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CONTAGION AND SELF-LEARNING IN ASIAN ECONOMIC CRISES 1997-1998 AND 2008-2010. CASE STUDY OF MALAYSIA

PROBLEM ZARAŻANIA I UCZENIA SIĘ W KRYZYSACH AZJATYCKICH 1997-1998 I 2008-2010. STUDIUM PRZYPADKU MALEZJI

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Summary: The contagion effect is of a systemic importance for the real, financial and political spheres. In contagion analysis the impact of centralization and self-learning in a complex system on the ability to respond to contagion escalation is interesting. The system approach methodology seems best to resolve such systemic issues. Malaysia, selected for a case study, was affected both by the 1997-1998 and the 2008-2010 crisis. The tested hypothesis: centralized system is more prone to contagion, but self-learning and response to contagion may be faster, was proven. Malaysia was prone to contagion mostly due to links with neighbouring countries, correlated especially with Indonesia, less with Thailand, but centralization, similar to other SE Asian countries, made the contagion relatively fast. Conversely, the centralized yet controversial reaction of Mahathir bin Mohammad, allowed Malaysia to overcome the crisis faster and broadly implement a self-learning mechanism to avoid future shocks.

Keywords: contagion effect, Malaysia, Complex Systems Theory, Asian Financial Crisis 1997-1998, Global Financial Crisis 2008-2010.

Streszczenie: Efekt zarażania ma kluczowe znaczenie dla sfery realnej, finansowej i politycznej. Ciekawa jest kwestia centralizacji i samouczenia w systemie złożonym w odniesieniu do zdolności odpowiadania na efekt eskalacji zjawiska zarażania. Metoda analizy systemowej jest najwłaściwsza do analizy tej kategorii zjawisk. Na studium przypadku wybrano Malezję, dotkniętą zarówno kryzysem z lat 1997-1998 i 2008-2010. Hipoteza: systemy scentralizowane są bardziej podatne na zarażanie, ale samouczenie w systemie i odpowiedź na zarażanie może być szybsza, została dowiedziona na przypadku Malezji. Kraj ten był podatny na zarażanie ze względu na powiązania z sąsiadami: wysoką korelację z Indonezją i mniejszym z Tajlandią, a centralizacja w systemie doprowadziła do szybkiego rozprzestrzeniania się zjawiska zarażania. Z drugiej strony scentralizowana, czasem uznawana za kontrowersyjną reakcja Mahathira bin Mohammada pozwoliła Malezji przezwyciężyć kryzys szybciej i wdrożyć szeroko mechanizmy samouczenia.

Słowa kluczowe: efekt zarażania, teoria systemów złożonych, azjatycki kryzys finansowy 1997-1998, globalny kryzys finansowy 2008-1010.

1. Introduction

On the wave of the financial crises and bankruptcies, numerous publications concerning the contagion effect emerged [Edwards 2000; Hernandez, Valdes 2001; Henggeler-Müller 2006; Kaminsky 2003; Kelly, Grada 2000]. After the collapse of Lehman Brothers on September 15, 2008 some authors also discussed the contagion effect phenomenon [Dungy et al. 2010; Geert et al. 2011; Forbes 2012; Markwat et al. 2009; Rose, Spiegel 2009]. The numerous analyses take up the subject of the contagion effect propagation in Asia both for 1997-1998 and 2008-2010 crisis [Kawai 2008; Takatoshi, Hashimoto 2005; Wilson, Zurbruegg 2004; Rungcharoenkitkul 2011; Shin 2013].

The system approach methodology is rather rarely applied to interpret the contagion and contagion effect escalation, both worldwide and in Asia [Choi, Douady 2013]. However, this approach is beneficial for identification of feedbacks and casual loops that are hard to follow by using linear thinking.

