

## Bank Income and Bank Lending Channel: Evidence from Indonesia

(Pendapatan Bank dan Saluran Pinjaman Bank: Bukti dari Indonesia)

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### ABSTRACT

*This study aims to examine the importance of bank lending channel (BLC) in Indonesia by investigating the impact of monetary policy and bank-level variables (size, income, liquidity and capital) on bank loans. The BLC in Indonesia was examined using panel data sourced from 56 commercial banks during 2001 to 2014 and the Generalized Method of Moments (GMM) model. The novel bank level variable, such as bank income, was introduced to assess the effectiveness of BLC in the country. The findings established that monetary policy in Indonesia influenced bank loans through three variables, namely interest rate, bank income and total assets, hence indicating the BLC effectiveness. Further, the response of high-income banks to interest rate shocks was smaller than the low-income ones. The central bank in Indonesia can achieve the ultimate targets by changing the interest rate, and in consequence, adjusting loans and total demand.*

*Keywords: Monetary policy; interest rate; bank income; loans; GMM; Indonesia*

### ABSTRAK

*Kajian ini bertujuan untuk mengkaji kepentingan saluran pinjaman bank (BLC) di Indonesia dengan menyiasat kesan dasar monetari dan pembolehubah peringkat bank (saiz, pendapatan, kecairan dan modal) ke atas pinjaman bank. BLC di Indonesia telah dikaji menggunakan data panel yang diperolehi daripada 56 bank perdagangan sepanjang 2001 hingga 2014 dan model Kaedah Momen Teritlak (GMM). Pembolehubah tahap bank baru, seperti pendapatan bank, diperkenalkan untuk menilai keberkesanan BLC di negara ini. Dapatan kajian mendapati bahawa dasar monetari di Indonesia mempengaruhi pinjaman bank melalui tiga pembolehubah iaitu kadar faedah, pendapatan bank dan jumlah aset, seterusnya menunjukkan keberkesanan BLC. Selanjutnya, tindak balas bank berpendapatan tinggi terhadap kejutan kadar faedah adalah lebih kecil daripada bank berpendapatan rendah. Bank pusat di Indonesia boleh mencapai sasaran akhir dengan mengubah kadar faedah, dan akibatnya, pelarasan pinjaman dan jumlah permintaan.*

*Kata kunci: Dasar monetari; kadar faedah; pendapatan bank; pinjaman; GMM; Indonesia*

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### INTRODUCTION

The monetary authority in a country uses monetary policy tools to affect macroeconomic variables, such as income, investment, consumption, exports, imports, loans and total expenditure, through policy channels like credit channel (the channel of bank lending and balance sheet) (Bernanke & Gertler 1995; Mishkin 1995). The bank lending channel (BLC) is associated with the relationship between monetary policy and bank loans. During stagnation period, declining interest rate in the developed countries, or increasing money supply in most developing countries, an expansive monetary policy will increase bank reserves, and subsequently boost bank loans thus

exerting positive impact on output (Bernanke & Blinder 1992; Bernanke & Gertler 1995). The second channel of credit is related to the relationship between monetary policy and credit demand, in which the tightening of monetary policy, through increasing interest rate in the developed countries, or decreasing money supply in most developing countries, raises borrowing cost and, therefore, weakens firms' investment, as presented in the balance sheet channel (BSC) (e.g., Shokr et al. 2016).

This paper examines the importance of BLC in Indonesia through five important changes in monetary policy. First, the Indonesian central bank (BI) had selected inflation, as a final objective in Indonesia, since 2000. Second, the monetary base in Indonesia, as operational



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target, was substituted with BI interest rate, to improve the transmission of monetary policy (BI 2005). Third, the interest rate and credit ceilings had been abolished since 1983. Further, the BI had eliminated the foreign borrowing ceiling by banks since 1989, which had led to increased foreign borrowing by banks as a new source of finance (Agung 2000). Fourth, the financial deregulation in Indonesia also included reserve requirements, which decreased from 15% to 2% in 1988 but later increased to 3% in 1995 and subsequently boosted to 5% in 1997, including all deposits forms in the banking system. Fifth, in conducting the BI intermediate target, the bank had depended more on indirect tools, such as open market operations, which included two tools; selling Bank Indonesia certificates (SBI) and purchasing money market securities (SPBU). For example, The BI sells the SBI during monetary contraction in order to decrease reserves and deposits in banks, and reduce money supply and total demand. However, during monetary expansion, the BI purchases the SPBU from banks to increase reserves of banks and enhance money supply and total demand (Agung 2000).

In addition, the BI applied a series of procedures in the Indonesian banking sector. First, it issued a series of regulations related to bank lending and also improved regulations overriding acquisitions, mergers and consolidation. Further, the BI adjusted the requirements on assets quality. Second, the BI prolonged the period of using operational risk, improved transparency and increased risk management to diminish the negative impact of the European and the USA financial crises. In cognizance, this study will thus provide answers to two important questions; how effective is the bank lending channel in Indonesia? and how important is bank income in dealing with interest rate shocks, which affect bank loan supply in Indonesia?

The pioneers for the BLC were Bernanke and Blinder (1988), who sustained the effect of macro level variable (interest rate) on loans. The differences in response to monetary policy between small and large banks' loans were introduced by Kashyap and Stein (1994). However, Bernanke and Blinder (1988), and Kashyap and Stein (1994) only focused on interest rate and were not concerned with the effectiveness of micro level variables, such as total assets, liquidity and capital in transmitting BLC. The importance of micro-level variables (size, liquidity and capital) in transmitting monetary policy to loans of banks, were later highlighted by Ehrmann et al. (2002).

In the Indonesia BLC context, many empirical studies supported the importance of BLC using macro and micro-level data (e.g., Agung 2000; Fazaalloh 2014; Lerskullawat 2017; Catalan et al. 2020 and Naiborhu 2020). For example, Lerskullawat (2017) supported the importance of interest rate, liquidity and capital in transmitting BLC. However, most of the existing empirical studies of BLC in Indonesia, such as Agung (2000), Fazaalloh (2014), Hamada (2017) and Naiborhu (2020), did not focus on

the importance of micro level variables, such as total assets and liquidity, in transmitting monetary policy to loans, except for the practical studies by Lerskullawat (2017) and Catalan et al. (2020). However, these studies (Lerskullawat (2017) and Catalan et al. (2020) did not emphasize the effect of bank income and global financial crisis on loans in Indonesia. This study will thus fill the information gap and examine the effect of bank income and global financial crisis on loans in Indonesia. The bank income is important in determining the difference between the low and high-income banks and in detecting the transmission of monetary policy to loans, through this variable. The important effect of bank income on loans was explained by Shokr (2020).

