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The Effectiveness of the Bank Lending Channel: The Role of Banks' Market Power and Business Model

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ABSTRACT

This paper examines the effectiveness of the bank lending channel in a dual banking system in Malaysia, where both conventional and Islamic banks operate alongside each other. It also investigates the impact of bank competition on lending channels in financial systems. Using panel data from both Islamic and conventional banks in Malaysia, our findings indicate the ineffectiveness of the bank lending channel. Further, the empirical results suggest that the impact of monetary policy on bank lending does not depend on bank competition. In other words, the effectiveness of the lending transmission channel does not depend on the market power of the individual banks. Furthermore, the effectiveness of the lending channel appears to be independent of whether the bank is Islamic or conventional. This result is probably explained by the fact that the vast majority of Islamic banks in Malaysia are subsidiaries of conventional banks. Policymakers therefore do not need to differentiate between conventional and Islamic banks in regard to the effectiveness of the bank lending channel.

KEY WORDS:

Bank competition, Bank lending channel, Dual banking system, Islamic banking, Monetary policy

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1. Introduction

The structure of the Malaysian banking market has experienced several changes in the last 30 years. These changes have included mergers between banks and the introduction of Islamic banking as windows, subsidiaries and full-fledged banks. With the recent introduction of Association of Southeast Asian Nations (ASEAN) Financial Integration

Plan, further changes in the market structure and competition conditions are expected. These changes highlight the need for further exploration of the impact of these changes on the effectiveness of the monetary policy. In particular, the lending channel of the transmission mechanism has attracted increasing attention after the recent financial crisis.

The extant literature on the channels of monetary policy indicates that monetary policy works through both interest rate and bank lending channels, an observation which has received significant attention after the global crisis (2008-09) (Costa-Climent & Martinez-Climent, 2018). As first described by Bernanke and Blinder (1988), the

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tightening of monetary policy leads to a reduction in loan supply. The effect varies across different banks depending their characteristics, such as size and capitalization, as well as the availability of additional sources of funding. Moreover, it is also contingent on the market structure of banking sector and the market power of individual banks. In other words, the effectiveness of monetary policy, through the bank lending channel, depends significantly on the competitiveness of the banking system (Fungáčová, Solanko, & Weill, 2014; Nyasha & Odhiambo, 2016). Further, bank lending channels are even more important in emerging markets where borrowers mainly rely on banks for financing (Adams & Amel, 2005).

In this paper, we depart from earlier literature by examining the impact of banking market power on bank lending in a dual banking economy, Malaysia. We investigate the interaction of competition and policy rates to study the potential effect of competition on bank lending. The important premise of the paper is the role played by Islamic banks in response to changes in monetary policy. The existing literature shows evidence of the distinct nature of Islamic banks compared to their conventional counterparts. For instance, they are different in terms of capitalization (Beck, Demircuc-Kunt, & Merrouche 2013), risk (Safiullah & Shamsuddin, 2018), competitive conditions (Ariss, 2010), etc. The recent work of Caporale, Çatık, Helmi, Ali, & Tajik (2016) and Ibrahim (2017) provide conflicting evidence of Islamic banks' responses to changes in monetary policy rates. For instance, Caporale et al. (2016) showed that Islamic banks were less responsive to interest rate shocks relative to their conventional counterparts, whereas Ibrahim (2017) provided evidence indicating Islamic banks are more sensitive and responsive to monetary policy.

There are two notable contributions of this paper. First, we add to the limited literature on the monetary policy mechanism of bank lending in a dual banking system. With the notable exceptions of Aysan, Ozturk, Fethi and Disli (2017), Caporale et al. (2016) and Ibrahim (2017), we are not aware of other studies that have investigated this channel in a dual banking economy, especially in the context of Islamic banks. Second, and more importantly, we add to the literature about the effects of bank structure on lending growth.

2. Theoretical Background

Monetary policy is a central topic in macroeconomics. Changing the central bank's interest rate is among the tools

used to affect the money supply through lending channels. In theory, an increase in the central bank's rate would reduce the banks' lending, while reducing it would have an inverse impact. Accordingly, to pursue a contractionary monetary policy, which aims at curbing the consumption and investment expenditures to control inflation, central banks would increase the interest rate. However, the effectiveness of this policy depends on the effectiveness of lending channels, which in turn depends on how banks adjust their loan portfolios following changes in monetary policy. Furthermore, conventional and Islamic banks could potentially differ in their reactions to such policies (Aysan et al., 2017; Ibrahim, 2017). In this section, we provide an in-depth discussion of the theories that first explains the relationship between monetary policy and lending channels (loan growth) and also illuminates the potential impact of bank competition on lending channels.

2.1 Impact of monetary policy on credit channel (loan growth)

The role of commercial banks is crucial in the monetary transmission process because monetary policy actions influence the bank lending behavior. These banks do have direct relationships with the real economy through their deposit and lending channels. Bernanke's (1983) research provides empirical evidence on the existence of the bank lending channel of monetary policy transmission. Moreover, according to the theory of bank lending channels, bank lending behavior serves as an important monetary policy transmission mechanism (Bernanke & Gertler, 1995). This channel explains how the monetary policy actions directly affect banks' balance-sheets with variations in loan supply and, thereby, in output. Dhun-gana (2016) mentions that "bank lending and monetary transmission mechanism are closely interlinked phenomena. Banks cannot be efficient in their performance without analyzing the impact of monetary policy actions. On the other hand, central bank cannot take appropriate policy actions without having appropriate knowledge of bank lending behavior". Ibrahim (2017) argues that changes in monetary policy are transmitted to the real sector through various channels, including the interest rate, exchange rate, asset prices and the credit channel, which is the focus of this paper.

