

# Investigating the Fiscal Theory of Price Level and Price Puzzle Phenomenon in Pakistan

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**Abstract:** The study aims to test the existence of the price puzzle phenomenon and the fiscal theory of price level in Pakistan; how does the tight monetary policy cause inflation? Another research question is; does fiscal and monetary interaction cause the price puzzle phenomenon?

To test the price puzzle phenomenon the annual data of 50 years have been used. Testing the study hypotheses, time-series tools have been used which specified autoregressive distributed lag model for the long-run analysis while the error correction model (ECM) for the short-run analysis.

The findings of the study reveal that growth in the public debt level causes inflation in the economy. Furthermore, the findings report that the price puzzle phenomenon exists only in the short-run while monetary policy is effective in controlling inflation in the long run. Results suggest policy recommendations to the government to rationalize spending behavior and work for fiscal consolidation.

Prior literature on the interaction between fiscal and monetary policies in Pakistan is limited. Compatibility of actions taken by the State Bank of Pakistan and Ministry of Finance is required to achieve common economic goals. If the actions of the two bodies are not compatible then it creates problems for each other in achieving their objective(s). The study analyzes the interaction between the two bodies and the compatibility of their actions.

**Key Words:** Fiscal Policy, Debt, Inflation, Interest rate, fiscal consolidation

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**Introduction:** Pakistan has a history of high public debt and volatile inflation. Many economic variables of the economy interact with each other similarly the interaction of fiscal and monetary variables create problem in achieving the objective(s) for each authority. To determine the effectiveness of monetary policy the government budget constraint plays a crucial role. The budget constraint of the government connects fiscal policy with a monetary variables like inflation and interest rate in the economy. Sim (1988) investigates

the situation where the dominant treasury forces the passive monetary authority to bridge the shrinking fiscal space. His findings revealed that budget deficit monetization by the central bank alters the position of the government liabilities which bring reduces nominal rigidity. This brings fluctuation in inflation and volatility in prices either now or the future. Fiscal neutrality and non-neutrality is a well-researched area in macroeconomics and is still a recurring theme in the contemporary issues in macroeconomics. Pakistan is very persistent in running budget deficits and experienced. The pressure on treasury is also mounting from the State Bank of Pakistan (SBP) because the ruthless spending of the government is creating problem for monetary authority. Fiscal authority knows the attached economic distortions produced by the printing of currency. The treasury benches have no or very limited options on the table to finance the deficits because resource availability from external sources is not only difficult but time-consuming as well. Furthermore, historically SBP proved accommodative and extends a helping hand to the federal government to bridge the gap between government revenue and expenditure by providing the required seigniorage. The persistent and continuous monetization of the budget deficit increases the chances of fiscal non-neutrality.

Fiscal policy has considerable monetary policy implications. The non-neutrality of fiscal has implications for the instruments of monetary policy and its implementation. SBP seeks and demands cooperative behavior from the treasury benches in Pakistan. The sub-optimal outcome of monetary policy forces the money managers to contain the dynamically inconsistent behavior of fiscal managers in Pakistan. The State bank of Pakistan wants to compel the government to inform the central bank in advance of its seigniorage requirements. According to the State Bank, this kind of explicit details about seigniorage requirements by the treasury would increase the monetary policy effectiveness. State bank of Pakistan positively responds to inflation in the economy. State Bank of Pakistan is striving hard for stabilization of level of the price in the country with tight monetary policy stance. The inflation response towards the tight monetary policy is interesting. To control inflation at least in the short run, the interest rate is not effective as a policy instrument.

