Central Bank Credibility and Monetary Policy: Evidence from Small Scale Macroeconomic Model of Indonesia

[1]**TANUWIDJAJA, E. and [2]Keen Meng CHOY**

[1,2]National University of Singapore, E-Mail: enrico@nus.edu.sg

Keywords: Monetary Policy, Central Bank Credibility, Indonesia, Trade-off Frontier

EXTENDED ABSTRACT

Macroeconomic models are usually developed in a large framework that comprises hundreds of equations. Some pitfalls, however, are inevitable such as a partial failure of forecasts and some theoretical shortcomings of a large macroeconomic model (Lawson 1992 and Wallis 1989). In the early 1990s, small scale macroeconomic model (SSMM) emerged as an alternative tool for comparing the results obtained from larger macroeconomic models. An SSMM is deliberately kept small with a substantial level of aggregation, thus forcing the model to focus on key issues rather than to look at excessive details in the economy. An SSMM is characterized by a compact system of equations that describe the behaviour of key macroeconomic aggregates.

In this paper, we develop an SSMM of a forward-looking nature that captures the island-wide dynamics of the Indonesian economy which is potentially useful for carrying out policy analysis, and in particular to analyze the effects from monetary policy. The goal is to better understand the options available to Indonesia policymakers to deal with economic shocks. Batini-Haldane (BH 1999) model will be used as theoretical underpinnings in our study along with several choices of policy rules such as the well-known Taylor rule (1993) and the McCallum rule for money supply (1988) to complete the Indonesian SSMM. The BH model is appealing because of the forward-looking feature that captures the dynamics of the economy by taking into account saving behaviour of rational agents, thus ensuring the macroeconomic model that we built is immune to Lucas' critique.

Based on this Indonesian SSMM, we will conduct deterministic and stochastic econometric simulation exercises to capture the essence of monetary policy transmission mechanism in the Indonesian economy. Specifically, we will look at the role of the central bank's credibility in ensuring the achievement of the inflation target. It is found that, in the case of Indonesia, no credibility at all is highly undesirable for the central bank but we show that at least for a given level of credibility, inflation target can be achieved in much faster time. Furthermore, we will experiment with two types of monetary policy rules (Taylor and McCallum) and compare their relative merits in mitigating output and inflation variability in the Indonesian economy. It is found that both simple rules perform equally well but we suggest the central bank to adopt Taylor rule in recent years to support the move towards inflation targeting. Policy frontier concerning the variability of output and inflation as we vary the relative importance of these macroeconomic variables in the policy reaction function will also be discussed thoroughly. The importance of this study is to highlight the usefulness of a small scale macroeconomic model in analyzing key issues for an economy as large as Indonesia. Given the complexity of the dynamics in the Indonesian monetary policy management and transmission, our model has proven its capability to deliver some crucial policy implications that will be useful for policy-makers in Indonesia and in the region alike.

Through our econometric exercise, we found that the small-scale macroeconomic model we have built is able to capture the short- to medium-term economic dynamics in Indonesia. Credibility of the Central Bank is very important for achieving sustainable non-inflationary economic growth. This finding supports the new Central Bank Act in 1999 that requires BI to announce the inflation target on a regular basis to the public as to ensure its accountability and to reduce the inflation volatility.

1. Introduction

The primary objective of this paper is to capture the present structure of the Indonesian economy through the construction and simulation of a small-scale macroeconomic model (SSMM). We need to emphasize that Indonesia is a big economy in terms of area and inhabitants and SSMM is a small-scale model, not a model for a small economy. The use of an SSMM raises a question of why we choose it over a large-scale macroeconometric model. An important reason is that the SSMM is an aggregated model with considerable theoretical content that can provide a stylized and compact representation of the whole economy as opposed to larger models with the usual complexities involved. In comparison with a typical macroeconometric model, an SSMM contains far fewer equations and provides direct analytical solutions.

