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The impacts of monetary policy on consumption and investment: empirical evidence from selected countries in Southeast Asia

Zukarnain Zakaria
Universiti Teknologi Malaysia

This paper investigates the effectiveness of monetary policy in four major countries in Southeast Asia by using impulse-response functions within a vector error correction model (VECM) framework. The impacts of interest rate shock on two macroeconomic variables, investment and consumption have been analysed and compared based on the magnitude and the speed of adjustment. The findings show that the effectiveness of monetary policy differs not only between countries but also on the macroeconomics variable used in the analysis. Monetary policy was found more effective in influencing investment in the Philippines compared with Malaysia and Thailand, and the impacts are smallest in Indonesia. For consumption, the impacts are stronger in Thailand and smallest in the Philippines. The impacts of monetary policy on consumption are also less responsive compared with it impacts on investment.

JEL classification: E52, E21, E22
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1. Introduction

Most economists agree that monetary policy has significant effects on the real sector in the short run. Many studies have discussed the channels of the transmission mechanism of monetary policy, especially through the so-called credit view. According to the credit view, the transmission mechanism of monetary policy can be divided into two separate channels: the bank-lending channel and the balance-sheet channel. The bank lending channel is related to banks' ability, and the balance-sheet channel is related to banks' willingness to

supply loans to the private sector. In the credit view, the banking sector serves as the main source of finance for both households and firms. Thus, changes in banks loan could have consequences on the total output through its effect on private-sector spending. The credit view, however, relies on the assumption of imperfect capital markets, which implies that the effects of monetary policy may differ between firms, industries, or countries.

This paper's objective is to empirically examine the performance of monetary policy in four selected countries in Southeast Asia—Indonesia, Malaysia, Thailand, and the Philippines—by using impulse-responses function. In contrast with the previous studies on the effectiveness of monetary policy, which normally look at the impact of monetary policy actions on output and/or price, this paper compares the effectiveness of monetary policy in affecting the level of investment and consumption. The usage of investment and consumption is based on the fact that these two variables are the main channels through which the impact of monetary policy actions is transmitted to output. The direct impact of monetary policy changes on these variables could provide a clearer picture of the impacts of monetary policy on the countries being studied.

2. Review of literature

The monetary transmission mechanism is a process through which monetary policy actions are transmitted into changes in income and inflation [Taylor 1995]. The traditional view proposes that the transmission mechanism is the process by which monetary factors operate via equilibrium in asset markets to influence output and asset prices, and these in turn influence desired consumption and investment spending [Purvis 1992]. In the more recent literature, however, there are two main views surrounding the debate on the transmission mechanism. The first emphasizes the role of money (the money view) in the transmission mechanism process; the second emphasizes the role of credit (the credit view). A number of comprehensive surveys have been carried out on these theories. These include Bernanke [1993], Gertler and Gilchrist [1993], Kashyap and Stein [1994, 1997], Hubbard [1995], and Cecchetti [1995]. This section will only focus on the credit view.

In the credit view, there are two possible channels of transmission of monetary policy. The first is the balance-sheet channel, which emphasizes the impact of monetary policy on the borrower's balance sheet by focusing on the role of the firm's net worth in obtaining external finance. There are several ways by which monetary policy can affect the net worth of a firm.

First, a restrictive monetary policy increases interest payments for the firm, thus reducing the firm's cash flow and net worth. Second, rising interest rates could also cause share prices to fall and hence reduce the value of the firm. The unexpected share price decreases lead to a higher debt burden, thereby exacerbating agency problems. The proponents of this channel argue that a negative monetary shock would make external finance more expensive relative to funds raised internally. Since the net worth of the firm is inversely related to the external finance premium for a given amount of finance required, the shrinkage in the net worth will reduce the borrower's spending and production [Bernanke, Gertler, and Gilchrist 1996]. The effect of monetary shock will become more significant when there are no close substitutes for bank credit, particularly for the households and small firms that depend largely on banks for external finance. The second linkage of transmission mechanism in the credit view is the bank-lending channel, which focuses on the possible effect of monetary policy actions on the supply of loans by the banking system. The bank-lending channel argues that a tight monetary policy will restrict interbank lending, reducing banks' credit supply.

