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The BSP's monetary policy reaction function from 1992 to 2003

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Abstract

This paper attempts to empirically determine the Philippine central bank's recent monetary policy stance before and after it adopted the inflation-targeting framework, as revealed by its interest-rate setting behavior. Employing Clarida, Galí, and Gertler's [1998, 2000] forward-looking model, it finds that the Bangko Sentral ng Pilipinas (BSP) has indeed been stabilizing inflation by and large through its key policy rate, although it appears to be accommodative with respect to the output gap. In addition, currency stability and expansionary money supply (M1) growth are other concerns of the BSP, although significantly so only in earlier periods.

JEL classification: E52, E58
Keywords: inflation targeting, Taylor rule, monetary policy reaction function, stabilization, interest-rate setting

1. Introduction

The Bangko Sentral ng Pilipinas (BSP) has traditionally conducted monetary policy by targeting monetary aggregates in line with its mandated duty of maintaining price stability, which is conducive to economic growth. This approach to controlling inflation through the appropriate tweaking of money supply growth is based on the quantity theory of money (QTM) and was essentially part of the Philippine government's loan program with the International Monetary Fund (IMF). However, starting the second semester of 1995, it adopted a so-called modified framework, which attempted to "[complement] monetary aggregate targeting with some form of inflation targeting, placing greater emphasis on price stability in lieu of rigidly maintaining the intermediate monetary targets" [Guinigundo 2000]. This new framework allowed base money to exceed target as long as inflation targets were met, with mopping-up operations done if and when inflation eventually overshot target.[1]

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[1] While one reason offered for the adoption of this approach was the supposed weakening of the relationship underlying monetary aggregate targeting, it is apparent that the BSP in effect took a passive monetary stance during the time this framework was in place.

Monetary policy took another turn in January 2000 when the Monetary Board (MB), the BSP's policy-making body, adopted in principle the shift to an inflation-targeting framework, formally adopting it two years later. This move was largely prompted by the apparent success of many central banks in attaining low inflation after adopting such a framework,[2] and as such was seen as the new best practice. The approach essentially entailed announcing an explicit inflation target, either a point or an interval, and setting a monetary policy instrument consistent with achieving that target given inflation forecasts and other relevant information. Moreover, this is accompanied with a high degree of transparency and accountability, as the central bank is expected to explain to the public its actions and the motivations for its policies, thereby putting its credibility directly at stake.[3]

The sustained regime of low inflation and relatively more stable growth in major economies has fueled academic interest in the empirical assessment of the behavior of monetary policy. This traces the central bank's aggressive commitment to fight inflation to the setting of its key policy rate. We attempt here to do such an assessment for the Philippine setting, investigating whether the BSP's monetary policy can be modeled empirically by assuming that the BSP has been targeting inflation through the overnight reverse repurchase (RRP) rate, and whether it is primarily concerned with fluctuations in inflation and output, much like in studies done in developed countries. Further, we hope to understand how the changes in the policy framework adopted by the BSP were rendered in practice.

The paper is organized as follows: section 2 presents the methodology we employ and some notes on the estimation of monetary policy reaction functions; section 3 introduces the data used and discusses some preliminary observations; section 4 proceeds with the estimation of the baseline specification and its extensions and then an analysis of the implied monetary policy behavior over the period studied; finally, section 5 offers concluding remarks.

2. The model

Following Clarida, Galí, and Gertler [1998, 2000], we cast the processes underlying monetary policy in a "rule" context in which the central bank sets every period a policy variable r^*, in most cases the interbank lending rate for overnight loans, to influence inflation π, dependent on the deviations of expected inflation from target π^* and of expected output from trend y^*:

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[2] Introduced in New Zealand in 1990 and later on adopted in Australia, Brazil, Canada, Chile, Colombia, the Czech Republic, Finland, Israel, South Korea, Mexico, Peru, Poland, South Africa, Spain, Sweden, Switzerland, Thailand, and the United Kingdom. The United States, Germany, and Japan are also largely seen as practicing inflation targeting, even before this approach was labeled as such.

[3] Svensson [2001] puts out three criteria indicative of genuine inflation targeting: (a) a clear mandate for a monetary policy directed toward low inflation, (b) central bank independence, and (c) accountability of the central bank for achieving the mandate. The BSP broadly meets these criteria: the first two are explicit provisions in the New Central Bank Act of 1993, while the third has been demonstrated starting 2002 with the BSP's publication of the minutes of the monthly MB meetings, quarterly inflation reports, and a yearly open letter to the president.

$$r_t^* = \bar{r} + \beta\left(E\left[\pi_{t+n}|\Omega_t\right] - \pi^*\right) + \gamma\left(E\left[y_{t+m}|\Omega_t\right] - y_{t+m}^*\right), \tag{1}$$

where Ω_t denotes the information set available at time t, E denotes the expectation operator, n and m are the forecast horizons for inflation and output respectively, and $\bar{r}$ is the desired nominal rate of interest that is expected to prevail when inflation and output are at their target levels. We impose a forward-looking specification, i.e., $n, m \geq 0$, and thus allow the central bank's decisions to be based on its beliefs about contemporaneous or future values of inflation and the output gap, formed by considering pertinent information.[4]

Many theoretical models justify the use of such a specification, and is most plausible for an economy with temporary nominal wage and price rigidities and a central bank that has a quadratic loss function over inflation and output. We postulate that the nominal rigidities result in a short-run output-inflation tradeoff that the central bank addresses by stabilizing both inflation and output.

Note that we can rearrange (1) to get

$$rr_t^* = \overline{rr} + (\beta - 1)\left(E\left[\pi_{t+n}|\Omega_t\right] - \pi^*\right) + \gamma\left(E\left[y_{t+m}|\Omega_t\right] - y_{t+m}^*\right), \tag{2}$$

where $rr_t^* = r_t - E\left[\pi_{t+n}|\Omega_t\right]$ is the *ex ante* real interest rate target[5] and $\overline{rr} = \bar{r} - \pi^*$ is the long-run equilibrium real interest rate. This equation puts the policy rule in a real context, and thus translates to a determination of whether policies made in the nominal domain are effective. Since lower (resp. higher) real interest rates stimulate (resp. stifle) output and inflation, the monetary stance on deviations of inflation from target and of output from trend depends on the signs of β and γ, in which case it is patently stabilizing if $\beta > 1$ and $\gamma > 0$ and accommodating otherwise.

The central bank is assumed to smooth interest rates, probably to minimize the disruption of capital markets, to insulate against charges of policy reversals that would erode its credibility, or to build consensus in support of policy changes. This gradualist tendency is modeled by allowing the policy rate to adjust partially to target:

$$r_t = (1 - \rho)r_t^* + \rho r_{t-1} + v_t, \tag{3}$$

where v_t is a zero mean exogenous interest rate shock and r is the smoothing parameter.

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[4] In contrast, the so-called Taylor [1993] rule, popularized by its ability to track rather closely the nominal Federal funds rate since 1979, uses the first lags of inflation and the output gap. Note that if lagged values of inflation and the output gap, or a linear combination of these, are sufficient statistics for forecasting its future values, then such a backward-looking specification would result in similar parameter estimates.

[5] This is an approximate measure since the maturity of the short-term policy rate may be different from the forecast horizon used on expected inflation.

Letting $\alpha = \bar{rr} - (\beta - 1)\pi^*$ and $\hat{y}_t \equiv y_t - y_t^*$, we insert (1) in (3) and get

$$r_t = (1-\rho)\{\alpha + \beta(E[\pi_{t+n}|\Omega_t]) + \gamma(E[\hat{y}_{t+m}|\Omega_t])\} + \rho r_{t-1} + v_t. \quad (4)$$

Now assuming rational expectations, we come up with

$$r_t = (1-\rho)\{\alpha + \beta\pi_{t+n} + \gamma\hat{y}_{t+m}\} + \rho r_{t-1} + \varepsilon_t, \quad (5)$$

where $\varepsilon_t = -(1-\rho)\{\beta(\pi_{t+n} - E[\pi_{t+n}|\Omega_t]) + \gamma(\hat{y}_{t+m} - E[\hat{y}_{t+m}|\Omega_t])\} + v_t$. Letting $\mathbf{u}_t$ be a vector of variables that belong to the information set Ω_t at the time the central bank chooses the interest rate, such as lagged values of inflation, the output gap, exchange rate, commodity prices, and interest rates, we estimate $[\alpha, \beta, \gamma, \rho]$ in (5) using generalized method of moments (GMM) on the orthogonality condition

$$E[\varepsilon_t \mid \mathbf{u}_t] = 0. \quad (6)$$

Since other variables may affect the target rule, independent of the information they contain about inflation and output, we may augment (5) with θz_{t+q} within the braces and add lagged values of z in the instrument list. In this paper, we already include the lagged values of z in the instrument list even before its inclusion in the specification because we deem that a bigger information set would enrich the estimation, barring problems with imposing too many moment restrictions.

3. Data and preliminary observations

The overnight RRP rate series was obtained from the Department of Economic Research (DER) of the BSP. Gaps in the series prompted a limited sample length of just twelve years; we attempted to compensate for this with increased data frequency by using monthly observations from January 1991 to December 2003.

