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A Monetary Policy Rule for Jamaica

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Abstract

Since 1996, the Bank of Jamaica (BoJ) has sought to limit changes in the exchange rate for the Jamaican dollar in the context of its efforts to maintain low inflation. However, with a persistently high public sector deficit, real interest rates have remained generally high, which partly explains the slow pace of growth. This paper discusses an alternative monetary policy mix for achieving low variance for inflation and output through the prism of an empirical macroeconomic model. The simulation results suggest that a monetary policy mix that takes into account the impact of policy on both inflation and output achieves lower variance for inflation and output compared with the current policy mix, which tilts somewhat toward exchange rate stabilization. A case, therefore, can be made for the BoJ to move to a soft inflation targeting regime supported by fiscal consolidation.

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I. Introduction

After several prolonged periods of high inflation, the Bank of Jamaica (BoJ) embarked on an exchange rate-based stabilization program in the middle of 1996. Despite the eruption of a financial crisis in late 1996,[2] the BoJ has not deviated from its stabilization path, although this, on occasion, has resulted in interest rates increasing to above 30 percent.

Except for a period in late 2002/early 2003, the stabilization strategy has been largely successful. Twelve-month inflation came down rather quickly, from around 30 percent at mid-1996 to below 10 percent by March 1997, and remained in single digits through 2002. The Jamaican dollar was broadly stable in exchange markets during this period and the BoJ increased its net international reserves (NIR) from US$500 million in March 1996 to almost US$2 billion in March 2002.

The Jamaican dollar came under acute pressure in the last quarter of 2002, as the fiscal deficit rose and the current account deficit increased sharply. The cumulative depreciation from September 2002 to June 2003 was close to 30 percent, while NIR declined to US$1.1 billion and inflation returned to double digits. As it had done in 1996, the BoJ responded by increasing interest rates and intervention in the foreign exchange market to tighten liquidity, which—together with a renewed fiscal adjustment effort—contributed to stabilizing the foreign exchange market. Interest rates have subsequently declined markedly in the context of decelerating inflation and recovering foreign exchange reserves.

The 1996 and 2003 stabilization episodes illustrate that, while interest rates have generally trended downward since the mid-1990s, they usually rise during periods when the BoJ tries to stem the pressures on the Jamaican dollar. The resulting relatively high interest rates (real interest rates hovered around 10 percent in recent years) have clearly contributed to anemic growth—the economy has only registered slow growth in recent years. They have also been very costly from a budgetary standpoint, in view of the very high level of public sector debt—currently at around 145 percent of GDP.

The monetary policy stance has also been costly to the BoJ. The Bank has been running increasing operating losses (on a cash basis) in recent years. For FY 2002/03–03/04, its operating loss averaged 2 percent of GDP, mainly due to the mismatch of interest rates between its assets and liabilities. Indeed, the interest spread between the BoJ's domestic liabilities (mostly open market operation instruments) and its foreign exchange reserves is very large—over 10 percent in recent years. Over the years, while the NIR has increased

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[2] The financial crisis was a result of excessive lending during the period of financial liberalization and a weak regulatory and supervisory framework. The sharp increase in interest rates as a result of monetary tightening precipitated the financial crisis. The bail out of failed financial institutions eventually cost close to 40 percent of GDP by end-March 2001.

(partly to lend credibility to its exchange rate policy), the stock of BoJ's open market instruments has also increased (currently around 20 percent of GDP almost equivalent to its NIR). Because the Bank tends to intervene through 270–360 day papers rather than shorter term instruments, its operating losses have been even larger, given the interest spread.[3]

The macroeconomic situation in Jamaica remains vulnerable, despite progress made in stabilizing the over the past year. Addressing the challenges of reversing adverse debt dynamics and achieving high growth warrants a rethinking of the policies. Has the current exchange rate stabilization policy run its course? Is it time to move to a different policy mix—for example, should the BoJ change the anchor to a more explicit inflation target? Many country experiences have shown the strong burden a rigid exchange rate system can impose on supporting policies and the consequences of inconsistent policies (especially high fiscal imbalances).[4] Partly for this reason, a diverse group of open economies (including for example, Canada, Australia, New Zealand, Brazil, and the United Kingdom) have opted to move to some form of explicit inflation targeting.

There has not been any empirical analysis on the merits of the monetary policy-exchange mix followed by the Jamaican authorities. Fund advice has argued for a balanced mix while the authorities' approach has generally tilted toward a somewhat tight exchange rate management, which is viewed as needed to contain inflationary expectations. This paper attempts to assess whether a monetary policy mix anchored on a more explicit inflation target would be appropriate using an empirical model for Jamaica.