In the credit view theory, the effectiveness of policy depends on capital market imperfections, which make it easier for some firms to obtain financing than others. Information asymmetries and moral hazard problems, together with bankruptcy laws, mean that the state of a firm's balance sheet has implications on its ability to obtain external finance. More important for the transmission mechanism per se is that some firms are dependent on banks for finance, and that monetary policy affects bank-loan supply. A reduction in the quantity of reserves forces a reduction in the level of deposits, which must be matched by a fall in loans. Lower levels of bank loans will have an impact on the real economy if there are firms without an alternative source of investment funds [Cecchetti and Krause 2001]. Substantial empirical evidence supports the importance of both capital market imperfections and firm dependence on bank financing. Kashyap and Stein [1997] provide a summary of two types of studies. The first type suggests that banks rely to a substantial extent on reservable-deposit financing, thus a contraction in reserves will prompt banks to contract their balance sheets, reducing the supply of loans. The second type establishes that there are a significant number of bank-dependent firms which are unable to mitigate the shortfall in bank lending with other sources of finance.

Empirical findings clearly indicate that the nature of the transmission mechanism is influenced by the structure of a country's financial system. Cecchetti [1995], for example, investigates the importance of firms' dependence on bank loans for the effectiveness of policy changes. He looks at how

differences in the size, concentration, and health of the banking systems, across a sample of 16 countries, are likely to affect the impact of monetary policy and concludes that countries with many small banks, less healthy bank systems, and poorer direct capital access display a greater sensitivity to policy changes than do countries with big healthy banks and deep, well-developed capital markets. Allen and Gale [2001] look at the evidence related to differences in financial structure and growth between countries over a long average period of time. They find that, in general, financial structure does affect aggregate real economic variables. Meanwhile, Cecchetti and Krause [2001] study the issue of whether financial structure affects the effectiveness of monetary policy. Cecchetti and Krause [2001] look at 23 developed and emerging market countries and find that financial structure does matter. Specifically, countries with less direct state ownership of banking-system assets have lower variances of both output and inflation.

3. Methodology

3.1. Estimation strategy

There is serious reason to question the finding of time-series studies that do not properly account for unit roots in the data. Phillips [1998] criticized the use of levels VARs (vector autoregressions) in the presence of some unit roots or some near-unit roots in order to derive impulse responses. He showed that long-run impulse-response estimates are inconsistent in unrestricted level VARs. Thus, this paper first examines the unit root properties of each series. The presence of unit roots has been tested by using the augmented Dickey-Fuller (ADF) tests [Dickey and Fuller 1979] and the Phillips-Perron (PP) tests [Phillips and Perron 1988]. The findings from unit root tests show that the series in this study are nonstationary in levels but stationary in the first differences. This finding suggests that the first-differences VAR is more appropriate than level VARs to model the series in this study.

Further investigations test the number of the cointegration relationships among the series. This was accomplished by using Johansen's maximum likelihood-based trace statistics [Johansen 1995]. In this test we allow for presence of an intercept but not for deterministic trends in the cointegrating equations. In all of the cases, the tests indicate the existence of at least one cointegration equation in the model. Based on this finding, the vector error correction model (VECM) is a more appropriate approach to model the relationship among series in the study.

To derive impulse responses, a set of identifying restrictions must be imposed. There are two widely used approaches to achieve identification of the shocks. The first is based on imposing restrictions on the contemporaneous effects of shocks, while the second is based on imposing long-run restrictions on the effects of shocks. To impose contemporaneous restrictions, the standard approach is a Choleski decomposition of the residual covariance matrix from the VAR model. This approach imposes a contemporaneous recursive structure on the shocks that depends in a crucial way on the ordering of the variables in the system. The ordering reflects the speed at which variables respond to shocks.

