4 Research Result

4.1 Introduction

This section describes the testing result and analysis of it based on what have been defined in the theoretical framework. From the result of the analysis, it will be used as reference for decision either to accept or reject the hypotheses developed. The result is not expected to be the same as what presented by other researches in literature review as different data is used which is interested to be explored.

4.2 Revenue Volatility

This section describes the empirical result and analysis of the result based on testing for revenue volatility research framework.

The *Figure 4* shows the chart of total income growth compared with the growth of components that construct it. From the diagram it is found that the net interest income (NET) growth is more volatile compared to the non interest income growth. If the time frame is breakdown into before and after 1998 (economic crisis), the net interest income (NET) is still more volatile than the time before crisis, even though in overall income, it is more stable.
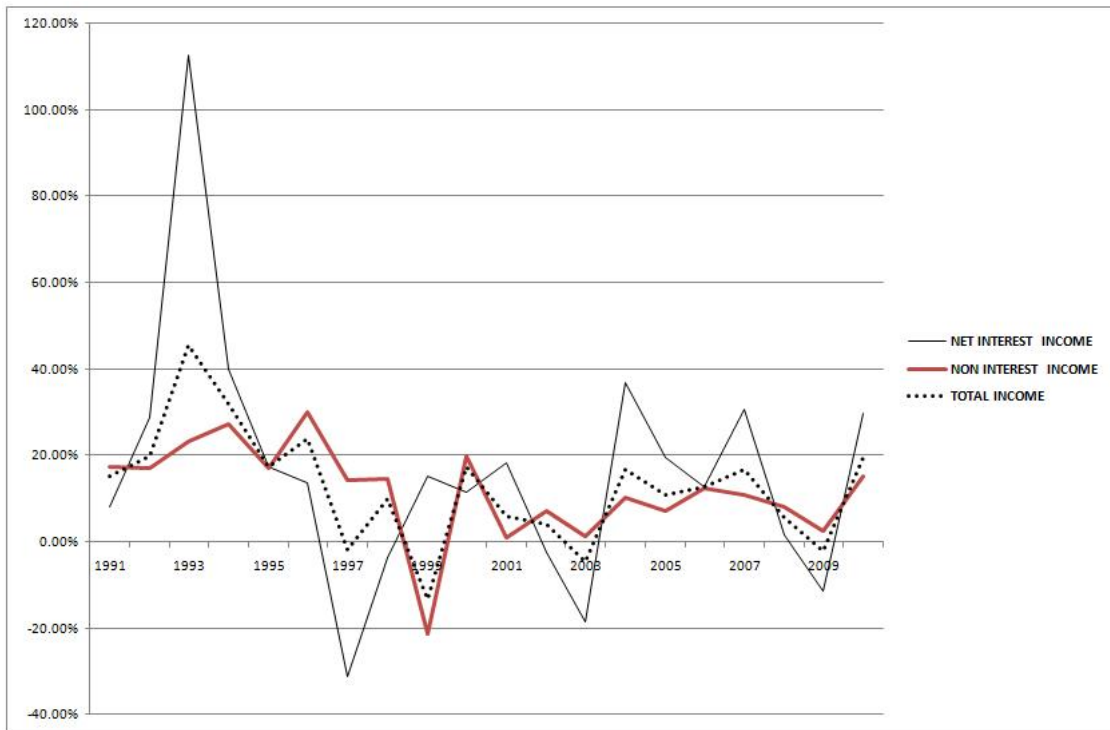
Figure 4 Aggregate Income Growth

Figure 5 shows how the share of non interest income (NONSH) movement compared to the total income growth. The chart does not really describe whether the share of non interest income gives an effect to the volatility of the total income of banking institutions.
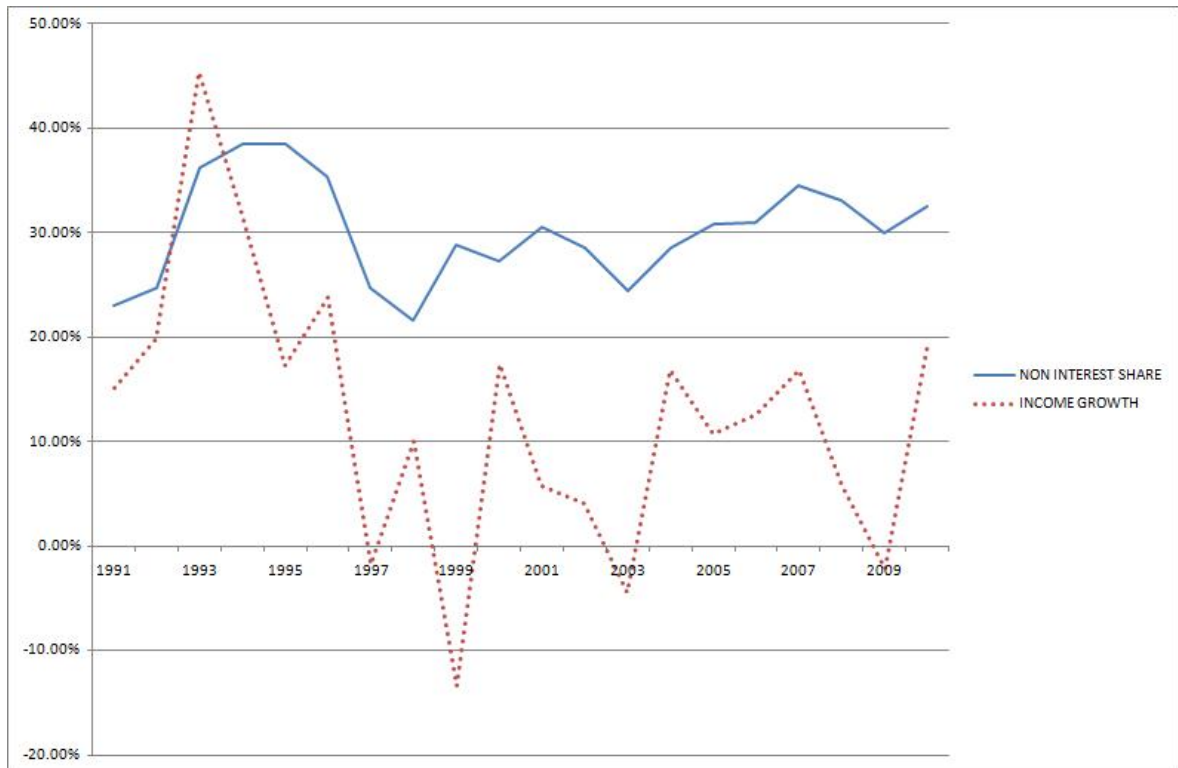
Figure 5 Non Interest Share towards Total Income Volatility