The application of system thinking results in identification of some gaps in the analysis of contagion and contagion effect. For example, the impact of system centralization on contagion and contagion effect escalation should be further discussed. What is more, the self-learning mechanism, including the role of centres and the response towards contagion requires the in-depth analysis. What seems to be also important, the application of the system approach methodology could be complimentary to the network analysis on the contagion and contagion effect [Toivanen 2013; Gallegati et al. 2008].

The authors assume following hypothesis: centralized system is more prone to contagion, but self-learning and response to contagion may be faster.

Malaysia is a selected case for analysis, as it was affected both by the 1997-1998 crisis and the 2008-2010 crisis. Taking this into consideration, authors decided to analyse the impact of centralization on contagion and contagion propagation, including the self-learning phenomenon.

2. Contagion and Contagion Effect

The in-depth literature review allows us to distinguish two basic approaches to the understanding of the term *contagion*. In the social and economic scientific sources, they both involve the spread of financial crises and imitation of behaviour.

The imitation of behaviour is reflected with the emotional contagion, and defined as “tendency to automatically mimic and synchronize facial expressions, vocalizations, postures and movements with those of another person and, consequently, to converge emotionally” [Hatfield et al. 1994]. Part of the interpretative framework of such phenomena are viral marketing [Trusov et al. 2009], attributes of social networks [Kramer et al. 2014], purchasing decisions [Argo et al. 2008], creativity [Visser et al. 2013] and the behaviour within the supply chain [McFarland et al. 2008].

The approach to financial markets puts emphasis on the spreading of crises, negative shocks or disturbances [Goldstein 1998; Edwards 2000; Reinhart 2000; Moser 2003; Pericoli, Sbracia 2003; Kaminsky, Rose Spiegel 2009; Forbes 2012; Caccioli et al. 2015].

Both cognitive approaches are sometimes complementing and e.g. the analyses describing the spread of financial crises involve the imitation of behaviour typical of herding behaviour. An essential strand of analyses undertaken within the framework of contagion is that it intensifies the existing interdependence [Kaminsky, Reinhart 2003; Markwat et al. 2009]. It is assumed that contagion is subject to escalation, and local disturbances may transform into regional or global crises [Markwat et al. 2009]. Contagion is also defined as the co-movement implied by the factor model, i.e. above and beyond what can be explained by fundamentals, having in mind their natural evolution over time [Geert et al. 2011].

The mechanism of spreading crises involving investors in a number of countries, owning the same assets or using the same cognitive mechanisms, is also a component of understanding contagion. The latter results in, for example, the panic effect and herding behaviour, and facilitates the spread of contagion [Roubini, Mihm 2011].

In this paper, we define contagion as a phenomenon of rapid, immediate, highly frequent, self-replicating influence on the affected entities. Immediacy consists in the fact that as soon as the mechanism of influence starts to operate, contagion occurs. Rapidity is tantamount to the intensity of the phenomenon. Its scope may include such attributes of contagion as its high frequency. The latter refers to the escalation of connections as the result of contagion, as well as its capacity to replicate in numerous situations.

3. Centralization

The centralization degree should be dependent on the types of problems which are crucial for surviving of systems in the long term. The centres should address problems that are complex, general and long term or require the pooling of resources in the short term.

Following the system theory, the control on the centres side is ineffective due to the administrative measures in the form of orders, bans, restrictions, judgments and other forms of interventionist influence. In the meantime, self-organization contributes to higher efficiency of system. This is due to better control, which is an effect of more accurate information and shorter time between gaining information and action. Yet, the centre in its own activities is not in a position to take into account all the necessary variables [Skyttner 2005].

The other aspect of considering the centralization phenomenon includes the optimization and sub-optimization principles. When the whole system optimum prevails, not all subsystems are at their optima. As a result, it is hard to expect that the sum of subsystems' optima will necessarily lead to the total system's optimum.

