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Preliminary Considerations of an Inflation Targeting Framework for the Philippines [1]

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Abstract

Monetary policy in the Philippines has had multiple objectives. Moreover, shifts in money demand and the money multiplier have made base money a less reliable anchor for monetary policy. Hence, on present policies, a steady reduction in inflation is not assured, and changes to the monetary policy framework should be considered. This paper reviews the benefits as well as the constraints of an inflation targeting framework and the necessary preconditions--both in terms of the institutional infrastructure and the appropriate inflation target--for its successful implementation, including the ability to forecast inflation reasonably well over policy-relevant time horizons.

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SUMMARY

The Philippines' economic performance in the last four years has been commendable, notwithstanding the difficult conditions in late 1997. Nevertheless, important structural problems remain, and as the Philippines prepares for a new era of sustainable growth, it will face many challenges. One of these challenges is to achieve a *lasting* reduction in inflation.

Despite the relatively favorable inflation performance in 1997, it is difficult for the Philippines to achieve and sustain a low inflation environment with the present monetary framework. Supply shocks, shifts in money demand, and the pursuit of multiple objectives within the monetary framework has compromised the inflation objective. In this paper, we explore the option of inflation targeting as a means for the Philippines to achieve a sustained reduction in inflation and to establish its credibility in committing monetary policy to the primary goal of price stability.

Adopting an inflation targeting framework would require a number of changes to the Philippines' monetary policy decision process. The central bank would have to demonstrate a willingness to abandon its practice of targeting multiple objectives. It would have to develop the necessary institutional infrastructure, including defining an appropriate price index and inflation target. In addition, given that the inflation target is proactive, rather than reactive, the central bank must focus on the forecast of inflation at the policy horizon. This implies an increased reliance on forward indicators of inflation and on inflation forecasting models, and continual assessment of the relationship between the instruments of monetary policy and the inflation target. Accordingly, the paper provides a first attempt at developing such a body of information, by highlighting a number of variables that might serve as leading indicators of inflation and estimating an inflation forecasting equation. On balance, we find the Philippines a suitable candidate for inflation targeting.

I. INTRODUCTION

The Philippines' economic performance in the last four years has been commendable, notwithstanding the difficult conditions in late 1997. Growth, which virtually came to a halt in the early 1990s, picked up in 1993 and accelerated steadily to almost 7 percent by end-1996, fueled by an expansion in exports and investment. At the same time, the fiscal position strengthened, inflation was successfully brought down to single digits, and with large capital inflows, particularly in 1996, gross international reserves rose to record levels. This reversal of economic fortunes has not been easy to accomplish and, in fact, is largely the result of major reforms undertaken in the past decade which liberalized the economy and laid the foundation for investment and export-led growth. Nevertheless, important structural problems remain and as the Philippines prepares for a new era of sustainable growth, it will face many challenges. These include fiscal consolidation to raise public savings over the medium-term and reduce the reliance on foreign savings, addressing banking sector vulnerabilities through strengthened supervision and prudential regulations, maintaining low inflation, reducing poverty and improving income distribution.[2] In this paper, we explore the challenge to achieve a *lasting* reduction in inflation.

Traditionally, inflation in the Philippines has been consistently higher and more variable than those of its ASEAN neighbors, mainly because of sharp policy swings, fluctuations in the exchange rate which feed quickly into domestic prices, and supply shocks (Chart 1). Given that high and variable inflation can lead to inefficient resource allocation and lower long-run growth (Fischer 1993), it is desirable that the Philippines lower its average inflation rate to 4–5 percent in the near term and to 2–3 percent over the longer-term. Indeed, with an average annual inflation rate of 9.4 percent between 1991–97, the Philippines can afford to be more ambitious in its inflation objective.

However, despite the relatively favorable inflation performance in 1997, it may be difficult for the Philippines to achieve and sustain a low inflationary environment with the present monetary framework. In the past, in addition to large and volatile supply shocks, shifts in money demand and the pursuit of multiple objectives within the monetary framework have effectively compromised the inflation objective. In short, the Philippines needs to establish credibility in committing to low inflation over the medium-term. There are a number of ways in which this can be achieved:[3]

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[2]Gerson (1997) describes trends in income distribution and poverty rates in the Philippines relative to other ASEAN countries.

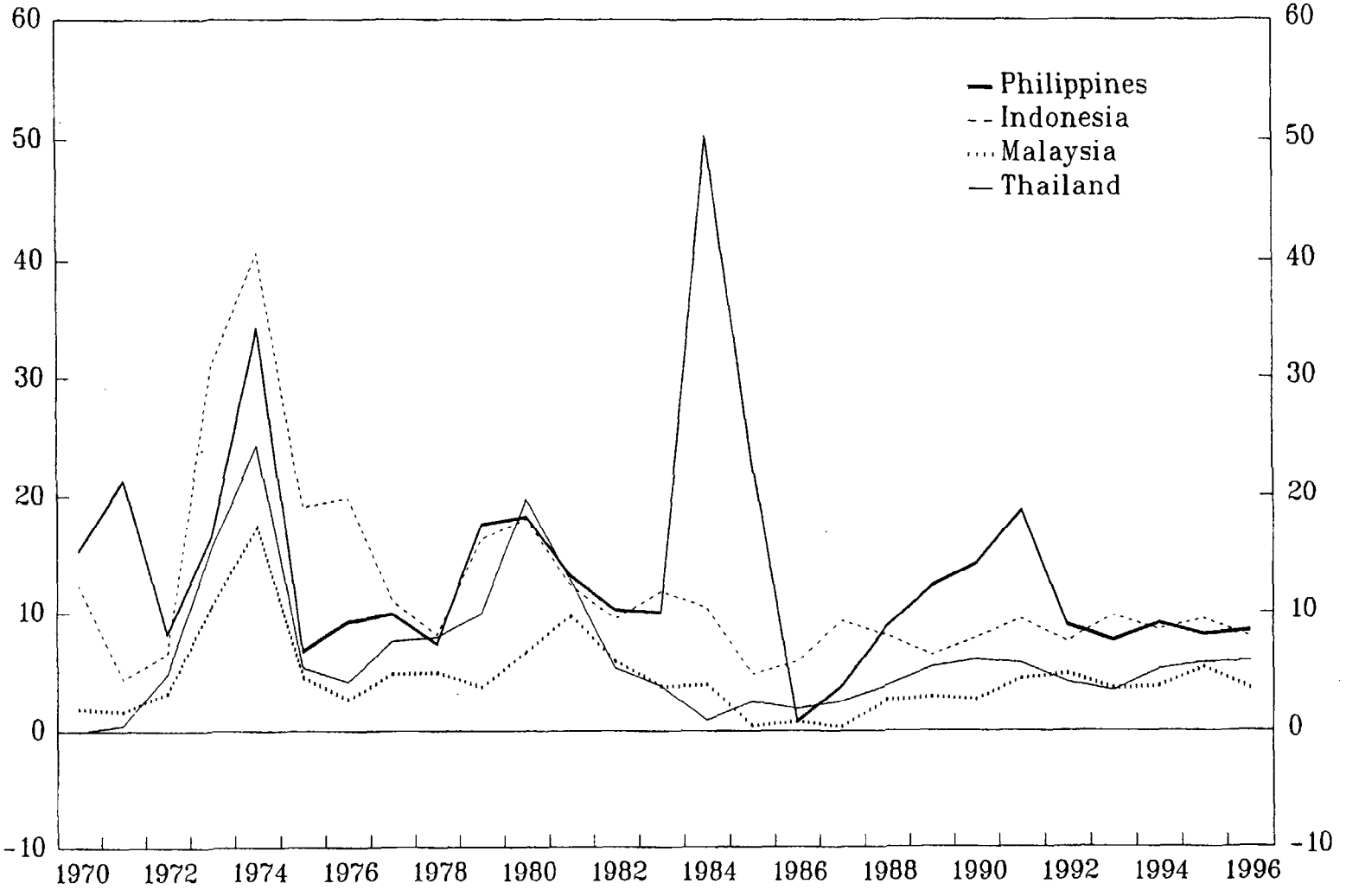
[3]Houben (1997) reviews in more detail the merits of three monetary strategy options for the Philippines: stricter adherence to a money supply rule, adoption of an exchange rate peg, and a switch to direct inflation targeting.

CHART 1

PHILIPPINES

CPI Inflation, 1970-96

(In percentage change)



Source: IMF: International Financial Statistics.

- adopting a fixed exchange rate peg. Between end-1995 and July 1997, the central bank effectively kept the exchange rate fixed against the dollar. Although an exchange rate anchor seems an attractive option given the openness of the Philippine economy, it is vulnerable to speculative attacks as evidenced during the recent regional currency turmoil. This and the relatively low level of reserves in the Philippines (US$10 billion) preclude the use of a tight peg as a viable option at the present time.

- maintaining the current monetary arrangement, which incorporates a feedback rule for inflation. Under this arrangement, base money targets are adjusted upward by the amount that international reserves exceeds programmed levels as long as inflation stays within a targeted range. If year-on-year inflation in the previous month exceeds the targeted rate by 1 percentage point or more, the adjustor will be capped at the previous month's level. This approach, however, is vulnerable to money demand instability, particularly at a time when the Philippine economy is undergoing significant changes in financial intermediation.

