



## **MOVING TOWARD NON-INTEREST INCOME FOR BANKING SUSTAINABILITY: A CASE STUDY ON DETERMINANTS OF NON INTEREST INCOME OF CIMB BANK AND RHB BANK**

Baskaran Meyappan<sup>a,b</sup>, Rosylin Mohd. Yusof<sup>a,c</sup> and  
Ahmad Rizal Mazlan<sup>a,d</sup>

*<sup>a</sup>Othman Yeop Abdullah Graduate School of Business, Universiti  
Utara Malaysia, Kuala Lumpur, Malaysia. (Email: <sup>b</sup>baskarvals@  
yahoo.com, <sup>c</sup>rosylin@uum.edu.my, <sup>d</sup>arizal@uum.edu.my).*

### **ABSTRACT**

This study seeks to analyse the determinants of non-interest income for CIMB Bank and RHB Bank in Malaysia. A comparative analysis between CIMB Bank and RHB Bank was conducted covering the years 2004 till 2015. This research is important to increase the banks' non-interest income revenue or encourage banks to diversify into non-interest income whenever their interest income is threatened. By employing time series analysis techniques such as Vector Error Correction Model (VECM), Johansen Co-Integration Analysis and Forecast Error Variance Decomposition (FEVD) Analysis to identify the relationship among variables in the short run and long run, this study finds that each bank has its unique determinants of non-interest income. Both in the long run and short run the determinants of non-interest income differ between CIMB Bank and RHB Bank. These findings further suggest the potential of non-interest income as a revenue source for banks (both conventional and Islamic). For conventional banks, non-interest income will not make the banks worse off and for Islamic banks, eschewing interest will also make them as competitive as their conventional counterparts. These findings can be useful for the banks to identify the significant variables to increase their non-interest income or revenue.

JEL Code: G21 C58

Keywords: Non interest income, Banking sustainability, Malaysia, Diversification, Volatility

## 1. INTRODUCTION

Banks earn interest income from loans disbursed and earn non-interest income from fees and charges from offering various types of financial services and products (Kwast,1989). Non-interest income components consist of commissions, fees on loan/financing, portfolio management fees, service charges, corporate advisory fees, guarantee fees, investment income, forex income, placement fee, underwriting commissions and other fee income. Fee based income is the largest component of non-interest income among Malaysian commercial banks (DBS Bank, 2015). Fee incomes include advisory fee, brokerage fee and other fees.

Non- Interest Income accounts for 45% of operating income in 2015 among all the US banks (FDIC, 2016). According to a Spanish banking group, Banco Bilbao Vizcaya Argentaria (BBVA), fee based income consists of almost 30%-40% of income among Nordic banks and 33% in France and Italy as of 2015. In the Asian region, non-interest income contributes more than 30%to the total income of the banking industry in Singapore and Thailand respectively as of 2014 (The Global Economy).

In Malaysia, non-interest income constituted less than 20% of the total banking industry revenue in 2015. This is relatively low and still has a huge potential to grow because factors such as competition, global economic environment, lower net interest margin and introduction of Basel III will put pressure on interest based products (The Star Online, 2016). This study seeks to identify the significant variables in determining non-interest income of commercial banks in Malaysia. Malaysia has eight commercial banks and this study analyzes the determinants of non-interest income for two major banks: CIMB Bank and RHB Bank. The two banks were selected because both are in the same asset size range. By examining the significant variables determining non-interest income, banks can identify and focus on these variables to increase their non-interest income and revenue.

## 2. LITERATURE REVIEW

Banking institutions have started to diversify their operations from traditional interest-based lending activities to non-traditional activities generating on-interest income (DeYoung and Rice, 2004). As discussed earlier, non-interest income is an important source of diversification for banks (Huang and Chen, 2006). Although non-

interest income can help banks diversify their portfolio, it also can increase their earnings volatility (DeYoung and Roland, 2001; Stiroh, 2006). The volatility of non-interest income makes a bank less reliant on it. Hence non-interest income is known as a supplementary income for banks along with stable interest income. According to the study by DeYoung and Rice (2004), interest income is still the core income for banks but non-interest income will co-exist with interest income rather than replacing it. A study conducted by Chiorrazzo, Milani and Salvani (2008) among Italian banks from 1996 to 2003 and a study on US banks by Stiroh (2006) found that diversification to non-interest income increases the volatility of bank earnings.

