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# Fiscal Determinants of Inflation in Pakistan

Bilal Raza and Khurrum S. Mughal*

## Abstract

This study explores relevance of Fiscal Theory of Price Level for Pakistan, which postulates that fiscal variables also play a role in determining inflation. We have used Autoregressive Distributive Lag model over the period of FY2000Q1-to-FY2019Q3. Unlike most of the previous studies that used only aggregate measure of fiscal deficit, we also have tested for disaggregated fiscal variables on the revenue side. The article finds inflation in Pakistan is a multidimensional process; and fiscal variables along with monetary and supply side factors contribute significantly towards inflation. In particular, we find that different variations of disaggregated fiscal variables like total tax, indirect tax and sales tax are important determinants of inflation.

**JEL Classification**: E31, E52, E62,

**Key Words**: Fiscal, Monetary, Inflation,

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## 1. Introduction

Price stability is an important public policy objective. The knowledge of underlying driving forces is key to achieve and sustain desirable level of price stability. However, schools of thought within economics differ in their theoretical explanation of inflation so public policy domain remains contested.

The monetarist doctrine, a refined reincarnation of classical quantity theory of money, holds monetary expansion as sole reason of inflation. The monetarist link between money supply and fluctuations in price level is succinctly described in famous statement of Friedman (1956), i.e., inflation is always and everywhere a monetary phenomenon. Theoretical foundations of monetarist framework are well presented in Friedman (1968, 1970, 1971) while major proponents include McCallum (2001, 2003) and Niepelt (2004). However, fiscal theory of price level (FTPL) developed by Leeper (1991), Sims (1994), Woodford (1994, 1995, 2001) and Cochrane (1998) emphasizes that fiscal balances must be sustainable for stable price level in an economy. Persistent deficits are financed through money creation and cause higher inflation.

Monetarist and FTPL advocates agree that both monetary and fiscal policies must be selected in the appropriate way if price stability is to be achieved. However, monetarist doctrine holds that a tough central bank will automatically compel the fiscal authorities to adopt an appropriate fiscal policy. Therefore, they consider an independent central bank a pre-requisite for price stability. However, FTPL contests monetarist argument. It says that money supply is not exogenous and mostly determined endogenously by financial requirements of fiscal authorities to induce money supply (Sargent & Wallace, 1981). Moreover, allowing the price level to fluctuate with unexpected shocks to government budget produces public finance benefits (Woodford, 1998). These benefits overwhelm distortionary cost of volatile price so complete price stability is not optimal.

The FTPL thesis has special significance for developing countries where structural bottlenecks such as inefficient tax collection, political instability, and limited access to external borrowing (Alesina & Drazen, 1991; Calvo & Vegh, 1999; Cukierman et al, 1992) lower relative cost of seigniorage. Similarly, high political costs associated with imposition of a tax and economic costs associated with debt servicing make inflation tax a lucrative option (Catao & Terrones, 2005). Empirical evidence also suggests that there is a significant relationship between fiscal deficits and price level in high inflation countries (Metin, 1998; Domac & Yucel, 2005). Therefore, price stability requires that public deficit is sustainable and inter-temporal budget constraint is balanced (Leeper, 1991; Sims, 1994).

Pakistan is an interesting case for both policy relevance and empirical investigation of FTPL. Central bank of Pakistan is shifting toward Flexible Inflation Targeting (FIT) regime while government usually runs large deficits. Given that FTPL is working, shifting to FIT also needs fiscal discipline to be successful in achieving price stability. Some studies for Pakistan like Shabbir et al. (1994), Chaudhary et al. (1995), Agha & Khan (2006) and Jalil et al. (2014) show significant relationship between fiscal deficit and inflation whereas Aleem et al. (2007) find insignificant contribution of fiscal policy to inflation. It suggests that empirical evidence is inconclusive. Moreover, these studies have incorporated fiscal policy only in terms of aggregate measures like budget deficit, total taxes, etc. However, it is plausible to assume that impact on inflation of disaggregated variables, e.g., relative share of direct, indirect and sales tax may differ from that of aggregate measure, e.g., total taxes in both sign and size. It is yet another reason to further analyze underlying determinants of inflation in Pakistan's economy.