In other words, if the subsystems sub-optimize, but work towards the whole systems optimum, they will in aggregate reach a better total system optimum, than if each tries to optimize its own system separately. The principle of sub-optimization means that when the individual subsystems optimize its actions, the whole system does not work optimally. There is no contradiction in promoting, solutions worked out on a centralized basis, on the one hand, and in the implementation carried out by the decentralized decision units, on the other [van Gigch 1991].

The optimal structure of the system provides the balance between time of information flow and problems stemming from the sub-optimization. However, centralization is the one of the forces which drive the system's ability to learn. The centres can manifest as leaders that are a kind of reference points and build the sense of security.

4. Methodology

Upon the literature review [Skyttner 2005; van Gigch 1991], we decided to develop an analytical model, allowing us to identify the system and analyse its different dimensions. System identification and analysis is based on the model described by Figure 1.

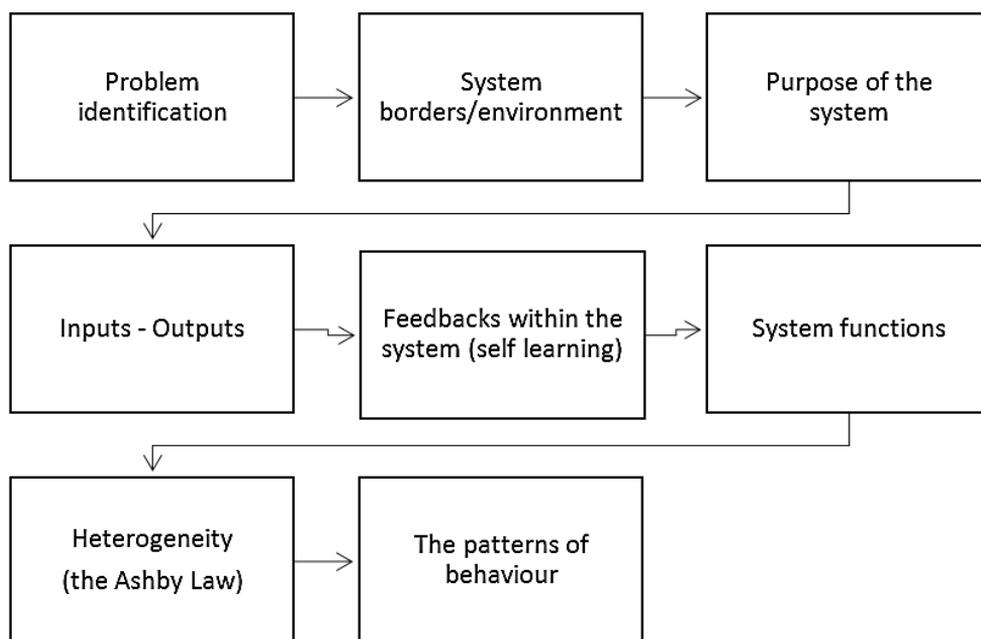


Fig. 1. The research methodology of the complex system amidst contagion

Source: Own study.

This methodology is applied to analyze Malaysia as the complex system amidst contagion.

Based on the model presented by Figure 2, we may consider Malaysia a complex system. The problem identified is naturally the contagion resulting in financial/economic crisis. As for the system borders, Malaysian financial and economic system is analyzed as separated from the environment, being East Asia (especially Southeast Asia) in a narrower sense and global economy in a broader sense. The purpose of the system is identified as providing stability for broadly understood economic activity and development, including monetary and financial stability. As for inputs and outputs of the system, we may consider both trade links, investment (including direct and capital investment), as well as monetary links.

This area in the model is important in centralization's assessment and changes in this respect, visible especially with Mahathir bin Mohammad increasing the control over the capital flows or re-nationalization of Malaysian companies. As for the self-learning mechanisms, changes in the Malaysian economy in the aftermath of the Asian Financial Crisis 1997-1998 are described. System functions are analyzed in the context of aforementioned purpose of the system. Heterogeneity in the paper refers mostly to the diversification of the Malaysian economy. Finally, patterns of behaviour refer to activities undertaken within the Malaysian economic system.