Based on many studies, the most important determinant is bank size, which is usually measured by total assets. Several studies conducted in both developed and developing countries such as India (Pennathur and Subrah, 2012), the United States (Saunders, Schmid, and Walter, 2014/17) and The Organisation of Economic Cooperation and Development (OECD) countries (Hahm Joon-Ho, 2008) found that bank size is one of the significant factors positively related to non-interest income. In contrast, a few studies conducted in the Third World countries such as Barbados (Craigwell and Maxwell, 2006) and Ghana (Damankah, Olivia, and Albert, 2014) show a negative relationship between bank size and non-interest income.

Total loan is also frequently found to be a significant determining factor of non-interest income. Several studies conducted in the US (DeYoung and Rice, 2004), Europe (Smith and Wood, 2003) and OECD countries (Hahm Joon Ho, 2008) found that higher loan-based products will lead to lower non-interest income and vice versa. However different results were found in Tunisia (Hakimi, Hamdi, and Djelassi, 2012) where total loan and non-interest income were positively related.

Capital Adequacy Ratio (CAR) is a statutory capital requirement for banks to keep minimum capital as required by Basel Committee to minimize banking risk. This regulation ensures that all financial institutions are equipped with enough capital to meet their obligations in case of any unexpected losses. Research conducted with a sample of 600 banks from 29 OECD countries (Hahm Joon Ho, 2008) found that capital adequacy ratio is significantly and negatively related with non-interest income.

Net Interest Margin (NIM) is defined as the difference between interest income and interest paid out to lenders. Theoretically, when net interest margin shrinks, banks' interest

income will shrink and banks may want to diversify to the non-interest income based products; hence NIM is negatively related with non-interest income. A study conducted in Tunisia (Hakimi et al., 2012) found that NIM is a significant factor that determines the non-interest income in the Tunisian banking system. However, according to Rogers and Sinkey (1999), in some circumstances NIM and non-interest income can be positively related as well. In some situations, where NIM is very low, banks tend to increase the loan volume and offer lower interest rate to their clients. So, in this situation declining NIM has been offset by increase in the loan volume. In such situations, banks will push more traditional products and this will reduce their non-interest income.

Based on previous studies, the most significant macroeconomic factors influencing non-interest incomes are inflation rate and stock market index. Due to high multicollinearity between stock market index and bank size for CIMB Bank and RHB Bank, this present study only focuses on inflation rate. The inflation rate is expected to have a negative relationship with business performance and bank profitability (Mishkin, 2007). Significant negative relationship exists between inflation rate and banking sector development (Boyd and Smith, 2001). As the general prices of goods increase, the bank operational costs increase thus reducing profitability. Fluctuation in the inflation rate impacts on bank performance and hence banks may diversify their business into non-interest based income generating activities (Demirguc-Kunt, A., and H. Huizinga, 2010). Similar finding is also evidenced in Craigwell and Maxwell (2006) and Sanya and Wolfe (2010).

In general, non-interest income determinants vary across countries depending on the methodology employed and period of analysis. Furthermore it may due to central bank regulation, economic progress of the country, the product itself, the cultural differences, technology impact, and so forth. Against this backdrop, this study seeks to investigate the link between non-interest income and the hypothesized determinants, namely, bank size, total loan, CAR, NIM and inflation for CIMB Bank and RHB Bank in Malaysia.

### 3. METHODOLOGY

The dependent variable in this study is the ratio of non-interest income, following Rogers and Sinkey (1999) and Hahm Joon-Ho (2008). The independent variables are categorized into two broad

categories which are internal factors or bank characteristics and external factors or macroeconomic variables. The internal factors are bank size, total loan, total equity or CAR and net interest margin. The only macroeconomic variable in this study is inflation.

Ratios for all the variables have been obtained from DataStream database.