The heterogeneous responses of banks to interest rate shocks come from three arguments related to information, bank characteristics and financial position. The first argument is imperfect information between banks that affects the heterogeneous responses between small and large banks. The second argument is the financial position, which also impacts the heterogeneous responses between banks (Bernanke & Gertler 1995; Walsh 2003). Besides, bank level variables (size, income, liquidity and capital) can impact the importance of BLC (Ehrmann et al. 2002; Shokr 2020). For example, the response of high-income banks to interest rate shocks is smaller than that of the low-income banks, since the former can use its income to better protect its loans from interest rate shocks, compared to the low-income ones.

This study advances on past research in three dimensions of the BLC. First, the study improves on BLC empirical studies by introducing a new variable, such as bank income, to the equation of Ehrmann et al. (2002). This variable is important in order to examine the effect of bank income on loans, to test the transmission of monetary policy to loans through bank income, and to study the difference in heterogeneity between low-income and high-income banks. For example, the study by Shokr (2020) supported the important effect of bank income and its interaction on loans. Second, the study examines the dissimilar responses between banks and interest rate variable. Third, it examines the reaction of loans in Indonesia to global financial crisis (GFC) that occurred in the USA and Europe. These aspects were not examined in the extant studies in Indonesia, such as Agung (2000), Fazaalloh (2014), Hamada (2017), Lerskullawat (2017), Catalan et al. (2020) and Naiborhu (2020).

This study reports on four noteworthy results. First, it identified the important role of the BLC in Indonesia in the response of bank loans to interest rate, as macro level variable, which was significant and negative. Second, total assets in Indonesia, as micro level variable, exerted positive and significant impacts on bank loans, whereas liquidities and securities, as micro level variables, did not. Third, the study established the significant reaction of bank loans in Indonesia to bank income. Fourth, the response of loans in Indonesia to the GFC was not significant.

## LITERATURE REVIEW

The empirical studies on the importance of BLC are classified into three categories; specifically bank-level studies, macro-level studies and international bank lending studies.

### BANK-LEVEL STUDIES

The bank-level studies are more important in evaluating the effectiveness of BLC than the macro-level ones because they concentrate on transmitting monetary policy, not only through policy interest rate, but also through characteristics of banks. The importance of bank characteristics and interest rate in transmitting monetary policy shocks were highlighted in many empirical studies. For instance, Karim et al. (2011), who used GMM model in Malaysia, reported that micro level variables (capital, size and liquidity) and policy interest rate had important impacts on the reaction of loans. This is because banks with large size, high liquidity and capital are less reactive to interest rate than other banks. In another study that similarly used panel data, micro level variables, namely bank size, liquidity, and interest rate were shown to produce important influence on loans in Thailand (Karim et al. 2013), and in Indonesia (Karim et al. 2014). In the case of Egypt, the importance of these micro variables and significance of policy interest rate were supported by Shokr et al. (2014), Shokr and Al-Gasaymeh (2018), and Shokr (2020).

In the European countries, several bank-level studies on transmission of the BLC, supported the effectiveness of interest rate and bank characteristics variables. For example, the bank-level work by Ehrmann et al. (2002) verified the importance of policy interest rate shocks on loans. They discovered that high-liquid banks, in the Euro area, were less reactive to interest rate shocks than less-liquid banks. Similarly, Gambacorta (2005) sustained this opinion and displayed that the response of low liquid and less capitalized banks to interest rate shocks, in Italy, were greater than the responses exhibited by high liquid and well capitalized banks. In another study, the influence of policy interest rate on small banks, in the Central and Eastern Europe countries, was shown to exceed the effect on larger banks (e.g., Jimborean 2009). Other bank-level studies in Europe, by Heryan and Tzermes (2017), Huang (2003) and Kakes and Sturm (2002), further verified the importance of BLC.

In the United States, the bank-level studies by Kandrac (2010) and Kashyap and Stein (1995) supported the differential responses between banks to policy interest rate shocks. These shocks exerted greater impact on small size banks, compared to larger ones. In another USA study, Temesvary et al. (2018) verified the importance of BLC. In the developed economy of Japan, the bank-level studies by Hosono (2006) and Ogawa and Kitasaka (2000) similarly established the heterogeneous responses between banks to interest rate. It is thus clear from

the above studies, in both developed and developing countries, that bank variables impact the effectiveness of BLC.

In the developing economy of Malaysia, the study by Said (2013), who employed panel data and GMM model, established that policy interest rate (macro level variable) and the bank level variables (risk weighted loans, securities and risk weighted assets) exerted significant effects on bank loans. In another study that similarly used panel data and GMM model, credit risk on loans and time deposits and policy interest rate were shown to produce important effect on interest rate of loans and therefore on loans taken Said and Bashir (2018). Likewise in Thailand, Mahathanaseth and Tauer (2019) discovered different responses to policy interest rate between banks, since it was difficult for small banks to obtain external funds through the issuance of stocks due to high-cost factor. In Vietnam, Dang and Dang (2022), who used GMM with aggregated data, concluded that the expansionary monetary policy increased bank liquidity through reducing interest rates, and consequently amplified bank ability in providing loans. The study also established that bank-level variables, specifically bank size, affected the volume of bank liquidity, whereas bank capital did not. In Colombia, Gomez-Gonzalez et al. (2020) examined the effectiveness of the BLC using aggregate data and Feasible Generalized Least Squares (FGLS). They concluded that an increase in policy interest rate decreased bank credit. The study established that there are differences between banks in response to monetary policy shocks. The BLC is also more effective during periods of monetary restriction compared with periods of expansion. Thus, the central bank has greater control over the supply of bank credit under the restrictive monetary policy.

The findings of earlier empirical studies in developed and developing countries showed the effectiveness of the BLC operating through interest rate and micro-level variables, and the differences between banks in their response to monetary policy. However, these studies did not examine the effect of bank income on loans nor the transmission of BLC through bank income.

### MACRO-LEVEL STUDIES

Many empirical studies used macro-level data in confirming the importance of BLC through interest rate and the differences in response between bank loans to interest rate. For instance, the monetary policy in the USA had substantial effect on reserves, deposits and loans in the banking sector (Bernanke & Blinder 1988). Consistent with this, loans in developed Germany and Japan responded significantly and negatively to interest rate shocks (e.g., Hülsewig et al. 2006; Hosono 2006).