The descriptive statistic of overall data for year 1991-1998 is described in the Table 1, while Table 2 describes the overall descriptive statistic for year 1999-2010. From the two tables it is found that the average of share of non interest income is little bit higher in the time before the banking crisis in 1998 compared to after crisis time. While the average growth of both non interest income and net interest income is also higher in the time before the banking crisis in 1998.

```
Year 1991-1998
Descriptive Statistics: NONSH, NONGW, NETGW, INCOMEGW


Variable    Mean   SE Mean   StDev  Variance  Minimum      Q1  Median      Q3
NONSH     0.3034   0.0261  0.0739    0.0055   0.2166  0.2348  0.3005  0.3791
NONGW      0.232    0.148   0.420     0.176   -0.313  -0.006   0.154   0.371
```

```
NETGW     0.2013  0.0212  0.0599   0.0036   0.1430  0.1514  0.1729  0.2619
INCOMEGW  0.2016  0.0501  0.1416   0.0200  -0.0180  0.1130  0.1849  0.2980


Variable  Maximum  Skewness  Kurtosis
NONSH      0.3849      0.01     -2.49
NONGW      1.125       1.38      3.20
NETGW      0.3018      0.83     -0.88
```

Table 1 Descriptive Statistic of Revenue Volatility Testing Variable 1991-1998

```
Year 1991-1998

Descriptive Statistics: NONSH, NONGW, NETGW, INCOMEGW


Variable     Mean  SE Mean    StDev  Variance  Minimum       Q1   Median
NONSH     0.30025  0.00790  0.02737   0.00075  0.24410  0.28604  0.30264
NONGW      0.1194   0.0491   0.1701    0.0289  -0.1845  -0.0149   0.1399
NETGW      0.0618   0.0298   0.1031    0.0106  -0.2129   0.0148   0.0760
INCOMEGW   0.0746   0.0294   0.1019    0.0104  -0.1338  -0.0058   0.0825


Variable      Q3  Maximum  Skewness  Kurtosis
NONSH    0.32141  0.34528     -0.34      0.47
NONGW     0.2713   0.3696     -0.37     -0.60
NETGW     0.1206   0.1982     -1.73      4.55
```

Table 2   Descriptive Statistic of Revenue Volatility Testing Variable

Based on the framework defined in chapter 3, the volatility of banking institutions revenue testing, based on the modification of the standard composition of portfolio volatility into decomposition of portfolio growth volatility as defined in equation (1), is discussed:

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

To make a better understanding of the testing result interpretation, some explanatory variables based on the equation are defined:

$\alpha^2 \sigma^2_{NONGW}$: CONTRIBUTION NON

$(1-\alpha)^2 \sigma^2_{NETGW}$: CONTRIBUTION NET

$2\alpha(1-\alpha)Cov(NONGW, NETGW)$: CONTRIBUTION COVARIANCE

The "contribution" variables represent the share-weighted variance to overall revenue volatility based on the each component on the right-hand side of equation (1).

	BEFORE 1998	AFTER 1998
AVERAGE share of NET	0.6966	0.6998
AVERAGE Share of NON	0.3034	0.3002
AVERAGE Growth of Share of NON	0.0040	0.1194
VARIANCE Growth INCOME	0.0200	0.0104
VARIANCE Growth NET	0.0036	0.0106
VARIANCE Growth NON	0.2317	0.0289
COVARIANCE (Growth NON, Growth NET)	0.0101	0.0037
CONTRIBUTION NON	0.0213	0.0026
CONTRIBUTION NET	0.0017	0.0052
CONTRIBUTION COVARIANCE	0.0043	0.0015

Table 3 Revenue Volatility Testing Result

Table 3 describes the testing result based on the equation (1) composition. From the table we can see that the revenue in the time before crisis is more volatile compared to the time after crisis. The variance of revenue growth declines from 0.02 to 0.0104. However, this decline does not show that there is any diversification benefits that

affecting the decline as the covariance between the two time frames still in positive level even though it shows some decline from 0.0101 to 0.0037. A positive covariance means that both growth of non interest income and growth of net interest income move together not in inverse mode.

