3 Research Methodology

3.1 Introduction

Sekaran (2003) defines that research is an organized, systematic, data-based, critical, objective, scientific inquiry or investigation into a specific problem undertaken with purpose of finding answers or solutions to it. The information provided could be the result of a careful analysis of data gathered first hand or data that are already available.

This chapter describes the methodology approach and procedures that are conducted to obtain a comprehensive research analysis. The approach adopted will be based on hypotheses testing research methodology through the development of theoretical framework as foundation in conducting empirical examination to the research questions described in first chapter.

3.2 Theoretical Framework

Based on the research objectives defined in chapter 1, the theoretical framework is developed and categorized into three framework discussions.

3.2.1 Revenue Volatility

The first interesting thing to study is the volatility of revenue stream through the existence of non interest income component in the revenue portfolio. The model below shows the components that give contribution in the revenue volatility of a banking institution.

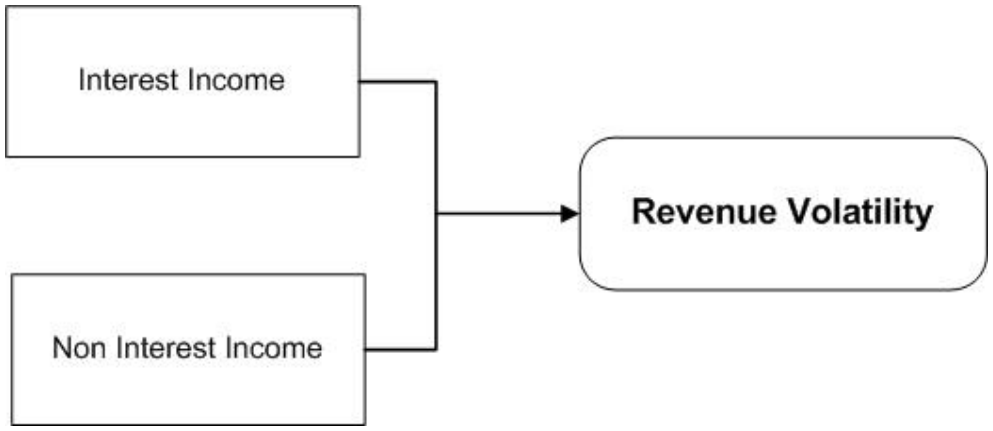

Figure 1 ***Revenue Volatility Framework***

A stable revenue stream is the main objective defined by both banking institutions and regulators in the banking industry. As presented by Stiroh (2004), non interest income component triggers the revenue volatility in the banking institution. With the support by DeYoung (2001), non interest based activity is influenced by many external factors such as competition and market situation which is sometime unpredictable. This is the one that makes the bank institution should keep conducting innovation on non interest based products.

This model will show whether Malaysia banking industry is experiencing the similar situation with the findings presented by Stiroh (2004) and DeYoung (2001).

3.2.1.1 Variable Definition and Analysis Technique

Modified standard decomposition of revenue portfolio defined by Stiroh (2004) is used to evaluate the volatility between revenue and components that construct it, which consists of net interest income and non interest income.

If net operating revenue (OPREV) is defined as the sum of net interest income (NET) and non interest income (NON), then the volatility of net operating revenue growth is defined as:

$$\sigma^2_{d\ln OPREV} = \alpha^2\sigma^2_{d\ln NON} + (1-\alpha)^2\sigma^2_{d\ln NET} + 2\alpha(1-\alpha)Cov(d\ln NON, d\ln NET)$$

Where α = NON/(NET + NON) is the non interest share of bank revenue growth, $d \ln X$ is the growth rate of X, and the contribution of each component to overall volatility is the share-weighted variance, e.g., $\alpha^2\sigma^2_{d\ln NON}$ is the contribution of non interest income.

The theory above states that the overall variance of net operating revenue rise as the non interest income share grows if non interest income is more volatile than net interest income. The negative covariance between non interest income growth and net interest growth will directly lower the overall variance. In the condition of covariance term is positive; the tradeoff between growth of net operating revenue and volatility can be improved. Average growth is the weighted average of the growth rates of the component, but the standard deviations will be less than the weighted average as long as the covariance is not exactly one.