TABLE 1  
Measurement of Variables and Sources of Data

Variables	Variable Measurement	Period	Measures
Non-Interest Income	Amount of non-interest income over total revenue of the banks	1Q 2004 till 4Q 2015	Portion of Non-Interest Income Over Revenue (In Percentage)
Bank Size	Amount of Total Assets (Natural Log)	1Q 2004 till 4Q 2015	Size of the banks in terms assets size (in value)
Total Loan	Total Loan Value Over Total Assets of the Bank	1Q 2004 till 4Q 2015	Portion of Total Loan Value Over The Total Assets (In Percentage)
Total Equity Capital or Capital Adequacy Ratio (CAR)	Value of Total Shareholder's Equity Over Total Assets	1Q 2004 till 4Q 2015	Portion of Capital to Asset Ratio (In Percentage)
Net Interest Margin (NIM)	Interest Income – Interest Paid Out to Depositor/Investor	1Q 2004 till 4Q 2015	Reflects the efficiency pricing policy of interest based products (In Percentage)
Inflation	Quarterly Inflation as published	1Q 2004 till 4Q 2015	Reflects general price level every three months

The main objective of this study is to identify the factors influencing the non-interest income of banks. The following is the equation used to analyse the relationship between non-interest income and selected independent variables:

$$NIITR = \alpha + \beta_1 \text{Bank Size} + \beta_2 \text{Total Loan} + \beta_3 \text{Total Equity} + \beta_4 \text{Net Interest Margin} + \beta_5 \text{Inflation}$$

Based on the above equation, we further express our mathematical model as follows:

$$(1) \quad NIITR_t = a_0 + a_1 Bank\ Size_t + a_2 Total\ Loan_t + a_3 Total\ Equity_t + a_4 Net\ Interest\ Margin_t + a_5 Inflation_t + e_t$$

We employ the Vector Error Correction Model (VECM) as expressed below:

$$(2) \quad \Delta \ln NIITR_t = a_0 + \sum_{j=1}^{k1} b_j \Delta \ln NIITR_{t-j} + \sum_{j=0}^{k2} c_j \Delta \ln Bank\ Size_{t-j} + \sum_{j=0}^{k3} d_j \Delta \ln Total\ Loan_{t-j} + \sum_{j=0}^{k4} e_j \Delta \ln Total\ Equity_{t-j} + \sum_{j=0}^{k5} f_j \Delta \ln Net\ Interest\ Margin_{t-j} + \sum_{j=0}^{k5} g_j \Delta \ln Inflation_{t-j} \ln HFI_{t-1} + n_2 \ln GDP_{t-1} + n_3 \ln HPI_{t-1} + n_4 \ln KLSI_{t-1} + n_5 OPR_{t-1} + \epsilon_t$$

Our methodology starts with standard procedure of testing the stationarity of the variables of the models using unit root test and estimation of long-run dynamics via cointegration test in time series analysis. We further employ Impulse Response Functions (IRF) and Forecast Error Variance Decomposition (FEVD) based on the Vector Auto Regression (VAR) model to explain how the change in the dependent variable is attributable to the shock in each of the independent variables.

In a VECM (Vector Error Correction Model) framework, when a set of variables is found to have one or more cointegrating vectors then a suitable estimation technique is a VECM. Lag length criteria also suggests the choice of one lag for estimating VECM. In order to establish the joint significance of the variables, under VECM all those variables are taken as endogenous ( $\Delta Y$ ) and exogenous ( $\Delta X$ ), in order to establish the long and short run

dynamics between them. The dependent variable NIITR denotes the percentage of non-interest income over total income of the banks (DeYoung and Roland, 2001; Stiroh, 2006). The independent variables of bank size, total equity or capital adequacy ratio and net interest margin have been used by Rogers and Sinkey (1999) in their model. The loan ratio included in the model above is used by DeYoung and Rice (2004). As for macroeconomic factors, inflation rate has been used in many countries as discussed in the literature review.

The following are the definitions of all the variables involved.