If we look at the share of non interest income and net interest income in constructing the total income, it seems that there is no significance difference between the time before and after crisis. It means that the banking institutions is still maintaining their portion of activities and still more rely on interest income generating activities. While the portion of activities are almost the same, but the volatility of net interest income is higher in the time after crisis compared to before. This leads to higher contribution to the volatility of revenue, from 0.0017 to 0.0052.

The non interest income in different condition shows a decline in term of volatility after the banking crisis time. This is a quite significance in term of level from 0.2317 to 0.0289 which leads to the significance decline also to the contribution of non interest income volatility to total revenue volatility from 0.0213 to 0.0026.

The testing result above shows that banking institutions in Malaysia do not really concentrate in non interest based income generating activities as option for activity diversification. The relatively stable non interest share between two time frames supports this explanation. Surprisingly, a significant lower volatility of revenue stream is still can be achieved by the banking institutions even though the interest income is higher including its contribution to the total revenue volatility. The lower volatility of non interest income is the one that contribute to this condition.

This situation is different with the one in US banking industry. While over there, banking institutions increase more towards non interest based income generating activities as described by Stiroh (2004). Malaysia banking industry still plays more to traditional banking activities which is more dependency to interest based income generating activities.

This does not mean that Malaysia banking industry is not putting diversification as significant issue that should be discussed. If we look at the recent conditions, where a lot of Malaysian banking institutions go to other countries and conduct acquisitions to some of anchor banks in those countries, it can be another explanation of how the Malaysian banking institutions implementing their diversification strategy. It could be a smart strategy for them, as looking at the Malaysian small population and well educated people, while in the same time the market policy has been widely liberalized, focusing on creating innovative bank non interest based product will be a very difficult due to the tough competitions. Banking institutions will not be only against other similar banking institutions in non interest based income generating activities, but they will be facing competitions from other financial institutions such as insurance, unit trust provider, and other investment service based institutions which not only consist of local players but also international based players as competitors.

From this analysis of the testing result, **I reject the null hypotheses below**:

$H0_1$:   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

Both net interest income and non interest income have significant effect in contributing the volatility of banking institution revenue stream based on the analysis result presented.

4.3   Determinants of Non Interest Income

Based on the variables defined in theoretical framework section in previous chapter, descriptive statistic analysis is conducted to provide some summary about the samples and measures. Table 4 shows the result of the descriptive statistic.

```
Descriptive Statistics: NONSH, ASSET, CAR, NONDEPOSITSH, INFLATION, KLSE FIN


              Total
Variable      Count      Mean   SE Mean      StDev  Variance     Minimum
NONSH            81   0.34963   0.00800    0.07196   0.00518     0.19890
ASSET            81    18.109    0.0827      0.744     0.553      16.763
CAR              81   0.11409   0.00264    0.02379   0.00057     0.06993
NONDEPOSITSH     81   0.23429   0.00927    0.08345   0.00696     0.08017
INFLATION        81   0.02281   0.00156    0.01407   0.00020     0.00613
KLSE FIN         81  0.000472  0.000108   0.000975  0.000001   -0.001700


Variable            Q1    Median        Q3   Maximum  Skewness  Kurtosis
NONSH          0.31447   0.34553   0.39830   0.55755      0.17      0.21
ASSET           17.451    18.082    18.617    19.630      0.22     -0.93
CAR            0.09855   0.11086   0.13147   0.17849      0.55      0.21
NONDEPOSITSH   0.17534   0.22697   0.28480   0.41692      0.43     -0.33
INFLATION      0.01427   0.01836   0.02931   0.05388      1.05      0.21
KLSE FIN      -0.000114  0.000726  0.000950  0.001919     -0.89      0.54
```

Table 4 Descriptive Statistic of Non Interest Income Determinants

From the descriptive statistic, we can see that average share of non interest income of all banking institutions is 35% from total income even though there is bank that has 56% of non interest income share.

The next testing result analysis will be based on each equation defined in theoretical framework in previous chapter.

4.3.1 Internal Factors

The internal factors analysis framework is represented by the equation (2.1).

$$NONSH = \alpha + \beta_1\,ASSET + \beta_2\,CAR + \beta_3\,NONDEPOSITSH + \varepsilon$$

The result of the equation testing is as described in *Figure 6*.

```
Regression Analysis: NONSH versus ASSET, CAR, NONDEPOSITSH

The regression equation is
NONSH = - 0.348 + 0.0301 ASSET + 0.804 CAR + 0.265 NONDEPOSITSH


Predictor          Coef    SE Coef       T      P
Constant        -0.3484     0.1645   -2.12  0.037
ASSET          0.030058   0.009033    3.33  0.001
CAR              0.8038     0.2993    2.69  0.009
NONDEPOSITSH    0.26474    0.08503    3.11  0.003


S = 0.0598971   R-Sq = 33.3%   R-Sq(adj) = 30.7%
```

Figure 6 Internal Factors Determinant Testing Result

From the multiple regressions testing on ASSET, CAR and NONDEPOSITSH variables, we can see that NONDEPOSITSH has very significant effect to the share of non interest income compared to other variables even though ASSET and CAR is also contributing a positive relationship to the share of non interest income.