The remainder of the paper is organized as follows. In Section II, an empirical macroeconomic model is developed for Jamaica. In Section III, an optimal policy rule based on the empirical model is derived. In Section III and IV, the empirical model is used to simulate the performance of macroeconomic variables under BoJ's policy mix and an alternative efficient monetary policy regime. Section V discusses the simulation results and issues related to changing the existing mix to the alternative regime, and Section VI concludes.

II. An Open Economy Model for Jamaica

Many studies of monetary policy rule rely on an estimated (or calibrated) econometric model. For example, the first paper that extended the monetary policy rule for a closed economy to an open economy (Ball (1998)) used a calibrated model. Similarly, Ryan and Thompson (2000) used a empirical model to study whether the Reserve Bank of Australia should set short-term interest rates on the basis of expected inflation in the nontradable sector or react

[3] Such patterns of intervention have resulted in periodic increases in interest rates, most distinctly around October–November in recent years when the existing stock matures.

[4] Recent financial crisis in Argentina and other Latin American countries provided a useful backdrop to the trend of moving to a flexible exchange rate system.

directly to expected wage pressures in that sector's labor market (which links more closely to aggregate inflation). In many cases, an empirical model that incorporates most macroeconomic variables such as output, inflation, the interest rate, and the exchange rate is established. The efficacy of different monetary policy rules are then evaluated through simulations based on the established empirical model. This approach is adopted in this paper.

A macroeconomic model for Jamaica is estimated based on quarterly data series covering the period 1996Q1 to 2003Q4. In the model, output (seasonally adjusted, y^{sa}), the price index (p), the real exchange rate (e) are endogenous variables; and the interest rate (six month T-bill rate, i) and money supply (M1) are treated as predetermined variables.[5] All variables except the interest rate are in logs. The central government balance (deflated by CPI index, *CG*) is also included to test whether this would have an impact on the endogenous variables. The interest rate is assumed to be determined through a monetary policy rule.

The model is estimated in first difference form since all the time series are integrated I(1) series in the period studied (see Figures 1 and 2)—unit-root tests of all the time series are not rejected (see Table 1), and no co-integration is found among the series. Considering that it is difficult to decide on the long term or "equilibrium" rate for inflation, growth, interest rate, and real exchange rate, the model is therefore estimated in first difference form without error-correction items. Given that the period under study was a period that the economy was returning to some normalcy after the disruption of financial crisis—and it is still not clear whether normalcy has been attained, a model in first difference seems appropriate.

[5] Seasonally adjusted output is selected because of clear seasonality in the original series.

Figure 1. Jamaica: Output, Price, Exchange Rate, and Interest Rate
(In logs except for interest rate, 1996Q1–2003Q4)

Figure 2. Jamaica: Output, Price, Exchange Rate, and Interest Rate
(In first difference, 1996Q2–2003Q4)