The data on quarterly real gross domestic product (GDP), inflation, money supply (M1), average nominal peso-dollar exchange rate (Php/USD), and the real effective exchange rate (REER) index were obtained from the Institute for Development and Econometric Analysis (IDEA) Inc., which archived it from publications of the National Statistical Coordination Board (NSCB). Real GDP was seasonally adjusted using the US Census X11 procedure (additive seasonal components), and then its trend was unmasked by the Hodrick-Prescott filter, using the suggested smoothing parameter for quarterly data.[6] The two resulting quarterly output measures were converted to monthly data by fitting a quadratic polynomial to every

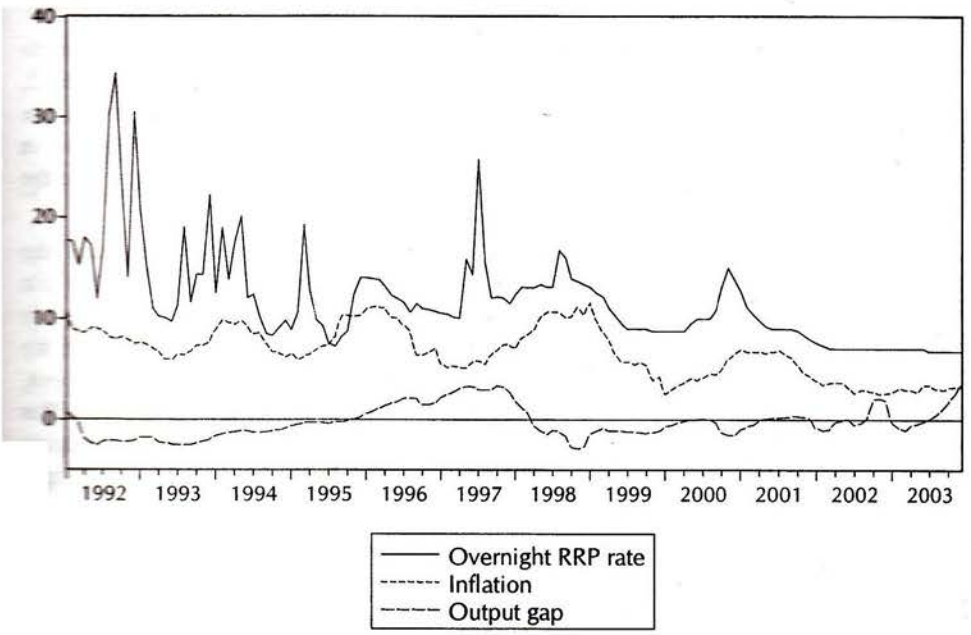
[6] The Hodrick-Prescott [1997] filter, although widely used, is a centered smoothing estimator that exhibits end-point problems [Taylor 1999]; we attempt to remedy the problem at the starting endpoint by extending the real GDP series back to 1981:01.

three adjacent points of each series (two for the endpoints) and then by matching the sums of the three months that correspond to the relevant quarter.[7] Upon conversion, the percentage log difference was considered the output gap. Inflation was computed from the consumer price index (CPI).

The Federal funds rate series was culled from the US Federal Reserve website while monthly averages of Dubai crude oil spot prices were, in turn, obtained from the World Bank website. In the specifications, percentage changes were used, monthly for the exchange rate and crude import price measures, and yearly for the money supply. To better mirror sustained changes in the monetary aggregate, we employ the three-month moving average of money supply growth.

Looking at the historical picture of inflation, the output gap, and the overnight RRP rate from 1992 to 2003 in Figure 1, we indeed see attempts at reining in on inflation via overnight RRP rate adjustments in as much as overnight RRP rate hikes precede inflationary easing, similar to those observed in the G3. We also see such a hike in mid-1997, coincident with a significant positive output gap; however, this hike was more likely a reaction to the nominal

Figure 1



[7] This has the effect of smoothing the series within quarters, ignoring the possibility of a monthly seasonal character of GDP. We do not have viable alternatives for obtaining monthly output, however. The problem with industrial production, the closest measure, is that it does not take into account the country's larger service and agriculture sectors, aside from having just been recently made available.

currency depreciation that triggered the Asian financial crisis rather than a proactive response to anticipated inflation brought about by sustained economic growth before the crisis. Otherwise, we do not see much positive association between output gap and overnight RRP rate movements; indeed, their sample correlation is -0.2387 compared to 0.5126 for the other pair. For inflation at least, this graph lends some confidence on the acceptability of our assumption regarding interest-rate targeting even as the BSP started adopting such a framework only in 2000. This assumes, of course, that monetary policy has indeed been stabilizing, although the casual evidence here is that the BSP has been accommodating the output gap.

We also observe that there is considerable persistence in the overnight RRP rate series, notably most recently, with significant deviations brought back soon enough to a seeming underlying trend, justifying our adoption of a partial adjustment model of interest-rate targeting.

In Table 1 we have the descriptive statistics of these three series across the whole sample and the three subperiods that we now define: period 1 runs from 1992:01 to 1995:06, period 2 from 1996:07 to 1999:12, and period 3 from 2000:01 to 2003:09. Note that the two breakpoints correspond to the introduction of the "modified" monetary framework and the adoption *in principle* of the inflation-targeting framework; we assume that the BSP has already been practicing inflation targeting even before its formal adoption in January 2002.

We see that the average overnight RRP rate has been declining over the three subperiods along with decreasing variability, while average inflation marginally went up in period 2, accompanied by a surge in variability, before dramatically falling in period 3. In turn, the average output gap has been significantly negative in period 1 and slightly negative in period 3, which improved to moderate positive territory in period 2 with more than twice the variability as the other periods.

One criterion we will use in evaluating the appropriate forecast horizon and the plausibility of different specifications would be the implied inflation-rate target. We can uniquely identify it from the constant term α in (5) by finding a proxy for the long-run equilibrium real interest rate $\overline{rr}$. We use the sample average of the difference between the 91-day Treasury bill rate and the inflation rate prevailing three months later for this purpose, equal to 4.69 percent from 1992:01 to 2003:09. Note in Figure 2 that the monthly series of this proxy variable has been rather volatile, and furthermore, we have but a short sample. Judging from Figure 1, we expect the implied target inflation rate to be below 6.73 percent, the sample mean of inflation.

We feature in the four panels of Figure 3 the movements of the instruments used in this study.

Before we go on to the empirical estimation of the monetary policy reaction function, we point out two issues that affect the reliability of the results. First, we assume here that the inflation and overnight RRP rate series are stationary, thus shunning away spurious results that can possibly be brought by their being cointegrated or by plainly having unit roots. However, because of the persistence of both series, we find using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests that both have unit roots. Clarida, Galí,

Figure 2

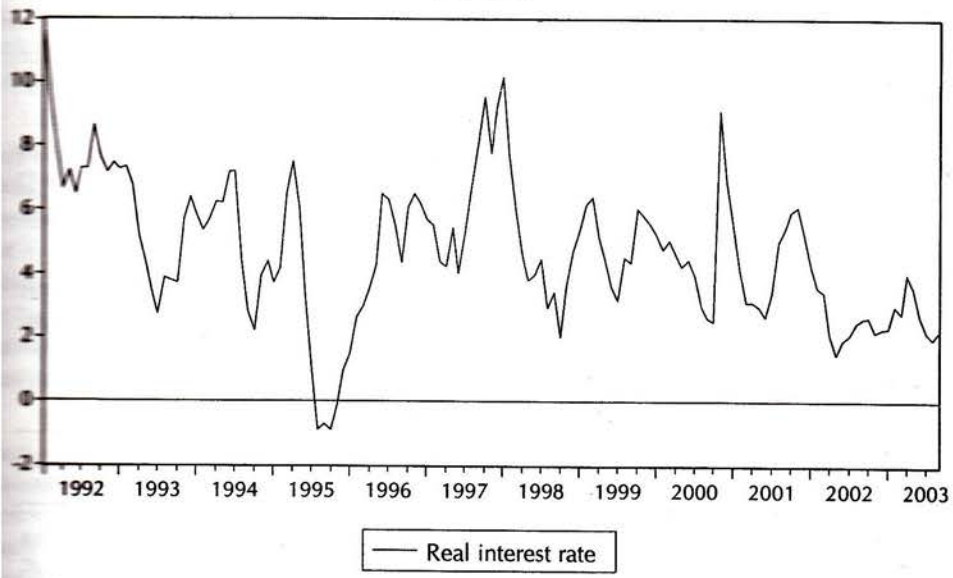
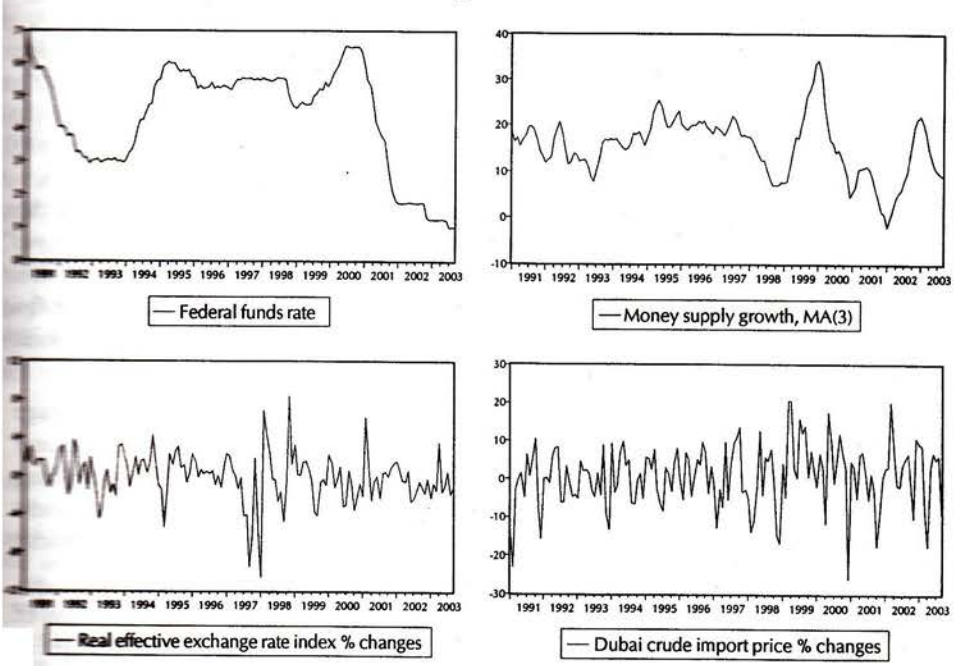


Figure 3



and Gertler [2000] encounter the same problem but brush it aside, arguing that unit root tests have low power anyway. We follow the same.