This presents a similar result with previous researches by Kunt (2010) explained in the literature review. Banking institutions with bigger asset significantly will involve in the non interest based income generating activities. While in term of risk which is represented by CAR, we can see the same result as CAR will significantly move in the same trend with the share of non interest income. The high coefficient of NONDEPOSITSH shows that banking institution that conduct in funding diversification, will tend to have bigger portion of non interest based income generating activities.

4.3.2   External Factors

The external factor analysis framework is represented by equation (2.2). The result is described in *Figure 7*.

```
Regression Analysis: NONSH versus INFLATION, KLSE FIN


The regression equation is
NONSH = 0.230 + 4.16 INFLATION + 52.5 KLSE FIN



Predictor      Coef  SE Coef      T       P
Constant    0.22996  0.02840   8.10   0.000
INFLATION    4.1600   0.9546   4.36   0.000
KLSE FIN      52.54    13.78   3.81   0.000



S = 0.0653287    R-Sq = 19.6%    R-Sq(adj) = 17.6%
```
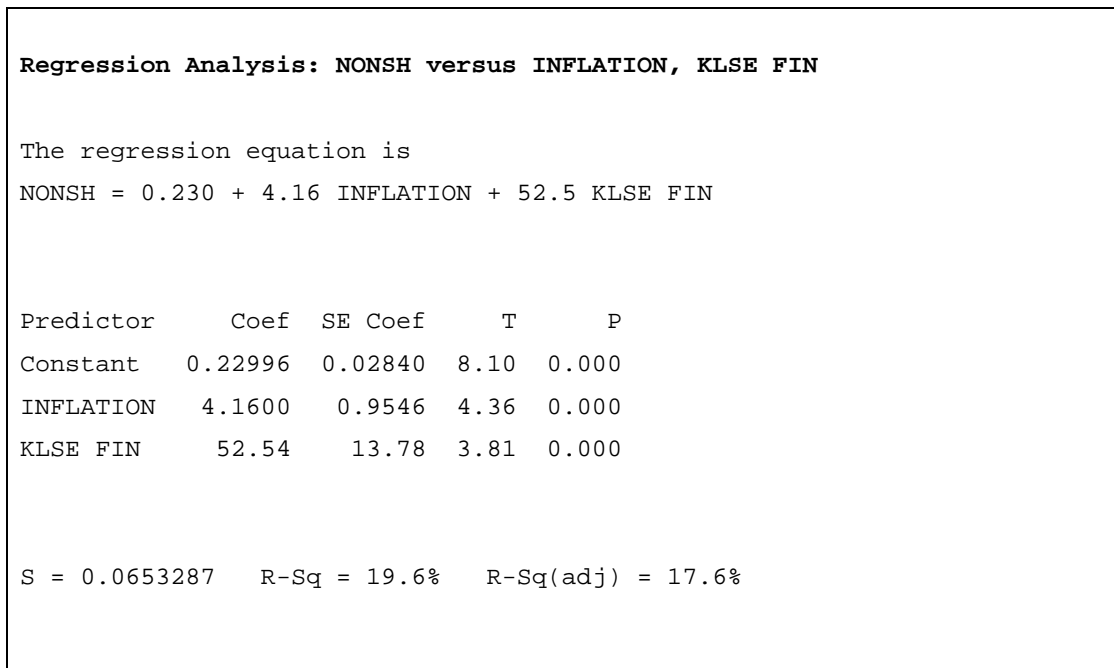
Figure 7 External Factors Determinant Testing Result

From the testing result, both INFLATION and KLSE FIN shows a positive correlation with NONSH. It means that the macro economy variables will have

significant effect to the decision of banking institution to go to non interest based income generating activities. KLSEFIN shows a higher coefficient value than INFLATION. It means that the stock market values the diversification conducted by the banking institution. This is similar result with what has been presented by Baele (2007) and Stiroh (2006a) whereby stock market will always have a significant correlation of what the activity the banking institutions involved. When the management of the banking institutions see that stock market give a positive signal in the industry, they will decide to engage more to non interest based income generating activities.

4.3.3   All Factors

As it has been described through equation (2.3) in theoretical framework, the testing result with overall variables combined is presented as below:

$NONSH = \alpha + \beta_1\,ASSET + \beta_2\,CAR + \beta_3\,DEPOSITSH + \beta_4\,INFLATION +$

$\beta_5\,KLSEFIN + \varepsilon$

```
Regression Analysis: NONSH versus ASSET, CAR, ...

The regression equation is
NONSH = - 0.342 + 0.0234 ASSET + 0.899 CAR + 0.241 NONDEPOSITSH + 3.78
INFLATION      + 47.3 KLSE FIN


Predictor          Coef    SE Coef      T      P
Constant        -0.3415     0.1459  -2.34  0.022
ASSET          0.023384   0.008131   2.88  0.005
CAR              0.8988     0.2669   3.37  0.001
NONDEPOSITSH    0.24136    0.07586   3.18  0.002
INFLATION        3.7826     0.7898   4.79  0.000
KLSE FIN          47.29      11.36   4.16  0.000
```

```
S = 0.0530933   R-Sq = 49.0%   R-Sq(adj) = 45.6%
```

Figure 8 All Determinant Variables Testing Result

The combination of all variables both internal and external factors in multiple regressions testing to the NONSH shows consistent result compared to the testing done for each factors. All variables show a positive correlation with NONSH variable.