- a. Non-Interest Income - is the income bank earned from all the non-interest based activities and it is known as fees, commissions, service charges, handling fee, transaction fee, professional fee, corporate advisory fee and so forth.
- b. Bank Size - is determined by the asset size of each bank. The asset usually refers to the cash balance, due from banks, various types of investments and loans.
- c. Total Loan - various types of loan products disbursed by the banks such as housing loan, hire purchase loan, personal loan, term loan, syndicated loan, revolving credits, factoring loans, trust receipt loan, share margin financing, bills receivables and other loans.
- d. Total Equity Capital or Capital Adequacy Ratio - is the regulatory capital requirement set by central bank in each country to ensure that financial institutions are backed by quality capital to absorb losses if any. According to latest Bank Negara Malaysia (BNM) capital adequacy framework issued on 13th October 2015, any financial institutions must maintain minimum total capital of 8% and this will be computed based on risk weighted assets.
- e. Net Interest Margin (NIM)- is the difference between interest income banks obtained from their loans and interest paid out to their depositors. This is the spread between loan interest rate and deposit interest rate.
- f. Inflation- is the rate of increase of general prices of goods and services over a certain period. Consumer Price Index (CPI) measures price increase of a basket of goods and services that will be consumed by the majority of the people.

The data collected in this study were analyzed using EViews. Analyses of data include trend analysis, descriptive statistics, unit

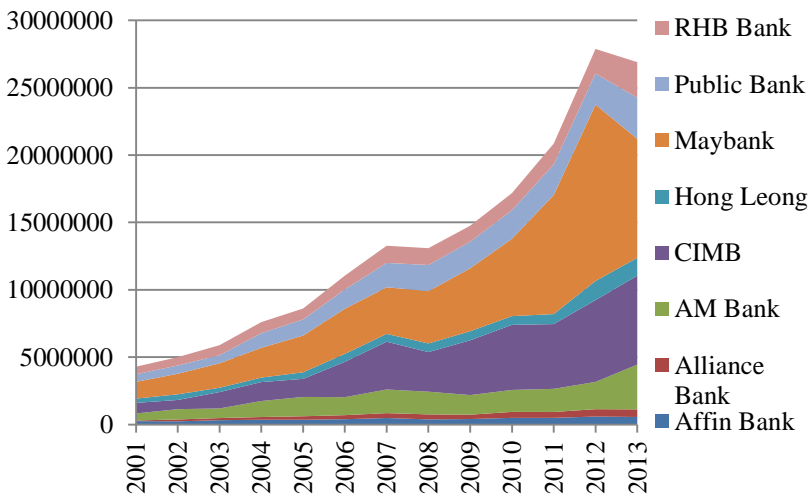
root test, correlation analysis, co-integration Analysis and Variance Decomposition analysis.

## 4. RESULTS AND DISCUSSION

### 4.1 TREND ANALYSIS

Figure 1 shows the non-interest income earned by all the commercial banks from 2001 till 2013 and it is moving in upward trend. According to the chart, the major portion of non-interest income are captured by Maybank followed by CIMB Bank. These are two of the largest banks in Malaysia in terms of asset size. We can thus interpret that bank size plays an important role in capturing the non-interest income in the Malaysian banking system.

FIGURE 1  
Non-Interest Income of Malaysian Commercial Banks



The current global trend shows that non-interest income accounts for almost more than 40% of the total banking income in USA and Europe, more than 30% in Singapore and Thailand. In Malaysia currently the total non-interest income consists of around 20% of the entire income of commercial banks. This statistic shows that the current Malaysian banking industry is still very much depending on interest income. On the positive side we can view that non-interest income among Malaysian commercial banks is still in



the beginning stage and there is very high potential in the future for the Malaysian banking industry to follow the trend in the USA, Europe, Singapore or Thailand.

The actual average growth per year for non-interest income of Malaysian commercial banks is 7.6% per annum whereas average growth per year for interest income is 7.9% per annum from 2005 till 2015 (BNM,2016). Therefore the growth of non-interest income is equally important as that of interest income.

#### 4.2 DESCRIPTIVE ANALYSIS

Based on the following Table 2, almost all the variables for both CIMB Bank and RHB Bank have a normal distribution. Only NIITR and NIM for RHB Bank have negative values more than one showing that they are skewed to the left. However, it poses no serious problem because it is still below 2.0.

