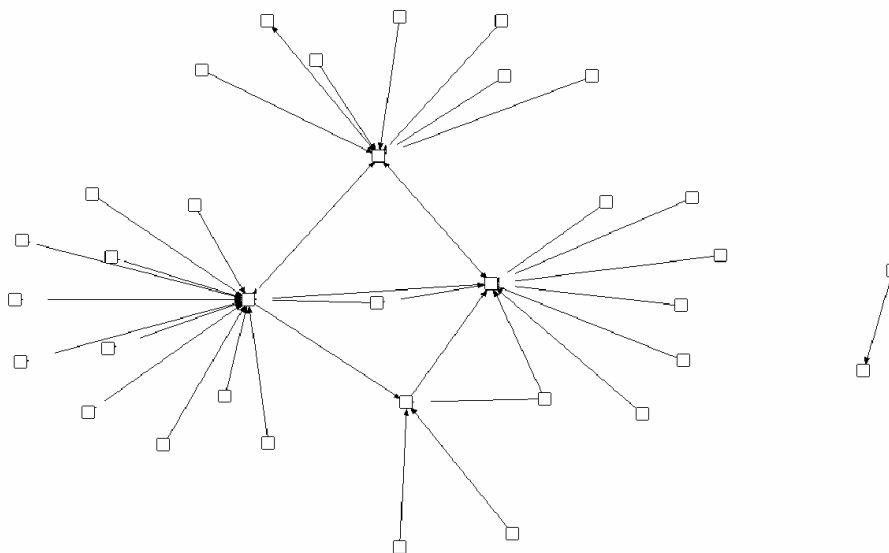
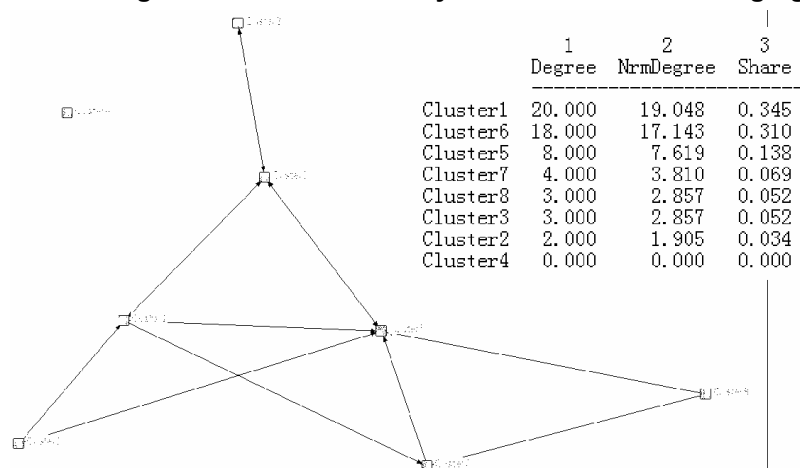


Figure 3. Switching Network and Centrality of Clusters in the Emerging Markets



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