- adopting an inflation targeting framework. This approach provides a reference point against which the central bank can enhance its credibility in committing to low inflation. It provides a transparent anchor to wage and price-setting as well as to monetary policy decisions, and it does not need to be adjusted as frequently as a monetary growth target in the presence of shifts in the money demand function.

In this paper, we explore the option of inflation targeting as a means for the Philippines to achieve a sustained reduction in inflation and to establish its credibility in committing monetary policy to the primary goal of price stability. Nevertheless, while an inflation targeting framework may help the central bank overcome the problems of supply shocks and money demand instability, it will not provide an immediate solution to the problem of multiple objectives. Although moves to reform the central bank in the early 1990s have provided it with instrument independence, a crucial requirement is the willingness to abandon its practice of targeting multiple objectives.

The paper is organized as follows. Section II reviews the present monetary policy framework in which base money targets are nominal anchors. It notes the problems encountered in adhering to these targets in the past. Section III discusses the inflation targeting framework, analyzing in some detail its benefits as well as constraints for promoting price stability over other nominal anchors. Section IV outlines the preconditions of institutional infrastructure necessary for successful implementation of inflation targeting; in particular, the independence of the central bank and the appropriate definition of the inflation target are discussed. Section V develops a set of leading indicators of inflation using bivariate Granger-causality tests and variance decompositions. The impulse response functions of these indicators are reported, together with an estimated reduced-form inflation forecasting equation. Section VI concludes by drawing some policy implications from the empirical findings.

II. Current Monetary Framework

Following the debt crisis in late 1983 and the subsequent move to a floating exchange rate regime in October 1984, monetary policy in the Philippines has been anchored, in

principle, to base money targets. Base money targeting was introduced in an attempt to bring down inflation, which had soared to over 50 percent in 1984. Inflation was quickly reduced to single digits after monetary policy was tightened. However, monetary policy was later relaxed and base money targets, which were announced ever since, were rarely met until 1996. This was mainly because monetary policy was used to pursue multiple objectives, although shifts in money demand during this period also contributed to missing the monetary targets. In particular, there was a tendency to reduce interest rates both to stimulate growth as well as to maintain a competitive exchange rate even at the risk of compromising the inflation objective. The monetary targets were frequently breached as the central bank intervened to purchase foreign exchange originating from unexpected capital inflows.

From the mid- to late 1980s, the central bank's financial position was severely weakened by significant losses from defending the overvalued peso during the debt crisis and later by large-scale operations to rescue failing domestic banks affected by the sharp downturn in economic performance. This restricted the central bank's ability to conduct effective monetary policy, and in 1993, the central bank was restructured and recapitalized. Under the new Central Bank Charter (RA 7653), renewed focus was given to promoting price stability. Base money targets were kept (in the 1994 EFF program) but an inflation feedback rule was incorporated into the program in order to ensure the inflation objective was met; under this approach, base money targets were adjusted upward by the amount that international reserves exceeded expected levels as long as inflation stayed within a targeted range. However, in mid-1995, interest rates were steadily lowered in reaction to capital inflows, until they, coupled with a drought-induced food price shock, helped push inflation to double digits. Inflation remained at these high levels before tight monetary policy in 1996 and the easing of food prices reduced inflation to single digit levels by end-year; in the first few months of 1997 annual inflation fell to less than 5 percent but picked up in late 1997, given the sharp depreciation of the peso since July.

Despite the recent success in reducing inflation, the Philippines has had a poor track record on inflation. Although part of this problem stemmed from the vulnerability of the inflation rate to supply shocks—food makes up 59 percent of the consumer price index—a significant part was also due to the sharp swings in monetary policy resulting from the pursuit of multiple objectives. Two conclusions can be drawn here. First, careful consideration is required to choose the appropriate price index. Over time, however, this would prove to be less of a problem as the weight of food in the index will gradually decline. In fact, the weight will be revised downward to 49–50 percent in 1998 on the basis of the results of the 1994 Family and Expenditure Household Survey. Second, there has been no transparent anchor of inflation expectations given the difficulty in determining the primary goal of monetary policy. Furthermore, the relationship between the intermediate monetary target and the level of prices and real output has become increasingly obscured as shown by a number of studies on money demand in the Philippines (Stone (1995); Goldsbrough and Zaidi (1989); see also Appendix I). The instability of money demand makes it difficult to establish the level of monetary growth that is consistent with the final inflation objective. Hence frequent adjustments of the intermediate monetary target would be required to ensure the inflation objective was met.

Given the problems inherent in the current arrangement, should an alternative framework, such as a formal exchange rate peg or inflation targeting, be adopted? An exchange rate peg, as noted above, is vulnerable to speculative attacks. Moreover, as long as

inflation remains volatile and financial confidence remains sensitive to price developments, it would be important to retain the option of exercising direct control over the money supply which is not possible with a fixed exchange rate. In this context, the inflation targeting framework would be a preferable alternative as it allows a broad set of indicators, including money, to be monitored. Of course, adopting this approach is not without cost as the Philippines would need to establish the appropriate institutions and policy framework before considering a move toward inflation targeting.

III. AN INFLATION TARGETING FRAMEWORK [4]

An inflation targeting framework has been adopted in a number of developed countries in recent years after unsatisfactory experiences with alternative monetary frameworks, including monetary targeting and exchange rate targeting. An inflation target can circumvent some of the problems associated with other intermediate targets by focusing directly on the primary goal for monetary policy, namely price stability. This advantage, however, may be offset by a lack of a stable relationship between the instruments of monetary policy and the inflation target.

A. Advantages of Inflation Targeting

The countries which have adopted inflation targets had, in the past, been perceived to lack credibility in their desire to achieve low inflation. The inflation target can help address this problem by providing a reference point against which the central bank can enhance its credibility. The inflation target serves to confirm the central bank's commitment to low inflation in the eyes of external observers. This commitment may not be so explicit when the central bank pursues an intermediate target, where the link between the intermediate target and the inflation objective may be imprecise and variable. If the central bank pursues the strategy of examining a wide range of indicators (the "check-list" approach), the inflation target can serve as a focal point for assessing the information provided by the indicators.

In the Philippines, the Central Bank Act (1993) defines price stability as the primary goal for the central bank. An inflation target can translate this goal transparently into the central bank's day-to-day operations. It would provide a constant focus for monetary policy decisions. In effect, an inflation target specifies the reaction function of monetary policy such that monetary policy reacts to the difference between the inflation target and the forecast of inflation (at the appropriate policy horizon). Policy changes may be more easily conveyed to the public if they are made in relation to an explicit inflation goal, rather than a more nebulous monetary target. This is true in the Philippines where the inflation target range rather than the monetary growth rates are announced to the public.

A credible inflation target also serves as an anchor for wage and price-setters in the economy. Because of the lack of transparency in the implementation of monetary policy in the past, price-setters in the Philippines have not had a reliable mechanism for anchoring their

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[4]There is an extensive literature on inflation targeting and on the experiences of the countries that have adopted the framework. Masson, Savastano, and Sharma (1997) studied the possibilities of extending the framework to developing countries.

inflation expectations. Initially, there may be some slippage, while the central bank is establishing its commitment to the inflation target, but the target should soon become a reference point for forward-looking expectations. Again, the central bank's emphasis on an explicit inflation target may serve as a better focus for wage and price-setting than an intermediate money or exchange rate target.

An inflation target has an advantage over other potential intermediate targets for monetary policy in that once specified, it should not need to be revised frequently. A monetary growth target on the other hand may need to be revised periodically, as there are shifts in the money demand function that lead to a change in the relationship between monetary growth and the price stability goal. In focusing directly on the final objective, an inflation target sidesteps this problem.

The main advantages of an inflation target, therefore, are that it provides a transparent anchor to both wage and price-setting and to monetary policy decisions, and it does not need to be adjusted frequently.

B. The Constraints of Inflation Targeting

An inflation target needs to be forward-looking, to take account of the potentially long lags between monetary policy changes and their effect on inflation. Thus, in practice, monetary policy should respond to any deviation between the inflation target and the inflation forecast at the policy horizon. Consequently, there needs to be sufficient information to be able to produce a reliable forecast of inflation. Furthermore, the forward-looking nature of an inflation target introduces greater uncertainty into the policy decision, than adherence to a exchange rate rule or a monetary growth rule. Thereby, inflation targeting permits more discretion on the part of the central bank. On the other hand, however, rigid adherence to a particular rule may constrain needed flexibility in responding to changing economic circumstances. The possibility of instrument instability can be addressed by appropriately defining the band-width and central point, and by specifying limited escape clauses for supply shocks.

There must be a reasonably stable relationship between the instruments of monetary control and the inflation target for the inflation targeting framework to be successful. Knowledge of the relationship between instruments and outcomes is obviously vital for any monetary policy strategy. However, an inflation target requires continual assessment of the relationship whereas alternative strategies such as monetary targeting may only require an infrequent reassessment of the relationship between the monetary target and the policy goal.

