Monetary Policy and Exchange Market Pressure: the Case of the Philippines

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*Corresponding author. Gochoco-Bautista acknowledges the support of the Philippine Center for Economic Development. We thank Douglas McMillin, Emmanuel S. de Dios, and two anonymous referees for their comments. The usual disclaimer applies.

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Abstract

This study examines how monetary authorities respond to exchange market pressure (EMP) and tests whether traditional monetary prescriptions of contracting money to lend strength to a currency are valid in the case of the Philippine peso. Monthly data for the period 1990.1-2000.4 and a VAR methodology in Tanner [1999, 2001, 2002] are used. In general, it is found that contracting domestic credit growth and raising the interest rate differential both reduce EMP. In crisis periods, however, authorities responded differently to EMP. They chose not to sterilize and instead contracted domestic credit growth. The possibility of a perverse effect from raising domestic interest rates cannot be ruled out.

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1 Introduction

The Asian Financial Crisis interrupted what had previously been a long period of relative exchange-rate stability in East Asia. Following the devaluation of the Thai baht in July 1997, other currencies of the region also depreciated with varying degrees of severity. In the case of the Philippine peso, monthly year-on-year depreciation jumped to 10.45 percent in July 1997, compared with only 0.69 percent in June and annual rates of change that were in the single digits prior to the crisis.[1] A standard IMF prescription to affected countries at the time was to use contractionary monetary policy to counter depreciation pressures but not to target any particular exchange rate level [See Boorman et al. 2000, p.8].

This study examines whether traditional tight-money prescriptions indeed contributed to the strength of the Philippine peso during the period. In the traditional view, tighter monetary policy, as implemented through lower domestic credit growth or higher interest rates, should in principle help strengthen a currency whether this is reflected in the exchange rate, in additional foreign reserves, or both.

In light of the experience of affected Asian countries during the crisis, however, doubts have been raised regarding the validity of traditional theory. A revisionist view has been proposed in which raising interest rates could actually exacerbate the depreciation of the domestic currency and inflict harm on the real economy. A 'Laffer curve' could then be said to exist, following which contractionary monetary policy induces a panic among investors and a decline rather than a gain in a currency's value [See for example, Pakko 2000, Corsetti, Pesenti, and Roubini 1998, Furman and Stiglitz 1998, and Radelet and Sachs 1998]. High interest rates could then lead to actual or expected bankruptcies, or fears of default on debt, which weaken not only the economy but the

banking system as well, resulting in a higher risk premium. The expected return on domestic assets declines as the risk premium rises, even though domestic interest rates rise. Still other studies put forward a fiscal-based theory in which higher interest rates mean a higher burden on the public sector [See for example, Flood and Jeanne 2000 and Lahiri and Vegh 2000, 2001]. In this view, the currency would not strengthen without a corresponding adjustment of the primary surplus.

The appropriate policy response to pressures on the currency thus poses a dilemma: can currency pressures be reduced by contracting money supply and raising interest rates as traditional theory prescribes, or would such a policy response be ineffective and possibly counterproductive? Are the effects of contractionary monetary policy invariant with respect to the period when it is used, i.e., do the predictions of traditional theory hold equally under crisis and non-crisis periods?

This study uses exchange market pressure (EMP) rather than exchange rate movements alone to gauge the strength of the domestic currency. This is because there is evidence to suggest that monetary policy in the Philippines (as well as in some other Asian countries), was anchored on the exchange rate regime and managed to reflect changes in the US dollar prior to the crisis [See Enoch et al. 2001, p.86, and Gochoco-Bautista 2001]. In a managed exchange rate regime, the flow excess supply of money is reflected in both exchange rate and reserve movements. Hence, it is appropriate to look at changes in the exchange rate in conjunction with reserve losses.

Monthly data for the Philippines over the period 1990.1-2000.4 and a VAR methodology in Tanner [1999, 2001, 2002] are used to answer these questions. It extends Tanner's studies by dividing the sample period to examine whether the effects of the monetary policy stance are the same in crisis and non-crisis periods.

The rest of the study is divided into the following sections: Section 2 gives a brief review of Philippine experience; Section 3 is a review of the literature; Section 4 discusses the empirical methodology; Section 5 presents the empirical results; and Section 6 presents the conclusions.

2 A Brief Review of the Philippine Experience

Monetary policy in the Philippines since the 1980s has been anchored on targeting base money to control inflation.[2] In practice, however, authorities have also attempted to maintain a stable and strong (typically overvalued) currency and have countered depreciation pressures ostensibly as a means of keeping inflation under control. Given the difficulties of attaining simultaneous monetary and exchange rate targets when capital is internationally mobile, however, the central bank's pursuit of multiple objectives, combined with shifts in money demand, have resulted in higher and more variable rates of inflation compared with others in the region [Debelle and Lim 1998, p.6].

Adjustments in the central bank's monetary stance are effected primarily through changes in interest rates and in reserve requirements. As the peso experienced real appreciation prior to the Asian crisis while being managed to basically track the nominal movements of the US dollar, however, several other measures were implemented to maintain exchange-rate stability. These included some degree of sterilization of capital inflows and some pre-payment of external debt service, such as those owed to the Paris Club. Government policy also encouraged the private sector to use dollar loans from foreign currency deposit units as these carried lower rates of interest than peso loans.

The Philippines has been a client of the IMF for several decades, and Philippine monetary authorities have generally abided by IMF prescriptions to survive periodic BOP crises.[3] When the Asian crisis struck the Philippines was on an IMF Extended Fund Facility Program.[4] Following the Fund's suggestion, the Philippine central bank reduced monetary growth, as shown in

Chart 1A, and raised interest rates dramatically. This despite the fact that the rate of inflation had actually declined relative to the beginning of the year, and actual rates of inflation were below target for all months in 1997. The central bank's overnight borrowing rate rose to 25.72 percent in July 1997 from 14.36 percent in June. Interbank rates climbed to between 40 to 60 percent.[5] The 91-day Philippine Treasury bill rate rose to 12.2 percent while the interest rate differential between it and the 3-month US Treasury bill rate widened to 7.13 percent. Monetary tightening persisted until around the end of 1998.

Heretofore, however, it has been unclear whether these measures can unambiguously be considered as having successfully prevented the further depreciation of the peso. The year-on-year rate of peso depreciation only decelerated in September 1998, and the peso began to strengthen only in December 1998. It has been contended that perhaps even greater monetary contraction was needed to produce sufficiently higher interest rates to stabilize the peso more quickly.