5. Contagion in Malaysia

As we observe the 10-year period between Asian economic crisis of 1997-1998 and the global economic crisis of 2008+, we can evaluate the mechanisms of both: spreading of the crisis in the complex systems, and self-learning of the system in the analyzed period between the crises.

The contagion effect during the financial crisis is a topic of many publications. Especially after the Asian crisis in 1997 and the Russian currency devaluation in 1998, many academic papers were published, in which authors tried to measure, understand, predict and prevent international financial contagion [Baig, Goldfajn 1998]. Lastly, contagion is usually mentioned as one of the main causes of the Eurozone debt crisis [Arestis, Sawyer 2012]. There is no doubt that such effect exists and can cause a great impact in highly interdependent systems, like the banking system or monetary unions.

However, the problem of contagion in such complex systems as international institutions: regimes (like Asia-Pacific Economic Cooperation, APEC) or organizations (like Association of Southeast Asian Nations, ASEAN), has not been sufficiently examined yet. Similarly, multidimensional (considering political, economic, social etc. dimensions) analyses have not been conducted so far [Backman 2009; Carney (ed.) 2009; Gerard et al. 2005; Jackson 1999; Menon, Hill 2014; Okubo et al. 2014; Park 2014].

Figure 2 depicts the growth of real GDP between 1996 and 2013, showing a clear difference between the Asian Economic Crisis (1997-1998) and the Global Financial Crisis (2008-2009), when countries mostly affected by the previous crisis (Indonesia) managed to maintain a positive economic growth.

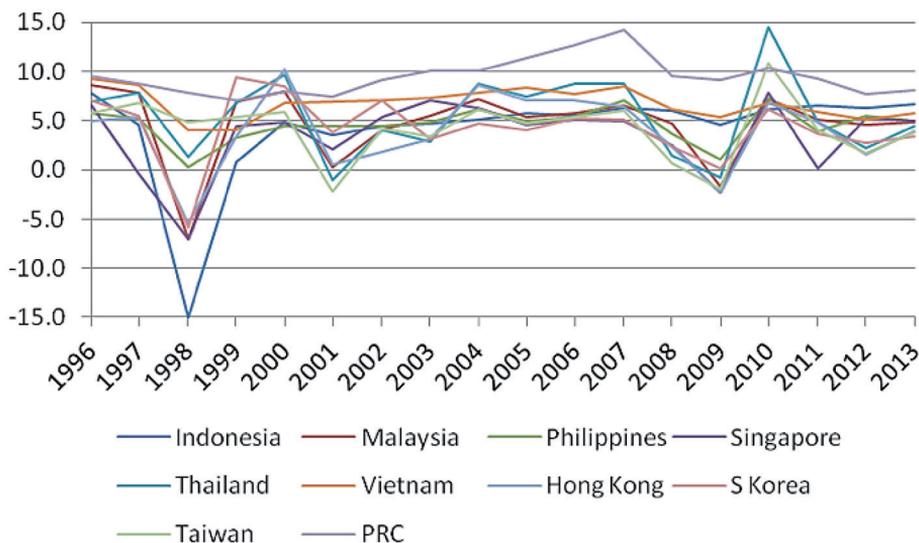


Fig. 2. GDP growth in 1996 and 2013

Source: Dixon [2015].

Table 1 illustrates GDP growth of the biggest ASEAN+3 economies (1995-2000 and 2006-2011), showing the crisis itself, as well as the recovery. In this case, we may clearly see the recovery after the Global Financial Crisis was much faster in the ASEAN+3 economies.

