

Monetary Policy, Bank Ownership, and the Lending Channel: Evidence from ASEAN

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Abstract: *This paper examines the effectiveness of bank lending channels in ASEAN countries. The main objective of this paper is to identify whether the effectiveness of bank lending channels in ASEAN differs based on the countries' financial structure, banks' fundamentals and ownership type. The study makes use of unbalanced panel data of 214 commercial banks in nine ASEAN countries for the period from 2001 to 2015. Analysis using dynamic GMM estimators finds that the bank lending channel is more effective in CLMV countries which have a less-developed financial sector compared to ASEAN-5 countries which have a more developed financial sector. Particularly, we find that smaller banks with less liquidity have a broader scope to expand their financing portfolios when interest rates rise. We also find that foreign banks in ASEAN-5 countries and state-owned banks in ASEAN countries weaken the effect of monetary policy transmissions. However, local banks are vulnerable to changes in monetary policy. Further analyses confirm that the influence of ownership structure on credit growth is partly driven by the differences in the banks' specific characteristics. Our findings suggest that the effectiveness of bank lending channel depends on financial structure, bank fundamentals and ownership structure. The regulators need to take this into account to ensure that the changes in monetary policy achieve the desired objectives.*

Keywords: Bank lending channel; monetary policy; ownership; ASEAN; GMM
JEL Classification: E44; E52

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1. Introduction

Banks play a very important role in the economy. Traditional macroeconomic models emphasise the role of banks in transmitting changes in monetary policy to the real economy. Bernanke and Blinder (1988) initialised the concept of a bank lending channel, which analyses how monetary policy decisions are transmitted into the economy. This channel emphasises the effects of monetary policy changes on the supply of bank

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loans. More specifically, it asserts that a contractionary monetary policy causes a reduction in bank reserves and deposits. Banks' inability to replace these reductions without incurring any costs causes them to reduce lending to businesses and consumers. This reduces investment and ultimately leads to a reduction in economic output. The opposite happens during an expansionary monetary policy. The existing literature dwells on the existence and the effectiveness of the bank lending channel. Most earlier studies focus mainly on testing the bank lending channel in the United States and Europe. Later studies look at the bank lending channel in developing countries. However, not many studies have analysed the effectiveness of the bank lending channel in member countries of the Association of Southeast Asian Nations (ASEAN).

ASEAN consists of ten countries that differ widely in terms of the development of their financial market. Countries such as Indonesia, Malaysia, Philippines, Singapore, and Thailand (ASEAN-5) have a more developed financial market than Brunei, Cambodia, Lao, Myanmar, and Vietnam (BCLMV). The composition of financial assets as percentages of GDP for Malaysia, Singapore and Thailand are similar to European countries, while the composition for Vietnam, the Philippines and Indonesia are similar to developing countries. In contrast, the level of financial assets as percentages of GDP are extremely low for Brunei, Cambodia, Laos and Myanmar (Shimizu, 2014). The differences in the financial asset accumulation between the ASEAN-5 and BCLMV countries is mainly accounted for by the differences in the stock market capitalisation and bonds outstanding (Lee & Takagi, 2013). Prior to the 1997 financial crisis, the financial systems in ASEAN countries were mainly centred on the banking sector, and no alternative channel of intermediation was available. Nevertheless, ASEAN capital markets started to grow rapidly over the years (Chaisrisawatsuk, 2016). Singapore, Malaysia and Thailand have well-established stock markets, Indonesia and the Philippines have developing stock markets, while BCLMV countries have underdeveloped stock markets (Shimizu, 2014).

Considerable efforts have been made since 1997 to develop the ASEAN-5 bond markets as an alternative financing channel for firms to obtain funds. Malaysia, Thailand and Singapore have larger bond markets relative to GDP compared to others, whereas BCLMV countries have just started to develop their bond markets (Chaisrisawatsuk, 2016). The stock markets and government bond markets in ASEAN-5 countries are very deep and liquid, but the corporate bond markets are shallow and illiquid (Lee & Takagi, 2013). However, corporate bonds issuance started to grow rapidly since the 2008 global financial crisis driven mainly by the domestic market (Kowalewski, 2017).

Despite the differences, banks remain the major source of financing in ASEAN countries. Credit as a percentage of GDP is higher in the ASEAN-5 countries than in BCLMV countries (Figure 1). Higher reliance on the credit market makes the bank lending channel a crucial transmission mechanism of monetary policy in these countries. However, in order for the bank lending channel to be effective, banks must be prevented from offsetting changes in monetary policy by substituting capital market funds for deposit funds (Gertler & Gilchrist, 1993). Rapid development in the ASEAN-5 capital market gives banks in these countries access to growing non-deposit sources of funds during periods of monetary tightening, as shown in Figure 2. In comparison, BCLMV countries do not have capital and bond market operations, and as a result, they rely heavily on their banking sector as a source of funds (Yamanaka, 2014). Noticeable differences in the structure of the financial market between these two groups of countries may influence the monetary policy changes and how its effects are transmitted to the rest of the economy.

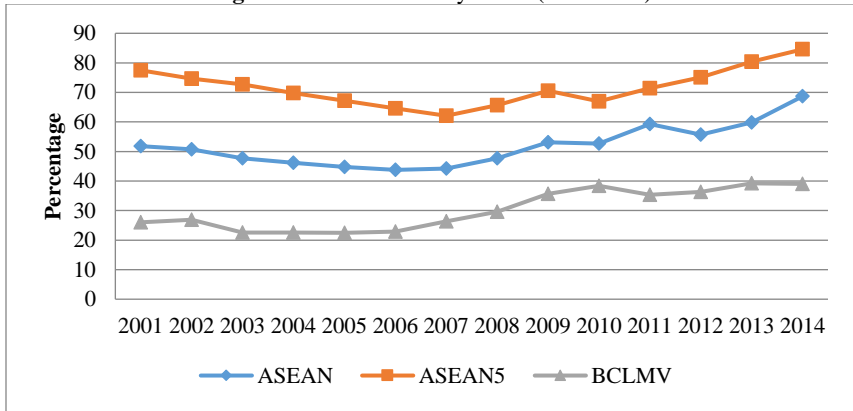
The ASEAN banking sector has undergone reforms through privatisation, mergers and acquisitions, and increased foreign bank participation to improve its soundness after the Asian financial crisis. Furthermore, an ASEAN Banking Integration Framework (ABIF) is proposed to achieve partial integration in the banking sector by 2020 for commercial banks. Under the ABIF, barriers to entry and discrimination against ASEAN-based foreign financial institutions will be eliminated. This has increased the level of cross-border holdings of ASEAN-based foreign banks in the region (Asian Development Bank, 2013). These changes have affected the ownership structure of commercial banks in the region. The number of foreign banks as a percentage of total banks is the highest in Malaysia and Cambodia, as shown in Figure 3. Brunei and Myanmar do not have any foreign banks. State-owned banks continue to have a significant presence in several ASEAN countries and often have ties to state enterprises. In Indonesia, Laos, and Myanmar, a large percentage of the commercial banks are controlled by the government, but in Brunei, Cambodia, and Singapore, none of them are. Private banks are dominant in Brunei, Singapore, Thailand, and Vietnam.

