



CREDIT FOR MSMEs, PRIVATE CREDIT, AND REGIONAL ECONOMIC GROWTH IN INDONESIA: A PANEL VECTOR AUTOREGRESSIVE ANALYSIS

Doddy Kristianto

*University of Adelaide, Universitas Indonesia
iebecakep@gmail.com*

INFORMASI ARTIKEL

Diterima Pertama
[23 September 2019]

Revisi
[5 November 2019]

Dinyatakan Diterima
[5 November 2019]

KATA KUNCI:
msme credit, micro small medium enterprise, government guaranteed loan, regional economic growth

ABSTRAK

This study aims to analyse the dynamic between credit to micro, small, and medium enterprises (MSMEs), private credit, and regional economic growth in Indonesia. A panel vector autoregression model is employed to understand the dynamic in the model. Unlike previous cross-country studies, this paper is using provincial panel data. The variables in the model are connected under the same regulation, monetary authority, and fiscal institution. Thus, there will be no effects from the differences of institutions. The results suggest that the interaction between credit to MSMEs and private credit is bi-directional. Also, credit to MSMEs and private credit do affect regional economic growth. However, the result does not provide strong evidence for causality from regional economic growth to credit for MSMEs or private credit.

Penelitian ini bertujuan untuk menganalisis hubungan dinamis antara kredit kepada UMKM, kredit kepada sektor privat, dan pertumbuhan ekonomi regional di Indonesia. Untuk memahami hubungan ketiga variabel tersebut, penelitian ini menggunakan panel vector autoregression (Panel VAR). Penelitian ini berbeda dengan penelitian antar negara yang telah ada sebelumnya karena penelitian ini menggunakan data pada level provinsi. Data pada level provinsi memiliki keunggulan karena berada pada sistem regulasi perbankan dan regulasi fiskal yang sama sehingga tidak terdapat efek dari adanya perbedaan institusional. Dari penelitian ini diketahui bahwa interaksi antara kredit kepada UMKM dan kredit kepada sektor privat adalah dua arah. Kredit kepada UMKM dan kredit kepada sektor privat mempengaruhi pertumbuhan ekonomi regional, namun tidak terdapat bukti kuat yang menjelaskan hubungan sebaliknya

1. INTRODUCTION

In a developing country, small businesses play essential roles in economic activities. Based on the worldbank (The World Bank, 2019), small businesses can contribute more than 50% from the total output of a developing country. Therefore, many governments start to focus on the development of small business, not only in developing countries but also developed countries. However, encouraging the development of small businesses is not easy, especially if it is related to funding issues. Developing MSMEs is a popular policy among developing countries including Indonesia, because MSMEs employ more workers and need less capital compared to large industries.

Despite the fact that MSMEs are crucial for economic growth, many of them are facing financial constraints if they want to expand their business - the main problem for business development (International Finance Corporation, 2010). According to the Central Bank of Indonesia, only 30% of MSMEs were able to access the financial market. Moreover, only 76.1% of these MSMEs obtained credit from banks, and the rest were only able to access financial support from non-banks institutions such as cooperatives. In other words, around 70% -80% of all MSMEs do not have access to finance through banks. This problem makes MSMEs hard to develop and contribute to economic growth.

This article will evaluate the dynamic relationship between credit for MSMEs, private credit, and regional economic growth in Indonesia. In particular, this study examines (i) how these variables interact with each other; (ii) and how credit to MSMEs, private credit, and regional economic growth react to each other shock in the economy. The results point out that credit to MSMEs and private credit does not have a strong relationship with regional economic growth while causality between financial development and credit to MSMEs does exist in two directions. Knowing this relationship is essential because it can be used as a source of policy formulation, primarily to support MSMEs and promote regional economic growth. This study is divided into five sections. Section 2 will explain theories about relationship between MSMEs credit, private credit, and economic growth. In section 3, data and variables will be presented along with the methodology. Section 4 will provides empirical results, and analyse responses of each variable to another variable's shock. The last section outlines the conclusions from this study and suggests recommendations for further study.

1.1. Definition

The increased attention to MSMEs begs the question—what kind of enterprises should be considered as MSMEs. Determining the definition of MSMEs is essential because the number of small enterprises and their involvement in the economic activities increase overtime. Thus, it is tempting to find a universal

definition of MSMEs. A clear definition of MSMEs will benefit MSMEs and other related institutions such as the government as a regulator, statistical agency for data collection, financial services, and many others. However, there is no standard definition in determining MSMEs around the world. Most countries use criteria to determine MSMEs, and the most universal criteria are the number of workers and financial indicators.

The definition of MSMEs depends on many factors, such as business environment; population size; capacity of industry; and economic condition. These factors lead to a different exact definition across countries. A country could have the same indicators as criteria, but they might have a different threshold for each indicator. For instance, a developed country may have a higher level of total turnover and total assets than developing countries. Gibson and Van der Vaart (2008) proposed a general term of defining MSMEs. In their study, they used turnover as a basis to determine the scale of business because it has multiple advantages than workers or assets as criterion, given that it is also comparable across sectors. They defined a small enterprise as a formal firm with turnover per year between 10 to 1,000 times from the average national income per capita. However, using turnover is not easy to implement, especially in a developing country when the number of informal sectors outweighs the formal ones. The lack of data, diverse structures of economies, and cultural and political reasons are problems for seeking a universal definition of MSMEs among countries.

The definition of SME in the European Union (EU) came into force in 2003 (table 1). Using total workers and financial indicators - either balance sheet or turnover, the categorization at the organizational level is necessary for the EU members because the EU is a free trade area. With general acceptance of definition, MSMEs can compete with other MSMEs across countries without having legal constraint.

Table 1 here

In Australia, a small business is defined differently depending on the institution. According to the ASIC (the Australian Securities and Investment Commission), small business is a small proprietary company that fulfils of the two of the three following characteristics (a) total revenue is less than AUD25 million per year, (b) the number of employees is no more than 49 at the end of the financial year; and (c) consolidated assets are less than AUD12.5 million at the end of the financial year.

The ATO (Australian Taxation Office) has different criteria for determining small business. The ATO categorizes a small business if the annual turnover (excluding Good and Services Tax) is less than AUD2 million. On the other hand, the ABS (the Australian Bureau of Statistics) defines small enterprises using

workers as the criterion. An enterprise is categorised as a small company if it employs less than 20 people. The number of employees as a criterion is universal for statistical agencies around the world - following the concept given by the World Bank.

Table 2 here

Similar to Australia, Indonesia also has several definitions of MSMEs. Based on the law number 20/2009, MSMEs are defined based on total assets and total turnover (Table 2) whereas the Indonesian Central Bureau of Statistics (also known as Badan Pusat Statistik/BPS) determines the scale of business based on the number of workers (Table 3), similar to the criteria used by the ABS.

Table 3 here

In addition, the monetary threshold in the criteria used by the law 20/2009 can be changed at any time with the presidential enactment. This flexibility is essential because the measurement of money as criteria is relative at any time depends on the economic condition.