This paper explores effect of fiscal variables and inflation in Pakistan by using quarterly data from Q1-FY2000 to Q3-FY2019. While we find that money supply is a significant factor affecting inflation with a large positive coefficient, our results also support fiscal theory of price level. Budget deficit has a significant and positive relationship with inflation. Similarly, disaggregated fiscal variables like total taxes, indirect taxes and sales taxes also contribute to increase in inflation.

The rest of the paper proceeds as follows. Section 2 is literature review. Section 3 presents data sources, variables and estimation methodology. Section 4 presents empirical result. Section 5 is conclusions.

## 2. Literature Review

Over the last few decades, debate on determinants of inflation has moved away from always a monetary phenomenon (Friedman, 1956; Schwartz, 1973) to structural (Baumol, 1967; Rijckeghem & Maynard, 1976) and fiscal (Sargent & Wallace, 1981; Leeper, 1991) phenomenon. The focus of this study is to test empirical relevance of FTPL for Pakistan; however, it also includes monetary and structuralist variables. Although Sims (1994) asserts that inflation in most cases is more of a fiscal phenomenon and expectation formation depends on fiscal policy, Bajo-Rubio et al. (2009) show that empirical evidence is at best mixed.

Most of the empirical studies for developed economies do not provide strong evidence to support FTPL hypothesis. King & Plosser (1985) used single equation OLS and VAR analysis to identify determinants of inflation for United States and twelve other countries, and did not find any causal relationship between deficits, monetary growth and inflation. Guess & Kaford (1986) used granger causality test using data from 1949-to-1981 for seventeen OECD countries and find that deficits are not responsible for inflation or crowing out phenomena of private investment. Similarly, Sahan & Bektasoglu (2010) used panel data from 1980-to-2008 for seventeen European countries and concluded that generally no long run relationship exists between inflation and deficits. Instead, they found that deficit-inflation relationship changes with variation in level of development and structural features of the economy.

However, most studies for developing countries do find evidence to support FTPL which may partly reflect general presence of structural deficits and fiscal dominance. For Iranian economy, Samimi & Jamshidbaygi (2011) document positive relationship between budget deficits and inflation. For Turkey, most studies confirm that government debt and deficits remained significant determinants of inflation during different time spans (Metin, 1998; Seljuk, 2001; Kia, 2010); however, Tekin-Koru & Ozmen (2003) find no conclusive evidence to support deficit inflation nexus. Habibullah et al. (2011) used Granger causality and Error Correction Model (ECM) technique on data from 1950-to-1999 for a panel of thirteen Asian countries, and confirmed FTPL hypothesis. However, Nawaz et al. (2012) rejects FTPL hypothesis for a panel of selected SAARC countries. Fischer et al. (2002) used fixed effects model for a panel of ninety-four developed and developing countries, and demonstrate that deficits-inflation nexus is asymmetric in that deficits are important factor in high inflation countries but turn out insignificant for low inflation countries. Lin & Chu (2013) also find strong relationship between fiscal deficit and inflation for developing countries with a long history of high inflation.

The behavior of inflation w.r.t deficits does not only depend on overall size of deficit but also on its composition. Pekarski (2011) argues that government deficit can be divided into two parts: inflationary and non-inflationary. The deficit resulting from investment expenditures is sustainable while deficit originating from consumption expenditures leads to even higher deficits in the long run,

and hence may cause inflation (Tiwari et al. 2012). If we apply same logic to revenue side of government budget that is also our area of interest for this study, we may find that different revenue measures also exhibit asymmetric relationship with inflation.