3 Review of the Literature

The literature on the relationship between interest rates and exchange rates (rather than EMP) is extensive but has not produced unequivocal results. Some studies such as Nadal-De Simone and Razzak [1999] and Goldfajn and Gupta [1999] find support for traditional theory. The first study uses a model for the behavior of exchange rates in the long run and finds that an increase in the nominal interest rate differential causes the domestic currency to appreciate. The second study finds that higher interest rates are associated with real currency appreciation through changes in the nominal exchange rate.

Other studies provide no support for the traditional view. Furman and Stiglitz [1998] find that 'temporarily high' interest rates in nine emerging markets are associated with currency depreciation. Ohno, Shirono, and Sisli [1999] examine the correlation and Granger causality

among interest rates, exchange rates and external financial variables. During the crisis, high domestic interest rates became ineffective in stemming currency falls. Kaminsky and Reinhart [1999] use a VAR framework and find little evidence of systematic causality among interest rates or exchange rate linkages in five countries prior to the crisis.

Other studies have more mixed results. Goldfajn and Baig [1999] use data for five countries and a VAR model to examine the effect of monetary policy on the exchange rate after a collapse. They find no evidence that higher interest rates weakened currencies except in Korea and Thailand, where higher real interest rates were associated with real depreciation.

Some studies have attempted to see whether the perverse effect alluded to by the revisionist view can be ruled out; alternatively, they seek to address the endogeneity problem by controlling for factors that could obscure the relationship between interest rates and exchange rates. Basurto and Ghosh [2000] use a standard monetary model in order to isolate the risk premium. This allows them to determine whether higher real interest rates are associated with a larger risk premium. They find that higher real interest rates are not correlated with a larger risk premium, thereby ruling out a significant perverse effect. Gould and Kamin [2000] add measures of the stock market and bank stocks as explanatory variables in exchange rate equations to control for investor perceptions of future profitability in the economy and in the banking sector. Their findings do not support the operation of a perverse effect as interest rates were generally found not to Granger-cause potential channels of such an effect such as credit spreads, aggregate stock prices, or bank stock prices. Cho and West [2001] relate the sensitivity of exchange rate premia to interest rate levels in order to find out whether interest rates should be raised or lowered to stabilize the exchange rate. In contrast to Godfajn and Baig's [1999] findings for Korea, they find that increases in interest rates led to currency appreciation in Korea as well as the Philippines, but likewise, to depreciation in Thailand. Kraay [1999] finds little evidence for the efficacy of tight

monetary policy as a defense against speculative attacks using an IV probit model to control for possible biases induced by the endogeneity of policy.

4 Empirical Methodology

Following Tanner (1999, 2001, 2002), this study uses a VAR methodology and focuses on EMP. Tests are conducted to ascertain whether contractionary monetary policy helps reduce EMP, where the latter is equivalent to the excess supply of money in a managed exchange rate regime. Using a simple monetary model, Girton and Roper [1977] show that EMP can be measured as the sum of exchange rate depreciation and reserve outflows, scaled by base money.

Tanner finds that a reduction in domestic credit growth helps reduce EMP for a number of countries by increasing the value of a country's currency and/or its stock of foreign reserves. He also finds that the response of EMP to interest rate shocks is weaker than its response to changes in domestic credit growth.

The VAR system is the following:

$$X_t = a_0 + a_1 X_{t-1} + a_2 X_{t-2} + \ldots + v_t$$

where $X_t = (\delta, \text{EMP}, \text{INTDIF})$ is a vector of variables; the a_is are coefficient matrices and $v_t = (v_\delta, v_{EMP}, v_{INTDIF})$ is a vector of error terms. δ is the change in domestic credit divided by lagged base money, EMP is exchange market pressure, and INTDIF is the interest rate differential between the 91-day Philippine Treasury bill rate and the 3-month US Treasury bill rate. The ordering of the variables imposes certain restrictions on the VAR model so that domestic credit growth is assumed to be the exogenous policy variable. To see whether the results are sensitive with respect to other orderings, an alternative ordering of the variables in the VAR is also considered, placing δ *after* EMP rather than before.

Using monthly data for the Philippines over the period 1990.1 to 2000.4, the model is designed to address several questions. The first is whether monetary policy affects EMP in the way presumed by traditional theory. Specifically, we examine whether contractionary monetary policy reduces EMP.

In answering this question, a methodological issue that needs to be addressed is how the stance of monetary policy is to be measured. The nominal interest rate is usually adopted as the de facto gauge of the stance and instrument of monetary policy tightening, [Ghosh and Phillips 1999, p.36]. This has its shortcomings. Basurto and Ghosh [2000, p.3], for example, cite the experience of Indonesia where nominal interest rates reached almost 60 percent per year in January 1998 when the money supply was growing at the not-too-tight rate of 30 percent per month. The main problem is that not all changes in interest rates are the result of deliberate policy actions. Expectations of future depreciation or default on debt may cause a domestic currency to depreciate but will also cause interest rates to rise [Gould and Kamin 2000, p.9]. In the case of sterilized intervention and exchange rate targeting, foreign reserve losses will be offset by increases in domestic credit. Monetary policy is looser even though interest rates have not fallen.

As a compromise, this study measures the stance of monetary policy using both changes in domestic credit as a proportion of the monetary base, and the differential between Philippine and US Treasury bill rates. Unlike interest rates, domestic credit is controlled directly by the monetary authorities. To address the first question, the response of EMP to innovations in both domestic credit growth and the interest differential is examined.[6]

A second question that the study addresses is whether the stance of monetary policy itself is a function of EMP. In other words, do the authorities tighten monetary policy in response to increases in EMP or do they sterilize, such that domestic credit is increased when there are large

capital outflows. To answer this question, the effects of lagged innovations in both exchange market pressure and the interest rate differential on domestic credit growth are examined.

5 Empirical Results

Table 1 shows the results of tests of the time series properties of the main variables, namely, EMP, δ, and INTDIF. It is evident that both EMP and δ are stationary but INTDIF is not. Hence, its first difference (ΔINTDIF) which is found to be stationary is used.