1.2. MSMEs' Contribution

MSMEs' contribution has been recognized not only in emerging countries but also in industrialized countries. The important roles of MSMEs in the economy are to be the source of job generation and economic growth. A study in the United Kingdom by Robson and Gallagher (1993) found that small firms have a greater potential to create jobs than large firms. In contrast, Li and Rama (2015) conducted a study in developing countries and argued that small enterprises contribute not only for a greater job opportunities but also for job destruction. Indonesian data shows that total workers employed by small and micro firms increased from 2010 until 2013 and then dropped dramatically in 2014 before bounced up in 2015 (Figure 1). Hence, it is true that small and micro firms not only provide vast job opportunities but also easily lose them.

Figure 1 here

The role of MSMEs in the national economy shows that MSMEs contribute nearly IDR8,000 trillion rupiahs or 60% of gross domestic product (GDP) (Figure 2). Although the role of MSMEs is vital for economic development, in fact, the spread of MSMEs are still concentrated in Java. According to BPS, in 2015, the number of small and micro business units in Java Island was 76% and 65% respectively of total MSMEs in Indonesia - a wide gap compared to Sumatera, the second highest region, with only 7% of small businesses and 12% of micro businesses. The percentage of GDP contributed by MSMEs, especially micro size, is even more intriguing. In 2017, micro enterprises provided a significant contribution almost close to the contribution given by large firms. The contribution of micro, small, medium, and large enterprises are 37%, 10%, 13%, and

40% respectively.

Figure 2 here

The positive relationship between the number of MSMEs, total credit for MSMEs, and total GDP is shown in Figure 3. The correlation between these three indicators is supported by Krishnan, Nandy and Puri (2015). Their study indicates that an increase access to financial markets will have a positive effect to productivity of a company, which leads to additional output.

Figure 3 here

However, the causality between access to bank financing and the productivity of firms might be debatable, and there could be two different ways of interpreting this relation. First, when firms grow and become more productive, they will look for additional capital from financial markets to expand their business. Second, an increase in financial capacity can be used by firms to make investments to enhance their productivity. The two interpretations, at least, bring an insight that increase access to financial markets allows small companies to grab opportunities that they might not be able to do so without financial support. Therefore, we can draw a conclusion that the growth of small companies can be influenced by their financing capabilities.

1.3. Government Policy

Knowing the importance of MSMEs, the government of Indonesia has implemented many policies to support MSMEs. There are some policies to encourage MSMEs' growth such as ease of registration, ease of taxation processes, regulations that make MSMEs able to participate in the procurement of Government goods and services, as well as financial aid. Related to financial aid, the government has run a credit guarantee program in 2007-2015 and an interest subsidy program in 2015-present. The financing programs had helped MSMEs because the growth of MSMEs is very high when there were government programs. However, a continuous subsidy program needs to be cautiously managed because it will reduce the competitiveness in the market.

Many MSMEs cannot meet the requirements requested by financing companies or banks when they propose loans, such as having a formally registered company, collateral sufficiency, audited financial reports, cash flow forecasting, and a business plan (Adam & Lestari, 2017). Given the importance of MSMEs for the Indonesian economy, particular policies from the government are needed to facilitate MSMEs. One policy that has been tried was the government guaranteed loan, which is a government contribution in the form of payment of the guarantee fee to guarantee companies. In general, the scheme works through a replacement of money from guarantee companies to

the lenders if a default occurs. Usually, the guarantee company will replace 70-80% of the total loan principal (Benavente, Galetovic, & Sanhueza, 2006). The following government policy is the interest subsidies program that aims to decrease the interest rate imposed by banks to MSMEs. Different from the loan guaranteed program that focuses on altering lender behaviour by pooling loan recovery risk, the interest subsidies are carried out by giving direct subsidy to banks which provide loans. The characteristic of small business cannot be separated with asymmetric information that makes them become a high-risk company. Also, the probability of default from high-risk borrowers makes lenders charge MSMEs with higher interest rates (Edelberg, 2006).

There are at least two advantages of interest subsidies. First, interest subsidies offer more benefit for the borrowers because they will get monetary benefits higher than guarantee fees. Second, interest subsidies mean lower expenses for MSMEs in the financial report, which leads to a higher financial profit. Thus, a lower interest rate is expected to give a higher efficiency (Huergo & Moreno, 2017). The mechanism of interest subsidies, however, has been carried out to encourage MSMEs growth in Indonesia after the monetary crisis in 1998 but was not very successful. The government could lift social welfare by giving subsidy to debt interest, but some credit subsidy policies, including loan guarantee, yield inefficient outcomes in general (Innes, 1991). Thus, the government was not supposed to assist directly to MSME, but it is better to create better business conditions so that MSME can develop (Berry, Rodriguez, & Sandee, 2001). To support government policies, the Indonesian Central Bank also launched a regulation number 14/22 in 2012. The central bank mandated commercial banks to give at minimum 20% of total credit disbursement to MSMEs and should be carried out at the latest in 2018. This policy aims to assist MSMEs to access financial markets and enhance their contribution to economic growth.

2. LITERATURE REVIEW

2.1. MSMEs and Economic Growth Interaction

Many scholars believe that MSMEs play essential roles in economic development through the creation of job opportunities, poverty alleviation, and economic stimulus that lead to output growth. MSMEs' contribution to the job creation process began to be heavily discussed in the late 1980s (Hart & Hanvey, 1995). The MSMEs' contributions to job creation are not debatable because MSMEs are labour intensive rather than capital intensive. Ayyagari, Beck, and Demirgüç-Kunt (2007) studied the contribution of MSMEs to employment rate, job creation, and economic growth across developing countries and concluded that small companies (<20 workers) contribute only a small portion to aggregate employment or slightly above

20% of total full-time workers. Despite having a small contribution to the aggregate data, small firms generated most of the new job opportunities. Another advantage of MSMEs is that they can be still able to create jobs during the economic downturn because MSMEs are less reliant to the funding market and more responsive than large companies (Berry, Rodriguez, & Sandee, 2001). The next contribution of MSMEs is their participation for stimulating economic activities by producing outputs for several economic sectors, such as manufacturing, agriculture, mining, construction, and trade (Beck & Demirgüç-Kunt, 2006; Hoque, Sultana, & Thalil, 2016). The roles of small business to stimulate economic growth and alleviate poverty not only exist in emerging countries but also a developed country such as the United States (Servon, Visser, & Fairle, 2010).

Empirical studies show that the presence of MSMEs has positive impacts on poverty alleviation. Significant business opportunities and ease of business processes are advantages for MSMEs to create jobs. The technology used in production is simple and does not require highly qualified human capital. As a result, many unskilled workers who are unable to compete in the labour market are employed by MSMEs. If someone works, then he is assumed to receive income from his job. This channel is then considered as a path to poverty alleviation. A study by Yasa et al. (2014) showed that strategy differentiation enhanced MSMEs' performance and alleviated poverty in the district level. Another study in South Africa found that small firms have helped to improve the living standard of the poor through their engagement into small business activities such as establishing groceries shops, hairdressers, retailers, and many others (Akinwale & Ogundiran, 2014). Even though the study about MSMEs' ability to reduce poverty rate is proliferating, the controversy about its ability to get out of the poverty trap is still ongoing. Seng (2018) found that households, which range from non-poor to extremely poor, who applied for the loan from microcredit institutions, did not enjoy an increase in their household consumption per capita. He concluded that microcredit did not have impacts on reducing poverty, but it could have adverse effects.