Second, the output gap and inflation series must exhibit sufficient variation within the sample, and that this sample period must be long enough. We see from Table 1 that the output gap is not as volatile as inflation and that volatility decreases for both in periods 1 and 3. While we cannot have the luxury of having a long sample due to the missing values in the overnight RRP rate series before the 1990s, we note that de Brouwer and Gilbert [2003] used a sample with 70 points, half as many as ours, and still got plausible results, although the difference is that they used quarterly data.

Having disclosed these caveats on the confidence we can attribute to our parameter estimates, we proceed to attempt an approximation of the BSP's implicit reaction function.

Table 1. Descriptive statistics of main variables

Sample	*Overnight RRP rate*				*Inflation*				*Output Gap*			
		I	*II*	*III*		*I*	*II*	*III*		*I*	*II*	*III*
Mean	11.92	15.26	12.06	8.65	6.73	7.76	8.03	4.21	-0.36	-1.56	0.44	-0.19
Median	10.88	13.97	12.05	8.35	6.68	7.55	8.02	3.64	-0.51	-1.78	0.32	-0.17
Maximum	34.41	34.41	25.72	15.00	11.54	10.64	11.54	6.93	3.30	0.72	3.30	2.12
Minimum	6.75	8.31	7.30	6.75	2.50	5.88	3.94	2.50	-2.99	-2.68	-2.99	-1.59
Std. Dev.	4.74	6.17	2.90	2.04	2.47	1.24	2.25	1.50	1.55	0.86	1.84	0.79
Skewness	1.99	1.33	1.84	1.35	0.01	0.29	-0.04	0.68	0.66	0.66	0.03	0.98
Kurtosis	8.51	4.54	10.35	4.38	2.05	2.11	1.56	1.95	2.79	2.61	1.74	4.67
Observations	141	42	54	45	141	42	54	45	141	42	54	45

4. Estimation results and analysis

The empirical analysis begins with the estimation of the baseline specification over the whole sample; we do this for different forecast horizons. Using the chosen target profile, we check for subsample stability of the parameter estimates. We then test if the specification we use is significantly different from a backward-looking one. Afterward, we ascertain the plausibility of other variables significantly entering the reaction function, specifically with regard to movements in the money supply and the exchange rate.

We estimate the parameter vector $[\pi^*, \beta, \gamma, \rho]$ using the two-step nonlinear two-stage least squares estimator [Hansen 1982], in which the initial parameter estimates from traditional two-stage least squares are used to form a consistent estimate of the optimal weighting matrix, which is then used to iterate the coefficients to convergence. We specified a quadratic spectral kernel to weigh the covariances and Andrews's [1991] method for bandwidth selection. A convergence tolerance of 1×10^{-5} was imposed.

We used the first to sixth, ninth, and twelfth lags of our instrument list, composed of the overnight RRP rate, inflation, output gap, Federal funds rate, and percentage changes in Dubai crude import prices, the real effective exchange rate index, and money supply.

We ran a grid search on the contemporaneous and quarterly forecast horizons[8] up to two years[9] for both regressors over the 1992:01 to 2003:12 sample period. The criterion we use is the minimum standard error of regression (SER), which measures the dispersion of actual values of the overnight RRP rate from the fitted values.

Since we have more instruments than parameters to be estimated, we tested for the validity of the overidentifying restrictions. The null hypothesis that all the overidentifying restrictions are satisfied is comfortably not rejected for each forecast profile since the associated p-values of the test are all above 0.77. This implies that we are not omitting some relevant explanatory variable(s) in the specification, which may be correlated with our set of instruments that would, if it were instead true, lead to the violation of our imposed orthogonality condition and a statistical rejection of the model. Initially and over the sample studied, this belies the relevance of controlling money supply growth and stabilizing the exchange rate as additional concerns of the BSP.

With careful examination, we see in Table 2 that, rather than in the reverse, the coefficient estimates are more stable across target profiles when the target horizon for inflation is held constant while the target horizon for the output gap is allowed to vary. We also find in this case that the estimates of β are not variably changing and that it happens to be above unity only under inflation forecasts of one and two quarters ahead. Inflationary expectations away from target are thus more stable concerns of the BSP than output deviations from trend.

The SER is at its lowest at one-quarter rational forecasts of inflation and the output gap; we thus choose this target profile.[10] In comparison, de Brouwer and Gilbert [2003] find that in the case of the Reserve Bank of Australia, four-quarter forecasts of inflation and contemporaneous and one-quarter-ahead forecasts of the output gap dominate other target profiles, the former in keeping with the model-based results of de Brouwer and Ellis [1998] that this target horizon for inflation is the most reliable for policy. Clarida, Galí, and Gertler [1998] casually assumed a forecast horizon of one year for inflation and contemporaneous for the output gap for various central banks from developed countries, arguing that policymakers are more likely concerned with medium- and longer-term trends in inflation. Clarida, Galí, and Gertler [2000] preferred a one-quarter-ahead forecast profile for targeting the Federal funds rate even if they show that it was not qualitatively different from what they observe as more realistic target horizons of $n = 12$ and $m = 6$ or 12, in line with allowances for lags in the effect of monetary policy actions. Our interpretation here is that this relatively short target horizon for the BSP reflects the susceptibility of the Philippine

[8] We use quarterly forecast horizons because data on real GDP come out every quarter and it is conceivable that policymakers anticipate economic variables over the succeeding quarters rather than over the following months.

[9] The BSP formally adopts a two-year inflation-targeting horizon.

[10] We tried using monthly forecast horizons and arrived at a forecast profile of n = 2 and m = 2 with an implied inflation target equal to 6.33 percent, just below the sample mean of inflation. The other parameter estimates are not much different from that of the forecast profile we adopt, although the coefficient on the output gap is insignificant.

Table 2. Baseline specification, whole sample estimation

n	m	Π^*	β	Y	ρ	p-*value*	*SER*
0	0	1.88	**0.94**	-0.03	**0.65**	0.9683	3.2545
		(6.09)	(0.08)	(0.11)	(0.02)		
0	3	**6.16**	**0.87**	-0.08	**0.64**	0.9264	3.2812
		(1.33)	(0.08)	(0.15)	(0.02)		
0	6	**6.46**	**0.82**	-0.02	**0.64**	0.9502	3.3195
		(1.02)	(0.08)	(0.15)	(0.02)		
0	9	**6.15**	**0.80**	**-0.51**	**0.59**	0.9755	3.3116
		(1.00)	(0.06)	(0.16)	(0.02)		
0	12	**6.85**	**0.87**	**-0.91**	**0.55**	0.8860	3.3024
		(1.73)	(0.08)	(0.16)	(0.02)		
0	15	**8.35**	**0.87**	**-0.92**	**0.56**	0.9206	3.3308
		(1.56)	(0.07)	(0.11)	(0.02)		
0	18	**8.91**	**0.90**	**-1.21**	**0.54**	0.9049	3.3845
		(2.50)	(0.05)	(0.09)	(0.02)		
0	21	**6.88**	**0.76**	**-0.71**	**0.60**	0.9831	3.4607
		(1.02)	(0.07)	(0.12)	(0.02)		
0	24	**6.83**	**0.73**	**-0.68**	**0.61**	0.9909	3.5307
		(1.06)	(0.10)	(0.15)	(0.02)		
3	0	**4.78**	**1.14**	**-0.22**	**0.59**	0.9177	3.2404
		(0.66)	(0.05)	(0.06)	(0.01)		
3	3	**4.68**	**1.13**	**-0.26**	**0.58**	0.9058	3.2374
		(0.87)	(0.05)	(0.10)	(0.01)		
3	6	**4.00**	**1.13**	-0.14	**0.59**	0.8825	3.2741
		(0.94)	(0.05)	(0.11)	(0.02)		
3	9	-2.52	**1.03**	**-0.51**	**0.57**	0.9248	3.2730
		(14.77)	(0.06)	(0.14)	(0.02)		
3	12	1.10	**1.06**	**-0.72**	**0.55**	0.9322	3.2817
		(6.40)	(0.07)	(0.18)	(0.02)		
3	15	0.15	**1.06**	**-0.87**	**0.54**	0.9095	3.3055
		(6.61)	(0.06)	(0.11)	(0.02)		
3	18	1.89	**1.11**	**-1.17**	**0.53**	0.9074	3.3440
		(2.49)	(0.06)	(0.09)	(0.02)		
3	21	0.70	**1.08**	**-0.91**	**0.56**	0.9054	3.3882
		(3.36)	(0.05)	(0.12)	(0.01)		
3	24	14.55	**0.96**	**-0.78**	**0.58**	0.9437	3.4694
		(15.47)	(0.07)	(0.12)	(0.02)		
6	0	**3.48**	**1.18**	**-0.33**	**0.61**	0.8250	3.3031
		(0.72)	(0.05)	(0.10)	(0.01)		
6	3	**3.07**	**1.15**	**-0.18**	**0.62**	0.8212	3.3045
		(0.94)	(0.05)	(0.12)	(0.01)		
6	6	**3.15**	**1.17**	**-0.09**	**0.62**	0.8716	3.3083
		(0.91)	(0.05)	(0.11)	(0.01)		
6	9	-3.73	**1.05**	**-0.47**	**0.61**	0.9074	3.3131
		(14.27)	(0.08)	(0.12)	(0.02)		
6	12	63.42	**0.99**	**-0.79**	**0.58**	0.8529	3.3249
		(407.20)	(0.08)	(0.17)	(0.02)		
6	15	27.90	**0.97**	**-0.63**	**0.60**	0.8845	3.3649
		(67.15)	(0.08)	(0.09)	(0.01)		
6	18	-235.65	**1.00**	**-0.95**	**0.58**	0.7757	3.4039
		(6650.72)	(0.08)	(0.10)	(0.01)		
6	21	20.62	**0.96**	**-0.84**	**0.61**	0.9708	3.4364
		(23.41)	(0.06)	(0.10)	(0.01)		
6	24	**13.06**	**0.89**	**-0.91**	**0.60**	0.9373	3.4886
		(3.62)	(0.05)	(0.13)	(0.01)		