Table 1. GDP growth of biggest ASEAN+3 countries

	GDP Growth (%)											
	1995	1996	1997	1998	1999	2000	2006	2007	2008	2009	2010	2011
China (PRC)	10,9	10,0	9,3	7,8	7,6	8,4	12,7	14,2	9,6	9,2	10,4	9,3
Indonesia	8,2	7,8	4,7	-13,1	0,8	4,9	5,5	6,3	6,0	4,6	6,2	6,5
Japan	1,9	2,6	1,6	-2,0	-0,2	2,3	1,7	2,2	-1,0	-5,5	4,7	-0,5
Korea, South	8,9	7,2	5,8	-5,7	10,7	9,9	5,2	5,5	2,8	0,7	6,5	3,7
Malaysia	9,8	10,0	7,3	-7,4	6,1	8,9	5,6	6,3	4,8	-1,5	7,4	5,1
Philippines	4,7	5,9	5,2	-0,6	3,1	4,4	5,2	6,6	4,2	1,1	7,6	3,7
Thailand	8,1	5,7	-2,8	-7,6	4,6	4,5	4,9	5,4	1,7	-0,9	7,4	0,6
Viet Nam	9,5	9,3	8,2	5,8	4,8	6,8	7,0	7,1	5,7	5,4	6,4	6,2

Source: Own study, based on ADB [2015].

Figure 3 illustrates the export value growth in the region. As regional economies are generally export-oriented, both financial crises led to substantial fall in the export of these countries.

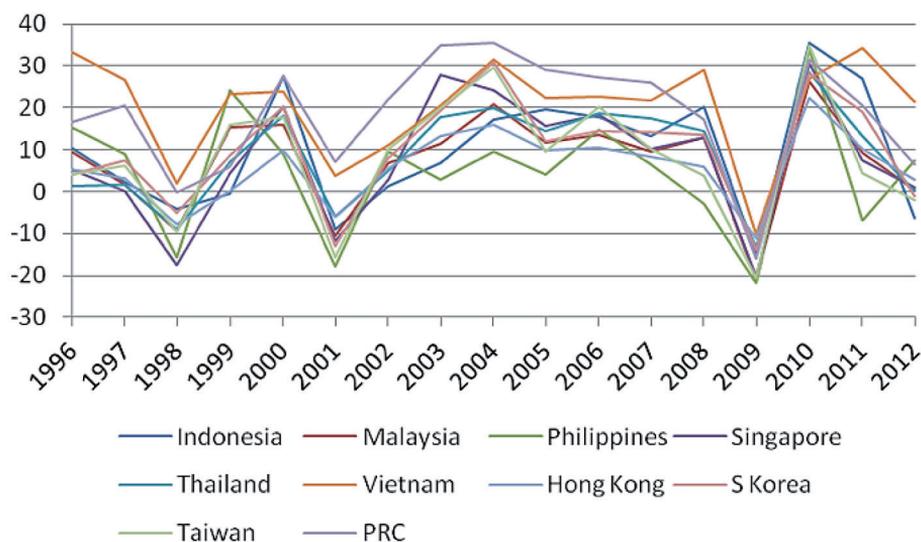


Fig. 3. Growth of the export value in the region

Source: Dixon [2015].

Tables 3 and 4 present exports and imports of goods and services as a share of GDP, illustrating possible vulnerability to the external and internal shocks, as well as the costs of crisis (imports in Malaysia as the import/GDP ratio).

Table 2. Imports of goods and services in selected Asian countries as a share of GDP

Imports of goods and services (% of GDP)												
	1995	1996	1997	1998	1999	2000	2006	2007	2008	2009	2010	2011
China (PRC)	18,6	18,0	17,3	16,0	17,6	20,9	31,4	29,6	27,3	22,3	25,6	25,9
Indonesia	27,6	26,4	28,1	43,2	27,4	30,5	25,6	25,4	28,8	21,4	22,9	24,9
Japan	7,7	9,2	9,7	8,9	8,6	9,4	14,9	16,1	17,5	12,3	14,0	16,0
Korea, South	29,0	30,4	32,2	32,1	30,8	32,9	36,4	38,1	50,0	42,9	46,2	54,3
Malaysia	98,0	90,2	92,4	93,7	96,3	100,6	90,4	86,3	77,2	71,1	76,3	75,2
Philippines	44,2	49,3	59,3	53,9	49,4	53,4	48,4	43,4	39,4	33,4	36,6	35,7
Thailand	48,3	45,3	46,8	42,3	44,3	56,5	65,6	61,2	69,3	55,1	61,0	69,3
Viet Nam	41,9	51,8	51,2	52,2	52,8	57,5	70,7	84,7	85,2	73,3	80,2	83,5