### **Theory and Literature**

Extensive literature is available on the inflationary implication of fiscal policy and budget deficits. Findings of the available literature on this subject are highly heterogeneous. The changing level of public debt and ultimately its ratio to money supply and GDP affects inflation and the choices of the monetary authority. Woodford (1996) reveals that the absence of fiscal sustainability and frequent changes in the budgetary position of the government necessarily results in price level instability. The presence of a volatile fiscal position makes it difficult for the monetary policy to ensure equilibrium with stable prices. The phenomenon- inflation is always a monetary phenomenon- is challenged by the fiscal theory of price determination. Fiscal policy affects aggregate demand which plays a central role in affecting price level. The contemporary research in the field of the fiscal theory of price level suggests that fiscal profligacy can be the main determinant of inflation. Dixit and Lambertini (2000) reveal that monetary policy mainly works through financial markets which depend considerably on the financial position of the government. Moses and Nicola (2009) disclose that indiscipline fiscal policy could jeopardize monetary stability through debt monetization which directly affects the price level. Bahar (2009) examines the issue and assesses the impact of different sources of fiscal deficit financing and its impact on inflation. He argued that domestic sources of deficit financing carry crucial implications for price level and interest rates. Kydland et al, (1977) investigate and their findings suggested that the fiscal branch should follow rules to avoid the time-

inconsistent behavior of politicians and fiscal managers. Nordhaus *et al* (1994) find that fiscal profligacy leads to higher budget deficits, inflation, and higher interest rate. Budget deficit monetization is not desirable because the provision of seigniorage causes the level of price in the economy to rise and reduces monetary policy effectiveness. Woodford (1995) identifies the shrinking fiscal space and the level of government's nominal debt as dominant factors in the determination of the level of the price. Cukierman's (1992) and Cukierman *et al* (1995) findings primarily suggest that the central bank directive is mainly to control inflation rather than to work as a financing agent of the government. Tabellini (1987) finds that public debt and volatile inflation cannot be arrested without a connected effort and backup from the treasury. Herman and Norman (2002) investigate the issue and find that fiscal authority is responsible for fiscal sustainability and does not rely on the inflationary tax for financing its budget deficit to ensure a stable price level in the country.

We also know that politicians generate political business cycles because they want to maximize their vote bank and get reelected. Politicians spend excessively and over-stimulate the economy to protect their constituencies. Dixit *et al* (2001, 2003a, b) explain a situation where the fiscal authority maximizes social welfare that requires higher employment and growth rather than a low level of inflation. The fiscal branch forces the Central bank to adopt an easy and loose monetary policy to spur economic growth and prosperity. Such political business cycles please voters along with considerable implications for price level and monetary policy. The seminal and influential work of Sargent *et al*, (1981) titled in their study some unpleasant arithmetic of monetarism which showed that absence of sustainable fiscal policy leads to higher inflation in future if monetary authority tries to fight current inflation with tight monetary policy. Fair (1994) finds that huge public debt can be diminished and even tight monetary policy effects can be reversed to minimize inflation.

Grohe and Uribe (2001) investigated and found a significant relationship between public debt and inflation. Blanchard *et al*, (2002) find the existence of dominant and active fiscal policy allows politicians to adopt discretionary policies and behave in inconsistent. Canzoneri *et al* (2001, 2002) argue that no additional fiscal constraints are required for price stability as far as the non-discretionary component of fiscal policy is concerned. Poterba (1994, 1995) finds that adherence to fiscal policy rules surely reduces the budget deficit and inflation. Leeper (1991) finds that dominant treasury breaches the stipulated laws and limits related to government budget constraints. Woodford (1998) revealed that high public spending by active treasury stimulates growth and employment along with an increase in the general price level.

The presence of an accommodative treasury enhances the effectiveness of monetary policy and helps to reduce inflation. Sim (1988) finds that fiscal profligacy does not affect inflation in the presence of a responsible and accommodative treasury. Fiscal authority potentially affects the price level when the treasury behavior is not responsive to the demands of the central banks. Marco *et al* (2001, 2009) reveal that treasury least bothered about budget deficits and inflation while maximizing the welfare of the people. Uhlig and Ravn (2002) explore that fiscal authority produces inefficient and sub-optimal outcomes because treasury benches are usually concerned with employment and output growth. Blinder (1982) found that the reliability of monetary policy does not entirely depend on the central bank autonomy but it also depends on the fiscal position of the government. A similar situation is for the fiscal policy. Acemoglu *et al*, (2008) find that political factors are very instrumental and policies are largely counter-productive and distortionary when politicians face fewer constraints.