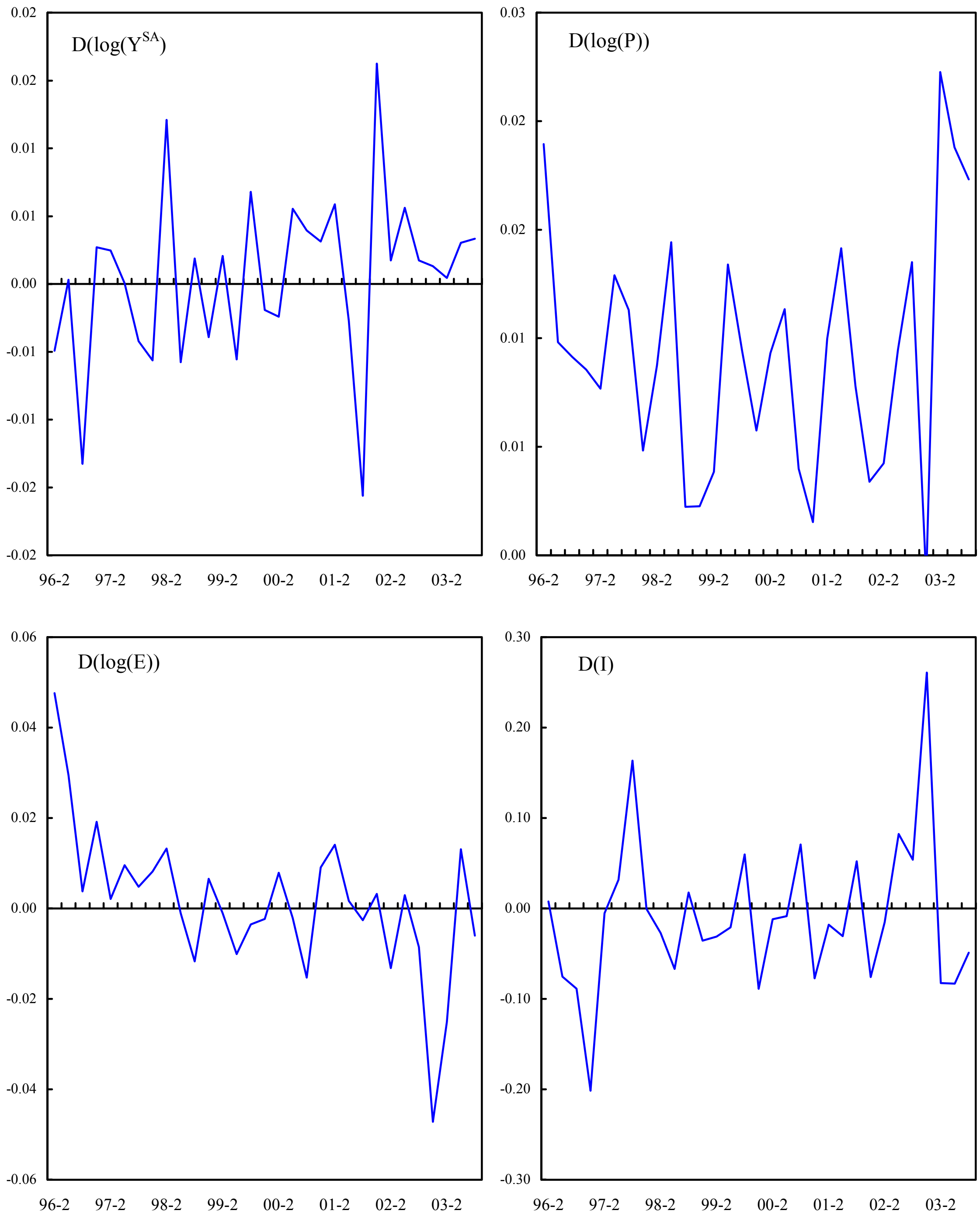


Table 1. Selected Augmented Dickey-Fuller Test Results of Unit-Root

Variable	
Interest rate, i	c, c+s
Money supply, M1	c, c+t
Price index, P	c
Output, y^{sa}	c, c+t
Real exchange rate, e	c+t, c+t+s
Government deficit, CG	c+s

Note: "c" indicates that the ADF test is significant with a constant included in the equation; "c+s" with a constant and seasonals, "c+t" with a constant and trend, "t" trend, "t+s" trend and seasonals. All results are significant at 1% level of significance.

The model consists of equations for inflation, output, and the exchange rate. Given that all variables selected are relevant in explaining endogenous variables under the standard macroeconomic theory for open economy, the real challenge is to find a parsimonious presentation of the explanatory variables for each endogenous variable. This is done through a general to specific approach advocated by Hendry (1980). For each dependent variable, a search for a parsimonious presentation of explanatory variables is conducted which resulted in the selection of specific variables as well as their lags. While this is done separately for each dependent variable, the final model is estimated as a system by FIML (see Box 1).[6]

[6] Less efficient estimation methods such as 3SLS and 2SLS were also used with very close results.

Box 1. Model Estimation Results

$$\pi_t = \underset{(6.2)}{0.01} + \underset{(3.1)}{0.21}\,\Delta e_{t-1} - \underset{(0.2)}{0.03}\,\pi_{t-1} - \underset{(3.2)}{0.51}\,\pi_{t-2} + \varepsilon_t^{\pi} \quad (\pi_t = \log(p_t - p_{t-1})$$

$$\Delta y_t^{sa} = \underset{(2.8)}{0.006} - \underset{(1.9)}{0.02}\,\Delta i_t - \underset{(4.9)}{0.6}\,\Delta y_{t-1}^{sa} - \underset{(3.0)}{0.22}\,\Delta e_{t-2} - \underset{(1.5)}{0.34}\,\pi_{t-2} - \underset{(4.1)}{0.09}\,\Delta m_{t-1} + \varepsilon_t^{y}$$

$$\Delta e_t = -\underset{(2.7)}{0.03} + \underset{(.3.0)}{2.43}\,\pi_t - \underset{(3.9)}{0.07}\,\Delta i_t - \underset{(4.1)}{1.0}\,\Delta y_{t-1}^{sa} + \underset{(2.6)}{1.62}\,\pi_{t-2} - \underset{(2.9)}{0.4}\,\Delta e_{t-2} - \underset{(3.1)}{0.12}\,\Delta m_{t-2} + \varepsilon_t^{e}$$

σ = 0.003, 0.004, and 0.007 respectively.

