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**MEASURING FINANCIAL STRESS INDEX (MFSI) FOR
MALAYSIAN ECONOMY**



**A Master Project Submitted to
Othman Yeop Abdullah Graduate School of Business
University Utara of Malaysia
In Fulfilment of the Requirement for the Master Degree of Economics**

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ABSTRACT

This study focuses on the construction of financial stress index in an emerging economy like Malaysia. This becomes imperative as a result of the repeated episodes of financial crises. This study measures financial stress index for Malaysian economy. We aggregate the identified financial and economic factors into a single index using the principal component analysis (CPA). The result shows that MFSI increases as a result of increase in banking sector fragility index, credit stress, external debt, stock market volatility and exchange market pressure index. Moreover, the weights of the variables reveal that the magnitude of the Malaysian financial stress is mainly driven by the fragility of the banking sector. The combine variables explain about 53 percent of the total variation in the Malaysian financial stress index (MFSI). Thus, the financial stress is determined to be the key player in the co-movement of the components used in the construction process. Furthermore, the aggregated components practically capture the known key aspects of financial stress in Malaysia. The implication of the finding is that authorities should focus more on banking sector stability than other components of the financial stress. This will help to reduce the overheating of the Malaysian financial stress.

ABSTRAK

Kajian ini memberi tumpuan untuk membina indeks tekanan kewangan dalam ekonomi baru seperti Malaysia. Ia menjadi penting akibat daripada krisis kewangan yang sering berulang. Kajian ini mengukur indeks tekanan kewangan bagi ekonomi Malaysia (MFSI). Pengiraan secara agregat faktor kewangan dan ekonomi yang dikenal pasti sebagai indeks tunggal telah digunakan dalam analisis komponen utama (CPA). Hasil dapatan menunjukkan bahawa MFSI meningkat apabila berlaku peningkatan dalam indeks kerapuhan sektor perbankan, tekanan kredit, hutang luar negeri, turun naik pasaran saham dan indeks tekanan pasaran pertukaran. Selain itu, pemberat kepada pembolehubah yang digunakan mendedahkan bahawa magnitud tekanan kewangan Malaysia sebahagian besarnya didorong oleh kerapuhan sektor perbankan. Gabungan pembolehubah dapat menjelaskan kira-kira 53 peratus daripada jumlah variasi dalam indeks tekanan kewangan Malaysia (MFSI). Oleh itu, tekanan kewangan ini telah dipilih untuk menjadi faktor utama dalam pergerakan bersama komponen yang digunakan dalam proses pembinaan indeks. Tambahan pula, komponen agregat tersebut secara praktikalnya telah menunjukkan aspek utama yang dikenal pasti dalam tekanan kewangan di Malaysia. Implikasi daripada dapatan mencadangkan pihak berkuasa memberi lebih tumpuan kepada kestabilan sektor perbankan daripada komponen lain daripada tekanan kewangan. Ini akan membantu untuk mengurangkan tekanan melampau kewangan Malaysia.

ACKNOWLEDGEMENT

All praise due to Allah SWT, the Lord of the world that makes it possible for me to complete this project. Blessing and salutation also be on Prophet of Allah SWT, Muhammad SAW. I would like to take this opportunity to express my gratitude and appreciation to the following individuals whose guidance and contribution in preparing this paper.

I am greatly indebted to my supervisor, Associate Professor Dr. Hussin bin Abdullah who has made a significant contribution until the completion of this project paper and deserves special thank for his kindness, patient, generosity and guidance. Special thanks also go to Professor Jauhari Dahalan and Mr. Mohammad Umar (PhD candidate from Nigeria) who has made a huge contribution on this study.

Finally, special respect and thanks to my beloved husband who inspires me to succeed and also to my parents for their unconditional love and encouragement. Last but not least, special thanks also go to my family members and friends for being supportive throughout my studies in University Utara Malaysia, Sintok, Kedah.

Thank you.

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CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter outlines the introduction of this study consists the background of study problem statement, research questions and objectives, significant of study and scope and limitations of the study.

1.2 Background of the Study

The growing role of the emerging economies in the global landscape is having significant implications on global and regional trade and finance, the nature and direction of capital flows, and global governance in the areas of finance and economics. In the global economy, Asia is leading the recovery process today, and is expected to remain as the world's fastest growing region over this decade. The rapid transformation of the region over this decade will contribute to increasing its financial and economic potential.

Within Asia, the Association of Southeast Asian Nations (ASEAN) region is in a strategic position to leverage on the increasing opportunities emanating from the Asia-Pacific region. The integration of ASEAN as a single market will enhance the region's growth and dynamism. The sizeable population of about 600 million people in ASEAN presents a large and fast-expanding market. The region's focus on greater financial integration will further enhance regional economic growth and promote

greater financial stability. Initiatives are already underway to strengthen financial integration within the broader Asian region (BNM Financial Sector Blueprint 2011–2020, 2011).

The recent global financial crisis highlighted the importance of measuring financial stress for example the global financial crisis in 2008 and Asian financial crisis in 1997 to 1998. Even before the crisis, there was an emerging literature that tried to measure financial stress and financial conditions and its impact on economy. In most general terms, financial stress can be thought of as an interruption to the normal functioning of financial markets (Hakkio & Keeton, 2009). Most economists agree that there will not be the same financial stress between two financial crises.

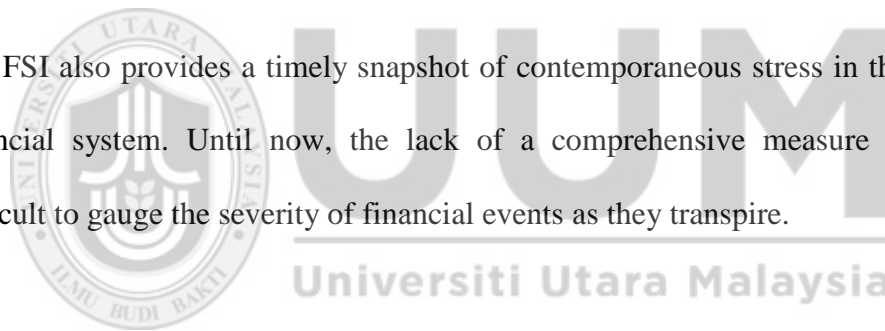
However, they are also agreeing that at least there will involve one or more phenomena and often all of them. This is because, in order to promote stability in dynamic financial system, policymakers must continually monitor the system to identify risks that threaten the financial stability. It is also provide insight into the factors that adversely affecting the economy for the past or future. Hence, it is would help the policymaker provide the best solution or monetary policy that effectively in the pursuit macroeconomic objectives.

The literature on financial crises devotes little attention to actually measure the contemporaneous severity of these crises. In fact, crises are most often measured by simple binary variables. Moreover, crises are usually treated as banking and/or currency phenomena, rather than system wide events. The literature on financial crises in developing countries is quite extensive, and numerous models using early-

warning indicators (EWIs) have been created. However, these models have not been successfully applied to highly developed countries, owing to the rarity of crises in large mature markets.

The financial stress index (FSI) addresses the weakness inherent in models that use EWIs by improving the reference variable. In particular, the FSI is continuous, of high frequency (daily), and covers the equity markets, bond markets, foreign exchange markets, and the banking sector. Therefore, it is far better suited to analysing financial stability in highly developed countries with numerous systemically important financial markets and institutions.