The existence of price level fiscal theory and price puzzle phenomenon is a recurring theme in the contemporary issues in macroeconomics.

**Model Specification and Bound Testing**

In this section, we check the long-run relationship or co-integration between inflation, public debt, and money market rate. This specification not only helps us in investigating the price determination fiscal theory but also proves helpful in evaluating the monetary policy effectiveness in controlling inflation. The specification of the basic model is

$$P_t = f(MMR, DB_t, \varepsilon_t) \dots\dots\dots (a)$$

$P_t$  is the price level,  $DB_t$  is the public debt  $MMR_t$  is the money market rate.

For Model (a), we have

$$P_t = \lambda_0 + \lambda_1 P_{t-1} + \lambda_2 MMR_t + \lambda_3 DB_t + \varepsilon_t \dots\dots\dots (b)$$

A priori expectation about the signs of the parameters are such that  $\lambda_1 > 0$ ,  $\lambda_2 < 0$ ,  $\lambda_3 > 0$ , and  $\varepsilon_t$  is the error term. Priori expectation is based on the theoretical economic background of the relationships among these variables. The model for assessing the cointegrating relationship is

$$\Delta P_t = \lambda_0 + \sum_{i=1}^q \lambda_i \Delta P_{t-i} + \sum_{j=0}^q \Phi_j \Delta DB_{t-j} + \sum_{k=0}^q \zeta_k \Delta MMR_{t-k} + \gamma_1 P_{t-1} + \gamma_2 DB_{t-1} + \gamma_3 MMR_{t-1} + \varepsilon_t \dots\dots(c)$$

Where  $\varepsilon_t$  is white noise while  $\Delta$  shows first difference operator which represents changes from period t-1 to t.

**Bound Testing:**

ARDL approach has been employed to get simultaneously the short-run and long-run parameters. This methodology starts with the bound test of no cointegrating relationship by estimating the above equation. The hypothesis of the conventional F-test is as

$$H_0 : \gamma_1 = \gamma_2 = \gamma_3 = 0$$

$$H_a : \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq 0$$

In other words, it means that

$$H_0 : \gamma_{i's} = 0 \text{ Against } H_a : \gamma_{i's} \neq 0 \quad \text{Where } i=0, 1, \dots, 3$$

The above null hypothesis means no relationship exists between inflation and other explanatory variables in long run. F-statistic calculated value has compared with the Peasranet al. (2001) critical value. The existence

of a cointegrating relationship or long-run relationship allows us to move further and estimate (ECM). In our model, this will be carried out in the following manner.

$$\gamma_1 P_{t-1} + \gamma_2 DB_{t-1} + \gamma_3 MMR_{t-1} = 0$$

$$\gamma_1 P_{t-1} = -\gamma_2 DB_{t-1} - \gamma_3 MMR_{t-1}$$

$$P_{t-1} = -\frac{\gamma_2}{\gamma_1} DB_{t-1} - \frac{\gamma_3}{\gamma_1} MMR_{t-1}$$

$$P_{t-1} = -\kappa_1 DB_{t-1} - \kappa_2 MMR_{t-1}$$

Where

$$\text{Where } \kappa_1 = -\frac{\gamma_2}{\gamma_1} \quad \& \quad \kappa_2 = -\frac{\gamma_3}{\gamma_1}$$

$$\Delta P_t = \lambda_0 + \sum_{i=1}^q \lambda_i \Delta P_{t-i} + \sum_{j=0}^q \Phi_j \Delta DB_{t-j} + \sum_{k=0}^q \zeta_k \Delta MMR_{t-k} + \kappa ECM_{t-1} + \varepsilon_t \dots\dots\dots (d)$$

Where parameter  $\kappa$  represents the speed of adjustment.