3.2. Model

A macroeconomic VAR model to study monetary policy shocks commonly includes at least four variables: output, price, money, and short-term interest rate. These correspond to the variables of a standard IS-LM model. The four-variable VAR model, however, often results in the price puzzle, which is a finding of a sustained price rise following an unanticipated monetary tightening represented by a positive innovation of the interest rate. Sims [1992] argued that the price puzzle is a result of omitting variables, which the monetary authority observes to obtain information on future inflationary pressures, and suggested that it could be resolved by including the exchange rate and commodity price in the set of variables.

Meanwhile, to formalize the credit view, Bernanke and Blinder [1988] suggest that the model should also include the loan price and the loan quantity. Based on the above discussion, a complete VAR model should consist of the prices and quantities of the three markets (goods, money, and credit market) as well as the exchange rate and the commodity price. However, due to the limitations of the data, the VAR model in this paper has only five variables. The vector of endogenous variables used in estimation is as follows:

$$V' = [v_t \;\; p_t \;\; r_t \;\; cr_t \;\; x_t] \tag{1}$$

where v is a macroeconomic variable, p is the price level, r is a short-term interest rate, cr is credit, and x is the exchange rate. In this paper, two macroeconomic variables are studied: investment (*inv*) and consumption (*con*). In the estimation process, these two macroeconomic variables were entered into the regression equations separately. The impulse responses of monetary policy shock on investment and consumption will be investigated individually.

The monetary policy shock is identified through a standard Choleski decomposition with the ordering of variables as in equation (1). The ordering of endogenous variables in equation (1) is fairly standard in the recent empirical literature of transmission of monetary policy shocks. This ordering is based on the assumption regarding the operation of monetary policy transmission mechanisms. The underlying assumption is that policy shocks have no contemporaneous impact on macroeconomic variables and prices, but may immediately affect credit and the exchange rate. However, the policy interest rate does not respond to contemporaneous changes in credit and the exchange rate. Specifically, the macroeconomic variable (v) is placed before all other variables, which means that the other variables can affect v only with lags. Meanwhile, price (p) is placed before the interest rate (r), which implies that r can affect p with lags. The ordering also allows contemporaneous changes in r to influence cr and x. During the estimation process, experimenting with other orderings, especially by swapping the position of cr with x, did not change the results significantly. Thus, in all regressions, the ordering of endogenous variables as in equation (1) has been used.

To draw valid empirical inferences on the response of investment and consumption to a change in monetary policy, we need an appropriate way of identifying the monetary shocks. There are two dimensions of the conduct of monetary policy. One is that central banks adjust the instruments of monetary policy in response to changes in variables related to their objectives (the reaction function). The other concerns actions taken by central banks to adjust the instruments of monetary policy to affect the real economy. This study is more related to the latter, which requires us to identify the policy-induced component of changes in investment/consumption. This is due to the fact that most central banks smooth overnight or other short-term interest rates when they deliberately intend to change the stance of monetary policy, thus the disturbances to the interest rate identified as shocks to monetary policy in this paper.

3.3. Data

For each country, the VECM model is estimated by using quarterly data over the period 1980-2003. The main sources of data are the International Financial Statistics of the International Monetary Fund (IMF) and the World Development Indicators 2004 of the World Bank. Specifically, the quarterly data for price (p)—measured by consumer price index CPI (base year 2000); interest rate (r), measured by lending rate; credit (cr), measured by domestic credit; and the exchange rate (x), measured by nominal effective exchange rate—were collected from Financial Statistics. Annual data for output (y)—measured

by real gross domestic product (RGDP), investment (*inv*) by real gross fixed capital formation, and consumption (*con*) by real household final consumption expenditure—were gathered from World Bank indicators. These annual data have been converted into quarterly data by using SPLINE methods in the EXPAND procedure provided by SAS/ETS (Statistical Analysis System/Economic Time Series). In all estimations, the data are expressed in logs, and the lag lengths were determined by using the Akaike information criteria (AIC) and the Schwartz information criteria (SIC). Based on AIC and SIC, this paper finds that, in many cases, appropriate lag length is 4 quarters.