Bold typeface indicates significance at the 5 percent level, standard errors in parentheses.

Table 2 (continued)

n	m	Π^*	β	Y	ρ	p-*value*	*SER*
9	0	**8.14**	**0.91**	**-0.49**	**0.66**	0.9331	3.3927
		(2.87)	(0.06)	(0.12)	(0.01)		
9	3	**9.71**	**0.92**	**-0.47**	**0.66**	0.9112	3.3920
		(3.74)	(0.06)	(0.14)	(0.01)		
9	6	**7.99**	**0.87**	-0.04	**0.68**	0.9460	3.4054
		(2.52)	(0.07)	(0.16)	(0.01)		
9	9	**8.93**	**0.91**	**-0.58**	**0.65**	0.9639	3.3815
		(3.47)	(0.08)	(0.15)	(0.02)		
9	12	**8.64**	**0.81**	**-0.61**	**0.66**	0.9455	3.3994
		(1.71)	(0.13)	(0.27)	(0.02)		
9	15	**7.11**	**0.69**	**-0.52**	**0.66**	0.9512	3.4435
		(1.02)	(0.11)	(0.19)	(0.02)		
9	18	**7.65**	**0.58**	**-0.70**	**0.65**	0.9228	3.4732
		(0.74)	(0.12)	(0.12)	(0.02)		
9	21	**8.18**	**0.61**	**-0.49**	**0.65**	0.9601	3.5177
		(0.64)	(0.10)	(0.21)	(0.01)		
9	24	**8.18**	**0.56**	**-0.69**	**0.64**	0.9752	3.5567
		(0.52)	(0.12)	(0.19)	(0.01)		
12	0	**8.67**	**0.74**	**-0.81**	**0.65**	0.8497	3.4249
		(0.82)	(0.08)	(0.12)	(0.01)		
12	3	**7.66**	**0.70**	**-0.86**	**0.65**	0.8983	3.4251
		(0.64)	(0.08)	(0.12)	(0.01)		
12	6	**7.82**	**0.60**	**-0.42**	**0.66**	0.8807	3.4313
		(0.61)	(0.09)	(0.12)	(0.01)		
12	9	**7.47**	**0.59**	**-0.74**	**0.65**	0.8883	3.4069
		(0.60)	(0.08)	(0.20)	(0.02)		
12	12	**7.81**	**0.49**	**-1.06**	**0.62**	0.8771	3.3824
		(0.57)	(0.12)	(0.19)	(0.02)		
12	15	**7.68**	**0.39**	**-0.77**	**0.65**	0.8643	3.4270
		(0.44)	(0.12)	(0.16)	(0.01)		
12	18	**7.88**	**0.36**	**-0.78**	**0.65**	0.9169	3.4761
		(0.36)	(0.13)	(0.14)	(0.02)		
12	21	**8.12**	**0.33**	**-0.58**	**0.64**	0.8640	3.5141
		(0.42)	(0.12)	(0.22)	(0.01)		
12	24	**7.95**	0.16	**-0.77**	**0.63**	0.9284	3.5569
		(0.31)	(0.12)	(0.20)	(0.01)		
15	0	**7.40**	**0.31**	**-0.61**	**0.67**	0.8859	3.4655
		(0.32)	(0.12)	(0.17)	(0.01)		
15	3	**7.62**	**0.40**	**-0.96**	**0.64**	0.8474	3.4496
		(0.27)	(0.10)	(0.16)	(0.01)		
15	6	**7.30**	0.20	**-0.54**	**0.66**	0.9015	3.4660
		(0.27)	(0.11)	(0.17)	(0.01)		
15	9	**7.41**	**0.25**	**-0.73**	**0.64**	0.8725	3.4356
		(0.28)	(0.09)	(0.19)	(0.01)		
15	12	**7.33**	0.17	**-1.03**	**0.64**	0.8676	3.4213
		(0.32)	(0.09)	(0.22)	(0.02)		
15	15	**7.31**	0.11	**-0.95**	**0.65**	0.8762	3.4276
		(0.28)	(0.09)	(0.15)	(0.01)		
15	18	**7.48**	0.06	**-0.95**	**0.66**	0.8994	3.4790
		(0.26)	(0.11)	(0.13)	(0.02)		
15	21	**7.55**	0.00	**-0.61**	**0.65**	0.8861	3.5213
		(0.28)	(0.10)	(0.21)	(0.01)		
15	24	**7.61**	-0.01	**-0.66**	**0.64**	0.9480	3.5652
		(0.28)	(0.09)	(0.22)	(0.01)		

Bold typeface indicates significance at the 5 percent level, standard errors in parentheses.

Table 2 (continued)

n	m	Π^*	β	Y	ρ	p-*value*	*SER*
18	0	**7.77**	**0.46**	**-0.63**	**0.64**	0.9088	3.4629
		(0.47)	(0.09)	(0.16)	(0.02)		
18	3	**8.02**	**0.56**	**-1.06**	**0.61**	0.8887	3.4380
		(0.48)	(0.07)	(0.13)	(0.02)		
18	6	**7.60**	**0.43**	**-0.81**	**0.63**	0.8952	3.4504
		(0.44)	(0.10)	(0.18)	(0.02)		
18	9	**7.84**	**0.48**	**-1.01**	**0.60**	0.8809	3.4059
		(0.44)	(0.09)	(0.16)	(0.02)		
18	12	**8.01**	**0.41**	**-1.18**	**0.60**	0.8515	3.4051
		(0.48)	(0.08)	(0.19)	(0.02)		
18	15	**7.93**	**0.36**	**-0.97**	**0.63**	0.8571	3.4293
		(0.41)	(0.07)	(0.15)	(0.01)		
18	18	**8.02**	**0.32**	**-0.94**	**0.63**	0.8655	3.4480
		(0.39)	(0.09)	(0.12)	(0.01)		
18	21	**7.88**	**0.28**	**-0.67**	**0.63**	0.8802	3.4913
		(0.39)	(0.09)	(0.22)	(0.01)		
18	24	**8.39**	**0.29**	**-0.67**	**0.61**	0.8688	3.5347
		(0.37)	(0.09)	(0.22)	(0.01)		
21	0	**8.62**	**0.67**	**-0.79**	**0.61**	0.9248	3.4782
		(0.99)	(0.08)	(0.16)	(0.02)		
21	3	**8.31**	**0.64**	**-0.96**	**0.60**	0.9412	3.4572
		(0.76)	(0.06)	(0.14)	(0.02)		
21	6	**8.53**	**0.68**	**-0.89**	**0.59**	0.9214	3.4496
		(0.96)	(0.08)	(0.19)	(0.02)		
21	9	**10.19**	**0.74**	**-1.06**	**0.55**	0.8714	3.3757
		(0.96)	(0.06)	(0.14)	(0.02)		
21	12	**10.21**	**0.71**	**-1.20**	**0.55**	0.8570	3.3855
		(1.26)	(0.07)	(0.16)	(0.02)		
21	15	**9.28**	**0.64**	**-0.89**	**0.59**	0.8810	3.4273
		(0.75)	(0.06)	(0.15)	(0.02)		
21	18	**9.62**	**0.60**	**-0.92**	**0.59**	0.8327	3.4600
		(0.86)	(0.07)	(0.15)	(0.02)		
21	21	**8.46**	**0.52**	**-0.56**	**0.62**	0.9086	3.4708
		(0.70)	(0.10)	(0.21)	(0.02)		
21	24	**9.40**	**0.57**	**-0.62**	**0.60**	0.8803	3.5149
		(0.75)	(0.09)	(0.20)	(0.01)		
24	0	**9.13**	**0.60**	**-0.53**	**0.62**	0.9047	3.5428
		(0.71)	(0.06)	(0.18)	(0.01)		
24	3	**8.03**	**0.60**	**-0.97**	**0.60**	0.9681	3.5350
		(0.65)	(0.06)	(0.14)	(0.01)		
24	6	**8.35**	**0.63**	**-0.85**	**0.59**	0.9429	3.5255
		(0.84)	(0.07)	(0.16)	(0.01)		
24	9	**9.45**	**0.72**	**-1.16**	**0.55**	0.9367	3.4444
		(0.91)	(0.06)	(0.11)	(0.01)		
24	12	**10.99**	**0.74**	**-1.40**	**0.50**	0.8547	3.4194
		(1.20)	(0.06)	(0.15)	(0.02)		
24	15	**10.48**	**0.69**	**-1.13**	**0.54**	0.8800	3.4688
		(0.62)	(0.05)	(0.11)	(0.01)		
24	18	**9.90**	**0.63**	**-1.15**	**0.55**	0.8879	3.5205
		(0.46)	(0.04)	(0.13)	(0.01)		
24	21	**9.01**	**0.54**	**-0.77**	**0.60**	0.9092	3.5256
		(0.63)	(0.08)	(0.16)	(0.01)		
24	24	**9.43**	**0.59**	**-0.69**	**0.61**	0.9243	3.5421
		(0.60)	(0.07)	(0.20)	(0.02)		