In the first step of estimating the autoregressive distributed lag model, equation (a) is estimated to investigate the long-run relationship between inflation, money market rate, and public debt.

**Unit Root Testing**

It is a standard practice in the research to check time series for unit root problem or stationarity before going to an estimation of any kind of equation. Before checking the cointegrating relationship or association among the variables of our interest, we need to determine the order of integration of variables. The series is non-stationary if it contains a unit root problem. If we proceed and estimate variables that are not stationary and have the problem of unit root, then it produces some spurious regression or meaningless relationship. Following standard protocol, this study checks whether the variables under consideration are stationary or non-stationary. Literature on time series suggests several methods and procedures for investigating the problem of unit root tests that broadly includes the augmented Dickey-Fuller (ADF) tests and Phillips-Perron (PP) Tests besides other methods. The study uses both tests to check the stationarity of the variables. Results of the two tests are given in the table below;

**Table 1. Results of Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) Tests**

Variable	ADF		PP		Order of Integration
	Level	First Difference	Level	First Difference	
INF	-3.3397*	-6.6242***	-3.4642*	-7.4842***	I(0)
MMR	-2.5762*	-7.0968***	-2.5882*	-7.1021***	I(1)
DB	-3.4679*	-8.6191***	-3.4463*	-11.7580***	I(1)

\* Significant at 10% level, \*\* Significant at 5% level, \*\*\* Significant at 1% level

Tests for stationarity suggest that variables of our interest are not integrated of the same order. We investigate the problem of unit root for inflation and find that inflation is stationary at a level. There is no need to take the first difference of inflation. Money market rate is non-stationary at the level and has the problem of a unit root. It becomes stationary when we take the first difference. This implies it is integrated of order one, I(1). Public debt is not stationary and integrated of order one, I(1). None of the variables is integrated of order two i.e. I(2). The different order of integration of the variable provides the logical justification for using Autoregressive Distributed Lag Model (ARDL) for investigating the cointegrating or long-run association and short relationship among these variables for further empirical analysis and policy prescription.

### Results of Autoregressive Distributed Lag Model Results

In the first step of estimating the autoregressive distributed lag model, we investigate the existence of the fiscal theory phenomenon of price determination in Pakistan. We further investigated the monetary policy effectiveness by examining the existence of the price puzzle phenomenon. In this, we check the cointegrating or long-run association between inflation and money market rate.

**Table 2. Estimated Long Run Coefficient: ARDL (1,1,1) Estimates Based AIC: Dependent variable Inflation**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF <sub>t-1</sub>	0.4583	0.1167	3.9271	0.000
MMR	-1.2422	0.3443	-3.6079	0.001
DB	0.4356	0.1350	3.2266	0.002

**Table 3. Error Correction Representation for the Selected ARDL (1,1,1) Model**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
dMMR	1.3585	0.3642	3.7300	0.001

dDB	0.1257	0.0406	3.0927	0.003
ECM(-1)	-0.5416	0.1167	-4.6407	0.000
R-Squared	0.5825			
DW-statistic	1.8614			

$$ECM = INF-0.2147*MMR -0.4356*DB$$

Table 4. F-Statistics for Co-integration Relationships

Equation	F-calculated	Critical values at 5%		Outcome
		I(0)	I(1)	
$P_t = f(DB, MMR_t, \varepsilon_t)$	11.6676	2.8539	4.0778	Co-integration

Source: Author’s Calculations

Table 4 shows that the F calculated value(11.6676)is greater thanthe critical value of 4.0778. It implies the existence of a long-run association between the level of public debt,price level, and money market rate. The results of short-run and long-run relationships of the variables are presented below.

