



# The dynamic of bank lending channel: Basel regulatory constraint

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## ABSTRACT

This article analyzes the impact of monetary policy on bank behavior under the Basel I regulatory framework using a dynamic model with monopolistic competition. There are two main objectives. First, we theoretically predict the dynamic model of bank lending channels under the Basel I regulatory constraint. Second, we empirically analyze the situation in Malaysia by using panel data on 23 commercial banks in the period of 1999 to 2007 by using General Method of Moments. The empirical results show that market rates on loans and policy rates are important influences on average rates of banks' loans. This has an implication that Malaysian banks have the power to set their own prices on loans as they are influenced by the change in the market rate and policy rate. We also have proven that the previous period of spread risk weighted loans and securities is statistically significant and correlated with the average loan rate, whereas risk weighted securities is also statistically significant and correlated with the average time deposit rate in both periods. This shows that the role of risk-weighted assets under the Basel I is important in influencing the optimal rates on loans and time deposits.

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## 1. Introduction

In the Malaysian context, the dynamic model of the bank lending channel is still limited in the existing literature. There are several empirical studies which have examined the existence of the bank lending channel by using disaggregate data such as those by Said and Ismail (2008) and Abdul Karim et al. (2010). For example, Said and Ismail (2008) analyzed the static model of the bank lending channel and found that there is a bank lending channel in Malaysia by using bank level data spanning between 1994 and 2004. However, Abdul Karim et al. (2010) investigated the dynamics of the bank lending channel of Malaysia by using a disaggregated bank level data set. They empirically found that monetary policy shocks significantly and negatively influenced the banks' loan supply. However, both of the analyses identified loan supply shocks via banks' quantities rather than prices. Therefore, we will theoretically develop a dynamic model of a bank lending channel under monopolistic competition. Why do we focus on price rather than quantity of lending? The reason is because of the trend of average banks loans and deposit rates that are spread equally to all categories of competitiveness (least, moderately and highly competitive) as can be found in the evidence of Malaysian banks data between 1999 and 2007. This can be shown in Table 1 below.

Table 1 shows the difference between average rates on loans and time deposits over individual banks and the average rates on loans

and time deposits over all banks between 1999 and 2007 (1999: being the base year). The industry or market average rates on loans for 1999 (9.14%); 2000 (9.11%); 2001 (8.5%); 2002 (8.05%); 2003 (8.21%); 2004 (7.85%); 2005 (8.47%); 2006 (8.86%) and 2007 (8.96%). The average of industry average rates on loans between 1999 and 2007 is 8.57%. On the other hand, the industry or market average rate on the time deposit for 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006 and 2007 are 3.85%, 3.19%, 3.37%, 2.87%, 2.43%, 2.06%, 2.21%, 2.29%, 2.99%, respectively. The average of industry average rates on the time deposit between 1999 and 2007 is 2.81%. These industry or market average loan and time deposit rates are calculated from the theoretical model of Said (2012). Therefore, if individual banks' average rates are above the average rates over all, banks are categorized as having high loan and time deposit rates. This category of bank is classified as moderate competitive of which two banks belong to this category; Bangkok Bank, and Deutsche Bank. In addition, banks categorized in high deposit and low loan rates are RHB Bank, United Overseas Bank (UOBC), OCBC, Ambank, and Nova Scotia Bank. These banks are highly competitive because they offer a low loan rate and a high deposit rate.

In addition, Public Bank, ABN AMRO, Bank of America, JP Morgan and Hong Leong Bank are categorized in high loan and low deposit rates or in other words, as least competitive banks because they offer a higher loan rate and a lower deposit rate compared to other banks. On the other hand, Eon Bank, Affin Bank, CIMB, Alliance Bank, HSBC Bank, Citibank, Bank of China, Southern Bank, Standard Chartered, Bank of Tokyo, and Maybank are categorized as moderate competitive banks as they offer low average loan and low average

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**Table 1**

Difference between average rates on loans and time deposits over individual banks and the average rates on loans and time deposits over all banks, 1999–2007 in Malaysia. Average industry loan rate and average industry time deposit rate between 1999 and 2007 are 8.57% and 2.81%, respectively.

	High loan rate	Low loan rate
High time deposit rate	Moderately competitive Bangkok Bank (9.24%, 3.07%) Deutsche bank (10.15%, 7.42%)	Highly competitive RHB Bank (6.47%, 2.82%) UOBC Bank (7.66%, 3.06%) OCBC (6.89%, 2.88%) Ambank (7.43%, 4.04%) Nova Scotia Bank (7.23%, 3.27%)
Low time deposit rate	Least competitive Public Bank (9.01%, 2.50%) ABN AMRO (16.25%, 2.50%) Bank of America (11.31%, 2.4%) JP Morgan (20.65%, 2.47%) Hong Leong (10.06%, 2.79%)	Moderately competitive Eon Bank (7.39%, 1.08%) Affin Bank (7.08%, 2.77%) CIMB Bank (7.13%, 2.74%) Alliance Bank (6.53%, 2.50%) HSBC (7.84%, 2.38%) Citibank (8.22%, 2.79%) Bank of China (6.64%, 1.84%) Southern Bank (4.37%, 2.22%) Standard Chartered (6.11%, 2.01%) Bank of Tokyo (6.79%, 2.3%) Maybank (7.63%, 2.72%)

Note: Average industry/market loan rates and average industry/market time deposit rates are reported in parentheses.

deposit rates. Therefore, this preliminary evidence suggests that all banks are spread equally to all the categories of competitiveness. This means that banks in Malaysia can be differentiated even if they offer heterogeneous products and services to the customers. This characteristic shows that Malaysian banks can be evidence for monopolistic competition. Therefore, it is relevant why our analysis is focused on the price rather than on the quantity of lending. Many researchers such as Salop (1979), Mamatzakis et al. (2005), and Staikouras and Fillipaki (2006) find that a monopolistic competitive framework is beneficial for banks to increase profits. This can be true if there exists a trade-off between the costs and benefits of competition.

