IJEM
International Journal of Economics and Management
Journal homepage: http://www.ijem.upm.edu.my

The Role of the Bank Lending Channel of the Monetary Policy on Bank Behavior

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ABSTRACT

The pass-through policy rates to bank lending channel is an essential topic. This study intends to analyze the role of the bank lending channel of the monetary policy on its behavior. We will also examine the impact of monetary policy, market interest rates, and risk weighted asset on the average rates using 20 commercial banks between 2008 and 2015 in Malaysia. The General Method of Moment (GMM) proposed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998) have been used in this study. Our main finding is that credit risk on loans and time deposit are important influences on the decision rate, average interest rate on loans, and time deposit. We found that market rates on time deposit, and policy rate are statistically significant influence the average interest rate on time deposit. We have also proved that higher risk loans are negatively correlated to the average rate on loans.

JEL Classification: E52, G21
Keywords: Bank behavior; Bank lending channel, , Basel II, Monetary policy

Article history:
Received: 13 July 2018
Accepted: 21 October 2018

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INTRODUCTION

The global financial crisis highlighted the fact that the finance sector is central towards transmission shocks and providing credit for global economic activities. During this period, monetary policy is considered as the main tool that policy makers relied on in their attempts to create growth. These evolutions have demonstrated the requirement for deciding on the necessary regulations on banks and the necessity of a good understanding of the determinants of the bank lending response to monetary policy. The real economy is influenced by interest rate/money channel and credit channel in monetary transmission channels. Interest rate channel assumes that there are no financial market flaws, and firms, households, and banks are indifferent towards bank loan or bond via the assumption of non–monetary financial assets. Due to the fact that interest rate channel is unable to create loan it instead became the origin of credit channel, which resulted in the assertion of market flaws in the mechanism of monetary transmission. The theoretical framework for the bank lending channel was laid down by Bernanke and Blinder (1988). They added a single assumption in the money channel, called "bank loans", which is imperfectly substitutable with the other two assets (Bernanke, 1993). The credit channel has an active role in supplying bank loans based on the assumption of informational imperfections in financial markets (Benkovskis, 2008). The following conditions must be satisfied for bank lending channel to operate: (Cecchetti, 1995; Kashyap and Stein, 1994; Kashyap et al., 1992; Juks, 2004; Jimborean, 2009; Oliner and Rudebusch, 1995; Oliner and Rudebusch, 1996b): First, monetary policy must affect the banks' credit supply when central banks control and conduct an open market sale to decrease aggregate demand drains bank reserves from the system. Bank liabilities (deposits) and assets decrease due to the reduction of the banks' reserves. Second, there must be borrowers that are reliant upon bank loans. Banks play an important role in the financial system, because they are exceptionally suitable in overcoming informational problems in the credit market. Borrowers will be able to attain credit markets only if they receive loan from banks (Mishkin, 2010). Therefore, the reduction of credit size created by the banking system needs to have significant macroeconomic outcomes (Bernanke, 1993; Claus and Grimes, 2003). In order for this condition to hold, the relation of perfect substitutes between bank loan and other to financing means in firms' balance sheets must be absent. In other words, in order for firms finance their investment project, they should not be any difference between issuing securities and receiving loans.

The new Basel accord, which is referred to as Basel II, seeks to better align regulatory capital with economic risk, also sometimes called the economic capital. Minimum capital requirement under Basel II established for capital on more risk sensitive basis on credit risk, operational risk and market risk. The capital charges of Basel II are based on asset quality instead of on types of asset. Banks will be able to choose several approaches. The standardized approach is based on the borrower's public ratings by attributing specific risk weights to the respective rating classes. More sophisticated banks will be eligible for the two internal ratings based approaches (IRB), which permit the use of the banks' own internal rating systems to quantify the creditworthiness of their debtors. As in the old framework, total capital charges are 8% of risk-weighted assets. It is worth noting that the Basel Committee apparently believes that capital charges will on average stay at the current level. The new Basel Accord is widely recognized as a much needed effort to deal with the shortcomings of the current system. By realigning capital adequacy rules with banks' incentives, they aim to restore the link between risk and capital holding. Nonetheless, a number of questions have been raised by central banks, regulators, and practitioners on the impact of a more risk-sensitive regulatory framework on macroeconomic stability. There is the issue of the potential pro-cyclical effects of the new capital adequacy requirements, i.e. the possibility that, during periods of weak economic growth, the rise in regulatory requirements implied by deterioration in the risk profile of banks' assets might lead to a reduction of credit supply, thus reinforcing the weakening of the macroeconomic conditions.

