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What Drives Monetary Policy?

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Abstract

Under its charter, the mandated duty of the BSP is to maintain price stability, yet there are many ways of translating this objective into a workable framework for monetary policy. Under the monetarist framework that forms the basis of the IMF's financial programming approach, including its program with the Philippine Government, this means that controlling the growth of the money supply is key to controlling inflation. This is the basic approach that has been in use in the Philippines since the mid-1980s.

This study is an attempt to understand how monetary policy is conducted today, if and how it differs from the manner it was conducted in the past, whether monetary authorities are faithful to the tenets of the theories they say underlie their framework, and whether any lessons have been learned at least since the onset of the Asian financial crisis in July 1997.

The basic finding is that the framework being used by the monetary authorities currently cannot be described as monetarist in the tradition of QTM. The results of the Granger tests performed, albeit a crude form of empirical testing, tend to support the hypothesis that what drives monetary policy in this country is basically concerns over the exchange rate. It appears that the authorities use monetary growth reactively, to set a floor on the rate of peso depreciation directly, as a way to ultimately control the rate of inflation.

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What Drives Monetary Policy?

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1 Introduction

For most central banks, price stability is a central objective. Yet, there are many ways to translate this objective into a workable framework for monetary policy. Consider, for example, the following:[1] The ultimate goal of the Bundesbank, as written in its charter, is the 'safe-guarding of the currency' but its strategy emphasizes annual target rates of change of the money supply than of the price level; the Bank of Japan announces 'projections' of M2 money growth but studies have shown that these are not monetarist targets; Canada has given legal status to explicit annual price level targeting; while New Zealand uses an inflation targeting framework which includes, among other things, tying the salary of the central bank governor to success at eliminating inflation.

In its charter, the mandated duty of the Bangko Sentral ng Pilipinas (BSP) is to maintain price stability. Under the monetarist framework that forms the basis of the IMF's financial programming approach, including its program with the Philippine Government, this means that controlling the growth of the money supply is key to controlling inflation. This is the basic approach has been in use in the Philippines since the mid-1980s.

Despite an improvement in the availability of data and in the degree of openness with respect to some pronouncements by Bangko Sentral ng Pilipinas (BSP) officials, including access to the Bank's website, the manner in which monetary policy is conducted, and the motivations for and the timing of actions taken by the monetary authorities are not well understood.

It is important to understand what drives monetary policy, the theoretical underpinnings of its framework and the consistency with which this framework is operationalized. There is always a signal extraction problem in this, yet the signal that the market extracts, whether correct or not, obviously has far-reaching implications on market outcomes, the state of the economy, and the credibility of monetary authorities. When there is a lack of transparency and a dearth of information, the costs associated with acquiring information and a better understanding of policies that largely determine the incentive system faced by market participants or the state of market fundamentals, such market participants are more likely to be susceptible to herding behavior or to make unwise investments.

This study is an attempt to understand how monetary policy is conducted today, if and how it differs from the manner it was conducted in the past, whether monetary authorities are faithful to the tenets of the theories they say underlie their framework, and whether any lessons have been learned at least since the onset of the Asian financial crisis in July 1997. It uses a study written by Guinigundo (2000) as a source for much of the discussion on the implementation of monetary targeting in the Philippines from the late 1980s to the present. Other sources of information include conversations with monetary officials and official pronouncements available on the BSP

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[1] Frankel, 1993, p.30.

website. Year-on-year (y-o-y) average of monthly data for the years 1997-2000 are used in the empirical work.

2 The Conduct of Monetary Policy

2.1 The Monetary Framework I: 1980s to the Early 1990s

From an operational perspective, a stable and predictable relationship between monetary growth and inflation is assumed to exist. Consider the Quantity Theory of Money (QTM) equation of exchange MV=PY, where M is the stock of money, V is the income velocity of money, P is the price level, and Y is the level of real income or output. Given target values for the rate of inflation, real GNP growth, and estimates of the income velocity of money, the rate of growth of the money supply can then be derived (residually) to ensure equilibrium in the money market.

The choice of the particular monetary aggregate to use is an empirical issue. In theory, a narrower monetary aggregate would be assumed to have a closer link to inflation, as narrow money is held primarily for transactions purposes while broader money measures partly reflect the holding of money as a store of wealth. This was the result obtained in a previous study of mine (1993) in which only M1 was cointegrated with interest rates, output, and the exchange rate. The results of Guinigundo's study likewise imply that narrower monetary aggregates are to be preferred as targets since broader aggregates tend to adjust more slowly towards equilibrium after a shock. [2]

Despite such evidence, however, the BSP uses M3 or total liquidity as its intermediate target, intermediate because the ultimate target is, of course, the rate of inflation. In order to have control over its intermediate target, the BSP must have an operating target with which to affect M3. The BSP's operating target is base money (BM), defined as reserve money (RM) plus reserve-eligible government securities, liquidity reserves, and reserve deficiency.[3] BM is related to M3 via the money multiplier i.e.,

$$M3 = \text{money multiplier} \times BM$$

Once M3 is known, from the simple QTM equation of exchange, BM can be obtained by dividing M3 by the money multiplier.

Hence, there are two key relationships in attaining the ultimate goal, the control of inflation. These are (1) the relationship between the intermediate target or M3, and inflation and (2) the relationship between the operating target or BM, and the intermediate target, M3.

Guinigundo states that large fluctuations in velocity have weakened, and in some cases, broken down the relationship between monetary aggregates and their ultimate goal variables. He claims that financial liberalization in 1993 weakened the two key relationships mentioned above. He cites, in particular, the deceleration in the rate of inflation from 9 percent in 1994 to 8.1 percent in 1995, despite the historically high rates of liquidity growth in 1994 and 1995, as a break from the

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[2] Guinigundo, 2000, p. 11.

[3] In the balance sheet of the BSP, BM is on the liabilities side. BM is equivalent to net foreign assets (NFA) and net domestic assets (NDA) on the assets side.

past. He attributes the good inflation performance in part to supply side factors such as the favorable agricultural harvest in 1994 and the easing of power shortages.