The above developments in the ASEAN banking sector provide an interesting avenue for examining the effectiveness of the bank lending channel. Existing studies on the effectiveness of the bank lending channel have mainly focused on the ASEAN-5 countries. This study contributes to the existing literature in two significant ways. Firstly, this study analyses the effectiveness of the bank lending channel among nine ASEAN member countries and compares the effectiveness of the bank lending channel between ASEAN-5 countries, which have a rapid pace of credit growth, and BCLMV countries, which have slower credit growth. Secondly, this study analyses the impact of bank ownership in ASEAN countries on the

effectiveness of the lending channel of monetary policy transmission. Existing studies on this topic are mostly based on developed countries, which are dominated by private banks. Given that foreign and state banks also play a prominent role in the ASEAN banking sector in addition to private banks, the effectiveness of monetary policy may also differ accordingly. Hence, the findings of this study may provide different policy implications for regulators.

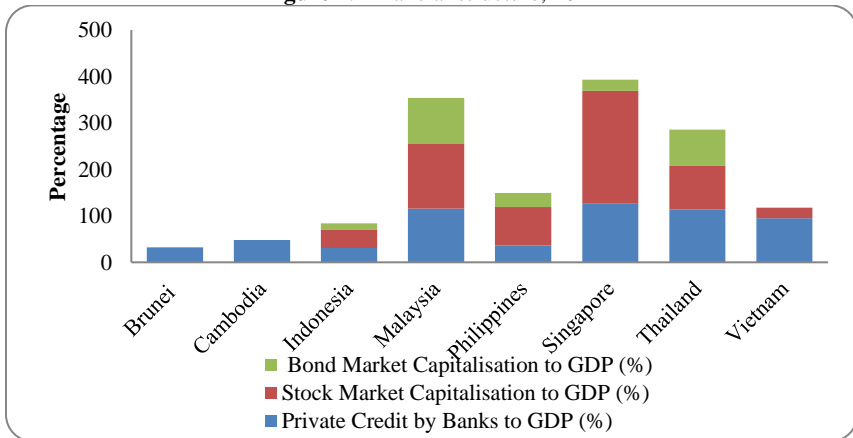
The remainder of the paper is structured as follows. Section 2 describes the empirical literature. Section 3 describes the methodology, model specification, and data. The results are discussed in Section 4. Finally, Section 5 concludes.

Figure 1: Private credit by banks (% of GDP)



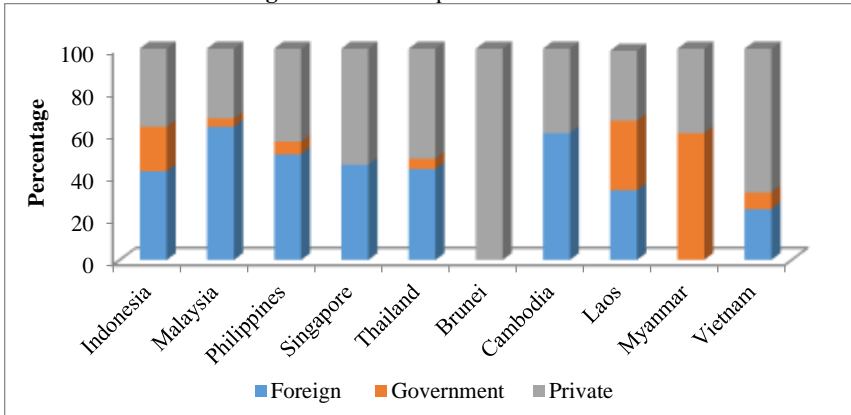
Source: Global Financial Development Database, World Bank

Figure 2: Financial structure, 2014



Source: Global Financial Development Database, World Bank

Figure 3: Ownership structure in 2015



Source: BankScope and authors' calculation

2. Literature Review and Hypothesis Development

Most early studies on the bank lending channel focus on identifying the existence and the importance of monetary transmission through the lending channel (Bernanke & Blinder, 1988, 1992; Bernanke & Gertler, 1995; Kashyap & Stein, 1995). Earlier studies use aggregate data to test the existence of the bank lending channel (Bernanke & Blinder, 1992; Kashyap, Stein & Wilcox, 1993). However, this method is not suitable because it fails to distinguish between changes in credit behaviour that are due to shifts in loan demand and shifts in loan supply. As a result, most recent studies use bank-level data to test for the existence of a bank lending channel. This method takes into account the fact that the reactions of banks to monetary policy changes vary depending on their characteristics.

Earlier studies analyse banks' ability to protect their loan portfolio from monetary policy changes by focusing on the strength of their balance sheets. Capitalisation, size, and liquidity are often used to differentiate banks' financial strength. Kashyap and Stein (1995) find that smaller and less liquid banks are more sensitive to monetary policy changes, as it is costlier for them to raise uninsured funds. Kishan and Opiela (2000) find that smaller and less-capitalised banks are more responsive to monetary policy changes. Banks with less capital are often perceived as risky. Hence, they may face difficulty in raising alternative funds. These studies suggest that undercapitalised, illiquid, and smaller banks in the United States are more sensitive to changes in monetary policy.

However, findings of the European banking sector are inconclusive. Ehrmann et al. (2001) find that illiquid banks are more vulnerable than smaller and undercapitalised banks to changes in monetary policy. By

contrast, Altunbaş, Fazylov and Molyneux (2002) find that undercapitalised banks in Europe are more sensitive to changes in monetary policy. Hernando and Martinez-Pages (2003) find that the bank lending channel is not effective in Spain because banks maintained an adequate level of liquid assets to offset significant shocks to their traditional funding sources. Kakes and Sturm (2002) find support for the existence of a bank lending channel in Germany. Even though smaller banks hold a larger buffer of liquid assets, they find that credit cooperatives, which are smaller on average, are most vulnerable to monetary shocks. Gambacorta (2005) finds that well-capitalised and liquid banks in Italy are able to protect their loan portfolio against monetary tightening, but bigger banks are unable to do so. These findings imply that the effectiveness of the bank lending channel in the European banking sector varies given the heterogeneous nature of the banks in different countries.

