THE DYNAMIC RELATIONSHIP BETWEEN INFLATION AND NON-PERFORMING PROPERTY LOANS IN MALAYSIA

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ABSTRACT

As costs of services and goods rise in Malaysia while income levels remain low and unemployment rises, there is significant concerns on the rising amount of non-performing property loans that seems to have a close relationship with inflation. Hence, it had been assumed by many where inflation leads to higher non-performing property loans, as a result of rising living costs that cause repayment defaults. In fact, recent findings from various countries across Asia had shown that higher levels of inflation tend to contribute positively to the increase of non-performing property loans. This study is to determine the effects of inflation on non-performing property loans in Malaysia during a unique economic period from 2010 to 2015, where NPLs, which had been declining since 2010 observed its first increase in 2015 after a consistent 5 year decline. This economic occurrence hence, offers a great opportunity of research into the economic observation of 2015 respectively. While there had been studies conducted on non-performing loans, there had been little light shed on the effects of inflation upon non-performing property loans specifically. The method adopted is applying Cointegration test and the Vector Error Correction Model (VECM), as well as Heteroskedasticity Tests, to validate the results in VECM. The results showed that there is a significant co-integration and relationship between non-performing property loans and inflation, lauding long run afflictions upon the real estate market which if not carefully monitored, may result in more property NPL delinquencies in Malaysia.

Keywords: Inflation, Consumer Price Index, Non-Performing Property Loans, Co-integration, Vector Error Correction Model, Heteroskedasticity Test

1. INTRODUCTION

Due to the dynamic evolution of macroeconomic conditions, researchers, economists, regulators and central banks are concerned with the channelling of accurate and prudent monetary policies in addressing the problem of non-performing loans or NPLs (IMF, 2020; ESRB, 2019). Monetary policies are crucial in prevention of an economic crisis (Glickman, 2014). While monetary policy can affect every sector of the economy and mitigate NPLs, it is also true that conditions of various sectors of the economy affect the implementation of monetary policy (Fendi, et al., 2017; Shrestha, 2008). Therefore, central banks need to properly assess the existing situation and monitor carefully each and every development taking place in the economy for credible monetary policy management. This calls for the need of Macroeconomic Surveillance in determination of monetary policy. Based on the information on the current state of the economy and the likely future developments, appropriate measures can be recommended to achieve monetary policy objectives consistent with various macroeconomic goals (Fendi, et al, 2017).

It had been found as early in the 19th century where rising inflation is one of the major macroeconomic factors identified to causing a rise of NPL that leads to banking crises (Demirguç-Kunt 1998). This had still been in relevant and prevailing in modern economics where Inflation had shown to produce contrary effects on NPLs. While inflation had been found to affect interest rates, it may improve the ability of borrowers to pay off the remaining balance due to the diminishing value of the debt (Beck et al, 2013). However, other studies tend to support the inference where interest rates, has a positive relationship with the NPLs (Mazreku, 2018; Klein, 2013; Dash, 2011; Julia, 2010). High interests' rates resulted in high levels of non-performing loans. The literature suggests that in general, during the long run, loan contracts adjust to inflation, which is captured by the interest rates and thus, reduces the risks of non-performing loans.

In Malaysia, inflation was found to have a significant positive impact on the NPLs in Islamic financial institutions (Adebola 2011). However, there are little studies that had been conducted in Malaysia concerning implications of inflation on specifically property NPLs. This study is crucial to describe the real estate market performance concerning the causal relationship between inflation and property NPLs in Malaysia.

Table 1.1: Changes in Property NPLs Year on Year Basis in %

Year	Total Property NPLs (RM Mill)	Changes in Property NPLs (%) YoY
2009	49,833.25	NIL
2010	39,385.82	-20.96477
2011	33,769.17	-14.26058
2012	29,052.51	-13.96735
2013	26,612.00	-8.400341
2014	25,173.96	-5.403727
2015	26,849.10	+6.654257

Source: Analysis base on reports by Central Bank of Malaysia (Bank Negara Malaysia, 2018)

As seen in Table 1.1, the rising of property NPLs in Malaysia was observed for the first time in 2015, of 6.65% increment after a long decline. This economic observation offers a unique opportunity of research in order to identify the causality and relationship between inflation and property NPLs in Malaysia. This will help to explain how inflation affects the property NPLs in Malaysia. Knowing the dynamics of relationship between inflation and non-performing property loans allow governments to focus and understand the relevant significant macroeconomic factors in an effort to curb the rising number property NPLs in Malaysia.