The existence of MSMEs in the local economy can have direct or indirect impacts. MSMEs will have an immediate effect on the local economy in terms of expenditures made by entities for business operation such as inventory, utilities, equipment, and payment of salaries to employees. The indirect impacts appear when their expenditures trigger local economy that surrounds it and generate multiplier effects. Additional impacts will occur when employees, suppliers of goods and services, or other entrepreneurs carry out the same activities and spend their income. This cycle would generate potential income for entrepreneurs and local communities, which means multiplier effects arise from the existence of MSMEs. In his study, Vidyattama (2010) mentioned that growth in provinces level in Indonesia

is also affected by trade openness. Trade openness also implies that each region provides opportunities for MSMEs from other regions to enter into their market. Thus, MSMEs can also be a valuable source of growth if they can expand their market share outside the regional border. However, Beck, Demirguc-Kunt, and Levine (2005) argued that even though MSMEs have a strong relationship with economic growth using simple regression, but after controlling for endogeneity, the result is statistically insignificant.

On the other direction, MSMEs also get benefits from economic growth. Economic conditions impact all size of the business, but small firms will feel the effect of economic changes faster than their larger counterpart. A growing economy creates a pleasant environment for the creation of new small firms or business expansion for current firms, whereas an economic downturn can have severe and lasting impacts for both. At least, there are two benefits of a booming economy for MSMEs. First, as business activities increases and firms generate additional profit, small firms could expand their business to keep pace with higher demand by hiring additional employees and increasing capital through loans from financial markets. Second, a smaller decision-making structure makes MSMEs one step ahead than larger companies to determine the production process. So, MSMEs can realize profits faster during an economic expansion.

On the other hand, during an economic recession, many MSMEs are burdened by a higher fixed cost to pay labour wages. During the economic downturn, consumers become more concerned about saving and more likely to be cautious with their spending. Thus, an economic contraction will decrease small enterprises' revenue and create difficulties for them to manage production cost, including interest payable. Also, it is less likely for firms to get loans for working capital from financial markets when businesses are facing financial distress. A downsizing of the workforce to reduce wages expenditure also has further negative consequences for the economy, especially the unemployment rate. Besides, lowering production factors mean that MSMEs limit their production capacity and cause a shortage in the supply of good and services in the market. As a result, the economic condition could become worse if the market does not respond with an increasing demand, and could lead to a severe economic recession.

2.2. Private Credit and Economic Growth

There is extensive literature that tries to assess the relationship between private credit and economic growth. The direction of dynamic causality between two variables is important because it has different policy implications. One could argue that policymaker should emphasize on the financial development sector, while others prefer to growth-enhancing policies. However, the causal relationship remains debatable among scholars, and both competing arguments are

supported by empirical data and analysis by prominent experts in the field.

A previous study about the relationship between the size of a financial system (financial depth) and economic growth is conducted by King and Levine (1993b), who followed the idea of Joseph Schumpeter. They concluded that the services served by financial market institutions are essential for economic growth. Financial system that supports entrepreneurial innovation could accelerate growth while distortions in the financial market might reduce the innovation rate and decrease economic growth. Rousseau and Wachtel (2002) examined the impact of the inflation rate on the relationship between financial development and economic growth. They argued that finance-growth has a positive relationship when inflation under the threshold; otherwise, finance ceased to affect growth. The inflation rate could also harm financial depth when the average inflation rate is under the circumstances. The most recent study by Yang (2019) finds that financial development contributes to economic growth through channels of physical capital stock and total factor productivity in the middle-income economy countries.

The argument of reverse causality that economic growth can enhance financial development is presented by Demetriades and Hussein (1996). They found very little support that financial development leads to economic growth, but they did not reject that causality between both variables is bi-directional. The main thing that made a difference was the implementation of financial reforms that contributed to the process of financial development and economic growth. The evidence showed that the causality is very specific across countries due to different institutional characteristics, policy, and implementation. Thus, there is no full acceptance of the view that finance leads to growth or growth follows finance. Using bank credit to GDP ratio as a proxy, De Gregorio and Guidotti (1995) found a positive correlation between financial development and long-run economic growth, but the impact changed across countries. The result suggested that efficiency in financial system development is the main channel for economic growth rather than volume of financial products.

Even though financial development has a strong relationship with economic growth, some economists believe that it is not always the case. The argument that there could be bi-directional causality between economic growth and financial development comes from Patrick (1966), Apergis, Filippidis and Economidou (2007), and Dal Colle (2011). Calderon and Liu (2003) examined the direction of causality between financial development and economic growth in developing and industrial countries. They found that causality between both variables in two directions coexists. The financial deepening promotes economic growth from two-channel, capital accumulation and productivity growth. Moreover, financial development in developing

countries has a more significant effect of triggering economic growth than in industrial countries.

Many scholars outline the critical role of credit growth in the relationship between financial development and economic growth. A positive relationship between finance-growth is confirmed during long-run periods, but the impact becomes negative during periods of financial distress (Breitenlechner, Gächter, & Sindermann, 2015). This result is similar to Bhattarai (2015), who mentioned that excessive financial leveraging could lead to an economic recession. Thus, the link between financial depth and economic growth is not always definite, but there is a threshold above, which makes financial depth becomes non-monotonic to growth (Arcand, Berkes, & Panizza, 2015).

Another argument opposes the notion and claims that financial depth has no positive correlation with economic growth in countries with developed financial sectors. In this case, Demirgüç-Kunt, Feyen and Levine (2013) claimed that credit markets became less important for economic growth as the equity markets emerge and play an essential role as financial intermediaries. This argument is reinforced by Sturn and Epstein (2014), who concluded that the relationship between finance and economic growth is much weaker in recent decades when credit became more pro-cyclical.

2.3. MSMEs and Private Credit Interaction

Given the importance of MSMEs to economic growth, the importance of MSME credit to promote private credit or financial development also needs to be assessed. De Guevara and Maudos (2009) researched the effect of regional financial development and bank competition on firms' growth. The results showed that industries with a high dependence level on external finance grew faster in more financially-developed regions, and the effect of banking competition and financial development is essential on MSMEs than large firms. Even though banking competition creates a better environment for the financial sector, there is a trade-off between banking competition and financial stability. Financial stability is needed to promote economic growth, whereas banking competition will discourage financial stability.

For some economists, the development of financial sector can be used as an indicator of economic growth, but not the underlying factor that cause economic growth (King & Levine, 1993a). Beck, Levine and Loayza (2000) found that the relationship between financial development and economic growth is through the channel of total factor productivity. The connection between financial development and both real income per capita GDP growth and total factor productivity is economically large and statistically significant because financial development will foster MSMEs' productivity,

thus contributing to economic growth. This result aligns with the view that a better function of financial intermediaries causes an improvement in the resource allocation (King & Levine, 1993a; Pradhan, Arvin, Hall, & Nair, 2016). Therefore, financial development will lead to economic growth only if the allocation of resources is given to worthy borrowers who can increase their total factor productivity.