Recent studies also find supporting evidence of a bank lending channel in developing countries. Bhaduri and Goyal (2015) find that size and liquidity influence the effectiveness of the bank lending channel in India. Similarly, Matousek and Sarantis (2009) find that size and liquidity influence bank reactions to changes in monetary policy in eight Central and Eastern Europe countries. Qiyue and Xian (2015) find that the size and capitalisation of banks influence monetary policy transmission in China. More specifically, they find that banks with high capitalisation are more sensitive to expansionary monetary policy, while banks with lower capitalisation are more sensitive to contractionary monetary policy. Ono (2015) concludes that bank size and capitalisation influence the effectiveness of monetary transmission in Russia, while Meral (2015) sees similar results in Turkey. Mahathanaseth and Tauer (2018) find that an increase in monetary policy rates reduces loan supply of small banks in Thailand more compared to that of bigger banks since the latter are better able to continue lending by sourcing funds through debt issuance.

Further studies find that bank reactions to monetary policy also depend on factors other than the quality of bank balance sheets. Altunbaş, Gambacorta and Marques-Ibanez (2009) confirm that banks with broad exposure to securitisation are less prone to monetary policy shocks because they can obtain additional funds from other sources. Khan, Ahmed and Gee (2016) and Olivero, Li and Jeon (2011a) find that greater banking sector competition reduces the effectiveness of the bank lending channel. Olivero, Li and Jeon (2011b) find that greater concentration in the banking sector weakens the transmission mechanism of monetary policy through the bank lending channel. Recent studies also show that the effectiveness of the bank lending channel depends on the type of financial institution. Zulkhibri (2013) finds that finance companies are more sensitive to changes in monetary policy than commercial banks, while Caporale, Nazif, Helmi, Ali and Tajik (2016) concluding that Islamic banks are less sensitive to monetary policy

changes than conventional banks. The recent study by Heryán and Tzeremes (2017) finds that the effectiveness of the bank lending channel varies before and during the Global Financial Crisis in European Union countries.

The ownership structure of banks may influence banks' lending decisions, which can lead to either higher or lower loan growth (Stiglitz & Weiss, 1981; Tirole, 1994; Shleifer, 1998). The market strategy of banks may differ according to their ownership (Ananchotikul & Dulani 2015). Hence, differences in bank ownership can play an essential role in determining banks' responses to monetary policy even after other bank characteristics are controlled for. Foreign banks can benefit from having a stable supply of credit from their parent banks during a time of crisis in the host country (Fungáčová, Herrala & Weill, 2013). As a result, their credit supply can be less sensitive to monetary policy shocks. However, loan growth at state-owned banks can be determined more by government directives and political influence than funding constraints that arise as a result of changes in monetary policy. Andries and Billon (2010) assert that, given their political links, state-owned banks can have a greater capacity to absorb shocks due to tightening monetary policy. This suggests that ownership can influence banks' responses to changes in monetary policy.

The existing literature looks at the impact of bank ownership on the lending channel from monetary policy transmission. Houston and James (1998) find that banks affiliated with a multibank holding company are less sensitive to monetary policy transmissions, while Cetorelli and Goldberg (2008) believe that banks with a large global presence are less sensitive to monetary policy shocks. Bhaduri and Goyal (2015) and Bhaumik, Dang and Kutun (2011) confirm that banks with different ownership structures react differently to monetary policy changes in the Indian banking sector. More specifically, the latter study finds that foreign banks are more affected by tight monetary policy, but old private banks are more affected by loose monetary policy, while the former study finds that local banks are more sensitive than foreign banks to changes in monetary policy. Based on an analysis of 35 emerging countries, Wu, Luca and Jeon (2011) find that foreign banks are less sensitive than domestic private banks to changes in monetary policy in host countries. Nevertheless, Laidroo (2016) finds that the ownership structure of banks in Central and Eastern Europe does not influence their reaction to changes in monetary policy. Brei and Schclarek (2015) find that public banks give more loans to the real sector during times of crisis than do private banks. Bertay, Demirguc-Kunt and Huizinga (2015) conclude that public bank lending is less procyclical than private bank lending.

Despite the dominant role of banks in ASEAN economies, not many studies have analysed the effectiveness of the bank lending channel. Existing studies by Khan et al. (2016) and Olivero et al. (2011a, 2011b) focus mainly

on the role of bank competition and consolidation in influencing the effectiveness of the bank lending channel in ASEAN-5 countries only. None of the existing studies compares the effectiveness of the bank lending channel in the ASEAN-5 and CLMV countries. This is a pertinent question that needs to be addressed, given the well-known institutional differences that exist between the two groups of countries (Asian Development Bank, 2013). We contribute to the literature by comparing the effectiveness of the bank lending channel between the two groups of countries. We hypothesise that banks in the ASEAN-5 countries will be less sensitive to changes in monetary policy given that they are able to obtain funds from the debt and equity market. Given that the strength of banks' balance sheet differs among the sampled banks, we also hypothesise that stronger banks will be less sensitive to monetary policy changes.

Furthermore, none of the existing studies looks at the role of bank ownership in influencing the effectiveness of monetary policy transmission in ASEAN countries. This is a crucial topic that needs to be addressed given the fact that state-owned banks play an important role in this region and liberalisation of the financial sector has increased the presence of foreign banks (Lin, Doan & Doong, 2016). Financial integration in ASEAN since the Asian financial crisis has increased the number of ASEAN banks with a regional presence (Yamanaka, 2014). We hypothesise that foreign banks will be relatively insensitive to changes in monetary policy as they may substitute for a loss of deposits with other funds that are sourced externally. Similarly, state banks may be able to source funds from the government during a contractionary monetary policy period. Hence, we hypothesise that state banks are less sensitive to monetary policy changes. However, we expect domestic banks to be more sensitive to monetary policy shocks due to their inability to source alternative funds. In line with this, we hypothesise that domestic banks are more sensitive to monetary policy changes.

3. Research Methodology

3.1 Theoretical Model

The existing literature on the bank lending channel differentiates loan supply movement from loan demand movement by emphasising cross-sectional differences between banks (Gambacorta, 2001). This is done because loan supply movements are influenced by bank-specific characteristics, whereas the same does not apply in the case of loan demand movement. The base specification used in analysing the effectiveness of the bank lending channel in ASEAN countries is as shown in Equation 1:

$$\begin{aligned} \Delta Loan_{i,t} = & \alpha + \sum_{j=1}^l \omega_j \Delta Loan_{it-j} + \sum_{j=1}^l \beta_j \Delta MP_{t-j} \\ & + \gamma_1 CAP_{it-1} + \gamma_2 LIQ_{it-1} + \gamma_3 SIZE_{it-1} \\ & + \sum_{j=1}^l \eta_j \Delta GDP_{t-1} + \sum_{j=1}^l \sigma_j \Delta Prices_{t-1} \\ & + \mu_i + \epsilon_{i,t} \end{aligned} \quad (1)$$

where $i = 1, \dots, N$, $t = 1, \dots, T$

N = number of banks

T = time period

j = number of lags.