The central bank must also have an instrument of monetary policy at its disposal that can be used to pursue the inflation target without any other constraints. In the Philippines, the central bank relies primarily on changes in its overnight and short-term interest rates (reverse repurchase agreements) to adjust the stance of monetary policy. It also has, on occasion, used liquidity reserve requirements to siphon excess liquidity from the system, most recently between August and September 1997.

A significant complication of inflation targeting for the Philippines is its ability to respond to large and potentially volatile capital inflows. Adherence to an inflation target

implies that any exchange rate goal is secondary to the achievement of the desired inflation outcome. Whether a conflict arises between an exchange rate goal and the inflation goal would depend on the nature of the capital inflows. If the inflows were temporary, sterilized intervention to maintain exchange rate stability should not compromise the inflation target. However, in the face of more permanent capital inflows, maintenance of a constant nominal exchange rate would either be too costly (if there was sterilized intervention), or would lead to inflation (if there were not).

In the long run, it is likely to be preferable not to resist appreciations in the nominal exchange rate, if capital inflows reflect improved fundamentals.[5] The improved fundamentals suggest the need for a long run real appreciation which would be better achieved by nominal appreciation rather than an increase in domestic inflation. Allowing the nominal appreciation up-front would assist the maintenance of low inflation and obviate the need for a costly disinflation at a later date to sustain the inflation target.

In practice, it may be difficult to distinguish between temporary and permanent capital inflows, and hence between preventing or allowing appreciation. Furthermore, allowing an appreciation up-front could potentially lead to nominal exchange rate overshooting with adverse consequences on the current account. An inflation target, however, simplifies this decision by emphasizing inflation as the primary goal ahead of exchange rate stability.

IV. Preconditions for an Inflation Targeting Framework

There are two main components of an inflation targeting framework which would need to be in place in the Philippines for the framework to operate successfully. They are establishing the necessary institutional infrastructure to underpin the independence of the central bank in its conduct of monetary policy, and defining an appropriate price index and inflation target.

A. Instrument Independence

A fundamental requirement of an inflation targeting framework is that the central bank has the ability to pursue the inflation target without any political interference, that is, that the central bank have "instrument independence."[6] Such a requirement is necessary in any monetary policy framework but it is particularly essential in an inflation targeting framework, which permits greater discretion in the conduct of monetary policy.

The central bank must be able to set its instruments of monetary policy with a primary focus on the inflation target. For example, the central bank should not be required to finance the budget deficit, nor seek to attain low interest rates on public debt, nor attempt to maintain a particular nominal exchange rate. There should be no political pressure on the central bank to increase the rate of economic growth in a manner inconsistent with the achievement of the

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[5]For more details on the appropriate response to capital inflows, see Haque, Mathieson, and Sharma (1996).

[6]Debelle and Fischer (1994).

inflation target. Once the government has agreed to the inflation target there should be no pressure, for example, on the central bank to accommodate fiscal policy slippages. Measures that have been taken in other countries to safeguard the independence of the central bank include: the appointment of the central bank governor for a term greater than the length of the political cycle; the appointment of a central bank board with overlapping terms of a similarly long length; and the absence from the central bank board of any person holding public office.

To counterbalance this degree of independence of the central bank, there needs to be a sufficient degree of public accountability. In a number of the countries that practice inflation targeting, this accountability has taken the form of the regular publication of the central bank's assessment of present economic conditions and future prospects for the economy in the central bank's bulletin, which may include the publication of the central bank's inflation forecast. Regular testimony by the central bank governor before parliament has also been instituted in a number of countries. A further measure that serves to increase accountability and enhance the credibility of the framework is for the central bank to announce changes in the stance of monetary policy immediately when they occur, and to explain the changes in terms of the expected impact on the inflation target.

The 1993 Central Bank Charter of the Philippines established many of these foundations for an inflation targeting framework. It established an independent central monetary authority with full fiscal and administrative autonomy, allowing the central bank to exercise instrument independence as described above. Furthermore, the Charter specifies the primary objective of the central bank as maintaining price stability conducive to the balanced and sustainable growth of the economy. This is interpreted operationally as pursuing low inflation. In this context, the central bank has consistently issued press statements announcing its inflation target, which is usually defined within a range, for the year.

Nevertheless, a number of institutional arrangements that would support an inflation targeting framework are absent from the Charter. In particular, the Governor, including some members of the Monetary Board, are appointed for a six-year term, exactly the length of the political cycle; of the seven-member Board, one position is designated to a Cabinet member, whose objectivity may be compromised by its public office.

Finally, in nearly all country cases, the inflation targeting framework has been endorsed by the government, rather than been unilaterally imposed by the central bank, and has therefore served to increase the credibility of the framework. Such a government endorsement would also benefit an inflation target in the Philippines.

B. Defining the Inflation Target

The definition of the inflation target needs to address such issues as the appropriate measure of inflation to target, the list of shocks that may permit the temporary suspension of the target, the choice of a target band or a single point, and the level of the target.

The inflation target may be specified in terms of a "headline" or an "underlying" rate. The headline rate is calculated on the basis of the entire consumption basket of the consumer price index. Alternatively, it may be more appropriate to define an underlying rate which excludes components of the headline index that are subject to short run shocks—such as

seasonally volatile food prices—that should not precipitate a change in the stance of monetary policy. The Philippines has always used the headline inflation rate in its monetary program and for public announcements. In the estimations below, the headline inflation rate was employed mainly because very disaggregated data needed to calculate an underlying rate was not readily available prior to 1993. Our results suggest that the headline inflation forecast is subject to a relatively wide margin of uncertainty. Nevertheless, as the weight of volatile food components in the CPI basket is reduced over time—the weight will decline to 49–50 percent in 1998—the inflation target can be made with increasing reliability on the basis of the headline inflation rate, which is more popularly known. However, as an operational matter, the central bank may wish to focus on a measure that excludes volatile items. One possibility is to target the median inflation rate or a trimmed mean, which excludes the most volatile price movements[7] in a given period.[8] The central bank has in fact developed these underlying inflation series back to 1993, on a monthly basis.

To preserve the integrity of the inflation target, any components of the CPI which are to be excluded should be specified ex ante rather than ex post. This could take the form of a list of "caveats" which specify certain shocks which induce an adjustment to the target inflation rate. These shocks might include natural disasters, large changes in the terms of trade or indirect tax changes. The extent to which the target inflation rate is adjusted in response to these shocks should also be pre-specified in as much detail as possible. For example, one can calculate the impact of a terms of trade shock by examining the import-content of the CPI basket, and the degree and timing of the pass-through from foreign prices to domestic prices.

In the Philippines, the target could either be set to maintain the current rate of inflation, or a timepath for a gradual reduction of the inflation rate could be specified. Empirical research has generally failed to identify any significant economic costs from inflation rates similar to the current rate.[9] However, the possibility of slippage to higher rates of inflation that do have significant economic costs suggest that an inflation target in the short to medium term of around 4–5 percent may be appropriate. In the longer term, this target could be reduced to 2–3 percent.

The inflation target can either be specified in terms of a target band, or a single point. The advantage of specifying the target in terms of a band is that it clearly defines what the central bank is aiming for, and provides a conclusive benchmark against which the performance of the central bank can be assessed. It clearly delineates the central bank's tolerance for variation in the inflation rate.

There are, however, also a number of disadvantages in specifying the target as a band. Firstly, it may not be possible to maintain inflation within a narrow band, even with optimal monetary policy, because of the size of shocks that hit the economy, and because of the lag in

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[7]Say the top and bottom 10 percent of the distribution of price changes.

[8]Another option is to use the price index for Metro Manila where the weight of food in the consumption basket is lower.

[9]Sarel (1996) finds little impact on economic growth of inflation rates below 8 percent.

the effect of monetary policy in responding to those shocks. To some extent, this threat is reduced by the specification of appropriate "caveats" (described above) or focussing on an underlying rate. Nevertheless, empirical analysis in industrial countries suggests that an appropriate bandwidth may be as much as 5 percentage points.[10] In the Philippines, the historical volatility of the inflation rate suggests that the band would need to be at least this wide. Specifying such a wide bandwidth would likely not serve to increase the credibility of monetary policy.

Secondly, attempting to maintain inflation within too tight a band may induce instability in the instrument of monetary policy. That is, excessively large and frequent changes may be needed as the economic outlook changed. Also, to the extent that changes in the exchange rate impact on the inflation rate with a relatively short lag, large swings in the exchange rate induced by these changes may prove damaging to the traded-goods sectors.

A third disadvantage is that in specifying a band, wage and price setters may focus on the band ceiling, rather than the centrepoint, when forming their inflation expectations. Over time this problem should diminish as experience with inflation targeting increased, but specifying the target as a single point provides a clear focal point for expectations.