4. Analysis and findings

This section presents the results of impulse-response functions that were obtained from the VECM approach. In this approach, first, the number of cointegration equations in the model was estimated by using the Johansen [1995] procedure. With the number of cointegration tests complete, the next step is to estimate the VECM, and based on these estimations the impulse responses of the interest rate shock on investment and consumption are generated. The size of the shock is an increase of one standard deviation in the interest rate. The impacts on investment and consumption have been investigated over a period of 20 quarters. Since the focus is on impulse-response functions, no discussion will be made on the parameters estimated.

In analysing the result of impulse response, the relative effectiveness of monetary policy was determined by comparing the size and the speed of the adjustment. With regard to the size, comparison will be carried out based on the maximum negative impacts of the interest rate shock on investment and consumption. This is in line with the theoretical argument that the expected impact of an increase in the interest rate on these two variables is negative. Meanwhile, the speed of adjustments will be evaluated based on how fast a shock in interest rate affects investment and consumption, and the time it takes for the negative impact on these variables to disappear.

4.1. The impact of interest rate shock on investment

Figure 1 shows the impulse-response functions of investment to the positive shock in the interest rate. Impulse-response functions of investment in Figure 1 show that the interest rate affects investment almost immediately after the shock in the case of the Philippines and Thailand. Meanwhile, for Indonesia and Malaysia, the negative impacts on investment can only be observed after quarters 4 and 5, respectively. The negative impact of monetary policy shock on

investment in the Philippines is relatively long-lasting compared with Malaysia, Indonesia, and Thailand. Figure 1 also shows that, in the Philippines, the negative impacts on investment remain observable even after quarter 20. This is in contrast with Thailand where the negative impacts die out in less than ten quarters. With regard to the size of the negative impacts, Figure 1 shows that the impacts are larger in the Philippines; meanwhile in Indonesia, the impacts are negligible.

This paper finds that the impact of monetary policy on investment is relatively stronger in Philippines compared with other countries being studied. The impact is smallest in the case of Indonesia. The impacts of monetary policy shock on investment are also long-lasting in the Philippines. This paper finds that in Thailand and the Philippines, investment responds immediately to the shock in interest rate. Meanwhile, in Indonesia and Malaysia, the impacts can only be observed after quarter 4.

4.2. The impact of interest rate shock on consumption

The impulse-response functions of investment to the positive shock in the interest rate are shown in Figure 2. Graphs in Figure 2 show that in all countries being studied, the negative impacts on consumption can be observed after quarter 6. In Malaysia and Indonesia, the initial impact of the positive shock in the interest rate on consumption is positive. These temporary positive impacts, however, turn negative after quarter 6 in Malaysia, and after quarter 7 in the case of Indonesia.

Graphs in Figure 2 also show that, only in Thailand, the negative impacts remain observable even after quarter 20. Meanwhile, in Malaysia, Indonesia, and the Philippines, the negative impacts die out after quarters 12, 14, and 15, respectively. With regard to the magnitude of the impact, it was found that the impacts are relatively larger in Thailand. Meanwhile, in Indonesia, Malaysia, and the Philippines, the impacts are small and almost similar in magnitude.

5. Discussion and conclusion

This paper investigates the effectiveness of monetary policy in four selected countries in Southeast Asia: Indonesia, Malaysia, Philippines, and Thailand. For this purpose, impulse-response functions have been used to examine the impact on investment and consumption to a shock in monetary policy actions, which is represented by an increase in the interest rate. The impulse-response functions were generated through the estimation of first differences VECM consisting of five variables.