Nevertheless, his study seems to belie that fluctuations in velocity have occurred to a degree that would render it unpredictable by the authorities, that the two key relationships have weakened, and that supply side factors are very important for the good inflation performance in the period.

He tests the stability of the income velocity of money and finds that the first difference of income velocity is stationary. This means that its growth rate is predictable, even though its level is not, as it contains a unit root. It is incorrect to interpret the QTM equation of exchange as assuming a stable income velocity of money in terms of a **constant** income velocity of money.[4] His results imply that the growth rate of income velocity is stable and, therefore, would not potentially pose a problem as far as the reliability of monetary targeting achieving the goal of price stability.

He finds that the money demand equation has remained stable despite financial liberalization and other shocks in the period 1986-1999 such as large capital inflows. In particular, all monetary aggregates, with the exception of reserve money, are cointegrated with output and the interest rate. This means that there is a long-run relationship between money, on the one hand, and output and interest rates, on the other, so that even if there are shocks to the economy, the variables will return to their trend equilibrium levels. Although financial liberalization and economic growth may have led to changes in the money multiplier, for example, this does not mean that the money demand relationship is no longer stable and predictable. The money multiplier increased beginning in 1993 after financial liberalization, as the currency to deposit ratio declined in the face of economic growth and technological innovations such as electronic banking.

As for the role of supply side factors in inflation, simulations of Guinigundo's non-core inflation equation, which purportedly account for the role for supply-side factors in inflation, produce an average non-core inflation rate in the period January 1990-June 1999 of about one percentage point. In contrast, demand side factors and his core inflation equation accounted for about 8.7 percent of annual inflation on average. Hence, if one accepts this dichotomy between demand and supply side influences on inflation, as well as the legitimacy of running such regressions to predict inflation, his results imply that inflation is a monetary phenomenon. If so, given the marginal effect of supply side factors on average inflation over the period, one can question the importance of such supply side factors in the good inflation performance in the face of what he refers to as 'historically high' liquidity growth rates in 1994 and 1995.

From the evidence presented, therefore, there seems to be little justification for abandoning the monetary targeting approach.

2.2 The Monetary Framework II: June 1995 to the Present

The BSP does not claim to have abandoned monetary targeting. Nevertheless, the supposed weakening of the key relationships underlying the monetary targeting framework led the BSP to adopt what it calls a 'modified framework' beginning in the second semester of 1995. This modified framework apparently attempts to enhance the effectiveness of monetary policy 'by complementing monetary aggregate targeting with some form of inflation targeting, placing greater emphasis on price stability in lieu of rigidly maintaining the intermediate monetary

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[4] Guinigundo, 2000, p.8.

targets.'[5] This approach evidently 'reduces the risk of monetary policy being either too tight or too loose, as may happen with strict adherence to a traditional base money program.'[6]

Certain key modifications were introduced into the monetary targeting framework over the next four years and are covered in so-called adjustment clauses in the agreement with the IMF:

1. It appears that the main change is that the modified framework allows BM levels to go beyond target as long as the inflation targets are met. As Guinigundo states, 'As long as inflation adheres to the program monthly path, the base money limits are automatically increased by the amount of the excess of net international reserves over the program targets. This provides an automatic mechanism for the BSP to respond to unexpected increases in the real demand for money coming from improvements in the external sector of the economy.'[7]

2. 'An excess of one or more percentage points of inflation over the program induces a mopping up operation by the BSP to bring down base money to the previous month's level. If actual inflation exceeds targets for three consecutive months, then the entire monetary program is reviewed.'[8]

The question that comes to mind is what really the difference is between this modified framework minus the adjustment clauses, and the original monetary targeting framework. The phrase 'complementing monetary aggregate targeting with some form of inflation targeting' is technically incorrect as they are two distinct types of nominal anchors for monetary policy. Marrying these two procedures so that they 'complement' each other is difficult to understand.

Under a monetary aggregate targeting framework, the monetary authority fixes money growth in order to reduce expected inflation in long-run equilibrium. In so doing, the authority gives up on affecting output. The optimal growth rate of money sets Ep, where p is the log of the price level, equal to the target value for p, which is zero. This means that the log of the money supply, m, is set at Ey, where y is the log of real output, which is equal to y*, the log of the natural rate of output since in the long-run, this is the only level of output consistent with non-accelerating inflation.[9]

In contrast, under an inflation targeting procedure or a price level rule, the authorities set monetary policy so that the price level is not just zero in expectation, but is zero regardless of later shocks.[10] The price level rule eliminates the effects of demand disturbances. It can be shown that the price level rule is likely to dominate the money supply rule if velocity shocks are large and any weight is placed at all on the inflation objective. This is precisely because the one-to-one correspondence between money and prices under the QTM equation of exchange formulation, for

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[5] Guinigundo, 2000, p7.

[6] Guinigundo, ibid.

[7] Guinigundo, ibid.

[8] Guinigundo, ibid.

[9] Frankel, 1993, p.43.

[10] Frankel, 1993, p.45.

example, is not likely to hold when the income velocity of money is unpredictable. Nevertheless, as pointed out earlier, income velocity growth has been predictable.

It is unclear what theoretical basis underlies this 'monetary aggregate targeting with some form of inflation targeting' framework. Under a monetarist framework, the control of inflation relies on the control of monetary growth. This modified framework reverses this theory and states that **if** inflation is under control, **then** monetary growth can be allowed to increase. It is not a monetarist explanation of inflation at all. It seems to allow monetary authorities pleasantly surprised by good inflation figures to passively allow BM to increase. If this is so, it appears that the monetary authorities themselves seem to have all but forgotten that monetary growth is at all related to the rate of inflation, since growth in excess of monetary targets will produce inflation in the future unless the supply of output increases enough so that excess monetary growth does not create excess demand. When this future inflation will occur is not known with certainty as money growth is assumed to work with long lags. Monetary policy here is endogenous, reacting passively to good developments on the inflation front. Furthermore, the authorities do not seem to have an alternative explanation as to what drives inflation.

