CHAPTER 1:

INTRODUCTION

Recent world financial crisis and failure in some of the financial institutions have highlighted the importance of financial system stability to macroeconomic performance. The collapse of venerable investment banks, Bear Sterns, Lehman Brothers and the injection of government funds into major financial institutions across the world have resulted in a major shakeup in the global financial landscape and battered stock markets over the world. Hence, the linkage of financial system and business cycle has been subject to a lot of studies.

Berger and Udell (2003) mentioned that the Ideas of Procyclicality of financial system is procyclical are quite consistent with economic events, such as credit crunch in the US during the early 1990s, Asian crisis in the late 1990s and the large corporate bankruptcies in the early 2000s. During the economy downturn, consumer's profitability is going down and will deteriorate banks' loan quality, which often causing losses in banks' balance sheets. Some of the factors which caused by crisis like reduction in consumption of service, rising of bankruptcies, credit challenged which more people will look for loans, reduction in capital availability and increased of cost to serve will automatically push down banks' profit curve.

On the employment front, the retrenchments of employees will affect the households' income and their repayment capacity. Hence, financial Institution which involve in lending funds to households or corporate, even with on-going developments in credit risk transfer techniques, is still not a risk free business for them. Probability of default on every loan (i.e., a credit risk) may still occurred and these risks might result in a significant financial loss for a lender when judged against its annual profits, loan-loss provisions or capital reserves.

Under the write up of Bloomberg Businessweek (April, 2009), *"Predicting Bank Stress Test Result"*, noted that Keefe, Bruyette & Woods (KBW), US investment bank, had conducted stress test on US banks which it tried to assess the credit fallout for banks of a 2010 unemployment rate of 10.3% and more serious credit deterioration for mortgages, credit cards and loans in home equity, commercial and commercial real estate. From the research of the entire U.S. banking system, the industry eventually could need an additional $1 trillion of capital to meet certain credit benchmarks and meet regulatory definitions of "well capitalized."

While all these unexpected scenarios have become the norm in the crisis, there is no longer a regulatory compliance issue but as a survival tool for banks to prepare for these situations or stress-test their lending books by taking into account the interconnected nature of risks.

Stress test, a different modelling approach that employs aggregated data to predict the impact of economic and portfolio changes on bank default losses. It allows the review and actualisation of risk strategies, risk capacities and capital allocation. In fact, it permits a forward-looking analysis and a uniform approach to identifying potential risks to the banking system as a whole. Besides, it plays a role in the regulatory requirements of the Revised Framework on the International Convergence of Capital Measurements and Capital Standards (Basel II).[1] In Basel II "International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version", Basel Committee on Banking Supervision (2000) states that stress testing

[1] Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version. Website: http://www.bis.org/publ/bcbs128.pdf

should involve identifying possible events or future changes in economic conditions that could have unfavourable effects on a bank's credit exposures and assessing the bank's ability to withstand such changes. With an underlying principle of modern financial risk management, the statistical models can be used to estimate the distribution of possible future financial outcomes, such as changes in interest rates or a firm's credit quality. The estimated distribution indicates the probability that the portfolio's value will be above or below any given value. The firm can manage its portfolio's risk exposure with that information in hand by setting aside capital sufficient to cover, for instance, 95% of possible portfolio losses arising from adverse outcomes.

1.1 Research Objective

The objective of this paper is to review and examine the stress test model which currently part of risk management tool in banking environment. The study aimed to identify possible events or future changes in the financial and economic conditions changes and the assessment of banks' ability to withstand these changes. The following research questions attract the interest of this study.

(i) How vulnerability of financial institutions' portfolio is against market movement?

(ii) How worst the portfolios would be in any stressful event?

(iii) What macro economic factors will cause the magnitude of shock? Is there any significant difference in the factors which cause the shock?

(iv) What will be the borrower risk characteristics that will affect obligor risks and increase the default probabilities in the market movement?

1.2 Scope of Study

Basically, the following macro stress test for the Malaysia banking sector draws on the approach outlined in the research which previously performed by Muliaman D. Hadad, *et. al.,* in *Macroeconomic Stress Testing for Indonesian Banking System*. This research will examine on the stress model on commercial banks' loan loss data. A main item of default rate or credit risk i.e. Non-performing loans (NPL) will be obtained from Central Bank of Malaysia, in order to stress test against the following macroeconomics indicators:

(a) Gross Domestic Product (GDP)

(b) Consumer Price Index (CPI)

(c) Unemployment Rate (UE)

(d) Financial Time Stock Exchange (FTSE) Bursa Malaysia KLCI (Formerly known as Kuala Lumpur Composite Index (KLCI))

(e) House Price Index (HPI)

The NPL data which obtained from Central Bank of Malaysia will covered both business and consumer sectors. Since the consumer total loan is currently 56% of the total loan (refer section 2.4 for details), this research will focus more on consumers' credit risk testing.

Macroeconomic models used in this research explain changes in the default rate or credit risk on the basis of macroeconomic conditions. These macroeconomic variables are recurring indicators, for example, GDP growth rates which we may observe a drop in almost once every 10 years with the crisis happened.

Chan-Lau (2006) lists three advantages of macroeconomic models which stated as follow:

(i) This type of model is very suitable for designing stress scenarios.

(ii) It is also possible to conduct cross country comparative studies as most of the data series are available for most countries.

(iii) Less assumption being made as the default rate used to estimate the model is observed historically.

However, there is a drawback of macroeconomic models which the time period of the data needs to be longer than one business cycle; otherwise, the model would not capture the impact of the business cycle on probabilities of default. Furthermore, this type of model is subject to Lucas critique since the parameters or functional forms are unlikely to remain stable whereby it is virtually impossible to capture the complex interaction between the state of the economy and the default risk. Finally, aggregate economic data are usually reported with substantial lags. Forecast of macroeconomic models is hard to estimate with up-to-date information.

1.3 Organization of Study

This paper is constructed in the following manner.

Section-2: Literature Review: This section provides readers with the theoretical background of the study. The literature review on framework and concept of stress test and approaches will be discussed in details.

Section-3: Research Methodology: This section presents the methodology adopted in conducting this study including data format, source of data, data collection and data analyzing method.

Section-4: Data Analysis: This section details the research findings through empirical investigation, summarizing the data collected and the results

Section -5: Conclusions and Recommendations: This last section highlights the discussions and conclusions that are drawn from the study, recommendations and suggestions for future research.