Source: Own study, based on ADB [2015].

Table 2. Exports of goods and services in selected Asian countries as a share of GDP

Exports of goods and services (% of GDP)												
	1995	1996	1997	1998	1999	2000	2006	2007	2008	2009	2010	2011
China (PRC)	20,2	20,1	21,8	20,3	20,4	23,3	39,1	38,4	35,0	26,7	29,4	28,5
Indonesia	26,3	25,8	27,9	53,0	35,5	41,0	31,0	29,4	29,8	24,2	24,6	26,3
Japan	9,1	9,7	10,7	10,8	10,2	10,9	16,2	17,7	17,7	12,7	15,2	15,1
Korea, South	28,5	27,7	31,7	44,3	37,2	35,0	37,2	39,2	50,0	47,5	49,4	55,7
Malaysia	94,1	91,6	93,3	115,7	121,3	119,8	112,2	106,2	99,5	91,4	93,3	91,6
Philippines	36,4	40,5	49,0	44,8	45,5	51,4	46,6	43,3	36,9	32,2	34,8	32,0
Thailand	41,6	39,0	48,2	57,9	56,4	64,8	68,9	69,1	71,7	64,5	66,6	71,0
Viet Nam	32,8	40,9	43,1	44,8	50,0	55,0	67,8	71,1	71,5	63,0	72,0	79,4

Source: Own study, based on ADB [2015].

As for the contagion effect, correlation analysis was conducted by Baig and Goldfajn [1998], focusing on highest degree of correlation between the Malaysian and Indonesian stock markets (among the all pairs tested), as well as on consistent correlation between the Indonesian and Malaysian exchange rates. At the same time, we may observe extremely high level of exports and imports share in Malaysian GDP (Tables 3 and 4), being the highest in the region¹. Therefore, we may presume exchange rate stability is crucial for the stability of the Malaysian economy in general. If we look at the GDP growth and the exports growth of Malaysia during both crises (Figures 3 and 4), we may see clear correlation among the East Asian economies, however, the scale of crises varies, both in terms of given countries and given crises (1997-1998 vs. 2008-2010).

Malaysia's economic model before 1997-1998, highly influenced by the prime minister Mahathir bin Mohammad, was based on two, contradicting patterns: on the one hand, the support for the big, state owned industrial conglomerates (like Keiretsu in Japan or Jaebol in South Korea), on the other, the strong role of capital investment enlarging the Malaysian stock exchange (Bursa Malaysia). At the same time, the support for Malay (underrepresented in the economy, as it was mostly controlled by the Chinese minority) was introduced in the form of affirmative action. Finally, till mid-nineties of the 20th century, large privatization campaign was conducted by the Mahathir bin Mohammad-led government, resulting also in larger capitalization of Bursa Malaysia, making it the biggest stock exchange in Southeast Asia. Also the industrialization based on foreign capital was relatively extensive in Malaysia, as it was also treated as a countermeasure to the Chinese dominated economy [Gomez 2012].

After the Asian Financial Crisis started, Malaysian finance minister Anwar Ibrahim decided to implement the IMF's approach of introducing austerity measures

¹ Actually the selected economies, being the biggest East Asian countries, as Singapore and Hong Kong, have higher shares of exports and imports.