Base money automatically increases when there are capital inflows that tend to raise net international reserves and no sterilization measures are undertaken to reduce the expansionary effect on the money supply. In other words, the authorities do not have to do anything to raise base money when there are capital inflows because the money supply will automatically increase if no sterilization measures are undertaken. This is what the statement about 'an automatic mechanism for the BSP to respond to unexpected increases in the real demand for money coming from improvements in the external sector of the economy' implies. However, it is not quite correct to say that the BSP 'responds' by not countering the natural tendency of the money demand to increase when there are capital inflows as long as inflation is below target,' since it is **money supply** that is affected.[11] In other words, the BSP passively adapts to what is happening to the money supply as a result of capital inflows. Perhaps, the authorities do not believe that this will lead to higher inflation, which is why they are not countering the expansionary effects on money, a distinctly non-monetarist approach. In particular, it is difficult to say that the authorities are serious about targeting money.

When inflation is higher than target for three months, however, the authorities go into high gear. They undertake 'mopping up operation to bring down base money to the previous month's level if there is an excess of one or more percentage points of inflation over the program.'[12] In fact, if 'actual inflation exceeds targets for three consecutive months, then the entire monetary program is reviewed.'

It appears that while inflation targets are 'hard' targets, BM targets are not. One piece of evidence in support of this hypothesis is the fact that average annual M3 growth rates using y-o-y monthly data have consistently been much lower than annual BM growth targets. According to information obtained from the BSP website, for example, BM growth targets for 1999 and 2000 were 17 percent and 15 percent, respectively. Yet the actual growth rates of M3 in 1999 and

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[11] Net Foreign Assets (NFA) + Net Domestic Assets (NDA) = Base Money (BM). When there are capital inflows, NFA increases and, hence, BM automatically increases (and via the money multiplier, so does the money supply) unless the monetary authorities reduce NDA through sterilization measures. They can reduce NDA by contracting domestic credit through the usual 'mopping up' techniques.

[12] Guinigundo, 2000, p.7.

2000, respectively, were only 10.56 percent and 10.87 percent, respectively. This means that actual BM growth rates had to have been very much less than these two latter figures, unless the money multiplier declined by a substantial amount, which is unlikely for the period in question. Hence, it appears that the BM growth rates have been set at very high and incredible ceiling rates. They certainly do make the authorities look good, especially in the eyes of the IMF, since both BM and M3 are consistently going to overperform, or be below target, when such ceiling rates are set.

Conversations with monetary officials also seem to confirm that the BM targets are not really 'hard' targets in the sense of being monetarist targets. It is said that these very high ceilings on BM are set to give the authorities a lot of leeway. If this is so, then it is difficult to say whether the basic monetary targeting model is used at all since the actual monetary growth figures do not appear to be consistent with targets even as actual inflation targets are met or are within close range of being met. It appears that either other rules governing the conduct of monetary policy are operative and/or that the authorities conduct monetary policy with a great amount of discretion.

The modified framework was revised further to place a limit on the amount of allowable adjustment in the base money ceilings if there was an overperformance in the BSP holdings of net international reserves (NIR) as these intensified beginning in 1994. In particular, BM limits would be increased by the full amount of the first US$500M of overperformance over the NIR target, translated into pesos at the average exchange rate prevailing in the month concerned, and half by any additional overperformance.[13] This means that the authorities would not sterilize capital inflows, simply raise their BM target and accept the increase in BM in the relevant period, but that the increase in BM would be limited to the first US$500M over the NIR ceilings and then by half that amount for succeeding capital inflows. Guinigundo further states, 'Limiting the allowable adjustment in base money ceilings on account of capital inflows was another step towards greater emphasis on reining inflation **through controlling money growth**.' [14] (Emphasis mine)

3 Monetary Policy and the Exchange Rate

The openness of the economy to internationally mobile capital has given rise to difficulties in the usual conduct of monetary policy. This is because when capital is mobile, it is difficult if not entirely impossible, for the authorities to target the money supply and the exchange rate simultaneously. Attempting to fix the level of the exchange rate, for example, means that the monetary authorities have to buy dollars and hence, increase the supply of pesos, when there is an excess demand for pesos, in order to prevent the peso from appreciating in value relative to the dollar and maintain the exchange rate. However, this means that the domestic money supply will increase, *ceteris paribus*. The only way to undo the automatic effect on the money supply of the foreign exchange market intervention is to contract domestic credit or sterilize the effects of the foreign exchange market intervention on the domestic money supply. For various reasons that many authors have cited, the effects of sterilization are limited and it cannot be used indefinitely.

The importance of appreciating the theoretical consistency of targeting the growth of monetary aggregates in order to control inflation under a flexible exchange rate system is one of the lessons

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[13] Guinigundo, 2000, p.7.

[14] Guinigundo, ibid.

that should have been obvious in the aftermath of the Asian crisis of 1997. Indeed, in the aftermath of the crisis, many policymakers, including the monetary authorities, stated that they would now allow a greater degree of flexibility in the exchange rate.

In theory, the Monetary Approach to the Balance of Payments, which is really a QTM theory in an open economy context, posits that there is an automatic, self-correcting mechanism in the economy when the BOP is not in balance and the exchange rate, or the relative price of foreign exchange determined by the relative demands or both domestic and foreign currency, is not fixed. A country that exports more goods and financial capital than it imports will experience dollar inflows and a BOP surplus. The domestic currency will tend to appreciate relative to the foreign currency. However, since dollars are part of a country's NFA and hence, its base money, its money supply will automatically increase in the absence of sterilization, or a corresponding reduction in NDA. Consistent with QTM, the domestic price level will, therefore, start to rise. As this happens, the opposite process takes place: exports of good and financial capital will tend to decline, the BOP will tend to be in deficit, and the domestic currency will tend to depreciate. As dollar inflows decline, the domestic money supply will automatically decrease in the absence of sterilization, and the domestic price level will also decline. As this happens, the process starts over. This approach is based on the QTM, as inflation depends on the amount of money (domestic currency and foreign currency) in a country, and flows of specie will continue across borders as long as people are not satisfied with their holdings of domestic currency relative to foreign (which affects the price of one versus the other, or the exchange rate). Hence, adjustments automatically take place. In this approach, it is unimportant for the authorities to know what the appropriate level of the exchange rate is as market forces will gravitate toward it if unencumbered by intervention, to ensure internal and external equilibrium.

