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**CENTRAL BANKING IN A SMALL
OPEN ECONOMY:
POLICY EVALUATION AND
CHALLENGES**

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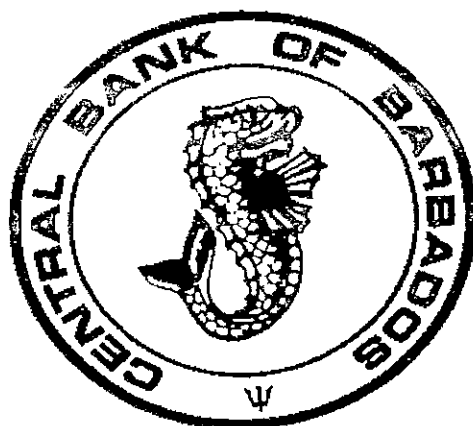
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The authors would welcome any comments on this paper. The views expressed are those of the authors and do not necessarily represent those of the Central Bank of Barbados

Central Banking in a Small Open Economy: Policy Evaluation and Challenges

by

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Central banking in a small open economy: Policy evaluation and challenges

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Abstract

How effective has been monetary policy in Barbados? What are the challenges that confront monetary policymakers in the 21st century? These are the two main questions that this paper explores. The authors stress that monetary policy on its own cannot bring about a lower rate of variation in Barbados' major target variable, the net foreign assets of the monetary authorities. However, an accommodating monetary policy with stringent fiscal policy can reduce the rate of variation in the NFA from its desired level. It is noted that although monetary policy has been relatively successful in its accommodating role, the 21st century could make monetary policy making in the future somewhat more difficult. In addition, with the current trends taking place today in the world economy, the NFA may no longer be an optimal target. Instead, some manner of inflation targeting may be more relevant. However, this would imply that the current fixed exchange rate regime would no longer be sacrosanct.

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1. Introduction

At age 28, the Central Bank of Barbados has been operating for nearly one generation, a period that makes it necessary for a detailed appraisal of the Bank's activities to help give further directions to policy. Like most central banks in the region, the Bank has the primary role of promoting and maintaining a sound/healthy financial system that will be conducive to stable economic growth and balanced economic development in the Barbados economy. This requires the Bank to undertake policies to preserve the internal and external value of the Barbados dollar as well as to play an active and/or catalytic role in the promotion of economic development and the development of capital markets in Barbados. How successful has the Bank been in discharging these functions?

According to a number of researchers the Bank has been quite successful in a number of these areas. Blackman (1997) believes the Bank has "palpably performed its prime function of promoting the island's macroeconomic stability". To support his claim, he cites a number of factors including the relative stability of the Barbados dollar which has remained unchanged for almost a quarter of a century; the relative low rate of inflation, the timely production of the Bank's economic reports, the public trust in the institution and the output and quality of its monetary and economic research which are deemed among the best in the region. Worrell (1997) attributes the operational success to the fact that the Bank has maintained a market-friendly approach to policy from the start.

While the Bank's policies may have played some role towards the success of the macro economy in Barbados, there is a need for a more quantitative assessment of those policies to

ascertain how effective they have been. This study attempts to do that by formulating and testing a policy evaluation model that is applicable to the characteristics of a small open economy with a fixed exchange rate. Such a quantitative assessment will help readers ascertain whether or not monetary policy has a role to play in the maintenance of the exchange rate targeting regime or in the stabilisation of real shocks to output in a small developing country with relatively underdeveloped capital markets. This will hopefully provide a useful guide to the direction of future policy formulation in Barbados.

The paper is structured as follows. Section 2 reviews the literature on policy evaluation and presents the model, which is used to evaluate economic policy in the paper. Section 3 presents the data and an estimation procedure used in the study and gives the results of the empirical investigation. Section 4 builds on the conclusions derived from Section 3 and presents some challenges for central banking in the 21st century. A summary of the findings of the paper is then presented in the final section.

2. Policy evaluation

Research on monetary policy evaluation usually assumes that the central bank has some target variable, which it tries to influence. This target is kept as close as possible to its desired level by use of a policy instrument which responds to developments in the economy. The goal of these studies is to assess whether the use of simple benchmark rules can be used to improve economic performance.