Economic literature highlights several other factors, which may affect price level in the case of Pakistan. Oil price is administered in Pakistan and changes in it are likely to have large spillover effects on inflation. Historically, exchange rate has also remained under tight administrative control. Trend analysis of exchange rate clearly highlights periods of overvaluation followed by sharp adjustment. The resultant depreciation may pass-through to inflation. Another important factor is the cost of borrowing capital i.e. interest rate that may contribute significantly toward cost-push inflation. In case of Pakistan, Jalil et al. (2014) and Hasan (1999) find interest rate is significant determinant of inflation; however, relationship between nominal interest rate and inflation is not one to one so Fisher effect does not hold. Similarly, Kandil (2005) and Kose et al. (2012) also find significant relationship between interest rates and inflation.

Zakariya (2010) reports both fiscal and monetary policies as major determinants of inflation. Khan et al. (2007) apply OLS technique on data from 1973-to-2006 and find that most important determinants of inflation are adaptive expectations, private sector credit and rising import prices. They also show that government deficit is insignificant while direct taxes put downward pressure on price level. Similarly, Jalil et al. (2014) take data from 1972-2012 and apply bounds testing approach to identify determinants of inflation for Pakistan. Their findings demonstrate that apart from deficits most important factors contributing toward inflation are interest rate, trade openness, private sector credit and government borrowing. We can't find any study for Pakistan that specifically investigates relationship between inflation and different measures of tax including total taxes, sales taxes and direct and indirect taxes.

## 3. Data and Methodology

Drawing from the existing literature on the subject, we test for both demand side and supply side variables along with policy variables as potential determinants of inflation. Following is the general regression specification.

$$lcpi_t = \alpha_0 + \alpha_1 lbd + \alpha_2 lms + \alpha_3 lr + \alpha_4 lt_{ti} + \alpha_5 lZ_{ti} + U_t \quad (1)$$

Where, $lcpi$ is log of consumer price index, $lbd$ is log of budget deficit, $lms$ is log of money supply and $lr$ is log of lending rate. The term $lt_{ti}$ represents log of various tax related fiscal variables including total taxes, sales taxes and direct taxes. Similarly, $lZ_{ti}$ includes log of different control variables including exchange rate, oil price index, budgetary borrowing and private sector credit. $\alpha_0$ and $U_t$ are intercept and error term, respectively.

We used quarterly data for empirical analysis ranging from FY2000Q1-to-FY2019Q3. The main sources of data are Pakistan Bureau of Statistics and State Bank of Pakistan. The variables used for this study are consumer price index ($cpi$),[1] budget deficit ($bd$), money supply ($ms$), net budgetary borrowing ($nbb$), private sector credit ($psc$), exchange rate ($er$), interest rate ($r$), oil prices ($op$), total tax ($t$), ratio of total taxes to nominal GDP ($ty$), sales tax ($st$), ratio of sales tax to total tax ($stt$), ratio of sales tax to nominal GDP ($sty$), direct tax ($dt$), ratio of direct tax to total tax ($dtt$), and ratio of direct tax to nominal GDP (($dty$). The budget deficit is taken as ratio of nominal GDP to avoid any scale bias. The variable $ms$ is standard monetary aggregate M2. Similarly, $nbb$ and $psc$

[1] Following Jalil et al. (2014) we use CPI because Pakistan is a net importer country and its basket of consumption include a lot of foreign produced goods. Therefore, wholesale price index (WPI) and GDP Deflator may underestimate impact of fiscal deficits on inflation.

reflect fiscal and monetary policy stance, respectively; and because of high correlation don't enter in the same regression with $bdy$ and $ms$, respectively. The $er$ is the average nominal exchange rate, $r$ is the average lending rate and $op$ is the average oil price index.[2] The tax variables are taken in level form as well as percentage of total taxes and GDP, whenever theoretically relevant. For example, it is theoretically possible for $itt$ and $ity$ to have coefficients which differ in magnitude and/or sign. All variables are taken in logarithmic form.

