AN INQUIRY INTO THE POLICY OF INFLATION TARGETING IN THE PRESENCE OF FISCAL IMBALANCES IN PAKISTAN

M. ALI KEMAL

I. INTRODUCTION

The debate on controlling inflation at the minimum possible level was started since the articles by Kydland and Prescott (1977) and Barro and Gordon (1983). Rogoffs (1985) gave the idea of conservative central banker whose primary goal is to control inflation irrespective of what is going on with other macroeconomic variables. Similarly stabilization policies, policy of monetary targeting, interest rate, and targeting inflation are other policies to control inflation. New Zealand was the first country to start policy of inflation targeting in 1989 followed by other countries, such as Canada, UK, Sweden, Finland, Australia, Spain etc.

Policy of inflation targeting is a commitment to maintain inflation at the announced level. Interest rate is the main variable used in controlling inflation in the policy of inflation targeting. However, central bank resists to increase interest rate of the proportion of dollar denominated debt is higher in total public debt. In higher dollar denominated debt country problem starts with an increase in interest rate because it pressurizes foreign exchange market[1] which leads to depreciation of currency. Depreciation leads to further increase in prices[2] [for more details see e.g., Sims (2005)

---

[1] Since flexible exchange rate is a prerequisite to the policy of inflation targeting, thus increase in interest rate increase the fiscal deficit and hence debt repayment and servicing, which pressurises the foreign exchange market eventually results in the depreciation of exchange rate.

[2] This phenomenon is knows as exchange rate pass through. Chaudhari and Khan (2001) and Hyder and Shah (2004) does not find evidence that depreciation causes inflation in Pakistan.

and Blanchard (2004)]. Thus in high fiscal deficit[3] and public debt countries it will be difficult for central bank to control inflation using interest rate as an instrument. Moreover, reliance on seigniorage[4] is quite high in Pakistan due to low tax collections/base, thus inflation targeting gives less opportunity to use inflation tax for revenue collection, which directly effects the revenue collection from seignorage[5].

Based on the above theoretical explanation, we established two links in the paper; (i) short run association between real interest rate and real exchange rate; and (ii) short run association between real exchange rate and prices. If the association is true then inflation targeting is perverse for developing countries [Blanchard (2004)].

Following this introduction, Section II reviews functioning of inflation targeting and its prerequisites; Section III explains fiscal constraints countries can face in pursuing the policy of inflation targeting; Section IV describes data and methodology; results are explained in Section V; and Section VI draws important conclusions of the paper.

II.   INFLATION TARGETING: HOW DOES IT WORK?

Economists generally agree that high inflation distorts decisions of private agents to make investment, savings, wage contracts, etc., which slows down the process of economic growth. Moreover, to get short term gains politicians (policymakers) increase the money supply to decrease the unemployment in the short run. Although, it is true that unemployment decreases initially but eventually entire change in money supply results in increase in inflation [For more details see Grauwe, and Polan (2005), and Kemal (2006)].

---

[3] Interestingly fiscal policy, which plays an important role in the policy of inflation targeting, especially for developing countries like Pakistan, is ignored in the models of inflation targeting [Fraga *et al*. (2003)].

[4] It is the net revenue derived from the issuing of currency. It is also known as inflation tax.

[5] This, in a way, plays positive role in curbing inflation, which sometimes known as mini budget as well.

The policy of getting temporary gains by increasing money supply results in the problem of dynamic consistency or time consistency[6]. To overcome this problem several solutions are suggested, including inflation targeting is the one which is adopted by several countries including New Zealand, Australia, Sweden, England etc.

The process of inflation targeting starts with an announcement of targeted inflation for the next period by the government and the Central Bank. Period could range from one year to two years or even three years depending on the situation and confidence they have in the markets and markets have in them. Independence of central bank is one of the prerequisites of the policy of inflation targeting. After the announcement of inflation for the next period, independent central bank, which has instrumental independence, is responsible for achieving the target. Generally, interest rate is used to curtail inflation at its targeted level. In case, central bank fails to achieve the targets then she should provide her strategy to curtail inflation to the public openly. The transparent way of functioning will increase the credibility and accountability of the central bank.