Similarly, Kashyap and Stein (1994 & 1995) confirmed the differences in response between bank loans to interest rate shocks in the USA, where small bank loans were more affected compared to larger ones. Later studies in the country, also produced similar results (e.g.,

Kandrac 2012). In Malaysia, Caporale et al. (2020), using aggregate data and TVAR model, examined the response of commercial and Islamic bank loans to interest rate to gauge the effectiveness of the BLC. The study verified the effectiveness of the BLC for both commercial and Islamic banks. There were also differences in response to interest rate shocks between the two types of loans. In the developing economies of China, Norway and India, the important role for the BLC was further confirmed through empirical studies (Sun et al. 2010; Halvorsen & Jacobsen 2016; Mishra & Burns 2017). In the euro area, Evgenidis and Salachas (2019), using the TVAR model, supported the importance of the BLC in transmitting the unconventional monetary policy to the economy during the period of financial crises. The unconventional policy stimulated the demand for credit and increased the financial wealth of borrowers. As verified by some earlier empirical studies (e.g., Bernanke & Blinder 1988; Hülsewig et al. 2006; Hosono 2006; Kashyap & Stein 1994; Evgenidis and Salachas 2019); Bernanke & Gertler 1995) macro data were used to assess the effectiveness of the BLC through interest rate shocks and also to show differences in the response to bank loans.

#### INTERNATIONAL BANK LENDING STUDIES

Many studies supported the importance of international markets on BLC. In the USA, Temesvary et al. (2018) evaluated the IBLC by examining the response of foreign flows of USA banks to two monetary policy variables (quantitative easing and federal rate). The study established that foreign flows in USA banks are highly affected by monetary easing. The USA credit to banks in Bolivia for instance, was significantly affected by the USA monetary policy (e.g., Ioannidou et al. 2015). The survival of the IBLC in the USA, was highlighted in D'Avino (2017).

Gajewski et al. (2019) further assessed the effects of foreign monetary policy in four developed regions (the USA, the UK, Japan and Euro area) on loans taken in three countries (Poland, Chile and Korea). The study concluded that the loans in Chile and Korea were influenced by foreign policies, which thus illustrated the importance of the IBLC in these countries. However, the IBLC was not important in Poland. Differences in the impact of international monetary policy are due to variances and heterogeneity in the banks' financing structures (foreign financing and liquidity constraints) in these countries.

Lindner et al. (2019) studied the IBL channel through examining the impact of monetary policies of major advanced economies (the USA, the UK and Eurozone) on loans in two countries; namely Germany and Austria. They concluded that the more the banks in Germany and Austria were funded by the US dollars, the more the domestic lending in both countries responded to the USA policy interest rate. The findings thus support the importance of the IBLC in the two countries.

In Mexico, the importance of IBLC is supported by some empirical studies (e.g., Mora 2013; Morais et al., 2017). Mexican bank loans were shown to be greatly responsive to European monetary policy. Similarly, in Canada, establishing monetary policy in Switzerland produced significant impact on Canadian banks (e.g., Auer et al. 2019). In Egypt, Shokr and Abdul Karim (2021), who used macro-level data and the SVAR model in their study, discovered that the domestic bank loans in Egypt responded significantly to foreign monetary policy of their major trade partners; the USA and the European countries.

#### EMPIRICAL STUDIES IN INDONESIA

There have been several studies on the BLC in Indonesia. Agung (2000) examined its importance across three categories of banks through assessing the effect of interest rate on three variables (loans, securities and deposits), using the VAR model, which comprised five variables; interest rate, exchange rate, balance sheet variable, output and prices. The results showed important effect of interest rate on non-forex banks loans (small banks) but not on state banks loans (large banks). State banks have the capacity to compensate the fall in deposits after monetary contraction, by raising external finance through issuing non-deposits funds or borrowing from abroad. Further, the types of loan are influential, since state banks concentrate on investment loans, whereas non-forex banks focus on consumption loans, which are more responsive to interest rate shocks. The results sustain the effectiveness of the BLC in Indonesia and explain the differential responses of loans to interest rate shocks. However, this study did not highlight the importance of micro-level variables, such as income and liquidity, in transmitting monetary policy to loans.

Another bank-level study by Fazaalloh (2014) examined the BLC in Indonesia using regression model and panel data. The variables were loans, deposits, securities and Bank Indonesia (BI) interest rate. The author divided the banks into two groups based on two bank level variables; assets and capital. The BLC in Indonesia works on banks with small assets or capitalization, whereas this channel does not impact on banks having large assets or capitalization. This study similarly did not consider the transmission of bank lending channel through bank-level variables.

Hamada (2017) examined the BLC in Indonesia through bank capital using panel data of 118 banks together with fixed and random effects models. The variables included loans, total assets, non-performing loans rate, output, interest rate, inflation and bank capital. The results showed that well capitalized banks were able to increase their lending more than poorly capitalized ones, since the former can more easily access uninsured finance relative to other banks. Similarly, Naiborhu (2020) used quarterly bank-level data from 2005 to 2016 in Indonesia together with FELS and OLS estimations, to examine the

relationship between policy interest rate and loans. The BI policy interest rate has an impact on bank loan for small and large banks, which thus indicates that the BLC is effective in Indonesia. The results also indicate that capital and liquidity alleviate the effectiveness of BLC for large banks, whereas they do not affect the response of loans for small banks.

The study by Catalan et al. (2020), using panel data from 2001 to 2018, sustained the important relation between bank capital and bank loans in Indonesia. Similarly, In ASEAN countries, Lerskullawat (2017), who used the two-stage least squares estimation (2SLS) and panel data from 1999 to 2011, supported the role of bank level variables in conducting the BLC. The higher the bank liquidity and capital in the ASEAN, the lower the effectiveness of the BLC. Studies by Hamada (2017), Lerskullawat (2017), Naiborhu (2020) and Catalan et al. (2020) however did not highlight the effect of bank income on loans, nor the effect of global financial crisis on loans in Indonesia.

Notwithstanding the findings of the earlier research in Indonesia, it is clear that past studies did not discuss the effect of bank income on loans (e.g., Agung 2000, Fazaalloh 2014, Hamada 2017, Lerskullawat 2017, Catalan et al. 2020 and Naiborhu 2020). This paper will thus fill the information gap and introduce bank income in examining the BLC in Indonesia. Bank income

$$Loans_{it} = \theta Loans_{it-1} + a GDP_t + b inf_t - c_1 MP_t + c_2 MP_t AS_{it} + c_3 MP_t Liq_{it} + c_4 MP_t Cap_{it} + d_1 AS_{it} + d_2 Liq_{it} + d_3 Cap_{it} + \varepsilon_{it} \quad (1)$$

Where,  $Loans_{it}$ : indicates the dependent variable (loans of bank  $i$  at period  $t$ ). The independent variables include two types of variables: macro and micro. The macro variables in turn are explained by three variables; inflation ( $inf$ ), output or gross domestic product ( $GDP$ ) and monetary policy ( $MP$ ). The micro variables are explained through three variables; bank liquidity ( $Liq$ ), bank total assets ( $AS$ ) and bank capital ( $cap$ ).