In Equation 1, *Loan* denotes a change in the logarithm of total loans, *MP* is the monetary policy rate, *GDP* is the growth rate of real GDP, *Prices* is the growth rate of a consumer price index (CPI), *CAP*, *LIQ*, and *SIZE* are bank capitalisation, liquidity, and size, respectively. The macroeconomic data are obtained from the International Monetary Fund's International Financial Statistics. μ_i represents individual bank effects, while $\epsilon_{i,t}$ is the random error term.

We use the method introduced by Kashyap and Stein (1995) to test whether bank reactions to monetary policy shocks vary according to bank-specific characteristics. This method has been used in the literature widely (Gambacorta & Mistrulli, 2004; Matousek & Sarantis, 2009; Zulkhibri, 2013). We test the asymmetric response of bank credits to changes in monetary policy by including interaction terms between the monetary policy variable and bank-specific variables in the estimated benchmark model of bank lending, using a panel of information for individual banks. Economic output and price variables are controlled for to take account of the demand-side effects on loan behaviour. The model allows for dynamic adjustments, and the variables are estimated in first differences due to non-stationarity. Following Gambacorta (2005) and Kashyap and Stein (1995), we estimate the specification that takes account of the impact of banks' financial strength on loan supply with respect to changes in monetary policy as shown in Equation 2:

$$\begin{aligned} \Delta Loan_{i,t} = & \alpha + \sum_{j=1}^l \omega_j \Delta Loan_{it-j} + \sum_{j=1}^l \beta_j \Delta MP_{t-j} + \gamma_1 CAP_{it-1} \\ & + \gamma_2 LIQ_{it-1} + \gamma_3 SIZE_{it-1} + \sum_{j=1}^l \pi_j \Delta MP_{t-j} * CAP_{it-1} \\ & + \sum_{j=1}^l \rho_j \Delta MP_{t-j} * LIQ_{it-1} + \sum_{j=1}^l \tau_j \Delta MP_{t-j} * SIZE_{it-1} \\ & + \sum_{j=1}^l \eta_j \Delta GDP_{t-1} + \sum_{j=1}^l \sigma_j \Delta Prices_{t-1} + \mu_i + \epsilon_{i,t} \end{aligned} \quad (2)$$

In Equation 2, three bank-specific characteristics that signify banks' financial strength are selected based on the theoretical assumption that banks

with specific fundamentals are more likely to be more responsive to monetary policy changes than others. We select three bank-specific characteristics—capitalisation, liquidity, and size—which are widely used in the literature for the estimation.

Capitalisation (CAP) is measured using the ratio of total equity to total assets. Rising interest rates during a monetary contraction increase banks' financing costs, but the return on bank assets remains stagnant. Since banks with higher capitalisation are usually able to obtain additional uninsured debt financing at a lower cost, they should be better able to absorb unexpected shocks to reserves caused by monetary policy tightening (Kishan & Opiela 2000). Liquidity (LIQ) is measured using the ratio of liquid assets to total assets. Banks with higher liquidity may be better able to insulate their loan supply during a monetary contraction, while banks with lower liquidity are less likely to counter the effect of a monetary contraction on lending by reducing their cash and securities holdings. SIZE is measured by the logarithm of total assets (A). Bigger funds may find it easier to obtain other sourced of funding during a monetary contraction than smaller banks. Hence, the latter may be forced to reduce their lending more than the former.

All the bank-specific financial strength variables are normalised with respect to their sample means (Equations 3 to 5). The CAP and LIQ variables are normalised with respect to the sample means for each period to get rid of the overall mean, while the SIZE variable is normalised with respect to the sample means for each period to get rid of the persistent upward trend in size. This sums the indicators to zero for all observations, which suggests that the average interaction term is zero.

$$CAP_{ijt} = \frac{K_{ijt}}{A_{ijt}} - \left(\sum_{t=1}^T \frac{\sum_{i=1}^N \frac{K_{ijt}}{A_{ijt}}}{N_T} \right) / T \quad (3)$$

$$LIQ_{ijt} = \frac{LA_{ijt}}{A_{ijt}} - \left(\sum_{t=1}^T \frac{\sum_{i=1}^N \frac{LA_{ijt}}{A_{ijt}}}{N_T} \right) / T \quad (4)$$

$$SIZE_{ijt} = \ln A_{ijt} - \frac{\sum_{i=1}^N \ln A_{ijt}}{N_T} \quad (5)$$

All bank-specific variables interact with monetary policy variables in Equation 2. The parameters for the interaction terms are interpretable as the average monetary policy effect on loan supply. We posit that banks with lower capitalisation, lower liquidity, and smaller size are more sensitive to

monetary policy changes. This means that the coefficient for the interaction terms should be positive and significant.

We are interested in examining whether bank ownership has a bearing on loan supply. Identifying the ownership structure of banks is one of the major tasks in this study. The BankScope database provides only information about the current ownership status of the banks. We had to rely on other sources to track the ownership status of the banks for all the years under study. We employ the following steps to obtain bank ownership data. First, we review the banks' overview in the BankScope, which identifies the ownership of some banks. Second, we review the historical profile of banks on its website, which often highlights any changes in ownership. Third, we review the central banks' website for each country. We gather information about the ownership structure of the banks from the annual reports. Fourth, we countercheck our data on foreign ownership against the database provided by Claessens and Van Horen (2014, 2015).