In the process of this examination there are three variables defined:

- OPREVGW = growth of operating revenue
- NETGW = growth of net interest income
- NONGW = growth of non interest income
- α = share of non interest income to the total revenue

By using the defined variables, an equation is able to be constructed as follow:

$$\sigma^2_{OPREVGW} = \alpha^2\sigma^2_{NONGW} + (1-\alpha)^2\sigma^2_{NETGW} + 2\alpha(1-\alpha)Cov(NONGW, NETGW) \quad (1)$$

3.2.2 Non Interest Determinants

In the previous chapter, it is described that the representative of fee based activity income is the amount of non interest income of a banking institution. There are factors that associated with the shifting activities of banking institutions from interest based activities towards fee based income generating activities.

The model below shows the factors that theoretically associated with the development of non interest based income:

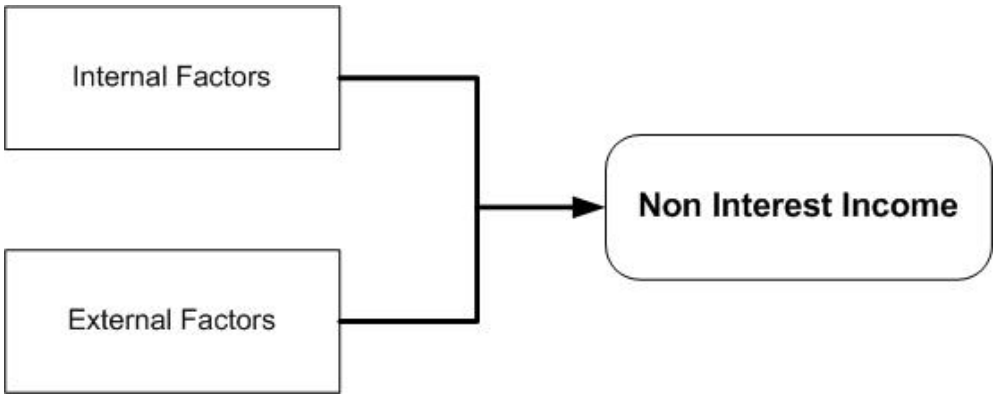

Figure 2 ***Non Interest Income Determinant Framework***

The theoretical framework of non interest based income generating activities determinants above, describes the possible components that might contribute effects to the non interest income as what have been discussed in the literature review.

In general, there are two categories of factor related with the bank that contribute in the decision of the management of the bank to decide the portion of non interest based

income generating activities. In this case, non interest income is put as dependent variable, while the factors, both internal and external factors, will be the independent variables (predictors).

Internal Factors

Internal factors are defined as all characteristic that are resulted from internal banking institution environment. Even though there are a lot of internal characteristics in a banking institution, three factors are chosen based on some references from previous researches that discussed in the literature review chapter.

- **Bank Size**

  As what has been described by Kunt (2010), the bigger the size of the bank, the more opportunities for the bank to diversify its activities. It is expected that with a bigger asset value, banking institutions will raise the portion of non interest based income generating activities as representation of diversification activities.

- **Bank Risk**

  Kunt (2010), Stiroh (2004) and DeYoung (2001) use bank risk as bank characteristic that has significant relationship with non interest based income generating activities. When a banking institution is having high risk level, it is expected that the portion of non interest based income generating activities will be increased to reduce the risk level of the banking institution.

- **Bank Funding Strategy**

  The funding strategy, as presented by Kunt (2010), is also part of diversification activities in banking institution. This is to present other diversification activities of banking institution, contributing the share of non interest based income generating

activities of the total operation. It is expected that the higher the portion of non interest based funding strategy leads to higher portion of non interest based income generating activities.

External factors

Beside internal characteristic of banking institution, this research also looks at the external factors outside the banking institution that have possibility in affecting the operation strategy of the banks. Similar as how internal factor variables are defined, the external factor characteristics are also defined based on previous researches as reference.

- **Macroeconomic Indicators**

  Based on the result of Kunt (2010), macroeconomic indicators is found to have a strong relationship in banking institution operational strategy decision, including on the portion of non interest based income generating activities. Banking institutions will engage more in activity diversification when the macroeconomic indicators of a country show a good signal.

- **Stock Market Performance**

  As presented by Baele (2007) and also supported by Stiroh (2006a) research findings, stock market performance is interesting component to be analyzed on the effect contribution to bank diversification. When the stock market in the industry gives a positive performance, the management of banking institution will have more confident in the development of non interest based income generating activities because positive performance of stock market shows a positive environment of the industry.