The first section of this article introduces the background of the study; second section examines the review of previous studies on inflation and non-performing property loans; third Section outlines the econometric methodology and fourth Section discussed the results and findings. Lastly, the fifth Section concludes the paper and provides recommendations to policymakers.

2. LITERATURE REVIEW

Inflation and Non-Performing Loans

Inflation happens as prices of various products and services rise over a period of time (Abel 2005). In modern times, a working paper by the International Monetary Fund supported the theory where a high inflation on NPL may be either positive or negative (IMF, 2016). Should income levels remain fixed or unchanged, higher inflation reduces the ability of property purchasers to meet their debt obligations, contributing to a rise of property NPLs. Should income levels remained fixed or unchanged, lower inflation increases the ability of property purchasers to meet their debt obligations. This is due to better cashflows and purchasing power as a result of lower inflation (IMF, 2016). Inflation affected non-performing loans significantly. Higher lending costs leads to a rise of NPLs because inflation affects cashflow of borrowers, resulting in difficulties in repaying their debt obligations. However, on the other hand, should inflation happens while income and wages increase, inflation could benefit the borrower. Healthy inflation as a result of higher income allows a borrower to repay their loans and principle sum, effectively reducing the amount of interests payable.

In a declining economy and rising inflation, a study conducted in Poland and Hungary found that non-performing loan rises which contributed to banking crises (Festic, 2005). This is on par with one of the early prevailing studies on the implications of adverse economic growth and rising inflation which ultimately led to a rise of NPLs in banking crises (Demirguç-Kunt 1998). Due to inflation, price of goods such as property prices will increase, causing the need of additional credit to purchase these properties. Should income and wages remains fixed, financial institutions will benefit from the interest rates charged on the higher value of properties. If people are spending more money due to an increase in the cost of living, they have less money to settle or meet their debt obligations, especially

when wages remain fixed or do not increase as inflation happens (Castro, 2012). As consumers or debtors require more time to settle or meet their previous debt obligations, financial institutions profit from the higher collection of interests. This may backfire, resulting in higher default rates of NPL.

However on the flip side, inflation may enhance debt servicing capacity by diminishing value of the debt or outstanding principal sum, affecting the non-performing loans. Real debt services decline with higher inflation, driving down the non-performing loans (Klein, 2013). Hence, inflation may potentially diminish the debt principal amount, assisting with the decrease of property NPLs through higher repayments.

In Central and the Eastern Europe, a study conducted on various economies including Czech Republic, Slovenia and Hungary found that inflation is significantly affecting non-performing loans (Klein, 2013). It was found that loan defaults are affected by quality of banking assets and macroeconomic factors including inflation. At the same time, the study shows that bank specific factors yielded a lower descriptive power as compared to macroeconomic factors like inflation. The impact of inflation is not just observed in Europe, but in other parts of the glove as well. In Nigeria, inflation is found to be one of the significant macroeconomic factor that affected non-performing loans (Chimobi, 2010). This is also observed in Kenya where reduced consumer buying ability as a consequence of inflation was found to cause non-performing loans (Imbuga, 2014). Interestingly, as compared to the usual implications of inflation on NPLs, a study conducted in Pakistan found that inflation has an impact on loan defaults in both positively and negatively. It was discovered that inflation led to a decrease in NPLs from 2002 to 2008, but then led to an increase from 2008 to 2011 (Khan, 2011).

In Malaysia, while many studies focus on Endogenous Factors in affecting NPLs, there are very little studies on Macroeconomic Factors and their impact on NPLs. In the study of Macroeconomic Factors and NPLs, one of the very few studies being conducted is that of Mustafa and Ali (2019), who studied macroeconomic factors in Malaysia from 1998 to 2018 and their influence on commercial bank NPLs using economic output, inflation and unemployment. Out of the three macroeconomic factors, only economic output and Unemployment were found to be significant and correlated with NPL fluctuations. Inflation on the other hand, has no correlation. Moreover, the study is different as it focuses on the NPLs of commercial banks, while this research focuses on non-performing property loans of all types of lending institutions in Malaysia, both Islamic and Conventional Banks (Mustafa & Ali, 2019). Another study conducted by Zainol, et al. (2018) on Macroeconomic Determinants of NPLs in Malaysia was done using the ARDL Approach. The study incorporates Gross Domestic Product, Base Lending Rate, Inflation and Household Income Distribution (Zainol, et al., 2018). The study found that inflation is insignificantly negative towards NPL. Both of these studies, while similar, possess different periods of economic observation. Moreover, both studies did not focus on the NPLs of all types of financial institutions with a focus on property which are significantly different from other NPLs.