Two variables (bank income ( $INC$ ) and its interaction with interest rate are added to Equation

$$Loans_{it} = \theta Loans_{it-1} + a INC_{it} + b inf_t - c_1 MP_t + c_2 MP_t AS_{it} + c_3 MP_t Liq_{it} + c_4 MP_t Cap_{it} + c_5 MP_t INC_{it} + d_1 AS_{it} + d_2 Liq_{it} + d_3 Cap_{it} + \lambda_i + \mu_{it} \quad (2)$$

A dummy variable, which represents the global financial crisis in the USA and European countries, is added to Equation 2. The variable takes the value one (1) during the period of crisis (from 2007 to 2009) an zero (0) for other years. The crisis is factored into the loan model

$$Loans_{it} = \theta Loans_{it-1} + a INC_{it} + b inf_t - c_1 MP_t + c_2 MP_t AS_{it} + c_3 MP_t Liq_{it} + c_4 MP_t Cap_{it} + c_5 MP_t INC_{it} + d_1 AS_{it} + d_2 Liq_{it} + d_3 Cap_{it} + d_4 dummy + \lambda_i + \mu_{it} \quad (3)$$

$$\varepsilon_{it} = \mu_{it} + \lambda_i$$

Where, the error term ( $\varepsilon_{it}$ ) includes two parts; remainder error term ( $\mu_{it}$ ) and unobservable bank-specific effect ( $\lambda_i$ ) (Baltagi 2005).

is important for two reasons. Firstly, it is important in determining the difference between the low- and high-income banks and in their response to interest rate. Secondly, bank income is an important variable in identifying the transmission of monetary policy to bank loans. This paper assumes that bank income, and its interaction in Indonesia, have positive impacts on bank loans, which increase the effectiveness of BLC in the country. It also assume that low-income banks in Indonesia display higher reaction in their loans during monetary policy shocks, relative to high-income banks. The findings of this study should assist academicians and professionals in understanding the relationship between bank income and loans.

## METHODOLOGY

The methodology comprises three parts; the model description, the estimation method and data and variables.

### MODEL DESCRIPTION

The loans equation 1, introduced by Ehrmann et al. (2002), explains the relation between loans and independent variables.

1. The gross domestic product is substituted by bank income to determine the difference between the low- and high-income banks in bank response to shock interest rate. It is expected that the low-income banks display higher reduction in their loans supply during contraction monetary policy relative to high-income banks. Bank income ( $INC$ ) and its interaction are added to loan equation by Shokr (2020). Equation 2 is the new loans equation.

in Indonesia, since the USA and European countries, being the larger economies in the world, affect small open economies like Indonesia through some channels; namely, exports, imports, exchange rate, output, foreign prices, financial markets and foreign monetary policy.

### ESTIMATION METHOD

The GMM was first introduced by Arellano and Bond (1991), and subsequently established by Blundell and

Bond (1998), and Arellano and Bover (1995). Based on Roodman (2006, 2009), this method is a superior technique to solve endogeneity problem, which originate from association between error term and lagged loans.

The current study uses system GMM, which comprises regression in both difference and level, to estimate the impact of macro-level (interest rate and inflation) and bank variables (assets, income, liquidity and capital) on loans in Indonesia. System GMM is considered better than the difference GMM for two reasons. First, the difference GMM uses a type of instrument (lagged levels) for the regression in difference, whereas, the system GMM employs two types of instruments (lagged levels and differences) to estimate the regressions in difference and level, respectively. Second, based on Roodman (2006) and Windmeijer (2006), the lagged levels are fragile instruments, and thus the difference GMM estimations are imprecise and biased, especially since the dependent variable follows the random walk.

There is a disagreement between scholars relating to the effectiveness of one-step and two-step system GMM. The first group of scholars prefers the one-step system GMM because the findings of this model are superior

with only a slight standard error (e.g., Bond 2002). Nevertheless, based on Windmeijer (2006) and Roodman (2009), the coefficients of the two-step system GMM that employs corrected standard error, are more precise and superior. Therefore, the present study will adopt both one-step and two-step system GMM.

#### DATA AND VARIABLES

This study employs macro level data (monetary policy and inflation) and micro level data (bank income, loans, total assets, equities and securities), sourced from 56 Indonesian commercial banks, from 2001 to 2014. The starting year 2001 was chosen since data were collected following the Asian crisis in 1997. Data collection ended in 2014 since it exceeds the global financial crisis of 2009. Furthermore, the effect of the global financial crisis on loans in Indonesia is one objective of the study. Data coverage is thus for a duration is 14 years, which is brief enough and suitable for the GMM method. The macro data set was sourced from the World Bank (WB) and micro data was composed from Bank Scope (BS) as shown in Table 1.

TABLE 1. The macro and micro-level variables

Variables	The definition	The source
Bank Income (INC)	Indonesian banks' real net income	BS
Inflation (Inf)	Indonesian consumer price index (CPI%).	WB
Monetary Policy (MP)	Indonesian debit interest rate in Indonesia (%).	WB
Loans	Indonesian banks' real net loans.	BS
Size (AS)	Indonesian banks' real total assets.	BS
Liquidity (Liq)	total securities over total assets.	BS
Capital (Cap)	equities over total assets.	BS

#### RESULTS

This part includes three groups, namely full sample, subsample and robustness check.

##### FULL SAMPLE

Table 2 displays the effect of independent variables on loans in Indonesia. The GMM model is accurately specified and instruments are valid for three reasons. Firstly, the instruments used in the GMM estimations, are valid because its number (39) is fewer than the number of banks (56). Secondly, the lagged loans do not undergo serial correlation because the Arellano-Bond test (AR 1) equals 0.01 and 0.015, in one and two-step system GMM, (i.e., less than 10%). Since, the Arellano-Bond test (AR 1) is less than ten percent, we could not reject the null hypothesis (H0: there is no autocorrelation), which thus suggests that there is not serial correlation between residuals. Thirdly, since the Arellano-Bond (AR 2) equals

0.144 and 0.157, in one and two-step system GMM (more than 10%), we could not reject the null hypothesis (H0: no autocorrelation), meaning that there is not serial correlation between residuals. Similarly, since the Hansen test equals 0.45, in one and two-step system GMM, (more than 10%), we could not reject the null hypothesis (H0: the validity of instruments). The Hansen test is thus not significant and, accordingly, the instruments are valid. Finally, the Wald test shows that the GMM model is significant. Therefore, findings using one-step and two-step estimators are accurate because Arellano-Bond tests (AR 1) and (AR2), and Hansen test are all not significant.