Credit, or lending, as a transmission channel of monetary policy that affects the real sector by influencing monetary aggregates, has been discussed extensively

from various perspectives and in the context of different monetary policies (i.e., monetary expansion or tightening). For example, some studies have investigated banks' reactions to the different monetary policy stances, including how they modify and adjust their portfolios, price, loans, securities, deposits and other liabilities, as well as nonfinancial aspects, such as the nonprice conditions of credit facilities (see Bernanke & Blinder, 2002; Dhungana, 2016; Gertler, Gilchrist, & Natauci, 2003). Other studies were more precise in their analysis, such as Kashyap and Stein (2000), who suggested that the lending transmission mechanism is more powerful for less liquid banks, and the studies of Romer and Romer (2000), which concluded that the final decrease in banks' credit corresponds with a decline in industrial production as a proxy of economic activity. Similarly, a study by Amidu (2006) performed regression to estimate the effect of monetary policy actions on bank lending and found that banks' lending behaviors are significantly affected by changes in money supply and the country's economic activities. Moreover, he argued that the interest and inflation rates affect banks' lending negatively but were statistically insignificant.

Other studies focused on certain countries, such as Sengonul and Thorbecke (2005), who researched whether contractionary monetary policy decreases the loan supply in Turkey. Their results showed that contractionary monetary policy reduces lending more at banks with less liquid balance sheets, which is in line with Kashyap and Stein (2000), as mentioned above.

In regard to the effects of monetary policy tightening on lending from banks, the evidence is conflicting (Dhungana, 2016). As an example, Gertler et al. (2003) looked at banks' responses to contractionary monetary policy, particularly regarding business lending. They concluded that such lending does not decline in the case of tight monetary policy. Moreover, they found that the decrease in banks' lending originates from the decline in both consumer and real estate loans. A narrower analysis by Gertler et al. (2003) provided evidence that, surprisingly, lending to manufacturing businesses showed a significant increase in the context of tighter monetary stances.

Studying the monetary policy-lending nexus according to the tools used by central bank of Nepal, Dhungana (2016) found that certain monetary policy instruments, namely, required reserve ratios and open market operations, impact bank lending negatively, while the

central bank's interest rate influences lending positively. The asymmetric effects of monetary policy on output through lending (i.e., the lending channel mechanism) was also explored by some papers, such as Chang, Jansen and Bachmeier (2005), who found that in order to explain the different reactions of output in response to the changes in monetary policy, it is not important whether the response of the lending channel to monetary policy is symmetric or asymmetric. In other words, the asymmetric response of bank lending to monetary policy is not significant in explaining the variations in GDP caused by the lending channel mechanism.

Analyzing the effectiveness of monetary policy on bank lending in a low interest rate environment, Borio and Gambacorta (2017) suggested that when interest rates reach a very low level, reducing the short-term interest rate further (i.e., pursuing expansionary monetary policy) will be less effective in enhancing the growth of bank lending. This result was reinforced after controlling for various bank-specific variables, such as liquidity, costs of funding, credit risks, capitalization, and noninterest income (i.e., diversification) over the business cycle as a macroeconomic variable. Morris and Sellon (1995) found evidence that bank lending is constrained by monetary policy. Studying four periods of contractionary monetary policy within 20 years (1975-1995), Morris and Sellon (1995) found that, in order to maintain the same level of lending, banks sold securities and issued managed liabilities to offset the decline in deposits that occurred in response to the tighter monetary policy. However, by analyzing the terms of bank business lending, they found little evidence for the hypothesis that banks reduce their loans or rationalize their credit as a response to contractionary monetary policy.

From another perspective, Becker, Osborn and Yildirim (2012) mentioned that in order to identify the effectiveness of monetary policy or the speed of its impact, the velocity of the pass-through rate is usually considered. Accordingly, Matemilola, Bany-Arifin and Muhtar (2015) investigated the relationship of the pass-through of the long-term interest rate to the banks' lending rate in South Africa; further, they examined the asymmetric adjustment of the banks' lending rate. They found that the bank lending rate adjusts to a decrease rather than to an increase of the money market rate. In a nutshell, studies about the impact of monetary policy and its tools on banks' lending are abundant, and the literature on this topic is resourceful.

2.2 Impact of bank competition on lending channel

As explained by Olivero, Li and Jeon (2011), it is expected that changes in competition among banks affect the degree of influence of monetary transmission mechanism via bank lending channels in three main ways. The first case occurs when larger banks increase their market share and thus increase competition, which implies weakening the power of bank lending as a channel of the monetary transmission. The second case happens when there is a decline in information asymmetries among banks regarding their borrowers' creditworthiness, which is associated with increased competition; in this case, the increased competition would also weaken the influence of the bank lending channel. Finally, competition may enhance the influence of monetary policy by increasing the sensitivity of loans' rates to monetary policy shocks.

Supporters of the market structure-lending channel hypothesis argue that changes in monetary policy influences banks' marginal cost (via interest paid on deposits) in addition to their impacts on reserves (through open market operations of changing the reserve requirement). Studies such as Amidu and Wolfe (2013) argued that in a concentrated banking market, high lending rates lead to a decline in lending. In addition, since the level of market power determines how the shocks of bank's marginal costs could be passed to the bank's rates and lending, banking market structure is considered a crucial aspect.

Regarding the empirical studies, Olivero et al. (2011) found evidence that increased competition in the banking sector leads to less powerful transmission of monetary policy through the lending channel, at least for some banks. Furthermore, two studies, namely Gunji et al. (2009) and Olivero et al. (2011) examined how does bank competition impact the transmission of monetary policy using H-statistics as a proxy for competition. They provided evidence that more competition leads to a decrease in the influence of monetary policy on bank lending. Within the same context, using data from 55 countries around the world, Amidu and Wolfe (2013) explored to what extent the level of bank competition can influence monetary policy transmission. They concluded that more bank competition reduces the impact of monetary policy on loans provided by banks, which is in line with

the three studies mentioned earlier. More importantly, their findings were robust to a large group of sensitivity tests, including additional measurements for competition, such as the Lerner index, as well as different samples and various model specifications.