Prior to July 1997, the exchange rate was extremely stable as the authorities essentially fixed the exchange rate. As shown in Table 1, the y-o-y rate of depreciation on a monthly basis of the peso vis-à-vis the dollar was nil. In July 1997, the rate of depreciation of the peso suddenly jumped to 10.45% from practically zero the month before. Reserve money (RM) growth decelerated to 4.51 percent in July 1997, the lowest rate for the year.[15] The policy borrowing rate of the BSP, the overnight RRP rate, jumped to 25.72 percent in July 1997 from 14.36 percent in June, while the term RRP rate rose from 10.47 percent to 14.57 percent. The interest rate differential between the 91-day Treasury Bill rate and the 3 –month US treasury Bill rate widened to 7.13 percent as the 91-day Treasury Bill rate rose to 12.2 percent or about 2 percentage points from the previous month. Note that the authorities were tightening money even as the rate of inflation had in fact **declined** compared to the beginning of the year, from 5.0 percent in January 1997 to 4.77 percent in July 1997. Moreover, the monthly y-o-y rates of inflation in 1997 were all below target. What is apparent, therefore, is that the monetary authorities were reacting to the depreciation of the peso rather than the inflation rate.

For the rest of 1997, the peso continued to depreciate against the dollar. The RRP rate was about 2 to 3 percent higher than they had been prior to July 1997. Interest rate differentials between the 91-day Treasury Bill rate and the 3-month US Treasury Bill rate widened to double digits beginning in September 1997and this lasted until April 1998 as the 91-day Treasury Bill rate rose to very high levels, ranging from 15.4 percent to 17.7 percent between August and December 1997. In the face of very high interest rates, RM was allowed to grow in the double-digits between September and November 1997. In general, M3 grew at higher rates during the last half

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[15] I use RM growth rates, as BM data were unavailable. Nevertheless, RM forms the bulk of BM.

of 1997 than before the crisis, i.e., over 20 percent y-o-y on a monthly basis. This seems to be the only time in the 1997-2000 period that the monetary authorities allowed large increases in the rates of M3 growth despite the depreciation of the peso. This may have been due to attempts to cushion the impact of the Asian crisis on the economy as well as the overperformance on both the monetary and inflation targets for the year.

Nevertheless, in December 1997, the peso depreciated by 52.07 percent y-o-y compared with 31. 83 percent a month earlier, the highest ever recorded until that point. RM growth decelerated to single-digits again, growing at only 9.54 percent compared with 12.31 percent in the previous month. Again, this was despite the 6 percent rate of inflation in December 1997 and the average rate of inflation in 1997 of 5.01 percent being below their respective targets under the IMF program of 7.1 percent and 6.6 percent.

By January 1998, the peso rate of depreciation had increased to a historically high figure of almost 61 percent. The BSP borrowing rate, term RRP, was dramatically raised from 11.99 percent in December 1997 to 16.86 percent in January 1998 while the overnight RRP rate rose slightly to 12.37 percent in January 1998 from 11.48 percent in the previous month. Term RRP rates in 1998 were about 4-6 percent above the pre-crisis levels. The interest rate differential between Philippine and US Treasury Bills increased further and were in the double digits, reaching 14.01 percent in January 1998 as Treasury Bill rates reached 19.10 percent. With the exceptions of January, February, April and July 1998, RM growth rates were negative, continuing until the first two months of 1999. The average of y-o-y monthly rates of RM growth amounted to –1.54 percent for the year 1998. The fact that RM growth rates were decelerating and became negative beginning in March 1998 also meant that whatever intention the authorities had to try and spur aggregate to demand cushion the impact of the Asian crisis that started in July 1997 were put aside in light of the historically high rates of depreciation of the peso of above 50 percent between December 1997 and February 1998.

Meanwhile, the inflation rate was at 6.44 percent in January 1998 from about 5 percent in the previous year, despite the hefty rates of growth in the money supply in the latter half of 1997. This was largely on account of the tremendous slack in the economy. In other words, although inflation had risen, it had not increased by a grossly disproportionate amount that would seem to justify contracting RM growth and hiking interest rates by the amounts they were. In fact, while inflation rates in 1998 were above target from February to September, the inflation rate did not exceed the targets under the IMF program by more than one percent except in June and July, while interest rate hikes and monetary tightening began at the beginning of 1998. By October and December 1998, actual inflation rates were below target by two percent and one percent, respectively, yet the contraction in RM growth that began early in 1998 continued until the end of the year.

Hence, what appears to have precipitated monetary tightening were the historically high rates of peso depreciation that began in December 1997 and persisted until almost the end of 1998. In August and September 1998, for example, RM was not growing, as its growth rates were –11.99 percent and –14.31 percent, respectively. Overnight RRP rates jumped to 16.73 percent in August 1998 and 16 percent in September 1998 from 13.09 percent in July. These very large contractions in RM growth and hikes the borrowing rates of the BSP coincided with periods of high peso depreciation rates. These moves appear to have worked to slow down the rate of depreciation of the peso, from 45.45 percent in August 1998 to 29.33 percent in September and further down to 16.87 percent in October and 13.87 percent in November 1998. In October 1998, the statutory reserve requirement was raised. Curiously between November and December 1998, the inflation rates were in the double-digits but were actually below targets, yet RM growth continued to

decline and the rate of depreciation of the peso slowed down. By December 1998, the peso actually appreciated for the first time since the crisis even though inflation was in the double-digit range at 10.47 percent.

1999 was a year of peso strengthening. By January 1999, the peso appreciated by 8.71 percent and continued on this trend until October 1999. The –9.99 percent growth in RM in December 1998 may have led to the 6 percent appreciation of the peso in January 1999 compared with December 1998. It seems almost certain that the appreciation of the peso was due to contractions in RM growth that characterized almost all of 1998, particularly the latter half, and continued into early 1999. The peso appreciation in December 1998 until February 1999 could not have been due to low inflation rates, per se, since the inflation rates, although below the IMF targets, were in the double digits in the period between November 1998 and February 1999.