The FSI also provides a timely snapshot of contemporaneous stress in the Malaysian financial system. Until now, the lack of a comprehensive measure has made it difficult to gauge the severity of financial events as they transpire.



1.3 The Financial System in Malaysia

The Malaysian financial system comprises of a diversified range of institutions to serve the more varied and complex needs of the domestic economy. The financial system consists of the conventional financial system and the Islamic financial system which co-exists and operates in parallel.

The Malaysian financial system has played an important catalytic role in facilitating the economic transformation and growth of the Malaysian economy through the various phases of economic development. This strategic role of the Malaysian

financial sector will increase in importance in the years ahead as Malaysia becomes even more integrated with the international financial system and the global economy.

The rapid changes in the global economic and financial environment will also contribute towards transforming the operating landscape of the Malaysian financial system. At the same time, a more integrated and globalised environment, greater regionalisation, and the more sophisticated and diverse investment and financing needs of the domestic economy will require a financial system that is more progressive and dynamic to advance the nation's vision towards the attainment of a high value-added, high-income economy (BNM Financial Sector Blueprint 2011–2020, 2011).

Bank Negara Malaysia thru the 10-year Blueprint strategic plan (2011) of future direction of the Malaysia financial system as transitions towards becoming a high-income economy in year 2020 has characterised the financial landscape by 10 characters which are,

1. Offerings of a wider range of financial products and services to meet the more advanced and differentiated needs of Malaysian businesses and households.
2. Wider access to the formal financial system that enables all members of society to participate in and benefit from economic progress, underpinned by a high degree of financial literacy.
3. Enhanced and more meaningful participation by qualified international financial institutions in the domestic financial sector that can contribute towards Malaysia's economic growth and transformation and financial stability.

4. Wider operational breadth and scope of institutional investors with the introduction of infrastructure funds, private pension funds and funds of funds, as well as the rejuvenation of the venture capital and private equity industries.
5. Insurers and takaful operators having an enhanced role in providing comprehensive protection and investment plans for the entire lifecycle of consumers, as well as offering greater avenues for risk mitigation to reduce the cost of doing business in Malaysia.
6. Stronger and more prominent specialised financial institutions such as development financial institutions and cooperatives having a leading role in providing financial services and nurturing the growth of targeted sectors, as well as contributing to financial stability.
7. Growth of the domestic debt securities market and Malaysia's role as a centre for debt securities origination and fund-raising activities.
8. Liquid and broad range of product offerings in the domestic foreign exchange and money markets.
9. The increased presence of Asian banks and the greater regional presence of Malaysian banks. These institutions will catalyse intraregional trade and investment activities and strengthen Malaysia's linkages within Asia.
10. Expanded dimension of Islamic financial activity with greater emphasis on the management of Islamic funds in Malaysia through the advent of Islamic investment banks, fund managers and wealth advisory service providers with global reach and stature.

Therefore, it is important for Malaysia to rethink their strategies, strengths and market plans in view of underlying trends reshaping the market from time to time. These

include global market volatilities, rise and interconnectivity of Asian and global market, demographic and technology changes and the transformation of Malaysia's economy. To ensure the desired outcomes are achieved, a robust implementation and monitoring framework will be put in place. This includes update on the progress of implementation of the blueprint within Malaysia financial sectors.

1.4 The Central Bank

The Central Bank of Malaysia is at the apex of the monetary and financial structure of the country. The principal objective of the Bank is to promote monetary stability and financial stability conducive to the sustainable growth of the Malaysian economy. Its primary functions as set out in the newly enacted Central Bank of Malaysia Act 2009 are to,

1. Formulate and conduct monetary
2. Policy in Malaysia;
3. Issue currency in Malaysia;
4. Regulate and supervise financial institutions which are subject to the laws enforced by the Bank;
5. Provide oversight over the money and foreign exchange markets;
6. Exercise oversight over payment systems;
7. Promote a sound, progressive and inclusive financial system;
8. Hold and manage the foreign reserves of Malaysia;
9. Promote an exchange rate regime consistent with the fundamentals of the economy;
10. Act as financial adviser, banker and financial agent of the Government.

To achieve its mandates, the Bank is vested with powers under various laws to regulate and supervise the banking institutions and other non-bank financial intermediaries. The Bank also administers the country's foreign exchange regulations.

1.5 Conceptualizing Financial Stress

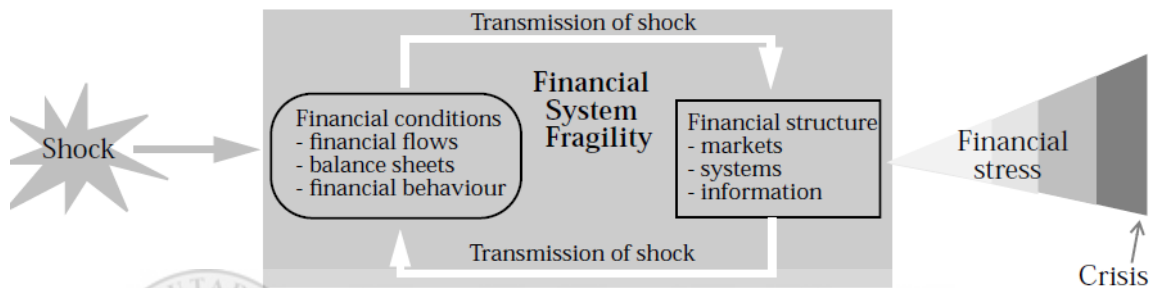
If financial stress is systemic, economic behaviour can be altered sufficiently to have adverse effects on the real economy. Therefore, financial stress is a continuous variable with a spectrum of values, where extreme values are calling a crisis. Stress increases with expected financial loss, with risk (a widening in the distribution of probable loss), or with uncertainty (lower confidence about the shape of the distribution of probable loss).

This study attempts to derive an ordinal estimate of macroeconomic financial stress in the form of an index. A variety of measures of probable loss, risk, and uncertainty are compiled from the banking, foreign exchange, debt, and equity markets (the four most important credit channels in Malaysia). Stress in the household sector and the non-financial business sector is implicitly reflected in the behaviour of agents in these four markets.

Stress is the product of a vulnerable structure and some exogenous shock. Financial fragility describes weaknesses in financial conditions and/or in the structure of the financial system. A shock is more likely to result in stress (in the extreme, a crisis) when financial conditions are weak; for example, when cash flows diminish rapidly, balance sheets are highly leveraged, or lenders become more risk-averse. The shocks

may also propagate through a weakness in the structure of the financial system, as when there are market coordination failures, or computer systems become overloaded, or the flow of information is highly asymmetric. The size of the shock and the interaction of financial-system fragilities determine the level of stress (see Diagram 1).

Diagram 1: Schematic of Financial Stress



1.6 Problem Statement

Financial system stability and economic growth have close and versatile relationship, which also highlights the importance to continuously assess and monitor the condition of a financial system (Siņenko, Titarenko & Āriņš, 2013). There are increasing efforts on improving the assessment and monitoring tools to create mechanisms for effective mitigation and prevention of systematic risk in order to sustain financial stability. Earlier studies (Demirguc-Kunt & Detragiache, 1998; Berg, 1999; Kaminsky & Reinhart, 1999 and Disyatat, 2001) identify common antecedent factors from historic crisis episodes to examine the factors that may cause financial instability. For example, Demirguc-Kunt and Detragiache (1998) determine the factors associated with the emergence of systematic banking crisis, using multinomial logit model.