Central bank generally decides on the future course of monetary policy after assessing the inflation forecasts based on different indicators. These forecasts could be based on models such as structural models, VAR models and/or survey of market based inflation expectations [Croce and Khan (2000)]. However, there are certain issues for the authorities that include, which measure of inflation to use, what target level of inflation to

---

[6] Agents tend to believe that actual inflation will be higher than the announced inflation because authorities have a reputation to increase excess money supply after announcing it because the policy they announced at time t does not remain optimal at time t+1, which leads to policy/dynamic/time consistency problem.

choose[7], whether to adopt inflation target point or target ranges[8] and policy horizon[9] (Ibid).

The second prerequisite for the policy of inflation targeting is the flexible exchange rates. However, due to the degree of pass-through from exchange rate changes to prices, which is higher in the developing countries, leads to considerable inflation inertia (Ibid). Moreover, developing countries have higher rates of inflation which is difficult to forecast. It is also difficult for central bank to maintain inflation at its targeted level if it is very high. Therefore, it is suggested to decrease the inflation first, say to single digit level, and then start inflation targeting. Another problem we can have in developing countries is the non-availability of optimal level of inflation. Central bank independence is the major issue in the developing countries (Ibid). Interestingly, even in the presence of all these difficulties (ibid) suggests that inflation targeting is a good policy for the developing countries because it offers a number of operational advantages and it compels policymakers to deepen reforms, enhance transparency, and improve the fiscal stance; it also holds out the promise of eventual convergence to international levels of inflation.

III. FISCAL CONSTRAINTS

Reliance on tax and non-tax revenues is different in developed and developing economies. Direct taxes is the major sources of tax revenues in developed countries

---

[7] Most industrialized countries chose 1 – 3 percent [Croce and Khan (2000)]. Masoon, Savastano and Sharma (1998) argued that developing countries do not have optimal inflation rate and thus they also have a problem that what level of inflation to target.
[8] It is more difficult to target points but it is also difficult to define the range, if the range is too small then it will have the same problem as target points [Croce and Khan (2000)].
[9] How fast the adjustment would be whenever inflation deviates from its long run target [Croce and Khan (2000)].

while, indirect taxes are the major source of tax revenues in developing countries. Although share of direct taxes in total tax revenues has been more than two fold in the last 20 years but still tax base is very low. Various tax holidays, non-effective implementation of GST, tax evasion/avoidance, depreciation allowance, excessive tax returns, and deduction and exemptions are the major hurdles in collecting tax revenues. The above mentioned hurdles play vital role in shaping fiscal policy to curb fiscal deficit and hence less borrowing from the State Bank of Pakistan especially. Thus fiscal policy plays important role in conducting optimal monetary policy.

Benigno and Woodford (2006) build a model based on three different assumptions of fiscal policy: i.e., (i) little distortion is required to raise additional government revenue, (ii) only distorting sources of revenue exist but distorting taxes are adjusted optimally, and (iii) tax rates are exogenous and cannot be expected to change in response to change in monetary policy. Considering all the three cases (ibid) concluded that optimal monetary policy can be implemented in the form of flexible inflation targeting. Moreover, they also concluded that an optimal policy commitment will be a credible commitment by the central bank if inflation is returned to its long-run target level fairly promptly after it diverts from the long run target, which can thus justifies as a temporary departure from the target.

As discussed in previous section that interest rate is the main instrument used in this policy to curtail inflation. Blanchard (2004) argues that increase in interest rate increases the probability of default on the debt if proportion of dollar denominated debt is high in total public debt. Under this hypothesis inflation targeting is clearly a bad policy for the developing countries. Moreover, increase in real interest rate in response to

increase in expected inflation leads to real depreciation of exchange rate, which again results in higher inflation due to pass – through effect. In such situation, (Ibid) argues, fiscal policy is the right instrument to decrease inflation not the monetary policy.