The literature suggests that Ordinary Least Square method might not reliable for time series data in the presence of reverse causality/endogeniety. We are primarily interested in the long run relationship, and Engle and Granger (1987) and Johansen and Juselius (1990) are commonly used procedures to estimate co-integrating relationship. However, these approaches require that all time series have same order of integration, a condition that does not satisfy in our case (see next section). Therefore, we used Autoregressive Distributive Lag (ARDL) model that is applicable when underlying series are $I(0)$ or $I(1)$ but none of the series is $I(2)$. The ARDL framework of Eq. (1) is as follows:

$$\Delta lcpi_i = \beta_0 + \sum_{i=1}^{p} \psi_i \Delta lncpi_{t-i} + \sum_{i=1}^{p} \Phi_i \Delta lbd_{t-i} + \sum_{i=1}^{p} \lambda_i \Delta lms_{t-i} + \sum_{i=1}^{p} \sigma_i \Delta lr_{t-i} + \sum_{i=1}^{p} \delta_i \Delta lZ_{t-i} + \theta_1 lcpi_{t-1} + \theta_2 lbd_{t-1} + \theta_3 lms_{t-1} + \theta_4 lr_{t-1} + \theta_5 lZ_{t-1} + U_t \quad (2)$$

Where the terms with summation and θ sign represent error correction dynamics and long run cointegrating relationship, respectively. Econometric literature highlights that ARDL modeling has certain advantages over other techniques (see Banerjee et al. 1993; Pesaran & Shin, 1999). For example, it allows different variables to have different optimal lags. All variables enter endogenously. The single equation set up makes it parsimonious, and easy to implement and interpret. Finally, simple linear transformation produces Error Correction Model (ECM). The following ECM model is estimated:

$$\Delta lcpi_i = \beta_0 + \sum_{i=1}^{p} \psi_i \Delta lncpi_{t-i} + \sum_{i=1}^{p} \Phi_i \Delta lbd_{t-i} + \sum_{i=1}^{p} \lambda_i \Delta lms_{t-i} + \sum_{i=1}^{p} \sigma_i \Delta lr_{t-i} + \sum_{i=1}^{p} \delta_i \Delta lZ_{t-i} + \Upsilon ECM_{t-1} + U_t \quad (3)$$

The $\Upsilon$ coefficient represents the speed of adjustment to long run equilibrium after a short run shock.

**4. Empirical Results**

The first step in time series analysis to verify underlying variables are stationary. As noted above, ARDL framework works when series are $I(0)$ or $I(1)$ but none of the series is $I(2)$. Therefore, to check stationarity we used conventional Augmented Dickey-Fuller (ADF) test. All variables are either level or first difference stationary while none of the series is second difference stationary. Hence, it provides a strong justification for the use of ARDL model.

The next step is to establish existence of long run relationship among variables. For this, we use bounds test approach. The estimated F-stats provide strong evidence for presence of cointegrating relationship when compared with the Pesaran et al. (2001) critical values. We use Akaikie Information Criterion (AIC) to select optimal lags for each model. The estimated F-stats for each model are presented in Table 1 along with results of all estimated 8 models.

[2] We take average of the entire period instead of end of the period value as it is better captures the reality.

The coefficient of budget deficit is positive and significant in all the estimated models. For example, coefficient of budget deficit in first model (M-1) implies that inflation may be increased by $0.15$ percent with 1 percent increase in budget deficit. These results support grand proposition of FTPL i.e. inflation is also a fiscal phenomenon in case of Pakistan. However, the impact of deficit on inflation is not as strong as found in some previous studies e.g. Jalil et al. (2014) used same bounds test procedure and their estimated coefficient was on average around 0.5.[3]

On the monetary side, money supply also enters as significantly positive factor in all of the models, and also has relatively large coefficient compared with budget deficit. On average, coefficient of money supply is around $0.5$ as compared to $0.15$ of budget deficit. This result might suggest that inflation in Pakistan is more of a monetary than fiscal phenomenon; however, before jumping on to this conclusion we must also look at the coefficient of disaggregated fiscal variables, that is also the main contribution of this study.