Nonetheless, these studies are subject to drawbacks thus are ineffective to measure the episodes of financial stress (Illing & Liu, 2006; Balakrishnan et al., 2011). First of all, these studies measure the occurrence of a crisis as a simple zero-one binary variable, whereby no crisis takes the value of zero and presence of crisis takes the value of one, instead of providing the intensity of crisis and near-miss events. Note that a country that takes the value of zero does not necessarily signify low financial stress. Secondly, earlier studies are paying more attention to banking, currency and debt crises, but pay little attention to securities-market stress (Cevik, Dibooglu & Kenc, 2013).

On the other hand, Kaminsky (1999) examines the empirical evidence on currency crises and develops an early warning indicator (EWI) to predict a potential crisis. The system involves monitoring the evolution of a number of economic indicators that tend to systematically behave differently prior to a crisis. Whenever an indicator exceeds a certain threshold value, it alarms that a potential currency crisis may take place. Empirical results show that the variables that are effective in predicting currency crisis include exports, deviations of the real exchange rate from trend, the ratio of broad money to gross international reserves, output and equity prices. As robustness, the indicator is tested for the Asian crisis, which point out clear signs of distress as early as 18 months before the currency collapse.

In recent years, increasing number of studies has shifted focus to developing financial stress index (FSI), a single composite indicator (Illing and Liu, 2006; Hakkio & Keeton, 2009; Balakrishnan et al, 2011; Cevik, Dibooglu & Kenc, 2013 and Cevik, Dibooglu & Kutan, 2013). FSI is an alternative continuum and contemporaneous measure used to evaluate and monitor the condition of a financial system.

Additionally, FSI is claimed to address the weakness inherent in models that use EWIs by improving the reference variable. The indicator is a continuous dependent variable of high frequency, constructed by aggregating several indicators including the equity markets, bond markets, foreign exchange markets, and the banking sector (Illing and Liu, 2006). However, there are also studies that focus only on sector specific intensity of crisis, such as the banking stress index derived by Hanschel and Monnin (2005) that measure the intensity of banking crisis in Switzerland.

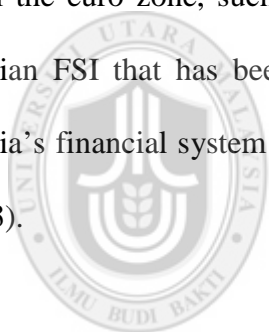
Illing and Liu (2006) develop an index to measure the degree of financial stress for the Canadian financial system. A variety of measures of probable loss, risk, and uncertainty are compiled from the four most important credit channels in Canada, which includes the banking, foreign exchange, debt, and equity markets. The variables are also chosen for their timeliness, forward-looking information, systemic relevance, and ability to reflect agents' behaviour. Then, the FSI is constructed using several techniques, including factor analysis, econometric benchmarking, and Generalized Autoregressive Conditional Heteroscedasticity (GARCH) modelling. An internal Bank of Canada survey is used to condition the choice of variables and evaluate the FSI ability to match the results of the survey to ensure the robustness of the constructed FSI.

Since the pioneering work of Illing and Liu (2006), other researchers continue to develop their own versions of FSIs to reflect individual country experience. For example Hakkio and Keeton (2009) examine the episodes of financial stress in US and develop a comprehensive FSI, known as the Kansas City Financial Stress Index (KCFSI). KCFSI is constructed based on 11 financial market variables, each of which

captures one or more key features of financial stress. Results show that KCFSI can be a useful tool in the Federal Reserve's exit strategy for the recent global financial crisis. Others include Misina and Tkacz (2009) who construct FSIs for the Canadian, Japanese and US financial systems, Yiu, Ho and Jin, (2010) develop FSI and four sub-FSIs to provide a timely snapshot of contemporaneous stress in the whole financial system and in each of the four market segments (equity market, sovereign debt market, foreign exchange market and banking sector) in Hong Kong, Cardarelli, Elekdag and Lall (2011) derive FSI for 17 advanced economies, and Hollo, Kremer and Lo Duca, (2012) develop the Composite Indicator of Systematic Stress (CISS) for European markets.

In addition, there are considerable attempts to derive FSI for emerging countries. Balakrishnan et al (2011) not only proposes FSI for developing countries, but also examine the transmission channels of financial stress between advanced and developing countries. The FSI is constructed using the same methodology as Cardarelli et al (2011). Domestic FSI of an emerging economy is claimed to be influenced by financial stress in developed economies as well as GDP growth, interest rate, degree of financial and trade linkages and other domestic macroeconomics vulnerabilities (Balakrishnan, et al, 2011). Results confirm that financial crises in advanced financial systems pass through to emerging markets and the degree of pass through is dependent on the depth of financial linkages between the two. On the other hand, Park and Mercado (2013) examine the channels of financial transmission in emerging market economies. Using FSI of 25 emerging markets in Asia and Europe, Park and Mercado conclude that domestic financial stress not only increases by advanced economies FSI, but also regional and non-regional emerging market FSIs.

Cevik, Dibooglu and Kenc (2013) modify and extend the index proposed by Balakrishnan, et al (2011) for developing countries with specific considerations to measure the degree of financial stress in the Turkish economy. The index (TFSI) is found to be a reasonably successful leading indicator of aggregate economic activity to capture recessions and influence economic activity in Turkey. Furthermore, the proposed index of Balakrishnan, et al (2011) is modified and extended by Cevik, Dibooglu and Kutan (2013) to measure the financial stress in transition economies, including Bulgaria, the Czech Republic, Hungary, Poland and Russia. These countries (excluding Russia) are part of European Union, thus are subject to shocks emanating from the euro zone, such as the European debt crisis. Other index also include the Latvian FSI that has been used by the Bank of Latvia as one of the elements of Latvia's financial system stability monitoring framework since 2010 (Sinenko, et. al, 2013).



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As for the specific variables used to measure financial stress, the emphasis is on banking sector, foreign exchange, debt, and equity markets, being the four most important credit channels in most countries (Illing and Liu, 2006; Yiu, et al, 2010 and Balakrishnan, et al , 2011). Nonetheless, it is argued that financial markets alone is not enough to gauge financial stress of emerging markets since there are additional sources of financial stress such as external debt and sovereign risk (Cevik, Dibooglu & Kutan, 2013) and trade credit (Cevik, Dibooglu & Kutan, 2013; Cevik, Dibooglu & Kenc, 2013 and Rey, 2009).

1.7 Research Questions

Consistent to the discussion so far, there were some of the following questions. Research questions have to be answered regarding to the impact of financial stress index to the Malaysia's economy, follow as;

1. What is the financial index for Malaysia's economy?
2. What are the key financial stress episodes in Malaysia?

1.8 Research Objectives

The main objective of the research is to construct financial stress index for Malaysian economy. Specifically the study is aimed at achieving the following objectives.

1. To construct financial stress index for Malaysia.
2. To identify the key financial stress episodes in Malaysia.

1.9 Significant of the Study

It is described that present study would be significant to academicians in several ways. By using some indicator as composed the effect of MFSI in Malaysia's economy, this study can identify how the MFSI will influence the Malaysia's government on providing the best solution or monetary policy that effectively in the pursuit macroeconomic objectives. The finding of this study can be used to know the impact of MFSI to economy especially in financial market. Furthermore, the MFSI

also can capture the Malaysia's ability to absorb the shocks of the financial crisis from time to time. This will help the foreign investor to understand the financial stability in Malaysia market.