The specific objectives of this paper are to discuss the empirical findings from the Indonesia SSMM; to analyze the important macroeconomic factors that played key roles in supporting sustained non-inflationary economic growth; and to identify some key policy vehicles through which Indonesia might be able to achieve macroeconomic stabilization. The focus will be on the formulation and implementation of monetary policy by the central bank—Bank Indonesia (BI). The paper is organized as follows. Section 2 will review the related literature of SSMM that is followed by the construction of Indonesian SSMM in Section 3. Estimation and simulation results will be discussed in details in Section 4 before we conclude this paper with some policy implications in Section 5.

2. Review of Small Scale Macroeconomic Model

In the early 1990s, small scale macroeconomic model (SSMM) emerged as an alternative tool for comparing the results obtained from larger macroeconomic models. An SSMM is deliberately kept small with a substantial level of aggregation, thus forcing the model to focus on key issues rather than to look at excessive details in the economy. An SSMM is characterized by a compact system of equations that describe the behaviour of key macroeconomic aggregates such as output (GDP), inflation, unemployment, exchange rates (for an open economy), interest rates, etc. Although the SSMM is not meant primarily for forecasting, it helps to clarify and understand the developments of key macroeconomic variables, for example those relevant in the process of determining the inflation rate in the economy. This is an advantage of an SSMM which is highly aggregated—it could help to mitigate the problem of poor fit in large macroeconomic models. This might explain the recent trend of employing SSMMs in central bank modelling activities to counter-check the results from larger macroeconomic models.

SSMMs have been adopted by countries such as New Zealand, Canada, the United Kingdom, Sweden, Finland, Australia, Spain, Brazil, Chile, and Venezuela (see Haldane 1995, Leiderman and Svensson 1995, de Freitas and Muinhos 1999, Arreaza et al. 2003). Among the countries we have mentioned, it may not be coincidental that most of the countries that employ SSMMs are inflation-targeting countries. At this point in time, SSMMs have not been applied extensively to Asian countries in general and Indonesia in particular. Hence, we hope to pioneer the study of SSMMs in the Asian context, with Indonesia being our choice of country in this regard. In this paper, we adopt the Batini-Haldane (BH, 1999) small scale model to build the Indonesian SSMM.

To sum up, the SSMM is particularly useful for carrying out policy simulations and experiments that can provide valuable analytical insights. The SSMM is simple and tractable and can also provide a cross-check on the results of large macroeconometric models. Some other assumptions suggested by economic theory can also be imposed in SSMMs in order to achieve more analytical results for policy analysis. We will discuss the empirical findings from the Indonesian SSMM and examine the dynamics simulations based on this SSMM in the next section.

3. The Indonesian SSMM

The Indonesian SSMM consists of four behavioural equations and two identities. In specific, the UIP relationship—being a stochastic identity—is not estimated but is included in full model simulations while the policy rule is separately estimated later. A constant term was included in all the estimated equations. In the estimation of the model, we deal with uncertainty through the *perfect foresight* assumption i.e. rational agents make unbiased forecasts. Consequently, actual historical outcomes are used as a proxy for expectations, thereby combining expectational errors with structural residuals. The perfect foresight assumption was imposed in equations that contain the expected future values of macroeconomic variables viz. the IS and

inflation equations, and the monetary policy rule. The Indonesian SSMM is as follows:

IS Equation:

$$(y^{no} - y^{no*})_t = \alpha_1 (y^{no} - y^{no*})_{t-1} + \alpha_2 E_t (y^{no} - y^{no*})_{t+1} + \alpha_5 \Delta q_t + \alpha_6 \Delta y_t^f + \varepsilon_{1t} \quad (1)$$

Oil Equation:

$$(y^o - y^{o*})_t = \beta_1 \Delta y_{t-1}^f + \beta_2 \Delta oil_{t-1} + \varepsilon_{2t} \quad (2)$$

LM Equation:

$$m_t - p_t = \beta_3 y_t + \beta_4 i_{t-1} + \varepsilon_{3t} \quad (3)$$

Inflation Equation:

$$\pi_t = \theta E_t \pi_{t+1} + (1-\theta)\pi_{t-1} + \phi(y - y^*)_{t-1} + \gamma \Delta e_t + \psi \Delta p_t^f + \rho \Delta m_t + \varepsilon_{5t} \quad (4)$$