The variables net budgetary borrowing ($nbb$) and Credit to Private Sector ( $psc$), which are used as an alternative of budget deficit and money supply, respectively, also enter positively significant. The coefficient of $nbb$ is on average around $0.2$ which is closer to that of budget deficit. However, coefficient of $psc$ is significantly lower than that of $ms$ and turn insignificant in one model (M-5). Again, these results suggest that both fiscal and monetary variables are important determinants of inflation in Pakistan.

The rate of interest ($r$), measured as lending rate, is included in first three models and enters significantly positive in all of them, which may be an indicator of the presence of price puzzle in Pakistan as already established by Hayat and Hanif (2016).

The coefficient of log of exchange rate ($er$) is significantly positive in M-5. The large size of $er$ coefficient reflects large share of imported goods in Pakistan's consumption basket. The result is according to our a priori assumption based on empirically observed association between sharp depreciation of local currency and high episodes of inflation. Moreover, steady depreciation of PKR over the period under consideration also suggests presence of pressures on inflation from import sector. Similarly, the index of oil price, the largest imported item, also enters significantly positive in all four models. The coefficient on oil price $lop$ is remarkably stable and shows that (in M-1) that one percent increase in price may result in $0.15$ percent increase in overall inflation.

Turning to tax variables, the results in Table 1 show that one percent increase in government taxes may result in $0.19$ percent increase in inflation. The coefficient of direct taxes is insignificant. Finally, the coefficient for sales tax is positively significant and in line with literature. It shows that one percent increase in sales tax may translate into $0.44$ percent increase in inflation. We also enter direct taxes and sales taxes as ratio of total taxes as regressors. The results show that coefficient of $ldty$ is insignificant whereas coefficient of $lsty$ is significant and positive.

The error correction term, $ECM_{t-1}$, shows speed of adjustment toward long run equilibrium after system is hit by a short run shock. For example, in first model $ECM_{t-1}$ term is $-0.09$ which means that in response to a shock system may converge toward long run equilibrium at the rate of 9 percent per quarter. At this speed, it will take roughly three 3 years before the system fully return to the

[3] There are multiple reasons for this difference. First, Jalil et al. (2014) covers time from 1972-2012 whereas our data ranges from 2000-2019. Second, they use annual data while we have data set with quarterly frequency. Third, Pakistan repeatedly entered in IMF program during the period covered in our study. However, that was not the case for 1970s and 1980s, the period covered by Jalil et al. (2014). As IMF programs often strictly impose fiscal discipline, it is possible that inflation in periods with relatively more presence of IMF is less influenced by fiscal deficit and vise-versa.

equilibrium path. The short run results are presented in Table 2. Save coefficient of budget deficit, most of the variables in short run appear with expected signs.

## 5. Conclusions

This study identifies determinants of inflation with particular emphasis of budget deficit and disaggregated fiscal variables through ARDL estimation technique and uses time series data from FY2000Q1-to-FY2019Q3. Our results lend support to fiscal theory of price level. Budget deficit is significantly positively related to inflation although its impact is not as high as in some previous studies. However, at disaggregate level other fiscal variables like total taxes, indirect taxes and sales taxes are also found to have impact on inflation. On the monetary side, money supply has a large, positive and significant coefficient which shows that inflation in Pakistan is also influenced by monetary developments. Finally, administered and supply side variables like exchange rate and oil prices also contribute significantly toward inflation.