On the other hand, studies such as Adams and Amel (2005), who examined the impact of US banks' concentration on the effectiveness of monetary policy, concluded that in more concentrated markets, monetary policy has less of an influence on lending.

In contrast, Fungáčová et al. (2014) included the 2008 crisis in her study and found evidence that banks with less market power were more sensitive to monetary policy only before the global financial crisis of 2008 to 2009. Huseynov, Jamilov and Zhang (2013) and Liebersohn (2017) found support for a positive impact of competition on the efficiency and quality of bank lending and the effectiveness of the bank lending channel. However, examining the impact of competition on the lending channel in dual banking systems is still unexplored, which is the main objective of this paper.

3. Bank competition and banking lending channel in Malaysia

In this section, we first explain bank competition in Malaysia and then the lending channel in Malaysia.

3.1 Bank competition in Malaysia

According to Fah and Ariff (2017), the Malaysian banking sector has exhibited periodic instability since 1957, when a large number of banks experienced pressure during bad years, leading to many banking failures. In the late 1990s, Bank Negara Malaysia proposed a major restructuring plan to transform the banking industry into a more competitive market (Berger, et al., 2008). Consolidation in the Malaysian financial sector began after the introduction of a two-tier banking system in 1990s. BNM pushed domestic banks to merge in order to minimize potential systemic risks (Bank Negara Malaysia, 1999).

Despite the extensive literature about the bank competition in different countries e.g., Delis and Matthews (2010) in Korea, Shin and Kim (2013) in China, Gischer and Stiele (2008) in Germany, Mlambo and Ncube (2011) in South Africa, and Aktan and Masood (2010) in Turkey, among others, studies about bank competition in Malaysia are quite limited.

Abdul Majid and Sufian (2007) was one of the first studies in Malaysia to explore the effects of bank consolidation on competition and market structure in the Malaysian banking industry during the years of 1998–2005. They found that revenues earned by the financial institutions in Malaysia were obtained because of monopolistic competition, where the market for conventional banking was less competitive compared to the overall market. However, they argued that there was insufficient evidence to support the hypothesis that changes in market structures enhanced the competition. Later, in a similar study during a different time period, Sufian and Habibullah (2013) examined the impact of consolidation on market structure and competition in Malaysian banks. Their results clearly demonstrated the existence of monopolistically competitive behavior between 1996 and 2008. In addition, they concluded that competitive behavior may not be explained by market structure. In a similar time period, Abd Kadir, Habibullah, Hook and Mohamed (2014) examined the banking market in Malaysia, finding that it was moderately concentrated and that concentration decreases over time.

To analyze the relationship between concentration and competition in the banking market in Malaysia, a study by Mohammed, Ismail and Muhammad (2015) argued that several factors, including technological advancements (i.e., the ICT sector), mergers and acquisitions (M&A), the liberalization of the financial sector, and improvements to the Islamic banking system, among other aspects, account for the structural changes in banking market in Malaysia, which is considered a dual banking system. In addition, considerable implication of concentration and competition in this market can be derived from such structural changes. Their main finding revealed evidence that during the period (1997–2010), concentration in both Islamic and conventional banks has declined, which led to a more competitive market. However, the Islamic banking market witnessed more competition compared to the conventional banking market.

Using different measures for competition to examine the status quo of the Malaysian banking system, which had restructured a more diverse banking system for a better efficiency and financial stability, Fah and Ariff (2017) reported new findings on competition in banking industry in Malaysia eight years after a banking sec-

tor consolidation. They found that the banking market is neither operating under perfect nor monopolistic competition, but that the competitive environment is more like a cartel with a low H-statistic. They concluded that Malaysia's banking industry benefited from a cartel-like environment by trading-off the costs of competitive banking before 2002–2004 with cartel-like industry structures, moving away from a lack of competition towards more competition, especially in recent years.

3.2 Lending channel in Malaysia

Addressing the lending and financing channel for Islamic banks is timely (Ibrahim, 2017), as these banks have become systematically important in many jurisdictions around the world (according to Islamic Financial Services Board [IFSB], Islamic banks' assets represent more than 15% of total banking assets in the domestic market that are considered systematically important), and Malaysia is an excellent example of a location where Islamic banks constitute approximately 25% of the total banking assets (IFSB, 2018).

With regard to the empirical literature about the lending channel in Malaysia, we found many studies that explored this channel and its effect on lending and financing growth. Most of these studies presented evidence about the existence of such channels in the Malaysian banking system. However, additional results related to the impact of this channel and were not the same, especially when Islamic and conventional banks were studied together. For example, Goh, Chong and Yong (2017) tested the relevance of banks' lending in Malaysia as a transmission channel for the monetary policy. Among their findings was that there is a tendency for deposit to shrink after contractionary monetary policy shocks. However, banks could maintain their loans and protect them from the decline in deposits by conducting modifications in liquid instruments. Therefore, such shocks could not influence the growth in lending portfolios. Moreover, the study did not find evidence that supports the effectiveness of the bank lending channels for the transmission of monetary policy, despite the interest rate policy that was implemented during and after the Asian financial crisis.

Considering the asset side as a channel for monetary policy that influences real sectors, Said and Ismail (2008) analyzed the role of Malaysian banks in

the transmission of monetary policy and the business cycle and found robust evidence about the existence of lending channels in Malaysia. Furthermore, they argued that any changes in interest rate proxy by three-month interbank rates can influence loan supply and it would affect the other portfolios, such as deposits, profits, and securities in a positive relationship. A similar study was conducted by Abdul Karim, Azman-Saini and Abdul Karim (2011) using disaggregated bank-level data in Malaysia. They found that banks' loans are negatively affected by shocks caused by adjustments in monetary policy, providing evidence for the bank lending channel. The results also showed that bank characteristics have a significant impact on their loan supply, in contrast with Ibrahim (2017), who argued that the bank-specific variables have no impact on the potency of the lending channel in Malaysia.