We construct two bank ownership dummies, namely FOREIGN and STATE. Each sampled bank is classified as FOREIGN if a foreign entity owns more than 50% of its capital. Similarly, a bank is classified as STATE if the government owns more than 50% of its capital. FOREIGN equals 1 in the years when the bank is foreign-owned and 0 otherwise. STATE is equal to 1 in the years when the bank is state-owned and 0 otherwise. The ownership dummies are expected to control for the differences in bank-specific characteristics and institutional backgrounds, such as differences in corporate governance, business strategies, customer types, and access to alternative sources of funds. Specification by taking into account the impact of bank ownership on loan supply when there are changes in monetary policy is as shown in Equation 6.

$$\begin{aligned}
 \Delta Loan_{i,t} = & \alpha + \sum_{j=1}^l \omega_j \Delta Loan_{it-j} + \sum_{j=1}^l \beta_j \Delta MP_{t-j} \\
 & + \gamma_1 CAP_{it-1} + \gamma_2 LIQ_{it-1} + \gamma_3 SIZE_{it-1} \\
 & + \sum_{j=1}^l \pi_j \Delta MP_{t-j} * Bank\ Ownership_{t-1} \\
 & + \sum_{j=1}^l \eta_j \Delta GDP_{t-1} + \sum_{j=1}^l \sigma_j \Delta Prices_{t-1} \\
 & + \mu_i + \epsilon_{i,t}
 \end{aligned} \tag{6}$$

The interaction term of bank ownership variables and measure of monetary policy $MP_{t-j} * Bank\ Ownership_{t-1}$ in Equation 6 captures the marginal effect of ownership on monetary policy transmission through the bank lending channel. When we estimate the equation for State bank, for example, β represents the sensitivity of private banks to monetary policy changes while $\beta + \pi$ represent the sensitivity of State banks to monetary policy changes.

3.2 Econometric Model – Dynamic System GMM

The analysis is carried out using the panel data method, which yields consistent and unbiased estimates of the relationship between the macroeconomic variables, bank-specific characteristics, and bank lending. The difference generalised method of moments (GMM) estimator developed by Arellano and Bond (1991) is used. The GMM estimator exploits the time-series element of the data, allows the lagged dependent variables to be included as regressors and controls for the endogeneity of independent variables (Roodman, 2006). The GMM method uses instruments whose validity is based on the orthogonality between the lagged values of the dependent variables and the errors. The GMM estimators are efficient and consistent when there are no second-order serial correlations and the instruments used are valid. The former is confirmed using the AR(2) test while the latter is confirmed using Sargan/Hansen over-identifying tests. The difference GMM method has been used extensively in the bank lending channel literature for panel data (Altunbaş et al., 2010; Hernando & Martinez-Pages, 2003; Zulkhibri, 2013). The statistical properties of the models indicate that the models are correctly specified. The existence of the residual autocorrelation of second-order is rejected for all cases. The instruments' validity is not rejected based on Sargan/Hansen tests.

3.3 Data

The annual bank-level data used in this study is sourced from unconsolidated balance sheet information in BankScope, a financial database maintained by Bureau van Dijk. The dataset constitutes an unbalanced panel for 214 banks for the period 2001 to 2015. The analyses include banks in Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. Only commercial banks are included in the analysis. This is justified by the fact that they account for a large percentage of the total financial assets in the ASEAN banking sector (Asian Development Bank, 2013). Commercial banks account for over 82% of total financial assets in the ASEAN banking sector. However, this number is as high as 98% in the BCLMV countries (Asian Development Bank, 2013). Brunei is excluded because it has only one commercial bank. Following Arena, Reinhart and Vazquez (2006), we processed the data to remove negative values for loans and assets. We deleted outliers in the sample by removing observations for which the growth rate of loans exceeds 300%, the growth rate of assets exceeds 200%, and the volume of loans is more than 100 times that of deposits. Only commercial banks with a minimum of five years of data are included in the analysis.

Following Olivero et al. (2011b), we use the money market rate as the measure of monetary policy. When this rate is not available, the Treasury bill rate or the discount rate is used instead. The monetary policy data are obtained from the World Bank's International Financial Statistics and the respective central banks' website. Based on data availability, money market rates are used as proxies of monetary policy tool for Indonesia, Malaysia, Philippines, Singapore and Thailand. Treasury bill rates are used as a proxy of monetary policy tool for Vietnam, while discount rates are used for Myanmar. The Bank of Cambodia uses reserve requirement rates as one of its monetary policy tools. Hence, we use this variable as a proxy of a monetary policy tool for Cambodia. The Bank of Laos carries out its monetary policy operation using its short-term interest rate and reserve requirement on local currency account¹. For the purpose of this study, we have used the Bank of Laos short-term interest rates as a proxy of monetary policy tool for Laos.

4. Empirical Findings and Discussion

4.1 Descriptive Statistics

Table 1 reports the basic descriptive statistics for the balance sheet items of the commercial banks. The reported numbers represent the mean of the balance sheet items to facilitate comparison based on the bank ownership type. The sample is divided into two groups of countries to illustrate the differences in banks' financial position. As far as ASEAN banks' balance sheet items are concerned, we find that, on average, state-owned banks have the largest total assets, liquid assets, and deposits, but their capital and total loans are smaller than those of private banks. The operations of foreign banks are the smallest in scale compared to the rest of the banks, as shown by the balance sheet items in Table 1.

It is clear that ASEAN-5 countries have more commercial banks than CLMV countries. More specifically, ASEAN-5 countries have the same number of foreign and private banks, but the latter is, on average, almost four times bigger than the former. State-owned banks are by far the biggest in the CLMV countries, followed by private and foreign banks. This shows that state-owned banks play a far more important role in the financial sector in the CLMV countries than in ASEAN-5 countries. In terms of total loans, we find that foreign banks disbursed less in loans than the other banks in both groups of countries. Private banks' share of lending is the highest in the ASEAN-5 countries, while state-owned banks' share of lending is the highest in the CLMV countries.

Table 1: Summary of descriptive statistics for all samples

(in USD million)	All Banks	Foreign	Government	Private	ASEAN5			CLMV		
					Foreign	Government	Private	Foreign	Government	Private
Total assets										
Mean	11,800	3,489.578	20,700	15,700	4,081.568	9,179.719	19,500	589.757	44,500	6,857.758
Std. dev.	37,000	6,515	58,600	41,500	6,995	12,200	45,100	770	97,200	29,800
Liquid assets										
Mean	2,707.081	872.845	7,984.947	2,668.793	996.301	1,819.642	3,286.302	246.530	20,700	1,223.214
Std. dev.	1,550	199	4,000	7,080	2,150	2,640	7,880	343	68,500	4,360
Capital & reserves										
Mean	1,036.254	434.026	1,029.244	1,482.543	502.304	874.159	1,886.636	99.568	1,350.108	540.097
Std. dev.	2,855	877	1,592	3,822	947	1,415	4,297	106	1,875	2,093
Deposits										
Mean	9,332.422	2,734.327	16,100	12,400	3,197.389	7,533.483	15,300	469.667	33,900	5,717.901
Std. dev.	28,700	54,379	44,800	32,300	5,854	10,100	34,700	657	74,300	24,900
Total loans										
Mean	6,340	1,920	7,820	9,160	2,260	5,500	11,400	274	12,600	3,910
Std. dev.	18,000	3,760	10,600	24,100	4,040	8,070	25,900	343	13,400	18,100
Number of observations	3,210	1,247	363	1,600	1,038	243	1,029	209	120	571
Number of banks	214	83	24	107	69	16	69	14	8	38