Monetary policy involves a number of rules, traditions and practices which may be jointly called operating procedures. When discussing the operation of monetary policy it is first necessary to identify the instruments, operating targets, intermediate targets and the policy goals. The instruments of economic policy are those variables, which are directly controlled by the Central Bank. In Barbados a number of monetary policy instruments have been used. These include moral suasion, changes in the discount rate, commercial bank reserve requirements, the intervention in the setting of deposit and loan rates, credit limits, interventions at treasury bill auctions, pricing of Government securities to market and purchase, sale and repurchase of treasury bills and other Government securities (Worrell, 1997). These instruments are then influenced to achieve some pre-specified operating target such as commercial bank reserves and rate of interest. Intermediate targets are those variables that fall between operating targets and policy goals. They are usually used to glean some idea of how effective the policy has been in achieving the policy goal, due to the infrequency of observation on the variable of interest. Policy goals are those variables of critical interest to policy makers.

There are four basic types of monetary policy regimes that are in use around the world. These include exchange rate, monetary and inflation targeting regimes along with monetary policy with an implicit, but not explicit nominal anchor (see Mishkin, 1999 for details). Barbados' fixed exchange rate regime can be classified under that of exchange rate targeting. However, exchange rate targeting can also involve the adoption of a crawling exchange rate peg. The fixed exchange rate peg that Barbados has adopted effectively means that the net foreign assets (NFA) of the monetary authorities is the central target of policy makers in Barbados. This is because the

country must ensure that it has an effective level of foreign exchange reserves to maintain the credibility of the exchange rate (see Worrell, et. al. 2000). This implies that the principal role of the central bank should be viewed in terms of its efficacy in the maintenance of adequate foreign exchange reserves. This conclusion can then be combined with the ever-increasing literature on policy evaluation to provide some insights into how effective the policy makers in Barbados have been in attaining this goal.

2.1. Theory

As noted by Taylor (1999) the usual framework used for evaluating monetary policy rules can be summarised in a set of dynamic stochastic equations as given below:

$$y_t = A(L, g)y_t + B(L, g)x + u_t \quad (1)$$

$$x_t = G(L)y_t \quad (2)$$

where y_t is a vector of endogenous variables, x_t the policy variable, u_t is a serially uncorrelated vector of random variables with a variance-covariance matrix of Σ , and $A(L, g)$, $B(L, g)$ and $G(L)$ are matrix polynomials in the lag operator L , while all the parameters of the vector g are included in the matrix $G(L)$. Equation (1) is a reduced form equation from a general equilibrium model while equation 2 provides the policy rule to be examined. Since Equation (1) is made up of lagged values of the target variable and the policy instrument one can substitute Equation (2) into (1) to obtain values for y_t , all that is left to do is to choose the parameters of the policy rule. One can then evaluate an objective function, which depends on the steady state of y_t .

From this simple framework a number of variations have been used to evaluate economic policy internationally. These range from small calibrated models without rational expectations, [see for example, Ball (1997), Rudebusch and Svensson (1998) and Ball (1998)] to large scale econometric models with rational expectations as presented by Taylor (1995), Williams (1997) and Levin, Wieland and Williams (1998) to name a few. Two major conclusions emanated from these studies. First, it was found that simple rules perform nearly as well as the optimal rules. Second, simple rules are generally more robust across models than more complex optimal rules. However, the robustness of these results remains a subject for further research.

2.2. *The model*

This section tries to provide an evaluation of how successful monetary policy has been in maintaining external balance and smoothing-out economic fluctuations compared to fiscal policy. The approach followed in this section is similar to that put forward by Orphanides (1998) who in turn follows that presented by Orphanides and Wilcox (1996), Ball (1997) and Svensson (1997). If monetary policy is used, it is assumed that in every period the evolution of the net foreign assets (NFA) of the monetary authorities and the deviation of credit from its trend (intermediate target) depends on only the previous period's level of NFA and credit. However, if fiscal policy is the dominant instrument used, NFA depends on the previous period's level of NFA and the output gap. The two scenarios are shown below, first for case when monetary policy is the main focus:

$$NFA_t = NFA_{t-1} + \beta \text{credit}_t + \varepsilon_{1t}, \quad (3)$$

and second, if fiscal policy is the main instrument of economic policy:

$$NFA_t = NFA_{t-1} + \beta y_t + \varepsilon_{2t} \quad (4)$$

where y_t is the deviation of actual income from its potential level in period t (commonly called the output gap), NFA_t are the net foreign assets of the monetary authority in period t and ε_{1t} and ε_{2t} are random shocks. The equations presented above imply that the central target of economic policy in Barbados is the NFA of the monetary authorities.