UIP Identity:

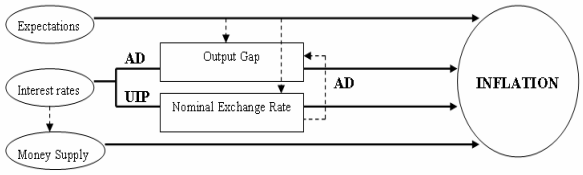
$$e_t = E_t e_{t+1} - i_t + i_t^f + \varepsilon_{4t} \quad (5)$$

National Income Identity:

$$Y_t = Y_t^{no} + Y_t^o \quad (6)$$

y_t^{no} denotes non-oil GDP while y_t^{no*} denotes non-oil potential output. $q_t = e_t - p_t + p_t^f$ represents the real exchange rate with e_t, the nominal exchange rate, being the domestic currency price of foreign currency (Rupiah/Foreign Currency). p_t and p_t^f are the domestic and foreign price levels respectively. y_t^f is real foreign output, representing external demand. y^o and y^{o*} denote oil output and potential oil output LM curve with the conventional explanatory variables that depict real money balances as being dependent on a nominal interest rate, reflecting the opportunity cost of holding money, and real output. The uncovered interest parity (UIP) condition for an open economy is specified as well in the Indonesian SSMM with the exchange risk premium being captured by the error term. Given the financial openness of the Indonesian economy, it is plausible to assume that UIP holds at least approximately. π_t is the current rate of inflation, e_t is the nominal exchange rate as defined earlier, m_t is the nominal money supply and ε_{5t} is the innovation in the inflation process. The inflation equation acknowledges the lag and lead terms in determining the current level of inflation rate, as given by $\theta E_t \pi_{t+1} + (1-\theta)\pi_{t-1}$. In other words, the inflation rate in the Indonesia SSMM is partially determined by a weighted average of past inflation and expected future inflation. According to this specification, inflation depends on its expected future value as well as its own lagged value. The presence of this lagged term produces a short-run trade-off between output and inflation as well as inflation persistence. Inflation expectations are given by $E_t \pi_{t+1} = \lambda \pi_{t+1} + (1-\lambda)\pi^*$ whereby π^* represents the inflation target and $0 \le \lambda \le 1$ represents a measure of credibility of the central bank. As λ approaches 1, monetary policy becomes less credible and vice versa and hence, λ can be interpreted as the *credibility* parameter for the central bank. Thus, the inflation expectations term implicitly allows for a targeted rate of inflation provided that λ is not equal to 1. We specify the inflation target as constant variables for 3 different sub-periods: 1983:Q1–1996:Q4, 1997:Q1–1998:Q4, 1999:Q1–2003:Q4.

The specification of our inflation equation differs from those typically considered in the literature due to the addition of an exchange rate effect on domestic inflation. The presence of the nominal exchange rate reflects the pass-through effect of foreign prices on the Indonesian economy. The lagged output gap found in this equation reflects the domestic sources of inflation. The determinants of inflation in the Indonesia SSMM can be represented by the following flowchart:



Note:
Ovals denote originating variables that determine inflation, rectangles denote intermediate variables that determine inflation, and bold letters denote the equations that appear in the Indonesian SSMM. Solid arrows denote direct transmission onto inflation while broken arrows denote indirect transmission onto inflation.

4. Simulation Results

We will discuss 2 major scenarios using our Indonesian SSMM as the underlying model to study the macroeconomic dynamics of Indonesia.

The Role of Credibility in Inflation Targeting

The first scenario in our DD simulation is to experiment with different degrees of credibility that people have in the central bank. This is reflected in the formation of inflationary expectations. We specified expected inflation as $E_t \pi_{t+1} = \lambda \pi_{t+1} + (1-\lambda)\pi^*$

whereby π^* represents the inflation target and $0 \le \lambda \le 1$ represents a measure of credibility of the inflation-targeting monetary authority. As λ approaches 1, the policy becomes less credible since very little weight is given by economic agents to the inflation target in the formation of inflationary expectations. The opposite is true as λ approaches 0. Therefore, the parameter λ can be interpreted as the credibility parameter for the central bank.