3.2.2.1 Variable Definition

This section presents the variable definition that will be act as proxies for all bank characteristic describes before.

Bank Size

To represent bank size, natural logarithm of bank total asset (ASSET) is used. Size of the banks in any research is usually presented by the total assets of the bank. The bigger the asset of the bank, then we can always assume the bigger the size of the bank. The higher the amount of ASSET should lead to the higher portion of non interest based income generating activities.

Bank Risk

Capital to asset ratio (CAR) is the proxy of bank risk as used by Kunt (2010) in his research. With a higher CAR which represents a lower risk, banking institution is expected to have higher portion of non interest based income generating activities as one main purpose of diversification is to reduce the risk of the banking institutions. CAR is calculated based on equation below:

$$CAR = Total\ Capital / Total\ Assets$$

Bank Funding Strategy

In the accounting structure of a banking institution, the funding strategy on how the bank leverages its operation is described in its liability structure. Traditionally a banking institution uses deposit to fund most of its operations. Since this research focuses more on bank diversification, then bank non deposit funding portion is used as it

represents the diversification of bank operation source of funding. It is expected that the more funding come from non deposit funding category, the more banking institution engage in non interest based income generating activities. This research is looking at the share of non deposit funding (NONDEPOSITSH) related to total funding (liability) of the bank.

Macroeconomic Indicators

Following the previous research presented by Kunt (2010), inflation (INFLATION) is used to proxy the condition of macro economy of a country. Kunt (2010) presents a finding that the annual inflation rate could affect the bank performance and could influence the bank decision to diversify its operation into non interest based income generating activities. When inflation indicator is showing high rate, banking institutions will engage in less portion of diversification.

Stock Market Performance

To proxy the industry stock market performance in contributing effect to banking institution non interest based income generating activities, Kuala Lumpur (KL) Financial Sector index price return is used. It is taken from average daily return on the index price. The KL Financial Sector index price is reflecting the overall stock market performance of the finance industry in Malaysia. When the finance market is good, the more return will be achieved by the investor. The management of the banking institutions can use the "sign" sent by the market to reflect the stock market performance. If the performance is good, the management of banking institution is confident to develop more diversification activities. KL Financial Sector Index Price return is defined as KLSEFIN.

3.2.2.2 Analysis Technique

Based on the theoretical framework developed, multi regression analysis technique is used to look at the relationship between the dependent variable and its independent variable (predictors).

Firstly, equation to draw relationship between non interest based income generating activities and banking institution internal characteristic is constructed. If non interest income based generating activities is defined as the share of non interest income (NONSH) to total income, then the equation is constructed as following:

$$NONSH = \alpha + \beta_1 ASSET + \beta_2 CAR + \beta_3 NONDEPOSITSH + \varepsilon \quad (2.1)$$

Using similar approach, the construction of equation to describe the relationship between external factors of banking institutions with its non interest based income generating activities is defined as follow:

$$NONSH = \alpha + \beta_1 INFLATION + \beta_2 KLSEFIN + \varepsilon \quad (2.2)$$

From those two equations, the relationship of each variable to non interest based income generating activities, for each category of predictors (internal and external factors), is clearly defined.

Finally, it is important to see the overall relationship of all predictors to the dependent variable (NOSH), described as one model. This equation is developed to represent the model:

$$NONSH = \alpha + \beta_1 ASSET + \beta_2 CAR + \beta_3 NONDEPOSITSH + \beta_4 INFLATION + \beta_5 KLSEFIN + \varepsilon \quad (2.3)$$

Those approaches bring a better analysis result by comparing the relationship of predictors to their dependent variables when it is put in separated model based on different factor categories, and when all predictors are combined into one model. If the later model shows more significant result, it means that in defining the portion of non interest based income generating activities of a banking institution, is not based on internal or external factors only. The management of the bank should look into overall factors, both internal and external ones, which might give influence on the success of the activities.