The summary for each result for equation 2.1, 2.2 and 2.3 is presented in Table 5, to see the changes of coefficient for each predictor.

	2.1	2.2	2.3
ASSET	0.03006		0.02338
	0.00100		*0.00500*
CAR	0.80380		0.89880
	0.00900		*0.00100*
NONDEPOSITSH	0.26474		0.24136
	0.00300		*0.00200*
INFLATION		4.16000	3.78260
		0.00000	0.00000
KLSEFIN		52.54000	47.29000
		0.00000	0.00000

R2	33.30%	19.60%	49.00%
R2 (adj)	30.70%	17.60%	45.60%

Table 5 Summary of Testing Result for Non Interest Income Determinant

When we look at the summary of testing result that shows each equation result, we can see that when all variables are put together in one model, most of coefficient of each variable will decline even though still showing a positive relationship with the share of non interest income, except for CAR variable which show higher than when it is evaluated for each factor group.

The adjusted R square value, which represents the validity of the model constructed, supports the analysis result. The value of 45.60% for adjusted R square as equation 2.3 testing results is common value in financial testing analysis. It means that the model is qualified enough to be used in predicting the non interest income generating activities.

Based on the testing result analysis above, **I reject the null hypotheses below**:

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

All the predictors defined have significant effect to the decision of banking institutions in non interest based income generating activities.

4.4   Bank Performance Determinants

Based on the variables defined in theoretical framework section in previous chapter, descriptive statistic is conducted to provide some summary about the samples and measures. Table 6 shows the result of descriptive statistic

```
Descriptive Statistics: NONSH, NONDEPOSITSH, LOANR, GDPGW, ASSET, EQUITYR, ...

            Total
Variable    Count     Mean   SE Mean     StDev  Variance    Minimum
NONSH          81  0.34963   0.00800   0.07196   0.00518    0.19890
```

```
NONDEPOSITSH      81    0.23429   0.00927   0.08345   0.00696    0.08017
LOANR             81     1.0092    0.0146    0.1311    0.0172     0.8078
GDPGW             81    0.09214   0.00727   0.06539   0.00428   -0.08263
ASSET             81     18.109    0.0827     0.744     0.553     16.763
EQUITYR           81    0.08190   0.00184   0.01652   0.00027    0.05227
ROA               81   0.011799  0.000597  0.005377  0.000029  -0.012067
ROE               81     11.459     0.662     5.954    35.455    -10.960


Variable           Q1     Median         Q3   Maximum  Skewness  Kurtosis
NONSH         0.31447    0.34553    0.39830   0.55755      0.17      0.21
NONDEPOSITSH  0.17534    0.22697    0.28480   0.41692      0.43     -0.33
LOANR          0.9147     0.9725     1.0781    1.4040      1.17      1.00
GDPGW         0.09278    0.10209    0.12694   0.15397     -2.05      3.20
ASSET          17.451     18.082     18.617    19.630      0.22     -0.93
EQUITYR       0.07406    0.07895    0.08892   0.14367      1.14      2.54
ROA          0.008107   0.012326   0.015711  0.022529     -1.09      3.68
ROE             7.480     11.610     15.250    27.350     -0.34      2.35
```

Table 6 Descriptive Statistic of Bank Performance Determinants

Based on what has been described in the theoretical framework section in chapter 3, the first equation defined on the bank performance determinant is tested. The first equation (3.1a) includes the non interest income share component but exclude the funding strategy component.

$$\text{ROA} = \alpha + \beta_1\,\text{ASSET} + \beta_2\,\text{LOANR} + \beta_3\,\text{NONSH} + \beta_4\,\text{GDPGW} + \beta_5\,\text{EQUITYR} + \varepsilon$$

The result of testing analysis of equation (3.1a) is described in *Figure 9*.

```
Regression Analysis: ROA versus ASSET, LOANR, NONSH, GDPGW, EQUITYR


The regression equation is
ROA = - 0.0736 + 0.00469 ASSET - 0.00048 LOANR - 0.0282 NONSH + 0.00896
GDPGW
     + 0.121 EQUITYR
```

```
Predictor        Coef    SE Coef       T      P
Constant     -0.07358    0.01405   -5.24   0.000
ASSET       440.00469  0.0006989    6.72   0.000
LOANR        -0.000477   0.003889   -0.12   0.903
NONSH        -0.028198   0.007364   -3.83   0.000
GDPGW         0.008956   0.006909    1.30   0.199
EQUITYR       0.12069    0.02763     4.37   0.000


S = 0.00402247   R-Sq = 47.5%   R-Sq(adj) = 44.0%
```

Figure 9 Testing Result for Equation 3.1a

When the funding strategy component (NONDEPOSITSH) is excluded, it is found that only ASSET, NONSH and EQUITYR that statistically significant. ASSET has a high coefficient (440.00469) compared to other variables which show that the total assets of the banking institution has a very significant effect in generating high ROA. The bank equity ratio (EQUITYR) which represents capitalization has less significant coefficient compared to asset, but still contributing positive effect toward ROA.