The monetary authorities increased the rate at which RM grew beginning in March 1999, in which RM registered a positive rate growth of 4.46 percent. This trend of monetary loosening continued for the rest of 1999, hitting double-digit figures beginning in July. M3 also grew from single digit rates of growth to double digits beginning in July 1999, curiously following a 9.67 percent appreciation in June 1999. RRP rates also continued to decline, and by June 1999 as the peso appreciation peaked at its highest rate in the period considered of 9.67 percent, both overnight and term RRP rates declined to single-digit levels for the first time since 1997. The inflation rates, beginning in March 1999, were in the single digits and were all below target.

Beginning in November 1999, the peso started to depreciate again and by January 2000, the rate of RM growth decelerated to 11.67 percent from 34.15 percent previously.[16] The growth in M3 also slowed down to 13.6 percent compared with 19.27 percent previously. As the peso continued to depreciate, these lower rates of growth in RM and M3 also continued, despite the fact that inflation rates were very low, being in the 2-3 percent range.

By May 2000, the depreciation rate of the peso became double digit again, and RM and M3 growth slowed down further to 4.43 percent and 10.776 percent, from 12.67 percent and 15.22 percent in April 1999, respectively, despite a low inflation rate in April of 3.6 percent and in May of 4.01 percent. According to the BSP, this tightening in May 2000 was in response to the US Fed's decision to raise the federal funds rate by 50 basis points.[17] In July 2000, RM growth decelerated to 8.89 percent from 13.03 percent in the previous month as the rate of peso depreciation increased to 17.4 percent from 13.6 percent in the previous month. Overnight and term RRP rates rose to double-digit levels beginning in June 2000 even though inflation was at between 3.84 percent in June and 4.58 percent in August. Again in October 2000, RM growth decelerated to 5.06 percent from 10.79 percent in the previous month as the rate of peso depreciation rose from 12.62 percent in September 2000 to 27.99 percent in October. The inflation rate between September and October 2000 barely moved from 4.48 percent to 4.95 percent.

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[16] Apparently the large RM growth in December 1999 was made in anticipation of a problem related to Y2K.

[17] This information was obtained from the BSP's website. However, I believe that it is not the federal funds rate that the FED adjusted since this interest rate is market-determined, being the rate at which banks borrow from each other.

What is apparent is that, in general, when the authorities reduced RM growth or hiked interest rates, inflation rates were very low and were similar to those prevailing before the Asian crisis. The only apparent reason for their tightening stance and the timing of their interventions was the greater rates of peso depreciation in these periods.

4 Some Empirical Tests

Granger causality tests are used to determine the direction of causality between bivariate variables of interest. More precisely, Granger tests show the significance of the information contained in lagged values of the independent variable (the 'causing' variable) in explaining variations in the dependent variable (the caused' variable). Monthly y-o-y data for the period 1996.01 to 2001.12 are used.[18]

The following sets of bivariate regressions were estimated:

1. Term Reverse Repurchase Rates (TRRP) and the log of CPI/CPI(–12) to see whether TRRP causes inflation or not and vice-versa;

2. the log of E/E(–12) and TRRP to see whether policy interest rates cause the exchange rate or not and vice-versa; (E = P/$ exchange rate)

3. the log of RM/RM(–12) and TRRP to see whether RM causes policy interest rates or not and vice-versa;

4. the log of the CPI/CPI(–12) and the log of the P/$ exchange rate to see whether the exchange rate causes inflation or not and vice-versa;

5. the log of RM/RM(–12) and the log of CPI/CPI(–12) to see whether RM growth causes inflation as posited by the QTM or not and vice-versa;

6. the log of E/E(–12) and the log of RM/RM(–12) to see whether the exchange rate causes RM or not and vice versa;

7. Overnight Reverse Repurchase Rates (ORRP) and the log of CPI/CPI(–12)

8. the log of E/E(–12) and ORRP

9. the log of RM/RM(–12) and ORRP

The final three sets of regressions, 7, 8, and 9, are the same as those in the first three sets of regression except that overnight borrowing rates are used instead of term borrowing rates. Lag lengths used ranged between 2 and 6. The results are shown in Appendix 1. A summary of the results is shown in Table 2.

Certain results obtained seem to be robust regardless of the number of lags used. These include the following:

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[18] Computing annual growth rates in monthly data is equivalent to seasonal differencing of the logarithm of the variables, i.e., log (x) – log (x(-12)) = log (x/x(-12)).

1. TRRP causes inflation. This means that TRRP can be used to affect inflation presumably by contracting aggregate demand. The converse is not always the case. In only two cases, when lag lengths used were 5 or 6, could the result that inflation causes TRRP, meaning that the authorities react to inflation by changing TRRP, be found.

2. The exchange rate causes inflation. This is statistically the strongest result obtained. This is to be expected in an open economy. When the peso depreciates, demand tends to switch in favor of Philippine goods adding to demand for the economy's output. Nevertheless, the converse case also applies. Inflation causes the exchange rate. As a country's inflation rate exceeds that in the rest of the world, the domestic currency will tend to depreciate. The levels of statistical significance, however, are higher for the proposition that the exchange rate causes inflation than the converse.

3. Inflation causes RM growth. This means that the authorities react to inflation by changing RM. This means that monetary policy is endogenous and passive. It is not the relationship posited by QTM. However, the levels of statistical significance for this proposition are much lower those for the proposition that the exchange rate causes inflation. The converse hypothesis, that RM causes inflation, the monetarist proposition, is not upheld by the results except in the case with 2 lags.

4. The exchange rate causes RM growth. Again, this means that when the exchange rate is changing, the monetary authorities react by changing RM. This is a more statistically robust result that the proposition that inflation causes RM growth. This means that RM reacts more strongly to information contained in exchange rate changes than to information contained in changes in the rate of inflation. Presumably, as seen from the earlier discussion and from Table 1, when the peso is depreciating, RM growth decelerates or is contracted. Only when 4 lags are used is the converse true.

5. TRRP only causes the exchange rate when 6 lags are used. This implies that hiking interest rates to defend the peso generally does not work.