3.2.3 Bank Performance Determinants

This section discusses the influence of non interest based income generating activities towards banking institution performance. Theoretically, the framework below describes the potential determinants of a banking characteristic to its performance:

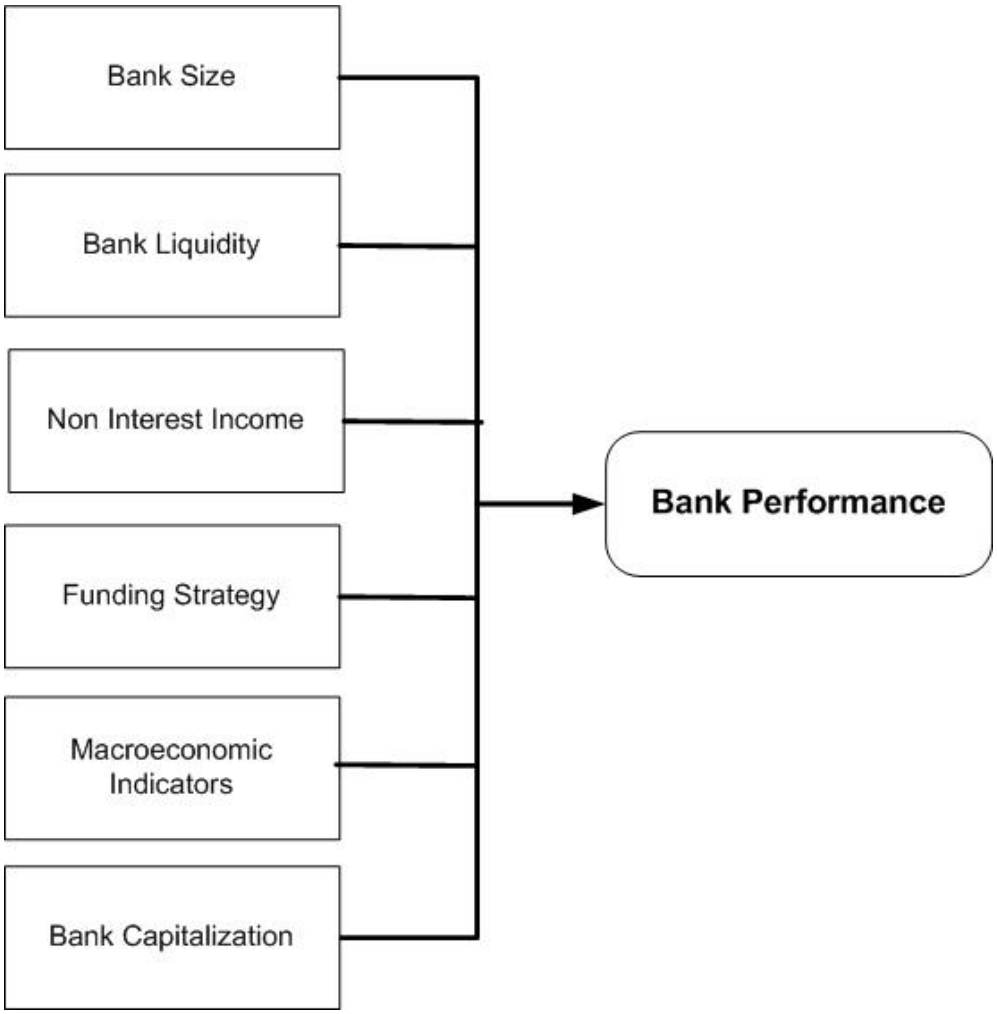

Figure 3 ***Bank Performance Determinant Framework***

The framework above describes that bank performance as dependent variable is potentially influenced by several banking institution characteristics and also some external macroeconomic factors.

- **Bank Size**

In any literature bank size will always has positive relationship with bank performance. The bigger the size of the bank, the more opportunities for the bank to utilize its asset in maximizing its performance

- **Bank Liquidity**

  Bank liquidity is one of potential determinant of bank performance. In the same time, it also shows the risk exposure of the bank. When the banking institution is having good bank liquidity indicator, then the banking institution is expected to have a better performance.

- **Non Interest Income**

  As component that constructs the total income of a banking institution, definitely non interest based income generating activities can be considered as determinant of bank performance. It is also the main variable that becomes the central of assessment in this research on how significant it affects the bank performance compared to the other determinants. The more banking institutions engage in non interest based income generating activities, the better bank performance is expected.

- **Funding Strategy**

  As considered to be source of diversification in banking institution, funding strategy is defined as a potential determinant in affecting banking institution performance. The better for a banking institution in managing its funding strategy, the better the performance of the banking institution is achieved.