There is inadequate research on the overall non-performing property loans of all types of financial institutions in Malaysia. When it comes to real estate loans, there is no distinction when it comes to real estate loans as failure in either the Islamic or Conventional Banks would affect the health of the real estate finance system. Hence, this is another gap that this research can fulfil where it focuses on the overall NPPLs of all types under both commercial and Islamic banks alike. Due to the nature of the ever changing macroeconomic conditions and the increasing number of NPLs in Malaysia, the effects of inflation on property NPLs in Malaysia warrants research and focus on the subject matter, in order to understand its dynamic relationship.

3. METHODOLOGY

In order to understand the implications of inflation on property NPLs in Malaysia, it involves an experimentative quantitative research approach. This is purely quantitative which is regarded as a positivism view, making use of the numerical measurement of observations and statistical analysis of data (Johansen & Juselius, 1990). The data analysis technique used is of Cointegration test and the Vector Error Correction Model (VECM) which helps to measure the significance and dynamic implications of inflation on property NPLs. The results of the data analysis is then validated using Heteroskedasticity Tests to rule out spuriousity. This is due to the fact that economic data such as inflation in this study, and statistical approaches are reliable, able to be replicated, and their reality is able to be explained. This is highly relevant in order to analyse the different observations of the property NPL performance and various time points, and to be able to infer the changes and differences of these observations to infer the performance of property NPLs in Malaysia overtime.

3.1 Source of data

The source of data for this research is purely secondary in nature. Economic data such as Inflation and Non-Performing Property Loans is obtained from the Central Bank of Malaysia Bulletin Reports from 1997 to 2018. Specifically Consumer Price Index is extracted (Bank Negara Malaysia, 2018).

3.2 Data analysis technique

3.2.1 Checking for non-stationary via Dickey-Fuller Test

A stationary test is conducted using the Dickey Fuller Test. This test is used to test for the suitability of the inflationary and non-performing property loans data collected for time series analysis.

The economic key data of non-performing property loans and inflation was analysed and necessary differentiations were done by logging with natural bases of the exponential. The formula can be seen as follow:-

$$\Delta y_t = a + \beta t + \gamma y_{t-1} + \delta_1 \Delta y_{t-1} + \ldots + \delta_{p-1} \Delta y_{t-p+1} + e_t$$

Where
a = constant,
β = coefficient on a time trend
p = lag order of the autoregressive process.

Stationary tests are conducted on the property NPLs and inflation data based on their differences respectively on critical values of 1%, 5%, and 10%. The data is then differentiated for a second result until all of the data are stationary, so that its critical value is less than 5%.

3.2.2 Co-integration

There is a need to test for co-integration as a linear combination of inflation and non-performing property loan may be non-stationary (Dougherty, 2011).

The long-run relationship between inflation and non-performing property loans in Malaysia is conducted using the Johansen-Jeselius maximum likelihood cointegration analysis. This can be seen as follow:-

$$y_t = \mu + \Delta_1 y_{t-1} + \ldots + \Delta p y_{t-p} + \varepsilon_t \ldots$$

Where:
yt = non-performing property loans,
$nx1$ = vector of variable that are integrated order commonly denoted (1)
İ = $nx1$ vector of innovations.

3.2.3 Vector error correction model

A vector error correction model is further conducted since the equation in this test is of a single equation. It allows short and long term view of the strengths of the model between non-performing property loans and inflation in Malaysia.

4. RESULTS AND DISCUSSION

4.1 Stationary tests

The variables of Non-performing property loans and inflation had been tested for its stationary to ensure the suitability for a time series analysis. The results are stationary, with ($p>0.05$), rejecting null hyphothesis of non-

stationary.