From the demand side, an increase in the number of MSMEs would increase demand for credit in the financial market. A study by Cheng (2007) suggests that raising demand for microloans is essential to improve microfinance outreach. However, to increase credit demand, some conditions need to be met, such as removing constraints and tailoring the financial products to meet the needs of customers. Pro-small-scale government policies such as the ease of establishing a new firm, financial aid, and a pleasant environment for business could increase the number of new companies and enlarge existing companies. An increase in terms of quantity and scale of small companies would also increase the demand for capital when the government guaranteed loans or interest subsidies are given. Indirectly, it will pull the financial market to increase its financing capacity. There are two ways of the relation between MSMEs and financial access. As the MSMEs grow into a bigger company, they need more capital to use it as investment or working capital. On the other hand, an increase in financial access makes MSMEs easy to expand their business.

Given that previous studies have outlined that the interaction between growth, financial depth, and MSMEs exists in cross-country studies, this research tries to outline the interaction under Indonesia's economic conditions by using provincial level data. This study differs from previous studies because each variable not only interacts under the same monetary and government institutions but also the same regulation. Also, this study also addresses the effect of credit for MSMEs by introducing it as a variable of interest in the model.

3. METHODOLOGY

This section explains data and variables used in the study as well as the panel VAR (vector autoregression) model. The coefficient variables of the VAR model can be estimated by testing the stationarity of time series data, the optimal lags structure of the model, the Granger causality among variables, and the stability of the model (Granger, 1969). In this study, three variables are included in the model to capture the dynamics of credit to MSMEs, private credit, and regional economic growth. The difference between this study and other cross-countries studies may occur because the data used in this study is data at the regional level of Indonesia. The advantage of using provincial data is that

the pattern and trend across the regions do not have many differences because they are under the same law, regulation system, monetary policy, and fiscal policy, whereas the result of cross-countries data may be more varied due to different institutional conditions.

The study uses quarterly data from the period 2011-2018 from 33 provinces in Indonesia that were collected from the Indonesian Central Bank and BPS. The empirical analysis of the interaction between credit to MSMEs, Private Credit, and Economic Growth is carried out using a panel VAR model consisting of three variables as follows:

- m = Credit to MSMEs/Gross Regional Product (GRP) at the province level (the portion of total credit to MSMEs divided by total GRP in each province);
- f = Private credit/GRP at the province level as a measure for financial depth (the portion of private credit divided by total GRP in each province);
- g = GRP growth at the province level as a measure of economic growth (percentage change of real GRP).

Table 4 here

In Table 4, the differences between median value and maximum value are very big for all variables. Also, the standard deviation value suggests that there are inequalities for each variable in the panel data. For time series panel data, it shows that the differences come from cross-section unit.

In time series estimation, if data from the past contain information about the future, then we can use them as variables of interest in the model (Lütkepohl, 2005). The choice of this kind of variable can be based on a theory or observations that the past period data has a relationship with the data in the following periods. For example, in estimating the rate of economic growth, an economist might know that in some regions, the economic growth rates in the past few periods tend to be followed by the same pattern in the following years. Such a pattern is known as seasonality. As another example, the total credit value in the financial market will not have a tremendous difference in the next period because the value would change gradually from the previous period.

Therefore, if the trend is applied in the future period, then an estimation model based on current and past data can be calculated using autoregression. However, in dealing with the economic model, one variable is not only affected by its own past values, but also could be influenced by other variables and past values of those variables. Therefore, this study uses a VAR model to examine the dynamic behaviour between credit for MSMEs, private credit, and economic growth toward any shocks from other variables.

In the VAR model, the regressand is depicted as a function of the lagged value of the regressand itself and the lagged values of the other regressor variables. The VAR model is useful to map the relationship between variables to see their interaction. A usual ordinary least square model is often suffered from endogeneity problem, but not with the VAR model. According to Sims (1980), the VAR model promotes all variables in the system to be treated symmetrically as endogenous variables. Also, a VAR model allows scientists to observe the reaction of a variable to any shocks of the other variables and the duration of adjustment by analysing the impulse response function.

The model in this study is a tri variate VAR with a panel of $i=1,2,3,\dots,33$ (representing 33 provinces in Indonesia) and 32 quarterly-period or $t=2011Q1,2011Q2,2011Q3,\dots,2018Q4$ as applied in Rousseau and Watchel (2000).

$$\begin{aligned}
 (1) \quad g_{it} &= \sum_{j=1}^l \alpha_{1j} g_{it-j} + \sum_{j=1}^l \beta_{1j} m_{it-j} + \sum_{j=1}^l \gamma_{1j} f_{it-j} + \eta_{1i} + \phi_{1t} + \varepsilon_{1it} \\
 (2) \quad m_{it} &= \sum_{j=1}^l \alpha_{2j} g_{it-j} + \sum_{j=1}^l \beta_{2j} m_{it-j} + \sum_{j=1}^l \gamma_{2j} f_{it-j} + \eta_{2i} + \phi_{2t} + \varepsilon_{2it} \\
 (3) \quad f_{it} &= \sum_{j=1}^l \alpha_{3j} g_{it-j} + \sum_{j=1}^l \beta_{3j} m_{it-j} + \sum_{j=1}^l \gamma_{3j} f_{it-j} + \eta_{3i} + \phi_{3t} + \varepsilon_{3it}
 \end{aligned}$$

Where:

- (a) g_{it} is economic growth in province at time ,
- (b) m_{it} is credit to MSMEs/GRP at province at time ,
- (c) f_{it} is the total private credit/GRP in province at time ,
- (d) η_i is province specific fixed effect,
- (e) ϕ_t is time effect to accounts trend,
- (f) ε_{it} is a random disturbance with the application of normal distribution,
- (g) l is the optimum lag that can be calculated using information criteria such as Akaike, Hannan-Quinn, or Schwarz.

In a panel VAR, an important assumption to convey the equation implies that error terms have positive variance and orthogonal to fixed effects and time effects, including lags of the endogenous variables. Thus, the correlation between the error terms and lags of endogenous variables becomes clear after differencing.

4. RESULTS

In a VAR model, estimating VAR coefficients does not give insight for the forecasters because of the presence of multicollinearity among variables. Practitioners in economics often use impulse response function (IRF) to check the reaction of a variable to any shock of the other variables. Holding all other variables'

innovation constant, every variable in the model gets shocks from other variables equal to one standard deviation of the residual. The IRF graphs show the responses of a variable to the system's shocks. Thus, if there are three variables in the VAR model, then there will be nine IRFs. The direction and the size of the temporary shock, represented by one standard error, is shown in the vertical axis. The duration of shock is represented in the horizontal axis. The dashed line in the graph outlines the + 2 standard errors for variables' responses.