The papers most closely related to ours are those by Kishan and Opiela (2000), Baglioni (2007) and Honda (2004), where they use a static model of the bank lending channel under the old Basel Accord. Jacques (2008), Ahmad (2006) and Kashyap and Stein (2004), on the other hand, introduce in the analysis the adverse macroeconomics effect of Basel, especially with its procyclicality 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. The results of his study suggest that with the increased differentiation of credit risk introduced by the new Basel II (revised standards), low credit risk loans may actually increase. Ahmad (2006) concludes that the new capital requirements can have both good and bad effects on the targeted financial institutions and markets. The recent study done by Boivin et al. (2010) review the empirical evidence on the changes in the effect of monetary policy actions on real activity and inflation and they present new evidence, using both a relatively unrestricted factor-augmented vector autoregression (FAVAR) and a DSGE model. They have found notable changes in policy behavior (with policy more focused on price stability) and in the reduced form correlations of policy interest rates with activity in the United States. Both approaches yield similar results. Besides, under the competition 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 the less sophisticated banks have a competitive advantage in the provision of high-risk loans (the standardized approach has a lower capital requirement).

Our research makes a different point by starting from a setup that differs in several important respects from those used by Jacques

(2008), Kashyap and Stein (2004), and Kishan and Opiela (2000). First, they analyzed the bank lending channel by assuming that banks operate in an imperfect-competitive market. According to their assumption, the correct bank strategic variable is quantity instead of price. In other words, each bank decides its optimal volume of loans, taking as given the volumes supplied by the other banks. The equilibrium price is the one equating the aggregate supply and demand for loans. However, our research is different from their studies since we assume that each of the banks behave as if in monopolistic competition (an assumption inspired by Baglioni (2007) and Boivin et al. (2010)). This market structure is suitable for describing the market for bank loans, despite the presence of many players in the market, in which each of them retains the power of setting their own price at the desired level. The reason for choosing monopolistic competition over imperfect competition markets in this analysis is because loans are not perfect substitutes to borrowers (it can be differentiated). Each bank has some market power in the market for loans (it faces a downward-sloped demand for loans with finite elasticity) and time deposits. The difference with the analysis made by Boivin et al. (2010) is that we use disaggregated data of banks and analyze the behavior of banks by changes in the policy rate. They, however, are more concentrated on the changes of monetary policy actions on real activity and inflation without looking into the behavior of banks individually.

Second, Jacques (2008) models bank competition on the asset side and ignores the competition on the liabilities side. However, in our analysis we will consider the competition on both the asset side and liabilities of banks' balance sheets. In other words, we will see whether small or large banks (bank size) become more or less competitive in engaging a higher or lower risk of loans and securities, and whether high or low risk loans/securities are more competitive under the Basel Accord.

Third, a dynamic model has been chosen in order to see the effect of the bank lending channel by setting bank prices as the optimal decisions in the different time periods. The time periods  $t$  (current) and  $t-1$  (previous) were chosen in order to provide clear proof of whether banks' optimal interest rates are determined by the current or previous period of market/industry interest rates, policy rate or other variables such as random effect, bank capitalization, bank size and so on. Baltagi (2008) has argued that most economic relationships are dynamic in nature; therefore, by developing a theoretical dynamic model and using a dynamic panel data framework in estimating the bank lending channel, it is believed to provide an appropriate prediction and result for policy purposes. Zulverdi et al. (2007), on the other hand, predicted that loan rates have a positive relationship with policy rates. The implication of this prediction has shown evidences of smaller sensitivity of loan rates to changes in policy rates during the crisis as compared to the pre-crisis period.

Fourth, we want to see whether bank characteristics such as bank capitalization and asset size are important in influencing the optimal interest rates within the periods. For example, if banks are assumed to impose capital requirement at the start of the period, tightening the requirement decreases the risk of assets (Blum, 1999) or otherwise increases the risk of assets Ahmad, 2006) depending on whether the requirements motivate banks from taking a lower risk or a higher risk in the first and second periods. In addition, we also want to see whether the random effects also affect the optimal rates. Thus, the chosen time periods  $t$  and  $t-1$  are sufficient enough to show banks' investment decisions in the first or previous period ( $t-1$ ) and all the costs are paid and returns are received in the second or current period ( $t$ ). This operation will continue over time if we assume the model to be in the  $n$ -period or infinite horizon. However, we do not pursue this as a two-period model, which can sufficiently prove the main objective.

Fifth, bank lending is also exposed to Gross Domestic Product (GDP) shocks. This is because demand for loans is pro-cyclical. An earlier researcher, King (1986) found that although there was no clear relationship between loans and output, there was a rather closer

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