LR test of over-identifying restrictions: $\chi^2(19)$= 33.12 [0.02]*

Correlation of structural residuals (standard deviations on diagonal)

	π	Δy^{sa}	Δe
π	0.003	0.065	-0.267
Δy^{sa}	0.065	0.004	-0.195
Δe	-0.267	-0.195	0.007

The hypothesis that the central government deficit (deflated by CPI, with 2 lags) is not significant is accepted by the exclusion test. $\chi^2(9)$ = 13.64 [0.14]

Inflation

The estimated inflation equation reflects strong inflation inertia as well as the effect of exchange rate movements. It is worth noting that an appreciation in the current period (which may reduce inflation) will tend to *increase* inflation in the next period (see below).

Output

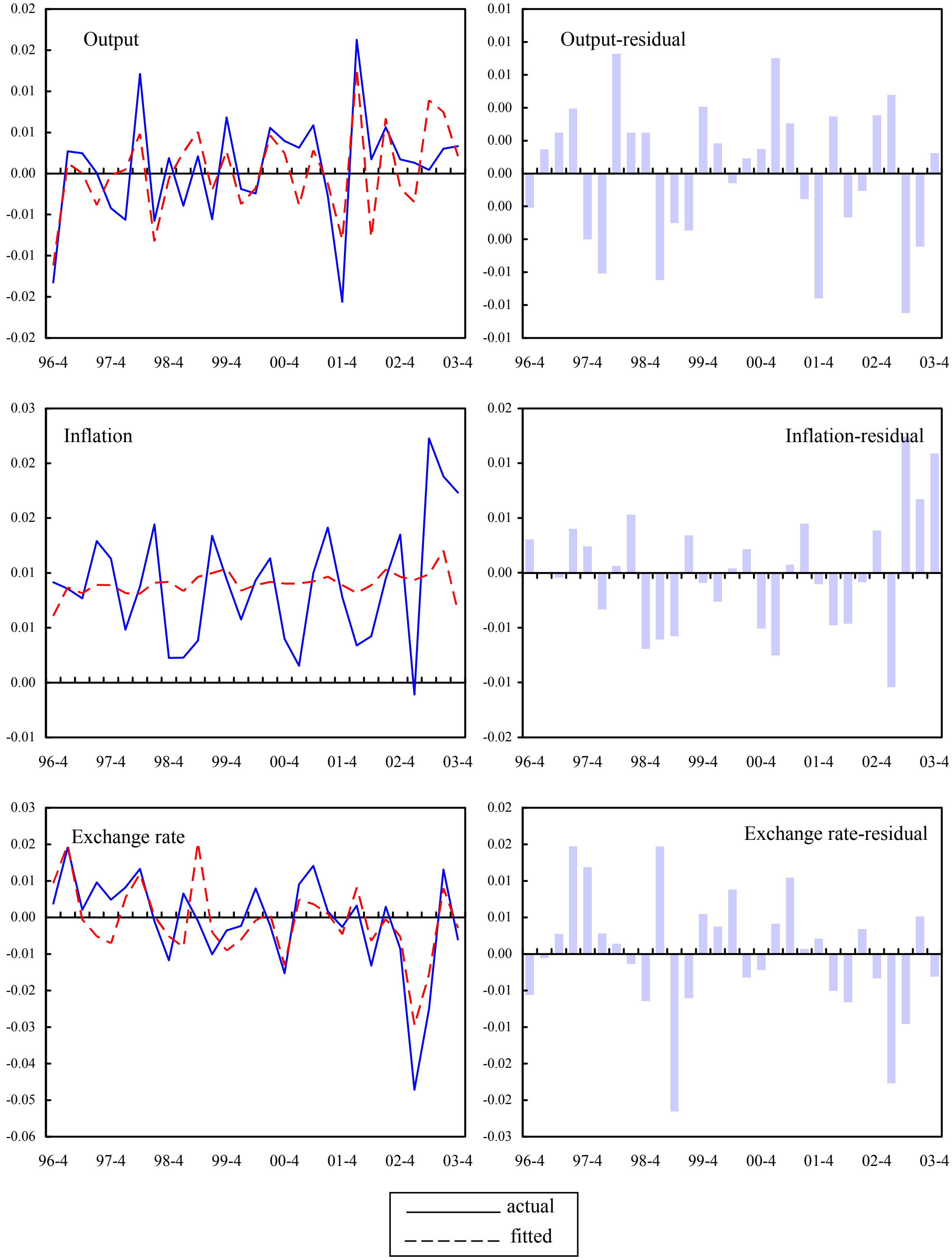
The estimated output equation shows that a higher interest rate or exchange rate appreciation reduces output growth. This result is consistent with standard theory.