The trade-off involved between defining the target as a band or a point is that between the credibility loss of breaching the target band occasionally (even with ex ante optimal monetary policy), and the potential credibility gain from specifying a tight hard-edged target band. A target point may make it difficult to assess the performance of the central bank in the short run, and hence decrease the credibility bonus of the inflation target.[11]

V. Forecasting Inflation

A. A Model of Inflation

Unlike a monetary or exchange rate target which only require that the current monetary aggregate or exchange rate is monitored, an inflation target must be forward-looking. This is necessary because of the relatively long lags between changes in the instrument of monetary policy and the effect on inflation. Consequently, a model of the inflation process is required, to provide a forecast of inflation which can be compared to the inflation target at the policy horizon. In this section we develop a simple model of inflation in the Philippines.

We assume that consumer price inflation in the Philippines (π) is a weighted average of domestic inflation π^d and imported inflation π^m, with α as the share of imported goods in the consumer price index:

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[10]See Haldane and Salmon (1995) for the United Kingdom, Debelle and Stevens (1995) for Australia, and Turner (1996) for New Zealand.

[11]In the experience to date in the industrial countries that have adopted an inflation targeting framework, the choice of a band or a single point does not seem to have had any significant impact.

$$\pi_t = (1-\alpha)\pi_t^d + \alpha\pi_t^m \tag{1}$$

The price of imported goods is equal to the exchange rate times the foreign price level, so that imported inflation is equal to the change in the exchange rate plus the foreign inflation rate:

$$\pi_t^m = \Delta e_t + \pi_t^f \tag{2}$$

Domestic inflation is determined by the standard expectations-augmented Phillips curve:

$$\pi_t^d = \pi_t^e + \beta(y_t - y_t^*) + u_t \tag{3}$$

where y is the level of output, y* is the level of potential output and π^e are inflation expectations (which may be approximated by lags of the inflation rate). The output gap (y-y*), in turn, is determined by lags of interest rates (the instrument of monetary policy) and real exchange rate changes:

$$y_t - y_t^* = C + A(L)i_t + B(L)(\Delta e_t - \pi_t) + v_t \tag{4}$$

Substituting equations (2) and (3) into equation (1) results in a model where inflation is a function of the output gap, exchange rate changes and foreign inflation. Monetary policy influences inflation through the impact of interest rates on the output gap, and the exchange rate on inflation and the output gap. Solving for π yields:

$$\pi_t = c_0 + c_1(y_t - y_t^*) + a(L)\pi_t + b(L)\pi_t^f + d(L)e_t + \epsilon_t \tag{5}$$

The inflation forecast, however, need not be solely derived from a model; at times, there may need to be a large degree of judgement in forming the inflation forecasts, particularly when full understanding of the structural economic relationships is not known with certainty. In this case, a large number of economic indicators may be monitored to provide additional input to the inflation forecast. This approach is particularly useful when the economy is subject to large structural changes, as in the Philippines. Typically, the multiple-indicator approach depends on the estimation of a series of vector autoregressions (VARs) which identify a set of indicators that has predictive information on inflation on the basis of tests of Granger-causality, variance decompositions and impulse responses. The bivariate Granger-causality tests provide information on the leading indicator properties of the variables tested; the forecast error variance decompositions measure the proportion of the variance of inflation that is explained by the variance of the indicator variable and the impulse responses assess whether the

indicator variables contain information about inflation sufficiently far into the future to be operationally meaningful. The estimated bivariate VAR equations are of the form:

$$\begin{aligned} \Delta X_t &= \alpha(L)\Delta X_{t-1} + \beta(L)\Delta Y_{t-1} + sd1 + sd2 + sd3 + \epsilon_t \\ \Delta Y_t &= \alpha(L)\Delta Y_{t-1} + \beta(L)\Delta X_{t-1} + sd1 + sd2 + sd3 + \eta_t \end{aligned} \qquad (6)$$

where X is the target variable or the price index in this case, Y the indicator variable and sd1, sd2 and sd3 are seasonal dummies included to take account of seasonality effects.

B. An Empirical Estimation: Leading Indicator Properties and an Inflation Equation

A pre-condition of a successful inflation targeting framework, as noted above, is the ability to forecast inflation reasonably well over policy-relevant time horizons. We follow two approaches in forecasting inflation. First, we assess the predictive content of a wide range of financial variables using VAR analysis as shown in equation (6). Second, we estimate an inflation equation along the lines of equation (5).

Since the headline inflation rate is used in the following estimations, pending the construction of a more satisfactory price index, the empirical results reported below are purely of an illustrative nature. The sample period was from 1983q1 to 1996q4 for all equations except those for base money and stock prices which were estimated from 1988q1 to 1996q4. All variables are in logarithm form except for interest rate variables. ADF tests show the CPI and the levels of the indicator variables to be I(1). Hence, inflation and the first differences of the indicator variables are assumed to be stationary.

(1) Leading indicators of inflation

To test the predictive content of various economic variables for inflation, likelihood-ratio tests were carried out for the null hypothesis that the indicator variable does not Granger-cause inflation. Table 1 reports p-values for lag lengths 1 to 8. The set of indicator variables (Y in equation (6)) are the output gap (OUTG), the peso-U.S. dollar exchange rate (FX),[12] broad money plus foreign currency deposits (M4), broad money (M3), base money (BaseM), the U.S. inflation rate (USINF), the 91-day Treasury bill rate (91-TBILL), the 364-day Treasury bill rate (364-TBILL), the differential between the 91-day Treasury bill rate and the
3-month SIBOR (RDIFF) and stock prices (PSEINDX) (see Appendix II for a detailed description of the variables). Tables 1–2 report the results obtained and Charts 2–3 plot the respective impulse response functions.

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[12]The output gap measures the deviation of potential output from actual output, where potential output is derived from the Hodrick-Prescott filter. An increase in the exchange rate implies a depreciation of the peso vis-à-vis the U.S. dollar. Hence, the expected signs of OUTG and DFX are positive.