Figure 4 here

In Figure 4, the upper left graph outlines that at the initial period, a shock on credit to MSMEs (*msmedepth*) will lead the *msmedepth* to go up by the shocking amount. The decay in the graph shows that effect of a shock in *msmedepth* decreases quickly in the next quarter and reaches its negative peak in the second quarter. In the third quarter, *msmedepth* rebounds toward positive trend but still has a negative effect until the fourth quarter. The effect reaches a positive peak in the fifth period, but then it goes down fast and becomes negative again in the sixth period. The convergence point toward zero value is achieved in more than the tenth period.

The response of *msmedepth* to credit to private sector (*findepth*) shock is minor. At the initial period, *msmedepth* does not respond to any shock caused by *findepth* at period 1. The response becomes negative in the second and third period, but in the following period, the response recovers to a positive trend and makes *msmedepth* moves toward zero value to converge. Small volatility of responses still occurs, but the magnitude does not make a big concern. Small responses on MSMEs' impulse can be interpreted as a situation where MSMEs are slightly affected by the financial institutions activities or any shock that happened in the financial sectors does not directly affect MSMEs' loans.

Msmedepth positively responses the shock from growth (*growthdata*). The effect persistently positive until the first three quarters and then converge to zero value afterwards. The effect of one standard deviation in growth cause *msmedepth* reaches a maximum effect in the second quarter after the growth's shock. Even though the response does not occur at the same time with the shock period, but the response is positive during four quarter afterwards. It can be seen that economic growth plays an essential role in developing MSMEs. Even though the response of *msmedepth* is not quite high, but the graph shows that MSMEs also adjust to the economic shock.

In the second row, a shock on *msmedepth* will lead the *findepth* to go up by the shocking amount at the same time (contemporaneous). The pattern is almost similar to the response of *msmedepth* to a shock in

msmedepth including the magnitude effect. The effect is quite high because the MSMEs loan accounts for almost $\pm 20\%$ of the total private credit – according to the regulation from Indonesia Central Bank. Thus, volatility in the MSMEs sector will affect the financial institutions through an increasing financial capacity at the same time when the shock occurs.

One standard deviation shock to *findepth* causes *findepth* to fall deeply in the next quarter, even though the effect at the same time of shock is positive. The response bounces back toward zero value in the third quarter and keeps showing a positive impact until the fourth period. The responses start to converge in the fourth period and the recovery to normal condition takes less than two years.

Overall, the response of *findepth* to an economic growth shock is not quite high – nearly the same with response of *msmedepth*. Even though the response of *findepth* does not occur at the same time within the shock, but *findepth* responses positively in the second period after shock. The positive respond is lasting over five period after the shock and adjusts to zero value at the fifth period. The shock effects start to vanish at seventh period. The result suggests that economic growth does affect financial development, but the effect is not significant. This result could be explained by the argument from Sturn and Epstein (2014) which stated that financial development weakly affected economic growth these days because funds can be obtained either from financial intermediaries or capital market.

The growth's responses are outlined in the third row. At the initial point, a shock in *msmedepth* has a small negative effect for growth. The effect remains negative during the first year and becomes positive in the fifth quarter. Then, the effect is started to converge to zero value in the ninth period. Thus, we can conclude that MSMEs is an important part of growth creation. If there is a shock in the MSMEs, then growth will response negatively during a first three quarter after the shock. The shock effect become favourable for growth after the third quarter and the shock effect disappear after six quarter or one and a half year. This result supports Beck et al. (2005) argument that shocks in MSMEs can cause negative effect on economic growth.

The growth also responses negatively at the same time when shock to *findepth* is occurred. The effect of *findepth* to growth remains negative until the fifth period. The effect goes up between the first and second period, but after reached the zero value in the second and third period, the effect declines into negative direction in the fourth quarter. The effect of the shock on *findepth* to growth becomes positive in the sixth period, but this positive effect does not last long and not significant because the effect starts to converge in the seventh period after the shock. The graph suggests the same direction with Calderon and Liu (2003) that

stated financial development has significant effect to trigger economic growth, and the result in this study showed a negative effect during a short run period. The result also supports King and Levine (1993) who concluded that financial intermediaries are essential for economic growth.

The last graph shows the effect of growth on growth shock. At the initial period, a shock on growth will contemporaneously lead the growth to go up by the shocking amount. The sudden drop in the graph shows that positive and significant effect of the shock is temporary. In the second period, the effect becomes negative until the fifth period when the effect reaches its lowest point. The response hikes in the next quarter and becomes positive in the sixth period. However, the effect starts to converge at the zero value afterwards.

Besides using impulse response function, another tool that can be used to investigate the connection between variable is variance decomposition. It breaks down the variance of forecast error for each variable due to a shock of other endogenous variables. Variance decomposition illustrates the fraction of the forecast error variance of an endogenous variable that can be attributed to orthogonalized shocks to endogenous variables. The interpretation of the variance of forecast error is subject to similar criticism as the interpretation of impulse response function (Lütkepohl, 2005). The total fraction of variability of all endogenous variables must be added up to 100%.

Table 5 here

Table 5 shows that a unit shock of *msmedepth* in the first period explains the variability of its own up to 100% whereas the other variables account for zero percent. In the fifth period, a unit shock of *msmedepth* explains 1,02% of the variability of the forecast error of *findepth* and the effect increases in the tenth period to 1,18%. The second largest shock that caused variability of *msmedepth* is growth. Shock to growth would explain 0,44% of the variability of *msmedepth* in the fifth period while in the tenth period the effect increases slightly to 0,56%. The small effects of shocks in *findepth* and growth may reflect that these shocks unable to explain *msmedepth*'s fluctuation.

The variability of *findepth* mostly can be explained by a shock of its own variable. A unit shock of *findepth* explains 58,9 % of the variability of the forecast error of *findepth* and 41% of the variability of the forecast error of *msmedepth*. On one hand the effect of shock to *findepth* tends to decrease as the period increase. On the contrary, the effect of shock to *msmedepth* variability is increase afterward. Nevertheless, the effect of shock to the growth variability is zero in the first period and stays small in the following period.

In the first period, the effect of growth's shock to the variability of the forecast error of growth is 99%. A unit shock of growth explains very small effect to

the variability of the forecast error of *msmedepth* and *findepth* about 0,4% and 0,26% in the first period respectively. The effect becomes greater for *msmedepth* and *findepth* as the period increase.

The variance decomposition result indicates that financial development only has a small effect on growth. It is aligned with King and Levine (1993a) argument that the development of the financial sector is necessary but not the underlying factor to determine economic growth. In addition, the weak relation between *msmedepth* and growth also supports the argument from Beck, Demirguc-Kunt, and Levine (2005).

The value of standard deviation presented in Table 4 shows that there is inequality between regions. According to Central Bureau of Statistics Indonesia, more than 60% of small firms are concentrated in Java island. The panel data suggests that six regions in Java island acquires more than half of total private credit in all region. Thus, contrast disproportion between Java and non-Java region may cause irregularity between theories and results.