TABLE 2  
Descriptive Analysis for CIMB Bank and RHB Bank  
(From 2004 till 2015)

	NIITR		LNBS		TL		TE		NIM		INF	
	CIMB	RHB	CIMB	RHB	CIMB	RHB	CIMB	RHB	CIMB	RHB	CIMB	RHB
Mean	25.75	22.19	12.34	11.77	62.00	61.24	8.48	7.09	0.50	0.38	3.45	3.45
Median	26.16	22.24	12.40	11.65	62.87	62.53	8.56	7.60	0.50	0.38	3.45	3.45
Maximum	40.97	29.97	13.07	12.35	69.57	75.41	9.43	10.01	0.63	0.62	5.80	5.80
Minimum	6.78	0.87	11.52	11.25	53.41	46.32	6.91	4.54	0.40	0.02	1.90	1.90
Std. Dev.	5.81	4.65	0.46	0.34	3.56	6.46	0.52	1.53	0.05	0.08	0.78	0.78
Skewness	-0.36	-1.76	-0.24	0.31	-0.38	-0.28	-0.52	-0.37	0.22	-1.05	0.88	0.88
Kurtosis	4.50	10.38	1.85	1.79	2.60	3.53	3.61	1.85	2.55	8.88	4.54	4.54
Jarque-Bera	5.52	133.83	3.07	3.71	1.47	1.21	2.92	3.75	0.78	77.87	11.02	11.02
Probability	0.06	0.00	0.22	0.16	0.48	0.55	0.23	0.15	0.68	0.00	0.00	0.00

#### 4.3 UNIT ROOT ANALYSIS

Time series data need to be tested for stationarity in order to obtain meaningful results (Engle and Granger, 1987) because the raw data could have been influenced by many factors. Usually, most of economic time series data are not stationary but the differencing often yields a stationary result. So, a test of stationarity is important to set up the specification and estimation of the correct model (Engle and Granger, 1987).

Based on the results in Table 3 and 4, The Augmented Dickey Fuller test (ADF) test shows that all variables are stationary at first difference and at 1% significance level Therefore, we can conclude that under ADF and Phillips-Perron (PP) methods, all the variables for CIMB Bank and RHB Bank are stationary at first difference and are integrated of order one (1). So, Johansen co-integration test can be performed for the time series elements that are integrated of the same order.

TABLE 3  
Summary of Unit Root Test (ADF and PP) for CIMB Bank Variables

Variable	At Level (ADF)		At Level (PP)		First Difference (ADF)		First Difference (PP)	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend	Intercept	Intercept and Trend	Intercept	Intercept and Trend
NIITR	-4.77***	-4.83***	-4.75***	-4.85***	-9.99***	-6.00***	-21.42***	-23.86***
LNBS	-1.07***	-2.47***	-2.24***	-2.34***	-6.97***	-6.99***	-7.89***	-11.04***
TL	-1.48***	-2.18***	-4.66***	-6.04***	-4.12***	-4.08***	-22.09***	-23.88***
TE	-3.72***	-4.84***	-3.72***	-4.61***	-8.45***	-8.35***	-16.80***	-16.41***
NIM	0.11	-5.00***	-2.21***	-5.02***	-7.37***	-7.57***	-22.52***	-24.98***
INF	-2.80***	-3.24***	-2.74***	-3.29***	-7.63***	-7.54***	-8.72***	-8.564***

Note: \*\*\*, \*\* and \* are respectively the 1%, 5% and 10% of the significant level.

TABLE 4  
Summary of Unit Root Test (ADF and PP) for RHB Bank Variables

Variable	At Level (ADF)		At Level (PP)		First Different (ADF)		First Different (PP)	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend	Intercept	Intercept and Trend	Intercept	Intercept and Trend
NIITR	-3.97***	-6.02***	-3.98***	-6.02***	-6.24***	-6.18***	-37.04***	-39.88***
LNBS	0.12	-1.54***	0.18	-1.56***	-7.65***	-7.61***	-7.604***	-7.57***
TL	-0.63***	-1.54***	-4.33***	-5.58***	-14.1***	-13.93***	-18.92***	-18.55***
TE	0.004***	-2.02***	-0.02***	-2.21***	-5.83***	-5.81***	-5.83***	-5.81***
NIM	-0.25***	-5.08***	-4.43***	-4.57***	-5.00***	-5.89***	-10.41***	-12.23***
INF	-2.80***	-3.24***	-2.74***	-3.29***	-7.63***	-7.54***	-8.72***	-8.56***

Note: \*\*\*, \*\* and \* are respectively the 1%, 5% and 10% of the significant level.