**Short run Coefficients**

$$P_t = 1.3585\Delta MMR + 0.1257\Delta DB - 0.5416ECM(-1) \dots\dots\dots (e)$$

(3.7300)                      (3.0927)                      (-4.6207)

**Long Run Coefficients**

$$P_t = 0.4583 * INF_{t-1} - 1.2422MMR_{t-1} + 0.1102DBg_{t-1} \dots\dots\dots (f)$$

(3.9271)                      (-3.6079)                      (2.6462)

**Structural Stability Test of Model**

We also carry out a test for the structural stability of our model. For structural stability, we use cumulative sum (CUSUM) and cumulative sum of square (CUSUMSQ) tests. The cumulative sum (CUSUM) test is used for tracking systematic changes while the cumulative sum of square (CUSUMSQ) tests is used to identify abrupt changes. Figure 1 shows the cumulative sum (CUSUM) and figures2 shows (CUSUMSQ) test. The two straight lines show a 5 percent level of significance.

Figure 1. Cumulative Sum of Recursive Residual

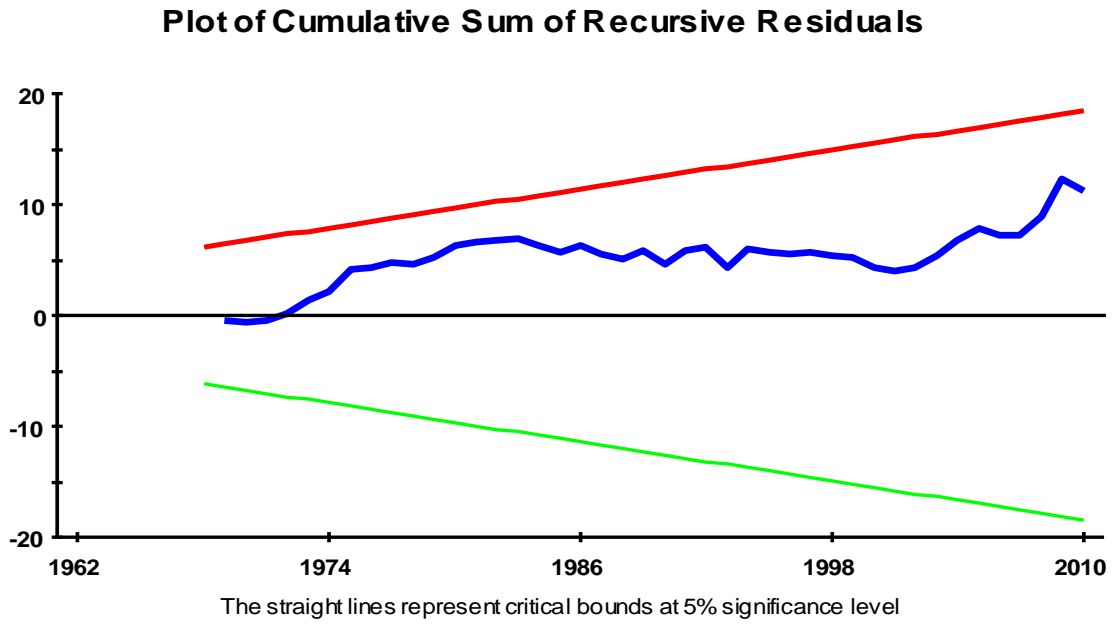
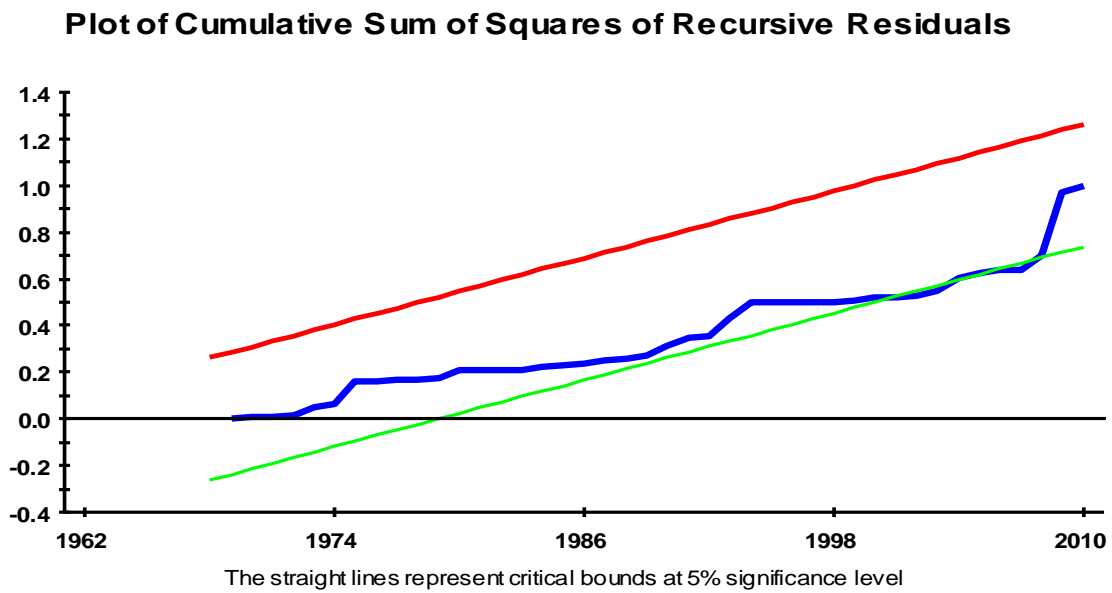