5. CONCLUSION

The purpose of this study is to investigate the interaction between credit allocation for MSMEs, private credit, and regional economic growth. In order to observe the interaction between these variables, a panel VAR model is constructed to determine the interaction. The study using 33 provincial level data over 32 quarterly periods from 2011Q1 to 2018Q4. The analysis is conducted using impulse response functions and variance decompositions to interpret the dynamic interaction between variables. The result suggests that both MSMEs credit and private credit have a strong bi-directional relationship while the response of both variables with economic growth shock is quite vague. However, the effects of shock on both variables credit MSMEs and private credit to economic growth are supported with theories. Some of findings in this study align with the literature review, even though some of the interaction does not have big influence. On the other hand, some of the results also show different direction compare with the theories such as the effect of shock in growth on credit to MSMEs and private credit. From the analysis above we can conclude that data in provincial level can estimate the dynamic between variables. However, this study also has some limitations. First, as a time series study, the span of time of the data need to be longer to capture the interaction, even though the observations are already sufficient with panel data. Second, while economic growth data usually suffers from seasonality, this study does not control the seasonality issue especially during the fourth quarter in every year when the government expenditure hikes dramatically. The recommendation for the next study is to cluster the regions according to the proportion of

credit – for example Western Indonesia versus Eastern Indonesia.

REFERENCES

- Adam, L. & Lestari, E. (2017). Indonesia's guaranteed microfinance programme (KUR): lessons from the first stage of implementation. *Journal of Southeast Asian Economies (JSEAE)*, 34(2), 322-344.
- Akinwale, O. & Ogundiran, O. (2014). The Impacts of Small Business on Poverty Reduction in Eastern Cape Province, South Africa. *Mediterranean Journal of Social Sciences*, 5(15), pp. 156-164.
- Apergis, N. Filippidis, I. & Economidou, C. (2007). Financial deepening and economic growth linkages: A panel data analysis. *Review of World Economics*, 143(1), pp. 179-198.
- Arcand, J. Berkes, E. & Panizza, U. (2015). Too much finance?. *Journal of Economic Growth*, 20(2), pp. 105-148.
- Ayyagari, M. Beck, T. & Demirgüç-Kunt, A. (2007). Small and medium enterprises across the globe. *Small Business Economics*, 29(4), pp. 415-434.
- Beck, T. & Demirguc-Kunt, A. (2006). Small and medium-size enterprises: Access to finance as a growth constraint. *Journal of Banking and Finance*, 30(11), pp. 2931-2943.
- Beck, T. Demirguc-Kunt, A. & Levine, R. (2005). Smes, growth, and poverty: Cross-country evidence. *Journal of Economic Growth*, 10(3), 199-229.
- Beck, T. Levine, R. & Loayza, N. (2000). Finance and the sources of growth. *Journal of Financial Economics*, 58(1), pp. 261-300.
- Benavente, J. M. Galetovic, A. & Sanhueza, R. (2006). Fogape: an economic analysis. *Departamento de Economía Universidad de Chile*, Chile.
- Berry, A. Rodriguez, E. & Sandee, H. (2001). Small and medium enterprise dynamics in Indonesia. *Bulletin of Indonesian Economic Studies*, 37(3), pp. 363-384.
- Bhattarai, K. (2015). Financial deepening and economic growth. *Applied Economics*, 47(11), pp. 1-18.
- Breitenlechner, M. Gächter, M. & Sindermann, F. (2015). The finance-growth nexus in crisis. *Economics Letters*, 132, pp. 31-33.
- Calderon, C. & Liu, L. (2003). The direction of causality between financial development and economic growth. *Journal of Development Economics*, 72, pp. 321-334.
- Cheng, E. (2007). The demand for microcredit as a determinant for microfinance outreach - evidence from China. *Saving and Development*, 31(3), pp. 307-334.
- Dal Colle, A. (2011). Finance-growth nexus: Does causality withstand financial liberalization? Evidence from cointegrated VAR. *Empirical Economics*, 41(1), pp. 127-154.
- De Guevara, J. F. & Maudos, J. (2009). Regional financial development and bank competition: Effects on firms' growth. *Regional Studies*, 43(2), pp. 211-228.
- De Gregorio, J. & Guidotti, P. E. (1995). Financial development and economic growth. *World Development*, 23(3), pp. 433-448.
- Demetriades, P. O. & Hussein, K. A. (1996). Does financial development cause economic growth? Time-series evidence from 16 countries. *Journal of Development Economics*, 51(2), pp. 387-411.
- Demirgüç-Kunt, A. Feyen, E. & Levine, R. (2013). The evolving importance of banks and securities markets. *World Bank Economic Review*, 27(3), pp. 476-490.
- Edelberg, W. (2006). Risk-based pricing of interest rates for consumer loans. *Journal of Monetary Economics*, 53(8), pp. 2283-2298.
- Gibson, T. & Van der Vaart, H. (2008). A Less Imperfect Way of Defining Small and Medium Enterprises in Developing Countries. *Brookings Global Economy and Development*, September 2008.
- Granger, C. W. J. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, 37(3), pp. 424-438.
- Hart, M. & Hanvey, E. (1995). Job generation and new and small firms: Some evidence from the late 1980s'. *Small Business Economics*, 7(2), 97-109.
- Hoque, M. Z. Sultana, N. & Thalil, T. (2016). Credit rationing's determinants of small and medium enterprises (SMEs) in Chittagong, Bangladesh. *Journal of Global Entrepreneurship Research*, 6(1), pp. 1-23.
- Huergo, E. & Moreno, L. (2017). Subsidies or loans? Evaluating the impact of R&D support programmes. *Research Policy*, 46(7), pp. 1198-1214.
- Innes, R. (1991). Investment and government intervention in credit markets when there is asymmetric information. *Journal of Public Economics*, 46(3), pp. 347-381.
- International Finance Corporation. (2010). Scaling-up SME access to financial services in the developing world. *Financial inclusion experts group|SME finance sub-group*, 94830, pp. 17-36.