Real exchange rate

The estimated equation reveals that high inflation causes the real exchange rate to appreciate, while previous period's growth tend to reduce pressure for the exchange rate to appreciate in this period, and monetary tightening coincides with exchange rate depreciation.

To test whether the government deficit would influence the results, the model is re-estimated to include the central government deficit (in first difference, and with up to two lags). The exclusion test result shows that it is not significant. The result that a high deficit (which has been the norm in this period) does not affect output is particularly revealing. It shows that the

Figure 3. Model Estimation: Fitted Variables and (Scaled) Residuals



stimulating effect of an expansionary fiscal policy is diminished in a high debt, high deficit, and high interest rate environment. Somewhat surprisingly, the estimation shows that money supply is not affected by other variables studied except that it seems to be a unit-root process.

The overall fit of the model is reasonably good (see Figure 3). The estimated model shows significant error-correlation across different equations, an indication that shocks to these variables are closely correlated.

III. An Optimal Monetary Policy Rule

Based on the estimated model, we will derive an optimal monetary policy rule along the lines of Ball (1998). As a first step, the model could be simplified to the following (all second lags are omitted here):

$$\Delta y_t^{sa} = \alpha_1 - \alpha_2 \Delta i_t - \alpha_3 \Delta y_{t-1}^{sa} - \alpha_4 \Delta m_{t-1} + \varepsilon_t^y \tag{1}$$

$$\pi_t = \gamma_1 + \gamma_2 \ \Delta e_{t-1} - \gamma_3 \pi_{t-1} + \varepsilon_t^\pi \tag{2}$$

$$\Delta e_t = \beta_1 + \beta_2 \pi_t + \beta_3 \Delta i_t - \beta_4 \Delta y_{t-1}^{sa} + \varepsilon_t^e \tag{3}$$

The key feature of this model is that monetary policy affects inflation and output through the following channels. A monetary contraction will reduce output in the current period. It will make the local currency stronger, which is likely to reduce inflation this period; however, inflation in the next period will increase as the currency appreciation is reversed, other things unchanged.[7]

An efficient monetary policy rule is often defined as one that minimizes the deviation of inflation from target and output from potential output (see, for example, Taylor (1993)). Given the difficulty of defining appropriate long term levels for inflation and output (as discussed above), the objective of an efficient rule is defined in this paper as one that minimizes a weighted sum of output variance and inflation variation (from previous period). The weights are determined by the central bank's preferences, and we use interest rate *i* as the policy instrument. Based on the model set-up, we assume that the state variables are current inflation and previous period's inflation and output. Expected current period output and next period inflation are determined by policies.

While a policy rule can be a rule for either interest rate (*i*) or exchange rate (*e*), or a combination of the two, we choose the rule for *i* as noted earlier. To derive the efficient rule,

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[7] This tendency for the exchange rate to return to its long-run level is the reason that optimal rule in an open economy should target the long-run inflation rate rather than current inflation as in a closed economy.

we need to show the effect of interest rate on output and inflation. The equations for output and inflation are laid out below.

It can be shown that the interest rate can be determined as a linear function of the state variables π_t and $\Delta y_{t-1,}$ and ε—the exchange rate shock, (as well as Δm_{t-1}, particular to our set-up) based on the equations for output and inflation are laid out below:

$$E_t \Delta y_t^{sa} = \alpha_1 - \alpha_2 \Delta i_t - \alpha_3 \Delta y_{t-1}^{sa} - \alpha_4 \Delta m_{t-1} \tag{4}$$

$$E_t \pi_{t+1} = \gamma_1 + \gamma_2 \ \Delta e_t - \gamma_3 \pi_t \tag{5}$$

From the above, it can be seen that a higher interest rate will lower output in this period. Nevertheless, a higher interest rate will cause higher expected inflation next period. This is because while a higher interest rate causes the exchange rate to appreciate in this period, this appreciation tends to be reversed in the next period which will lead to higher inflation.