Zulkhibri (2012) presented evidence that supports the bank lending channel in Malaysia through small and low-liquidity banks only. The evidence suggested that the different classifications for the financial institutions, which are distinguished by variations in market structure and the regulatory framework, determine the reaction of such institutions to a monetary policy shock. In particular, it was found that the reaction of financial companies was stronger when compared to commercial banks.

The dynamics of the bank lending channel in Malaysia from the perspective of the Basel I regulatory constraint were studied by Said (2013), who found that "market rates on loans and policy rates are important influences on average rates of banks' loans and thus, 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".

Viewing Malaysia as an example of a leading dual banking system, Caporale et al. (2016) compared Islamic and conventional banks. They showed that financing provided by Islamic banks is less responsive to interest rate shocks when compared with its conventional peers. This result was found to be consistent across different levels of growth. However, by contrast, the relative importance of Islamic banks' financing in driving output growth is much greater in low growth scenarios, as the effect was positive in this case. Ibrahim (2017) also chose Malaysia as a dual banking system country to examine the impact of monetary policy on bank lending. The findings suggested that varia-

tions in monetary policy have an impact on lending growth. Moreover, the study provided evidence that Islamic financing growth reacts more strongly to monetary policy changes. Interestingly, the results seemed to be the same for Islamic subsidiaries of conventional banks and stand-alone Islamic banks.

4. Data, empirical model and methodology

We extract bank-specific data on Malaysian banks from the Fitch-connect database. Since we want to compare Islamic banks with conventional banks, we had to rely on unconsolidated data, since most of Islamic banks in Malaysia are subsidiaries of the conventional ones. In fact, all local Islamic banks in Malaysia, except for Bank Muamalat and Bank Islam, are subsidiaries of conventional banks. Using consolidated data implies that the figures are overestimated. For instance, the total assets of the conventional mother banks would also include the total assets of its subsidiary Islamic bank, which is also included in the estimation. Such double counting would lead to inaccurate estimation.

Further, data on developing financial institutions and offshore banks were excluded, as these banks may not behave and compete with other commercial banks. Observations for merged banks and banks that have data for less than three consecutive years were also excluded to improve estimation. Overall, the dataset consisted of unbalanced panel data from 38 commercial Malaysian banks (both conventional and Islamic) for the period 2003-2014.

Bank specific variables are size, capitalization, liquidity, finding and asset quality. Total assets are the proxy for size. Equity to total assets (EQTA) is a proxy for capitalization. Liquid assets to total assets (LIQ) is used for liquidity. Total deposit to total liabilities (fund) is a proxy for funding. The ratio of reserves for impaired loans to gross loans (lrrr) is a proxy for asset quality. We add a dummy variable to address the specialization of the bank (Islamic or conventional).

Macroeconomic variables, such as the inflation rate and real GDP growth rate, are obtained from the World Development Indicators database of the World Bank.

The two main variables are the monetary policy changes and competition. We use short term interest rate as a proxy for monetary policy. The data is retrieved from IMF. For competition, we use the Lerner index of market power as a proxy for banking competition.

$$Ler = Lerner_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \tag{1}$$

where P_{it} is the price of bank's output and MC_{it} is the marginal cost. A higher value of the Lerner index suggests less competition, i.e., more market power. P_{it} is calculated by dividing the total revenues by total assets and MC_{it} is derived from the following trans-log cost function:

$$\begin{aligned} \ln TC_{it} = & \alpha_0 + \alpha_1 \ln Q_{it} + \frac{\alpha_2}{2} (\ln Q_{it})^2 + \sum_{j=1}^3 \delta_j \ln w_{jit} + \\ & + \frac{1}{2} \sum_{j=1}^3 \sum_{k=1}^3 \delta_{jk} \ln w_{jit} \ln w_{kit} + \sum_{j=1}^3 \gamma_j \ln Q_{it} \ln w_{jit} + \tau_1 Trend + \\ & + \frac{\tau_2}{2} Trend^2 + \tau_3 Trend \times \ln Q_{it} + \sum_{j=1}^3 \theta_j Trend \times \ln w_{jit} + \varepsilon_{it} \end{aligned} \tag{2}$$

where TC is the bank's total cost, Q is the output measured by total assets, w_j ($j = 1, 2, 3$) is the price of labor, funds and physical capital, which are measured by personnel expenses to total assets, interest expenses to total funds and non-interest expenses to total assets, respectively. Trend is included to capture technical changes in the cost function. We impose homogeneity and symmetry conditions in the estimation of the cost function, and then the marginal cost is calculated as follows:

$$MC_{it} = \frac{TC_{it}}{Q_{it}} \left[\alpha_1 + \alpha_2 \ln Q_{it} + \sum_{j=1}^3 \gamma_j \ln w_{jit} + \tau_3 Trend \right] \tag{3}$$

Following the literature on the bank lending channel (Ibrahim, 2017; Yang & Shao, 2016; Olivero, et al., 2011), we use the following model:

$$\begin{aligned} \Delta \ln(Loan_{it}) = & \alpha_i + \gamma \Delta \ln(Loan_{it-1}) + \beta Intr_i + \sum_{j=1}^k \theta_j BS_{it-1} + \\ & + \delta \Delta \ln(GDP_t) + \tau INF_t + \varepsilon_{it} \end{aligned} \tag{4}$$

To investigate the impact of banking competition on the bank lending channel, we need to add the proxy of competition and interact it with the proxy for monetary policy. We obtain the following model:

$$\begin{aligned} \Delta \ln(Loan_{it}) = & \alpha_i + \gamma \Delta \ln(Loan_{it-1}) + \beta Intr_i + \vartheta Ler_{it} + \\ & + \phi Intr_i * Ler_{it} + \sum_{j=1}^k \theta_j BS_{it-1} + \delta \Delta \ln(GDP_t) + \tau INF_t + \varepsilon_{it} \end{aligned} \tag{5}$$

$\Delta \ln(Loan_{it})$ is the difference in loans, which is denoted as d_loan in the estimation tables. $Intr$ is the interest rate, and Ler is the Lerner index, which is calculated

as explained earlier. $Intr_i * Ler_{it}$ is the interactive term between the Lerner index and the interest rate. BS represents the set of bank specific variables, while $\Delta \ln(GDP_t)$ and INF_t represent the macro variables. $\Delta \ln(GDP_t)$ is the gross domestic product growth that is denoted GDP_g , and finally, INF is inflation.