A widespread concern about the new risk-sensitive bank capital regulation, known as Basel II, is that it might amplify business cycle fluctuations, which will force banks to restrict their lending when the economy goes into recession. Even in the old regime of essentially flat capital requirements of the 1988 Basel Accord (Basel I), bank capital regulation has the potential to be pro-cyclical, because bank profits may turn negative during recessions, which will impair its lending capacity. Additionally, the capital requirements prescribed by the Internal Ratings Based (IRB) approach of Basel II are an increasing function of banks' estimates of the probability of default (PD) and loss given default (LGD) of each loan, and these inputs are likely to increase in downturns. So, the concern about Basel II is that the increase in capital requirements during downturns might induce shrinkage of bank loan supply. Banks invest on loans and securities and obtain funds from their own capital and deposit. They claim that regulatory capital requirement, which has been imposed by Basel II, has bounded them. Therefore, this paper

studies the impact of monetary policy on bank lending behavior under Basel II regulatory framework using a dynamic model of bank lending channel. Specifically, in this study we will test the effect of high and low risk loans on the optimal rates loans as we focusing on three types of loans.

Specifically, the research questions of this study are; first what are the relationship between monetary policy and bank behavior under Basel II regulatory constraint? Second, what are the impacts of risk weighted assets on the average rates of banks due to the change in monetary policy and Basel II on Malaysian banks? The main objectives of this study are: first, to examine the relationship between monetary policy and bank behavior under Basel II regulatory constraint. Second, specifically, this study intends to analyze the role of risk weighted assets on the average rates of banks due to the change in monetary policy and the Basel II regulatory constraint on Malaysian banks.

The main contributions of this study are to extend the analysis of the impact of banks' rate on the monetary policy, market rates and regulatory capital constraint in dynamic model. We extend a study done by Said (2013) by analyzing the dynamic of bank lending channel under Basel II and estimating the banks' risk weights on three types of loans which are residential mortgage loans, consumer/retail loans and corporate and commercial loans on optimal rates on loans, also we will estimate banks' risk weights on securities on optimal rate on time deposits for the period from (2008 to 2015) , which makes the research contributes from those used by Kishan and Opiela (2000), Kashyap and Stein (2004) , Jacques (2008) and Said (2013). In Malaysia context, up to my knowledge, this study has been the latest to analyze the impact of monetary policy on the dynamic of bank lending channel under the Basel II regulatory constraints. Said (2013) studied the dynamic of bank lending channel under the Basel I.

The rest of article will include four parts. The first is briefly introduces the relative studies which have been done about the topic. The following part discussed the research methodology. Then the next part will presents the empirical result. The final part will include the conclusion and the policy implication.

LITERATURE REVIEW

Bank lending channel (BLC) theory proposes that the effects of monetary policy extend beyond loan supply to banks. Traditionally, central banks rely on the BLC when (1) banks have limited access to non-deposit financing, that is, they lack other sources of external funding than deposits after the central bank tightens its monetary stance; and (2) enterprises are heavily dependent on bank lending, specifically, they lack alternative sources of financing when the central bank tightens its monetary stance. Lending is considered a major function of banks, and is its main source of income. However, most banks, in the course of lending, incur bad debt or non-performing assets, which lead to losses and affecting it profitability. This is attributable to noncompliance with lending principles and practices from banking officials (Yushau, 2001).

Banks play a significant role in modern banking, and it's considered the most important enabler of financial transactions, as well as the principal source of credit in any country's economy (Rose, 2002). They are the custodians of a nation's money, which are accepted in the form of deposits and paid out on the client's instructions. Lending, which is a fundamental function of the activities of the banking sector, involves the allocation of funds by a bank to a customer at a cost (interest), repayable within a stipulated time. Moreover, bank lending channel is based on the view that banks play an important role in the financial system as external sources of financing for firms. Due to its special role, certain borrowers will be highly dependent on bank loans, and will not have access to credit markets unless they borrow from banks. This is because any changes in the monetary policy stance will affect the banks' behavior in both asset and liabilities. For instance, a tight monetary policy will drain the reserves from the banking system, and the bank, in turn, will restrict the supply of loans, leading to a decline in investment spending and a fall in economic activity (output).