The deviation of credit from trend is then written as a function of itself lagged one period and the difference between actual and desired real rate of interest as shown below:

$$credit_t = \phi credit_{t-1} - \psi (i_{t-1} - i^*) + u_{1t} \quad (5)$$

while the output gap is formulated as a function of the previous periods output gap and the deviation of government's fiscal position (g_t) from its desired level:

$$y_t = \phi y_{t-1} - \psi (g_{t-1} - g^*) + u_{2t} \quad (6)$$

The major advantage of the models presented above is their simplicity. In every period only credit or the output gap and the stock of NFA of the monetary authorities determine the state of the economy. Obviously either of these would not provide a good representation of the short-run dynamics of the economy, however, it is assumed that over a longer period of time, a year for example, the approach should provide a relatively accurate description of the evolution of the economy.

With a simplified model of the Barbadian economy we now state the objective function of economic policy below:

$$\ell = \omega \text{Var}(NFA_t - NFA^*) + (1 - \omega) \text{Var}(y_t / \text{credit}_t), \quad 0 < \omega < 1 \quad (7)$$

Equation (7) shows that the objective of economic policy is to minimise the weighted sum of the unconditional variance of NFA from its desired level and the variance of credit or the output gap depending on whether monetary or fiscal policy is used. The weights reflect the extent to which the policy maker is willing to pursue the goal of NFA stabilisation at the expense of achieving either the stability of output or credit. The solution to the implied constraint minimisation problem is the set of response coefficients λ_{op} and γ_{op} which minimises the policymaker's objective for different possible values of the preference weight (ω) when policies follow the rules as indicated in (8) and (9):

$$i_t - i^* = \lambda_{OP_1}(NFA_t - NFA^*) + \gamma_{OP_1} \text{credit}_t \quad (8)$$

if monetary policy is the main instrument of economic policy or

$$g_t - g^* = \lambda_{OP_2}(NFA_t - NFA^*) + \gamma_{OP_2} y_t \quad (9)$$

if fiscal policy is the main policy tool used. The equations above show that the optimal policy response, the deviation of rate of interests from their desired rate or the deviation of government's fiscal position from its preferred level would be function of the policy makers response to deviations of NFA from its desired level and output or credit stability.

According to Orphanides (1998), the response coefficients expressed in terms of the parameters of the model and the policymaker's weight would be:

$$\lambda_{op_i} = \frac{-\beta\omega + \sqrt{4(1-\omega) + (\beta\omega)^2}}{2(1-\omega)\psi} \quad \text{and} \quad \gamma_{op_i} = \frac{\phi}{\psi} \quad (10)$$

where $i = 1$, for monetary policy and $i = 2$, for fiscal policy. When Equations (3) - (6) are estimated econometrically and arbitrary policy weights are used, this allows one to assess whether policymakers could have reduced the variation in the NFA from its actual value during the sample period.

3. Data, estimation procedures and results

To estimate the model highlighted in the previous section we need six variables; these are the output gap (y), nominal GDP, net foreign assets (NFA), credit, the rate of interest and the overall balance of government operations (g). GDP, NFA, domestic credit and g were obtained from the IMF's International Financial Statistics CD-ROM (September 2000). However, information on the output gap is not as readily available. In addition, there are many difficulties associated the various methodologies used to calculate this variable (see, St-Amant and van Norden, 1997, for a useful survey). Being aware of these difficulties we proceed with one of the most widely used methods in identifying the permanent and cyclical components of a particular time series as put forward by Hodrick and Prescott (1997). The output gap is then calculated as the deviation of actual nominal GDP from its Hodrick-Prescott trend. The rate of interest used is the real minimum savings rate obtained from the Economic and Financial Statistics of the Central Bank of Barbados (August 2000), which is then deflated by the rate of inflation obtained from the International Financial Statistics CD-ROM mentioned above. Some summary statistics for these variables are provided in Table 1. The variables are tested for stationarity using the augmented Dickey-Fuller tests, and the results show that all five variables used in the study are

stationary. As a result, Equations (3) to (6) are estimated using annual values from 1972 to 1999 by the method of ordinary least squares. .