The NONSH variable surprisingly has negative relationship with ROE. It means that the banking institutions ROA is statistically significant with the share of non interest based income generating activity but in negative way. If the share of non interest income increases it tends to lead to the decrease of ROA.

The next step is looking the same composition of equation, using ROE as the representative of bank performance. The equation defined is equation 3.1b.

```
Regression Analysis: ROE versus ASSET, LOANR, NONSH, GDPGW, EQUITYR


The regression equation is
ROE = - 62.8 + 5.01 ASSET - 4.36 LOANR - 30.5 NONSH + 5.73 GDPGW - 24.5
EQUITYR
```

```
Predictor      Coef   SE Coef       T      P

Constant     -62.78     16.05   -3.91  0.000

ASSET       5.0141    0.7987    6.28  0.000

LOANR       -4.362     4.444   -0.98  0.329

NONSH      -30.546     8.415   -3.63  0.001

GDPGW        5.733     7.895    0.73  0.470

EQUITYR     -24.50     31.57   -0.78  0.440


S = 4.59641   R-Sq = 44.1%   R-Sq(adj) = 40.4%
```

Figure 10 Testing Result for Equation 3.1b

From the testing result of the equation (3.1b), as presented in ***Figure 10***, only ASSET and NONSH are statistically significant. ASEETS is still showing positive relationship with the value of ROE. NONSH is also showing negative relationship to ROE. In this case for both relationship to ROA and ROE, ASSET and NONSH showing a same relationship. From the result of negative NONSH shows that diversification on the non interest based income generating activities does not give a positive value to the bank performance.

In equation 3.2a the NONSH variable is taken out and replaced with NONDEPOSITSH.

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

$$\beta_5\,EQUITYR + \varepsilon$$

The result of the testing of equation (3.2a) is described in Figure 8.

```
Regression Analysis: ROA versus ASSET, LOANR, ...


The regression equation is
ROA = - 0.0684 + 0.00405 ASSET + 0.00775 LOANR - 0.0358 NONDEPOSITSH
```

```
       + 0.0140 GDPGW + 0.0744 EQUITYR


Predictor          Coef    SE Coef      T      P
Constant        -0.06837    0.01267   -5.40   0.000
ASSET          0.0040512  0.0005989    6.76   0.000
LOANR           0.007749   0.004370    1.77   0.080
NONDEPOSITSH   -0.035825   0.007008   -5.11   0.000
GDPGW           0.013982   0.006606    2.12   0.038
EQUITYR          0.07437    0.02693    2.76   0.007


S = 0.00378750   R-Sq = 53.5%   R-Sq(adj) = 50.4%
```

Figure 11 Testing Result for Equation 3.2a

Figure 11 show that ASSET is still contributing a positive relationship to the ROA of banking institution. Using this model, the GDPGW shows a positive relationship with ROA and it is statistically significant. It tells us that better macro economy will contribute to a better ROA of banking institutions. The equity ratio is also showing a positive relationship.

Surprisingly, the funding strategy from non interest based funding generating activity shows a negative relationship to the ROA. Similar as the NONSH, diversification of funding for banking institutions contribute a negative effect to the ROA.

The next test is looking at the effect of the ROE, using the equation (3.2b) to compare the result.

```
Regression Analysis: ROE versus ASSET, LOANR, ...

The regression equation is
ROE = - 59.1 + 4.40 ASSET + 6.62 LOANR - 43.9 NONDEPOSITSH + 12.0 GDPGW
      - 80.0 EQUITYR
```

```
Predictor         Coef   SE Coef      T      P

Constant        -59.09     13.93   -4.24   0.000

ASSET           4.3953    0.6584    6.68   0.000

LOANR            6.618     4.804    1.38   0.172

NONDEPOSITSH   -43.894     7.704   -5.70   0.000

GDPGW           12.025     7.262    1.66   0.102

EQUITYR         -79.97     29.61   -2.70   0.009


S = 4.16357   R-Sq = 54.2%   R-Sq(adj) = 51.1%
```

Figure 12 Testing Result for Equation 3.2b

Using ROE as dependent variable creates statistically insignificant for the GDPGW as described in *Figure 12*. While ASSET is still showing positive relationship to the ROE, the EQUITYR shows a negative relationship to the ROE in this regression model.

The NONDEPOSITSH which represents the funding strategy of banking institution shows same result as the testing to the ROA. This gives some finding that non interest based funding activity will give a negative effect to the banking institution performance.

Finally it comes to the equation model where both non interest based income generating activities and non interest based funding activities are put together. Equation 3.3a is used as decomposition of the model.