In discussing the theoretical background of dynamic of bank lending channel, this study will focus on the model developed by Said (2013), Kishan and Opiela (2000), and Baglioni (2007). The idea that banks may be subject to financial frictions is also reported by others. For example, Kashyap and Stein (1995) and Stein (1998) argue that these frictions can give rise to a balance sheet channel for financial intermediaries, just as for ordinary firms. The specific frictions in Kashyap and Stein's model, which give rise to the lending channel, are different from the ones reported in this paper, but in both cases the implication is that economic shocks, such as monetary policy actions, can affect the supply of bank loans at least in part through their effect on the quantity of some bank liabilities. A further study by Kashyap et al. (2000) divided banks by two categories, namely asset and liquidity

size, and found that the smallest most illiquid banks were most responsive to monetary policy shocks. These findings are supported by Kishan and Opiela (2000), by dividing banks according to the size and capital strength. Kishan and Opiela (2000), Baglioni (2007) and Honda (2004) use a static model of bank lending channel under the old Basel Accord. Moreover, Jacques (2008), Ahmad (2006) and Kashyap and Stein (2000) introduced, in the analysis, the adverse macroeconomics effects of Basel, especially with its pro-cyclicality and its neglect of endogeneity of financial risk. Jacques (2008) develops a theoretical model to examine how commercial loans of varying credit quality are likely to respond to an adverse capital shock under the revised Accord. As a result of his study with the increased differentiation of credit risk loans introduced by the Basel II, low credit risk loans may actually increase. Ahmad (2006) found that the new capital requirements can have both good and bad effects on the targeted financial institutions and markets. This is well documented in literature, where most studies related to the credit channel are focused on bank aggregate data. For example, Bernanke and Blinder (1992) used innovation in 3-month Treasury Bills rate to capture exogenous shifts in monetary policy, and the result suggested an inverse relationship between bank loans and tight monetary policy, which supports supported the credit channel view in the US economy. However, Ashcraft (2006) questioned the existence of BLC in the US experience. When using bank data, he identified a differential response of loan supply to changes in the Federal Fund Rate (FFR) across banks. However, when he aggregated the bank data up to the state level, the loan market share of affiliated banks tends to mitigate the negative response of loan supply to changes in monetary policy. In addition, the aggregate elasticity of output to bank lending is very small (insignificant). The same conclusion has been found from studies on the UK economy and the EU. For instance, Altunbas et al. (2002) reported the important role of BLC in Italy and Spain, while Huang (2003) shows that a BLC works in the UK by reducing banks loans to small bank dependent firms. Moreover, Bolton and Freixas (2001) and Meh and Moran (2004) analyze the monetary transmission mechanism in the context of such a 'market-based' capital requirement. Though the mechanisms are different, both studies agree that contractionary monetary policy adversely affects the bank profitability, which worsens the agency problem between banks, and their fund supply lead to a decline in lending. Craig Furfine (2001) showed and estimated a dynamic bank model with capital adequacy regulations, captured through an exogenously specified cost function of the risk-based capital ratio and the leverage ratio. The capital requirements and prudential regulation of banks, in general, has been explored extensively. Ronald et al. (1993) found that capital requirements arise naturally in the presence of an agency problem between a bank and a public deposit insurance system. Employing the incomplete contract paradigm, Mathias and Tirole (1994) argue that prudential regulation, in general, can be viewed as a representation of small depositors, and due to a free rider problem, cannot be expected to intervene as effectively as large bondholders.

There is a recent study by Boivin et al. (2010), reviewing the empirical evidence on the changes in the effects of monetary policy actions on real activity and inflation. They presented new evidence involving the usage of both a relatively unrestricted factor–augmented vector auto-regression (FAVAR) and a Dynamic Stochastic General Equiblirium (DSGE) model. They found notable changes in policy behavior with policy more focused on price stability and in the reduced form correlations of policy interest rate with activity in the US. Both approaches yield similar results. Moreover, under the competitions on the asset side, Repullo and Suarez (2004) argue that banks eligible for the IRB approach have a competitive advantage in the provision of low-risk loans (the IRB approach has a lower capital requirement), while on the other hand, the less sophisticated banks have a competitive advantage in the provision of high-risk loans (the standardized approach has a lower capital requirement).