Table 2 shows the response of bank loans, as dependent variable, in one and two-step estimations, to the macro-level variables, namely interest rate and inflation, and bank variables, specifically, income and total assets. Firstly, the macro-level variables (the interest rate and inflation), in the case of one and two-step system GMM, exert significant influences on loans at 1% and 5%. The coefficients of interest rate are significant, in one-step and

two-step estimations, and equal (-0.27) in one-step and (-0.21) in two-step estimation. The negative relationship between interest rate and loans is associated with bank lending channel theory, Ehrmann et al. (2002) model and results of empirical studies. Further, the coefficients of inflation are significant, in one-step and two-step estimations, and equal 0.022 in one-step and 0.020 in two-step. The positive relation between inflation and loans is consistent with Ehrmann et al. (2002) model and empirical studies results. The study finding emphasises the importance of BLC in Indonesia. The earlier studies of Shokr et al. (2014), Agung (2000), Kashyap and Stein (1997), Agung (2000) and Naiborhu (2020) similarly postulated the importance of the BLC.

Secondly, the response of bank loans to bank income, as the micro-level variables, in the case of one and two-step system GMM, is significant at 1%. For example, the coefficient of bank income is 0.121 in one-step and two-step. The response of loans to interaction between total assets and interest rate, as micro-level variables in one and two-step estimations, is significant at 1% and 5% respectively. However, the response of loans to interaction between capital and interest rate, as micro-level variables in one and two-step estimations, is not significant. The impact of interaction among liquidity and interest rate, as micro-level variable on bank loans, is significant at 10% in the case of one-step GMM, but is not significant in two-step estimation. The positive relations among income, total assets, capital and liquidity, and loans are consistent with Ehrmann et al. (2002) model and empirical studies results. The findings indicate that large-size and high-income banks are able to increase their lending more than those of small-size and high-income banks, since the large-size and high-income banks can access uninsured finance easier than other banks. These results further maintain the importance of bank income and total assets in transmitting BLC in Indonesia. The results of this study are consistent with BLC results recorded by Ehrmann et al. (2002), Naiborhu (2020) and Kashyap and Stein (1997).

The study further indicates the importance of BLC, when affected by the bank-level variables, namely bank income and total assets. This should suggest the difference in responses to interest rate between large banks with high-income and smaller banks with low-income. The former can compensate the fall in deposits, and therefore secure loans after monetary tightening, through external financing by issuing non-deposit funds or borrowing from abroad (Ehrmann et al. 2002). The differential responses between banks were highlighted by earlier empirical studies (e.g., Agung 2000; Fazaaloh 2014; Ehrmann et al. 2002; Hamada 2017; Lerskullawat 2017; Kashyap & Stein 1995; Shokr & Al-Gasaymeh 2018 and Naiborhu 2020).

#### THE BANK INCOME INTERACTION

As alternative to BLC full sample model, the study substitutes bank income with the interaction between bank income and interest rate, which is introduced as a new micro-level variable. The bank characteristics thus consist of four variables; bank income, total assets, equities and capital, as shown in Table 3. However, the earlier studies on BLC in Indonesia (e.g., Jimborean 2009; Kashyap & Stein 1997; Naiborhu 2020) did not concern this relationship.

Table 3 displays the effect of macro and micro-level variables on loans in Indonesia. The GMM model is accurately specified for two reasons. Firstly, the residuals, in one-step and two-step estimations, are valid because the instruments number (44) is fewer than number of banks (56). Secondly, the results of one-step and two-step estimations do not suffer from serial correlation between residuals, since the Arellano-Bond test (AR 1) and Arellano-Bond test (AR 1) are not significant, as explained in Table 2. Further, the instruments are valid, since the Hansen test is not significant, as explained in Table 2. Finally, the Wald test shows that the results of GMM model are significant.

Firstly, the macro-level variables (interest rate and inflation), in the system GMM one- and two-step estimations, exert significant influences on loans at 1% and 5%, respectively. Thus, the importance of interest rate and inflation is robust using the interaction of bank income. The coefficients of interest rate are significant, in the one-step and two-step estimations, at 1% and equal (-0.31) in one-step and (-0.26) in two-step. The coefficients of inflation are significant, in one-step and two-step estimations, and equal 0.022 in one-step and 0.020 in two-step.

Secondly, the effects of interactions among total assets and bank income and interest rate, as micro-level variables, on bank loans in the same estimations, are significant. The response of bank loans to bank income, as micro-level variable, in the case of one and two-step estimations, is significant at 1%, as per the full sample model. The coefficients of total asset interaction are significant, in one-step and two-step estimations, at 1% and 5%, respectively, and equal 0.32 and 0.23. Thus, the importance of interaction of total assets is robust. However, the interaction of capital, as micro-level variable in the same estimations, is not significant, as similar to the base line model. Finally, the interaction of liquidity, as micro-level variable, is significant in the one-step estimation at 5%, but it is not significant in the two-step estimation, as similar to the base line model.

Thus, the significances of income and total assets of banks are robust. Therefore, interest rate, bank income and total assets are effective channels in transferring monetary policy in Indonesia, which hence supports the BLC in Indonesia.

TABLE 2. The full sample model

Variables	One step system GMM			Two step system GMM		
	Coefficient	St. er.	value of P	Coefficient	St. er.	value of P
Lag loans	0.467	0.071	0.0***	0.527	0.104	0.0***
MP	-0.272	0.060	0.0***	-0.210	0.089	0.017**
As x MP	0.032	0.006	0.0***	0.023	0.009	0.017**
Cap x MP	0.001	0.002	0.709	0.001	0.002	0.82
liq x MP	0.005	0.002	0.07*	0.003	0.003	0.167
Inc	0.121	0.035	0.001***	0.121	0.043	0.005***
Inf	0.022	0.007	0.007***	0.020	0.009	0.039**
Wald chi 2	10699			7096		
Pro. chi 2	0			0		
observations	617			617		
banks	56			56		
instruments	39			39		
Hansen test	0.45			0.45		
Difference test	0.123			0.123		
Arellano&Bond test (1)	0.01			0.015		
Arellano&Bond test (2)	0.144			0.157		

Source: the results are estimated using Stata12 software.

Where: (\*) is significant at (10%), (\*\*) is significant at (5%) and (\*\*\*) is significant at (1%).