Bold typeface indicates significance at the 5 percent level, standard errors in parentheses.

economy to various internal and external shocks and may be indicative of less mature markets and institutions.

All the coefficient estimates are highly significant, with the estimate of ρ suggesting moderate interest rate inertia of nearly 60 percent. The implied inflation target is 4.68 percent and is within the range of most recently published inflation targets of the BSP and the government, although we note that this estimate seems to be rather unstable across different target profiles, unlike that of the smoothing parameter. The corresponding 99 percent confidence interval for the implied inflation target is [2.97 percent, 6.39 percent].

We obtain a β that is significantly above unity here, implying that the BSP responds effectively enough to curb inflation and prevent the real interest rate from falling whenever inflationary expectations one-quarter ahead are above target. However, since this result is contingent on the target profile that we adopt, and indeed in the majority of cases β is lower than unity, we are not very confident of this result.

We find that α is significantly negative, and thus we have a curious mix in which the BSP is stabilizing expected inflation but accommodating the expected one-quarter-ahead output gap, impervious to the inflationary pressure this would later on exert. This estimate is rather convincing, given that all the other target profiles have this same sign.

These observations on the primary coefficients of interest may indeed be illumined by checking if the coefficient estimates are consistent within subperiods in our sample. We include dummies in (6) corresponding to the periods covered by the three monetary policy frameworks adopted by the BSP during our sample. We interpret these estimates with caution since we are in effect further trimming what is already a rather short sample.

We now see in the upper part of Table 3 that there have been distinctive changes in all the parameter estimates, most notable of which is for β, significantly above unity only in periods 1 and 3. The coefficient on the output gap is very negative in period 1 but not significantly so in period 3 and even moderately positive in period 2. Taken together, these estimates broadly suggest that monetary authorities were bent on reining in on inflation in period 1, probably because it had to meet the hard inflation targets that went with the IMF loan program, to the extent that it had to sacrifice stabilizing the output gap, which was negative all throughout this period. The estimates for period 2 show an accommodative stance to inflationary expectations, resulting in higher inflation with pronounced swings, although the modest concern for the output gap held this in check. The shift to inflation targeting in period 3 was indeed accompanied by strong responses to inflationary pressures and an apparent disregard of output deviations from trend.

The implied inflation targets are declining across time, consistent with increased concern over price stability, with the estimate for period 3 not significantly different from 4 percent, the lower end of the BSP's most recent inflation target. We note, however, that unreliable implied inflation-rate targets are more likely the casualty in this exercise, in as much as π^* interacts with β in α and that it is contingent on the particular long-run equilibrium real interest rate that we use. We still see hints of interest rate smoothing, and even though the estimate of ρ for period 3 is rather explosive, we find that it is not significantly different from unity. This is consistent with the noticeable stasis in the overnight RRP rate during this period.

Table 3. Comparison of subsample estimates and testing for forward-looking behavior

	Π	β	Y	ρ	θ	p-*value*	*SER*
Baseline specification							
I	**11.02**	**2.37**	**-4.02**	**0.51**		0.9746	3.2681
	(0.63)	(0.25)	(0.47)	(0.02)			
II	**6.93**	**0.62**	**0.36**	**0.33**			
	(0.58)	(0.06)	(0.09)	(0.06)			
III	**2.96**	**1.83**	-1.10	**1.26**			
	(0.75)	(0.36)	(1.01)	(0.18)			
Backward-looking specification							
I	6.58	**1.33**	**-0.98**	**0.55**		0.9644	3.2370
	(3.46)	(0.34)	(0.45)	(0.02)			
II	4.27	**0.76**	**0.58**	**0.44**			
	(2.88)	(0.14)	(0.16)	(0.09)			
III	**3.11**	-1.29	-0.01	**0.89**			
	(0.64)	(2.69)	(2.23)	(0.14)			
Lagged inflation added to baseline specification							
I	**8.33**	**2.53**	**-4.56**	**0.50**	**-0.53**	0.9794	3.3298
	(1.65)	(0.39)	(0.57)	(0.03)	(0.26)		
II	**9.85**	**0.64**	**0.32**	**0.31**	-0.12		
	(3.93)	(0.10)	(0.12)	(0.06)	(0.16)		
III	14.45	**1.19**	-0.33	**1.40**	0.63		
	(32.90)	(0.45)	(0.75)	(0.23)	(0.50)		

Bold typeface indicates significance at the 5 percent level, standard errors in parentheses.

We compute for the implied interest rate target from our baseline specifications and plot it together with the overnight RRP rate in Figure 4. We observe that the interest rate target series recovered from the whole sample estimation does a good job of capturing the broad movements in the overnight RRP rate, while the one recovered from the subsample estimation is more pronounced and follows the actual policy rate more closely, with the possible exception of period 3.[11] This is supported by correlation coefficients, measured on the whole sample and by subperiods, presented in the upper part of Table 4. On the other hand, plotting the two rate-target series with inflation in Figure 5 shows that the interest-rate target recovered from the whole sample estimation merely mimics the movement of inflation, albeit at an evident lead. Here we see that the rate-target series recovered from estimation by subperiods is not as responsive to the inflation swings of period 2 as the other rate-target series is, although this is probably in keeping with the apparent

[11] Both rate targets belatedly anticipate the hike in the actual rate on March 1995 and are noticeably higher until the end of 1995. We suspect that this may be caused by an indistinct transition or an imprecisely dated breakpoint, which we cannot distinguish a priori.