(both fiscal and monetary), but this seemed not to work. Therefore, prime minister Mahathir bin Mohammad decided to centralize the economy, including the selective capital control (one year moratorium for repatriation of proceeds from the sale of shares was imposed), exchange rate control, ringgit loans to foreign subjects were stopped, offshore trade of ringgit was stopped as well, finally fixed USD-RM was set (3.8 RM for 1 USD). It allowed the Malaysian central bank to lower the interest rates and achieve monetary expansion (as there was no risk for capital outflow). Mahathir's policy included also substantial fiscal stimulus of RM 2 billions, changing the budget surplus of 2.5% in 1997 into a deficit of 1.8% and 3.2% in 1998 and 1999 respectively.

The capital control was relaxed gradually between 1999 and 2005. Due to bailouts in the economy, gradual re-nationalization of selected Malaysian companies was observed [Ming 2007; Lim, Goh 2012]. Generally, as the result of the crisis centralization in the Malaysian economy was increased, but in the short run, it resulted in faster recovery from the crisis. In the longer run, however, it is worth mentioning that the average growth rate of more than 9% from before 1997 was not achieved after the crises, being reduced to about 5% annually, and this was mostly due to the government spending to balance the dramatic drop in private investment [Sundaram and Hui 2014]. This could be perceived as a cost of contagion effect, but on the other hand, growth in the economy was also based on links with the global economy.

The so called Global Financial Crisis of 2008-2010 was less harmful to East Asian (and especially Southeast Asian Economies). There was a set of reasons and crucial were characterized by Masahiro Kawai, who focused on [Kawai 2008, p.4]:

- Financial institutions had not incorporated highly complex products into their business models (also because of a kind of backwardness of the financial system);
- There was general avoidance of risk (investment in high return – high risk instruments) due to Asian Financial Crisis 1997-1998;
- Prudential supervision and risk management was introduced by authorities in the aftermath of the Asian Financial Crisis.

In case of Malaysia, one can realize, the resilience of the economy grew due to, inter alia, following factors [Lim, Goh 2012]:

- Healthy banking sector (risk-weighted capital ratio grew by 13% between 2001 and 2010 and core capital ratio by 10% in the same period; non-performing loans ratio decreased from 11.5% to 2.6% between 2003 and 2008);
- Increasing the positive current account balance (even during the Global Financial Crisis of 2008-2010) and growing foreign currency reserves (reaching RM 410 million in 2008 and falling to RM 320 million in 2009, but still adequating to 3.9 times of short term external debt), allowing fiscal stimuli to support the economy.

The resilient index for Malaysia, based on the set of criteria, including political factors, financial vulnerabilities, diversity of the economic base, flexibility of an economy, capacity of policy to respond effectively, all increased from 49.8 to 51.5 in

the period between 2000 and 2008, due to lower public debt, political and regulatory improvements, reduction of non-performing loans and higher export diversity by destination [Bhaskaran, Ghosh 2010]. This effect can be ascribed to the self-learning mechanism in the system, supported by its centralization.

Nevertheless, the set of obstacles exists in the Malaysian economy. The government should think about fiscal consolidation (public deficit has been declining, but the debt is slowly growing, government debt is mostly held domestically, but broadening income base is necessary – currently most of the government income is oil-based, there is just 1.8 million out of 30 million Malaysians paying taxes). Sustaining private consumption, as an important growth contributor, should also be in focus (on the one hand, Malaysia has one of the highest ratios of household debt to disposable income of 140%, on the other, due to openness of Malaysian economy, sharp increase of interest rates would result in further slowdown of the growth; slowly shifting from manufacturing to services, especially in exports [Yean 2015, pp. 59-70]).

6. Conclusions: Malaysia as the complex system amidst contagion

The article analyses actually two phenomena, first is contagion in the complex system, the other is self-learning mechanism within the system, based on the hypothesis: centralized system is more prone to contagion, but self-learning and response to contagion may be faster.