CHART 2

PHILIPPINES

Orthogonalized Impulse Responses of Inflation to One Standard Deviation Shock

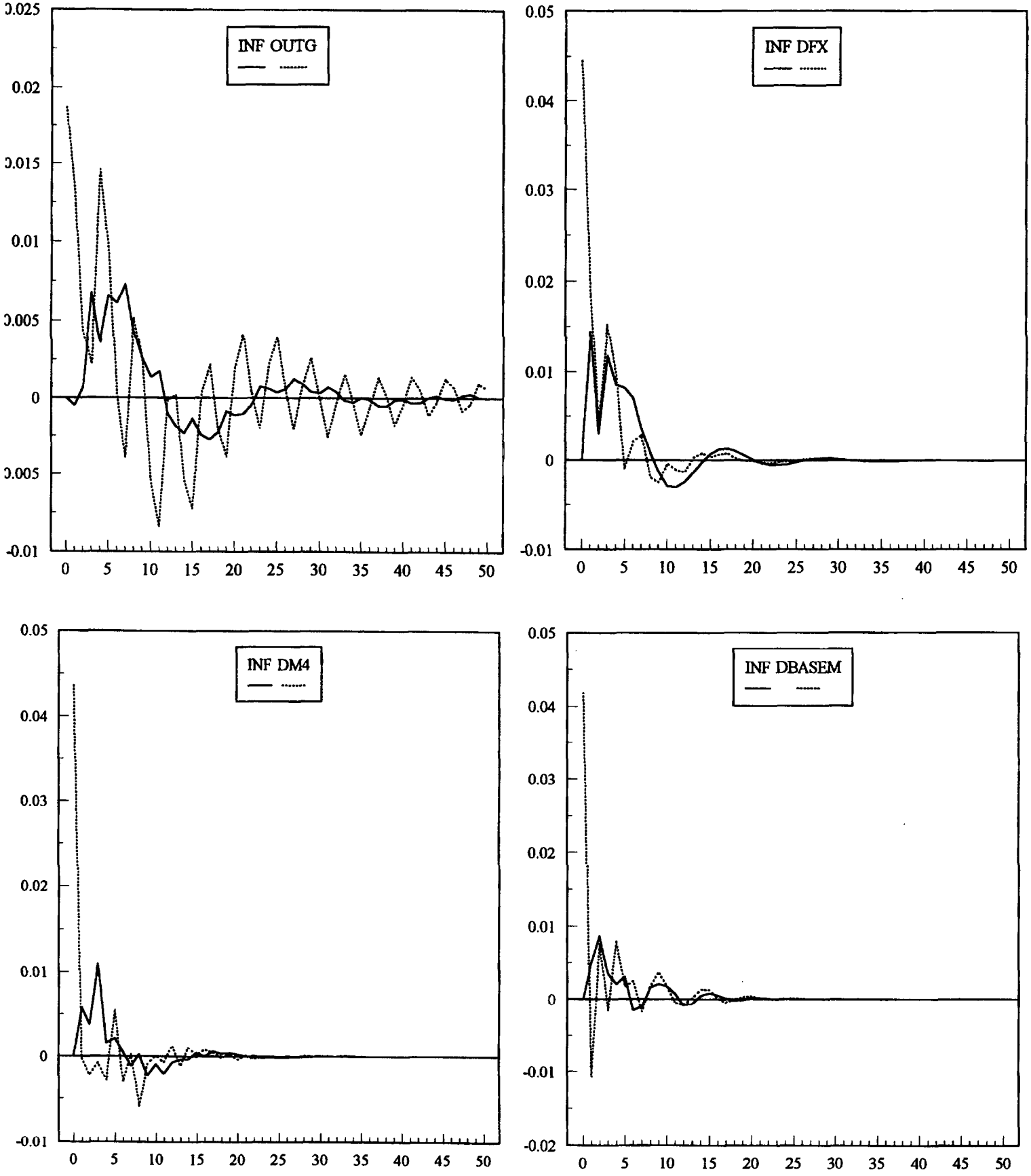
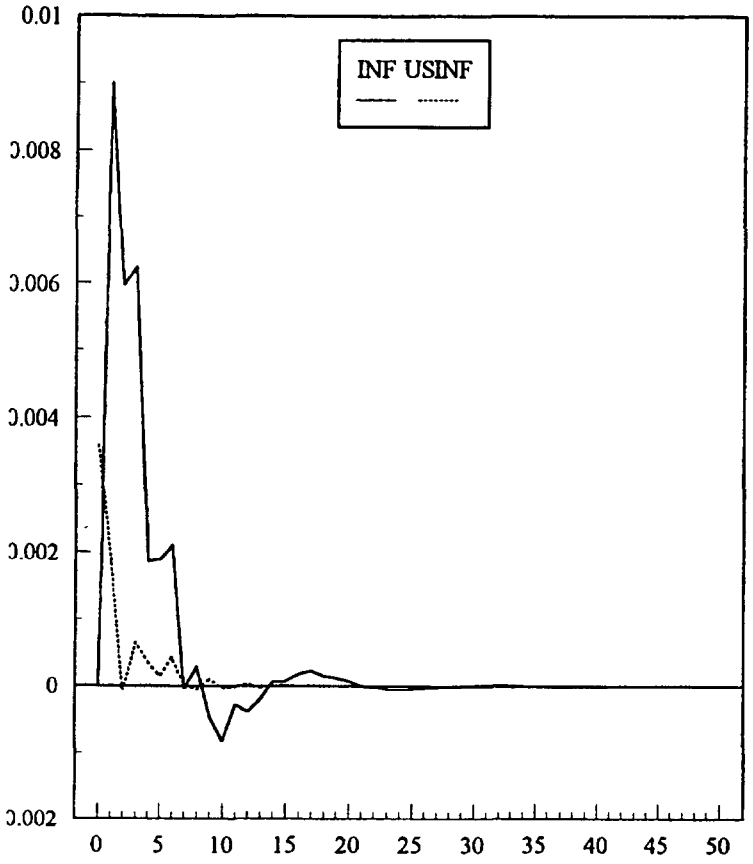
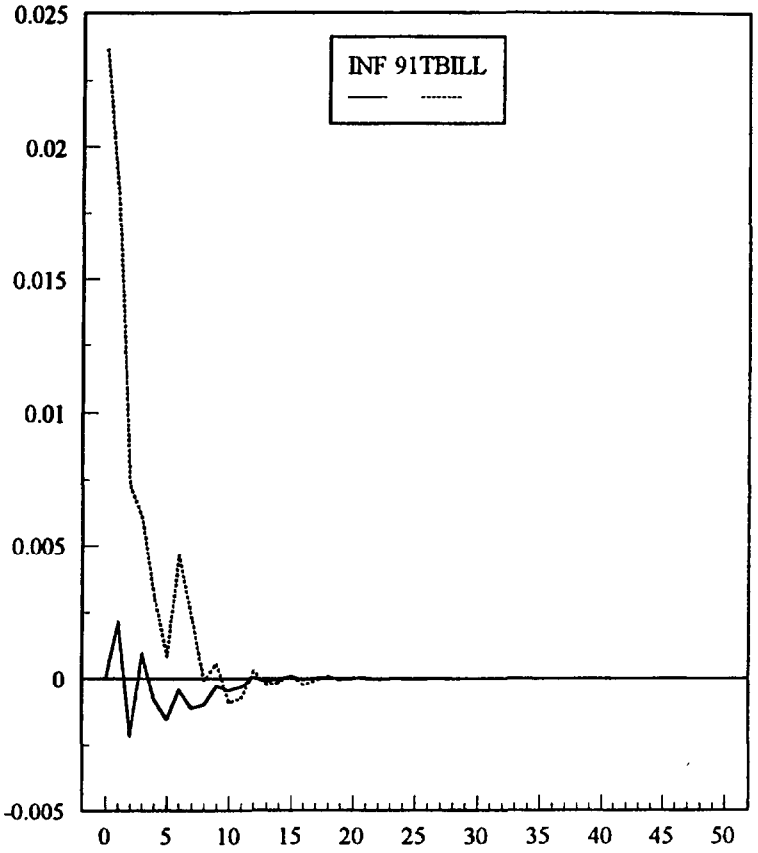


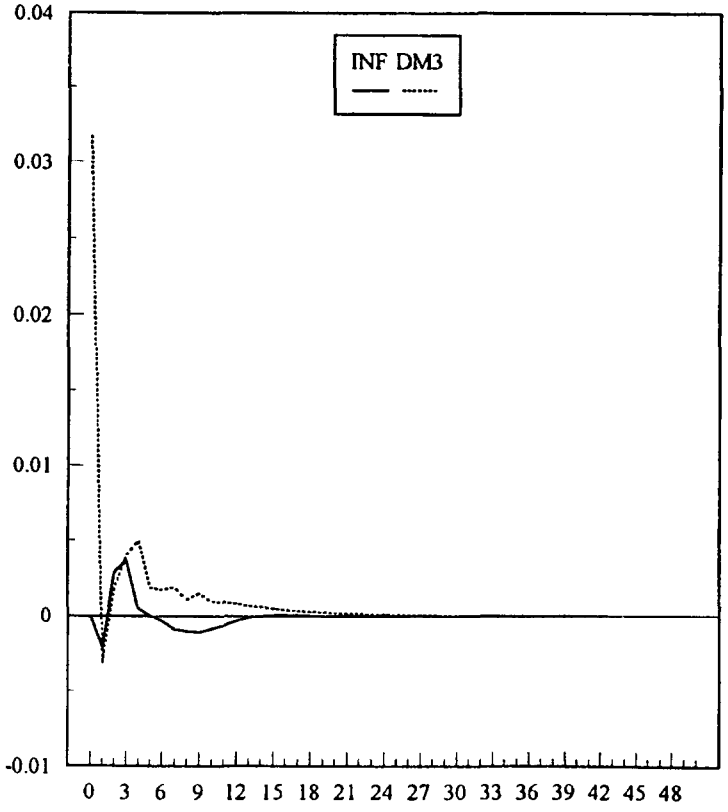
CHART 3

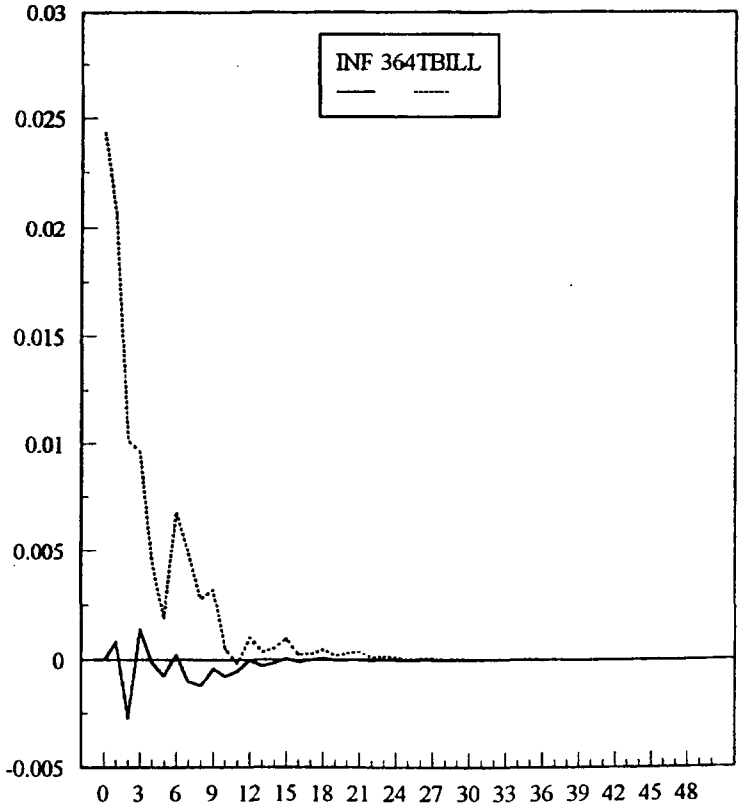
PHILLIPINES

Orthogonalized Impulse Responses of Inflation to One Standard Deviation Shock









The output gap, changes in the exchange rate, base money growth, M4 growth and the U.S. inflation rate have a high degree of predictive content on inflation. The level of interest rates and the differential between the 91-day Treasury bill rate and the 3-month SIBOR has some predictive content, but mostly in the initial lag lengths. Stock prices and M3 growth appear to have little predictive information. There is some evidence that the interest rate variables contain predictive information on inflation in more recent years; Granger-causality tests from 1988 shows a rejection of the null for the levels of interest rates as well as for the interest rate differential.