Figure 4

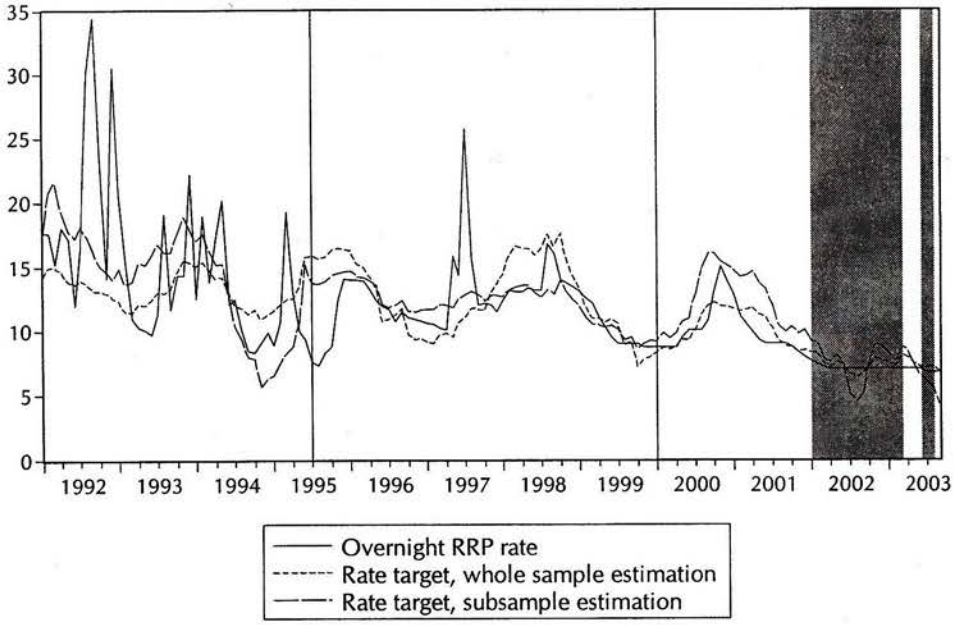


Figure 5

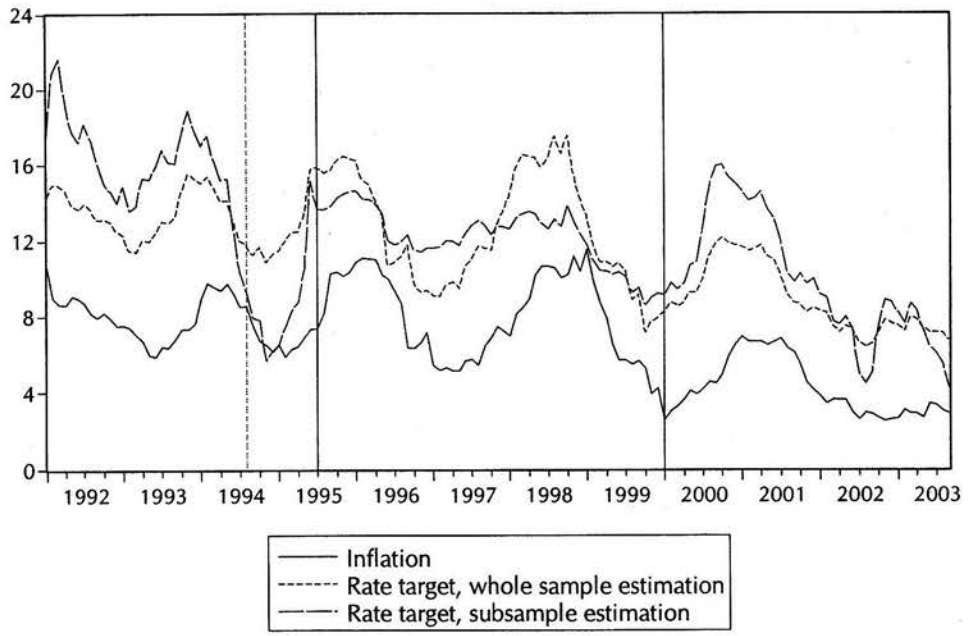


Table 4. Correlation between the overnight RRP rate and implied interest rate targets

Sample		*I*	*II*	*III*
Baseline specification				
Whole sample estimation	0.5217	0.2908	0.2913	0.8884
Subsample estimation	0.6037	0.4115	0.3848	0.8687
Backward-looking specification				
Whole sample estimation	0.4899	0.2880	0.2262	0.6042
Subsample estimation	0.5494	0.4157	0.4286	-0.6017
Lagged inflation added to baseline specification				
Whole sample estimation	0.5240	0.2975	0.2938	0.8862
Subsample estimation	0.6067	0.3865	0.3694	0.8453

accommodative stance taken by the BSP during this interim. We thus suppose that the baseline specification estimated by subperiods responds more favorably to information other than future inflation.

With regard to the sensible point that there are other monetary policy instruments available to the BSP that it may take advantage of in deference to using the overnight RRP rate, we further find that the interest rate target series estimated by subperiods indeed catches some of those occasions. One such case is the substantial 3 percent reduction in reserve requirements on 15 August 1994, the biggest in a series of cuts and marked by a broken line in Figure 5, which seems to have been captured by the dip in the implied rate-target series.

In another significant event, the BSP introduced on 17 January 2002 a three-tier sliding rate schedule for banks' overnight RRP placements, coincident with a 2 percent cut in the liquidity reserve requirement, that was lifted on 19 March 2003 and immediately followed by a 1 percent hike in the same liquidity reserve requirement. This tiering scheme was shortly restored from 15 June 2003 to 28 August 2003. The timing of these two events is illustrated as shaded areas in Figure 4. We see that these two monetary policy actions were largely depicted by movements in the interest rate target series, noting that the actual (initial tier) policy rates hardly moved.

We now try to verify if the forward-looking assumption we made is indeed reasonable. We first estimate a backward-looking version of the baseline specification with the immediate lag of inflation and the one-quarter lag of the output gap used instead of our chosen target profile. We then reestimate the original baseline specification but now include an additional term in the reaction function—the immediate lag of inflation—meant to see if this added variable significantly affects the coefficient estimates.

Tables 5 and 3 feature a comparison of the resulting estimates for the whole sample and by subperiods. We simply note that we get noisier coefficient estimates in the backward-looking versions and that the estimates of β, γ, and ρ in the forward-looking specifications

Table 5. Testing for forward-looking behavior, whole sample estimation

Π^*	β	Y	ρ	θ	p-*value*	*S.E.R.*
Baseline specification						
4.68 (0.87)	**1.13** (0.05)	**-0.26** (0.10)	**0.58** (0.01)		0.9058	3.2374
Backward-looking specification						
0.80 (6.66)	**0.93** (0.07)	-0.06 (0.09)	**0.64** (0.02)		0.9836	3.2878
Lagged inflation added to baseline specification						
7.88 (9.60)	**1.08** (0.10)	**-0.24** (0.11)	**0.59** (0.02)	0.04 (0.08)	0.9091	3.2478

Bold indicates significance at the 5 percent level, standard errors in parentheses.

that included lagged inflation did not differ too much from the baseline specifications. Moreover, we observe that in the whole sample estimation, lagged inflation is positive yet insignificant, but turning to the estimation by subperiods we find that this was significant in period 1, although the unexpected negative sign may be related to the increase in the corresponding β estimate, similar to the decreases in β that accompany the positive estimates of θ in the whole sample and in period 3.

We recover the implied interest rate target series and plot it in Figures 6 and 7. We do not include the baseline versions because they are very similar to that of the specifications with lagged inflation included in the reaction function, indicated by more or less similar correlation coefficients vis-à-vis the overnight RRP rate in Table 4 and confirmed by comparative correlations of 0.9997 for the whole sample estimation and 0.9737 for the estimation by subperiods. We, however, see significant departures from the baseline versions for the backward-looking specifications, with the rate-target series derived from the whole sample estimation exhibiting a clear lag and uniformly lower correlations with the overnight RRP rate. We find a similar lag for the rate-target series recovered from the subsample estimates in period 1 until the first half of period 2 and completely opposite turns in period 3, with a correlation coefficient of -0.60. These plots and correlation coefficients by and large lend support to our forward-looking assumption, especially for the latter periods. We differ in this result from Clarida, Galí, and Gertler [2000] who find that a backward-looking specification performs just as well as a forward-looking one for the US Federal Reserve, although this may well be a case of rather well-behaved inflationary expectations.[12]

We now try to see if the parameter estimates will be significantly affected by the inclusion of other variables that may also be monitored and responded to by monetary

[12] As argued in footnote 4.

Figure 6

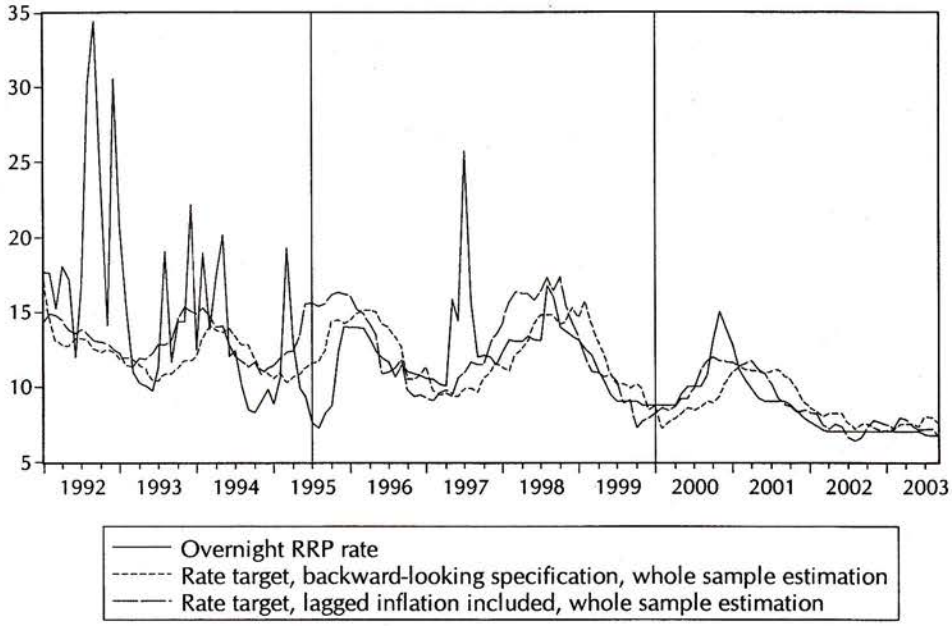
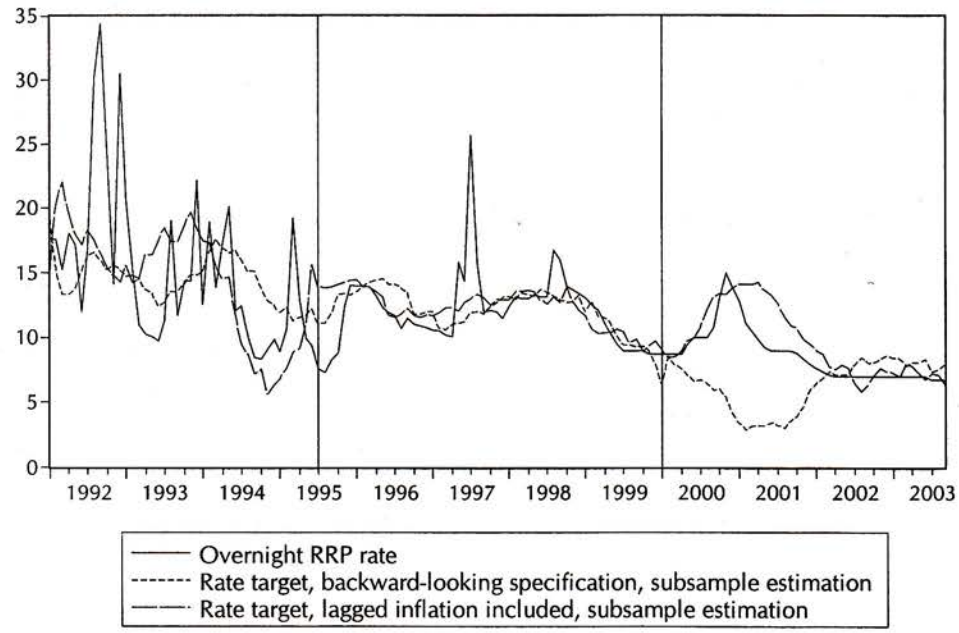


Figure 7



authorities, not necessarily in connection with the information they contain about future output and inflation. We individually include the contemporaneous values of the monthly percentage change of the real effective exchange rate index, the Federal funds rate, and the money supply growth in the baseline specification.[13] Gochoco-Bautista [2001] argues that exchange-rate stabilization appears to be an important concern of the BSP, while some authors argue that there is a certain "herd" behavior involved in the setting of interest rates, anchored on the largest economy—the United States. In turn, money supply growth is the primary channel by which monetarists control inflation.