$ROA = \alpha + \beta_1 \, ASSET + \beta_2 \, LOANR + \beta_3 \, NONDEPOSITSH + \beta_4 \, NONSH + B_5 \, GDPGW + \beta_6 \, EQUITYR + \varepsilon$

The result of this testing is described in *Figure 13*.
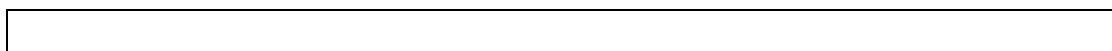
```
Regression Analysis: ROA versus ASSET, LOANR, ...


The regression equation is
ROA = - 0.0804 + 0.00485 ASSET + 0.0104 LOANR - 0.0307 NONDEPOSITSH
      - 0.0208 NONSH + 0.0138 GDPGW + 0.0863 EQUITYR


Predictor            Coef    SE Coef      T      P
Constant          -0.08043    0.01263  -6.37  0.000
ASSET            0.0048545  0.0006248   7.77  0.000
LOANR             0.010370   0.004229   2.45  0.017
NONDEPOSITSH     -0.030731   0.006846  -4.49  0.000
NONSH            -0.020848   0.006774  -3.08  0.003
GDPGW             0.013832   0.006262   2.21  0.030
EQUITYR            0.08631    0.02582   3.34  0.001


S = 0.00359014   R-Sq = 58.8%   R-Sq(adj) = 55.4%
```

Figure 13 Testing Result for Equation 3.3a

From *Figure 13*, we can see that using this model, ASSET, LOANR, GDPGW, EQUITYR show a positive relationship with the ROA. NONDEPOSITSH and NONSH consistently show a negative relationship to the ROA.

Before going to some final discussion, it is important to look at the same equation model for predictors to the ROE of the banking institution.

```
Regression Analysis: ROE versus ASSET, LOANR, ...


The regression equation is
ROE = - 71.4 + 5.22 ASSET + 9.30 LOANR - 38.7 NONDEPOSITSH - 21.3 NONSH
      + 11.9 GDPGW - 67.8 EQUITYR


Predictor          Coef   SE Coef     T      P
Constant          -71.40    14.01  -5.10  0.000
ASSET             5.2157   0.6929   7.53  0.000
LOANR              9.295    4.690   1.98  0.051
```

```
NONDEPOSITSH    -38.692      7.591   -5.10   0.000

NONSH           -21.291      7.511   -2.83   0.006

GDPGW            11.872      6.943    1.71   0.091

EQUITYR          -67.78      28.63   -2.37   0.021


S = 3.98104    R-Sq = 58.7%   R-Sq(adj) = 55.3%
```

Figure 14 Testing Result for Equation 3.3b

Figure 14 presents similar findings as what is found in the testing result of ROA equation model. NONSH and NONDEPOSITSH show a negative coefficient toward the ROE. This shows that diversification activities also give a negative relationship to the ROE of banking institution, same finding on the ROA model. Similar as previous equations, EQUITYR gives a negative relationship to the ROE while ASSET consistently gives a positive relationship towards the ROE.

The last equation is to test the linearity between NONSH and NONDEPOSITSH to the ROA and ROE by putting NONSHSQ and NONDEPOSITSQ to the equation (3.4a and 3.4b). The result is described in *Figure 15* and *Figure 16*.

```
Regression Analysis: ROA versus ASSET, LOANR, ...

The regression equation is
ROA = - 0.0877 + 0.00487 ASSET + 0.0115 LOANR - 0.0310 NONDEPOSITSH
      + 0.0118 NONSH + 0.0142 GDPGW + 0.0911 EQUITYR - 0.0468 NONSHSQ
      + 0.0003 NONDEPOSITSQ


Predictor           Coef    SE Coef       T      P
Constant         -0.08772    0.01616   -5.43  0.000
ASSET           0.0048722  0.0006330    7.70  0.000
LOANR            0.011525   0.004780    2.41  0.018
NONDEPOSITSH     -0.03105    0.02694   -1.15  0.253
NONSH             0.01177    0.04433    0.27  0.791
```

```
GDPGW            0.014161   0.006342    2.23  0.029

EQUITYR           0.09111    0.02698    3.38  0.001

NONSHSQ          -0.04679    0.06261   -0.75  0.457

NONDEPOSITSQ      0.00026    0.05494    0.00  0.996


S = 0.00362482   R-Sq = 59.1%   R-Sq(adj) = 54.6%
```

Figure 15 Testing Result for Equation 3.4a


```
Regression Analysis: ROE versus ASSET, LOANR, ...


The regression equation is
ROE = - 89.4 + 5.26 ASSET + 12.1 LOANR - 41.3 NONDEPOSITSH + 60.9 NONSH
      + 12.7 GDPGW - 55.6 EQUITYR - 118 NONSHSQ + 4.6 NONDEPOSITSQ


Predictor        Coef  SE Coef       T      P
Constant        -89.41    17.62   -5.08  0.000
ASSET           5.2565   0.6901    7.62  0.000
LOANR           12.068    5.211    2.32  0.023
NONDEPOSITSH    -41.34    29.37   -1.41  0.164
NONSH            60.89    48.33    1.26  0.212
GDPGW           12.713    6.914    1.84  0.070
EQUITYR         -55.59    29.41   -1.89  0.063
NONSHSQ        -117.82    68.25   -1.73  0.089
NONDEPOSITSQ      4.59    59.89    0.08  0.939


S = 3.95179   R-Sq = 60.4%   R-Sq(adj) = 56.0%
```

Figure 16 Testing Result for Equation 3.4b

The interpretation of the linearity test, between NONSH and NONDEPOSITSH based on the result shows an insignificant result.

The summary of the equation testing result from (3.1a) – (3.1b), to have an overall analysis of the findings is presented in Table 7.