6. ORRP does not exhibit any significant causal relationship either way with the inflation rate, RM growth, and the log of the exchange rate. The same implication as in 5 above applies.

5 Conclusions

Based on a cursory examination of data and the results of the Granger tests, the framework being used by the monetary authorities currently cannot be described as monetarist in the tradition of the QTM. The results of the Granger tests performed, albeit a crude form of empirical testing, tend to support the hypothesis that what drives monetary policy in this country is basically concerns over the exchange rate. Changes in the exchange rate cause TRRP and RM growth, both under the control of the monetary authorities, to change. It appears that the authorities use monetary growth reactively, to set a floor on the rate of peso depreciation directly, as a way to ultimately control the rate of inflation.

In contrast, using RM growth and policy interest rate changes to affect the depreciation rate of the peso is more the exception rather than the rule. Hence, it appears that the monetary authorities cannot control the rate of peso depreciation effectively, try as they may to do so, a result that is not surprising given the openness of the economy.

Even as the authorities cannot effectively affect the rate of peso depreciation by changing the growth of RM or the level of policy interest rates, the peso depreciation causes the rate of inflation. This result is a very robust one even though the converse is also true. That the exchange rate has a big role to play in controlling inflation is consistent with the open economy nature of the economy. Be that as it may, however, it does not in any way imply that the level of the exchange rate or its rate of change must be fixed in order to control inflation. To do so in a world with mobile capital would be futile. As has been pointed out, the penalty that goes with a regime of stabilizing the exchange rate is to be saddled with a monetary policy that destabilizes the overall price level.[19]

It is difficult to make a counterfactual study to estimate what inflation rates would have been if a truly monetarist approach had been used. They may not necessarily have been too much lower than those attained, but the economy would also not have had to suffer unnecessarily from severe contractions in monetary growth and high interest rates either. In other words, it is entirely possible that output growth could have been higher.

In his conclusion, Guinigundo asserts that 'adopting inflation targets at the practical level amounts to formalizing the present monetary targeting approach that after all, now places greater emphasis on the ultimate objective of price stability.'[20] What this seems to imply is that inflation targeting in the future will not materially change the manner in which the BSP conducts monetary policy regardless of what it announces.

Perhaps we can learn much from the experience of New Zealand with respect to inflation targeting, particularly as regards measuring the effect of the exchange rate on prices, encapsulated in a so-called Monetary Conditions Index.[21] As to when intervention is warranted, in New Zealand, offsetting increases in interest rates are unnecessary when a sharp movement in the exchange rate is due to an adverse development in external markets as these are assumed to have sufficient disinflationary impact on the economy to offset the inflationary impact of domestic currency depreciation. However, if the exchange rate change reflects some shift in investor preferences, without any underlying justification in the real economy, appropriate adjustments in monetary policy are made. Hence, further studies that enlighten us on why the exchange rate changes are important.

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[19] Frankel, 1993, p.32.

[20] Guinigundo, 2000, p.21.

[21] Brash, 1999, p.18.

Table 1

	Actual Inflation	IMF Target Inflation	Exchange Depreciation	Reserve Money Growth	M3 Growth	Term RRP rate	Overnight RRP rate	91Day TBILLS rate	Interest Differential
1997.01	5.00	6.4	0.61	16.87	14.26	10.75	10.54	10.83	5.78
1997.02	4.42	5.5	0.60	18.83	17.22	10.64	10.50	10.70	5.70
1997.03	4.85	5.8	0.65	8.64	17.25	10.21	10.17	10.10	4.96
1997.04	4.56	5.9	0.75	8.46	17.57	10.14	10.05	10.00	4.83
1997.05	4.19	6.3	0.58	12.25	19.27	11.60	15.79	10.87	5.74
1997.06	4.78	6.4	0.69	5.15	18.90	10.47	14.36	10.49	5.57
1997.07	4.77	6.6	10.45	4.51	24.22	14.57	25.72	12.20	7.13
1997.08	4.42	6.8	15.12	8.42	23.64	12.77	15.61	14.20	9.07
1997.09	5.17	7.3	29.01	11.31	23.53	13.90	12.00	15.30	10.33
1997.10	5.61	7.5	32.92	13.05	23.84	12.69	12.10	16.50	11.55
1997.11	6.40	7.5	31.83	12.31	23.94	12.84	12.00	15.90	10.75
1997.12	6.00	7.1	52.07	9.54	20.95	11.99	11.49	17.70	12.54
Average	5.01	6.59	14.61	10.78	20.38	11.88	13.36	12.90	7.83
1998.01	6.44	6.4	60.99	13.93	21.41	16.86	12.37	19.10	14.01
1998.02	7.44	7.1	53.28	11.96	17.90	15.77	13.12	17.79	12.68
1998.03	7.29	7	40.63	-0.25	17.22	16.12	13.00	16.60	11.57
1998.04	7.79	7.5	51.61	4.65	17.04	14.39	13.02	15.20	10.20
1998.05	9.19	8.4	47.49	-3.03	17.09	14.63	13.35	14.38	9.35
1998.06	9.87	8.2	59.53	-2.99	17.26	14.54	13.13	14.00	9.01
1998.07	10.11	8.6	45.04	0.80	10.15	14.49	13.10	14.67	9.71
1998.08	9.55	9	45.45	-11.99	10.81	13.67	16.73	14.09	9.15
1998.09	9.33	8.8	29.33	-14.31	7.83	13.91	16.00	13.82	9.08
1998.10	9.63	11.7	16.87	-2.35	7.45	14.10	13.94	13.53	9.45
1998.11	10.76	11.5	13.87	-4.83	7.16	13.93	13.68	13.45	9.01
1998.12	10.47	11.7	-2.29	-9.99	7.37	13.46	13.38	13.43	9.01
Average	8.99	8.83	38.48	-1.54	13.22	14.66	13.73	15.00	10.19
1999.01	11.55	10.1	-8.71	-6.09	6.66	13.11	13.08	13.24	8.90
1999.02	10.04	9.4	-3.14	-8.01	7.70	12.61	12.50	12.73	8.28
1999.03	9.04	9.1	4.54	4.46	7.10	12.22	12.12	12.14	7.66
1999.04	8.32	8.7	-4.91	2.27	6.97	11.23	11.02	10.90	6.62
1999.05	6.98	8.1	-2.06	9.37	8.18	10.05	10.34	9.96	5.45
1999.06	5.92	7.5	-9.67	9.74	8.52	9.48	9.48	9.26	4.67
1999.07	5.71	7.8	-8.98	11.08	10.26	9.04	9.00	8.43	3.83
1999.08	5.84	8.2	-9.58	10.40	11.61	9.11	9.00	8.40	3.64
1999.09	6.05	8.4	-6.16	19.50	13.21	9.10	9.00	8.60	3.87
1999.10	5.70	8.3	-1.65	10.06	12.08	9.10	9.00	8.60	3.72
1999.11	4.16	7	3.36	12.58	15.19	8.83	8.75	8.90	3.83
1999.12	4.22	–	3.21	34.15	19.27	8.78	8.75	8.90	3.67
Average	6.96	8.42	-3.64	9.13	10.56	10.22	10.17	10.00	5.34
2000.01	2.62	–	4.35	11.67	13.61	8.81	8.75	8.90	3.56
2000.02	2.97	–	4.35	8.46	11.79	8.84	8.75	8.80	3.23
2000.03	3.32	–	6.02	9.88	13.72	8.83	8.75	8.90	3.18