Figure 2. Cumulative Sum of Square recursive Residuals





The cumulative sum (CUSUM) test and cumulative sum of square (CUSUMSQ) tests for the variables under observation are largely within the 5 percent band. This implies that there is no structural break in the model under consideration.

### Discussion on Results

We used autoregressive distributed lag models (ARDL) for checking the cointegrating relationship or long-run association between growth in money supply, inflation, and the level of public debt. Parentheses contain *t*-values that are to be judged whether it is significant at a 5 percent level of significance or not. Our estimation shows that inflation considerably depends on its lag. The coefficient is 0.4583 and the test statistic is 3.9271 which is quite significant and implies that level of price in the current period *t* is considerably affected by the price level in the past period *t-1*. This means that inflation demonstrates a trend to stay high if it is higher in the previous period. Inflation tends to be persistent in Pakistan. The test statistic is significant and indicates a considerable degree of inertia. The inflationary pressure persistency in the economy is likely to be one of the major factors for the continued deceleration in the pace of economic growth. Such a situation in the country demands serious attention from the State Bank of Pakistan to work seriously on containing inflation in the country.

Our estimations also reveal that growth in the level of public debt has both contemporaneous as well as long-run effects. The short-run coefficient of the growth in public debt is 0.1257 and the test static is 3.0927 which is significant. The long-run coefficient is also greater than 2 and statistically significant. This implies that growth in the level of public debt triggers inflationary pressure in the economy. This implies that the fiscal theory phenomenon of price determination exists in Pakistan. This also indicates the central role of the treasury and fiscal dominance in Pakistan. In a fiscal dominance regime, politicians and the fiscal authority or the treasury benches always run a budget deficit and have no regard for the policy choices of the State Bank of Pakistan. Treasury sets its targets for revenue and expenditure independently. Fiscal authorities often breach the limits set in the fiscal responsibility and debt limitation act. When this is the situation, the federal government has no other option to bridge the fiscal gap except to contact the State Bank of Pakistan. State Bank is the principal and active player that usually bridges the gap between government revenue and expenditure by providing the required seigniorage to finance the deficit. The accommodative and cooperative behavior of State Bank induces domestic monetary growth and alters aggregate demand that puts upward pressure on the prices in the country. This implies that State Bank plays an important role and contributes to fueling inflation in the country rather than controlling it.