	3.1a	3.1b	3.2a	3.2b	3.3a	3.3b	3.4a	3.4b
ASSET	440.00469	5.0141	0.0040512	4.3953	0.0048545	5.2157	0.0048722	5.2565
	0	*0*	*0*	*0*	*0*	*0*	*0*	*0*

LOANR	**-0.000477**	**-4.362**	**0.007749**	**6.618**	**0.01037**	**9.295**	**0.011525**	**12.068**
	0.903	*0.329*	*0.08*	*0.172*	*0.017*	*0.051*	*0.018*	*0.023*
GDPGW	**0.008956**	**5.733**	**0.013982**	**12.025**	**0.013832**	**11.872**	**0.014161**	**12.713**
	0.199	*0.47*	*0.038*	*0.102*	*0.03*	*0.091*	*0.029*	*0.07*
EQUITYR	**0.12069**	**-24.5**	**0.07437**	**-79.97**	**0.08631**	**-67.78**	**0.09111**	**-55.59**
	0	*0.44*	*0.007*	*0.009*	*0.001*	*0.021*	*0.001*	*0.063*
NONSH	**-0.028198**	**-30.546**			**-0.020848**	**-21.291**	**0.01177**	**60.89**
	0	*0.001*			*0.003*	*0.006*	*0.791*	*0.212*
NONDEPOSITSH			**-0.0358**	**-43.894**	**-0.030731**	**-38.692**	**-0.03105**	**-41.34**
			0	*0*	*0*	*0*	*0.253*	*0.164*
NONSHSQ							**-0.04679**	**-117.82**
							0.457	*0.089*
NONDEPOSITSQ							**0.00026**	**4.59**
							0.996	*0.939*

R2	47.50%	44.10%	53.50%	54.20%	58.80%	58.70%	59.10%	60.40%
R2 (adj)	44.00%	40.40%	50.40%	51.10%	55.40%	55.30%	54.60%	56.00%

Table 7 Overall Summary of Bank Performance Determinants

From, Table 7 it is found that ASSET consistently contributes a positive relationship to the bank performance which shows similar findings with other research on banking institution performance. The most important findings from these several tests are the result from bank diversification testing. For both non interest based income generating activities and also non interest based funding strategy show a different results with what it is expected in the theory on diversifications.

Figure 17 shows on how the share of non interest based income generating activities and share of non interest based funding strategy interacts each other. From the figure, it presents how non interest based income generating activities and non interest based funding generating activities move negatively with bank performance.
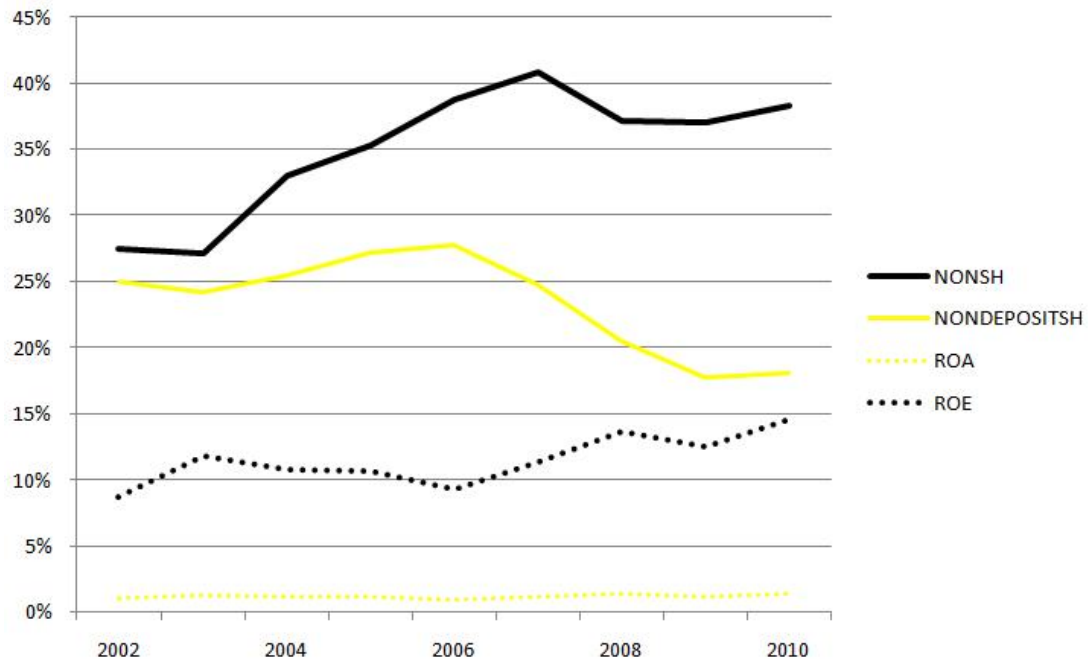
Figure 17 Diversification and Bank Performance Trend

This research findings, however shows a different result with Kunt (2010), as in his research it is presented that non interest based income generating activities and non interest based funding strategies have positive relationship with bank performance.

The similar reason with the analysis of non interest income determinant in previous section proves that Malaysian banking institutions are not really going to the diversification towards non interest based income generating activities due to the market condition.

From the finding and analysis above, **I shall reject all the null hypotheses below:**

$H0_5$:   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

Non interest based income generating activities and non interest based funding strategy contribute a significant effect to the banking institution's return on asset and also return on equity but in negative way.