In Table 6 it is apparent that the parameter estimates changed little if indeed they did, except for the noisier estimates of π^*. The coefficient estimates of the new variables included are practically insignificant, although the standard errors are much lower for the REER index and money supply growth. What this may imply is that monetary authorities are unperturbed by changes in such variables per se, apart from the information they contain about the inflation outlook and on a whole sample basis at least. What remains to be seen, however, is whether this robustness with respect to these particular omissions is borne within sample.

We explore the possibility of sustained money supply growth and the contemporaneous change in the REER index being additional drivers of the BSP's monetary policy by subperiods and present the relevant comparisons in Table 7. We still find stable point estimates for β and γ with respect to its sign and significance, although the coefficient on expected inflation for period 3 is now only significant at the 10 percent level when we include money supply growth in the reaction function. The changes in magnitude of the parameter estimates from those of the baseline specification are largely within the overlap of applicable confidence intervals.[14]

The implied inflation targets are also stable with the inclusion of the change in the REER index but only for period 3 in the other specification. The point estimates of the smoothing parameter are rather still high in period 3 for both, although values lower than unity are still not rejected.

We obtain significant estimates of θ only in period 1 for the REER index and only in period 2 for money supply growth. The sign of θ referring to money supply growth is negative in all three subperiods, suggesting a more probable accommodative stance toward the M1 monetary aggregate, contrary to the prescription of the traditional monetarist policy framework formally adopted by the BSP for so long. The insignificance of the coefficient on the REER index in periods 2 and 3 roughly indicates the abandonment by the BSP of its

[13] Comparison of the SER for the different quarterly target profiles of inflation and the output gap when the REER index, the Federal funds rate, and money supply growth were individually included in the whole sample estimation of the baseline specification affirmed the selection of three months for both n and m.

[14] We also conducted Wald tests of equivalence between the coefficients of different subperiods to check on between-subsample stability of estimates, although we have assumed outright that the three subperiods we have defined are sufficiently distinct from one another. We did obtain a number of equivalencies; however, for our particular sample, we did not deem this exercise as informative since we ended up with interest-rate targets that were very much identical to those we report here after applying the resulting restrictions.

Table 6. Testing for significance of other variables, whole sample estimation

Π^*	β	Y	ρ	θ	p-*value*	*S.E.R.*
Baseline specification						
4.68 (0.87)	**1.13** (0.05)	**-0.26** (0.10)	**0.58** (0.01)		0.9058	3.2374
Money supply growth added to baseline specification						
7.10 (1.54)	**1.16** (0.05)	**-0.26** (0.10)	**0.58** (0.01)	0.02 (0.02)	0.9396	3.2516
Percentage change in the REER index added to baseline specification						
4.51 (1.06)	**1.11** (0.05)	**-0.25** (0.10)	**0.58** (0.01)	0.04 (0.03)	0.8967	3.2527
Federal funds rate added to baseline specification						
4.71 (4.17)	**1.14** (0.10)	**-0.37** (0.17)	**0.58** (0.02)	-0.02 (0.14)	0.9740	3.2488

Bold typeface indicates significance at the 5 percent level, standard errors in parentheses.

Table 7. Testing for significance of other variables, subsample estimation

	Π^*	β	Y	ρ	θ	p-*value*	*S.E.R.*
Baseline specification							
I	**11.02** (0.63)	**2.37** (0.25)	**-4.02** (0.47)	**0.51** (0.02)		0.9746	3.2681
II	**6.93** (0.58)	**0.62** (0.06)	**0.36** (0.09)	**0.33** (0.06)			
III	**2.96** (0.75)	**1.83** (0.36)	-1.10 (1.01)	**1.26** (0.18)			
Money supply growth added to baseline specification							
I	**8.37** (1.00)	**2.79** (0.32)	**-3.52** (0.52)	**0.51** (0.03)	-0.15 (0.09)	0.9090	3.3275
II	**11.52** (1.01)	**0.43** (0.06)	**0.54** (0.10)	**0.16** (0.06)	**-0.12** (0.03)		
III	**2.62** (0.77)	2.57 (1.52)	-0.54 (1.36)	**1.17** (0.21)	-0.07 (0.10)		
Percentage change in the REER index added to baseline specification							
I	**10.40** (0.71)	**2.66** (0.38)	**-4.22** (0.57)	**0.51** (0.03)	**-0.54** (0.14)	0.9606	3.3137
II	**7.05** (0.53)	**0.63** (0.07)	**0.34** (0.10)	**0.27** (0.06)	-0.01 (0.04)		
III	**2.83** (0.81)	**1.90** (0.40)	-0.34 (0.91)	**1.29** (0.20)	0.28 (0.38)		

Bold typeface indicates significance at the 5 percent level, standard errors in parentheses.

widely believed practice of foreign exchange market intervention to strengthen the local currency.

The coefficient estimate for the contemporaneous monthly percentage change in the REER index is strongly negative in period 1 and is an overwhelming evidence of exchange rate stabilization during this time. Looking at the monthly movements of the trade-weighted REER index and the nominal peso-dollar exchange rate in Figure 8, we see that the nominal exchange rate moved rather narrowly during period 1, in tune with conventional belief that it was effectively pegged before mid-1997. The episodes of real currency depreciation depicted by shaded areas in Figure 8 indeed coincided with abrupt hikes in the overnight RRP rate. We notice that no similar episodes occurred after mid-1995 in the run-up to the Asian financial crisis.

With regard to money supply growth, the slightly negative coefficient in period 2 affirms the passive stance taken by the BSP during this period, together with a weak response to inflationary expectations. The overnight RRP rate was indeed not sufficiently raised in the first half of period 2 even if Figure 9 depicts sustained M1 growth during this time. The negative output gap in the second half of period 2 coincided with a downward trend in the policy rate, which may explain the positive γ estimate.

It may well be said that the adoption of the inflation-targeting framework in period 3 has resulted in a more consistent aversion to inflation, as embodied in the computed β estimate, to the exclusion of other concerns, although the purported slack in the economy after the

Figure 8

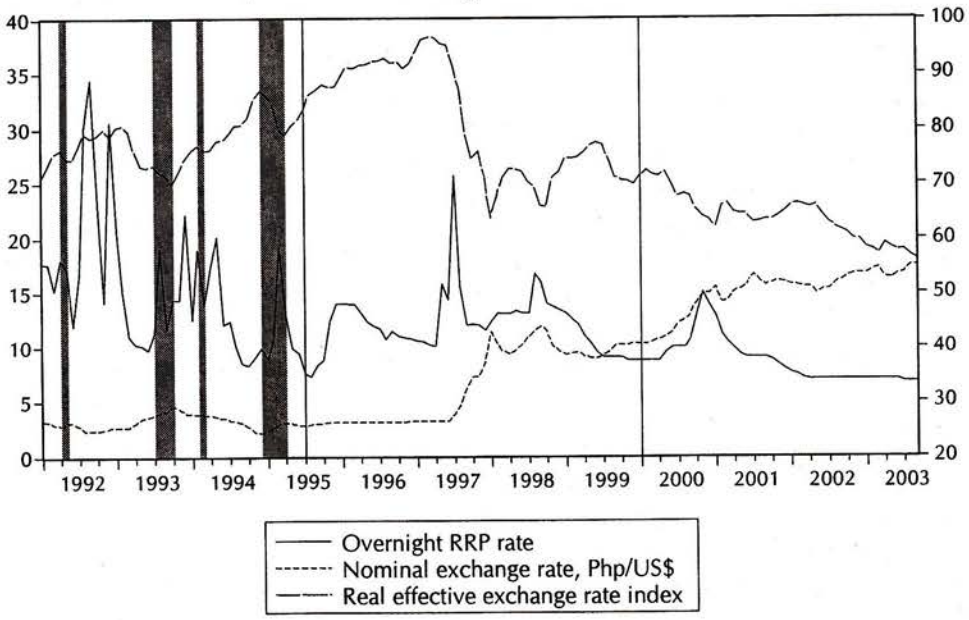
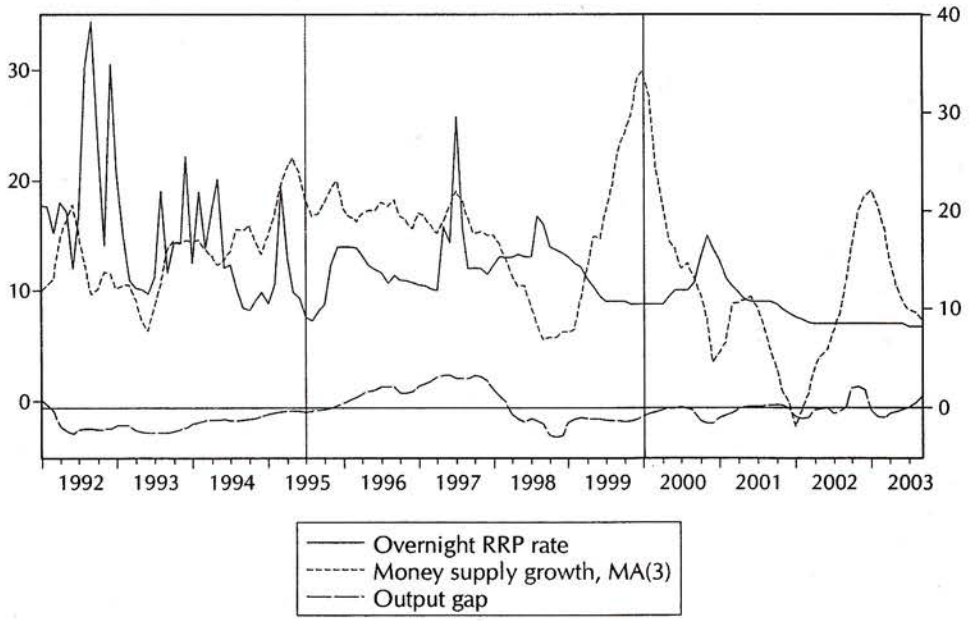