Charts 1B and 1C plot EMP and the change in domestic credit divided by lagged base money (δ), and EMP and the first difference of the differential between the 91-day Philippine treasury bill rate and the 3-month US Treasury bill rate (ΔINTDIF), respectively. EMP seems to be more closely related to the change in domestic credit than to the interest rate differential.

Table 2 shows the results of bivariate Granger tests using 4 lags while Charts 2, 3, and 4 show the impulse response functions (IRFs), both for the full sample period as well as two sub-periods, namely, a first non-crisis one from 1990.1- 1997.6, and a second crisis and post-crisis one from 1997.7- 2000.4. The results are as follows:

1. Effects of δ on EMP: Does a contraction in domestic credit reduce EMP?

   The Granger causality test results show that δ does not cause EMP in any period. However, the IRFs show that there is a positive and contemporaneous effect of δ on EMP. This result is supportive of traditional theory: an expansionary shock to monetary policy, as defined, either reduces reserves, causes the currency to depreciate, or some combination thereof.

2. Effects of EMP on δ: How do monetary authorities respond to EMP?

   The Granger causality test results show that EMP affects δ over the full period and the

non-crisis period, but not during the crisis period. The IRFs show a lagged positive relationship in both the entire period and in the non-crisis period. This suggests that lagged sterilization takes place. It confirms a key element of both the Mexican and the Asian crisis, namely, that monetary authorities sterilized reserve outflows and responded to increased EMP by providing additional liquidity to the banking system rather than contracting the money supply. It is similar to Tanner's (1999, 2001) results for Mexico and the countries worst- hit by the Asian crisis such as Indonesia, Korea, and Thailand. The perceived weakness of banks in these countries prior to the crisis, which would have probably failed without help from the central bank, may have motivated such actions. However, sterilization may increase speculation against a currency by creating expectations that the central bank will not defend the currency. In contrast, in the crisis period, the IRFs show a lagged negative relationship, implying that the authorities chose not to sterilize and attempted to keep money tight in the face of EMP. This is consistent with the contraction in domestic credit growth that occurred during the crisis and immediately thereafter, including most of 1998, shown in Chart 1A.

3. Effects of ΔINTDIF on EMP: Do high interest rates or an increase in the interest rate differential reduce EMP?

   Results of the Granger causality test show that ΔINTDIF causes EMP in the full period and the non-crisis period, but not in the crisis period. According to the IRFs, the effect of a shock to ΔINTDIF on EMP is negative and marginally significant at lag 1 in the full period and the non-crisis period. This is supportive of traditional theory.

   In contrast, in the crisis period, the effect of a shock to ΔINTDIF on EMP is slightly positive at lags 1 and 2. This may be because a higher interest rate differential signals greater currency depreciation and risk or both. It leaves open the possibility of a perverse effect in which higher interest rates increase rather than decrease EMP. It thus appears

that during crisis periods, high domestic interest rates cannot be relied on to deliver the usual results. The difference in the results between non-crisis and crisis periods is striking and indicates that these two time periods are different from each other. To formally show the structural break between these periods, a Markov switching model was estimated using the components of EMP, namely, the nominal exchange rate and base money. The results are shown in the Appendix.

4. Effects of EMP on ΔINTDIF

   The Granger causality test results show that EMP causes ΔINTDIF in the full period and both sub-periods. According to the IRFs, the effect of a shock to EMP on ΔINTDIF is positive. The positive effects of EMP on interest rates tend to reflect the fact that interest rates have both market-determined and policy-determined effects. This means that when EMP increases, either (1) the authorities attempt to raise the interest rate differential in order to reduce EMP or stem the depreciation of the domestic currency, or (2) that the interest rate differential widens when there is when EMP increases because of fears of currency depreciation and a higher risk premium.

How do the results differ when the ordering of the variables in changed so that δ is placed *after* EMP? While the direction of the effects do not change, there are differences in the timing and magnitudes of a shock to δ on EMP, EMP on δ, and δ on ΔINTDIF. These are shown in the IRFs in Charts 5, 6, and 7. The other results remained largely unchanged. Under this alternative ordering, there is no contemporaneous positive effect on EMP from a shock to δ in contrast with the earlier results. There is only a small positive effect on EMP from a shock to δ at lag 1 in the results for the full period and the crisis period. The effect on δ of a shock to EMP now exhibits a large positive contemporaneous effect whereas the earlier results showed lagged positive effects consistent with lagged sterilization. Hence, the results still imply that the authorities sterilize

albeit contemporaneously. Note once again that in the crisis period, the effect becomes negative at lag 1, implying that the authorities did not sterilize. Finally, the effects of a shock to δ on ΔINTDIF are of a smaller magnitude than in the earlier cases.

6 Summary and Conclusions

This study has examined the relationship between EMP and monetary policy in the Philippines in the 1990s in order to shed light on the appropriate policy response to pressures on the currency. In general, the study finds that contractionary monetary policy does reduce EMP in accordance with traditional theory.

The results show that the authorities respond differently in crisis periods compared to non-crisis periods. They tend to sterilize the effects of EMP and provide liquidity to banks in non-crisis periods. In crisis periods, they tend not to sterilize and instead contract domestic credit growth, perhaps in order to prevent more speculation against the currency by sending signals that the exchange rate will not be defended.

The findings regarding the effect of a shock to ΔINTDIF on EMP are perhaps the study's most interesting results. In non-crisis periods, raising the interest rate differential reduces EMP and is supportive of traditional theory. They also support those of Cho and West [2001, p.4] which find that an exogenous increase in the interest rate led to currency appreciation in the Philippines. In crisis periods, however, the effect of a shock to ΔINTDIF on EMP is positive. This leaves open the possibility of a perverse effect in which higher interest rates increase rather than decrease EMP, but only in times of crisis. Combined with the finding of a positive effect of a shock to EMP on ΔINTDIF, these findings suggest that the prescriptions of traditional theory were followed, i.e., raising interest rates to reduce EMP, but without clear success.

Areas for future research include using an alternative measure of EMP and a more detailed model of the possible channels of monetary policy.