1.10 Scope of the Study

This study is carried out using data of an emerging Asian economy, Malaysia including other economic measures such as trade finance and external debt as emphasised in Cevik, Dibooglu and Kenc (2013) in addition to most of the measures used in Illing and Liu (2006). The data constructs Malaysia's financial stress index using both financial and economic variables for the period spanning 1995:1 to 2014:12. The significance of including the economic indicators include addressing various aspects of financial stress especially those related to external debt and trade finance in emerging and developing economies. This is similarly emphasised in Cevik, Dibooglu and Kutan (2013). Moreover, the study uses longer sample data which covers the renowned financial episodes especially in Asia. This gives the true representation of the financial stress episodes for Malaysia. Furthermore, the study to the best of our knowledge is among the very few studies if any that construct financial stress index for Malaysian economy in isolation.

To develop the FSI, this study conducted an internal Central Bank of Malaysia survey to determine which events over the past 25 years were more stressful for Malaysia's financial system. With the survey results in hand, variables are then selected according to a literature review and combined into indexes. The variables are also chosen for their timeliness, forward-looking information, systemic relevance, and

ability to reflect agents' behaviour. The constructed indexes are evaluated based on their ability to match the results of the survey. Therefore, the FSI in this study is more directly reflects the Malaysian experience than measures suggested by the literature.

1.11 Organisation of the study

The rest of the paper is structured into the following components; chapter two presents literature review on financial stress, chapter three deals with the methodology of construction of financial stress index for Malaysia, chapter four describes data and empirical results and finally, chapter five concludes the paper and offers policy implications of the study.



CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section will focus on the theoretical and empirical review by previous studies, which provide a different framework for analysing the various MFSI for Malaysia's economy.

2.2 Theoretical and Conceptual Review

In recent years, increasing number of studies has shifted focus to developing financial stress index (FSI), a single composite indicator (Illing and Liu, 2006; Hakkio & Keeton, 2009; Balakrishnan et al, 2011; Cevik, Dibooglu & Kenc, 2013 and Cevik, Dibooglu & Kutan, 2013). FSI is an alternative continuum and contemporaneous measure used to evaluate and monitor the condition of a financial system. Additionally, FSI is claimed to address the weakness inherent in models that use EWIs by improving the reference variable. The indicator is a continuous dependent variable of high frequency, constructed by aggregating several indicators including the equity markets, bond markets, foreign exchange markets, and the banking sector (Illing and Liu, 2006). However, there are also studies that focus only on sector specific intensity of crisis, such as the banking stress index derived by Hanschel and Monnin (2005) that measure the intensity of banking crisis in Switzerland.

The construction of financial stress index becomes imperative as a result of the repeated incidences of financial crises. In emerging economies like Malaysia, the episodes of the financial crises occurred often enough (Hong, Lee & Tang, 2010 and Tng & Kwek, 2015). It is further argued that the episodes of financial crises are associated with prolonged process of recovery compared to other forms of recessions (Reinhart & Rogoff, 2014). The recent noticeably obvious episode is the mid-1980's fiscal profligacy regarded as a prime mover of the Malaysian commodity shock vulnerability coupled with the capital market liberalization of the early 1990s as well as the domestic credits accumulated by the Malaysian banking sector (Athukorala, 2010). However, the most significant financial crises in the history of Malaysian economy is the 1997 Asian financial crisis. This contracts the economic activities by a very sharp decline which raises the Malaysia's financial stress to reach its highest level starting from the early 1996 up until 1997.

Numerous earlier studies such as Demirguc-Kunt and Detragiache, 1998; Kaminsky and Reinhart, 1999; Berg and Pattillo, 1999 and Disyatat, 2001 identify common antecedent factors from the episode of the historic crisis to determine the factors that may cause financial instability. However, the continues nature of the financial stress is beyond the employed binary variables of zero-one to measure the magnitude of the financial stress and such a methodology does not take account of near-miss events. Furthermore, these studies basically focus on banking, currency and debt crises, without concern about securities-market stress (Balakrishnan, Danninger, Elekdag & Tytell, 2011; Cevik, Dibooglu & Kenc, 2013).

Illing and Liu (2006) develop an index to measure the degree of financial stress for the Canadian financial system. A variety of measures of probable loss, risk, and uncertainty are compiled from the four most important credit channels in Canada, which includes the banking, foreign exchange, debt, and equity markets. The variables are also chosen for their timeliness, forward-looking information, systemic relevance, and ability to reflect agents' behaviour. Then, the FSI is constructed using several techniques, including factor analysis, econometric benchmarking, and Generalized Autoregressive Conditional Heteroscedasticity (GARCH) modelling. An internal Bank of Canada survey is used to condition the choice of variables and evaluate the FSI ability to match the results of the survey to ensure the robustness of the constructed FSI.

Since the pioneering work of Illing and Liu (2006), other researchers continue to develop their own versions of FSIs to reflect individual country experience. For example Hakkio and Keeton (2009) examine the episodes of financial stress in US and develop a comprehensive FSI, known as the Kansas City Financial Stress Index (KCFSI). KCFSI is constructed based on 11 financial market variables, each of which captures one or more key features of financial stress. Results show that KCFSI can be a useful tool in the Federal Reserve's exit strategy for the recent global financial crisis. Others include Misina and Tkacz (2009) who construct FSIs for the Canadian, Japanese and US financial systems, Yiu, Ho and Jin, (2010) develop FSI and four sub-FSIs to provide a timely snapshot of contemporaneous stress in the whole financial system and in each of the four market segments (equity market, sovereign debt market, foreign exchange market and banking sector) in Hong Kong, Cardarelli, Elekdag and Lall (2011) derive FSI for 17 advanced economies, and Hollo, Kremer

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Cevik, Dibooglu and Kenc (2013) modify and extend the index proposed by Balakrishnan, et al (2011) for developing countries with specific considerations to measure the degree of financial stress in the Turkish economy. The index (TFSI) is found to be a reasonably successful leading indicator of aggregate economic activity to capture recessions and influence economic activity in Turkey. Furthermore, the proposed index of Balakrishnan, et al (2011) is modified and extended by Cevik, Dibooglu and Kutan (2013) to measure the financial stress in transition economies,

including Bulgaria, the Czech Republic, Hungary, Poland and Russia. These countries (excluding Russia) are part of European Union, thus are subject to shocks emanating from the euro zone, such as the European debt crisis. Other index also include the Latvian FSI that has been used by the Bank of Latvia as one of the elements of Latvia's financial system stability monitoring framework since 2010 (Siņenko, et. al, 2013).

As for the specific variables used to measure financial stress, the emphasis is on banking sector, foreign exchange, debt, and equity markets, being the four most important credit channels in most countries (Illing and Liu, 2006; Yiu, et al, 2010 and Balakrishnan, et al , 2011). Nonetheless, it is argued that financial markets alone is not enough to gauge financial stress of emerging markets since there are additional sources of financial stress such as external debt and sovereign risk (Cevik, Dibooglu & Kutan, 2013) and trade credit (Cevik, Dibooglu & Kutan, 2013; Cevik, Dibooglu & Kenc, 2013 and Rey, 2009).