In the given model (presented by Figure 1), inputs to the system came from different sources. In the first crisis, close interdependence between Malaysia and other East Asian, as well as Southeast Asian economies, in both trade and investment (to lesser extend), or monetary (with selected economies), existed. Therefore, all these connections were inputs to the system, but, naturally, Thai baht collapse, followed by Indonesian rupiah plummeting exchange rate, should be analyzed as an input to the system. As for the 2008-2010 crisis, the bankruptcy of Lehman Brothers is the crucial initial input, but then capital links (as Bursa Malaysia is the biggest stock exchange in SE Asia) prevailed. Contagion effect was lower due to self-learning mechanism (including deposit guarantee mechanism introduced for both traditional and Islamic banks in 2005) and limited engagement in sophisticated financial instruments.

As for outputs, one should look at the GDP growth before the Asian Economic Crisis 1997-1998, exceeding 9% annually, whereas the GDP growth rate since the Asian Economic Crisis was close to 5%. The reason for this may be natural lower marginal productivity growth of the given production factors in the better developed economy, but the sharp decrease should be correlated with the Asian Contagion, and also re-nationalization of given firms by the Malaysian government, slow-down of the reform, exclusion of the liberal politicians from the government and stronger

capital control. In the short run, such mechanism supported faster recovery despite of the lack of cooperation with the IMF, in the longer run; however, it resulted in slowed growth. Apart from the economic and financial costs, political consequences, including the dismissal of Anwar Ibrahim, longer rule of Mahathir-bin-Mohammad and more authoritarian policy, were visible. At the international stage, Malaysia intensified its conflict with the investors, especially capital investors, and the conflict between the U.S. and Malaysia was especially visible (with Vice-President Albert Gore arguing with Mahathir during APEC Economic Leaders Meeting in KL).

Such results were possible mostly due to centralization of the system and the extremely strong role of the Prime Minister Mahathir-bin-Mohammad (in office 1981-2003), as his decisions changed the Malaysian way of reacting to the crisis. Such a position of the Prime Minister was also possible, as Malaysian budget was largely dependent on commodities (with single largest contributor to the budget, namely the Petronas). Malaysia, as shown in Tables 2 and 3, is definitely a pro-export economy, being most dependent on foreign trade of all big SE Asian countries. As mentioned earlier, the economic structure is still to a large extent based on commodities, but also more and more sophisticated manufacturing export is visible, services sector (usually mostly dispersed) is relatively small – constitutes slightly more than 50% of the GDP. Therefore, heterogeneity in the system is comparatively low, decision making process for the whole system (Malaysia) is relatively simple and fast, enabling centralized countermeasures for the crisis.

The reaction of the Malaysian Prime Minister Mahathir-bin-Mohammad, possible in a highly centralized system (in both political, and economic terms: control over resources) allowed Malaysia to overcome the crisis smoother than other countries did. The problem of sub-optimization appeared as result of the centralized action. In the longer run, self-learning mechanism in this system may limit the potential of subsystems (or simply actors in the complex system) to respond in the appropriate way, as they may expect centralized reaction. Hence a proper reaction may be delayed. Moreover, the moral hazard risk may increase, if the centre will be expected to provide the support for highly indebted subjects. Also foreign actors present in the Malaysian economic system may be more cautious, as the political sphere may limit their profits (as it was impossible to expatriate profits from their capital investments).

Based on the aforementioned, we may say; the hypothesis tested in the paper is proven. Malaysia was prone to contagion mostly due to the extensive links with the neighbouring countries, being correlated especially with Indonesia, to lesser extend with Thailand, but centralization in the system, similar as in the other SE Asian countries made the contagion relatively fast. On the other hand, centralized, sometimes controversial, reaction of Mahathir bin Mohammad, allowed Malaysia to overcome the crisis faster and broadly implement the self-learning mechanism to avoid future shocks, especially in the given sectors.

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