In our inflation targeting scenario, we will look at several cases whereby the credibility given to the central bank is zero (the credibility parameter is 1); between zero and full credibility (the credibility parameter is between 0 and 1); and finally full credibility (the credibility parameter is 0). We will then compare the effects of different degrees of credibility in the face of a reduction in the inflation target. We specify a scenario whereby the inflation target is reduced by 1 percentage point for the out-of-sample DD simulations (this is equivalent to having a quarter-on-quarter inflation target of 0.8%). We present the results in Figure 1.

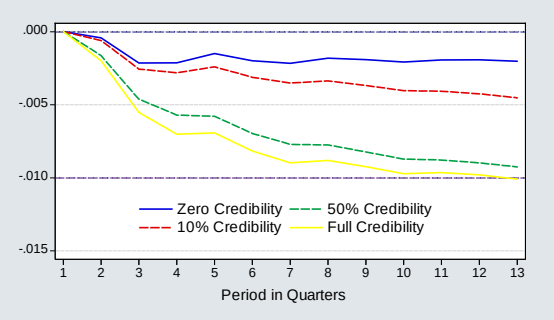


Figure 1. Effects of Central Bank Credibility

In Figure 1 above, we see that when the central bank has zero credibility—as shown by the blue line—it takes an extremely long time for the inflation target to be achieved. This is because, if the public do not have any confidence in the Central Bank, they rely more on the past inflation rate to form their expectations of future inflation, thus introducing substantial inertia into the actual inflation rate. If we look at the coefficient of the lagged inflation term in our estimated SSMM, the elasticity of 0.77 supports our claim. Even when we replace the headline inflation rate with the core inflation rate, the lagged inflation coefficient still remains at around 0.67. Although somewhat extreme, our scenario of zero credibility might not be so unrealistic. In Indonesia, the inflation target is not publicly announced, so people have to form their expectations on the inflation rate in the next period based on the past inflation rate and other information. Moreover, the (implicit) inflation target in Indonesia tends to change frequently, causing people to lose trust in the Central Bank's determination and ability to achieve the inflation target.

Our simulation results also show that if the Central Bank is able to gain just 10% of the public's confidence with respect to credibility in achieving the inflation target, then inflation can be brought down to the targeted level in a much faster time. The red line in Figure 1 shows the case of 10% credibility. Within a period of 3 years, the quarter-on-quarter inflation rate can be reduced by half a percentage point. In fact, if the Central Bank can successfully build up at least 50% credibility, i.e. when people put equal weights on the model-consistent expected inflation rate and the inflation target announced by the Central Bank, the inflation target can be reached by 15 quarters, as shown by the green line in Figure 1. This result is of even more interest to the BI—the central bank must show a strong commitment to the public that it is determined and able to achieve the announced inflation target in order to attain non-inflationary economic growth for the Indonesian economy.

When the Central Bank gains full credibility from the public, then the inflation target will be met in 3 years time as shown by the yellow line in Figure 1. The implication of our results is that the Central Bank does not require an extremely high level of confidence on the part of economic agents in order to achieve the inflation target, but as long as it can "signal" its commitment to meet the inflation target clearly to the public, then inflation can be brought down much faster. As a comparison of the red and green lines show, the biggest improvement occurs when the credibility parameter λ achieves the critical value of 50%.

The Policy Frontier

In the second exercise, we experiment with different weights for the inflation, output, and exchange rate variables in the Taylor rule equation to trace out the so-called *policy frontier*. The policy frontier is defined as a set of combinations of inflation and output gap volatility that can be attained given a particular form of the policy rule. It is traced out by varying the coefficients on the inflation and output gap in our Taylor policy rule and then plotting the standard deviations for these two target variables that

are obtained from stochastic simulation of the SSMM.