Bianco, Oet and Ong (2012) reporting the Cleveland Fed in develop an index of financial stress called CFSI, which designed to track distress in the financial system as it is building. The CFSI is constructed by daily data from 11 components that reflecting four financial sectors namely, credit markets, equity markets, foreign exchange markets, and interbank markets. The four sectors were selected because they encompass major US markets, and looking at them provides considerable coverage of the system. Authors also mentioned that, stress in any of those four sectors could carry over to others, affecting the system at large. Supported by Bordo, Dueker and Wheelock, authors employ a similar approach to distinguish the different

categories of distress severity, offering minimum thresholds for potential supervisory responses.

Hwa (2015) in his working papers for Bank Negara Malaysia has investigate the determinants of financial stress, the impact of financial stress on the real economy and the interactions between monetary policy and financial stress in the ASEAN-5 economies. The result from a panel model of the determinants of financial stress indicates the significance of 3 global and regional variables, namely US financial stress, world GDP, regional financial contagion – and one domestic variable, bank credit, as important sources of financial stress. From the subsequent SVAR analysis, he found that the financial stress have adverse effects on the real economy, with large initial effects followed by a gradual dissipation. The findings suggest that the central banks in Malaysia, the Philippines and Thailand tend to lower their policy interest rates when financial stress increases. This leads to improvements in economic activity, albeit often with different time dynamics compared to the impact of financial stress on economic activity. Compared to financial stress, monetary policy shocks tend to affect output more gradually over longer lags. Author also suggests that lower policy interest rates are found to have a limited effect in alleviating financial stress, but can stimulate economic activity through other channels.

In other hand, Duca and Peltonen (2011) similarly develop a framework for assessing systemic risks and for predicting (out of-sample) systemic events, for example, periods of extreme financial instability with potential real costs. They tests the ability of a wide range of “stand alone” and composite indicators in predicting systemic events and evaluate them by taking into account policy makers’ preferences between

false alarms and missing signals. The results show the importance of considering jointly various indicators in a multivariate framework. They also found that taking into account jointly domestic and global macro financial vulnerabilities greatly improves the performance of discrete choice models in forecasting systemic events. Their framework shows a good out-of-sample performance in predicting the last financial crisis.

Bianco, Oet and Ong (2012) reporting the Cleveland Fed in develop an index of financial stress called CFSI, which designed to track distress in the financial system as it is building. The CFSI is constructed by daily data from 11 components that reflecting four financial sectors namely, credit markets, equity markets, foreign exchange markets, and interbank markets. The four sectors were selected because they encompass major US markets, and looking at them provides considerable coverage of the system. Authors also mentioned that, stress in any of those four sectors could carry over to others, affecting the system at large. Supported by Bordo, Dueker and Wheelock, authors employ a similar approach to distinguish the different categories of distress severity, offering minimum thresholds for potential supervisory responses.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This section provides discussion on the sample of data and methodology used in the present in order to measure the Malaysia financial stress index. This chapter further will discuss in precisely on the model and technique that have been used in this study.

3.2 Data Description

This chapter study on specific model that is used to measure the FSI for Malaysia. The index is measured using financial stress variables that involve both financial and economic indicators that approximately proxy the features of financial stress. This study is carried out using data of an emerging Asian economy, Malaysia including other economic measures such as trade finance and external debt as emphasised in Cevic, Dibooglu and Kenc (2013) in addition to most of the measures used in Illing and Liu (2006).

In order to measure the financial stress index for Malaysia, this study collects monthly data from 1995:1 to 2014:12. The data are collected on money market interest rate, international reserve, foreign exchange rate, domestic currency credits, 10-years government bonds yield, external medium and long term debt securities, base currency in circulation, claims on the private sector, external liabilities, commercial banks deposit, foreign liability of banks and interest rate 3-months Treasury bills from

Bank Negara Malaysia (BNM). Whereas, data on net financial flows, banking sector and stock market indices are collected from the Bank for International Settlement (BIS). 10-years U.S bonds interest rate yields and claims on domestic private sector are generated from the Federal Reserve of U.S and International Financial Statistic respectively.

3.3 Measuring the Financial Stress Index for Malaysia

The paper constructs the MFSI following Hakkio and Keeton (2009); Cevik, Dibooglu and Kenc (2013) and Cevik, Dibooglu and Kutan (2013). The index is measured using financial stress variables. These variables involve both financial and economic indicators that approximately proxy the features of financial stress. It is argued that the characteristics of financial stress must include at least one of these features; rise in uncertainty about the fundamental asset value, increase substitution of illiquid with liquid assets, high asymmetry of information and decrease in the interest to own risky commodities/asset (Hakkio & Keeton, 2009). Despite the emphasis to measure financial stress using purely financial indicators, Rey (2009) suggests using other economic factors such as trade credit, especially in the developing economies. This is because using only financial market prices to measure financial stress in emerging and developing countries might not be sufficient in explaining the abnormal behaviour of the financial sector. Thus, in a more recent study, Cevik, Dibooglu and Kutan (2013) consider other variables such as external debt and financial sovereign risk in measuring financial stress for five emerging economies. Based on the previous literature, especially related to emerging economies, the study uses the following components to construct the financial stress index for Malaysia.

3.4 Banking Sector Risk

Banking sector crises is an inability of banks to meet their internal obligations due to actual or incipient bank failure (Bordo, 1986). It is also related to bank failures that lead to systemic exhaustion of either all or most part of its capital (Caprio & Kilingbiel, 1996). Financial stability of a country can be assessed based on the soundness of its banking system. This variable is employed in many studies to measure financial stress. However, previous studies basically used either banking sector stock market index volatility or the standard Capital Market Asset Pricing Model (CMAP) (Balakrishnan et al., 2011; Cevik, Dibooglu & Kenc, 2013; Cevik, Dibooglu & Kutan, 2013). Following Cevik, Dibooglu and Kutan (2013); Kibritçioglu (2003), we employ Banking Sector Fragility Index (BSFI) to measure the banking sector crises. The BSF index is constructed using data on assets and liabilities of banking sector. This includes data on real commercial bank deposit (CBD), real claims on domestic private sector (CDP) and real foreign liabilities of banks (FLB). The index is constructed based on Equation 1 as follows:

$$BSF_t = \frac{\left[\frac{(\Delta CBD_t - \mu \Delta CBD)}{\sigma \Delta CBD} \right] + \left[\frac{(\Delta CDP_t - \mu \Delta CDP)}{\sigma \Delta CDP} \right] + \left[\frac{(\Delta FLB_t - \mu \Delta FLB)}{\sigma \Delta FLB} \right]}{3} \quad (1)$$

where Δ represents a difference operator denoting changes in the series over 12-months period. The symbols μ and σ represent mean and standard deviation of the series under consideration. It is hypothesised that a decrease in the index shows increase in the banking sector riskiness (Balakrishnan *et al.*, 2011; Cevik, Dibooglu & Kutan, 2013). This might arise from high level of money withdrawals, decrease in deposit, increase in non-performing loans and exchange rate depreciation.

3.5 Stock Market Risk

Stock market risk is another vital components of financial stress, especially in developing countries. Stock market crisis is popularly measured as the stock market volatility using GARCH (1, 1) model proposed by Bollerslev (1986). The advantage of using the stock market return risk is that its conditional variance is used in pricing derivatives, hedging and calculating risk measures (Cevik, Dibooglu & Kutan, 2013). The volatility is measured based on Equation 2 and 3 below:

$$SMR_t = Y_t' \mathcal{G} + \varepsilon_t \quad (2)$$

$$\sigma_t^2 = \varpi + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 \quad (3)$$

where SMR_t is the stock market index for time t , Y_t' includes a vector of constant and autoregressive terms of the stock market return. σ_t^2 is the conditional variance and ε_t^2 represents the ARCH term.