We adopt a dynamic panel specification using generalized method of moments (GMM) estimators. Specifically, we use first difference GMM and System GMM. Endogeneity issues may arise in dynamic panel estimation because of the correlation between the individual specific effect and the lagged dependent variable. First difference GMM uses the lagged level variables as instruments to deal with endogeneity. The System GMM estimator has both a level variable and its first difference. The Arellano-Bond autocorrelation test is used to confirm the absence of second order autocorrelation. In addition, the Hansen test is used to verify the relevance of the instruments. We employ a two-step procedure and the robust standard errors of Windmeijer's (2005) finite sample correction.

5. Estimation Results:

The descriptive statistics and the correlations are provided in Tables 1 and 2, respectively. The mean credit is 0.15, indicating average growth of loans to be 15% over the period of 12 years (2003-2014). The loan growth is not surprising since Malaysia's economy is driven by consumption activities. The low standard deviation of 0.27 is indicative of the fact that the loan growth was more or less stable over the years. The mean, C3, which is indicative of concentration in the Malaysian banking industry, is 62. This result suggests that the market share of three large banks accounts for 62% of the total banking market. This value is not concerning because a concentration within the range from 40% to 70% is considered medium concentration. The industry with 62% concentration is considered an oligopoly market. The Lerner index of 0.4 is indicative of a competitive market. In other words, the figures suggest that the firms have low market power. The Lerner index confirms the results of C3. The mean interest rate of -0.22 indicates that the interest rates were lower during the sample. The low interest rates are not surprising because the Malaysian economy is consumption-based, and the interest rates were kept lower to support these consumption activities. The average equity to total as-

Table 1. Descriptive Analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
d_loan	342	0.130	0.282	-1.385	1.635
C3	342	74.345	21.535	45.800	98.990
Ler	342	0.430	0.091	0.043	0.656
intr	306	0.045	0.497	-1.337	0.743
t_asset	344	13717.030	19710.480	66.641	129487.700
ln_t_asset	344	8.615	1.488	4.199	11.771
eqta	341	10.835	6.597	2.930	38.990
liq	288	9.000	8.432	0.000	42.680
Inf	344	2.417	1.233	0.583	5.441
GDP_g	344	5.059	2.685	-2.526	9.428
llrr	341	3.550	3.838	0.260	47.640

Table 2. Correlation

	d_loan	C3	Ler	intr	t_asset	ln_t_a~t	eqta	liq	Inf	GDP_g	llrr
d_loan	1										
C3	-0.05	1									
Ler	0.05	0.15	1								
intr	0.16	-0.14	-0.08	1							
t_asset	0.01	-0.10	0.38	0.02	1						
ln_t_asset	0.07	-0.04	0.40	0.00	0.79	1					
eqta	-0.24	-0.07	-0.05	-0.02	-0.24	-0.65	1				
liq	0.11	-0.20	0.06	0.09	0.09	-0.01	0.03	1			
Inf	-0.01	0.07	0.00	0.47	0.02	0.03	-0.05	0.00	1		
GDP_g	0.16	-0.12	-0.09	0.79	0.00	-0.02	-0.01	0.06	0.19	1	
llrr	-0.22	0.38	-0.20	-0.05	-0.19	-0.28	0.25	-0.23	-0.01	0.01	1

sets is 226, indicating that Malaysian banks are well capitalized. The liquidity figures also indicate that the banks are fairly liquid and are capable of facing any risk arising out of maturity mismatches or other risks associated with low liquidity. The high capitalization and fair amount of liquidity can be attributed to a range of banking reforms that took place after the Asian crisis. These reforms were part of Financial Sector Masterplan (FSM). The asset quality is also good, as the average loan reserves are only 5%. On the other

hand, the macroeconomic indicators during the period also looked stable, with the economy growing at an average rate of 5.5% with single digit inflation of 6%.

The correlations between loan growth and the independent variables are negative except for the macroeconomic indicators and liquidity (Table 2). We focus on only our main variables, such as C3, the Lerner index and interest rates. The negative correlations between C3 and loan growth and between the Lerner index and loan growth indicate that banks provide more credit