Table 1
ADF Statistics

	With intercept	With intercept & trend
EMP	-4.10	-4.09
δ	-4.75	-4.73
INTDIF	-1.70	-3.04
ΔINTDIF	-5.64	-5.61
1% Critical Value	-3.49	-4.04
5% Critical Value	-2.89	-3.45
10% Critical Value	-2.58	-3.15

Table 2
Pairwise Granger Causality Tests

Whole Period: 1990:01 2000:04 Lags: 4 Null Hypothesis:	Obs	F-Statistic	Probability
δ does not Granger Cause EMP	119	1.92	0.11
EMP does not Granger Cause δ		2.29	0.06
ΔINTDIF does not Granger Cause EMP	119	2.37	0.06
EMP does not Granger Cause ΔINTDIF		4.84	0.00
ΔINTDIF does not Granger Cause δ	119	0.20	0.94
δ does not Granger Cause ΔINTDIF		2.39	0.05

First sub-period: 1990:01 1997:06 Lags: 4 Null Hypothesis:	Obs	F-Statistic	Probability
δ does not Granger Cause EMP	85	0.86	0.49
EMP does not Granger Cause δ		2.96	0.02
ΔINTDIF does not Granger Cause EMP	85	2.99	0.02
EMP does not Granger Cause ΔINTDIF		3.35	0.01
ΔINTDIF does not Granger Cause δ	85	0.78	0.54
δ does not Granger Cause ΔINTDIF		1.60	0.18

Second sub-period: 1997:07 2000:04 Lags: 4 Null Hypothesis:	Obs	F-Statistic	Probability
δ does not Granger Cause EMP	34	1.84	0.15
EMP does not Granger Cause δ		1.31	0.29
ΔINTDIF does not Granger Cause EMP	34	0.48	0.75
EMP does not Granger Cause ΔINTDIF		2.71	0.05
ΔINTDIF does not Granger Cause δ	34	1.31	0.29
δ does not Granger Cause ΔINTDIF		1.51	0.23