(Ibid) studies the case of Brazil, when in 2002 it was expected that the left wing candidate will come to power, led to acute macroeconomic crisis in Brazil. Rate of interest has gone up, dollar debt has increased sharply, which results in the increase in the probability of default on debt. Currency depreciated sharply and inflation surged at that time[10]. He concluded that when fiscal conditions are wrong, i.e., when debt is high, when a high proportion of debt is denominated in foreign currency, when the risk aversion of investors is high then an increase in the interest rate is more likely to lead to depreciation. This implies that policy of inflation targeting is perverse to use in curtailing inflation.

In most of the developing countries the decisions of the central bank is still governed by government to finance the fiscal deficit [Croce and Khan (2000)]. Under the IMF's stabilization program many countries had reduced their fiscal deficits but still there are large public debts and government borrowings which prevent central bank to perform their duties independently. In the presence of huge public debt central bank hesitates to increase the interest rate when it is required to curtail inflation (Ibid). Thus public sector borrowing should be non – existent if we need to adopt inflation targeting [Masson, Savastano and Sharma (1998)].

(Ibid) also argue that the government should have a broad revenue base and should not rely on the revenues from seigniorage; domestic financial markets should have enough depth to absorb the placement of public and private debt instruments; and the

---

[10] However, after he got elected people realized that whatever they were thinking was not the case, the economy came back to its steady path. Central bank at that time did not increase the real interest rate, which was the right policy to do.

accumulation of public debt should be sustainable and not unduly constrain monetary policy. In most of the developing countries inflation tax is a norm to generate revenues because of low tax base. Moreover, reliance of fiscal deficit is mostly on monetary policy, which thus gives rise to inflationary pressures that prevents central bank to achieve their target and thus get high rates of inflation. At high rates of inflation, fiscal and monetary policy tends to become virtually inseparable (Ibid). Controlled (administered) prices are an important component of change in prices (Ibid). Due to these administered prices, markets can't function properly and policy of inflation targeting could have adverse results instead of positive results

IV. DATA AND METHODOLOGY

Monthly data on exchange rate, interest rate (money market rate), Pakistan CPI, US CPI (proxy to world CPI) are taken from the various issues of International Financial Statistics. Since flexible exchange rate is the pre-requisite to the policy of inflation targeting thus data is taken from July 2000 when Pakistan was moved to flexible exchange rate system to September 2010.

$$RER = \frac{ER * CPI^*}{CPI}$$ *(Real Exchange Rate)*

$$\pi = \frac{CPI_t - CPI_{t-1}}{CPI_{t-1}}$$ *(Inflation Rate)*

$$R = I - \pi$$ *(Real Interest Rate)*

where, RER, ER, CPI, R, I, π, represent real exchange rate, nominal exchange rate, consumer price index, real interest rate, nominal interest rate, and inflation rate, respectively. Subscript t and t-1 represent current and lag periods, respectively.

As Blanchard (2004) mentioned that policy of inflation targeting is not good for those developing countries where the external debt has higher proportion in the public debt. Share of Pakistan external debt was remained higher in 1970s but had continuously declining trend over the time period. External debt was 31.8 percent of GDP in 2010 and Government domestic debt was 31.7 percent of GDP. Due to high public debt, government major share of expenditure goes to debt servicing. It is seen that in certain years if we subtract debt servicing from budget deficit, we have fiscal surplus instead of deficit (also known as primary surplus), e.g., in the year 2009 and 2010 we had 5.3 percent and 6.3 percent of fiscal deficit respectively, while our debt servicing was 7.4 percent and 7.1 percent respectively. Thus it is a double blow for the State Bank of Pakistan if they want to control inflation.