The results for the stationary tests can be seen in Table 4.1 and 4.2 as follows:-

Table 4.1: Augmented Dicker-Fuller Unit-Root Test at Level for Inflation (Consumer Price Index or CPI)

Symbol		t-Statistic	Prob.
CPI	Level	-2.714	0.0766
Test Critical Values	1%	-3.524	
	5%	-2.902	
	10%	-2.589	

Table 4.2: Augmented Dicker-Fuller Unit-Root Test at Level for Non-Performing Property Loans (NPHL)

Symbol		t-Statistic	Prob.
NPHL	Level	-2.582	0.1014
Test Critical Values	1%	-3.524	
	5%	-2.902	
	10%	-2.588	

Table 4.1 and 4.2 shows that the results of stationary tests for Inflation (CPI) and Non-performing Property Loans (NPHLs) respectively, where both are not stationary at level of 5% confidence significance, with p=0.076 for CPI, and p=0.1014 for DNPHL respectively. Hence, first difference is obtained to ensure the data are stationary.

Table 4.3: Augmented Dicker-Fuller Unit-Root Test at First Difference for Inflation (Consumer Price Index or DCPI)

Symbol		t-Statistic	Prob.
D(CPI)	Level	-5.783	0.0000
Critical Values	1%	-4.091	
	5%	-3.473	
	10%	-3.164	

Table 4.4: Augmented Dicker-Fuller Unit-Root Test at First Difference for Non-Performing Property Loans (DNPHL)

Symbol		t-Statistic	Prob.
D(NPHL)	Level	-3.478	0.0082
Critical Values	1%	-4.100	
	5%	-3.478	
	10%	-3.167	

Table 4.3 and Table 4.4 then shows the significance level for stationary at first difference for CPI and NPHL. Both variables are stationary at first difference at p=0.000, p<0.05 for D(CPI) and p=0.0082, p<0.05 for D(NPHL) respectively, showing significance at 5% (p<0.05).

4.2 Co-integration results

Using Unrestricted Cointegration Rank Test of Trace and Eigenvalue, the variables in the model which are not stationary in its raw form, are cointegrated. The co-integration results can be seen in Table 4.5 and 4.6 respectively.

Table 4.5: Unrestricted Cointegration Rank Test (Trace) between Inflation and NPHL

Hypothesized No. of CE(S)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.***	
None*	0.549338	62.1650	15.4945	0.0000	Trace test
At Most 1*	0.122608	8.7637	3.8414	0.0031	

indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 4.6: Unrestricted Cointegration Rank Test (Eigenvalue) between Inflation and NPL (Property)

Hypothesized No. of CE(S)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.***
None*	0.549338	53.4015	14.2646	0.0000
At Most 1*	0.122608	8.7637	3.8414	0.0031

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

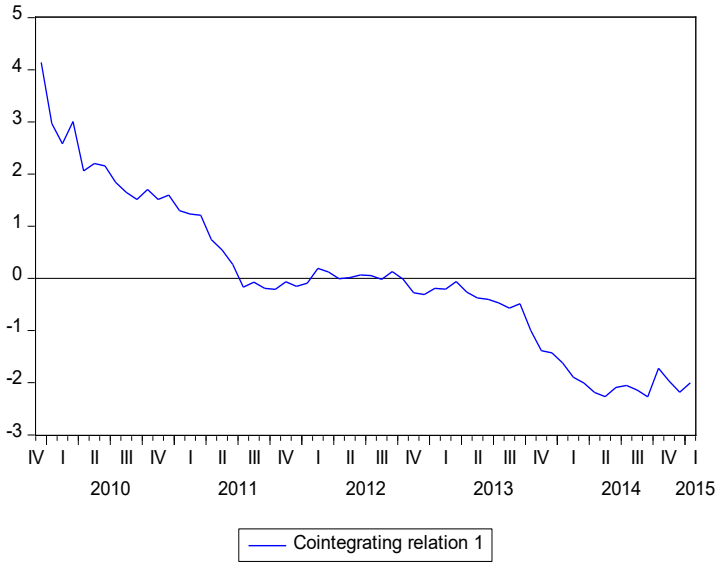

Figure 4.1: Co-integration Graph Between Inflation and Non-Performing Property Loans

Table 4.5 and 4.6 shows the Unrestricted Cointegration Rank Tests where although non-performing property loans and inflation are non-stationary, they are still appropriate and relevant to be used in this analysis, by the first difference of their respective state. They are also co-integrated. Hyphothesis is rejected due to T-Stat of 53.4015 is larger than the critical value of 14.2646, and that the probability is <0.05, being significant in the Eigenvalue Co-integration Rank Test. There is a long run relationship between inflation and non-performing property loans in Malaysia. Hence, this analysis is extended to observe the long run equilibrium via the multivariate vector error correction model.