- King, R. G. & Levine, R. (1993a). Finance, entrepreneurship, and growth: Theory and evidence. *Journal of Monetary Economics*, 32, pp. 513–542.
- King, R. G. & Levine, R. (1993b). Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics*, 108(3), pp. 717–737.
- Krishnan, K. Nandy, D. K. & Puri, M. (2015). Does financing spur small business productivity? Evidence from a natural experiment. *Review of Financial Studies*, 28(6), pp. 1768–1809.
- Li, Y. & Rama, M. (2015). Firm dynamics, productivity growth, and job creation in developing countries: The role of micro- and small enterprises. *World Bank Research Observer*, 30(1), pp. 3–38.
- Lütkepohl, H. (2005). *New introduction to multiple time series analysis*. Berlin Heidelberg: Springer.
- Patrick, H. T. (1966). Financial development and economic growth in underdeveloped countries. *Economic Development and Cultural Change*, 14(2), pp. 174-189.
- Pradhan, R. Arvin, M. Hall, J. & Nair, M. (2016). Innovation, financial development and economic growth in Eurozone countries. *Applied Economics Letters*, 23(16), pp. 1141-1144.
- Robson, G. & Gallagher, C. (1993). The job creation on effects of small and large firm interaction. *International Small Business Journal*, 12(1), pp. 23–37.
- Rousseau, P. L. & Wachtel, P. (2000). Equity markets and growth: Cross-country evidence in timing and outcomes, 1980-1995. *Journal of Banking and Finance*, 24(12), pp. 1933–1957.
- Rousseau, P. L. & Wachtel, P. (2002). Inflation thresholds and the finance – growth nexus. *Journal of International Money and Finance*, 21(6), pp. 777–793.
- Seng, K. (2018). Revisiting microcredit's poverty-reducing promise: Evidence from Cambodia. *Journal of International Development*, 30(4), pp. 615–642.
- Servon, L. J. Visser, M. A. & Fairlie, R. W. (2010). The continuum of capital for small and micro enterprises. *Journal of Developmental Entrepreneurship*, 15(03), pp.301–323.
- Sims, C. A. (1980). Macroeconomics and reality. *Econometrica*, 48(1), pp. 1–48.
- Sturn, S. & Epstein, G. (2014). Finance and growth: the neglected role of the business cycle. *Political Economy Research Institute*, 339.
- The World Bank. (2019, November 5). Small and Medium Enterprises Finance. Retrieved from the World Bank website: <https://www.worldbank.org/en/topic/sme/finance>
- Vidyattama, Y. (2010). A search for Indonesia's regional growth determinants. *ASEAN Economic Bulletin*, 27 (3), pp.281-294
- Yang, F. (2019). The impact of financial development on economic growth in middle-income countries. *Journal of International Financial Markets*, 59, pp. 74–89.
- Yasa N. N. K. Sukaatmadja, P. G. Rahyuda, H. & Giantari, I. G. A. K. (2015). Effect of industry competition and entrepreneurial company to implementation of differentiation strategy, SME performance, and poverty alleviation. *Asia-Pacific Management and Business Application*, May(1), pp. 14-27.

TABLE APPENDICES

Table 1 Criteria for MSME in European Union

Company category	Workers	Turnover	Balance sheet total
Medium	< 250	≤ €50 million	≤ €43 million
Small	< 50	≤ €10 million	≤ €10 million
Micro	< 10	≤ €2 million	≤ €2 million

(Source: European Commission adopted Recommendation 2003/361/EC)

Table 2 MSMEs' Criteria in Indonesia

Company category	Assets	Turnover
Micro	< IDR 50 million	≤ IDR 300 million
Small	IDR 50 – 500 million	IDR 300 million – 2,5 billion
Medium	IDR 500 – 10 billion	2,5 billion – 50 billion

(Source: Indonesia MSMEs Law 20/2008)

Table 3 Criteria for Enterprise Size According to BPS

Company category	Workers
Micro/household	1-4 workers
Small	5-19 workers
Medium	20-99 workers
Large	>100 workers

Table 4 Descriptive Data

Descriptive Data on Level	CR_MSME (IDR Million)	CR_PRIVATE (IDR Million)	GROWTH_DATA (%)
Mean	20.639.842	109.516.485	5,71
Median	9.073.722	35.468.598	5,64
Maximum	153.014.417	1.704.357.291	34,08
Minimum	808.688	2.786.874	-22,30
Std. Dev.	28.778.386	223.332.058	3,5601
Observations	1056	1056	1056

Table 5 Variance Decomposition

Variance Decomposition of D(LN_MSMEDEPTH):				
Period	S.E.	D(LN_MSMEDEPTH)	D(LN_FINDEPTH)	D(LN_GROWTHDATA)
1	0.054987	100.0000	0.000000	0.000000
5	0.062503	98.53638	1.023601	0.440014
10	0.064732	98.24891	1.189206	0.561889

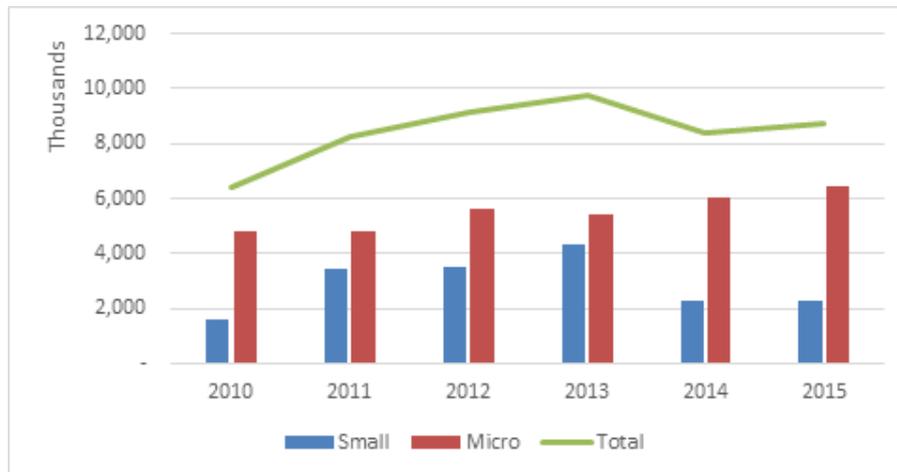
Variance Decomposition of D(LN_FINDEPTH):				
Period	S.E.	D(LN_MSMEDEPTH)	D(LN_FINDEPTH)	D(LN_GROWTHDATA)
1	0.062820	41.08261	58.91739	0.000000
5	0.068839	46.15374	53.36635	0.479909
10	0.070476	48.32782	51.02284	0.649336

Variance Decomposition of D(LN_GROWTHDATA):				
Period	S.E.	D(LN_MSMEDEPTH)	D(LN_FINDEPTH)	D(LN_GROWTHDATA)
1	0.313288	0.408020	0.269576	99.32240
5	0.334288	1.222982	0.399300	98.37772
10	0.339782	1.264341	0.468800	98.26686

Cholesky Ordering: D(LN_MSMEDEPTH) D(LN_FINDEPTH) D(LN_GROWTHDATA)

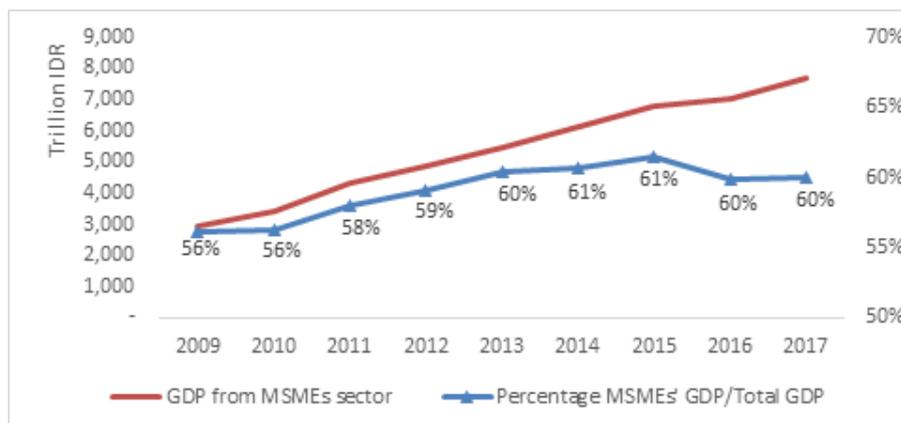
FIGURE APPENDICES

Figure 1 Total MSMEs' Workers in Indonesia between 2010-2015



(Source: BPS)