The estimation results of Equations 3 and 5 are given below:

Monetary Policy

NFA Equation

$$NFA_t = 0.99 * NFA_{t-1} - 0.09 * Credit_t \quad Adjusted R^2 = 0.81 \quad (11)$$

(11.89) (-3.94) $\sigma = 0.61 \quad d.w. = 1.71$

Credit Equation

$$Credit_t = 0.63 * Credit_{t-1} - 0.41 * i_{t-1} \quad Adjusted R^2 = 0.47 \quad (12)$$

(4.51) (-2.23) $\sigma = 4.23 \quad d.w. = 1.64$

(t-statistics in parentheses)

However, if economic management is made predominantly through fiscal changes then the model used in the experiment is given below:

Fiscal Policy

NFA Equation

$$NFA_t = 1.10 * NFA_{t-1} + 0.29 * GAP_t \quad Adjusted R^2 = 0.79 \quad (13)$$

(11.48) (3.50) $\sigma = 0.64 \quad d.w. = 1.86$

Output Gap Equation

$$GAP_t = 1.06 * GAP_{t-1} - 1.07 * g_{t-1} \quad Adjusted R^2 = 0.80 \quad (14)$$

(9.30) (-5.95) $\sigma = 0.80 \quad d.w. = 1.58$

(t-statistics in parentheses)

As reflected by the adjusted R^2 for both equations and the standard error of the overall regression, the models seem to explain the behaviour of the Barbadian economy relatively well. In addition, the parameters of the model are all significant at the five percent level of significance. Fulfilling the statistical goodness of fit norms are not the only factors used to assess the adequacy of a model, it is also necessary to see if the models make economic sense.

The NFA equation in the monetary policy scenario, given in Equation (10), shows that the level of NFA is positively related to lagged values of itself, but negatively related to the deviation of credit from its trend. This suggests that changes in the spending power of individuals would be reflected in increased imports or reduced levels of NFA. The credit equation shows that if the policy maker wanted to reduce the level of credit it should raise the real rate of interest, since this would have a negative impact on the deviation of credit from its trend.

The NFA equation in the fiscal policy scenario states that the current period's level of NFA is positively related to both lagged values of NFA and the output gap. This implies that as the economy comes closer to its potential level of output, NFA also increases. This is because as the economy reaches its potential level of output, the performance of the foreign exchange earning sectors reaches their optimal level, which leads to increased levels of NFA. The output gap equation, however, shows that the output gap is positively related to lagged values of itself, but negatively related to lagged values of governments overall fiscal balance. This implies that as the government increases its fiscal deficit the gap between potential and actual levels of real

GDP declines. Thus, we obtain the standard result that if the government wants to stimulate the economy it should increase the fiscal deficit.

With a simple model of the Barbadian economy and the resulting parameters, policy evaluation exercises can now be carried out. However, before this is done, the numerous assumptions that are made in studies of this type are highlighted. It is assumed that the model is correctly specified, while the parameters, policy choices and the stochastic processes of shocks are assumed to be constant over time and known with certainty. In this simple exploratory study the benchmark is the performance of the economy if a number of different weighting schemes had been used. The objective being, to see if economic performance could have been improved over the period and by how much.

Table 2 gives the efficient response parameters that are derived when the estimated coefficients are substituted into Equation (10) and arbitrary policy weights are used. A weight of 0.25, for example, implies that policymakers place more weight on output or credit stabilisation and relatively less weight on maintaining the stability of the NFA. In contrast, a weight of 0.9 indicates that the policymakers place relatively more importance on stabilising the NFA rather than the output gap or credit.