In the Malaysian context, there are several studies examining the existence of the bank lending channel by using aggregate data, such as Said and Ismail (2008) and Abdul Karim et al. (2011). Said and Ismail (2008) analyzed the static model of the bank lending channel, and found that there is a bank lending channel in Malaysian by using bank level data of 1994 - 2004. Abdul Karim et al. (2011) investigated the dynamics of bank lending channel of Malaysia using a disaggregated bank level data set. They empirically found that monetary policy shocks are significantly and negatively influenced the banks' loan supply. However, both studies identified loan supply shocks via banks' quantities instead of prices. In addition to the latest Malaysia study on firm-level investment and monetary policy, Abdul Karim et al. (2013) focused on two main channels of monetary policy transmission mechanism, namely, the interest rate and broad credit channels. The results support the both interest rate and broad credit channels in influencing investment spending. The result also found that the effect of monetary policy channels on firm investment is heterogeneous, such that small firms are more responsive to monetary tightening when compared to large firms. The closest study on this was conducted by Said (2013), who found that market rates on loans and policy rates are important influences on average rates of bank's loans. Her study focused on the

dynamic of bank lending channel under the old Basel accord. However, our study extends her research by focusing the impact of dynamic bank lending channel under the new Basel accord (Basel II).

Another studies conducted by Angeloni et al. (2010) focused on macro data and showed time series evidence for the EU and the US on the effect of monetary policy on measures of bank's leverage and balance sheet risk. They found robust evidence for the US than for the EU on the negative effect of monetary policy on bank risk. Jiménez et al. (2014) found strong evidence on lower short- term interest rates present, where less capitalized banks soften their lending standards and increase loans to ex-ante risky borrowers. Moreover, Dejan K. (2015) investigated the transmission of different foreign and domestic shocks to bank lending activity in Bosnia and Herzegovina through the bank lending channel, and the study investigated the reactions of small vs. large banks to those shocks. First, evidence was found that both groups of banks decreased their lending activity in the aftermath of the crisis. Second, evidence was also found that loosening of domestic monetary conditions via required reserves rate change had a positive effect on lending supply, especially for small banks operating in the country.

Morais et al. (2015) reported that a softening of foreign monetary policy increases the supply of credit of foreign banks to Mexican firms. Each regional policy shock affects supply via their respective banks. In addition, Breitenlechner and Scharler (2016) found that policy shocks associated with dynamics on the wholesale funding market that are consistent with the traditional BLC or changes in banks' risk premia contribute both to the variation of total loans, with the latter being nearly twice as strong as the traditional BLC. Ashraf et al. (2016) found that commercial banks have reduced assets portfolio risk in response to stringent risk-based capital requirements. Results also confirm that all banks having risk-based capital ratios either lower or higher than the regulatory required limits have decreased portfolio risk in response to stringent risk-based capital requirements.

Qinwei and Li (2017) reported significantly positive connections among economic policy uncertainty (EPU) and non-performing loan ratios, loan concentrations, and the normal loan migration rate. The general conclusion in most of the studies is the tight monetary policy leads to a decline in bank credit (loans), which in turn has a negative impact to the economy. Therefore, we will analyze the effect of high and low risk loans on optimal rates loans differently to see how the monetary policy affects banks behaviors.

Based on discussion on the above literatures, our study has contributed in several dimensions: first, under the new Basel accord, our study can analyze the level of banks' risk assets sensitiveness towards changes in monetary policy in Malaysia case. Second, the dynamic model of bank lending channel is taking into consideration for analyzing any possible pro-cyclical impact of the monetary policy on the macroeconomics variables.

RESEARCH METHODOLOGY

This part describes the data source and empirical model used to examine the relationship between monetary policy and banking behaviors in Malaysia. This chapter will also detail the method used to estimate our model in the presence of possible endogeneity of regressors and bank-specific fixed effects.