Figure 2 Percentage MSMEs' output to GDP



(Source: Ministry of Micro, Small-Medium Enterprise and Cooperation)

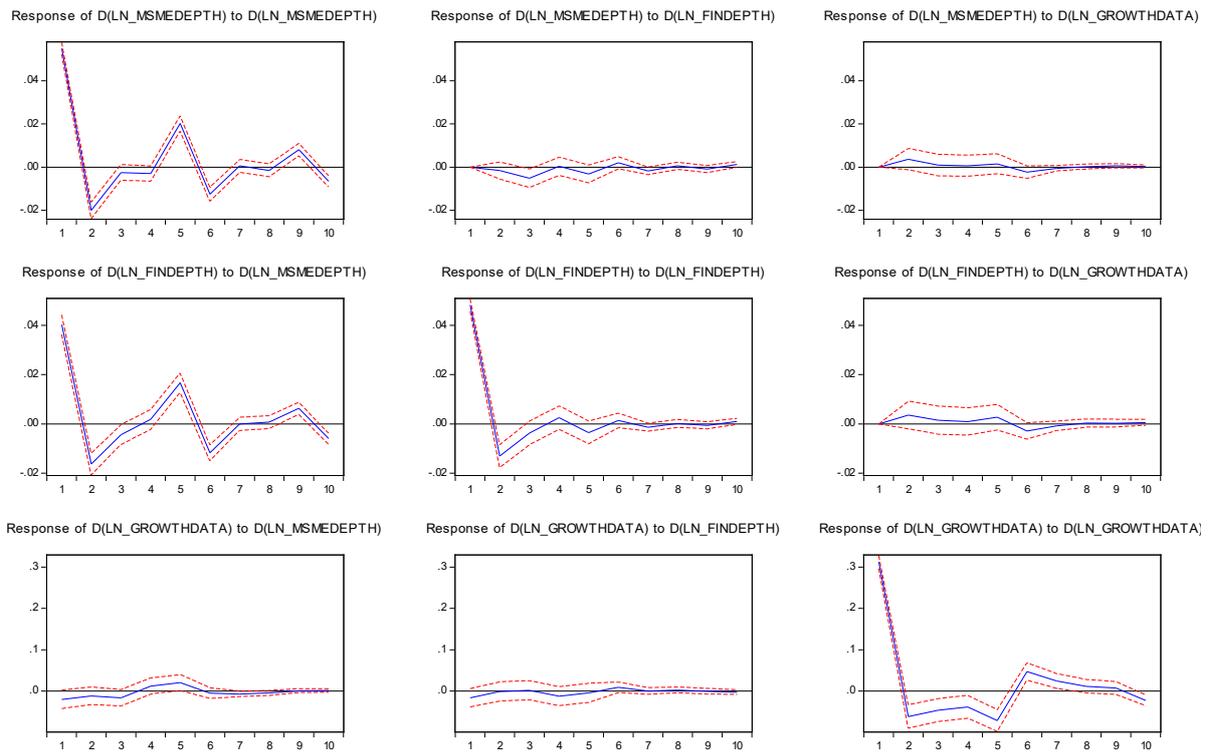
Figure 3 Total Micro and Small Enterprises in Indonesia between 2010-2015



(Source: BPS & Indonesia Central Bank)

Figure 4 Impulse Response Functions

Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.



SUPPLEMENT

Differentiation process of the model

$$\begin{aligned}
 g_{it} &= \sum_{j=1}^k \alpha_{1j} g_{it-j} + \sum_{j=1}^k \beta_{1j} m_{it-j} + \sum_{j=1}^k \gamma_{1j} f_{it-j} + \eta_{1i} + \phi_{1t} + \varepsilon_{1it} \\
 (g_{it} - g_{it-1}) &= \sum_{j=1}^k \alpha_{1j} (g_{it-j} - g_{it-j-1}) + \sum_{j=1}^k \beta_{1j} (m_{it-j} - m_{it-j-1}) + \sum_{j=1}^k \gamma_{1j} (f_{it-j} - f_{it-j-1}) + (\phi_{1t} - \phi_{1t-1}) \\
 &\quad + (\varepsilon_{1it} - \varepsilon_{1it-1}) \\
 \bar{g}_{it} &= \sum_{j=1}^k \alpha_{3j} \bar{g}_{it-j} + \sum_{j=1}^k \beta_{3j} \bar{m}_{it-j} + \sum_{j=1}^k \gamma_{3j} \bar{f}_{it-j} + \bar{\phi}_{3t} + \bar{\varepsilon}_{3it} \\
 m_{it} &= \sum_{j=1}^k \alpha_{2j} g_{it-j} + \sum_{j=1}^k \beta_{2j} m_{it-j} + \sum_{j=1}^k \gamma_{2j} f_{it-j} + \eta_{2i} + \phi_{2t} + \varepsilon_{2it} \\
 (m_{it} - m_{it-1}) &= \sum_{j=1}^k \alpha_{2j} (g_{it-j} - g_{it-j-1}) + \sum_{j=1}^k \beta_{2j} (m_{it-j} - m_{it-j-1}) + \sum_{j=1}^k \gamma_{2j} (f_{it-j} - f_{it-j-1}) + (\phi_{2t} - \phi_{2t-1}) \\
 &\quad + (\varepsilon_{2it} - \varepsilon_{2it-1}) \\
 \bar{m}_{it} &= \sum_{j=1}^k \alpha_{2j} \bar{g}_{it-j} + \sum_{j=1}^k \beta_{2j} \bar{m}_{it-j} + \sum_{j=1}^k \gamma_{2j} \bar{f}_{it-j} + \bar{\phi}_{2t} + \bar{\varepsilon}_{2it} \\
 f_{it} &= \sum_{j=1}^k \alpha_{3j} g_{it-j} + \sum_{j=1}^k \beta_{3j} m_{it-j} + \sum_{j=1}^k \gamma_{3j} f_{it-j} + \eta_{3i} + \phi_{3t} + \varepsilon_{3it} \\
 (f_{it} - f_{it-1}) &= \sum_{j=1}^k \alpha_{3j} (g_{it-j} - g_{it-j-1}) + \sum_{j=1}^k \beta_{3j} (m_{it-j} - m_{it-j-1}) + \sum_{j=1}^k \gamma_{3j} (f_{it-j} - f_{it-j-1}) + (\phi_{3t} - \phi_{3t-1}) \\
 &\quad + (\varepsilon_{3it} - \varepsilon_{3it-1}) \\
 \bar{f}_{it} &= \sum_{j=1}^k \alpha_{3j} \bar{g}_{it-j} + \sum_{j=1}^k \beta_{3j} \bar{m}_{it-j} + \sum_{j=1}^k \gamma_{3j} \bar{f}_{it-j} + \bar{\phi}_{3t} + \bar{\varepsilon}_{3it}
 \end{aligned}$$