The variance decomposition results support the Granger-causality findings. The variance of changes in base money explains a significant proportion of the variance in inflation, rising quickly from 20 percent in the first quarter to more than 50 percent by the end of one year. Changes in the exchange rate and the output gap are also good predictors, accounting for close to 40 percent and 14 percent of the forecast variance of inflation, respectively. Furthermore, the pass-through effect of changes in the exchange rate on inflation is relatively fast, as shown by the large forecast variance in the first quarter. The U.S. inflation rate is a reasonable predictor explaining 12 percent of the forecast variance of inflation but the interest rate variables, M3 and stock prices are poor predictors.

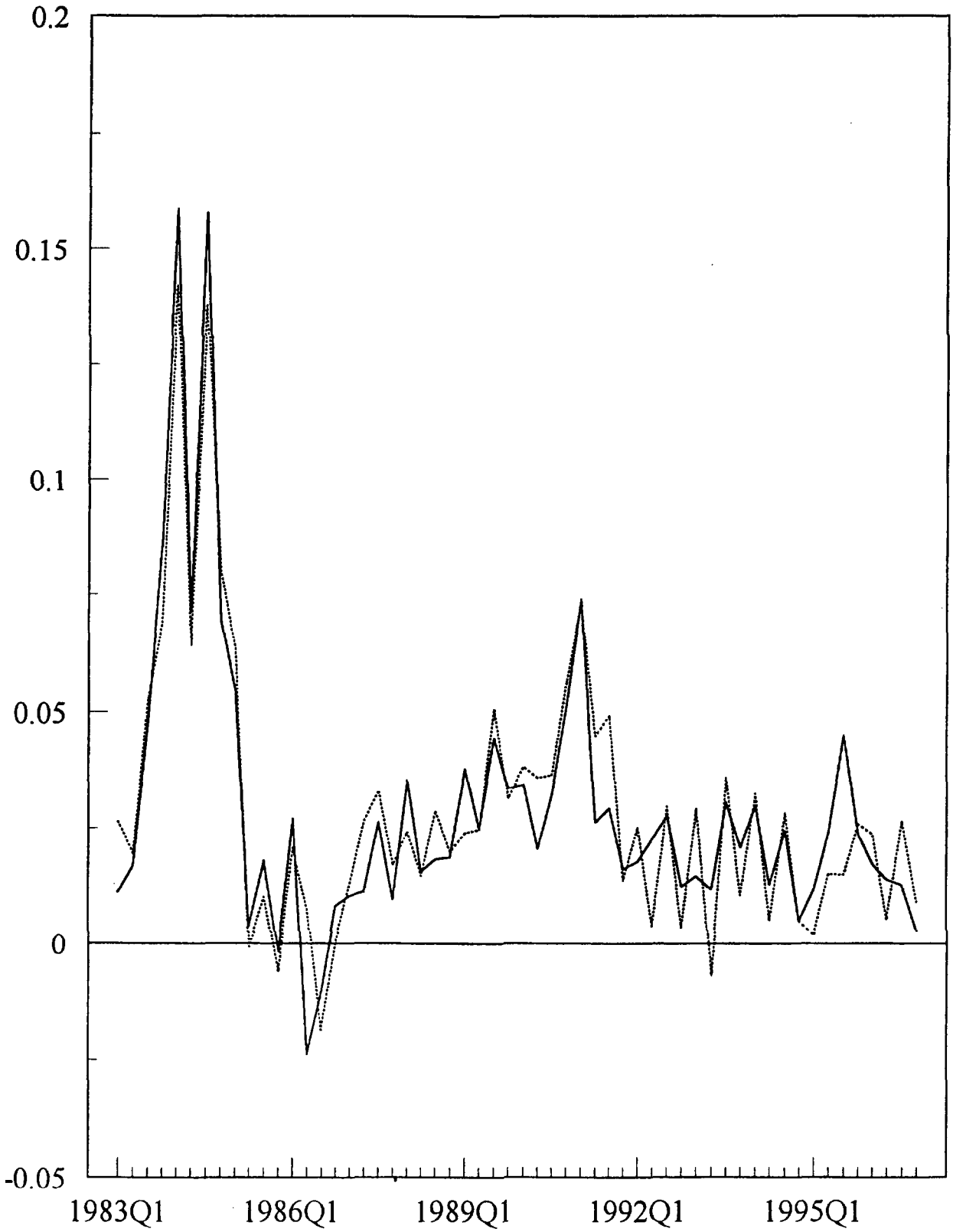
The impulse response functions show that movements in base money, exchange rates, the output gap, the U.S. inflation rate and the interest rate variables contain information on inflation sufficiently far into the future to be operationally useful for a policy maker. In particular, the impulse response function for the 91-day Treasury bill rate peaks around the first two quarters, base money around the second to fourth quarters, and the output gap at around the fifth quarter. For the exchange rate, the impulse response shows that it contains predictive information on inflation well into the fifth quarter; this is not so for the U.S. inflation rate which peaks at around the first two quarters.

(2) **An inflation equation**

The forecasting inflation equation (5) was estimated over the period from 1983q1 to 1996q4 with the output gap, changes in the nominal peso-U.S. dollar exchange rate and the U.S. inflation rate as explanatory variables. Column 1 in Table 3 shows that the estimated inflation equation explained inflation developments reasonably well with an adjusted R-square of 83 percent (Chart 4). The lags of inflation indicate inertia in the inflation process and/or are proxying for inflation expectations. The output gap variable is statistically significant after the third lag, suggesting that deviations of output from potential feed through to inflation relatively slowly. The rate of depreciation of the domestic currency vis-à-vis the U.S. dollar has an important effect on inflation. Although there is some evidence of overshooting, the estimated long-run coefficient amounts to a sizable 0.7 percent. Similarly, the U.S. inflation rate, a proxy for external shocks, is a major determinant of the Philippine inflation process, having a one for one impact on the domestic inflation rate in the short-run.

CHART 4
PHILIPPINES

Plot of Actual and Fitted Values (column 1)



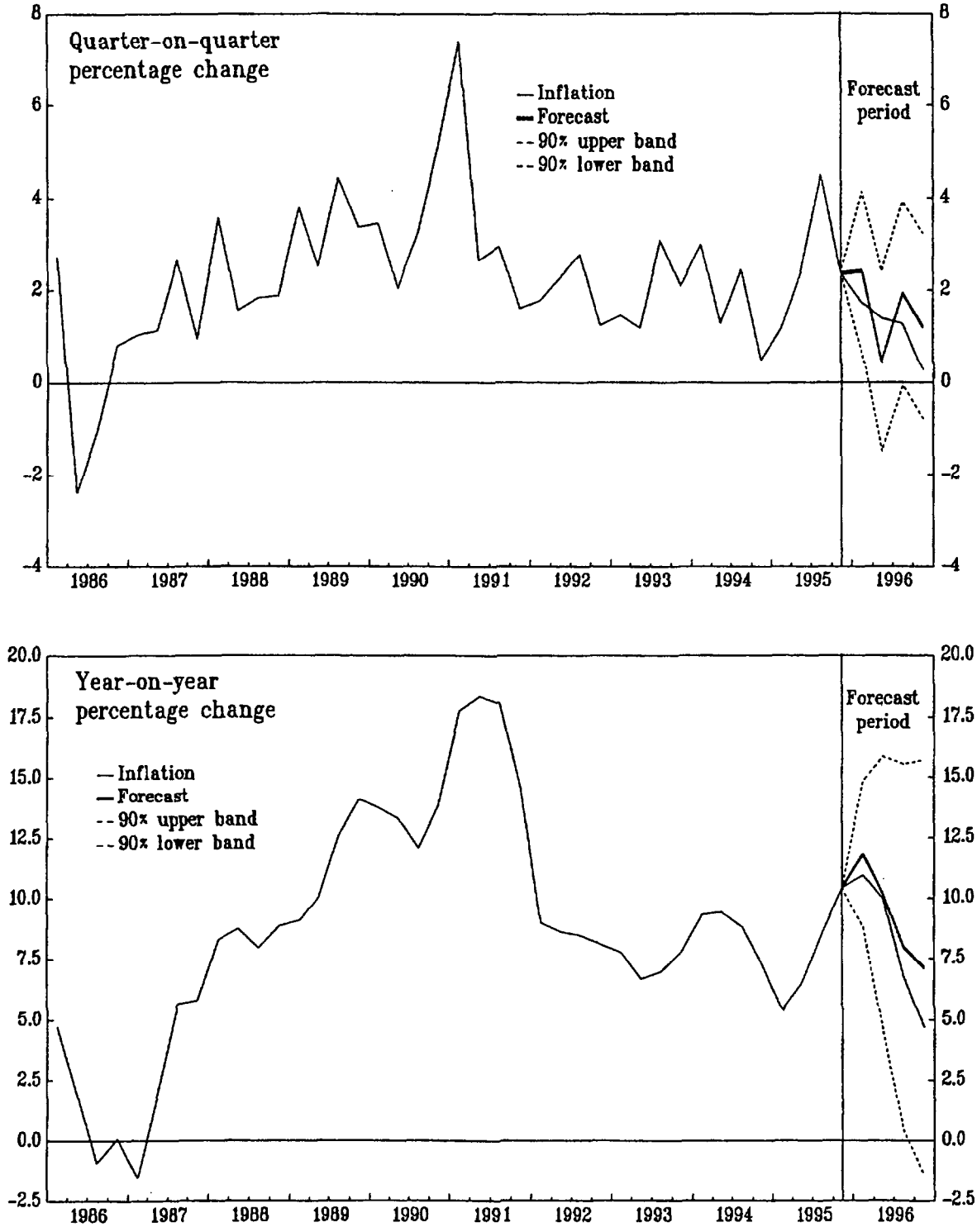
In columns 2–4, the influence of the output gap and monetary policy on inflation are proxied by lags of the 91-day Treasury bill rate, base money and M4. The estimated coefficients of these variables were statistically significant, and the inclusion of these variables did not significantly change the estimated coefficients of the remaining explanatory factors, with the exception of USINF whose estimated coefficient increased to 2 in column 2. All diagnostic tests were satisfactory with no evidence of serial correlation or heteroscedasticity.