Chart 1A
1997-1998

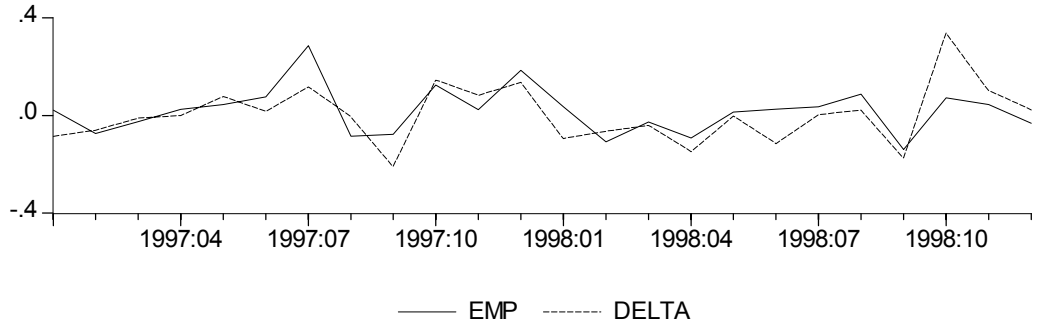


Chart 1B
Full Sample

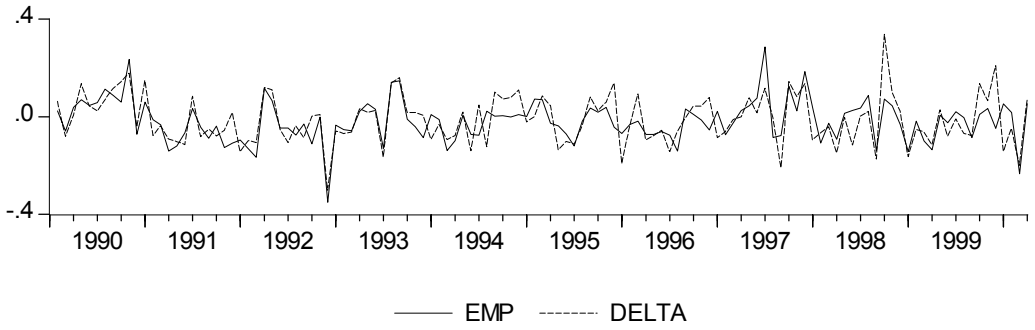


Chart 1C

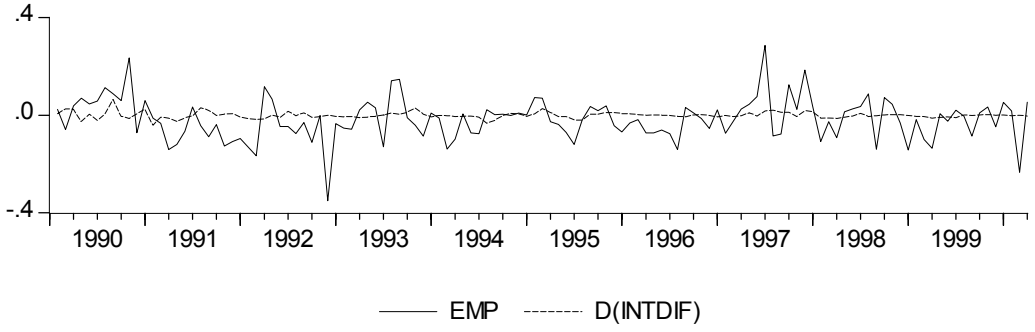


Chart 2
Impulse Response, Full Sample
Ordering: δ, EMP, ΔINTDIF