Table 3. Lending Channel and Market Power Impact

	(1) d_loan	(2) d_loan	(3) d_loan	(4) d_loan
Ld_loan	0.164* (1.80)	0.148 (1.43)	0.212** (2.04)	0.209** (2.17)
intr	0.116** (2.01)	0.101 (1.61)	0.0819 (1.00)	0.0336 (0.09)
L.ln_t_asset	-0.272** (-2.26)	-0.204* (-1.80)	-0.118 (-1.38)	-0.116 (-1.24)
Leqta	-0.0183 (-1.49)	-0.0121 (-0.92)	-0.0198** (-1.97)	-0.0200* (-1.70)
L.liq	0.00773* (1.77)	0.00790 (1.63)	0.00756 (1.23)	0.00697 (1.19)
Inf	-0.0222 (-1.59)	-0.0652** (-2.13)	-0.0493** (-2.03)	-0.0480* (-1.75)
GDP_g	0.00395 (0.33)	-0.00848 (-0.45)	-0.00125 (-0.06)	-0.00216 (-0.11)
L.lrr	0.0153 (0.73)	0.0106 (0.55)	0.0260 (1.22)	0.0259 (1.25)
Cris08		0.155* (1.65)	0.0781 (0.87)	0.0668 (0.68)
Cris09		-0.212 (-1.12)	-0.165 (-0.86)	-0.172 (-0.85)
LLer			-0.426 (-0.59)	-0.461 (-0.67)
c.intr#c.Ller				0.118 (0.15)
N	215	215	215	215
esttype	difference	difference	difference	difference
N_g	32	32	32	32
j	17	19	29	30
chi2	67.91	63.64	74.56	57.73
chi2p	1.28e-11	7.36e-10	1.64e-11	5.83e-08
ar1p	0.0467	0.0582	0.0472	0.0494
ar2p	0.187	0.324	0.562	0.640
sarganp	0.436	0.420	0.227	0.228
hansenp	0.264	0.137	0.255	0.211

t statistics in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

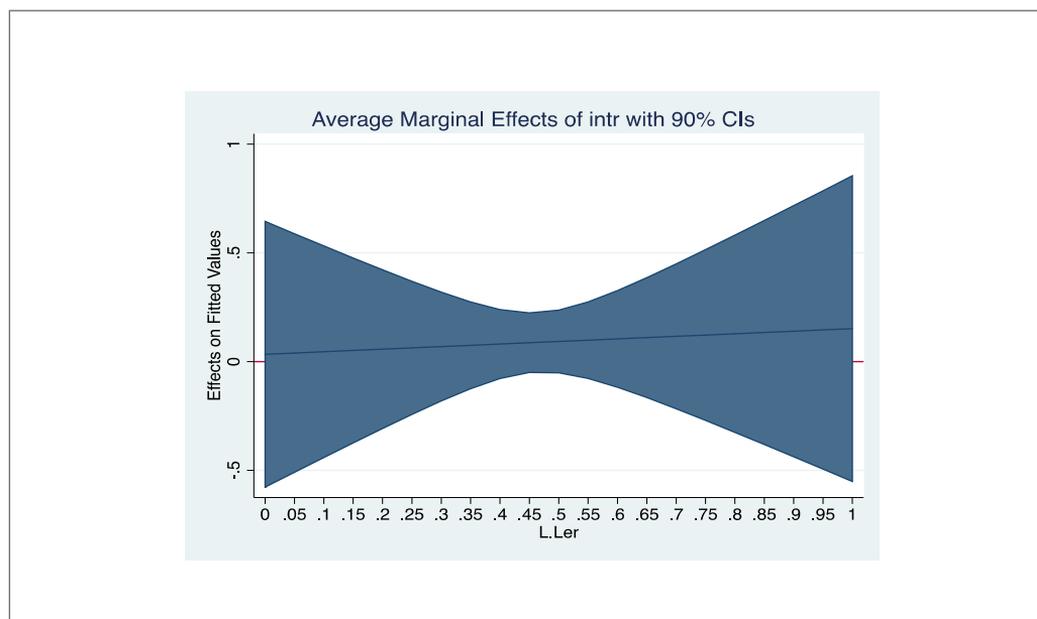


Figure 1. The marginal effect of market power on bank lending channel

in competitive markets. This result is understandable because competitive markets encourage banks to lend more in order to capture the market. On the other hand, the negative correlation between interest rates and loan growth is also understandable, as lower interest rates not only motivate banks to lend more but also provide incentives to borrowers during these periods due to the cheaper cost of credit. The positive association between GDP growth and loan growth suggests that the loan growth is cyclical in nature. In other words, banks lend more during good times (expansionary periods) but reduce lending during bad times (recessionary periods).

We first present the estimation results of the basic equation in Table 3. The table shows four specifications. Column 1 includes size, capitalization, liquidity, loan loss reserve, inflation and GDP growth. The second column controls the impact of global financial crises (2008-2009). The third column includes the Lerner index. The interaction of the Lerner index with monetary policy is added to the fourth column. At the bottom of the Table, the Arellano-Bond autocorrelation test statistics for autocorrelation in the residuals suggests a first-order au-

tocorrelation and insignificance of second-order autocorrelation. Moreover, the Hansen statistics fail to reject the over-identifying restrictions for instrument validity. Accordingly, given that these two tests are satisfied, the coefficient estimates are consistent.

The coefficient for bank capitalization is found to be negative in the Models 3 and 4, while Models 1 and 2 do not show significance. The coefficient of inflation is found to be negative in most of the models. The results do not show a significant impact for the liquidity of the bank, loan loss reserves and real GDP growth on the credit growth in most of the models. Finally, central to our theme, we find that the coefficient of the monetary policy changes to be insignificant in most of the models. Models 3 and 4 show that the Lerner index does not have a significant impact on credit growth. However, the interactive term between monetary-policy and the Lerner index is positive (Model 4). If the impact was significant, this would indicate that an increase in the level of bank market power may affect the transmission of the monetary policy. This would in turn support the idea that bank competition plays a role in the way that banks respond to