The efficient response parameters derived in Table 2 are then substituted into Equations (8) and (9) to arrive at optimal policy rules. The results derived from the use of these optimal policy rules are then given in Table 3. Table 3 gives the standard deviation of NFA, the output GAP and the deviation of credit from its trend level over the period 1976-1999, if either fiscal or monetary policy rules had been the main instrument of economic policy. A number of

interesting facts can be gleaned from this table. First, it shows that when optimal fiscal policy rules are followed a reduction in the variability of the NFA can be achieved. For example, when greater weight is placed on the stabilisation of NFA, rather than the output gap, the standard deviation of the NFA of Barbados could have fallen to 1.1 compared to 1.3 for the actual data. Second, it is difficult to achieve a lower level of variability of the NFA of Barbados with only the use of optimal monetary policy rules. This is reflected by the fact that even when optimal policy rules are followed, the standard deviation of the NFA falls to only 1.2 compared to 1.3 for the actual data. And finally, in the fiscal policy model if a greater weight is placed on NFA stabilisation instead of the output gap then a lower level of variability of the NFA could have been achieved over the sample period. However, in the monetary policy model if greater weight is placed on maintaining the stability of credit, a lower standard deviation of NFA could be achieved.

It should be noted though that the only way that this lower rate of variation in NFA was achieved in the simulation was through frequent and sometimes large changes in the fiscal position of Government. These changes might not be possible given the fixed nature of most of government expenses. This, plus the relatively small difference between the standard deviation of the actual data and the simulation seems to indicate that policy makers in Barbados have used a mixture of both fiscal and monetary policy. This finding seems to indicate the Central Bank of Barbados has been relatively successful in accommodating the plans of the fiscal policy makers and aiding their goal of reducing the level of fluctuation in the NFA.

4. Towards meeting future challenges

Section 3 of the paper has concluded that the Central Bank of Barbados has performed credibly in its goal of maintaining the exchange rate peg. It was suggested above that the primary focus of instituting policies directed primarily at maintaining the exchange rate peg. There is the likelihood that the Bank would adhere to these policies into the immediate future. But for how long? The rapid pace of technological change which is facilitating the international mobility in goods and capital may force small open developing economies to re-examine some of the thinking that would have guided their choice of the ultimate and/or intermediate targets.

In Section 2 it was noted that Barbados has used an exchange rate targeting monetary regime over the life of the Central Bank of Barbados. There are advantages and disadvantages to the operation of this type of monetary regime. One of the major advantages of fixing a country's exchange rate is that it anchors inflation expectations to that of the anchor country. Moreover, it helps mitigate the time inconsistency problem and it has the additional advantage of simplicity and clarity allowing it to be easily understood by the public (see Mishkin, 1999 for details). However, operating a fixed exchange rate is not without its flaws. First and foremost it results in the loss of monetary policy independence. A country that cannot use monetary policy to influence the domestic economy, especially in the era of large speculative international capital flows and trade liberalisation, is at a serious disadvantage. Since, it is very difficult for a small open economy to have enough resources to defend its currency from speculative attacks from a large international company. For instance, Barbados has maintained some controls on the

movement of capital to and from the country. Its commitments to WTO and her regional trading partners may gradually force the relaxation of these controls.

If the recent removal of surcharges on some imported items is a guide, opening the country up to increased trade competition will pose enormous challenges to the local agriculture and manufacturing base. There is limited scope for the use of some of the strategies allowed under WTO rules. For instance the use of bound rates to protect local manufacturing and agriculture are likely to raise operational costs in the important tourism sector. Apart from the employment impact of a weakening local production base, the sustainability of the external current account balance would be even more threatened as imports surge to replace the products that were originally produced under a regime of domestic protection. In a recent study by Lewis-Bynoe, et. al. (2000) the authors found that even with bound rates sometimes as high as 200% on some agricultural or manufactured products, it was still possible for wholesalers to source products from overseas producers at a cheaper price than from domestic producers. This conclusion could have major implications for the maintenance of the fixed exchange rate peg. Trade liberalisation implies that a country's ability to limit imports can be achieved only through changes in consumer's expenditure. However, manipulating consumption patterns under a fixed exchange rate regime can be difficult, since expenditure reducing monetary policies might put pressure on the exchange peg. This finding implies that in the era of trade liberalisation the exchange rate peg may increasingly come under pressure.

One may argue that increased capital inflows for investment in the tourism and other export service services would strengthen the financial and capital account and thus offset the

deterioration of the current account. That option is also only viable under a regime of low inflation because with the high mobility of international capital, foreign capital will only flow to countries with low inflation.