Given that the exchange rate is determined in this period through the interest rate (see equation (3)), we can derive the policy rule for *i* very easily. To see this, substitute (3) into (5) we will have:

$$E_t \pi_{t+1} = (\gamma_1 + \gamma_2 \beta_1) + (\gamma_2 \beta_2 - \gamma_3)\pi_t + \gamma_2 \beta_3 \Delta i_t - \gamma_2 \beta_4 \Delta y_{t-1} + \gamma_2 \varepsilon_t^e \tag{6}$$

Since the model is linear, the optimal interest rate will be a linear function of the state variables π_t and $\Delta y_{t-1,}$ and ε—the exchange rate shock, (as well as Δm_{t-1}, particular to our set-up). The rule can be expressed as follows:

$$\Delta i_t = a \Delta y_{t-1} + b \pi_t + c \varepsilon_t^e + d \Delta m_{t-1} \tag{7}$$

where a, b, c, and d are constants to be determined. Since ε can be replaced by an equation involve *e* and *i*, we can rearrange (7) as follows:

$$q \Delta i_t + (1-q) \Delta e_t = a \Delta y_{t-1} + b \pi_t + c \Delta m_{t-1} \tag{8}$$

where the new parameters are determined as follows:

$$q = \frac{1 + c\beta_3}{1 + c\beta_3 - c}$$

$$a' = \frac{a + c\beta_4}{1 + c\beta_3 - c}$$

$$b' = \frac{b - c\beta_2}{1 + c\beta_3 - c}$$

$$c' = \frac{d}{1 + c\beta_3 - c}$$

This shows the policy rule as a weighted average of interest rate and exchange rate.

As has been pointed out by many previous studies, the optimal rule supports the use of the average of *i* and *e*—a so-called "monetary condition index" (MCI)—as the policy instrument. Several countries have followed this approach in using the MCI as an indicator for policy purposes, including Canada and New Zealand (see Gerlach and Smets (1996)). The MCI measures the overall stance of monetary policy, including its impact on output and inflation through both interest rate and exchange rate. This rule also takes into account the impact of exchange rate on next period inflation. Therefore, as pointed in Ball (1998), the open-economy policy rule differs from the one for the closed-economy in that it targets a long-term measure of inflation or core inflation, rather than current period inflation alone.

It should be noted that the model depicted above does not contain forward-looking variables, which is borne out of the estimated macroeconomic model. For policy rules that incorporate forward-looking variables, see for example Svensson (2000). While a model that contains only backward looking variables such as this may not be adequate in addressing the role of expectations in monetary policy, this deficiency is mitigated as policymakers have to take into account forecasts of inflation and exchange rate variables in their rules regardless of the model structure. For example, comparing with the rule developed in Svensson's model, the operational rule depicted here is quite similar in terms of the group of predetermined variables included.

We will not attempt to further quantify the coefficients in the policy rule (8), but clearly these can be derived once the central bank's objective function is specified. Instead, we will try to simulate the performance of output and inflation variance under two different policy rules which may be pertinent to BoJ's operations.

IV. Policy Mix of the Bank of Jamaica

The BoJ has indicated officially that the "Bank's mandate is price and financial system stability." However, "the Bank will not allow *precipitous* movements in the exchange rate. Such movements only serve to undermine the economic strides we have made and lead to instability in a very fragile economy" (BoJ (2002)). The policy statements and actual conduct of the BoJ clearly indicate that it puts a premium on smooth exchange movements, as it is believed that the former is critical in achieving price stability. Its monetary policy mix therefore can be characterized (using the formulation above) as follows:

$$\Delta i_t = \alpha\pi_t - \beta(\Delta e_t - \Delta e_{t-1}) \qquad (9)$$

This rule states that the interest rate is adjusted to inflation and to changes to the real exchange rate, where the parameters (α and β) are the reaction weights which measure the responsiveness of the target rate to each feedback variable.

While the BoJ has not indicated its relative level of intolerance regarding inflation and exchange rate movements, historically intervention often occurred when exchange rate movements were judged to be large and destabilizing—a signal that the Bank is more cautious about the latter. Therefore, for illustrative purpose, we assume α =1 and β =4.[8]

A simulative run of the system (for 150 periods) shows that this type of monetary policy rule does deliver exchange rate stability most of the time, as indicated by fairly smooth exchange rates (Table 2, Panel A). It is obvious that such a result is brought about by rather volatile interest rates, and the inflation performance is also modest. Given the impact of interest rates on real output in the empirical model, it is not surprising that the volatility in output is somewhat sizable. The simulation is repeated 30,000 times, and then a grid-search is conducted to find the combination of the smallest variance of inflation and output. The result frontier is plotted in Figure 4.

[8] For the period studied, the ratio of correlation of Δi and Δe and that of Δi and π is about close 2 to 1.

Table 2. Results of Simulative Runs of the Model
Based a simulation of 150 periods of the model under alternative interest rate rule

	π	Δi	Δy^{sa}	Δe
		Panel A. Exchange Rate Rule		
Mean	0.004	0.043	-0.009	-0.024
Variance	0.005	0.162	0.011	0.017
		Panel B. Inflation and Output Rule		
Mean	0.004	-0.041	-0.008	-0.019
Variance	0.004	0.108	0.009	0.012
.				