2000.04	3.60	–	8.63	12.67	15.22	8.84	8.75	8.80	3.13
2000.05	4.01	–	12.35	4.34	10.77	9.61	9.52	8.80	2.88
2000.06	3.84	–	13.63	13.03	11.45	10.10	10.00	8.90	3.16
2000.07	4.18	–	17.40	8.89	10.42	10.10	10.00	8.90	8.90
2000.08	4.58	–	13.69	7.02	9.87	10.11	10.00	8.90	8.90
2000.09	4.48	–	12.62	10.79	–	–	–	9.10	9.10
2000.10	4.95	–	27.99	5.06	–	–	–	9.40	9.40
2000.11	6.02	–	21.12	3.64	–	–	–	15.80	15.80
2000.12	6.55	–	24.03	–	–	–	–	13.61	13.61
Average	4.26	–	13.85	8.68	12.11	9.41	9.31	9.90	7.07

Sources of Data: BSP, and Guinigundo (2000) for the IMF inflation targets.

Table 2
Summary of Granger causality tests

	2 lags	3 lags	4 lags	5 lags	6 lags
$TRRP \rightarrow P$	√	√	√	√	√
$P \rightarrow TRRP$				√	√
$E \rightarrow TRRP$	√	√	√	√	
$TRRP \rightarrow E$					√
$E \rightarrow P$	√	√	√	√	√
$P \rightarrow E$	√	√	√	√	√
$RM \rightarrow P$	√				
$P \rightarrow RM$	√	√	√	√	√
$RM \rightarrow E$			√		
$E \rightarrow RM$	√	√	√	√	√

Notes:

TRRP – Reverse repurchase rates (term)
E – Depreciation rate
P – Inflation rate
RM – Reserve money growth rate

√ – denotes significance at 10 percent or higher.

* Causality test of overnight RPP rates with other variables are not statistically significant.

Appendix 1
Granger Causality Tests
Sample: 1996:01 2000:12

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
DLOG(P,0,12) does not Granger Cause ORRP	42	1.06397	0.35541
ORRP does not Granger Cause DLOG(P,0,12)		1.82496	0.17544
DLOG(E,0,12) does not Granger Cause ORRP	42	0.84179	0.43903
ORRP does not Granger Cause DLOG(E,0,12)		0.81597	0.45001
DLOG(RM,0,12) does not Granger Cause ORRP	42	0.59675	0.55581
ORRP does not Granger Cause DLOG(RM,0,12)		0.61342	0.54691
DLOG(P,0,12) does not Granger Cause TRRP	42	2.03359	0.14524
TRRP does not Granger Cause DLOG(P,0,12)		6.20650	0.00474
DLOG(E,0,12) does not Granger Cause TRRP	42	4.23421	0.02209
TRRP does not Granger Cause DLOG(E,0,12)		0.07225	0.93043
DLOG(RM,0,12) does not Granger Cause TRRP	42	0.55189	0.58053
TRRP does not Granger Cause DLOG(RM,0,12)		3.24231	0.05041
DLOG(E,0,12) does not Granger Cause DLOG(P,0,12)	46	5.91760	0.00552
DLOG(P,0,12) does not Granger Cause DLOG(E,0,12)		2.80151	0.07237
DLOG(RM,0,12) does not Granger Cause DLOG(P,0,12)	45	2.59458	0.08720
DLOG(P,0,12) does not Granger Cause DLOG(RM,0,12)		7.18161	0.00216
DLOG(RM,0,12) does not Granger Cause DLOG(E,0,12)	45	1.97632	0.15188
DLOG(E,0,12) does not Granger Cause DLOG(RM,0,12)		4.59090	0.01604

Lags: 3

Null Hypothesis:	Obs	F-Statistic	Probability
DLOG(P,0,12) does not Granger Cause ORRP	41	0.98667	0.41064
ORRP does not Granger Cause DLOG(P,0,12)		1.23440	0.31234
DLOG(E,0,12) does not Granger Cause ORRP	41	0.62993	0.60073
ORRP does not Granger Cause DLOG(E,0,12)		0.77573	0.51568
DLOG(RM,0,12) does not Granger Cause ORRP	41	0.32064	0.81037
ORRP does not Granger Cause DLOG(RM,0,12)		0.73532	0.53823
DLOG(P,0,12) does not Granger Cause TRRP	41	1.01137	0.39968
TRRP does not Granger Cause DLOG(P,0,12)		3.05865	0.04132
DLOG(E,0,12) does not Granger Cause TRRP	41	2.53401	0.07322
TRRP does not Granger Cause DLOG(E,0,12)		0.15503	0.92572
DLOG(RM,0,12) does not Granger Cause TRRP	41	0.76875	0.51952
TRRP does not Granger Cause DLOG(RM,0,12)		1.82632	0.16095
DLOG(E,0,12) does not Granger Cause DLOG(P,0,12)	45	3.41936	0.02678
DLOG(P,0,12) does not Granger Cause DLOG(E,0,12)		2.69809	0.05934
DLOG(RM,0,12) does not Granger Cause DLOG(P,0,12)	44	1.81499	0.16135
DLOG(P,0,12) does not Granger Cause DLOG(RM,0,12)		3.98722	0.01476
DLOG(RM,0,12) does not Granger Cause DLOG(E,0,12)	44	0.88683	0.45691
DLOG(E,0,12) does not Granger Cause DLOG(RM,0,12)		7.53396	0.00047