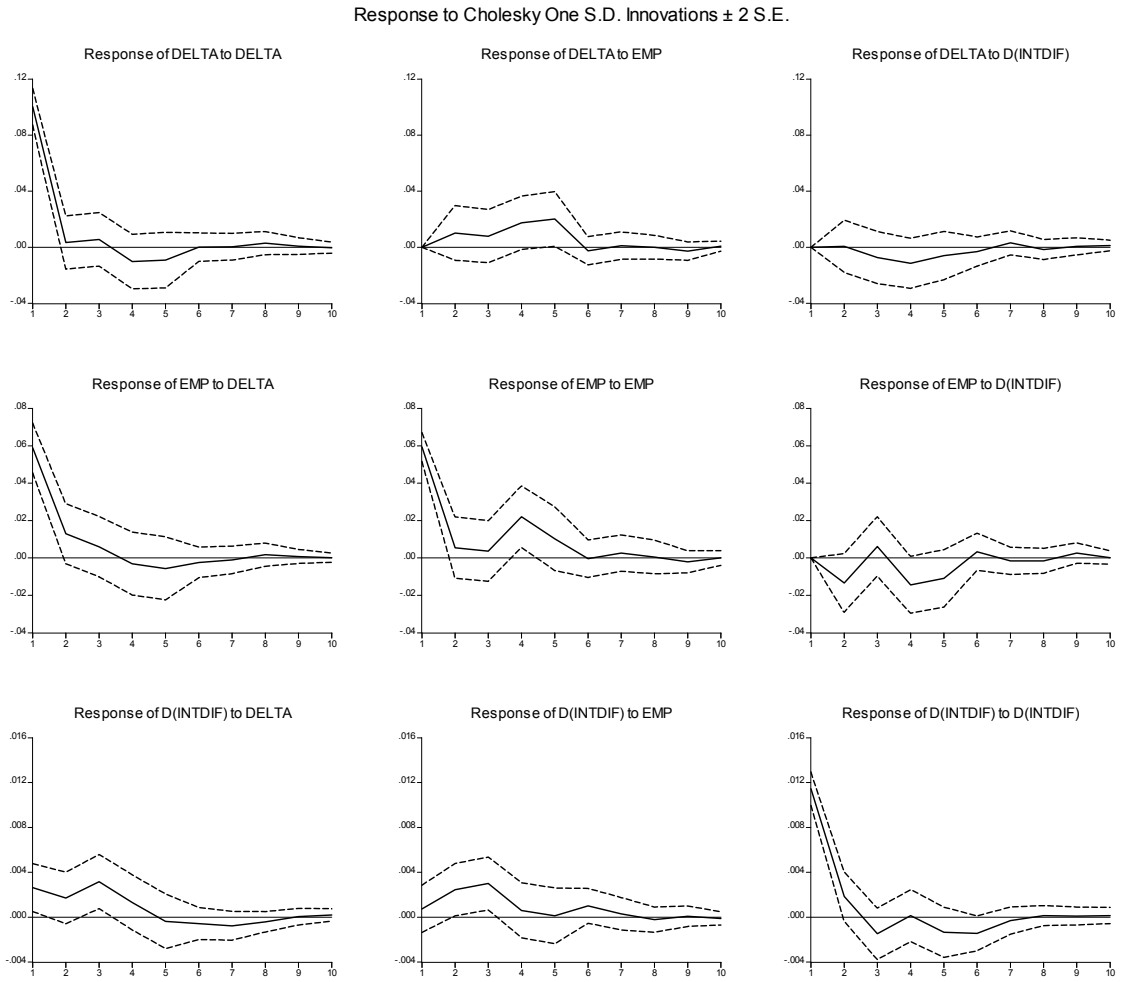


Chart 3
Impulse Response, First Sub-period
Ordering: δ, EMP, ΔINTDIF

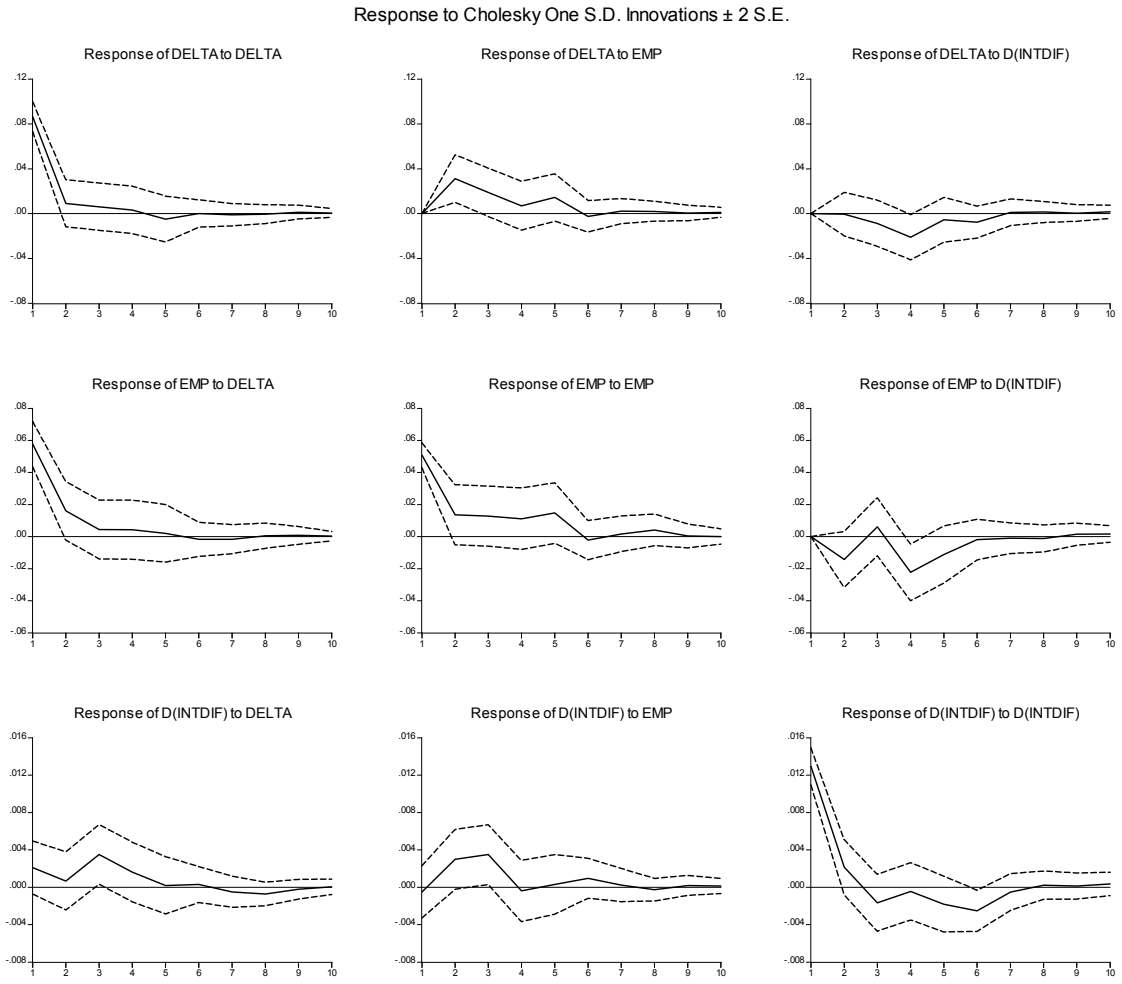


Chart 4
Impulse Response, Second Sub-period
Ordering: δ, EMP, ΔINTDIF

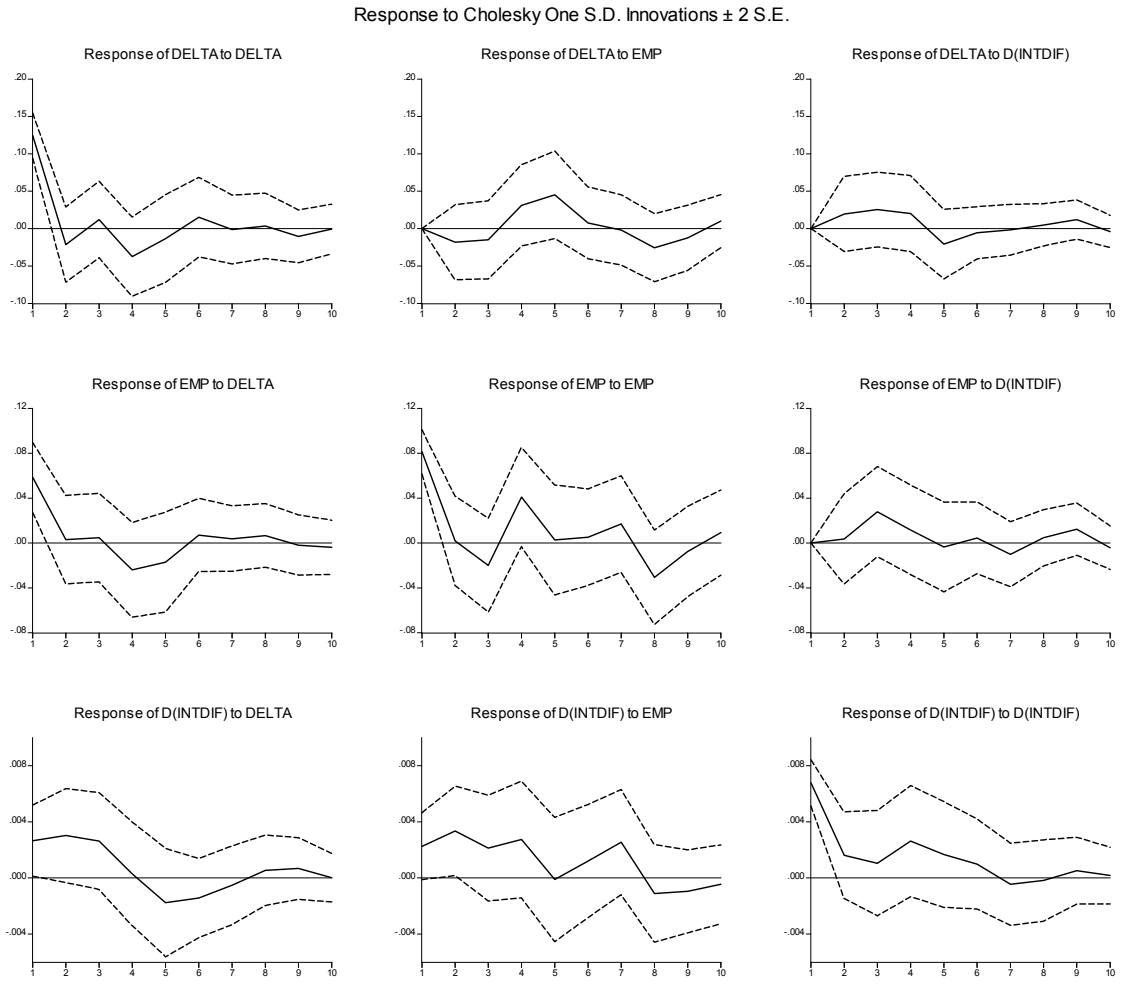