Table 4. Lending Channel and Market Power Impact Per Type

	(1) d_loan	(2) d_loan	(3) d_loan	(4) d_loan
L.d_loan	-0.0266 (-0.18)	0.514 (0.96)	0.0801 (0.68)	0.0543 (0.34)
intr	-0.628 (-0.88)	-2.812 (-0.85)	0.143* (1.79)	-0.245 (-0.25)
L.Ler	-0.297 (-0.41)	-2.565 (-1.30)	0.812 (0.45)	0.555 (0.30)
L.ln_t_asset	-1.180** (-2.13)	-2.127** (-2.23)	0.0424 (0.41)	0.0264 (0.19)
L.eqta	-0.0544 (-0.86)	-0.0802 (-0.90)	-0.0217** (-2.04)	-0.0231* (-1.89)
L.liq	0.00778 (0.72)	0.000509 (0.05)	0.00256 (0.40)	0.00255 (0.42)
Inf	0.0192 (0.26)	0.148 (1.11)	-0.0143 (-0.34)	-0.0143 (-0.34)
GDP_g	-0.0172 (-0.82)	-0.0313 (-0.96)	0.0136 (0.47)	0.00730 (0.19)
L.lrr	-0.0239 (-1.22)	-0.0255 (-0.64)	0.0370 (1.51)	0.0363 (1.33)
Cris08	-1.779 (-1.40)	-4.236 (-1.64)	0.130 (1.50)	0.0909 (0.61)
Cris09	-1.734 (-1.23)	-4.254* (-1.75)	0.168 (0.65)	0.0809 (0.20)
c.intr#cL.Ler		2.834 (0.34)		0.834 (0.39)
N	52	52	163	163
esttype	difference	difference	difference	difference
N_g	13	13	19	19
j	24	25	29	30
chi2	864.6	296.6	77.35	69.80
chi2p	2.50e-178	2.44e-56	4.79e-12	3.49e-10
ar1p	0.270	0.575	0.0727	0.0805
ar2p	0.448	0.208	0.118	0.219
sarganp	0.193	0.196	0.0670	0.0684
hansenp	1.000	1.000	0.958	0.963

t statistics in parentheses

* p < 0.10, ** p < 0.05, *** p < 0.01

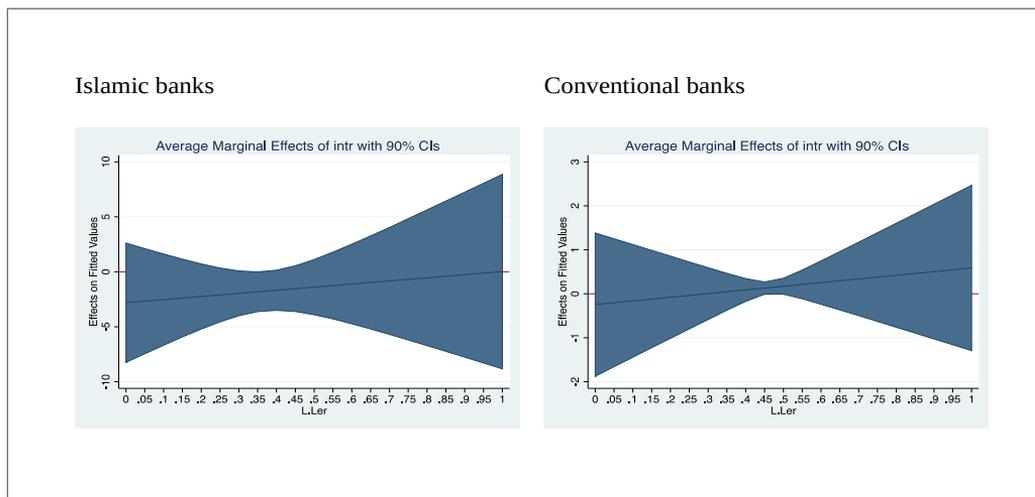


Figure 2. The marginal effect for Islamic and conventional banks separately

changes in monetary policy. Since Model 4 has an interaction term in the model, the significance of the Lerner index cannot be decided solely based on the significance of its coefficient but, rather, can be shown by plotting a marginal effect. According to Brambor, Clark and Golder (2006), when coefficients are jointly significant, the sign of the interaction term can be interpreted, even if its coefficient is found to be insignificant. To explain this, we recall our model presented in equation 5 earlier:

$$\Delta \ln(Loan_{it}) = \alpha_i + \gamma \Delta \ln(Loan_{it-1}) + \beta In_{it} + \vartheta Ler_{it} + \varphi In_{it} * Ler_{it} + \sum_{j=1}^k \theta_j BS_{it-1} + \delta \Delta \ln(GDP_t) + \tau INF_t + \varepsilon_{it} \quad (5)$$

We want to test the effect of the market interest rate on loan growth, that is, the first-order partial derivative of $\Delta Loan$ in respect to In_{it} . This is written as follows:

$$\frac{\partial \ln(Loan_{it})}{\partial In_{it}} = \beta + \varphi Ler_{it} \quad (6)$$

Equation 6, indicates that relationship between loan growth and interest depends on the value of Ler . The sign and magnitude of the relationship depends jointly on the estimated values of β and φ , as well as on the value of Ler that differs across banks. If β and φ are found to have different signs (as is the case in models 3 and 4 of Table 3), then the impact of the market interest rate on loan

growth might be positive or negative depending on the sign of the sum of the estimated β and the value of the estimated φ multiplied by the Lerner index of the specific bank in the specific year. Nonetheless, the joint significance should also be tested. For this, we chose to plot the 90% significance level boundary lines in the marginal effect figures. If the area within the boundaries is found to include zero marginal impact, then the impact for the given confidence level is not different from zero, implying no impact of interest on loan growth. Otherwise, the impact is either positive or negative. Accordingly, to test this hypothesis, we have plotted the marginal effect of the Lerner index on the bank lending channel in Figure (1).

The graph suggests an absence of a bank lending channel in Malaysia via bank competition. The bank lending channel is not effective for banks regardless of the market power they have.

To test the difference (if any) between Islamic banks and conventional banks, the paper split the data into two subsamples to test the monetary policy transmission across each type. The results are presented in Table 4, which separates banks into Islamic and conventional banks.