TABLE 3. The interaction of bank income model

Variables	One step system GMM			Two step system GMM		
	Coefficient	St. er.	value of P	Coefficient	St. er.	value of P
Lag loans	0.511	0.069	0.0***	0.547	0.097	0.0***
MP	-0.310	0.053	0.0***	-0.264	0.079	0.001***
As * MP	0.030	0.006	0.0***	0.023	0.009	0.017**
Cap * MP	0.001	0.002	0.793	0.001	0.002	0.711
liq * MP	-0.004	0.001	0.03**	-0.003	0.002	0.139
Inc * MP	0.007	0.001	0.0***	0.007	0.002	0.006***
Inf	0.019	0.007	0.01***	0.020	0.009	0.04**
Wald chi 2	11498			8043		
Prob. chi 2	0			0		
observations	619			619		
banks	56			56		
instruments	44			44		
Hansen test	0.19			0.19		
Difference test	0.658			0.658		
Arellano&Bond test (1)	0.010			0.012		
Arellano&Bond test (2)	0.118			0.139		

Source: the results are estimated using Stata12 software.

Where: (\*) is significant at (10%), (\*\*) is significant at (5%) and (\*\*\*) is significant at (1%).



## THE SUB-SAMPLE

Tables 4 and 5 explain the effects of macro and micro variables on small and large banks loans, respectively. The tables show that the results of one-step and two-step estimations did not undergo serial correlation, since the Arellano-Bond test (AR 1) and Arellano-Bond test (AR 1) are not significant, as explained in Table 2. Additionally, the instruments are valid because Hansen test is not significant, as similarly explained in the table.

Tables 4 and 5 illustrate the reaction of small bank loans to interest rate, as macro-level variable, in the system GMM. The one-step and two-step estimations are significant at 1%. Similarly, the response of large bank loans to interest rate, in one- and two-step estimations are significant at 1%, as in the full sample. For instance, the coefficients of small bank interest rate in the one- and two-step estimations equal -0.63 and -0.59 respectively, whereas the coefficients for large banks are respectively -0.42 and -0.38, as explained in Tables 4 and 5. The responses of large banks to interest rate shocks are therefore weaker relative to those for small banks. However, as macro-level variable, the inflation does not have an impact on loans for small and large banks,

as explained in Tables 4 and 5. Conversely, for the full sample, the impact is significant (Table 2).

The effects of income and total assets, as micro-level variables, on loans are significant for both small and large banks, whereas, the impact of capital on bank loans is not important for both banks. The coefficients of income are significant in one-step and two-step estimations, at 1% for small and large banks, and equals 0.022 and 0.013, respectively, for small banks and 0.079 in one-step and 0.069 for two-step in large banks.

Similarly, the reaction of small and large bank loans, as micro-level variable, to the interaction of total assets in the one-step and two-step system GMM, is significant at 1%, as per the full sample. The reaction of small and large bank loans to the interaction of liquidity, as micro-level variable, is significant in one-step estimation at 10% but not at two-step estimation, as with the full sample.

These results explain the importance of micro-level variables, namely total assets and bank income, in transmitting monetary policy in the BLC in Indonesia. The different reactions among banks are supported by other bank-level studies (e.g., Agung 2000; Kashyap & Stein 1997; Naiborhu 2020; Shokr et al. 2014; Jimborean 2009; Shokr & Al-Gasaymeh 2018)).

TABLE 4. Small banks estimations

Variables	One step system GMM			Two step system GMM		
	Coefficient	St. er.	value of P	Coefficient	St. er.	value of P
Lag loans	0.201	0.093	0.03**	0.214	0.124	0.086*
MP	-0.626	0.063	0.0***	-0.592	0.061	0.0***
As x MP	0.069	0.010	0.0***	0.066	0.011	0.0***
Cap x MP	0.003	0.009	0.753	0.003	0.010	0.807
liq x MP	0.006	0.003	0.079*	0.003	0.001	0.173
Inc	0.022	0.023	0.003***	0.013	0.03	0.002***
Inf	0.016	0.017	0.366	0.014	0.015	0.375
Wald chi 2	5024					
Prob. chi 2	0					
observations	276			4015		
banks	28			0		
instruments	23			276		
Hansen test	0.473			28		
Difference test	0.222			23		
Arellano&Bond test (1)	0.043			0.473		
Arellano&Bond test (2)	0.213			0.222		
				0.471		
				0.336		

Source: the results are estimated using Stata12 software.

Where: (\*) is significant at (10%), (\*\*) is significant at (5%) and (\*\*\*) is significant at (1%).

TABLE 5. Large banks estimations

Variables	One step system GMM			Two step system GMM		
	Coefficient	St. er.	value of P	Coefficient	St. er.	value of P
Lag loans	0.426	0.078	0.0***	0.495	0.094	0.0***
MP	-0.417	0.072	0.0***	-0.377	0.082	0.0***
As x MP	0.0449	0.010	0.0***	0.040	0.010	0.0***
Cap x MP	0.001	0.002	0.636	0.002	0.002	0.321
liq x MP	0.010	0.003	0.08*	0.009	0.003	0.16
Inc	0.079	0.025	0.002***	0.069	0.023	0.003***
Inf	0.006	0.007	0.444	0.008	0.007	0.294
	4716			3502		
Wald chi 2	0			0		
Prob. chi 2	341			341		
observations	28			28		
banks	23			23		
instruments	0.139			0.139		
Hansen test	0.828			0.828		
Difference test	0.016			0.012		
Arellano&Bond test (1)	0.270			0.220		
Arellano&Bond test (2)						

Source: the results are estimated using Stata12 software.

Where: (\*) is significant at (10%), (\*\*) is significant at (5%) and (\*\*\*) is significant at (1%).

#### ROBUSTNESS CHECK

The robustness check includes one variable, namely the global financial crisis (GFC). The results of GMM based line model (full sample or Table 2) are robust using the dummy variable embodying the 2007 GFC.

#### THE GLOBAL FINANCIAL CRISIS

As a substitute to the BLC baseline (full sample), this paper presents the dummy variable to represent the global financial crisis (GFC). The GFC that occurred in European countries and the USA led to decrease in bank lending, decline in investment, increase in unemployment and decrease in output and total demand in these countries (Mishkin 2011).

Similar to the BLC-based line model in Indonesia, the coefficients of interest rate, as macro-level variable, in one- and two-step estimations, are significant at 1% and 5%. Similar to the line model, the coefficients of inflation, as macro-level variables, in one- and two-step estimations, are significant at 1% and 5%. The significant

effects of interest rate and inflation on loans are therefore robust.

The coefficients of bank income, as micro-level variables, in one- and two-step estimations, are similarly significant at 1% and 5%, respectively, as per the base line model. Likewise, the coefficients of the interaction of total assets, as micro-level variables, in one- and two-step estimations, are also significant at 1% and 5%, respectively, as in the base line model. Therefore, the significance impacts of bank income and total assets are robust.