Exchange rate initially rose very fast from Rs. 51.79/$ to Rs. 64.0/$ in one year but then remained quite stable for the next seven years. It then hiked in 2008 when it depreciated by 25 percent in 8 months, from February 2008 to October 2008. Besides these two main incidents the value of exchange rate against dollars has been continuously depreciating since 2000 at the rate of 5 percent per annum[11] (approx). However, interestingly real exchange rate tells us a different story. Apart from the two incidents of huge depreciation real exchange rate appreciated continuously in the last ten years. Total appreciation in the real exchange rate was 14.5 percent compared to 40 percent depreciation in nominal exchange rate.

---

[11] Calculated using compound growth rate formula.

Inflation and interest rate, both have positive (long term) trend over the time period. This might imply that interest rate was used to control inflation and it might have reduced the increase in inflation but failed to reduce the inflation. Inflation kept on increasing at the rate of 9 percent per year for the last ten years.

Methodology

Discussion in Section III clearly states that in dollar denominated debt country interest rate increases the pressure on foreign exchange market leaves real exchange rate to depreciate. Depreciation in real exchange rate raises the price level (known as pass – through effect). Thus in order to curtail inflation when it is expected to increase, increase in interest rate leads to increase in inflation, which is contrary to the thrust of the policy of inflation targeting. Thus, we check two hypothesis: (i) short run association between real interest rate and real exchange rate, which tells us whether increase in real interest rate depreciate the currency; and (ii) short run association between real exchange rate and price, which tell us whether the pass – through hypothesis is true. To check both, we used Vector Autoregressive (VAR) approach.

VAR is atheoretical approach which does not consider too many structural variables. It relies on the previous information of the variables. In a simultaneous equation models, each dependent variable is regressed on its own lags and the lags of all the other variables in the model. Thus it is a pure statistical model which does not require very expert knowledge on the subject. Since all the explanatory lag variables are exogenous and there is no dependency among the explanatory variables within the system thus there is no problem of simultaneity and identification, hence we can estimate the

system of equations by ordinary least square (OLS) method. Mathematically, VAR model can be expressed as;

$$y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \varepsilon_t,$$

y_t is a vector of k variables, which is 2 in our case, α is a constant and thus vector of k-variables (2 in our case), β is a matrix of kxk parameters and ε_t is the error term, vector of k-variables (2 in our case). VAR model can also be expressed in matrix form, for two variable case;

$$\begin{bmatrix} y_{1t} \\ y_{2t} \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} + \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} y_{1t-1} \\ y_{2t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix}$$

The first step in using VAR model is to check the integration of the variables. If the variables are integrated of order one [I(1)] then we need to transform the variables into I(0) and run VAR model on it. Battery of tests are available in the literature to check the stationarity of the data. ADF, Philip-Perron and KPSS tests are among the most common tests used in the empirical literature of stationarity.

$$(i)\, \Delta y_t = \rho y_{t-1} + \beta \sum_{i=1}^{n} \Delta y_{t-i} + v_t$$

$$(ii)\, \Delta y_t = \alpha + \rho y_{t-1} + \beta \sum_{i=1}^{n} \Delta y_{t-i} + v_t$$

$$(iii)\, \Delta y_t = \alpha + \delta t + \rho y_{t-1} + \beta \sum_{i=1}^{n} \Delta y_{t-i} + v_t$$

Three different ADF test can be applied to check the unity root in the data. The main purpose is to check the value of ρ. If ρ=1, series has unit root, i.e., non-stationary and if $\rho \neq 1$, then the series can be a stationary series. However we can include constant

and trend in the equation. Moreover, lagged differences are used to capture the serial correlation in the data. Optimal lag levels are checked using Akaike Information Criteria (AIC);

$$AIC = 2k - 2\ln(L)$$

Where k is the number of parameters and L is the maximised value of likelihood function for the estimation model. The most minimum value of AIC implies the best lag length.