3.6 Currency Market Volatility

The currency market crises deals with depreciation in the exchange rate and decline in the international reserve. It is defined based on “its ability to capture both successful and unsuccessful speculative attacks” (Bussiere & Fratzcher (2006) in Cevik, Dibooglu & Kutan (2013). The manifestation of the foreign exchange stress depends on the exchange rate regime of a country. Volatility of exchange rate leads to uncertainty in the foreign exchange market. This arises due to high illiquidity which affects the foreign exchange market efficiency. The study calculates the Exchange Market Pressure Index (EMPI) to measure the degree of exchange rate pressure. The

EMPI has been proposed by Girton and Roper (1977) and widely used in the literature. The series is calculated following Balakrishnan *et al.* (2011) and Cevik, Dibooglu and Kenc (2013) among others as follows:

$$EMPI_t = \frac{\Delta exc_t - \mu \Delta exc}{\sigma \Delta exc} - \frac{\Delta frv_t - \mu \Delta frv}{\sigma \Delta frv} \quad (4)$$

Where Δ denotes 12-months changes in exchange rate and international reserve. *exc* is the exchange rate series, *frv* denotes foreign reserve excluding gold. The notations, μ and σ symbolise mean and standard deviation of the exchange rate and international reserve.

3.7 Sovereign Bond Risk

Changes in risk perception by investors especially in an emerging economy like Malaysia usually leads to short-term capital flows. Therefore, following Balakrishnan *et al.* (2011); Cevik, Dibooglu and Kenc (2013), the study uses 10-years government bond yield and 10-years US Treasury bond yield in constructing the Malaysian financial stress index. The sovereign risk spread can be used as an important measure of risk perception in the economy. This is measured as a difference between 10-years Malaysian government bond and US Treasury bond yield as follows:

$$SBR = GBY_t - USB_t \quad (6)$$

where SBR is the sovereign bond risk, GBY and USB indicate monthly 10-years Malaysian government bond yield and monthly 10-years U.S. Treasury bond yield

respectively. The subscript t denotes time period, which represents monthly frequency in this study.

3.8 Credit Stress

According to Cevik, Dibooglu and Kenc (2013) and Rey (2009) the financial stress index should involve a measure of credit stress in the construction. It has been noticed that the calculation of credit stress is not straight forward. However, this study follows the measurement adopted in Cevik, Dibooglu and Kenc (2013) to proxy credit stress. This is the use of rate of growth on claims on the private sector. The growth rate is calculated based on Equation 7, where credit stress is calculated as growth of claims on private sector.

$$CREDIT\ STRESS = \left(\frac{CPS_t - CPS_{t-1}}{CPS_{t-1}} \right) * 100 \quad (7)$$

The terms, CPS_t and CPS_{t-1} are the current and previous claims on private sector respectively. We arrived at the percentage changes by multiplying the fraction by 100.

3.9 External Debt

External debt constitutes one of the important financial stress indicators especially in developing economies (Bussiere & Fratzcher, 2006). This plays an important role in economic growth sustainability taking account of the Asian financial crisis (Cevik, Dibooglu & Kutan, 2013). Furthermore, Cevik, Dibooglu and Kenc (2013) emphasise that external debt component should be included in the financial stress index for developing countries. Perhaps, excessive external debts affect the stability of financial

system and economic activities via a process of debt overhang effect. This is a phenomenon characterized by decrease in the incentives to invest, impaired international credit access, reduced public investment and heavy constraints on government adjustment (Erbil & Salman, 2006). In this study, we proxy external debt using 12-months growth rate of external liabilities. The rate is calculated as follows:

$$EXDGR = \left(\frac{EXL_t - EXL_{t-1}}{EXL_{t-1}} \right) * 100 \quad (8)$$

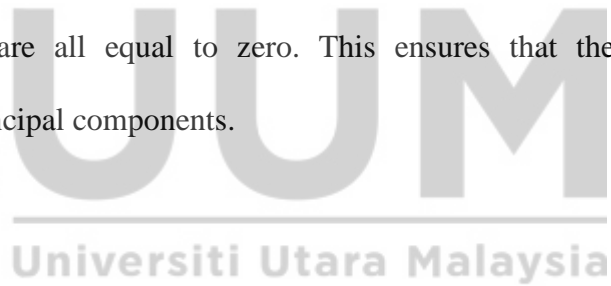
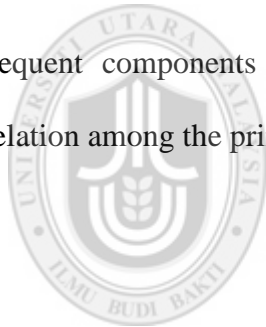
where *EXDGR* represents external debt growth rate. *EXL_t* and *EXL_{t-1}* are the current and previous external liabilities respectively. The value, 100 is multiplied by the fraction to arrive at the percentage change.

3.10 Principal Component Analysis

The principal component analysis is a descriptive and explanatory method of reducing the original large number of variables collected from a single population in to a lower non-correlated or orthogonally synthesized factors or variables. It scientifically visualises and correlates variables among statistical units. Prior to the component aggregation, this study standardized all variables by subtracting their mean from the contemporaneous value and dividing by their standard deviation. This is carried out to directly assess the magnitude of the coefficients. Furthermore, the standardization of the data prevents the problems of unit of measurement and variation bias. The PCA is calculated based on the following procedure,

$$\hat{Y}_{ij} = \hat{e}_{ij} X_1 + \hat{e}_{ij} X_2 + \dots + \hat{e}_{ip} X_p \quad (9)$$

Where represents a function of the standardised constructed variables for every j component are the regression coefficients of the random standardised variables, X_1, X_2, \dots, X_p in each of the components. X_i is a vector of variables such as banking sector fragility index, exchange market pressure index, stock market volatility, government bond spread, external debt, trade finance and credit stress. The principal components equal to the number of the random vector of variables. The first component specifies the coefficients of the constructed variables to maximise its variance and obtain a unique number subject to the constraint of equating the sum of the squared coefficients to unity. The process is similarly repeated in the second and subsequent components to account for the remaining variation as much as possible subject to the constraint that the correlation values of the first and second as well as subsequent components are all equal to zero. This ensures that there exist no correlation among the principal components.



CHAPTER FOUR

EMPIRICAL RESULTS

4.1 Introduction

This chapter will discuss the major findings of all various regression models that used in this study. Possible explanations of the findings and their implications are also will be discussed. This chapter concludes discussion of the relationship of the theoretical model proposed in chapter three with the findings.

4.2 Aggregation of the Components

Due to the relative approximation to various features of financial stress associated with our selected variables, there is a tendency that the variables move together due to changes in the degree of financial stress. However, combining economic and financial variables in the construction may facilitate changes in the variables as a result of other reasons different from financial stress. According to Hakkio and Keeton (2009) financial stress usually works toward variable convergence whereas, other factors lead to deviation of the variables from one another. This scenario is examined using correlation analysis presented in Table 4.1. The table presents the correlation coefficients among the selected variables over the study period. The coefficients show a maximum of 52 per cent coefficient between banking sector fragility index and credit stress. This indicates that although the variables move together within a certain boundary however, they do not move at the same speed. Furthermore, the coefficients

are not highly correlated, ranging from 0.04 to 0.54. This further suggests that the series independently contribute to the construction of the financial stress index.