In the exercise, we will deal with two cases. In the first case, we assume no exchange rate effect present in the Taylor rule and in the second case, the nominal exchange rate is included in the policy rule. Furthermore, we will restrict the sum of the parameters on the output and inflation gaps to be equal to one. The exchange rate coefficient is set to zero for the time being. We feel that by looking at recent trends, more meaningful policy implications can be drawn rather than focusing on the whole sample because around the crisis period, the monetary authority seems to be looking for a "mechanical" rule to guide their policy-making management after the collapse of the managed-floating exchange rate system. Thus, we will focus on generating the policy frontier for the time period of 1996-2004.

The results from the alternative Taylor rules are traced out in Figures 2 and 3. The policy frontier (and its related points) that moves in the southwest direction corresponds to a better outcome for the economy since it will generate less volatility in both the output and inflation gaps. Along each frontier, the points depict the trade-off between output and inflation volatility as measured by the standard deviations in percentage terms. Our results show that without assuming any exchange rate effect to be present in the policy rule, a Taylor-type rule with both inflation and output targeting generates a superior result for the economy in terms of lower variability in output and inflation. This means that by heeding concerns on both inflation and output stability, the authority can direct the economy into an improved state of welfare.

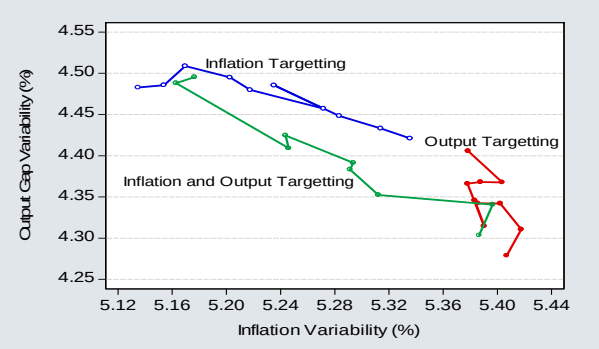


Figure 2. The Policy Frontier (Without Exchange Rate)

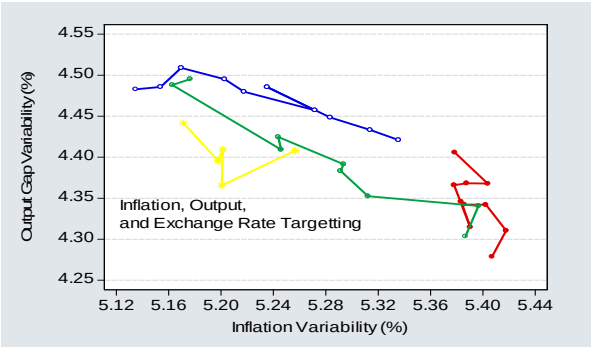


Figure 3. The Policy Frontier (With Exchange Rate)

In Figure 2, the blue line corresponds to a zero weight for the output gap in the policy rule and varying weights attached to the inflation gap—a strict 'inflation targeting' regime. As the weight on the latter is gradually increased, we move in the northwest direction. The red line is obtained by changing the weights attached to the output gap while assigning a zero weight for the inflation gap (an 'output targeting' regime). As the weight on the former is gradually increased, we move in the southeast direction. The results are in line with research in this area which found that, when the authority targets only the inflation rate, the variability of inflation will be lowered at the cost of increased volatility of the output gap. The same logic applies when the authority only cares about output stability. However, the green line in Figure 2 lies below the blue and red frontiers and more towards the southwest direction, suggesting an improvement when the authority cares about both output and inflation stability. In particular, we find that equal weights given to the output and inflation gaps in this policy rule will generate the lowest possible combination of output gap and inflation volatility of 4.39% and 5.3% respectively.