Chart 5
Impulse Response, Full period
Ordering: EMP, δ, ΔINTDIF

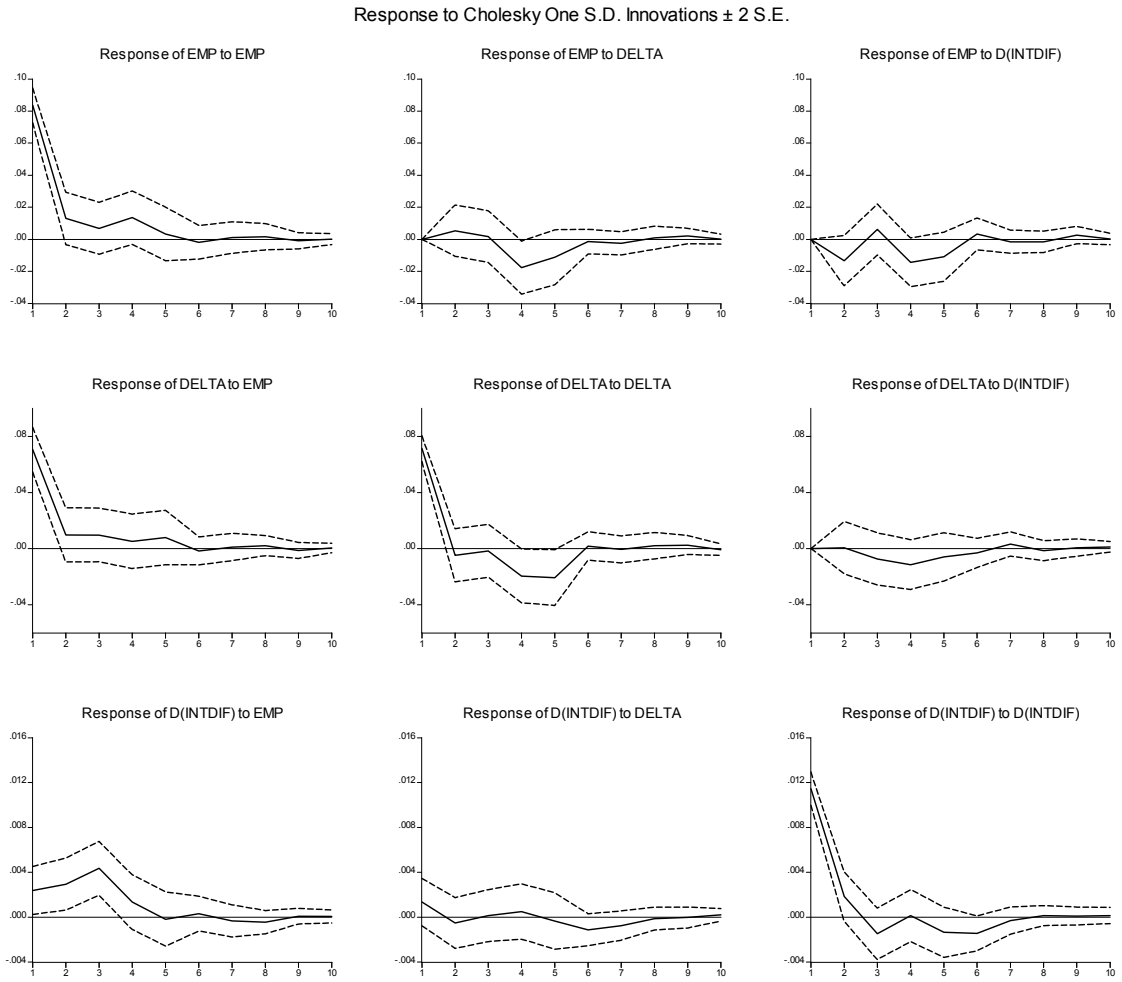


Chart 6
Impulse Response, First Sub-period
Ordering: EMP, δ, ΔINTDIF

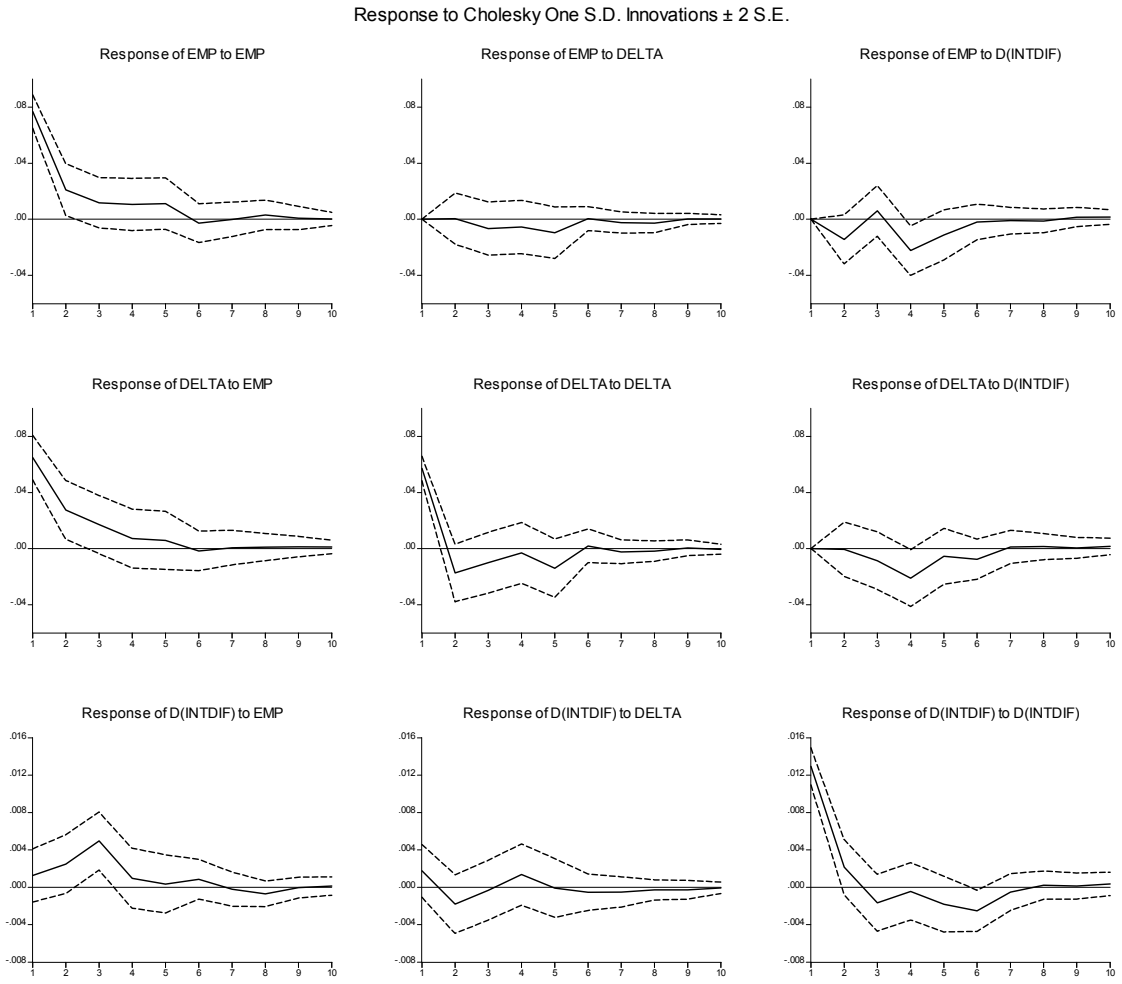
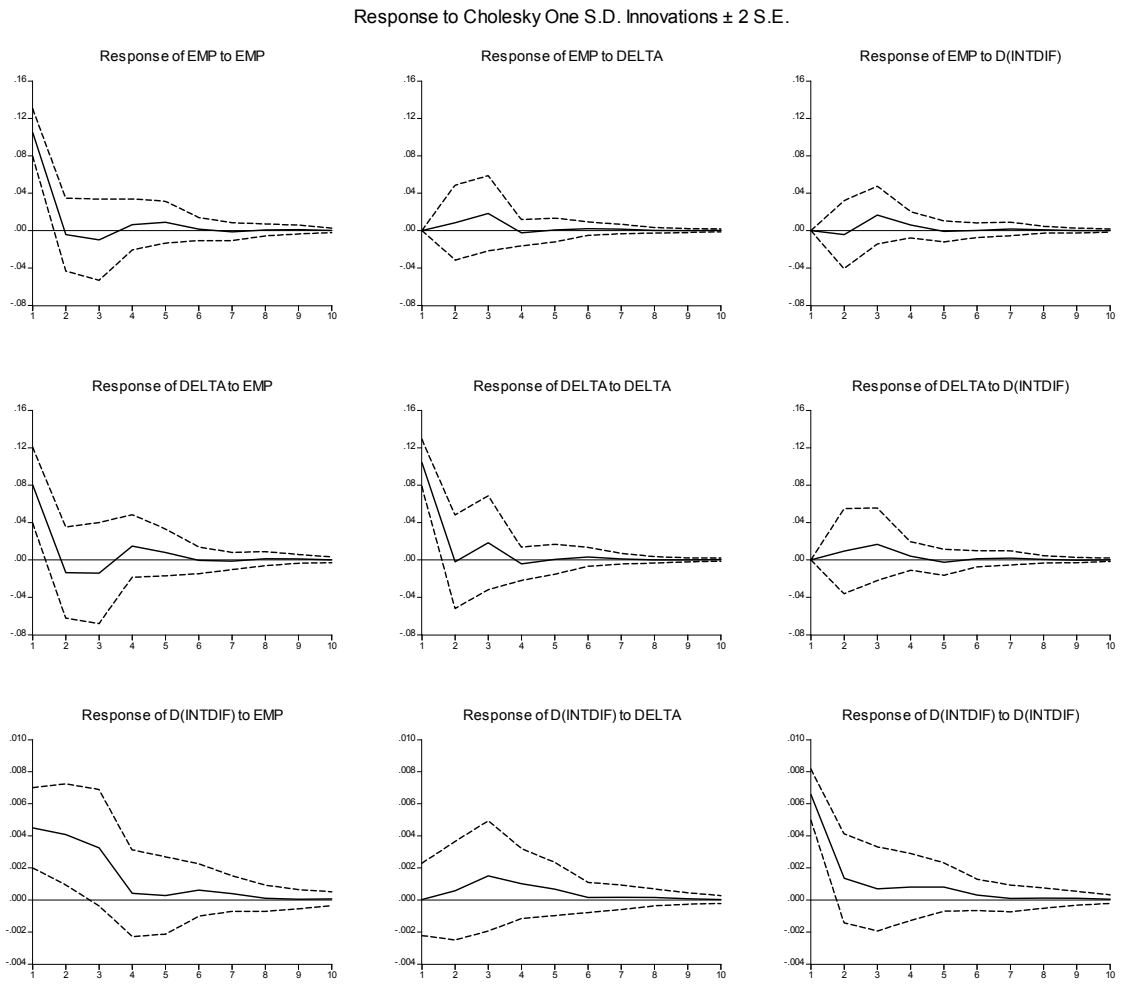