V. Alternative Quasi-Efficient Policy Rule

If less emphasis is placed on smoothing the exchange rate, will this lead to a better macroeconomic performance in terms of reducing volatility of output and inflation? Intuition suggests the interest rate would be less volatile, which will help reduce output volatility. To verify this, we set a rule for the interest rate as follows (similar to what is laid out in (7)).

$$\Delta i_t = \pi_t + \Delta y_{t-1} + 4\Delta e_{t-1} \tag{10}$$

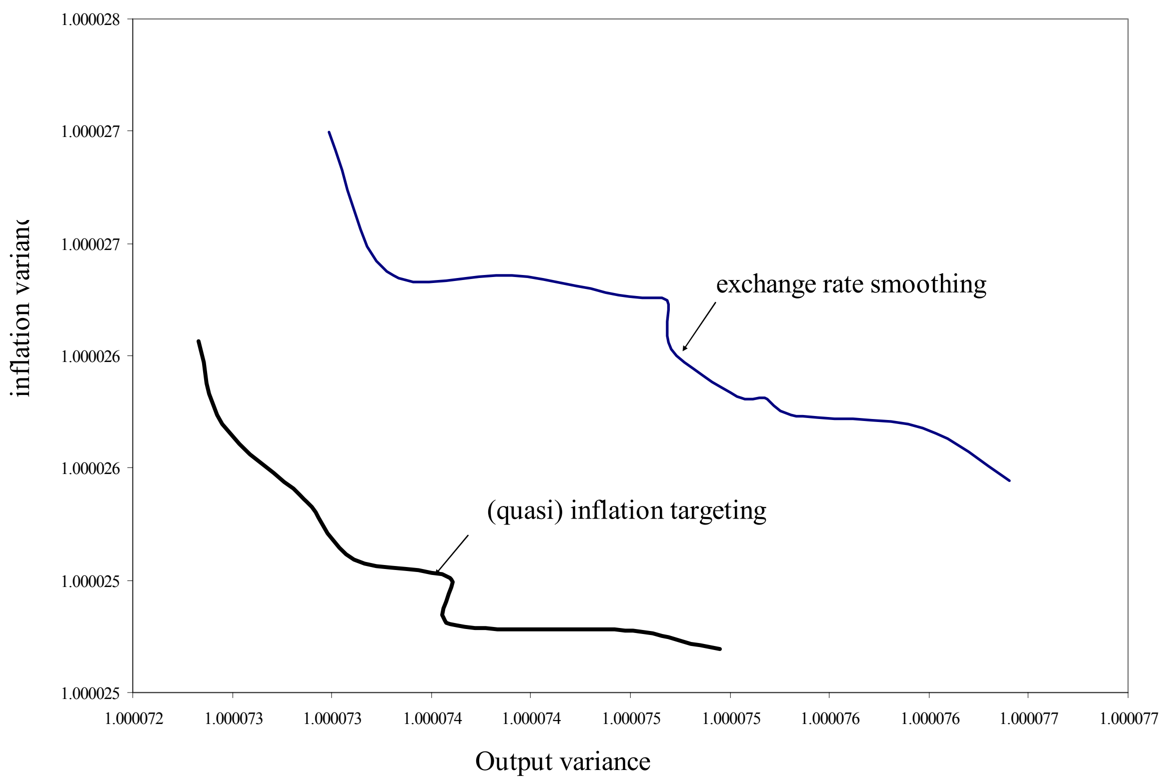
A simulative run shows that under this rule, both output and inflation variation are lower (Table 2, Panel B).[9] And interest rate and exchange rate volatility are also lower. The simulation is again repeated for 30,000 times, and a grid search is conducted to find the smallest combination of output and inflation variance. This frontier is also plotted in Figure 4.

It can be seen that, under the new policy rule, the output inflation trade-off frontier is lower than the one under exchange rate smoothing. This rule clearly delivers a better performance in terms of smaller output and inflation volatility.

[9] The item Δe_{t-1} is included to preserve some semblance to the original rule which also helped to achieve an improved result compared to a rule that only includes inflation and change in output.

The superior performance of the alternative policy rule over the original rule should not be a surprise as it takes into account the impact of policy on output in addition to inflation. The original rule pays extraordinary attention to exchange rate stability, but does not take into account the impact of policy on output and the output's impact on inflation, as it generates higher interest volatility. From this perspective, the existing policy rule, as stylized in the model, appears to be a bit narrowly focused.

Figure 4. Macroeconomic Performance Under Different Monetary Policy Rule



VI. Policy Implications

The results established above have indicated that an alternative monetary policy mix—especially one that does not seek to smooth out the path of the exchange rate—could offer better performance in terms of reducing volatility of output and inflation. However, a few issues need to be addressed before a concrete recommendation could be made for a change in BoJ's operating policy mix.