When we introduce the modified Taylor rule with the exchange rate present in the policy rule, the result shows that there is a further improvement in terms of reducing both output gap and inflation volatility. Figure 3 reproduces the three frontiers in Figure 2 but with the modified Taylor rule added. The yellow line, representing the results from this modified rule, lies below the green line, suggesting a further improvement in terms of macroeconomic stabilization policy is possible.[1] Specifically, the

[1] We vary the weight attached to the exchange rate term starting from 0.1 up to 0.5 only since increasing the weight more to more than 0.5 generate unstable results. The weights attached to the inflation and output gap is whatever 1 minus the weight attached to the exchange rate term and then divided equally among them.

result shows that for a weight of 0.2 given to the exchange rate term in the policy equation, a superior combination of output gap and inflation volatility of 4.36% and 5.2% can be achieved.

To understand this policy frontier better, we will explain the economics behind the results we obtained. The blue frontier that corresponds to strict inflation targeting tells us that BI will only respond to the change in the inflation gap and as the weight attached is increased, the magnitude of the policy response to a change in the inflation gap will also increase. Also in the blue frontier, we see that inflation variability is brought down at the expense of an increase in output volatility. As mentioned earlier, as the weight attached to the inflation gap is increased, the policy rate—the interest rate—will be raised by a bigger amount. A higher interest rate will then cause the money demand to fall, as is evident from the LM equation whereby the interest rate has a negative elasticity with respect to money demand. As money demand and supply falls, the inflation rate also declines. Furthermore, there is an indirect effect through the UIP equation that reinforces the drop in the inflation rate because an increase in the policy rate will appreciate the Rupiah, thus reducing the pass-through effect on domestic inflationary pressures.[2] The result is that inflation volatility will be brought down at the cost of an increase in output gap volatility. Output gap volatility increases due to the impact originating from the real exchange rate. Through the UIP relationship, the nominal exchange rate will appreciate but at the same time the domestic price level falls for the reason we have given above. The impact of the fall in the domestic price must have been greater than the effect of nominal appreciation, resulting in a real exchange rate depreciation that increases the output gap.

The red line traces the policy frontier whereby the authority is only concerned about minimizing output volatility regardless of inflation volatility. In this case, BI will only respond to any deviation that occurs in the output gap term in the Taylor rule equation. When output falls below trend, the domestic interest rate is lowered in response, leading to an immediate depreciation of the exchange rate which in turn improves the competitiveness of the economy, resulting in a rise in exports and thus output. The depreciation now leads to an increase in the domestic price level. At the same time, money demand increases with the output level, which aggravates inflation.

Nevertheless, what remains interesting and important is that when BI actually targets both inflation and output, then their variability can be reduced. This means that by caring not only for output but also inflation, the total variability of the economy can be mitigated. Furthermore, by acknowledging the role of the exchange rate, the ability of the Central Bank to reduce the volatility of output gap and inflation is improved marginally, as is evident from the fact that the yellow frontier rests entirely below the green line in the southwest direction. The implication of the exchange rate term is that, apart from responding to output and inflation gaps, BI is now also reacting to exchange rate fluctuations in a way that is now taken into account directly in the policy rule. The marginal improvement of the inclusion of the exchange rate argument is quite consistent with the conclusion stated in Ball (1999), Svensson (2000), and Taylor (2000) that little benefit results from augmenting the policy reaction function with an exchange rate term.

5. Conclusions and Policy Implications

The first policy implication that we can draw from this study is that the small-scale macroeconomic model that we have built is able to capture the short- to medium-term economic dynamics in Indonesia. This finding suggests that the implementation of a small-scale model warrants consideration in policy-making and it can also provide a cross-check on results from larger-scale models developed and maintained by BI, such as MODBI. An important feature is that the model explicitly considers the role of expectations in the form of model-consistent expectations. This is important because the lack of any forward-looking element significantly decreases the ability of the model to provide a credible description of the economy which is valuable to policy makers.