- **Macroeconomic Indicators**

  In literature review section, there are researches that present the situation whereby macro economy condition of a country contributes effect in highly correlated

relationship with the bank performance. The better the condition of macro economy in a country, it is expected that the banking institutions will deliver a better performance as well.

- **Bank Capitalization**

  This is to evaluate how the equity of the bank contributes to the amount of asset in generating profit. The higher the capitalization of the bank, it should reflect to a better bank performance.

3.2.3.1 Variable Definition

Variables that is used to proxy each of defined predictors described in the framework, is defined in this section.

Bank Size

The proxy for this predictor will be the same proxy as in the previous framework. Natural logarithm of total assets (ASSET) is used to be proxy of this independent variable. Higher the amount of ASSET is expected to lead to a better bank performance.

Bank Liquidity

Ratio of total loan to total deposit (LOANR) is used to proxy bank liquidity predictor. In traditional theory of financial intermediation, bank institutions obtain the income mostly based on the loan interest. The higher the loan ratio will lead to better performance of the bank. In the same time, the higher the loan ratio shows the higher risk the bank institution is exposed. When this situation happens and with the strict regulation imposed on the risk management in banking industry, banking institutions might refuse

new loan and looking at other potential source to generate revenue stream in order to maintain bank performance.

Non Interest Income

Similar with previous framework, the share of non interest income (NONSH) to the total income of a banking institution is used to proxy this predictor. The higher NONSH is expected to lead to a better performance of the banking institution.

Funding Strategy

Share of non deposit based funding source (NONDEPOSITSH) is used to proxy the funding strategy. Same reason with previous framework, the main interest in this research is on the diversification of banking institution activities, so that NONDEPOSITSH is the right variable to represent diversification together with NONSH. A higher amount of NONDEPOSITSH is expected to lead to a better performance of banking institution.

Macroeconomic Indicators

Gross Domestic Product growth (GDPGW) is used to proxy the macro economy condition of a country in contributing influences to the bank performance. Positive GDPGW represents a positive economy growth of the country which is expected to lead to better the banking institution performance.

Bank Capitalization

To proxy this predictor, equity to total asset ratio (EQUITYR) is used. The higher the ratio is expected to a better performance of the banking institution as bank

performance is also defined through the return on equity (ROE) instead just return on assets (ROA). So in this case, the predictors represents how the equity contribute to the banking institution's assets in generating profit.

Bank Performance

In general, text book based bank performance variables that are represented by banking institution Return on Asset (ROA) and Return on Equity (ROE) is used.

3.2.3.2 Analysis Technique

In this section, multiple regression analysis technique is used, as based on the framework, the most concerns are on how significant the independent variable in affecting the dependent variable. Since there are two dependent variables as the proxy of bank performance, all analysis steps are conducted for both ROA and ROE.

First step, an equation is constructed to represent relationship between bank performance and all predictors except for NONDEPOSITSH:

$$ROA = \alpha + \beta_1 \, ASSET + \beta_2 \, LOANR + \beta_3 \, NONSH + \beta_4 \, GDPGW + \beta_5 \, EQUITYR + \varepsilon \quad (3.1a)$$

The similar equation is constructed to examine the relationship to ROE:

$$ROE = \alpha + \beta_1 \, ASSET + \beta_2 \, LOANR + \beta_3 \, NONSH + \beta_4 \, GDPGW + \beta_5 \, EQUITYR + \varepsilon \quad (3.1b)$$

The next steps, the NONSH variable is taken out from the equation and replaced with NONDEPOSITSH:

$$ROA = \alpha + \beta_1 ASSET + \beta_2 LOANR + \beta_3 NONDEPOSITSH +$$

$$\beta_4 GDPGW + \beta_5 EQUITYR + \varepsilon \quad (3.2a)$$

Similar step is conducted for ROE relationship:

$$ROE = \alpha + \beta_1 ASSET + \beta_2 LOANR + \beta_3 NONDEPOSITSH +$$

$$\beta_4 GDPGW + \beta_5 EQUITYR + \varepsilon \quad (3.2b)$$

The two step approach above will show the comparison of significance of NONDEPOSITSH and NONSH to bank performance based on two different models.