4.2 Impact of Monetary Policy on Bank Lending

Table 2 provides basic estimation results for Model 1 using a difference GMM estimator. In line with bank lending channel theory, we find that a higher monetary policy rate is linked to significantly lower bank lending for all three groups of countries. However, the effects are only significant for ASEAN and CMLV countries. More specifically, we find that a one-percentage-point increase in monetary policy rate reduces the loan supply by 5.7 per cent for the ASEAN countries and 3.8 per cent in the CLMV countries. These results support our hypothesis that banks in the CLMV countries are more sensitive to changes in the monetary policy rate compared to banks in ASEAN-5 countries. The lack of sensitivity of ASEAN-5 banks could be due to the structure of their financial market that allows banks to compensate for reductions in bank deposits by other financing means. The findings obtained by Brissimis and Delis (2009) on some member countries of the Organisation for Economic Cooperation and Development (OECD) also shows that the effectiveness of the bank lending channel differs based on the structure of the financial market.

Table 2: Estimation Results for Baseline Models

Variables	ASEAN	ASEAN5	CLMV
	(1)	(2)	(3)
Δ Loans (t-1)	0.131 (0.080)	0.325* (0.179)	0.081 (0.089)
Δ MP	-0.057*** (0.020)	-0.020 (0.024)	-0.038* (0.022)
<i>Bank Characteristics</i>			
CAP	-0.021** (0.009)	-0.033*** (0.008)	-0.010 (0.012)
LIQ	-0.016*** (0.003)	-0.010** (0.004)	-0.011** (0.004)
SIZE	0.538*** (0.127)	0.364*** (0.124)	0.528** (0.224)
<i>Control Variables</i>			
Δ GDP	-0.016 (0.019)	-0.013 (0.015)	0.043*** (0.015)
Δ Prices	0.007 (0.007)	0.013 (0.010)	0.000 (0.006)
No. of observations	1,520	1,163	357
No. of individual banks	207	151	56
No of instruments	64	64	38
Hansen (prob)	0.656	0.819	0.584
AR(2)	0.266	0.759	0.231

Note: Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

The coefficient of the lagged loan variable is positive and significant for the ASEAN-5 countries. This suggests that banks with higher loan growth in the previous year may experience higher loan growth in the current year. As far as the bank-specific variables are concerned, we find the coefficients on capital are significant and negative in the ASEAN and ASEAN-5 banks' regressions. This suggests that banks with higher capitalisation are linked to lower loan growth. Similarly, we find that banks with higher liquidity are linked to lower loan growth. This evidence suggests that banks with riskier characteristics are more aggressive in their lending behaviour, whereas banks that are more solvent and liquid are more prudent. Similar observations are observed by Khan et al. (2016) and Olivero et al. (2011a) for selected Asian countries. The coefficient on size is significant and positive in all regressions, ranging from 0.36 to 0.54. This suggests that size is an important factor that influences banks' loan growth.

Overall, our findings confirm that larger banks in ASEAN have bigger loan portfolio. The move towards greater concentration in the ASEAN banking sector as shown by Khan et al. (2016) and Olivero et al. (2011a) may have led to greater monopoly power. This may have caused weaker banks to be aggressive in expanding their loan portfolio to gain market share.

4.3 Impact of Monetary Policy and Bank Characteristics

Further analyses are performed to test how bank-specific characteristics influence bank reactions to monetary policy changes. The results reported in Table 3 show that the estimated coefficient of $\Delta MP * CAP$ is not significant in both groups of countries. This result implies that capitalisation is not as important in distinguishing banks' reactions to changes in monetary policy as liquidity and size. This could be due to several reasons. Firstly, the use of capital to asset ratio may not be an accurate measurement of the capital constraint facing banks under the Basel standards, as suggested by Gambacorta (2005)². Secondly, the effect of monetary policy on bank lending may be varied based on the level of bank capitalisation and type of monetary policy, as shown by Kishan and Opiela (2006). In their study, the sample banks are divided into poorly capitalised banks and well-capitalised banks, while the analysis duration is divided into periods of expansionary monetary policy and contractionary monetary policy.

The estimated coefficient of $\Delta MP * LIQ$ is positive but not significant for ASEAN-5 countries. However, the estimated coefficient for CLMV countries is negative and significant. This suggests that banks with higher liquidity are not able to use their excess liquidity to weaken the transmission of monetary policy through the bank lending channel, as initially observed by Ehrmann et al. (2001) in the case of European banks. In contrast, Kishan and Opiela (2000), Matousek and Sarantis (2009), and Perera, Ralston and

Wickramanayake (2014) find that banks with higher liquidity are able to draw on their liquid assets during monetary shocks.

Size seems to be a highly important variable in the estimation. The estimated coefficient of $\Delta MP * Size$ is negative in the ASEAN-5 countries, indicating that smaller banks in the ASEAN-5 countries are able to weaken the transmission of monetary policy through the bank lending channel. This finding supports the effects of relationship lending on credit supply that small banks have competitive advantages when compared with large banks in the processing of soft information (Berger & Udell, 2002; Degryse & Ongena, 2005). Our findings contrast with the evidence found by Olivero et al. (2011a), which shows that smaller banks in Asia face difficulty in finding alternative sources of funding during monetary policy tightening. The differences in results could also be due to the fact that they include more countries (i.e., China, Hong Kong, India, Japan, and Korea) and a different period (i.e., 1996 to 2006) in their analyses. However, our results are in line with those reported by Matousek and Sarantis (2009) for Central and Eastern European countries.

4.4 *Impact of Monetary Policy and Bank Ownership*

We perform further analysis to identify the role of bank ownership in influencing the effect of the monetary policy transmission mechanism. Importantly, we find significant differences in the reaction of banks to monetary policy changes of central banks based on their ownership structure. The results in columns 1 to 3 of Table 4 show that local banks in ASEAN, ASEAN-5 and CLMV countries are sensitive to changes in monetary policy. We find that a one-percentage-point increase in monetary policy rate reduces the loan supply of local banks in the ASEAN countries by 2.8 per cent, ASEAN-5 countries by 6.7 per cent and CLMV countries by 9.1 per cent. Nevertheless, we find that a one-percentage-point increase in monetary policy rate increases the loan supply of foreign banks in ASEAN countries by 1.5 per cent and ASEAN-5 countries by 8.8 per cent, but the effect is only significant for the latter group. This finding supports our hypothesis suggesting that foreign banks in ASEAN-5 countries are able to weaken the transmission of monetary policy by increasing credit disbursement. This finding is similar to the behaviour of foreign banks in Latin America, as observed by Arena et al. (2006). The foreign banks' ability to weather monetary policy actions might be derived from their ability to obtain a stable supply of credit from their parent banks (Fungáčová et al., 2013).