The focus of central bank policies in the 21st century may therefore have to be directed not only to ensure financial sector stability in an environment of sustainable balance of payments, but to the maintenance of price stability. Indeed the maintenance of price stability may be the overriding focus of central banks in small open economies in the 21st century.

The level of inflation is an important variable followed closely by producers and investors and has become a common target of monetary policy in such countries as New Zealand, Canada and The United States of America. One of the major advantages of inflation targeting is that it allows monetary policy to focus on domestic problems and circumstances, in contrast to exchange rate targeting. In addition, given the impact of inflation on the real side of the economy and investment decisions it adds a level of stability to the economy as a whole.

The operation of an inflation targeting regime has implications for the Bank's operational independence, the exchange rate regimes in which they operate, as well as the choice of instruments for the conduct of monetary policy. One of the key challenges facing central banks in developing countries in the future is how to achieve the degree of operational independence necessary to pursue this important goal of achieving price stability.

Moreover, the impact of the rapid development of the Internet and the emergence of e-commerce and e-banking activities on monetary policy formulation and on prudential supervision cannot be ignored. Already trade in new products such as derivatives are

complicating monetary policy formulation and forcing regulators to rethink the use of traditional instruments for prudential supervision. This is because these new products impart far more uncertainty on the traditional quantity indicators such as monetary and credit aggregates. The wide participation of the populace in such trading activities, made possible by the advent of e-banking facilities could complicate the issues even further. Innovations such as cyber cash and smart cards may lead to a substitution of central bank base money and make the goal of defining and predicting monetary targets even more difficult. Monetary policy making in this setting becomes an impractical task given the reduction in demand for the Bank's liabilities.

5. Conclusions

In this paper a model was constructed to evaluate economic policy making over the life of the Central Bank of Barbados. It was shown that the Central Bank of Barbados, although not able to have a significant impact on the domestic economy on its own, was able, through supporting the current fiscal regime, to maintain the exchange rate peg. However, the paper also put forward the idea that central banking in the 21st century could be even more difficult because the challenges posed by trade liberalisation, and rapid advances in information technology.

In addition, the paper argues that because of these challenges, the current primary focus of policy, which favours the maintenance of the external value of the currency, may need to be modified to include greater consideration for the maintenance of the internal value of the currency.

Table 1

Summary statistics of variables

| | <i>i</i> | <i>NFA</i> | <i>g</i> | <i>GAP</i> | <i>Credit</i> |
|-----------|----------|------------|----------|------------|---------------|
| Mean | -0.90 | 0.93 | 0.16 | 0.02 | -0.78 |
| Median | -0.20 | 0.46 | 0.36 | -0.02 | -2.01 |
| Maximum | 5.27 | 4.68 | 2.16 | 2.98 | 9.63 |
| Minimum | -10.16 | -0.69 | -1.38 | -3.37 | -8.61 |
| Std. Dev. | 4.19 | 1.42 | 1.04 | 1.80 | 5.83 |

Table 2

Efficient response parameters

| | $\omega = 0.25$ | | $\omega = 0.50$ | | $\omega = 0.75$ | | $\omega = 0.95$ | |
|-----------------|-----------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|-----------|
| | γ | λ | γ | λ | γ | λ | γ | λ |
| Monetary Policy | 1.54 | 1.45 | 1.54 | 2.55 | 1.54 | 4.57 | 1.54 | 12.92 |
| Fiscal Policy | 0.99 | 0.50 | 0.99 | 0.81 | 0.99 | 1.26 | 0.99 | 2.24 |

Table 3

Standard deviation of NFA under various policy regimes

| | Fiscal Policy | | Monetary Policy | |
|-----------------|---------------|------------|-----------------|------------|
| | <i>Gap</i> | <i>NFA</i> | <i>Credit</i> | <i>NFA</i> |
| $\omega = 0.25$ | 0.9 | 1.4 | 4.9 | 1.2 |
| $\omega = 0.50$ | 0.9 | 1.4 | 5.1 | 1.3 |
| $\omega = 0.75$ | 1.0 | 1.3 | 5.5 | 1.3 |
| $\omega = 0.95$ | 1.5 | 1.1 | 9.1 | 1.4 |
| Actual | 1.6 | 1.3 | -6.4 | 1.3 |

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