The second implication is regarding the conduct of monetary policy in Indonesia. Based on a dynamic-deterministic simulation exercise in, we show that credibility of the Central Bank is very important for achieving sustainable non-inflationary economic growth. In the case where the Central Bank has no credibility at all as perceived by the public, it will take an extremely long time for the inflation rate to be brought down to the targeted level. Nevertheless, we see a major improvement when the Central Bank can successfully build some credibility. This finding

[2] Note also that when we trace out the policy frontier in the context of strict inflation targeting, we set the coefficient on exchange rate to be equal to zero. Thus, we eliminate any pressures from the exchange rate unto the interest rate as specified by the Taylor rule.

supports the new Central Bank Act in 1999 that requires BI to announce the inflation target on a regular basis to the public as to ensure its accountability since by announcing the inflation target, BI can "earn" the credibility it requires and the public's beliefs can be built up gradually. When, BI can successfully achieve this "critical" level of credibility by announcing and committing to the inflation target, we can expect, at least, a reduction in the inflation volatility that will ensure the sustainability of economic growth in Indonesia. It is also found that the best policy response in the recent years will be to focus on the Taylor rule with equal weights given to the output gap and inflation gap.

Exchange rate is also an important variable to be included in the policy rule as to capture the open economy aspect of the Indonesian economy. This is evident from the fact that as we introduce an exchange rate argument in the policy equation, the monetary authority can reduce the variability of output gap and the inflation rate provided that certain threshold is met when assigning the weights on exchange rate variable. Nevertheless, it is quite premature to say that this benefit will necessitate BI to change its policy course drastically by imputing exchange rate at this point in time to support the current shift in paradigm towards inflation targeting regime. This is so because, based on our empirical findings, the improvement is relatively mild. However, we still believe that this finding is a crucial indicator of how important exchange rate is in the future course of monetary policy management. Hence, further research in this regard is needed in due time.

6. References:

Alamsyah, Halim., Charles J., Juda A., and Doddy Z. (2000), Framework for Implementing Inflation Targeting in Indonesia in Monetary Policy and Inflation Targeting in Emerging Economies, *Proceedings of an International Conference held in Jakarta*, (ed. Charles Joseph and Anton H. Gunawan) Bank Indonesia.

Arreaza, A., Enid Blanco, and Miguel Dorta (2003), A Small Scale Macroeconomic Model for Venezuela (Second Draft), Banco Central de Venezuela Vicepresidencia de Estudios.

Ball, L. (1999), Policy Rules for Open Economies in Monetary Policy Rules (ed. John B.Taylor). National Bureau of Economic Research Conference Report.

Bank of England (1999), Economic Models at the Bank of England, Bank of England, Threadneedle Street, London, EC2R 8AH.

Batini, N., and Haldane, A. G. (1999), Forward-Looking Rules for Monetary Policy, in Monetary Policy Rules (ed. John B. Taylor). National Bureau of Economic Research Conference Report.

de Freitas P.S. and Muinhos M.K (1999), A Simple Model for Inflation Targeting in Brazil, Central Bank of Brazil-Research Department.

Fukuchi, T (1968), An Econometric Analysis of the Indonesian Economy, *The Developing Economies* 6, 324-355.

Haldane, A. G. (ed. 1995), *Targeting Inflation*, London: Bank of England.

Lawson, Nigel (1992), *The View from No. 11*, Bantam.

Leiderman, L., and L. E. O. Svensson (ed. 1995), *Inflation Targets*, London: Centre for Economic Policy Research.

Leitemo, K., and Söderström, U. (2001), Simple Monetary Policy Rules and Exchange Rate Uncertainty, *Working Paper Series 122*, Sveriges Riksbank (Central Bank of Sweden).

McCallum, B.T. (1988), Robustness Properties of a Rule for Monetary Policy, *Carnegie-Rochester Conference Series on Public Policy*, 29, 173–204.

Svensson, L. E. O. (2000), Open Economy Inflation Targeting, *Journal of International Economics* 50, 155–83.

Taylor, J.B. (1993), Discretion Versus Policy Rules in Practice, *Carnegie-Rochester Conference Series on Public Policy* 39, 195–214.

Taylor, J.B. (2000), Alternative Views of the Monetary Transmission Mechanism: What Difference Do They Make for Monetary Policy?, *Oxford Review of Economic Policy* 16, 60–73.

Wallis, Kenneth F. (1989), "Macroeconomic forecasting: a survey," *Economic Journal* 99, 28–61.