However, the results in column 3 of Table 4 show that foreign banks in the CLMV countries respond to increases in the monetary policy rate by reducing their loan disbursement. More precisely, we find that a one-percentage-point increase in the monetary policy rate reduces foreign banks

loan supply by 12.1%. This suggests that foreign banks in CLMV countries do not have the capacity to respond to tightening monetary policy by transferring resources from their home countries. This finding is in line with foreign banks in India, as identified by Bhaumik et al. (2011). Interestingly, a large percentage of foreign banks operating in CLMV countries are from neighbouring ASEAN-5 countries. This suggests that foreign banks from developing countries are not able to transfer resources to support their subsidiaries abroad. This may imply that foreign banks from developed countries are stronger than their counterparts from developing countries.

The results in column 4 of Table 4 show that a one-percentage-point increase in monetary policy rate is associated with a 3.6 per cent decrease in loan supply of private banks in the ASEAN countries. However, state banks' lending raises by 10.8%. This support our hypothesis suggesting that state-owned banks in the ASEAN countries have the ability to prevent monetary policy changes from squeezing their credit growth, but private banks do not. This could be due to the large amount of funding that state banks receive from the government and their large network base. However, further analyses performed by dividing the sample of banks into ASEAN-5 and CLMV countries show that a higher monetary policy rate is linked to lower loan supply by state banks, but the effect is not significant.

Table 3: Estimation Results for Monetary Policy and Bank Characteristics

Variables	ASEAN5	CLMV	ASEAN5	CLMV	ASEAN5	CLMV	ASEAN5	CLMV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ Loans (t-1)	0.611*** (0.160)	0.782** (0.046)	0.835*** (0.145)	0.744*** (0.045)	0.498*** (0.158)	0.213* (0.107)	0.348* (0.192)	0.056 (0.111)
Δ MP	-0.048 (0.031)	-0.073** (0.030)	-0.046 (0.039)	-0.049 (0.036)	0.107** (0.046)	-0.0732** (0.030)	0.000 (0.073)	-0.040 (0.051)
<i>Bank Characteristics</i>								
CAP	-0.051*** (0.015)	-0.054 (0.038)					-0.044*** (0.014)	0.003 (0.024)
Δ MP * CAP	0.002 (0.001)	0.004 (0.003)					0.002 (0.002)	-0.001 (0.002)
LIQ			-0.008 (0.006)	0.018** (0.008)			-0.009 (0.007)	-0.014 (0.014)
Δ MP * LIQ			0.001 (0.016)	-0.002** (0.001)			0.000 (0.000)	0.000 (0.001)
SIZE					0.678*** (0.171)	0.450* (0.263)	0.430*** (0.123)	0.531* (0.265)
Δ MP * SIZE					-0.015** (0.006)	0.003 (0.004)	-0.009 (0.008)	0.001 (0.004)
<i>Control Variables</i>								
Δ GDP	0.002 (0.019)	0.006 (0.019)	-0.024 (0.019)	0.0128 (0.030)	-0.018 (0.016)	0.046** (0.016)	-0.006 (0.018)	0.042** (0.016)
Δ Prices	0.015 (0.012)	-0.001** (0.000)	0.014 (0.012)	-0.000 (0.000)	-0.000 (0.012)	-0.001 (0.007)	0.012 (0.011)	0.002 (0.008)
# of obs.	1,165	357	1,164	357	1,166	357	1,163	357
# of banks	151	56	151	56	151	56	151	56
# of instruments	64	38	64	39	64	38	64	38
Hansen (prob)	0.338	0.405	0.86	0.443	0.421	0.472	0.925	0.274
AR(2)	0.21	0.954	0.139	0.768	0.316	0.37	0.582	0.395

Note: Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Estimation Results for Monetary Policy and Bank Characteristics

Variables	ASEAN5	CLMV	ASEAN5	CLMV	ASEAN5	CLMV
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Loans (t-1)	0.175* (0.095)	0.455* (0.260)	0.112 (0.110)	0.112 (0.077)	0.381** (0.186)	0.125 (0.114)
Δ MP	-0.028** (0.013)	-0.067* (0.035)	-0.091* (0.049)	-0.036** (0.011)	0.0113 (0.043)	-0.090 (0.059)
<i>Bank Characteristics</i>						
CAP	-0.012 (0.009)	-0.038* (0.022)	-0.003 (0.023)	-0.007 (0.010)	-0.042** (0.018)	0.007 (0.025)
LIQ	-0.011*** (0.004)	-0.002 (0.006)	-0.012 (0.008)	-0.014*** (0.004)	-0.000 (0.007)	-0.018* (0.009)
SIZE	0.471*** (0.124)	0.318* (0.165)	0.724*** (0.244)	0.499*** (0.122)	0.320* (0.171)	0.720*** (0.231)
<i>Bank Ownership</i>						
Δ MP * Foreign	0.043 (0.040)	0.155** (0.068)	-0.030* (0.017)			
Δ MP * State				0.144** (0.067)	-0.185 (0.230)	0.061* (0.036)
<i>Control Variables</i>						
Δ GDP	0.003 (0.006)	-0.000 (0.007)	0.023 (0.035)	0.004 (0.006)	-0.002 (0.005)	0.016 (0.037)
Δ Prices	0.000 (0.002)	0.002 (0.009)	0.017 (0.011)	-0.001 (0.002)	0.010 (0.006)	0.012 (0.011)
Year dummies	YES	YES	YES	YES	YES	YES
No. of observations	1,520	1,163	357	1,520	1,163	357
No. of banks	207	151	56	207	151	56
No. of instruments	61	36	38	61	36	38
Hansen (prob)	0.202	0.322	0.938	0.357	0.581	0.918
AR(2)	0.431	0.775	0.26	0.295	0.425	0.111

Note: Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

4.4 Impact of Monetary Policy, Bank Ownership and Bank Characteristics

We examine further what drives the different responses of bank ownership types to monetary policy changes. More specifically, analyses are performed to find if the differences in bank lending among foreign and state banks are attributable to the differences in their bank-specific characteristics. We include the interaction between bank-specific characteristics and type of ownership as additional variables. The results in columns 1 and 2 of Table 5 show that the coefficient of capitalisation is negatively associated with bank lending for local banks in ASEAN and ASEAN-5 countries, but it is positively associated with bank lending for foreign banks. In addition, results in column 8 show that highly capitalised domestic banks in ASEAN-5 countries have significantly lower loan growth compared to other types of banks. These findings have a number of implications. Firstly, it shows higher capitalisation of foreign banks is perceived as being less risky as postulated by Kishan and Opiela (2006). Secondly, it shows that even though foreign banks are able to obtain cheaper capital through the internal capital market of the banking group as observed by Laidroo (2016), local regulators are able to affect their lending behaviour through locally determined capital requirements. Lastly, the fact that the same is not applicable to local banks implies that capital adequacy policy is not sufficient in controlling local banks risk-taking activities.