Data sources and sample justification

The sample country for this research is Malaysia. In this study, we will use data from 20 Malaysian commercial banks, and this research will encompass 2008 - 2015. The data of the bank's balance sheet used in this research during the set time frame was obtained from Bankscope subscription, while the macroeconomics date (GDP, IRS, and i) has been collected from Bank Negara Malaysia. The variables were converted to real term with consumer price index (CPI) 2010 as its base year. We express all variables in logarithm return in real terms, except for (AIRL, AIRT, IRS and i), which will be expressed in real terms.

Empirical model

In order to estimate the transmission of monetary policy and bank lending rate, we use the dynamic model developed by Kishan and Opiela (2000) and Baglioni (2007), and extended by Said (2013):

$$r^*_{ljt} = \bar{r}_{lt} - \frac{1}{2\alpha}(1-q)[b_0 - b_1(r_{lit-1} - \bar{r}_{lt-1}) - b_2\bar{r}_{lt-1} + v_{jt-1}] + \frac{1}{2\alpha}\varepsilon[b_0 - b_1(r_{lit-1} - \bar{r}_{lt-1}) - b_2\bar{r}_{lt-1} + v_{jt-1}] - \frac{1}{2\alpha}\varepsilon q[b_0 - b_1(r_{lit-1} - \bar{r}_{lt-1}) - b_2\bar{r}_{lt-1} + v_{jt-1}] \quad (1)$$

$$r^*_{Tjt} = \bar{r}_{Tt} + \frac{1}{2\beta}[d_0 - d_1(r_{Tjt-1} - \bar{r}_{Tt-1}) - d_2\bar{r}_{Tt-1} + \omega_{jt-1}] \quad (2)$$

As shown in equation 1, the optimal interest rate on loans, r^*_{ljt}, depends on the cost function, $\frac{1}{2\alpha}$, and $\bar{r}_{lt}$, which is the market loan rate in the current period, alongside the previous period (t-1) of the loan rate, r_{lit-1} market loan rate, $\bar{r}_{lt-1}$, and the random error term, v_{jt-1}.

In equation 2, the optimal interest rate on time deposit, r^*_{Tjt} depends on the cost function, $\frac{1}{2\beta}$ and the market rate of time deposit, $\bar{r}_{Tt}$, and it is also influenced by the previous period t-1 of time deposit rate, r_{Tjt-1}, and market rate of time deposit, $\bar{r}_{Tt-1}$ and error term, ω_{jt-1}.

We have modified the previous model by dividing the risk weighted on loans into three types of loans, which are residential mortgage loans, consumer/retail loans, and corporate/commercial loans. The general empirical model to be estimated is as per the following specification:

$$AIRL_{jt} = \alpha_0 + \alpha_1 AIRL_{jt-1} + \alpha_2 MLR_t + \alpha_3(\delta L^1_{jt} + \delta L^2_{jt} + \delta L^3_{jt}) + \alpha_4 NPL_{jt} + \alpha_5 i_t + \alpha_6 EK_{jt} + \alpha_7 EKi_{jt} + \alpha_8 TA_{jt} + \alpha_9 TAi_{jt} + \alpha_{10} GDP_t + \alpha_{11} IRS_t + \mu_{jt} \quad (3)$$

$$AIRT_{jt} = \beta_0 + \beta_1 AIRT_{jt-1} + \beta_2 MTR_t + \beta_3 \delta S_{jt} + \beta_4 EK_{jt} + \beta_5 EKi_{jt} + \beta_6 TA_{jt} + \beta_7 TAi_{jt} + \beta_8 i_t + \beta_9 GDP_t + \beta_{10} IRS_t + \varepsilon_{jt} \quad (4)$$

Description of variables

In equation (3), the dependent variable AIRL represent the average interest rate on loans that has been extracted from individual banks' balance sheets. This variable is measured in real terms with consumer price index (CPI) of 2010 as its base year. The *j* subscript identifies the banks, while *t* denotes the years. The independent variables (α) is the coefficient, (MLR) is the market interest rate on loans in both periods t and t-1, which is assumed to be the same for all banks at the same year, (δL^1) represent residential mortgage loans in period t. This loan is considered a low risk loan, which assigns 35% risk weighted, (δL^2) is the other consumer/retail loans in period t, and this type of loan assigned 75% risk weighted, (δL^3) represent corporate and commercial loans in period t, which is considered as a higher risk loan as it was assigned 100% risk weighted. (NPL) are non-performing loans in period t, interbank rate (i), (EKi) is the interaction of excess of capital and interbank rate in period t, interaction of bank size and interbank rate (TAi) include the period t, gross domestic product and interest rate on securities (GDP) (IRS), respectively, in period t. Finally, the error term is denoted as (μ)[1].