Chart 7
Impulse Response, Second Sub-period
Ordering: EMP, δ, ΔINTDIF



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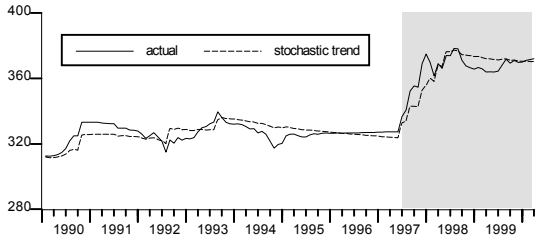
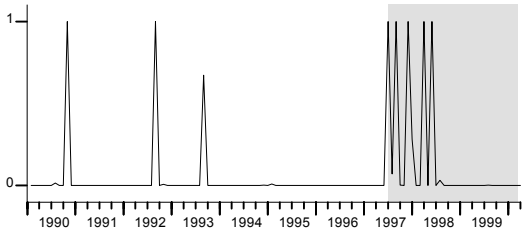
Appendix

This appendix reports the result of estimates of structural breaks in the components of the EMP[1] variable in this study using a generalized Hamilton model due to Lam (1990) and implemented by Kim and Nelson (1999) through state space methods. The model is a two-state Markov regime switching model that endogenously determines structural breaks in the variable of interest. The diagrams below show the main results.

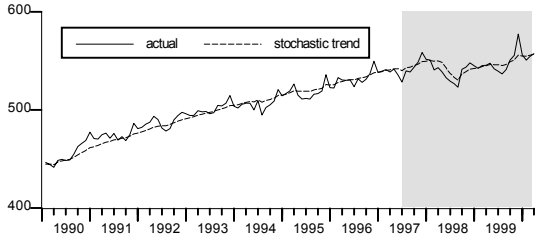
Exchange Rate - Actual and trend



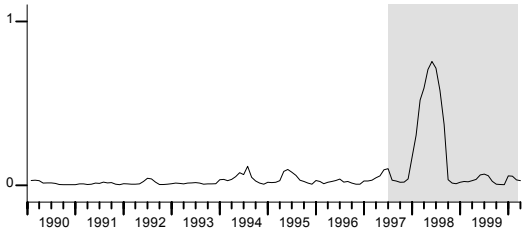
Smoothed probability of a high depreciation



Base Money - Actual and trend



Smoothed probability of a contraction in Base Money



The shaded area covers the period 1997:07 – 2000:04 and corresponds to the second sub-period covering the Asian crisis and post-crisis periods of the empirical portion of the study. It is clear from the diagrams that the first sub-period is different from the second sub-period.

[1] Components of EMP rather than EMP itself were used because the latter is stationary.

Endnotes

[1] The annual depreciation rate of the peso stood at 52.06 percent in 1997 compared with 0.28 percent in 1996.

[2] The central bank announced that it would adopt an inflation targeting framework beginning in 2002.

[3] An example of the central bank's willingness to accept bitter prescriptions from the IMF was during the BOP crisis of 1984-1985, when it raised interest rates to over 50 percent via the issuance of it own high-yielding securities to quell inflation. This led to real output contraction for the first time in the post-war history of the country.

[4] Under any IMF program, targets are set for key variables. For example, the target for international reserves for the Philippines was a 3-month import cover, but this target was missed during the crisis as actual international reserves declined to around 1.5 months worth of imports. The central bank augmented the supply of dollars in the market by encouraging selected banks to borrow abroad and sell the proceeds locally under a forward cover agreement with it.

[5] Interbank rates are market-determined rates at which banks borrow from each other.

[6] A methodological issue arises as regards the specification of exogenous policy variables. A policy variable is considered 'exogenous' in that current innovations of policy reflect the preferences of policy makers. This is implemented by imposing certain restrictions. The restriction used here assumes that domestic credit growth is the exogenous policy variable. The response of EMP to lagged innovations in interest rate differentials is also examined since it is assumed that interest rates have an endogenous component.