However, the coefficients of the interaction of capital, as micro-level variables, in one-step and two-step GMM, are not significant, as with the base line model, as shown in Table 6. The response of loans to liquidity, is significant at 10% in one-step estimation, but not significant in two-step estimation, as per the base line model. Therefore, the results of liquidity and capital, as microlevel variables, are robust. Finally, the responses of loans to the GFC in Indonesia, in both one- and two-step estimations, are not significant.

TABLE 6: The global financial crisis model

Variables	One step system GMM			Two step system GMM		
	Coefficient	St. er.	Value of P	Coefficient	St. er.	Value of P
Lag loans	0.467	0.071	0.0***	0.528	0.104	0.0***
MP	-0.272	0.060	0.0***	-0.213	0.089	0.017**
As * MP	0.032	0.006	0.0***	0.023	0.009	0.017**
Cap * MP	0.001	0.002	0.709	0.001	0.002	0.82
liq * MP	0.005	0.002	0.07*	0.004	0.002	0.167
Inc * MP	0.121	0.035	0.001***	0.121	0.043	0.005***
Inf	0.022	0.008	0.007***	0.020	0.009	0.039**
Dummy variable	-0.087	0.095	0.364	-0.086	0.115	0.457
Wald chi 2	11077			8108		
Prob. chi 2	0			0		
observations	617			617		
banks	56			56		
instruments	39			39		
Hansen test	0.45			0.45		
Difference test	0.123			0.123		
Arellano&Bond test (1)	0.01			0.015		
Arellano&Bond test (2)	0.144			0.157		

Source: the results are estimated using Stata12 software.

Where: (\*) is significant at (10%), (\*\*) is significant at (5%) and (\*\*\*) is significant at (1%).

The main results show the important relation among loans, as dependent variable, and the macro-level variables (interest rate and inflation) and micro level variables (bank income and total assets). These results support the importance of BLC in Indonesia.

Further, small banks in Indonesia are more receptive to policy interest rate shocks than large ones because the latter can compensate the fall in deposits, after monetary tightening, by raising the external finance through issuing non-deposits funds and borrowing from abroad. Also, the results affirm the heterogeneous influence of the Indonesian monetary policy on loans. The differential responses between banks to interest rate shocks are also highlighted in the many empirical studies (e.g., Kashyap & Stein 1995; Catalan et al. 2020 and Naiborhu 2020).

Finally, the influence of the GFC on loan supply in Indonesia banking sector is negative and not significant. The BI can thus use its tools to reduce the BI interest rate and, thus, moderate the negative impact of GFC. Nonetheless, the existing empirical studies in Indonesia by Agung (2000), Fazaalloh (2014), Hamada (2017), Lerskullawat (2017), Catalan et al. (2020) and Naiborhu (2020) did not focus on the impact of the GFC on loans.

## CONCLUSION

The objective of this paper is to demonstrate the effectiveness of bank lending channel (BLC) in Indonesia. The results established that the macro variables; specifically interest rate and inflation rate, greatly influence bank loans. The importance of BLC, as demonstrated in the study, is consistent with the findings from many earlier empirical studies (e.g., Catalan et al. 2020; Shokr & Al-Gasaymeh 2018, and Naiborhu 2020). In addition, loans in Indonesia responded significantly to micro-level variables, specifically bank income and total assets. Another important result is the impact of bank income on bank loans and policies, which was not covered in past research. The study also affirms the heterogeneous influence of the Indonesian monetary policy on loans. However, the micro-level variables, particularly capital and liquidity, do not greatly influence the granting of loans in the county. Lastly, the findings indicate that the USA and European GFCs do not considerably impact on loans in Indonesia.

The implication of BLC importance indicates that the Indonesian central bank (BI) can secure total

demand and economic growth by increasing the BI interest rate during flourishing economic growth or decreasing the BI interest rate during recession. These initiatives accordingly stabilise bank lending, including consumption and investment loans, to achieve the desired targets. Moreover, the microeconomic aspects of the bank characteristics, particularly bank income and total assets, can be taken under consideration by the BI in formulating its policy. Lastly, the findings also show that the BI needs to use the tools of monetary policy to reduce interest rate in dealing with the USA and European financial crises.