In equation (4), the independent variable (AIRT) identified the average interest rate on time deposits, and this variable is measured in real terms with consumer price index (CPI) 2010 as its base year. (δS) is the risk weighted securities, β is the coefficient, and (ε) represent the error term. The *j* subscript identified banks, while *t* identified the years.

This study used the system of generalized method of moments GMM proposed by Arellano and Bond (1991), and further developed by Arellano and Bover (1995), and Blundell and Bond (1998). GMM estimators would provide efficiency and consistency, given that the model is not subject to second-order serial correlation and the selected instruments are valid. GMM does not require complete knowledge of the distribution of the data, and this estimation provides a straightforward way to test the specification of models for which there are more moment conditions than model parameters. This is an important feature unique to GMM estimation.

In this study, we will use three specifications tests in our estimation. First, the robust standard error, which tests the overall validity of the instruments by analyzing the sample analog of the moment conditions used in the estimation process. Second, the autocorrelation test must accept the H-null hypothesis (no-autocorrelation). Third, to examine the hypothesis we use a Wald test, which should reject the null hypothesis. Next are the results for the empirical dynamic models as mentioned above. Since the number of instruments is higher by using System GMM,

[1] The error term is log-normality distributed, so it only has a positive value.

thus we estimate the robust standard error of System GMM. Fourth, the Sargan and Hansen tests will be carried out for over-identifying restrictions.

EMPIRICAL RESULT

Descriptive analysis

Table 1 shows the descriptive statistics results of individual specific bank factor for 2008 - 2015. All the values are in real terms, with 2010 as its base year in Malaysian Ringgit (MYR). The mean values of the risk weighted loans of the three types of loans is MYR1941822, while the mean values of the risk weighted securities is MYR16438. The average value of the risk weighted loans from the average risk weighted of total assets is 98.1%, while the maximum value of the risk weighted securities to the total risk weighted assets is just 2%. This implies that the credit risk on loans is higher than credit risk on securities.

As we can see in the table, the average total asset is MYR 84411.54 million, where the minimum is MYR 1510.95 million, while the maximum is MYR 627909.3 million. The maximum amount of the total assets is bigger than the minimum amount of the total assets. This shows that big banks have total asset value that is more than the average value of total assets.

In addition, the skewness and kurtosis results show the dataset has normalized the distribution. For skewness, there are four variables showing negative values, which are market loan rate, market time deposit rate, gross domestic product, and the interbank rate with values -1.30913, -1.91992, -0.41035, and -2.4785, respectively, which means that they are skewed to the left. The other variables show the positive values, and they are skewed to the right. For the kurtosis, there are only two variables showing negative values, which are gross domestic product and the interest rate on securities with values -0.75672 and -0.47113, respectively. A distribution with negative excess kurtosis has a lower, wider peak around the mean and thinner tails. The other variables show positive values. A distribution with positive excess kurtosis has a more acute peak around the mean and fatter tails.

Table 1 Descriptive Analysis

	Mean	Standard deviation	Minimum	Maximum	Skewness	Kurtosis
AIRL	0.048381	0.055577	0.010041	0.720804	11.44029	138.8029
AIRT	0.018781	0.00845	0.005569	0.087398	3.378005	26.54591
MLR	6.09838	0.224277	5.60529	6.327519	-1.30913	0.677433
MTR	2.70199	0.265335	2.065107	2.897287	-1.91992	1.983999
L1	17377.85	19109.11	1.418314	82152.11	1.447205	1.694203
L2	863.6172	949.1663	0.070388	4077.028	1.444566	1.682794
L3	1923580	2192425	89.34034	9868797	1.531643	2.065479
RWS	16438	23503.56	39.14729	125221.8	2.343955	5.936272
NPL	1115.061	1587.434	0.466853	7710.682	2.249779	5.196586
EK	18.98481	16.13863	0.013315	131.1801	4.839147	26.69327
Eki	54.62797	43.39091	0.039811	335.0712	4.24971	20.76894
TA	84411.54	117086.1	1510.95	627909.3	2.284806	5.804786
Tai	248269.5	354263.9	3064.56	1915123	2.424744	6.716167
GDP	849098.8	66720.14	725185.1	942119.5	-0.41035	-0.75672
IRS	1.695714	0.796175	0.45	3.12	0.14588	-0.47113
I	2.760034	0.402516	2.024415	3.32651	-2.4785	13.33069