#### 4.4 CORRELATION ANALYSIS

Based on the correlation results in Table 5, the independent variables having the highest correlation with non-interest income for CIMB Bank are bank size (0.24) followed by total loan (0.18) and total equity capital or capital adequacy ratio (0.17). For RHB Bank, it is observed that only net interest margin is correlated negatively with non-interest income. All other variables are correlated positively with non-interest income. The variables with the highest correlation

with non-interest income for RHB Bank are total equity capital (0.65) followed by bank size (0.60) and net interest margin (-0.53).

For both banks, size plays a significant role in determining their non-interest income and it is more apparent for RHB Bank than CIMB Bank. This is consistent with the finding by DeYoung and Rice (2004). The banks implement a completely different strategy in terms of their total equity to non-interest income. RHB Bank is holding very high capital to enter into non-interest income businesses. So, it very obvious that RHB Bank wants to keep a good additional buffer before entering into non-interest income business.

TABLE 5  
Pearson Correlation Matrix for CIMB Bank and RHB Bank

	NIITR		LNBS		TL		TE		NIM		INF		LNKLSE	
	CIMB	RHB	CIMB	RHB	CIMB	RHB	CIMB	RHB	CIMB	RHB	CIMB	RHB	CIMB	RHB
NIITR	1.00	1.00	0.24	0.60	0.19	0.38	0.17	0.65	-0.03	-0.53	-0.02	0.08	0.31	0.57
LNBS	0.24	0.60	1.00	1.00	0.59	0.46	0.51	0.85	-0.76	-0.28	0.44	0.38	0.90	0.91
TL	0.19	0.38	0.59	0.46	1.00	1.00	0.34	0.60	-0.52	-0.09	0.29	0.18	0.51	0.46
TE	0.17	0.65	0.51	0.85	0.34	0.60	1.00	1.00	-0.31	-0.15	0.11	0.41	0.62	0.80
NIM	-0.03	-0.5	-0.76	-0.28	-0.52	-0.1	-0.31	-0.2	1.00	1.00	-0.37	0.18	-0.66	-0.18
INF	-0.02	0.08	0.44	0.38	0.29	0.18	0.11	0.41	-0.37	0.18	1.00	1.00	0.22	0.22
LNKLSE	0.31	0.57	0.90	0.91	0.51	0.46	0.62	0.80	-0.66	-0.18	0.22	0.22	1.00	1.00

Loan based products are very much interrelated with fee based products for RHB Bank compared to CIMB Bank. Possibly, RHB Bank may bundle their loan products with fee based products, hence increasing their non-interest income. This is very obvious with coefficient correlation of 38% between total loan and non-interest income for RHB Bank compared to 18% for CIMB Bank. So, both of these banks have completely different strategies when it comes to non-interest income but both loan ratio and net-interest margin are correlated positively with non-interest income. This finding is very interesting because it differs from the finding of Hahm Joon Ho (2008) that the loan ratio is correlated negatively with non-interest income. So, in Malaysia (based on CIMB Bank and RHB Bank only) interest based products and non-interest based products have positive relationship. This finding indicates that the Malaysian banking industry is still very much focusing on interest based products and these will co-exist with interest based products.

## 4.5 CO-INTEGRATION ANALYSIS

Co-integration analysis refers to the long run relationship between variables. This is important because two or more variables may wander away from each other in the short run but move along in the long run (Enders, 1995). One of the main and powerful tools for co-integration analysis is Johansen's co-integration test. While performing Johansen analysis, the variables need to be integrated of the same order. In this study, all the variables of non-interest income for CIMB Bank and RHB Bank have been tested for unit root and it was found that all the variables for CIMB Bank and RHB Bank are stationary at first difference. Since all the variables are stationary at first difference or integrated of the same order we proceeded with Johansen's co-integration test. Johansen proposed two methods to test for cointegration which are trace test and maximum Eigen value test. These tests are important to see whether any variable in our model has long run relationship with the dependent variable which is non-interest income.