The first issue is the robustness of the results to alternative empirical model specifications. The estimated model presented here yielded satisfactory empirical results; and theoretical models of similar type based on open-economy inflation targeting have been extensively researched and applied to a broad spectrum of countries. Nevertheless, further tests on the model's robustness need to be conducted when devising actual operating rule for inflation targeting.

The second issue is the sensitivity of the results to changes in agents' behavior when policy rules change. There is an extensive study on rational expectations relating to changes in fiscal policy, but little research has focused on the impact of changes in monetary policy regime on agents' behavior.

The third issue is whether the new policy mix would prevent episodes of destabilizing exchange rate movement from emerging. Destabilizing exchange rate movements tend to occur only after periods of sustained misalignment. In many cases, such misalignments reflect prolonged imbalances in the current account and/or public finances. Under the inflation targeting rule—where the central bank reacts to short-term shocks to the real economy and financial markets with prudently tight policy to achieve the inflation target, the risk of sustained misalignment in the exchange rate is much reduced.

The fourth issue is what type of inflation targeting the BoJ should adopt, and whether conditions are ripe now for the change. Pure inflation targeting may be less appropriate for BoJ given the more stringent institutional and technical requirements.[10] One option seems to be moving to a "soft" inflation targeting regime under which the central bank would seek to adhere to an inflation target *on average*, over the course of a 3–5 year cycle or as a medium-term objective. The latter is also called "inflation targeting lite," as coined by Stone (2003). Experiences of countries that have adopted inflation targeting regimes for a number of years suggest that the public cares about the central bank's average performance over a period rather than its performance in any one year.

The need to tackle fiscal imbalances is of paramount importance regardless of the change in the nominal anchor. As pointed out by Sargent and Wallace (1981), when "the monetary authority is not in a position to influence the government's deficit path," then "without help from the fiscal authorities, fighting current inflation with tight monetary policy must eventually lead to higher future inflation." Inflation targeting would clearly have a greater chance of being successful with significantly improved fiscal balances. The very high financing needs of the government in Jamaica are a constraint for smooth conduct of monetary and exchange rate policy. Notwithstanding fiscal dominance, moving to a more flexibly managed exchange rate would give more freedom to the BoJ in conducting interest rate policy compared to an exchange rate system that is managed relatively tightly.

[10] For example, the BoJ is legally not independent; the CPI index is based on an outdated 1986 basket; and the proliferation of quasi-money (such as money market funds) in recent years has compromised the transmission mechanism of monetary operations.

VII. CONCLUSION

This paper has attempted to measure the effectiveness of a central bank's monetary-exchange rate policy mix in light of its policy objectives. The Bank of Jamaica has been successful in reducing inflation and maintaining a degree of exchange rate stability in recent years. This paper shows that under an alternative monetary policy mix, which pays attention to the policy impact on both inflation and output, it may have been possible to reduce volatility in both variables, and that the inflation volatility could be even lower than under a policy mix that focuses on inflation and exchange rate stability. It seems, therefore, that a case could be made for the BoJ to move to a soft inflation targeting regime.

REFERENCES

Ball, L., 1998, "Policy Rules for Open Economies," Research Discussion Paper 9806 (Canberra: Reserve Bank of Australia).

Bank of Jamaica, 2002, Governor's Press Speech, November 15.

Carare, A., A. Schaechter, M. Stone, and M. Zelmer, 2002, "Conditions in Support of Inflation Targeting," IMF Working Paper No. 02/102 (Washington: International Monetary Fund).

Gerlach, S., and F. Smets, 1996, "MCIs and Monetary Policy in Small Open Economies Under Floating Exchange Rates" (Basel: Bank for International Settlements), November.

Hendry, D.F., 1980, "Econometrics: Alchemy or Science?" *Economica*, Vol. 47, pp. 387–406.

International Monetary Fund, 2002, "The Evolution of Budget Balances and Public Sector Debt," *Jamaica—Selected Issues*, pp. 13–21.

Sargent, J.T. and N. Wallace, 1981,"Some Unpleasant Monetarist Arithmetic," *Federal Reserve Bank of Minneapolis Quarterly Review,* Vol. 5:3, (Fall), pp. 1–17.

Stone, M.R., 2003, "Inflation Targeting Lite," IMF Working Paper No. 03/12 (Washington: International Monetary Fund).

Svensson, Lars, E.O., 2000, "Open-Economy Inflation Targeting," *Journal of International Economics*," 50, pp. 155–83.

Taylor, J.B. 1993, "Discretion vs. Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, Vol. 39, pp. 195–214.