Table 2 reports the results of the average interest rate on loans to a policy rate by using the system GMM method (robust standard error). As seen in Table 2, the corporate and commercial loans, *L*3 which is regarded as a higher risk loan as assigned 100% risk weighted, are statistically and negatively significant at estimated coefficients of -1.07e-08 and a 1% significant level, and -9.13e-09 and a 5% significant level in one-step and two-step estimators, respectively. This proved that credit risk loans influence the decision rate or average interest rate on loans, implying that if the risk weighted loans increases, the average loan rate will decrease. This result is consistent with Ashraf et al. (2016). However, we failed to prove a significant effect of current period residential mortgage loans and corporate/commercial loans in both steps.

This result shows that the interbank rate and the market interest rate on loans at the current period are not statistically significant. This is not consistent with Said (2013). In the context of the bank's characteristics, none of

variables are statistically significant. The results have shown that output and interest rate on securities are statistically significant in one-step estimator at estimated coefficients of -6.02e-08 and 0.0029 at a 1% significant level, respectively.

As shown in Table 2, the Wald test has been expected to show the significance of the model. Overall, the models were assumed to be significant. The results of the specification test, AR(1), AR(2) for testing the serial correlation, the p-values for the AR (1),(2). This indicates that the first and second difference of white noise is not auto correlated from the autocorrelation test as the results do not reject the H-null hypothesis (no-autocorrelation). The Hansen test also does not reject the H-null hypothesis of the overall validity of the instruments for two-step estimator by analyzing the sample analog of the moment condition used in the estimation process (Hansen, 1982). The system GMM robust standard error has been run for this model, which implies that the empirical model has been correctly specified and robust.

Table 2 System Generalized Method of Moments - *Robust Standard Error* (Arellano-Bover and Blundell- Bond)

Dependent variable	AIRL	
Independent variables	***One-Step*** Coefficient (p-value)	***Two-Step*** Coefficient (p-value)
AIRL-1	0.0204 (0.009)***	0.0155 (0.636)
L1	0.00006 (0.165)	0.0001 (0.376)
L2	-0.0013 (0.174)	-0.0011 (0.386)
L3	-1.07e-08 (0.000)***	-9.13e-09 (0.014)**
MLR	-0.0072 (0.583)	-0.0027 (0.731)
NPL	9.23e-07 (0.760)	7.52e-07 (0.476)
I	0.01504 (0.151)	0.0072 (0.699)
EK	0.0004 (0.146)	0.0003 (0.400)
Eki	-0.0001 (0.414)	-0.0001 (0.319)
TA	-5.05e-08 (0.505)	-3.24e-08 (0.400)
Tai	1.89e-08 (0.378)	1.49e-08 (0.488)
GDP	-6.02e-08 (0.009)***	-6.20e-08 (0.320)
RS	0.0029 (0.003)***	0.0017 (0.314)
Constant	0.0885 (0.108)	0.0881 (0.699)
Wald chi2(11)	1973.94	417.28
Prob (chi2)	0.0000	0.0000
Observations	140	140
No. of Instruments	40	40
Autocorrelation test in first-differenced errors	0.2622	0.2691
AR(1)	0.8493	0.9562
AR(2)		
P-value for		
Sargan Test	0.0023	
Hansen Test		0.1601

Note: *** indicate significant at 1% level , ** Significant at 5% percent level, and * Significant at 10% percent level.