TABLE 6

Johansen Co-Integration Results for CIMB Bank and RHB Bank

	Normalized Co-Integrating Coefficients	
	CIMB Bank	RHB Bank
NIITR	1.00	1.00
LNBS	163.077(64.462)	57.056(11.992)
TL	1.440 (1.125)	1.079(0.117)
TE	49.625 (8.572)	-0.433(1.435)
NIM	-765.402 (118.761)	40.413(7.494)
INF	15.475 (3.917)	4.022(0.744)
@Trend (04Q2)	-9.331(2.447)	-1.840(0.413)

Similarly, as evidenced in Table 6, the results of Johansen co-integration analysis for RHB Bank and CIMB Bank show that bank size (LNBS), net interest margin (NIM), total loan (TL), total equity capital (TE) and inflation (INF) are significant factors affecting Net Interest Income. This result is consistent with Rogers and Sinkey (1999) and DeYoung and Rice (2004) where they found that bank size shows strong and positive link with non-interest income in US Commercial Banks. So, the same phenomenon occurs in Malaysia where larger banks tend to be more involved in fee based activities. So, the bigger the bank the larger the non-interest income earned. This may happen for various reasons such as bigger banks

having better technology and innovative ideas for increasing on-interest income or bigger banks having better reputation hence charging higher for fee-based business.

The next common significant factor in determining non-interest income of CIMB Bank and RHB Bank is net interest margin. So, profit margin from the interest based products has significant impact on their non-interest income based business. This is consistent with research conducted by Rogers and Sinkey (1999) and Hahm Joon Ho (2008).

Another significant factor for CIMB Bank is total equity capital or capital adequacy ratio. So, CIMB Bank needs to hold higher reserve in order to obtain higher non-interest income. This result is consistent with the finding of Rogers and Sinkey (1999) in American banks. As per BNM, the minimum capital adequacy ratio for any bank is 8% and there is no maximum level and it depends on each bank's capacity. So, the higher the equity capital held by CIMB Bank, the higher the non-interest income obtained and this further increases its profit margin.

Inflation is a significant factor for CIMB Bank in determining the non-interest income but it is not relevant for RHB Bank in the long run. This is consistent with findings of Hahm Joon Ho (2008) among OECD countries and Hakimi et al. (2012) among Tunisian Banks. CIMB Bank and RHB Bank operate under the same economic environment and regulations but these give different impacts to their non-interest income. This is maybe due to management decision of the banks where some banks may diversify their business or shift their resources to the non-interest income products when the inflation rate is high; this is subject to further study. Furthermore according to Demirguc-Kunt and Huizinga. (2010), inflation rate fluctuation is impacting bank performance and hence banks may diversify their business into non-interest based income generating activities.

Hence we can summarize that in the long run each bank has its unique determinants for earning non-interest income.

#### 4.6 FORECAST ERROR VARIANCE DECOMPOSITION ANALYSIS

We further extend our analysis to examine the short run dynamics by employing forecast error variance decomposition as developed by Sim (1980). FEVD analyzes the impact of changes in one variable on the variance of other variables in the short run. To determine what proportion of the variance in the model was due to its own shock and

other identified shocks, forecast error variance decomposition technique allocates weight to each identified shock in the model at every forecast horizon for a particular variable used (Odour, 2008). In this section, we analyze what are the important variables affecting non-interest income of CIMB Bank and RHB Bank in the short run.

Table 7 shows the results of forecast error variance decomposition of non-interest income for CIMB Bank. It shows clearly that in the short run total loan is the most important factor and the only factor determining the non-interest income of CIMB Bank. So, in the short run total loan (DTL) of CIMB Bank contributes around 12% to 15% to their non-interest income share. This scenario occurring in CIMB Bank may due to their operations which bundle the non-interest income based products with their interest based products. This strategy may increase CIMB's non-interest income in the short run.

TABLE 7  
Forecast Error of Variance Decomposition of Non-Interest Income (DNIITR) For CIMB Bank

Variance Decomposition of DNIITR							
Period	S.E.	DNIITR	DLNBS	DTL	DNIM	DTE	DINF
1	8.315	100.000	0.000	0.000	0.000	0.000	0.000
2	9.213	82.734	0.032	15.860	0.921	0.022	0.420
3	9.998	82.379	0.215	13.476	2.414	0.369	1.145
4	10.544	81.142	0.556	12.599	2.540	0.639	2.521
5	11.386	81.286	0.479	13.071	2.178	0.671	2.311
6	11.871	80.872	0.637	13.001	2.112	1.240	2.134
7	12.381	81.332	0.653	12.521	2.038	1.326	2.127
8	12.808	81.751	0.610	12.452	1.904	1.267	2.013
9	13.362	81.936	0.564	12.513	1.866	1.225	1.892
10	13.763	82.281	0.532	12.367	1.802	1.172	1.842