Generally, it is believed, and economic theory also indicates the negative relationship between interest rate and inflation. This means the price level increases with a decrease in the interest rate. But there are also instances, contrary to the established economic theory, of the positive relationship between the price level and interest rate which is called the price puzzle. Pakistan frequently experiences high and volatile inflation. To control inflation the State Bank of Pakistan (SBP) is doing its business by keeping a high-interest rate. Here in our ARDL setup, we document very interesting results. Price level and money market rate move in the same direction. Above table 2 and table 3 show a robust relationship between inflation and money market rate in the economy of Pakistan at least in the short run. During the short run, the money

market rate is positively associated with inflation and the test statistic is 3.7300 with a positive sign. The monetary policy of State Bank has a statistically significant contemporaneous impact but in opposite direction. This implies that the phenomenon of the price puzzle holds in Pakistan at least in the short run. This supports the famous notion of the price puzzle introduced by Bernanke and Blinder (1992). To control the inflation in long run the State Bank Monetary policy is effective with some lags. The test statistic with one lag is 3.6079 with a negative sign indicating statistical significance and shows the effectiveness of monetary policy in long run. This further implies that monetary policy takes time to have its full impact on inflation in Pakistan. Our result also validates Friedman's (1972) findings that to have the full impact on inflation, the monetary policy takes almost one year.

Error correction mechanism (ECM) holds a very prominent position in autoregressive distributive models once the long-run association is established among the variables. Our estimation results also reveal that the coefficient of error correction term holds the much expected negative sign, that is -0.5416 with a significant test statistic of -4.6407 at a 5 percent significance level. Error correction mechanism of -0.5416 means that 54.16 percent of the previous year's disequilibrium caused by shocks is corrected. We can say that speed of adjustment is fairly high. The considerable significance of the error correction mechanism validates the existence of a cointegrating relationship and advocates the long-run association between the variables under consideration. There is co-integration between growth in public debt, inflation, and money market rate in the economy. Growth in public debt has a considerable impact on inflation both in the short-run and in long run.

## Conclusions

The study found the existence of price level fiscal theory in Pakistan. Financing of the deficit with domestically created money put upward pressure on the prices. Here the coordination and accommodative behavior of the State Bank is creating problems and is not desirable, because such a cooperative behavior of State Bank leads to a hike in the general level of price. The fiscal profligacy of the treasury is instrumental in the determination of prices in Pakistan. The policy lesson for SBP in the presence of FTPL demands care in the construction and implementation of monetary policy. This study revealed that the political will is needed for effective legislation to stop fiscal profligacy. This particular kind of legislation will make rules more stringent and difficult for politicians not to avoid them. This situation also demands greater cooperation from fiscal authority with its monetary counterpart.

This study also found the existence of the price puzzle phenomenon in Pakistan in the short run. The positive response of inflation to the interest rate validates the existence of the price puzzle in Pakistan. The application of monetary economics standard models in the presence of fiscal theory of price level proves not only counterproductive but distortionary as well. On the one hand, this kind of response from the central bank fuels inflation, and on the other hand, it negatively discourages investment.

Monetary managers in the State Bank are aware of the fact that financing budget deficits through borrowing from State Bank create problems. State Bank of Pakistan keeps the interest rate high to discourage the growing trend of fiscal deficit and its habitual monetization. As the study revealed the ineffectiveness of monetary policy to control inflation in the short run, the tight policy stance of the central bank contributes not only bringing significant budget fluctuations but debt accumulation as well. The situation necessitates the importance of a more cohesive fiscal and monetary policy. Here we also have a

dilemma. The government relies on expensive domestic sources of borrowing despite the higher interest rate. The main reason for such expensive borrowing is the non-availability of foreign loans. This is not a healthy sign for the overall economy of Pakistan.

### Policy Recommendations

State Bank needs to consult the Ministry of Finance before formulating monetary policy, particularly when it adopts the contractionary monetary policy. The treasury also needs to rationalize its spending. Furthermore, in such a situation, policymakers should not entirely focus on contractionary monetary policy to stop ruthless government spending and excessive government borrowing. Monetary policy needs to be accompanied by institutional arrangements to stop fiscal profligacy.

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