Table 3 show the estimation results of the average interest rate on time deposit to a policy rate by using the system GMM method (robust standard error). The main result shown in table 3 is that the market interest rate is statistically significant, with an estimation coefficient of -0.0141 at a 5% level of significance, which is indicated that the market interest rate play an important role in influencing the average rate on time deposit. However, this

result is consistent with Zulverdi, et al. 2007 but not consistent with Said (2013). However, only the one-step estimator shows statistically significant.

In addition, the results show that the interbank rate is statistically significant influenced the average interest rate on time deposit, with an estimation coefficient of 0.0191 at a 10% level of significance in one-step estimator only which is not consistent with Said (2013).

Our result shows that the bank size is statistically significant, and the positive sign imply that modest sized banks are more responsive to the average interest rate on time deposit in one-step estimator only. We failed to prove the effect of bank capitalization on the average rate on time deposit, as we found it to be statistically insignificant in both step estimators.

The Wald test has been estimated to show the significance of the model. As seen in Table 3, overall, all the models were assumed to be significant. The results of the all specification test, AR(1),(2) for testing the serial correlation, the p-values for the AR (1),(2). The first difference of white noise is not auto correlated from the autocorrelation test, as we do not reject the H-null (no autocorrelation). The Hansen test also does not reject the H-null hypothesis of the overall validity of the instruments for two-step estimator by analyzing the sample analog of the moment condition used in the estimation process (Hansen, 1982). The system GMM robust standard error has been run for this model, which implies that the empirical model has been correctly specified and robust.

Table 3 System Generalized Method of Moments- *Robust Standard Error* (Arellano-Bover and Blundell- Bond)

Dependent variable	AIRT	
Independent variables	***One-Step***	***Two-Step***
	Coefficient (p-value)	Coefficient (p-value)
AIRT-1	0.2234 (0.000)***	0.3456 (0.274)
MTR	-0.0141 (0.021)**	-0.0056 (0.599)
RWS	-6.77e-08 (0.578)	4.30e-08 (0.721)
NPL	-2.40e-06 (0.089)	-1.15e-06 (0.311)
I	0.0191 (0.007)*	0.0121 (0.194)
EK	0.00001 (0.888)	2.59e-06 (0.990)
Eki	-0.00002 (0.254)	-0.0001 (0.832)
TA	1.29e-07 (0.052)*	6.06e-08 (0.288)
Tai	-3.08e-08 (0.024)**	-2.16e-08 (0.063)***
GDP	6.71e-09 (0.541)	8.27e-09 (0.448)
RS	0.0006 (0.215)	0.0007 (0.258)
Constant	0.0962 (0.139)	-0.0136 (0.416)
Wald chi2(11)	1438.25	23.06
Prob (chi2)	0.0000	0.0173
Observations	140	140
No of Instruments	40	40
Autocorrelation test in first-differenced errors		
AR(1)	0.1150	0.1593
AR(2)	0.3237	0.1941
P-value for		
Sargan Test	0.0028	
Hansen Test		0.1719

Note: *** indicate significant at 1% level , ** Significant at 5% percent level, and * Significant at 10% percent level

CONCLUSION AND POLICY IMPLICATION

After implementation of Basel II capital regulatory constraint, result has clearly shown that on every risk level of loans are more sensitive to monetary policy. The main result is the fact that credit risk on loans and time deposit are important influences upon the decision rate or average interest rate on loans and time deposit. The results found that higher risk loans with 100% risk weighted is negatively correlated to average rate on loans. The result has

shown that the higher risk loans have more response to monetary policy as compared to low risk loans. This result support the effectiveness of new capital regulatory framework could differentiate the level of responsiveness of each quality of bank loans. The results also found that risk weighted securities in the current period is negatively influencing the average interest rate on time deposit. We also confirmed that banks' characteristics is influencing the average interest rate on loans, which implies that when banks hold higher risk asset, it will increase the risk weighted asset.

The new Basel regulatory framework has been found effective to differentiate the level of risk sensitiveness of each of the banks' assets towards any policy changes. The higher risk loans have been found to response more has shown the Basel II regulatory framework successfully aligned the level of bank risk to any shocks in monetary policy. Thus, bankers can be more alert to insure or manage the higher risk assets.

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ACKNOWLEDGEMENT

The authors greatly acknowledged the financial support from Universiti Kebangsaan Malaysia and Ministry of Education Malaysia under the grant FRGS/1/2017/SS08/UKM/02/2.