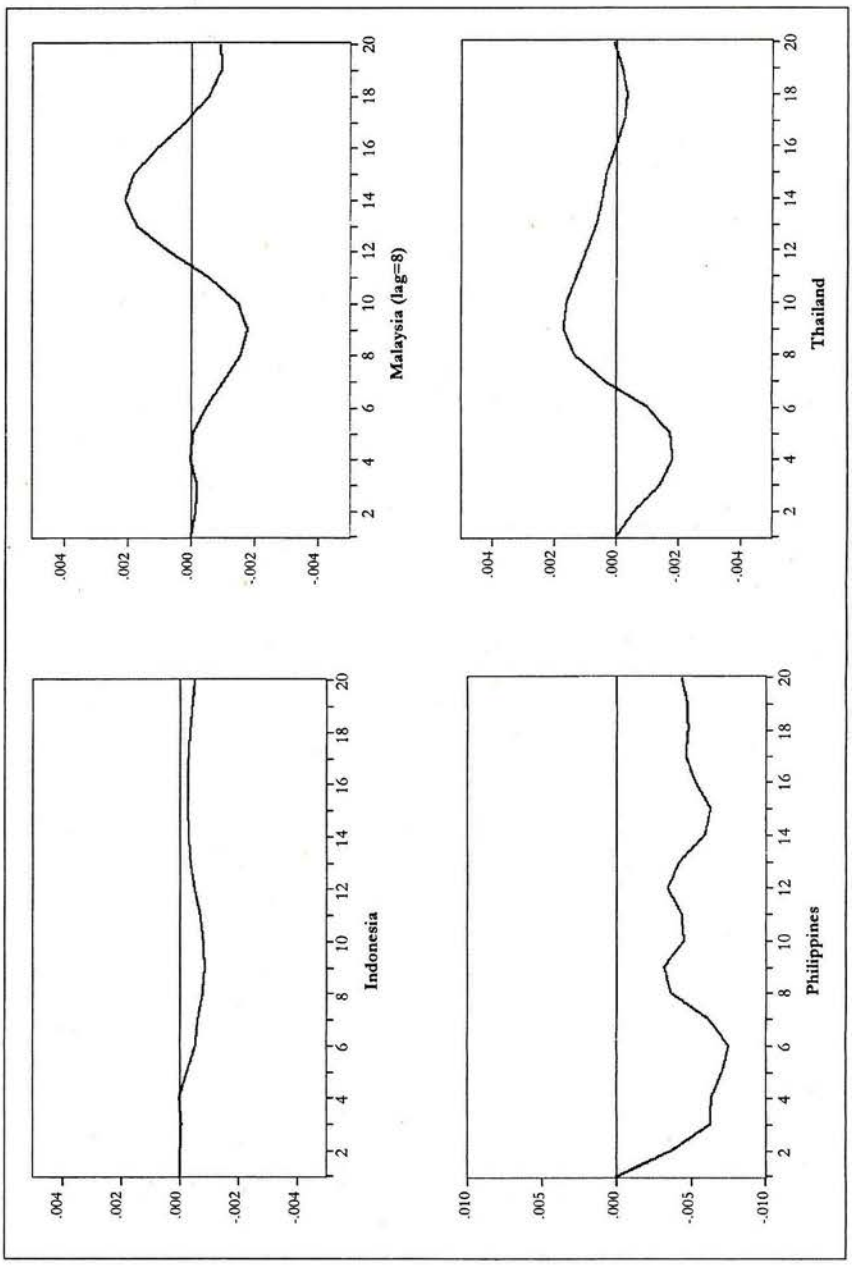

Figure 1. Responses of investment to the positive shock in the interest rate

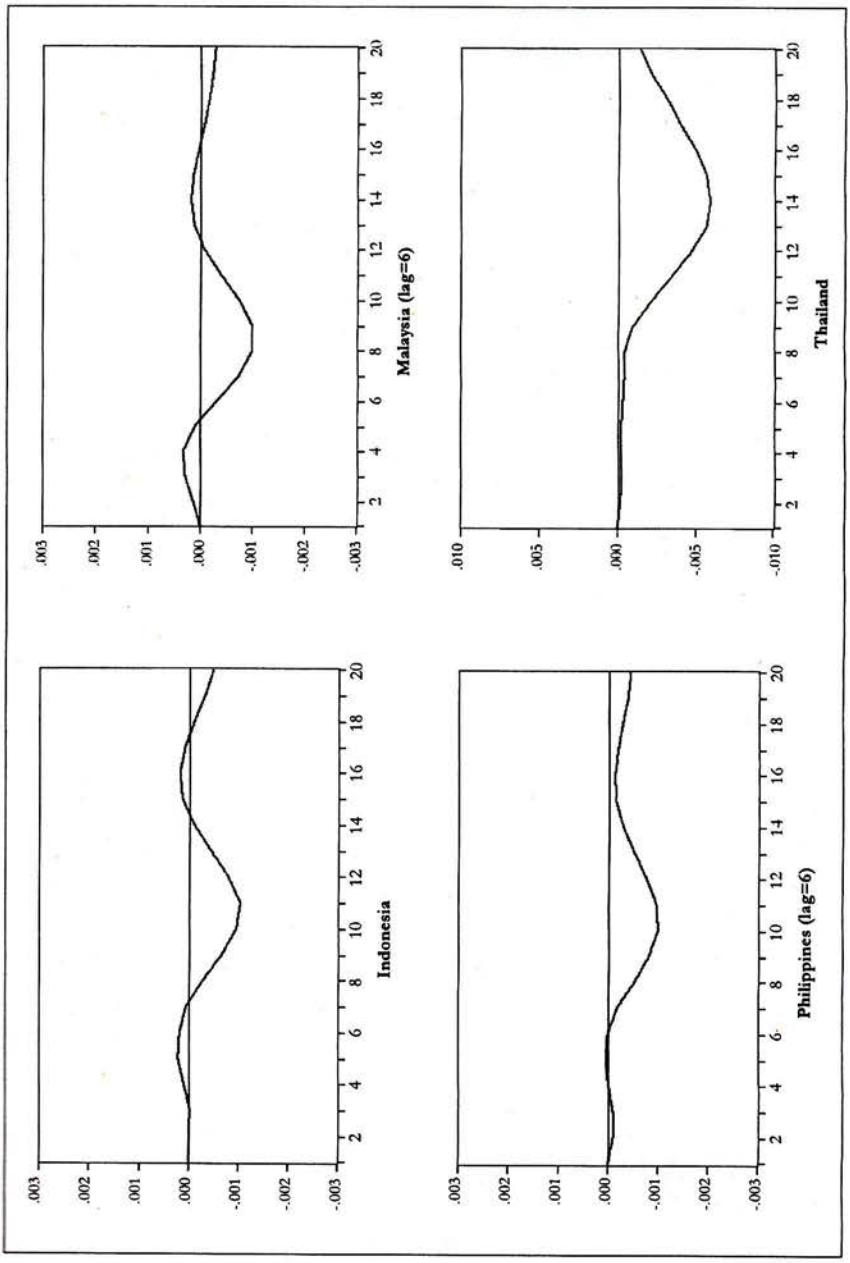

Figure 2. Responses of consumption to the positive shock in the interest rate

This paper finds that the impacts of interest rate shock are different between countries being studied. Findings from impulse response show that impacts on investment are higher, more responsive, and longer lasting in the Philippines. Meanwhile, in Indonesia, the impacts are smallest and less responsive. For Malaysia and Thailand, the impacts are slightly higher than Indonesia; however, only in Thailand, investment responds quickly to the change in interest rate. That the impacts of monetary policy are larger in the Philippines may indicate that firms in this country depend more on bank credit compared with firms in Malaysia, Thailand, and Indonesia. In Malaysia, Thailand, and Indonesia, where the stock markets are relatively more developed, firms have alternative sources of financing, and this makes them less affected by a change in monetary policy. With regard to consumption, this paper finds that the impacts of interest-rate shock on consumption are relatively smallest in the Philippines, but stronger in Thailand. However, in all countries, we find that consumption responds to the change in interest rate.

In addition, the impacts also depend on the macroeconomic variables used in the analysis. This study finds that the impact of an interest-rate shock on investment is relatively higher than the impact on consumption, especially in the case of Malaysia, Philippines, and Thailand. This finding suggests that, in these countries, investment is a major channel through which the effects of a monetary policy shock were transmitted to output. This indicates that monetary policy in these countries has more impact on firms' spending compared with households' spending. In Indonesia, however, consumption is a major channel of transmission mechanism.

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