**Table 1. Long run ARDL results for determinants of inflation**

| Regressors | Variable | M-1 | M-2 | M-3 | M-4 | M-5 | M-6 | M-7 | M-8 |
|---|---|---|---|---|---|---|---|---|---|
| Budget deficit | $lbdy$ | 0.15** | 0.16** | 0.07** | 0.15*** | - | 0.22*** | 0..18*** | 0.30*** |
| Net budgetary borrowing | $lnbb$ | - | - | - | - | 0.23*** | - | - | - |
| Money Supply | $lms$ | 0.52*** | 0.64*** | 0.62*** | - | - | 0.53*** | 0.18* | 0.49*** |
| Private sector credit | $lpsc$ | - | - | - | 0.24*** | 0.12 | - | - | - |
| Interest rate | $lr$ | 0.13** | 0.13** | 0.14*** | - | - | - | - | - |
| Exchange rate | $ler$ | - | - | - | 0.54*** | - | - | - | - |
| Oil price | $lop$ | 0.15** | - | - | - | 0.14** | - | - | - |
| Total tax | $lt$ | - | - | - | 0.19** | - | - | - | - |
| Direct Tax | $ldt$ | - | - | - | - | 0.11* | - | -0.05 | - |
| Sales Tax | $lst$ | - | - | - | - | - | - | 0.44*** | - |
| Total tax to GDP ratio | $lty$ | - | -1.29** | - | - | - | - | - | - |
| Direct Tax to GDP ratio | $ldty$ | - | - | - | - | - | - | - | 0.03 |
| Sales tax to GDP ratio | $lsty$ | - | - | - | - | - | - | - | 0.45** |
| Direct tax to total tax ratio | $ldtt$ | - | - | - | - | - | 0.25 | - | - |
| Sales tax to total tax ratio | $lstt$ | - | - | 0.37** | - | - | 0.41* | - | - |
| Constant | - | -.06** | .009 | -.42*** | -.06 | .10** | -.12 | .11*** | -.05** |
| $ECM_{t-1}$ | - | -.09*** | -.12*** | -.18*** | -.09*** | -.09*** | -.09*** | -.10*** | -.08*** |
| Bounds Test | - | 16.9*** | 6.7*** | 9.42*** | 6.86*** | 4.7*** | 6.43*** | 9.65*** | 6.14*** |

**Table 2. Short run ARDL results for determinants of inflation**

| Description | Variable | M-1 | M-2 | M-3 | M-4 | M-5 | M-6 | M-7 | M-8 |
|---|---|---|---|---|---|---|---|---|---|
| Budget deficit | D1.lbdy | -0.009*** | -0.013** | -0.005 | -0.009*** | - | -0.011*** | -0.011*** | -0.016*** |
| | LD.lbdy | - | -0.006* | - | - | - | - | - | -0.005* |
| Money supply | D1.lms | - | - | 0.181 | - | - | - | - | 0.145 |
| Private sector credit | D1.lpsc | - | - | - | - | -0.034 | - | - | - |
| | LD.lpsc | - | - | - | - | -0.079** | - | - | - |
| | LD2.lpsc | - | - | - | - | 0.082** | - | - | - |
| | LD3.lpsc | | | | | | | | |
| | LD4.lpsc | | | | | | | | |
| Interest rate | D1.lr | 0.052*** | 0.036* | 0.057*** | - | - | - | - | - |
| | LD.lr | -0.032* | -0.033* | -0.054*** | - | - | - | - | - |
| | L2D.lr | -0.017 | 0.001 | -0.022 | - | - | - | - | - |
| | L3D.lr | -0.144 | -0.018 | -0.041 | - | - | - | - | - |
| | L4D.lr | -0.38** | -0.047** | -0.055*** | - | - | - | - | - |
| Exchange rate | D1.ler | - | - | - | 0.095* | - | - | - | - |
| | LD.ler | - | - | - | -0.186*** | - | - | - | - |
| Oil Price | D1.lop | - | - | - | - | 0.016** | - | - | - |
| Sales Tax | D1.lst | - | - | -0.001 | - | - | - | - | - |
| | LD.lst | - | - | 0.011 | - | - | - | - | - |
| | LD2.lst | - | - | 0.045 | - | - | - | - | - |
| | LD3.lst | - | - | 0.072** | - | - | - | - | - |
| | LD4.lst | - | - | 0.083*** | - | - | - | - | - |
| | LD5.lst | - | - | 0.061*** | - | - | - | - | - |
| Total Tax to GDP ratio | D1.lty | - | 0.158*** | - | - | - | - | - | - |
| | LD.lty | - | 0.131*** | - | - | - | - | - | - |
| | LD2.lty | - | 0.085*** | - | - | - | - | - | - |

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