Table 8 shows the results of forecast error variance decomposition of non-interest income for RHB Bank. Based on the results, inflation is the highest contributor to non-interest income of RHB Bank in the short run. Inflation (INF) contributes around 10% to the non-interest income of RHB Bank in the short run. Theoretically, if the general prices of goods increase, this will increase operational cost of the bank and will reduce its profitability. As a result, banks will diversify their business to increase profits. Furthermore according to Boyd and Smith (2001), there is a significant relationship between inflation and banking sector development. The second largest factor contributing

to the non-interest income of RHB Bank in the short run is bank size (DLNBS). It contributes around 8% to the non-interest income in the short run. So in the short run, inflation and bank size are the only significant factors contributing to non-interest income of RHB Bank.

TABLE 8  
Forecast Error of Variance Decomposition of Non-Interest Income (DNIITR) For RHB Bank

Variance Decomposition of DNIITR:							
Period	S.E.	DNIITR	DLNBS	DTL	DTE	DNIM	DINF
1	4.975	100.000	0.000	0.000	0.000	0.000	0.000
2	5.389	86.080	0.119	2.990	0.137	0.443	10.22
3	6.178	79.907	7.445	2.424	0.169	0.968	9.083
4	6.602	78.376	8.312	3.193	0.675	1.471	7.970
5	7.163	73.533	8.279	3.674	2.529	1.361	10.623
6	7.608	72.787	7.402	3.448	4.454	2.411	9.496
7	8.085	73.497	6.635	3.422	4.609	2.732	9.102
8	8.301	71.821	6.727	3.622	4.405	2.760	10.663
9	8.678	73.624	6.165	3.577	4.066	2.770	9.795
10	8.947	74.194	5.872	3.633	3.826	2.679	9.792

According to FEVD analysis, total loan is the only significant factor in determining the non-interest income of CIMB Bank in the short run whereas bank size and inflation are the significant factors determining the non-interest income of RHB Bank in the short run. This FEVD analysis can be used as a forecasting tool. Hence banks can utilize the determinants identified to increase their non-interest income revenue. Our findings show that even in the short run the determinants of non-interest income differ from bank to bank.

## 5. CONCLUSION

Based on the findings, in the long run non-interest income of CIMB Bank depends on the bank size, total equity capital, net interest margin and inflation whereas non-interest income of RHB Bank depends on the bank size and net interest margin. So, we can conclude that each bank has its unique determinants and it could be attributed to various reasons such as bank's direction or policy toward non-interest income based business and the type of non-interest income products they offer.

In general, we can conclude that we have mixed findings where some factors are consistent while the others are inconsistent

with previous studies. Our findings suggest that, in the short run, total loan is affecting the non-interest income of CIMB Bank but in the long run the impact disappears. So, it means even if the banks bundle up the non-interest income products with interest income products it helps to increase the non-interest income revenue only in the short run whereas in the long run the impact disappears. Another notable finding is that net interest margin is a significant factor for both CIMB Bank and RHB Bank but for CIMB Bank it correlates negatively with non-interest income while for RHB it correlates positively. In most of the previous research net interest margin has negative relationship with the non-interest income but RHB Bank findings show that it has a positive relationship. Theoretically, when net interest margin is compressed banks will diversify to other fee based businesses as mentioned by many analysts and industry experts. So, the finding for RHB Bank for net interest margin is inconsistent with the theory and experts' opinion. Further study is needed to identify the actual reason for this scenario.

Based on the trend analysis, non-interest income accounts for about 20% of the total banking industry income in Malaysia from 2005 till 2015. Lending activities will still be the main growth engine for the banking industry but the non-interest income is growing steadily, implying that banks are diversifying their business portfolio. In this regard, the future scenario for the Malaysian banking landscape is consistent with the current banking landscape in developed economies such as the ones in USA and Europe where the non-interest income ratio is almost 40% of total banking income. Hence, banks need to focus more on their non-interest income components and their determinants to increase their profit and revenue.

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