Figure 9



Asian financial crisis may well be the primary reason for tamer inflation. Although the coefficient on the output gap is not significant in this period, the point estimate is nevertheless consistently negative, indicative of accommodation, which the BSP has formally acknowledged and pursued starting November 2000 [BSP 2004].

We now plot the implied interest rate target series for the subsample estimation of the two specifications in Figure 10. We exclude the derived series for the whole sample estimation because it is very much similar to that of the baseline specification, proof of which are the similar correlation coefficients vis-à-vis the overnight RRP rate presented in Table 8 and comparative correlation values above 0.9975, rightly so given that we found the included variables insignificant. We note that the rate-target series from the baseline estimation by subperiods is also very similar to the two expanded specifications with correlation values above 0.9745.

We observe that some abrupt overnight RRP rate movements, depicted by shaded areas in Figure 10, were not captured by the implied interest rate target series, thus qualifying as exogenous interest rate shocks. We attribute the sharp upturns in the second half of 1992 as brought about by market concerns on the ensuing energy crisis, that in mid-1997 as the response to the currency speculation that ensued after the devaluation of the Thai baht (an action that was not sustained given the inevitabilities of the situation), and the uptick in August and September 1998 as reactions to the political issue of the time (President Estrada's willingness to allow the burial of President Marcos at the National Heroes' Cemetery). Note that this was not the case during the political uncertainty that hovered over the country from mid-2000 to early 2001, with the situation now in reverse, the overnight RRP rate being

Figure 10

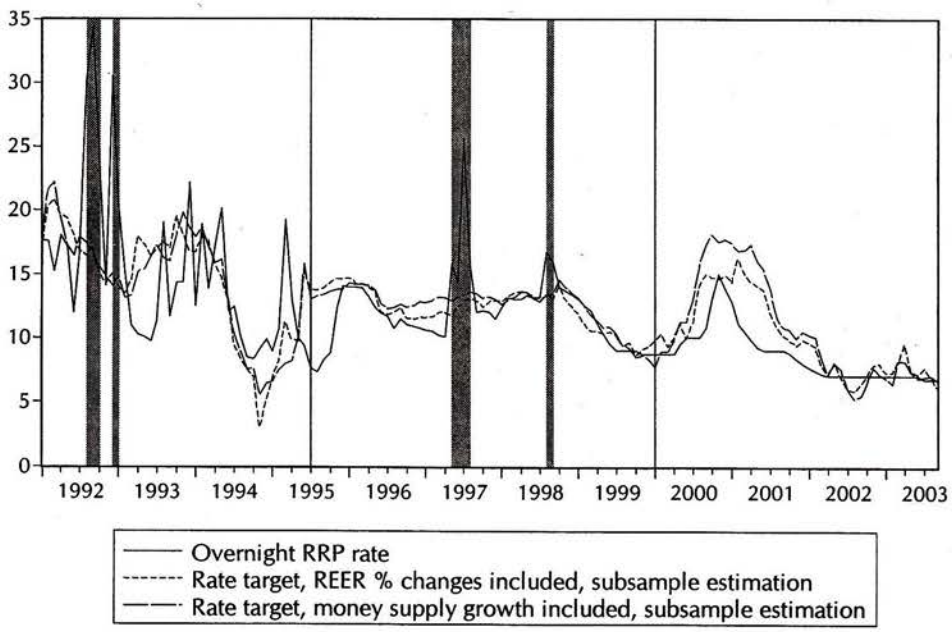


Table 8. Correlation between the overnight RRP rate and implied interest rate targets

Sample		*I*	*II*	*III*
Baseline specification				
Whole sample estimation	0.5217	0.2908	0.2913	0.8884
Subsample estimation	0.6037	0.4115	0.3848	0.8687
Money supply growth added to baseline specification				
Whole sample estimation	0.5192	0.2685	0.2839	0.8824
Subsample estimation	0.5820	0.4160	0.4759	0.8821
Percentage change in the REER index added to baseline specification	0.5188	0.2865	0.2827	0.8846
Whole sample estimation	0.6014	0.4053	0.3868	0.8630
Subsample estimation				

lower than target. A possible explanation is that the rate-target series are picking up concerns over the pump-priming activities done by the government starting mid-1999, evident in the rise of money supply growth, which was already resulting in higher inflation. The actual rates dovetail with the BSP's adoption of an accommodative monetary stance beginning November 2000.

Given this robustness of results and the intuitive interest rate targets implied by our model, we find generous empirical support for interest-rate targeting as a demonstrative instrument of monetary policy for the BSP even during periods when the monetary policy framework in place was different from inflation targeting.

However, as Svensson [2001] argues, given the simple and mechanical nature of the rule we estimate and the wider information set available to monetary authorities, situations do arise in practice when deviations from such a rule are indeed called for or are at least reasonable. In fact, he notes that no central bank has ever bound itself to such an explicit interest rate targeting rule, protective of its right to exercise discretion and reflecting the availability of other policy instruments it can put to use toward achieving its goal. The good empirical fit that we obtain may after all be consistent with the reaction function being a reduced-form version of a complex and elaborate decision-making process. It is in this regard that we consider our results as rule-of-thumb estimates, in that on the average, it is sufficient to look at the near-term inflation and output gap outlook to predict movements in the key policy rate that go hand in hand with the monetary policy stance.

We hasten to add, however, that we do not say here that other policy instruments are irrelevant or even unimportant with respect to determining the monetary policy stance; we are simply acknowledging the representative character of overnight RRP rate adjustments for monetary policy given a near-term forecast horizon. This is important to note given that monetary aggregate targeting works at a considerable lag of at least a year, and thus the target profile that we have adopted may be inhospitable to finding the significance of this alternative, if not joint, policy lever.

Moreover, it may well be the case that the model we use is particularly suited to developed countries that use interest-rate setting as the primary policy tool,[15] due to the presence of likewise developed markets—financial, most importantly—and stable economic relationships that in turn lead to stable expectations of future economic outcomes. Thus even if we get intuitive results here, it does not preclude the existence of a more apt depiction of the BSP's monetary policy behavior that specifically incorporates the use of various policy instruments.[16]

5. Conclusion

We find support in this paper for characterizing monetary policy in the Philippines by its central bank's (BSP) interest-rate setting behavior. The relevant forecast horizon we obtain is rather short at one quarter, which may be indicative of less mature markets and the

[15] Clarida, Galí, and Gertler [1998] find this true for the Federal Reserve and the Bank of Japan, and demonstrate that even though the Bundesbank has been claiming the practice of monetary aggregate targeting, its interest-rate setting behavior has been more reflective of its avowed monetary policy stance.

[16] Svensson [2001] indicates that similar exercises in the literature like ours have explained at best two-thirds of the interbank lending rate movements. We note that the adjusted R2 of both our baseline specifications and its extensions have been just above 0.50.

susceptibility of the economy to various shocks. This forward-looking behavior is demonstrated more convincingly in recent periods.

During the sample period studied, the monetary response to inflationary expectations away from target was observed to be stabilizing, although a subsequent subperiod analysis points to a rather accommodative stance practiced in the interim, before the adoption of the inflation-targeting framework.

In contrast, the output gap is largely accommodated by the BSP, although this result is strongest in earlier periods and even slightly reversed in the interim.

The real effective exchange rate, Federal funds rate, and money supply (M1) growth per se are not significant concerns of the BSP on the whole relative to the near-term outlook on inflation and the output gap, although subsample analysis suggests conduct of exchange rate stabilization from 1992 to mid-1995 and then money supply growth accommodation until 1999.

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