The third step is to put both NONDEPOSITSH and NONSH in the equation to look at the change of significant level when both variables are presented in the model:

$$ROA = \alpha + \beta_1 ASSET + \beta_2 LOANR + \beta_3 NONDEPOSITSH + \beta_4 NONSH +$$

$$B_5 GDPGW + \beta_6 EQUITYR + \varepsilon \quad (3.3a)$$

Similar step also deployed for ROE examination:

$$ROE = \alpha + \beta_1 ASSET + \beta_2 LOANR + \beta_3 NONDEPOSITSH + \beta_4 NONSH +$$

$$B_5 GDPGW + \beta_6 EQUITYR + \varepsilon \quad (3.3b)$$

The result of analysis above will tell us whether it is correct decision to put non interest based income generating activities and non deposit funding strategy together in the process of predicting the bank performance.

The last examination is similar with equation 3.3.*, with some other additional variables to look at the linearity between NONSH and NONDEPOSITSH to the bank performance. NONSHSQ which is defined as square of the NONSH and NONDEPOSITSHSQ as square of NONDEPOSITSH, is included. The equations for those two additional variables are described below:

$$ROA = \alpha + \beta_1 ASSET + \beta_2 LOANR + \beta_3 NONDEPOSITSH + \beta_4 NONSH + B_5 GDPGW + \beta_6 EQUITYR + \beta_7 NONDEPOSITSHSQ + \beta_8 NONSHSQ + \varepsilon \quad (3.4a)$$

Again, similar equation is constructed for ROE examination:

$$ROE = \alpha + \beta_1 ASSET + \beta_2 LOANR + \beta_3 NONDEPOSITSH + \beta_4 NONSH + B_5 GDPGW + \beta_6 EQUITYR + \beta_7 NONDEPOSITSHSQ + \beta_8 NONSHSQ + \varepsilon \quad (3.4b)$$

3.3 Hypotheses Development

The hypotheses statements of this research are developed based on the research questions described in the chapter 1 and supported by the breakdown on the theoretical framework. Below are the statements of hypotheses:

$H0_1$: Non interest based income generating activities have no statistically significant effect on banking institution's revenue stream volatility

$H0_2$: Net interest based income generating activities have no statistically significant effect on banking institution's revenue stream volatility

$H0_3$: Banking institution internal factors such as bank size, bank risk and bank funding strategies, have no statistically significant effect on banking institution's non interest based income generating activities

$H0_4$: Banking institution external factors such as inflation and stock market performance have no statistically significant effect on banking institution's non interest based income generating activities

$H0_5$: Non interest based income generating activities have no statistically significant effect on banking institution's return on asset

$H0_6$: Non interest based income generating activities have no statistically significant effect on banking institution's return on equity

$H0_7$: Non interest based funding strategies have no statistically significant effect on banking institution's return on asset

$H0_8$: Non interest based funding strategies have no statistically significant effect on banking institution's return on equity

3.4 Data

This research is using secondary data of banking industry. All data used are obtained from aggregate annual data, and also from individual bank level data. The aggregate data are mainly taken from Bank Negara Malaysia (BNM) publication as the main regulator of banking industry in Malaysia. The annual aggregate bank level data published in the annual report by the BNM, mostly data in the income statement, is used.

As it is published by the official authority, the aggregate data accuracy and validity will be guaranteed. Besides the BNM annual report, data from Datastream content provider by Thomson Finance to obtain individual banking institution data is also used. Some data are also taken from IMF International Finance Statistic database, especially on the macro economy indicators such as GDP, population and inflation.

3.5 Sampling Design

In this research, data sample of annual bank level data are taken for twenty years from 1991-2010 to analyze the volatility of revenue stream. As it is discussed in the literature review that the 1997 banking crisis in South East Asia has become the important milestone in the banking industry model change in the region, the data sample is divided into three groups of data sample for each analysis approach explained in the previous section. First is the data sample between year 1991-1998 (before crisis), then data sample between year 1999-2010 (after crisis). This is to give another perspective and comparison on how bank revenue stream volatility is influence by the contribution of non interest based income generating activities.

To analyze the non interest determinants and bank performance determinants, the annual individual banks taken from 2002-2010 is used. There are nine commercial bank institutions in Malaysia:

- Affin Bank
- Allianz Bank
- AM Bank
- CIMB Bank
- EON Bank

- Hong Leong Bank
- Maybank
- Public Bank
- RHB Bank

Through the above approach, it is expected that the analysis result will have better comprehensive analysis result as there will be some comparison based on different data sample. This will lead to a further research looking at different indicators for each time frame data sample.