Phillips-Perron test is similar to ADF test, in which we can use constant and trend and we can leave them out. However, we do not use lagged differences in it. However, the test statistic is different that ADF test statistics. PP test statistic is based on the Newey-West (1987) heteroscedasticity and autocorerelation consistent covariance matrix estimator.

V. EMPIRICAL RESULTS

As a first step we checked the order of integration of all the three variables; real interest rate, real exchange rate, and prices for each country by using ADF test. All the three variables are integrated of order one (see Table 1). Thus we took the first difference of the variables (all the variables are in log form) to make them non-stationary and used in the VAR model.

Table 1

ADF Results for Stationarity

Variables	Constant	Constant + Trend	Lags
Ln(RER)	-0.37	-4.76**	1
Δ Ln(RER)	-9.52*	-9.46*	1
Ln(1+r)	-1.86	-2.40	2

Δ Ln(1+r)	-9.06*	-9.08*	2
Ln(CPI)	3.52	-0.51	1
Δ Ln(CPI)	-3.44	-8.55*	2
Note: * *and ** indicate significance level at one percent and five percent respectively.*			

VAR is a simultaneous equation model which contains the exogenous variables. However, our objective is to check the impact of real interest rate on real exchange rate and impact of real exchange rate on prices. Thus we have only reported results of the effect of real interest rate on real exchange rate and ignored the other part of the equation. Similarly, we've only reported the results for the effect of real exchange rate on prices and ignored the other equation.

VAR results of real exchange rate and real interest rate association are given in Table 2. AIC in minimum when we use Lags 1-4, lag 6 and lag 12. R-square of the model is very good, which shows the strong explanatory power of the model. The results are not in the line of our proposed hypothesis that real interest rate pressurizes the foreign exchange market. Similar to Kemal and Haider (2004) real interest rate does not affect real exchange rate in the short run. In this model real exchange rate is very strongly associated to its first lag.

Table 2
Results of VAR: Real Interest Rate (LR) – Real Exchange Rate (LRER)

	LRER
LRER(-1)	1.129
	[10.8142]*
LRER(-2)	-0.214
	[-1.37166]
LRER(-3)	0.061
	[0.39296]
LRER(-4)	-0.010
	[-0.08379]
LRER(-6)	-0.013

	[-0.19837]
LRER(-12)	0.022
	[0.68125]
LR(-1)	-0.001
	[-0.35156]
LR(-2)	-0.002
	[-0.55371]
LR(-3)	0.003
	[0.70201]
LR(-4)	0.003
	[0.88655]
LR(-6)	-0.003
	[-1.01270]
LR(-12)	-0.002
	[-0.68338]
C	0.103
	[1.33449]
R-squared	0.980
Adj. R-squared	0.977
F-statistic	389.184*
Log likelihood	342.491*
Akaike AIC	-5.991
Schwarz SC	-5.672

Note: *Value in the parenthesis are t-values*
indicates significance level at the one percent level of significance.

VAR results of real exchange rate pass – through hypothesis from real exchange rate to prices are reported in Table 3. AIC is minimum when we used Lags 1 – 4 and Lag 12. Interestingly prices are strongly associated with its own first period lag and there is no pass through effect of real exchange rate to prices in the short run. However, there is an interesting result that lag 3 of real exchange rate is negatively associated with prices. This implies that real exchange rate appreciation leads to increase in prices after three months or real depreciation in exchange rate leads to decrease in prices after three months. Is it due to the definition error of the real exchange rate because domestic CPI comes in the denominator? R-square shows strong explanatory power of the model.

13

Table 2

Results of VAR: Prices (LP) – Real Exchange Rate (LRER)

	LP
LP(-1)	1.184*
	[11.3382]
LP(-2)	-0.138
	[-0.86282]
LP(-3)	-0.001
	[-0.00776]
LP(-4)	-0.082
	[-0.77733]
LP(-12)	0.043
	[1.48251]
LRER(-1)	0.111
	[1.66195]
LRER(-2)	0.027
	[0.25786]
LRER(-3)	-0.232**
	[-2.24093]
LRER(-4)	0.064
	[0.92062]
LRER(-12)	-0.005
	[-0.25923]
C	0.123
	[1.17189]
R-squared	0.999
Adj. R-squared	0.999
F-statistic	13978.020
Log likelihood	395.589
Akaike AIC	-6.930
Schwarz SC	-6.661

Note: *Value in the parenthesis are t-values*
* and **indicates significance level at the one and five percent level of significance respectively.