Table 4.1
Correlation coefficients of MFSI components

	BSFI	SMV	EMPI	SBR	CREDIT	DEBT
BSFI	1.000					
	-					
SMV	0.143** (0.027)	1.000				
		-				
EMPI	0.080 (0.221)	-0.394*** (0.000)	1.000			
			-			
SBR	-0.148** (0.022)	0.113* (0.080)	0.076 (0.244)	1.000		
				-		
CREDIT	0.543*** (0.000)	0.100 (0.122)	0.077 (0.233)	0.002 (0.973)	1.000	
					-	
DEBT	0.293*** (0.000)	0.041 (0.523)	-0.058 (0.367)	-0.126 (0.051)	0.107* (0.097)	1.000
						-

Note: ***, ** and * indicate significance level at 1%, 5% and 10% respectively. The values in parenthesis are the probability values of the pairwise correlation coefficients. The notations BSFI, EMPI, SMV, SBR, DEBT, and CREDIT represent the constructed variables, banking sector fragility index, exchange market pressure index, stock market volatility, government bond risk, external debt and credit stress respectively.

Furthermore, the aggregation of the components into an overall index is carried out following the popular methodology of principal component analysis (PCA) employed in the similar previous studies such as (Hakkio & Keen, 2009; Cevik, Dibooglu & Kenc, 2013; Cevik, Dibooglu & Kutan, 2013) to combine the identified financial and economic variables into a single financial stress index for Malaysia.

4.3 Principal Component Analysis

This is a descriptive and explanatory method of reducing the original large number of variables collected from a single population in to a lower orthogonally synthesized variables. It scientifically visualises and correlates variables among statistical units. The weights of the variables used in the principal component analysis for this study

are presented in Table 4.2. Prior to the component aggregation, the study standardized all variables by subtracting their mean from the contemporaneous value and dividing by their standard deviation. This is carried out to directly assess the magnitude of the coefficients. Furthermore, the standardization of the data prevents the problems of unit of measurement and variation bias.

The principal components equal to the number of the random vector of variables. The first component specifies the coefficients of the constructed variables to maximise its variance and obtain a unique number subject to the constraint of equating the sum of the squared coefficients to unity. The process is similarly repeated in the second and subsequent components to account for the remaining variation as much as possible, subject to the constraint that the correlation values of the first and second as well as subsequent components are all equal to zero. This ensures that there exist no correlation among the principal components.

This study estimates various combinations of the components with numerous grouping in the PCA to arrive at the index with high explanatory power of the total variance. The coefficients of the individual constructs are obtained from the eigenvector of the CPA correlation matrix.

Table 4.2
Principal component analysis results

Components	Coefficients
Banking sector fragility index (BSFI)	0.630
Stock market volatility (SMV)	0.323
Exchange market pressure index (EMPI)	0.252
Sovereign bond spread (SBS)	-0.102
Credit stress	0.560
External Debt	0.333
Total variance explained	53.06%

Source: Authors' Computation

Table 4.2 presents the results of the standardised CPA coefficients. It indicates the impact of one-standard-deviation shock in the components on the overall Malaysian financial stress index. The result shows that MFSI increases as a result of increase in banking sector fragility index, credit stress, external debt, stock market volatility and exchange market pressure index. In other words, the result shows that during excessive financial stress, the Malaysian banking sector becomes more fragile; the stock market becomes more volatile; the pressure on the domestic currency increases; external liabilities raises and claims on the private sector (credit stress) grew over time.

Moreover, the weights of the variables reveal that the magnitude of the Malaysian financial stress is mainly driven by the fragility of the banking sector. Similar result is found in Cevik, Dibooglu and Kutan (2013) for Bulgaria and Russia. This is followed by claims on the private sector (credit stress) and external debt and stock market volatility. The least component that increases the magnitude of the financial stress in Malaysia is the exchange rate pressure index. This might be as a result of the managed floating exchange rate regime of the country which does not fully allow the currency prices to be solely determined by the interaction of the market forces.

However, increase in the return realised on Malaysian government bonds in relation to United States (US) bonds yields and net financial flows tend to reduce the magnitude of financial stress in Malaysia, especially during the period of high financial crises. Therefore, the result also reveals that changes in the risk perception of the investor measured as government bond spread is the most important source of

financial stress reduction in Malaysia. The coefficients of the components are in most cases in line with a prior expectations.

However, the result on the external debt component contradicts the findings of Cevik, Dibooglu and Kutan (2013) and Cevik, Dibooglu and Kenc (2013) who found that short term debt is negatively related to financial stress index for Turkey, Bulgaria, Czech Republic, Hungary, Poland and Russia. The present study proxies external debt by external liabilities and found a positive relationship for Malaysia. Perhaps, this might be related to the perception and concern of the market participants about Malaysia's debt sustainability which is anticipated to affect the solvency of the country's financial sector, thereby increase in the abnormal workings of the financial system. Moreover, the result is in line with the findings of Reinhart, Reinhart and Rogoff, (2012) who conclude that external debt is one of the factors that retard economic growth.

The tendency of the financial variables to move together in explaining the overall financial stress index is investigated using the explanation of the total variance. The components jointly explained 53.06 per cent of the total variation in the financial stress index. Thus, the financial stress is determined to be the key player in the co-movement of the components used in the construction process. Furthermore, the performance of the constructed index is assessed by its ability to indicate the established episodes of financial stress. Figure 4.1 shows the plots of the MFSI and possible events that occurred during the period under study.

This study use the famous Harding and Pagan (2002) business cycle algorithms based on monthly data specification to identify the potential turning points, ensure alternation in peaks and troughs among others. This helps to avoid the possibility of ad hoc subjective selection of the recession regimes. The graph of the Malaysian financial stress index (see Figure 4.1) indicates the historic recessions that occurred in the economy from the period of 1995M1 to 2014M12. In emerging economies like Malaysia, the episodes of the financial crises occurred often enough (Hong, Lee & Tang, 2010 and Tng & Kwek, 2015). It is also argued that there is always a prolonged process of recovery from financial crises episodes compared to other forms of recessions (Reinhart & Rogoff, 2014).

Therefore, presenting all the indicated financial stresses on a single graph might not be appealing, instead the algorithm plots only episodes with a threshold parameter of at least 25 per cent and above. It has also been emphasised in Hakkio and Keeton (2009) that a certain threshold is required rather than casual determination of the financial stress's events. This ensures identification of high episodes of financial stress in Malaysia.