Lags: 4

Null Hypothesis:	Obs	F-Statistic	Probability
DLOG(P,0,12) does not Granger Cause ORRP	40	0.72020	0.58469
ORRP does not Granger Cause DLOG(P,0,12)		0.87303	0.49120
DLOG(E,0,12) does not Granger Cause ORRP	40	0.43605	0.78152
ORRP does not Granger Cause DLOG(E,0,12)		0.69091	0.60384
DLOG(RM,0,12) does not Granger Cause ORRP	40	0.37371	0.82556
ORRP does not Granger Cause DLOG(RM,0,12)		0.52509	0.71802
DLOG(P,0,12) does not Granger Cause TRRP	40	1.58409	0.20325
TRRP does not Granger Cause DLOG(P,0,12)		3.28550	0.02345
DLOG(E,0,12) does not Granger Cause TRRP	40	2.32888	0.07804
TRRP does not Granger Cause DLOG(E,0,12)		0.99430	0.42534
DLOG(RM,0,12) does not Granger Cause TRRP	40	1.21432	0.32469
TRRP does not Granger Cause DLOG(RM,0,12)		1.19820	0.33128
DLOG(E,0,12) does not Granger Cause DLOG(P,0,12)	44	5.85606	0.00102
DLOG(P,0,12) does not Granger Cause DLOG(E,0,12)		2.22548	0.08622
DLOG(RM,0,12) does not Granger Cause DLOG(P,0,12)	43	1.15570	0.34747
DLOG(P,0,12) does not Granger Cause DLOG(RM,0,12)		3.47772	0.01743
DLOG(RM,0,12) does not Granger Cause DLOG(E,0,12)	43	2.27069	0.08189
DLOG(E,0,12) does not Granger Cause DLOG(RM,0,12)		5.31693	0.00195

Lags: 5

Null Hypothesis:	Obs	F-Statistic	Probability
DLOG(P,0,12) does not Granger Cause ORRP	39	1.11449	0.37527
ORRP does not Granger Cause DLOG(P,0,12)		0.82197	0.54455
DLOG(E,0,12) does not Granger Cause ORRP	39	0.39082	0.85086
ORRP does not Granger Cause DLOG(E,0,12)		1.95377	0.11694
DLOG(RM,0,12) does not Granger Cause ORRP	39	0.93915	0.47109
ORRP does not Granger Cause DLOG(RM,0,12)		0.49812	0.77493
DLOG(P,0,12) does not Granger Cause TRRP	39	2.10169	0.09488
TRRP does not Granger Cause DLOG(P,0,12)		2.97980	0.02797
DLOG(E,0,12) does not Granger Cause TRRP	39	2.23608	0.07850
TRRP does not Granger Cause DLOG(E,0,12)		0.56616	0.72508
DLOG(RM,0,12) does not Granger Cause TRRP	39	1.27281	0.30326
TRRP does not Granger Cause DLOG(RM,0,12)		0.88251	0.50570
DLOG(E,0,12) does not Granger Cause DLOG(P,0,12)	43	9.40474	1.4E-05
DLOG(P,0,12) does not Granger Cause DLOG(E,0,12)		2.10530	0.09038
DLOG(RM,0,12) does not Granger Cause DLOG(P,0,12)	42	1.24232	0.31344
DLOG(P,0,12) does not Granger Cause DLOG(RM,0,12)		2.77977	0.03463
DLOG(RM,0,12) does not Granger Cause DLOG(E,0,12)	42	1.75498	0.15155
DLOG(E,0,12) does not Granger Cause DLOG(RM,0,12)		4.64330	0.00281

Lags: 6

Null Hypothesis:	Obs	F-Statistic	Probability
DLOG(P,0,12) does not Granger Cause ORRP	38	0.90198	0.50909
ORRP does not Granger Cause DLOG(P,0,12)		0.68777	0.66131
DLOG(E,0,12) does not Granger Cause ORRP	38	0.31931	0.92070
ORRP does not Granger Cause DLOG(E,0,12)		1.43463	0.24108
DLOG(RM,0,12) does not Granger Cause ORRP	38	1.08545	0.39787
ORRP does not Granger Cause DLOG(RM,0,12)		0.39642	0.87425
DLOG(P,0,12) does not Granger Cause TRRP	38	2.79466	0.03209
TRRP does not Granger Cause DLOG(P,0,12)		2.00582	0.10277
DLOG(E,0,12) does not Granger Cause TRRP	38	1.73601	0.15400
TRRP does not Granger Cause DLOG(E,0,12)		2.07058	0.09327
DLOG(RM,0,12) does not Granger Cause TRRP	38	1.18278	0.34714
TRRP does not Granger Cause DLOG(RM,0,12)		0.76272	0.60592
DLOG(E,0,12) does not Granger Cause DLOG(P,0,12)	42	7.65690	5.5E-05
DLOG(P,0,12) does not Granger Cause DLOG(E,0,12)		2.08793	0.08551
DLOG(RM,0,12) does not Granger Cause DLOG(P,0,12)	41	0.83679	0.55204
DLOG(P,0,12) does not Granger Cause DLOG(RM,0,12)		2.24395	0.06814
DLOG(RM,0,12) does not Granger Cause DLOG(E,0,12)	41	1.43397	0.23704
DLOG(E,0,12) does not Granger Cause DLOG(RM,0,12)		3.84313	0.00639

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