## REFERENCES

- Agung, J. 2000. Financial deregulation and the bank lending channel in developing countries. *Buletin Ekonomi Moneter dan Perbankan*. 121-145.
- Arellano, M. & Bond, S. 1991. Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies* 58(2): 277-297.
- Arellano, M. & Bover, O. 1995. Another look at the instrumental-variable estimation of error components models. *Journal of Econometric* 68(1): 29-52.
- Auer, S., Friedrich, C., Ganarin, M., Paligorova, T. & Towbin, P. 2019. International monetary policy transmission through banks in small open economies. *Journal of International Money and Finance* 90: 34-53.
- Baltagi, B.H. 2005. *Econometric Analysis of Panel Data*. John Wiley & Sons.
- Bernanke, B.S. & Blinder, A.S. 1988. Credit, money, and aggregate demand. *The American Economic Review* 78(2): 435-439.
- Bernanke, B.S. & Blinder, A.S. 1992. The Federal funds rate and the channels of monetary transmission. *The American Economic Review* 82(4): 901-921.
- Bernanke, B.S. & Gertler, M. 1995. Inside the black box: The credit channel of monetary policy transmission. *Journal of Economic Perspectives* 9(4): 27-48.
- Blundell, R. & Bond, S. 1998. Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics* 87: 115-143.
- Bond, S.R. 2002. Dynamic panel data: a guide to micro data methods and practice. *Portuguese Economic Journal* 1(2): 141-162.
- Buch, C.M., Bussiere, M., Goldberg, L. & Hills, R. 2019. The international transmission of monetary policy. *Journal of International Money and Finance* 91: 29-48.
- Caporale, G., Catik, A., Helmi, M. Ali, F. & Tajik, M. 2020. Bank lending channel in the Malaysian Islamic and conventional banking system. *Global Finance Journal* 45(2020) 100478: 1-29.
- Catalan, M., Hoffmaister, A., W. & Harun, C., A. 2020. Bank capital and lending: Evidence of nonlinearity from Indonesia. *Journal of Asian Economics* 68(101199): 1-20.
- Dang, V.D. & Dang, V.C. 2022. How bank characteristics affect the bank liquidity creation channel of monetary policy? *Finance Research Letters* 43.
- D'Avino, C. 2017. Quantitative easing, global banks and the international bank lending channel. *Economic Modelling* xxx: 1-13.
- Ehrmann, M., Gambacorta, L., Martínez Pagés, J., Sevestre, P. & Worms, A. 2002. Financial systems and the role of banks in monetary policy transmission in the Euro Area. *European Central Bank working paper* No. 105.
- Evgenidis, A. & Salachas, E. 2019. Unconventional monetary policy and the credit channel in the Euro area. *Economics Letters* 185 (2019) 108695: 1-7.
- Fazaaloh, A. 2014. Whether the bank lending channel can work? Evidence from foreign banks in Indonesia. *Review Integrated Business Economics Research* 4(1): 440-451.
- Gambacorta, L. 2005. Inside the bank lending channel. *European Economic Review* 49(7): 1737-1759.
- Gomez-Gonzalez, J., Kutan, A., Ojeda-Joya, J. & Ortiz, C. 2020. Does financial structure of bank influence the bank lending channel of monetary policy? Evidence from Colombia. *International Journal of Emerging Markets* 16(4): 765-785.
- Halvorsen, J.I. & Jacobsen, D.H. 2016. The bank lending channel empirically revisited. *Journal of Financial Stability* 27: 95-105.
- Hamada, M. 2017. Bank capital and bank lending in the Indonesian banking sector. *Institute Of Developing Economies*. Discussion Paper No. 662. 1-25.
- Hosono, K. 2006. The Transmission mechanism of monetary policy in Japan: Evidence from banks' balance sheets. *Journal of the Japanese and International Economies* 20(3): 380-405.
- Hülsewig, O., Mayer, E. & Wollmershäuser, T. 2006. Bank loan supply and monetary policy transmission in Germany: An assessment based on matching impulse responses. *Journal of Banking & Finance* 30(10): 2893-2910.
- Ioannidou, V., Ongena, S. & Peydro, J.-L. 2015. Monetary policy, risk-taking and pricing: Evidence from a quasi-natural experiment. *Review of Finance* 19(1): 95-144.
- Jimborean, R. 2009. The role of banks in the monetary policy transmission in the new EU member states. *Economic Systems* 33(4): 360-375.
- Kandrac, J. 2012. Monetary policy and bank lending to small firms. *Journal of Macroeconomics* 34(3): 741-748.
- Kashyap, A.K. & Stein, J. C. 1994. *Monetary Policy and Bank Lending*. Chicago: The University of Chicago Press.
- Karim, Z.A., Azman-Saini, W.N.W. & Karim, B.A. 2011. Bank lending channel of monetary policy: Dynamic panel data study of Malaysia. *Journal of Asia-Pacific Business* 12(3): 225-243.
- Karim, Z.A., Aziz, N.H. & Said, F.F. 2013. Monetary policy and bank lending channel in Thailand: A panel study. *Jurnal Ekonomi Malaysia* 47(2): 83-92.
- Karim, Z.A., Abdullah, N. & Said, F.F. 2014. Is bank lending channel of monetary policy relevance? A panel study of Indonesia. *Jurnal Pengurusan* 40: 151-161.
- Kashyap, A.K. & Stein, J.C. 1995. The impact of monetary policy on bank balance sheets. *Carnegie-Rochester Conference Series on Public Policy* 42: 151-195.
- Lerskullawat, A. 2017. Effects of bank sector and capital market development on the bank lending channel of monetary policy: An ASEAN country case study. *Kasetsart Journal of Social Sciences* 38: 9-17.
- Mahathanaseth, I. & Tauer, L.W. 2019. Monetary policy transmission through the bank lending channel in Thailand. *Journal of Asian Economics* 60(2019): 14-32.
- Mishkin, F., S. 1996. The channels of monetary policy transmission: Lessons for monetary policy. *NBER Working Paper No. 5464*: 1-27.

- Mishra, A. & Burns, K. 2017. The effect of liquidity shocks on the bank lending channel: Evidence from India. *International Review of Economics and Finance* 52: 55-76.
- Mora, N. 2013. The bank lending channel in a partially dollarized economy. *Journal of Applied Economics* 16 (1): 121–151.
- Morais, B., Peydró, J-L., Pena, J.R. & Ruiz, C. 2017. The international bank lending channel of monetary policy rates and quantitative easing: Credit supply, reach-for-yield and real effects. *Banco De Mexico, Workin Paper No. 2017-15*.
- Naiborhu, E., D. 2020. The lending channel of monetary policy in Indonesia. *Journal of Asian Economics* 67 101175: 1-14.
- Ogawa, K. & Kitasaka, S. I. 2000. Bank lending in Japan: its determinants and macroeconomic implications. In *Crisis and Change in the Japanese Financial System* edited by T. Hoshi & H. Patrick, 159–199. New York: Springer.
- Ongena, S., Schindele, I. & Vonnák, D. 2014. In lands of foreign currency credit, bank lending channels run through? The effects of monetary policy at home and abroad on the currency denomination of the supply of credit. *Center For Financial Studies. Working Paper Series* 474: 1-36.
- Roodman, D. 2006. How to do xtabond2: An introduction to difference and system GMM in Stata. *Center for Global Development Working Paper* 103.
- Roodman, D. 2009. A note on the theme of too many instruments. *Oxford Bulletin of Economics and Statistics* 71(1): 135-158.
- Said, F.F. 2013. The dynamic of bank lending channel: Basel regulatory constraint. *Economic Modelling* 31(2013): 606-613.
- Said, F.F. & Bashir, M.A. 2018. The role of the bank lending channel of the monetary policy on bank behaviour. *International Journal of Economics and Management* 12(2): 443- 455.
- Shokr, M.A. 2020. Real interest rate, income and bank loans: panel evidence from Egypt. *Journal of Financial Economic* 12(2): 227-243.
- Shokr, M.A., Abdul Karim, Z., Mansor, J. & Zaidi, M.A. 2014. The bank lending channel of monetary policy: The panel evidence from Egypt. *Gadjah Mada International Journal of Business* 16(3): 255-274.
- Shokr, M.A., Abdul Karim, Z. & Zaidi, M.A. 2019. Monetary policy and macroeconomic responses: non-recursive SVAR Study of Egypt. *Journal of Financial Economic Policy* 11(3): 319-337.
- Shokr, M.A. & Al-Gasaymeh, A. 2018. Bank lending channel and banking sector efficiency: Panel data of Egypt. *International Journal of Emerging Markets* 13(5): 1291-1310.
- Shokr, M.A. & Abdul Karim, Z. 2021. The impact of international monetary policy shocks on bank loans in Egypt: A non-recursive SVAR analysis. *Southeast Asia Journal of Economics* 9(1): 69- 102.
- Sun, L., Ford, J.L. & Dickinson, D.G. 2010. Bank loans and the effects of monetary policy in China: VAR/VECM Approach. *China Economic Review* 21(1): 65-97.
- Temesvary, J. Ongena, S. & Owen, A. 2018. A global lending channel unplugged? does US. monetary policy affect cross-border and affiliate lending by global U.S. banks? *Journal of International Economics* 112: 50–69.
- Windmeijer, F. 2006. GMM for panel count data models. *Discussion Paper No. 06/591*.

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