VI. CONCLUSIONS

Theoretically fiscal imbalance can create severe problems for central bank to control inflation under the policy of inflation targeting. Following Blanchard (2004) the

two most important linkages were tested in this study, i.e., increase in real interest rate depreciated the currency and depreciation in real exchange rate leads to increase in prices.

VAR model is used to check the short run association among variables. It is concluded that real exchange rate is not significantly associated to the real interest rate in the short run. Moreover, exchange rate pass through effect to prices is not present in Pakistan's case. Thus inflation targeting can be a policy to curtail inflation. However, we need to see the association between the interest rate and inflation, since interest rate is the main variable used to control inflation. Furthermore, State Bank needs to reduce the inflation to at least single digit level so that it is easy to control.

References

Barro, R. J. and D. Gordon (1983), "A positive theory of monetary policy in a natural rate model", *The Journal of Political Economy*, Vol. 91: 589 – 610

Benigno, P. and M. Woodford (2006), Optimal Inflation Targeting under Alternative Fiscal Regimes", *NBER working paper # 12158*, National Bureau of Economic Research

Blanchard, O. (2004), "Fiscal Dominance and Inflation Targeting: Lessons from Brazil", *Working Paper No. 10389*, National Bureau of Economic Research

Choudhari, E, and M. S. Khan (2001), "The Exchange Rate and Consumer Prices in Pakistan: Is Rupee Devaluation Inflationary" *The Pakistan Development Review,* Vol 41:2, 107 – 120

Correia, I., J. P. Nicolini, and P. Teles, (2003), "Optimal Fiscal and Monetary Policy: Equivalence Results," *CEPR Discussion Paper no. 3730*

Croce, E. and M. S. Khan (2000), "Monetary Regimes and Inflation Targeting", *Finance and Development,* September 2000, International Monetary Fund

Grauwe, P. D. and M. Polan (2005), "Is Inflation Always and Everywhere a Monetary Phenomenon?" *Scandinavian Journal of Economics,* Vol. 107 (2): 239 – 59

Hyder, Z. and S. Shah (2004), " Exchange Rate Pass-Through to Domestic Prices in Pakistan" State Bank of Pakistan, Working Paper #4

Kemal, M. A. (2006), "Is Inflation in Pakistan a Monetary Phenomenon?," *The Pakistan Development Review*, Vol. 45(2), pages 213 – 20.

Kemal, M. A. and R. M. Haider (2004), " Exchange Rate Behaviou After Recent Float: The Experience of Pakistan", *The Pakistan Development Review,* Vol. 43 (4): 829 – 852

Kydland, F.E. and E.C. Prescott (1977), "Rules rather than discretion: The inconsistency of optimal plans", *The Journal of Political economy*, Vol.85 (3): 473-91

Masson, P. R., M. A. Savastano, and S. Sharma (1998), "The Scope for Inflation Targeting in Developing Countries", *IMF Working Paper 97/130,* International Monetary Fund.

Newey, W. K. and K. D. West (1987), "A Simple, Positive Semi-definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix", *Econometrica*, Vol. 55 (3), pages 703-08

Rogoff, K. (1985), "The Optimal Degree of Commitment to an Intermediate Monetary Target", *Quarterly Journal of Economics*, Vol. 100: 1169-1190

Sims, C. A. (2005), "Limits to Inflation Targeting," in B.S. Bernanke and M. Woodford, eds., *The Inflation Targeting Debate,* Chicago: University of Chicago Press