Chart 5 plots the dynamic forecasts for 1996 of the estimated inflation equation from column 1. Although the equation predicts inflation developments in 1996 reasonably well, there is considerable uncertainty attached to the forecasts; in particular, the 90 percent confidence interval around the inflation forecast is large at some 7–8 percentage points on either side. This is not surprising given the historical volatility of the Philippine inflation rate. The inflation targeting framework, by committing monetary policy solely to lowering inflation, should reduce future forecast errors. Using the underlying rate of inflation instead of the headline inflation rate as the dependent variable could also reduce the standard error band. Food prices has been the single most volatile item in the basket (Chart 6).

CHART 5

PHILIPPINES

Out of Sample Forecast of Inflation, 1986-96



Sources: Data provided by the Philippine authorities; and Fund staff estimates.

Chart 6
Philippines
Variability of Inflation by Component
(*In percent*)

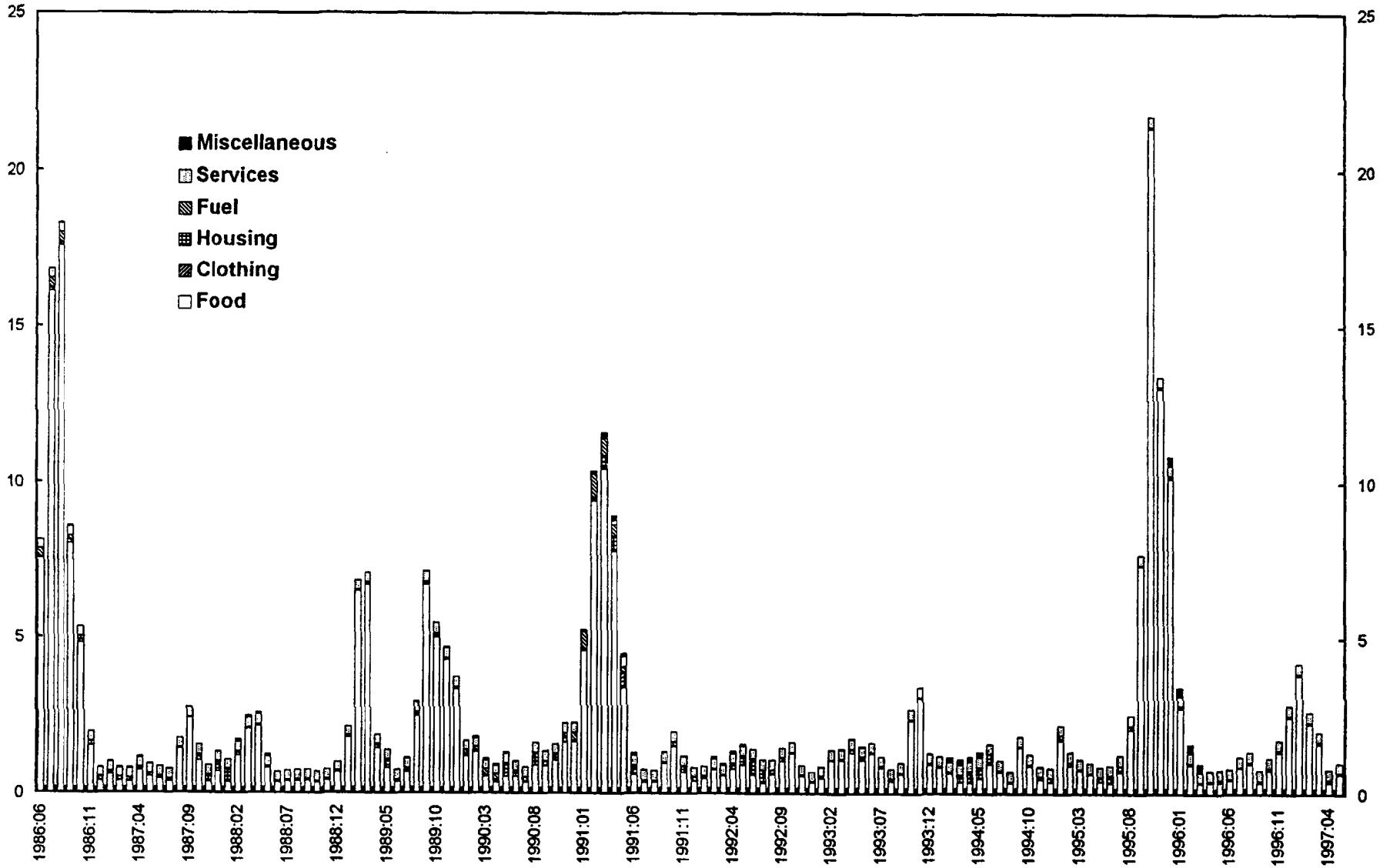


Table 1. Leading Indicators of Inflation: Bivariate Granger-Causality Tests

Indicator variables	Lags of VAR							
	1	2	3	4	5	6	7	8
OUTG	0.005	0.000	0.001	0.002	0.001	0.001	0.003	0.003
DFX	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DM3	0.561	0.254	0.238	0.366	0.386	0.532	0.536	0.354
DM4	0.038	0.033	0.000	0.001	0.003	0.003	0.002	0.001
DbaseM	0.263	0.010	0.026	0.014	0.000	0.001	0.001	0.001
DPC	0.089	0.137	0.320	0.555	0.348	0.444	0.246	0.263
USINF	0.021	0.050	0.089	0.047	0.034	0.014	0.033	0.050
RDIFF	0.026	0.006	0.071	0.287	0.205	0.114	0.134	0.092
91TBILL	0.152	0.055	0.395	0.670	0.616	0.502	0.596	0.553
364TBILL	0.114	0.044	0.344	0.470	0.527	0.558	0.763	0.730
PSEINDX	0.495	0.061	0.157	0.248	0.256	0.307	0.334	0.366

P-values shown for the likelihood ratio tests of the null hypothesis that the indicator does not Granger-cause inflation. All equations were estimated from 1983q1–1996q4 except those with base money and the stock index, which were estimated from 1988q1–1996q4.

Table 2. Forecast Error Variance of Inflation Explained by the Indicator Variable
(In percent)

Indicator variables	Horizon (in quarters)							
	1	2	3	4	6	8	12	20
OUTG	0.4	1.5	11.6	14.0	23.8	26.8	26.5	28.9
DFX	28.8	25.9	33.6	38.0	43.2	42.7	42.9	42.8
DM3	0.6	1.3	2.1	2.1	2.1	2.2	2.3	2.3
DM4	7.1	7.3	4.1	16.0	16.4	16.1	15.9	16.0
DbaseM	20.3	50.0	52.1	52.7	52.3	52.2	52.9	53.3
DPC	2.8	5.9	7.7	10.1	10.1	10.4	10.4	10.5
USINF	12.0	11.7	12.0	12.0	12.6	12.6	12.5	12.7
RDIFF	0.4	2.5	2.3	2.9	2.9	4.3	4.8	5.2
91TBILL	1.4	1.3	1.4	1.4	1.5	2.1	2.8	3.0
364TBILL	0.3	1.2	1.2	1.2	1.2	1.9	2.4	2.5
PSEINDX	2.6	10.6	12.1	12.1	12.3	12.8	13.1	13.2

Equations estimated as VARs with six lags. The orthogonalization method is the Choleski decomposition.