4.3 VECM results

The VECM of Malaysian inflation and non-performing property loans is significant. The results show that the system corrects its last period of disequilibrium and significant adjustment as indicated in the Table 4 below.

Table 4.8: VEC Results

Co-integrating Equation	CointEq 1
NPL (-1)	1.000000
DCPI (-1)	-5.597711
	(1.13864)
	[-4.91613]
C	-8.147216

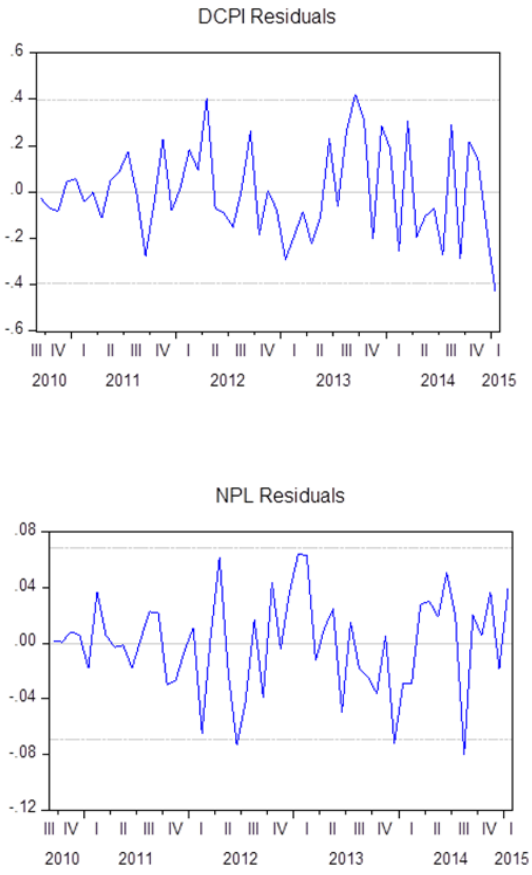

Figure 4.7: VEC Residuals Graph

4.4 Model fit

The R-squared value of the model was 0.6947 shows a good overall fit of the equation model. 69.47% of variation in the dependent variable that is non-performing property loans is caused by variation in Inflation.

To test overall goodness of fit, checking for heteroscedasticity is needed. This can be seen as follow:-

Table 4.9: VEC Residual Heteroskedasticity Test: No Cross Terms (Only Levels & Squares)

Chi Sq	df	Prob.
84.2354	66	0.0645

Hence, Heteroskedaticity is ruled out due to the probability of the Chi Sq > 0.05 (0.0645 in this case). The model formed is stable and non-spurious.

5. CONCLUSION

The study was conducted to examine the dynamic relationship beween non-performing property loans and inflation in Malaysia in both short to long term periods. The study employed the methodology of cointegration and vector error correction model. The statistical findings showed significant and long term relationship between non-performing property loans and inflation in Malaysia. During the period of economic stability and recovery, this study suggests that inflation is an impetus to the rise of non-performing property loans in Malaysia which would affect both

short to long term periods as shown by the co-integration and vector error correction model. With these findings in hand, the Malaysian government and Bank Negara Malaysia should incorporate inflation in its macroeconomic surveillance programs when addressing defaulting property loans so that accurate and prudent monetary policies can be channelled in consistent with international economic watchdogs (Bank Negara Malaysia, 2017; IMF, 2020; ESRB, 2019).

For future research, this study enables further tests to be conducted involving national income levels and unemployment with reference to the non-performing property loans together with this existing study of inflation to provide a more holistic view of the impact of macroeconomic factors on property NPLs in Malaysia. This will further help the Central Bank of Malaysia in assessing future loan defaults and controlling the increasing non-performing property loans in the Malaysian economy.

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