When taking into consideration banks' ownership structure, the results in column 2 show that size is positively related to loan growth for local banks. However, this relationship is reversed for foreign banks in ASEAN-5 countries. This suggests that bigger local banks can expand credit significantly, but foreign banks are not able to do so. The differences in the reaction of local and foreign banks could be attributed to high local and low foreign banks' share of the banking sector assets in ASEAN-5 countries, as shown in Table 1. Foreign-owned banks can lead to reduced access to finance for a majority of domestic firms and consumers if they concentrate only on the least risky and most transparent segment of the market (Detragiache, Tressel & Gupta, 2008). It may also be the case that foreign banks have a smaller market share, and, as a result, are less cost-efficient than domestic banks in ASEAN-5 countries. The ability of larger local banks to attract more credit could be attributed to cost minimisation that is linked to economies of scale. These findings confirm that the differences in bank lending based on the ownership structure of the banks are partly attributed to the differences in the banks' specific characteristics.

Table 5: Estimation Results for Bank Ownership and Bank Characteristics

Variables	ASEAN	ASEAN5	CLMV	ASEAN	ASEAN5	CLMV
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Loans _(t-1)	0.208** (0.099)	0.293* (0.149)	-0.0479 (0.141)	0.132* (0.076)	0.359** (0.177)	-0.0724 (0.133)
Δ MP	-0.023** (0.010)	-0.008 (0.012)	-0.017 (0.057)	-0.017* (0.009)	-0.002 (0.012)	-0.019 (0.052)
<i>Bank Characteristics</i>						
CAP	-0.027* (0.014)	-0.040** (0.019)	-0.017 (0.022)	-0.009 (0.011)	-0.011 (0.014)	-0.011 (0.017)
LIQ	-0.005 (0.007)	-0.007 (0.005)	-0.020** (0.009)	0.014*** (0.004)	-0.014*** (0.005)	-0.021** (0.010)
SIZE	0.424*** (0.146)	0.364*** (0.133)	0.635** (0.239)	0.483*** (0.120)	0.446*** (0.104)	0.590** (0.255)
<i>Bank Characteristics * Ownership</i>						
CAP * Foreign	0.034** (0.016)	0.047** (0.019)	0.012 (0.025)			
LIQ * Foreign	-0.010 (0.010)	0.002 (0.012)	-0.004 (0.013)			
SIZE * Foreign	-0.179 (0.142)	-0.141* (0.076)	-0.009 (0.158)			
CAP * State				-0.064 (0.071)	-0.016 (0.058)	-0.015 (0.140)
LIQ * State				0.008 (0.014)	0.02 (0.022)	0.011 (0.025)
SIZE * State				-0.057 (0.125)	0.007 (0.162)	0.087 (0.112)
<i>Control Variables</i>						
Δ GDP	-0.001 (0.010)	0.004 (0.004)	0.015 (0.042)	0.003 (0.007)	0.005 (0.005)	0.022 (0.043)
Δ Prices	0.002 (0.003)	-0.007 (0.005)	0.013 (0.012)	0 (0.002)	-0.005 (0.006)	0.01 (0.011)
Year dummies	YES	YES	YES	YES	YES	YES
No. of observations	1,520	1,163	357	1,520	1,163	357
No. of banks	207	151	56	207	151	56
No. of instruments	61	61	36	61	61	36
Hansen (prob)	0.34	0.563	0.626	0.141	0.101	0.724
AR(2)	0.423	0.728	0.255	0.152	0.395	0.275

Note: Robust standard errors in parentheses.

*** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

Earlier literature on the bank lending channel's transmission of monetary policy is based mostly on the United States and European countries. Recent studies have looked at the effectiveness of the bank lending channel in developing countries. However, studies on ASEAN countries remain scarce even though banks play an important role in their economies. In this paper, we study the effectiveness of the bank lending channel in ASEAN and

analyse how differences in bank characteristics influence the way in which banks respond to monetary policy changes. Comparisons are made by dividing the ASEAN countries into two groups based on their financial development. Even though private ownership of banks is prevalent in ASEAN, several state-owned and foreign banks operate in these countries. In line with this, this paper analyses how differences in the ownership structure of the banks affect the transmission of monetary policy through the bank lending channel in ASEAN countries.

The analyses in this paper use bank-level data from nine ASEAN countries for the period from 2001 to 2015. All analyses are performed using the difference GMM estimation method. We find that the bank lending channel is effective in ASEAN. However, separate analyses conducted on the ASEAN-5 and CLMV countries show that the bank lending channel is effective in the latter group of countries, which have a less-developed financial sector, but not in the former. By focusing on bank-specific characteristics, we find that bank liquidity and size influence their reaction to monetary policy changes. We also find that foreign banks are able to weaken the effect of monetary policy transmission in the ASEAN-5 countries, but are unable to do so in CLMV countries. As far as the state-owned banks are concerned, we find that only state-owned banks in ASEAN countries are able to weaken the effect of monetary policy transmission. Further analyses show that the effect of ownership structure on bank lending activities is partly driven by the differences in the banks' specific characteristics.

Most of the existing studies on the bank lending channel look only at the ASEAN-5 countries. We contribute to the literature by including CLMV countries in our analyses. This is relevant in light of the banking sector integration that is currently taking place in ASEAN. Going forward, greater consolidation is expected to take place in the ASEAN banking sector in line with efforts towards achieving an integrated banking system. From a policy perspective, our results imply that the regulators need to be aware of the trade-off that exists between foreign and state ownership of banks and the ineffectiveness of the bank lending channel. The regulators need to take this into account to ensure that the changes in monetary policy achieve the desired objectives.

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Notes

1. Source: Bank of Laos Annual Reports available at <https://www.bol.gov.la/english/annualreports1.html>
2. A better measurement can be obtained by using capital weighted by risk (Gambacorta & Mistrulli, 2004). However, the disclosure of such data is not sufficient for our sample of banks.

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