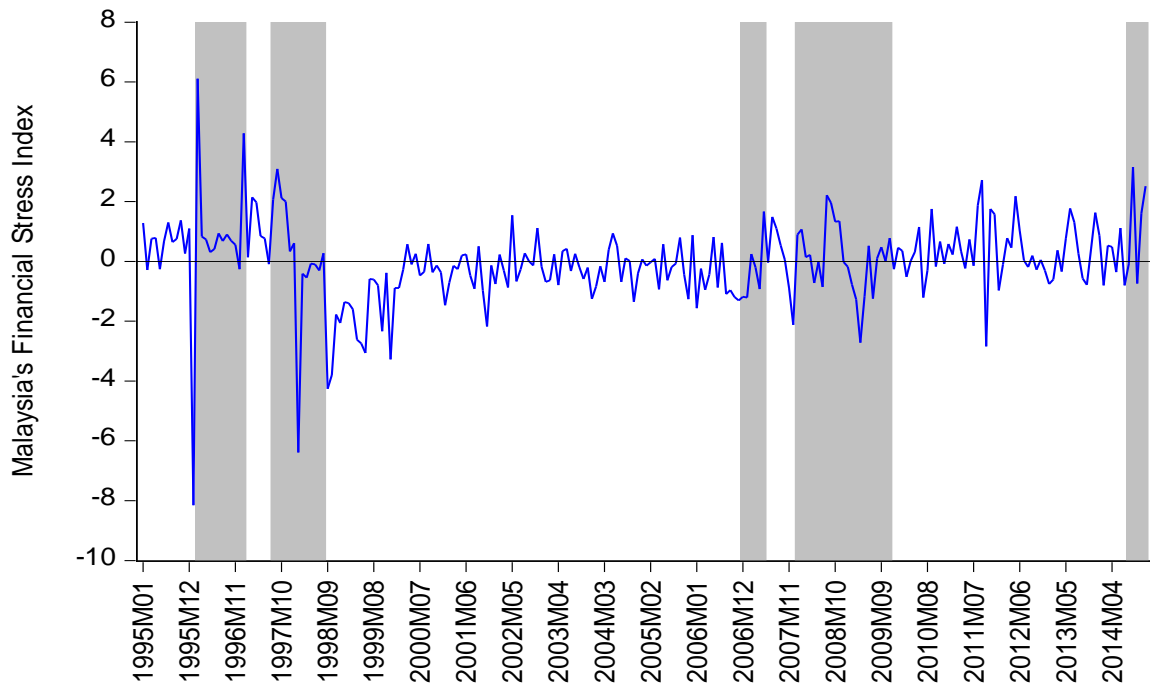
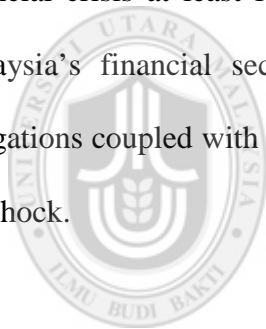


Figure 4.1.
The Malaysia's Financial Stress Index
Note: Shaded Areas are Recessions

The plot shows that the MFSI has been consistently volatile over the period of our study. The first obvious shock that is captured in the sample period is the spill over effect of the capital market liberalization of the early 1990s as well as the domestic credits accumulated by the Malaysian banking sector (Athukorala, 2010). However, the most significant episode in the history of Malaysian economy is the renowned Asian financial crisis. This is significantly captured in Figure 4.1. The event started in 1996 which leads to shrink in the Malaysian economic growth as a result of the speculative deals in the exchange rate market, fell in foreign inflow of investments, excessive capital outflows, reasonable decrease in the Kuala Lumpur Stock Exchange's composite index and low external debt exposure of banking sector. This contracts the economic activities by a very sharp decline which raises the Malaysia's financial stress to reach its highest level sometimes in the early 1996 up to 1997.

Additionally, the MFSI also captured the Malaysia's ability to absorb the shocks of the Asian financial crisis which started from the last part of 1998 to the early part of 1999. This is not unrelated to the implementation of pegged exchange rate, capital control measures, suspension of central limit order book trading, budget deficits, low interest rate and export orientation adopted by the Bank Negara Malaysia. These measures kept the MFSI mostly below zero with deviations within the same regime until 2007 when share prices declined as a result of the global financial crisis. This affects export and other financial sectors of the economy which dragged down the economic growth and raises the financial stress in the country. Nevertheless, the menace of the 2007-2009 financial crisis was not as severe as that of 1997-1998 Asian financial crisis at least for Malaysia. This is due to the improved resilience of the Malaysia's financial sector and its limited exposure to the U.S collateral debt obligations coupled with the immediate response of the Malaysian monetary policy to the shock.



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Moreover, the current Malaysia's currency depreciation leads to declining consumer and investors' confidence thereby raising capital flight. This also raises the financial stress index above the threshold starting from the last part of 2014 and contracts the recorded sustainable economic growth.

CHAPTER FIVE

CONCLUSIONS AND POLICY IMPLICATION

5.1 Introduction

This chapter summarises and concludes policy implications of the findings as discussed in chapter four, detailed limitations of the study, and suggestions for further research.

5.2 Conclusions and Policy Implication

This study construct financial stress index for Malaysian using both financial and economic variables for the period spanning 1995:1 to 2014:12. The variables include financial, such as banking sector fragility index, stock market volatility, exchange market pressure index, money market spread, government bond spread, and credit stress as well as, economic factors like the 12-month growth rates of external debt. This study applies principal components analysis to aggregate the MFSI. The plots of the index indicate that the MFSI captured the historic financial stress episodes that exist in the sample. This makes the MFSI a vital indicator of the real economic activity in the country.

The implication of the result is that increase in banks failure to meet up their internal obligations due to excess insolvency, increase non-performing loans and high money withdrawals will lead to procyclicality of debt stocks which reduces the credit facility of the financial sector and greatly affect the economic activity. On the other hand, the

prolonged manage floating exchange rate regime also leads to a significant loss in international reserve, rise in interest rate and domestic currency overheating in the exchange rate market. More so, perception and concern of the market participants about Malaysia's debt sustainability which is anticipated to affect the solvency of the country's financial sector, also increase the abnormal workings of the financial system. Likewise, the current Malaysia's currency depreciation leads to declining consumer and investors' confidence thereby raising capital flight. Furthermore, the increasing stock market risk, growth rate of external liabilities and claims on the private sector can also affect the financial stability which in turn deteriorate the level of economic activity in Malaysia.

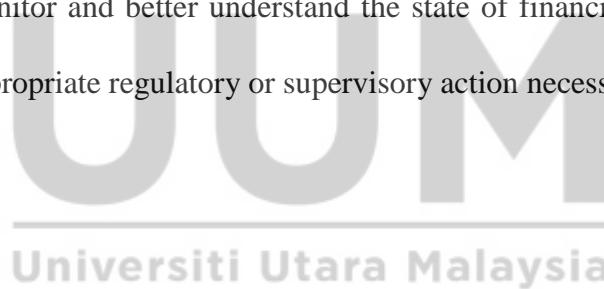
Thus, the study suggests that the monetary authority should directly deals with creditworthiness of the financial sector through providing sufficient credits to solve the usual problem of insolvency in the financial sector. Policies should be tailored towards export orientation especially when the financial stress is related to external sources. This will lead to more demand for the domestic currency and increase in the external reserves. The result of this study particularly reveals that authorities should focus more on banking sector stability than other components of the financial stress. This will help to reduce the overheating of the Malaysian financial stress.

More generally, the finding suggests the necessity for monetary policy easing to help offset the contractionary effects of adverse financial shocks on the real economy. However, monetary policy easing likely also needs to be accompanied by direct financial sector interventions to restore financial stability. This may include, short-term loans to alleviate liquidity shortages, direct equity injections to financial

institutions to reduce solvency concerns and ensuring the sufficiency of trade credit to facilitate continued trade activities.

5.3 Suggestion for Further Studies

Financial stress index is very important in emerging economies especially Malaysia. This study can be extended in order to enhance understanding the other important indicators that contributes to financial stress index and how it is indicate the financial market stability for a specific country. The contemporaneous nature of index, combined with the ability to trace the origins of elevated stress, will allow financial system supervisors to monitor and better understand the state of financial on a real-time basis, and to take appropriate regulatory or supervisory action necessary.



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