The first and second columns give the results for Islamic banks, while the third and fourth columns show the results for conventional banks. As may be seen at the bottom panel of each table, diagnostic statistics verify the consistency of our GMM estimates. Comparing the re-

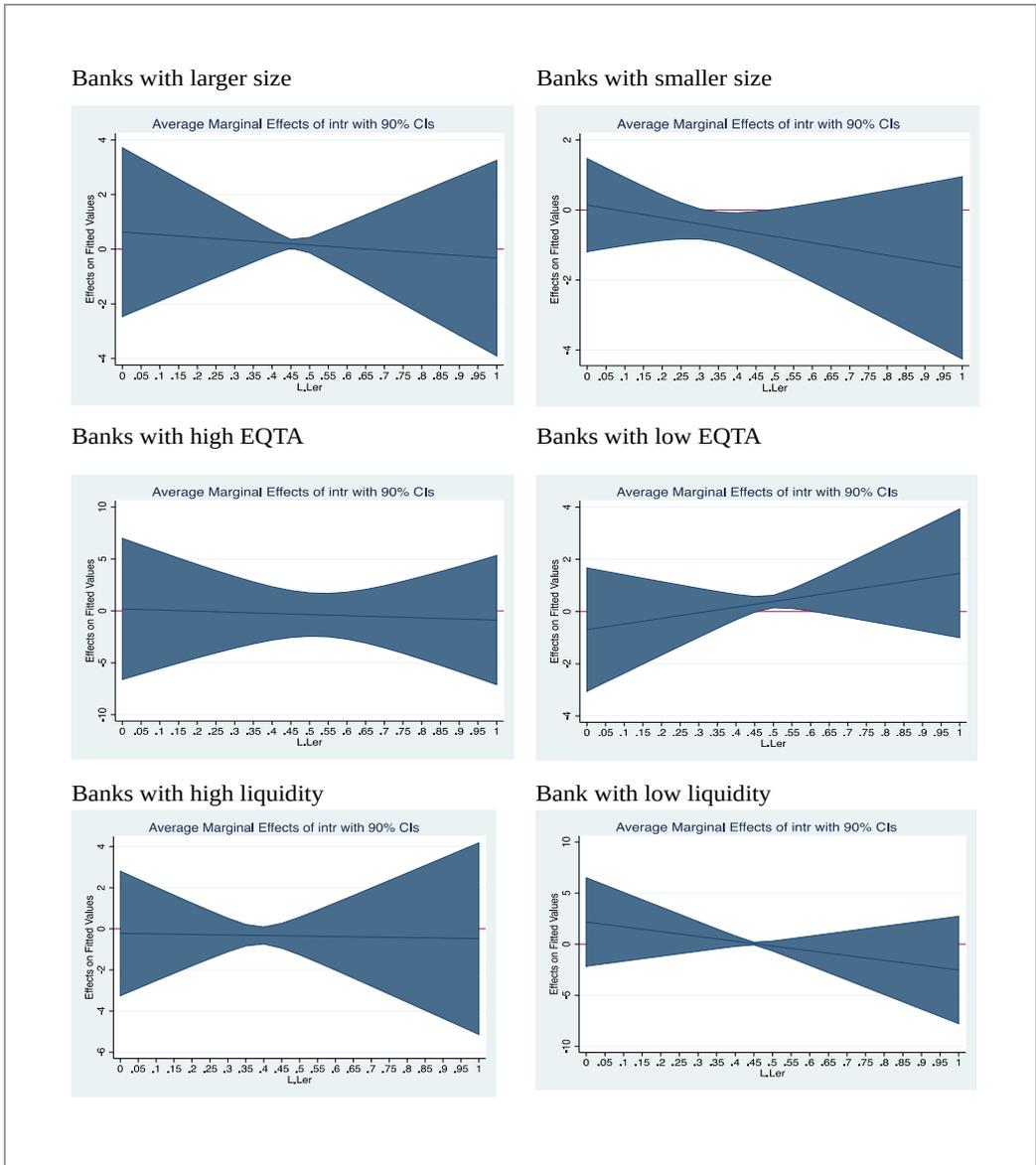


Figure 3. The robustness for subsamples based on the size, capitalization and liquidity

sults across different types of banks in column 1 and 3 suggests no difference in terms of the banks' responses to monetary policy changes.

In columns 2 and 4, we introduce the interaction of the Lerner index with monetary policy. The marginal effect is plotted in the figure 2 for each bank type.

Notably, introducing market power in the model reaffirms the insignificant impact of monetary policy on credit growth in both Islamic and conventional banks. Both graphs support the overall conclusion that suggests an absence or ineffectiveness of a bank lending channel in Malaysia via bank competition.

For robustness, we re-estimate the models for subsamples by size, capitalization and liquidity. The findings reaffirm our initial results that the bank lending channel is not effective in the Malaysian banking system regardless of the market power of the banks.

6. Conclusion

This research investigated the impact of market power on lending provided by banks in the dual banking system of Malaysia. To examine the potential effect of competition on bank lending, this work investigated the interaction of competition with the policy rate. In doing so, this paper contributes to the current literature, especially in regard to the responses of Islamic banks to monetary policy changes, and provides insight into the impact of bank structure on lending growth.

Three main findings are concluded from this paper. First, there is no empirical evidence supporting the effectiveness of changes in monetary policy on bank lending. This result indicates that central banks may need to depend on channels other than the interest rate to influence lending. Second, bank market power does not seem to have an impact on the transmission of monetary policy. The impact of the interest rate on banks with different levels of market power seems to be the same. In other words, the ineffectiveness of the bank lending channel is independent of their market power. Third, the results are consistent in both Islamic and conventional banks. This result could be justified since most of Islamic banks are subsidiaries of the conventional banks. Therefore, despite the theoretical differences, the subsidiary Islamic banks follow their parent banks' policies. As such, policymakers do not need to design different policies for Islamic and conventional banks. This might differ for markets characterized by a great number of full-fledged independent Islamic banks; however, this question requires further research in the context of other dual banking systems, such as the GCC.

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