Table 3. Inflation Forecasting Equation

	(1)	(2)	(3)	(4)
Explanatory variables	Coefficients 1983Q1 – 1996Q4	Coefficients 1983Q1 – 1996Q4	Coefficients 1983Q1 – 1996Q4	Coefficients 1986Q4 – 1996Q4
Intercept	0.011 (2.04)	0.017 (2.55)	- 0.011 (2.12)	0.004 (0.95)
ΔP(-1)	0.422 (3.05)	0.298 (2.52)	0.261 (2.17)	0.26 (2.62)
ΔP(-2)	0.049 (0.35)	0.299 (2.51)		
ΔP(-3)	-0.116 (1.00)			
ΔP(-4)	-0.272 (2.49)			
OUTG(-3)	0.109 (3.33)			
OUTG(-4)	0.036 (1.07)			
OUTG(-5)	0.080 (2.29)			
DFX(-1)	0.286 (6.24)	0.385 (8.78)	0.324 (5.77)	0.208 (2.80)
DFX(-2)	-0.223 (3.57)	-0.160 (2.45)	-0.126 (1.65)	
DFX(-3)	0.248 (3.84)	0.217 (3.39)	0.218 (3.95)	
DFX(-4)	-0.093 (1.45)	-0.098 (1.63)	-0.126 (2.14)	
DFX(-5)	0.167 (2.89)	0.114 (2.15)	0.075 (1.61)	
USINF(-1)	0.943 (1.77)	2.03 (3.81)	1.387 (2.46)	1.02 (2.34)
DbaseM(-1)				0.039 (2.34)
DbaseM(-2)				-0.010 (0.56)
DbaseM(-3)				0.039 (3.83)
DM4(-1)			0.111 (3.45)	
DM4(-2)			0.069 (1.77)	
DM4(-3)			0.105 (2.80)	
91TBILL(-1)		-0.186 (4.55)		
Adjusted R^2	0.831	0.816	0.801	0.653
S.E. of regression	0.013	0.014	0.014	0.008
LM(4)	2.322	3.813	1.229	1.358

The dependent variable is the quarterly change in the logarithm of the CPI index, ΔP. T-statistics in parentheses.

VI. CONCLUDING REMARKS

The breakdown in the money demand relationship and the floating of the peso in July 1997 have resulted in a need to reassess the appropriate framework for monetary policy in the Philippines. This paper has considered the option of an inflation target as the centerpiece of a new monetary framework. In addition to providing an effective framework for monetary policy, an inflation target has the benefit of serving as an obvious anchor for wage and price setters in the economy. It circumvents the uncertainties that arise in the monetary targeting framework by focussing directly on the final goal of inflation. However, unless the groundwork and the necessary conditions for adopting an inflation targeting framework are in place, it would be risky for the Philippine authorities to abandon the present base money anchor.

The adoption of an inflation target would require a number of changes to the monetary policy decision process in the Philippines. In particular, the inflation target must take

precedence over other policy considerations, including the exchange rate. From the perspective of monetary policy, the exchange rate should be seen as an important part of the transmission mechanism, rather than a final goal. In short, the central bank must demonstrate its willingness to commit to the single objective of promoting a low inflation environment. The inflation target should be endorsed by both the government and the central bank. Other steps might include publication by the central bank of regular assessments of the outlook for inflation, testimony before congress, and immediate announcements of policy changes. Improvements in this regard would be desirable, however, regardless of the framework adopted.

Since the inflation target must be proactive, rather than reactive, the central bank must focus on the forecast of inflation at the policy horizon. This implies an increased reliance on forward indicators of inflation, and on inflation forecasting models. Section V provides a first attempt at developing such a body of information, and highlights a number of variables that could be of use in this regard. Furthermore, to improve the forecasting ability of the models, the authorities could include other policy instruments in the equation and substitute the headline inflation rate with the core inflation series that they have recently developed.

Finally, adoption of an inflation targeting framework does not of itself guarantee an immediate improvement in credibility. Rather, the inflation target can provide a benchmark against which the central bank can build a record of low inflation credentials over a period of time.

COINTEGRATION ANALYSIS OF MONEY DEMAND IN THE PHILIPPINES

To determine if there was a stable relationship of money demand in the Philippines, cointegration analysis—using a residual-based approach as well as the Johansen maximum likelihood approach—was applied to a standard money demand equation involving broad money (M3), real income (GNP) and interest rates (91-day treasury bill rate). The estimation was performed for two periods, from 1981 to 1996 and from 1984 to 1996. The first estimation period was defined by the simple fact that quarterly data for GNP began in 1981. The second estimation period was chosen to exclude the external shock from the debt crisis in 1983 which could potentially bias the results toward a rejection of the null. All variables, except for the interest rate variable, were in logarithm, with broad money deflated by the CPI index. The estimated results show that the null of non-cointegration cannot be rejected at the 5 percent level for both test periods (Tables 4 and 5). Substituting M3 for M4 and base money yielded similar results. Hence, it can be concluded that the money demand relationship in the Philippines has been unstable.

Table 4. Cointegration Using a Residuals-based Approach

(i) Sample period: 1981Q1 to 1996Q4
Unit root tests for residuals of OLS regression:
lnRM3 = -18.86 + 1.63 lnRGNP - 0.006 91TBILL + 0.05 SR1 - 0.008 SR2 + 0.05 SR3

	Test statistic	AIC	SBC
DF	-3.4295	75.7688	74.7651
ADF(1)	-2.9271	74.8373	72.8299
ADF(2)	-1.9308	76.9741	73.9631
ADF(3)	**-1.0941**	82.2140	**78.1993**
ADF(4)	**-1.3185**	**82.2325**	77.2142
ADF(5)	-1.5021	81.9687	75.9467
ADF(6)	-1.7984	81.9706	74.9449
ADF(7)	-1.9313	81.2933	73.2640
ADF(8)	-2.2790	81.4498	72.4168

95% critical value for the DF statistic = -5.0198
AIC = Akaike Information Criterion; SBC = Schwarz Bayesian Criterion.

(ii) Sample period: 1984Q1 to 1996Q4
Unit root tests for residuals of OLS regression:
lnRM3 = -20.63 + 1.78 lnRGNP - 0.003 91TBILL + 0.07 SR1 - 0.003 SR2 + 0.05 SR3

	Test statistic	AIC	SBC
DF	-2.9149	66.3583	65.4777
ADF(1)	-2.4464	65.4131	63.6519
ADF(2)	-1.9117	64.9219	62.2801
ADF(3)	**-0.7287**	69.9938	**66.4714**
ADF(4)	-0.8793	69.2682	64.8652
ADF(5)	-1.1913	69.4279	64.1443
ADF(6)	**-1.7312**	**70.1459**	63.9817
ADF(7)	-1.6660	69.1997	62.1549
ADF(8)	-1.9341	68.8650	60.9396

95% critical value for the DF statistic = -5.1090
AIC = Akaike Information Criterion; SBC = Schwarz Bayesian Criterion.

The unit root tests suggest non-stationarity of the residuals of the cointegrating equation. Based on the AIC and SBC criterion, the optimal lag lengths were 4 and 3, respectively for the period 1981–96 and 6 and 3, respectively for the 1984–96 period. In all these cases, the test statistic does not reject the null of unit roots in the residuals.

Table 5. Johansen Maximum Likelihood Approach

(i) Sample period: 1981Q1 to 1996Q4
Cointegration with unrestricted intercepts and no trends in the VAR, order of VAR=3.
Cointegrating vector: (lnRM3, lnGNP, 91TBILL, SR1,SR2,SR3).

Cointegration LR test based on maximal eigenvalue of the stochastic matrix

Null	Alternative	Test statistic	95% Critical value
r = 0	r = 1	13.6740	21.1200
r <= 1	r = 2	6.9960	14.8800

Cointegration LR test based on trace of the stochastic matrix

Null	Alternative	Test statistic	95% Critical value
r = 0	r >= 1	20.9012	31.5400
r <= 1	r >= 2	7.2272	17.8600

(ii) Sample period: 1984Q1 to 1996Q4
Cointegration with unrestricted intercepts and no trends in the VAR, order of VAR=3.
Cointegrating vector: (lnRM3, lnGNP, 91TBILL, SR1,SR2,SR3).

Cointegration LR test based on maximal eigenvalue of the stochastic matrix

Null	Alternative	Test statistic	95% Critical value
r = 0	r = 1	13.6740	21.1200
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Cointegration LR test based on trace of the stochastic matrix

Null	Alternative	Test statistic	95% Critical value
r = 0	r >= 1	20.9012	31.5400
r <= 1	r >= 2	7.2272	17.8600

VARIABLE DEFINITIONS AND SOURCES

1. GDP (y); quarterly from 1981. Source: National Statistical Coordination Board, Philippines.

2. Peso/U.S. dollar exchange rate (e), quarterly. Source: *International Finance Statistics*, IMF.

3. M3, broad money excluding foreign currency deposits (M3), quarterly. Source: Bangko Sentral ng Pilipinas.

4. M4, broad money including foreign currency deposits (M4), quarterly. Source: *International Finance Statistics*, IMF.

5. Base money (BaseM), quarterly. Source: Bangko Sentral ng Pilipinas.

6. Private credit (PC), quarterly. Source: *International Finance Statistics*, IMF.

7. U.S. CPI (1990=100), quarterly. Source: *International Finance Statistics*, IMF.

8. Philippine CPI (1990=100), quarterly. Source: National Statistical Coordination Board, Philippines.

9. 91-day Treasury bill rate (91TBILL), quarterly. Source: Bangko Sentral ng Pilipinas.

10. 364-day Treasury bill rate (364TBILL), quarterly, for some years proxied by 182-day Treasury bill rate. Source: Bangko Sentral ng Pilipinas.

11. Stock market composite index (PSEINDX), quarterly. Source: IFC Emerging Market Database.

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