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FISCAL DISTURBANCES AND INFLATION: EVIDENCE FROM PAKISTAN

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***ABSTRACT*--**The objective of this research paper is to investigate the fiscal theory of price level in an open economy, like Pakistan. For empirical evidence, annually time series data from 1976 to 2015 has been used. While applying the ARDL approach the findings of the study reports that the intervention of the government is essential for the economy. Because when monetary policy in an open economy fails, the fiscal policy of the government reacts dynamically to influence the price level. So this study concludes that the government should focus on a fiscal policy that can control the double digit inflation rate and macroeconomic fluctuations in the economy.

Key words: Inflation rate, Fiscal policy, Non-Ricardian regime, Autoregressive Distributed Lag Approach (ARDL)

JEL Classification: E31, E42, H3, C32.

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1.INTRODUCTION

Inflation for any economy is not acceptable. It creates very serious problems in the economy for people. In classical view, Ricardian regime and Non-Ricardian regime are used to determine the price level in the economy. Ricardian regime supports monetary policy while Non-Ricardian approach supports fiscal policy as an important instrument in determining price level. Leeper (1991), Sims (1994, 1997), Woodford (1994-95, and 2001), and Cochrane (1998, 2000) supported fiscal determinants of price level. All these studies emphasized importance of fiscal policy performs as a crucial function in determination of the prices in economy. Similarly, Sargent and Wallace (1975), Leeper (1991), Micheal Woodford (1994, 1995 and 2001)) favored fiscal theory of price determination in an open economy. While in case of Pakistan, Javid et al. (2008), Moreira et al. (2007), Khan and Agha (2006) also support the fiscal policy to determine the inflation rate. In the procession of above experience, the major inspiration of this study is to evaluate that whether the non-Ricardian regime of fiscal policy has an impact on the volatility of price level in Pakistan in an open economy perspective.

Inflation is very diverse background in Pakistan. In decades of 60s, 70s and 80s Pakistan received a huge amount of aid, debt and remittances which create inflationary pressure in the country. In 1972 massive devaluation, oil price hike of 1970s, increasing non-development expenditure and increasing gap of govt revenues and expenditures deeply affected the economy. In 1980s main focus of the govt was on price stabilization policy after double digit inflation of 1970s. Although it was succeeded in controlling inflation but structural problems mounted like fiscal imbalance due to heavy burden of development and non-development expenditures and growing debt burden (Khan, 1994). In 1990s a lot of studies conducted to assess causes of inflation. They have divergent views about factors contributing to inflation

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but few of them are growth in money supply, imported inflation, administered prices and inflationary expectations (khan and Qasim 1996). The decade of 2000 witnessed a slow growth. Huge debt burden dampened growth and decreased foreign exchange reserves in later half of the decade. Historical overlook of problem of inflation emphasizes importance of fiscal variables in economy of Pakistan

2. LITERATURE REVIEW

Lot of studies relevant to the non-Ricardian regime of fiscal policy and inflation at national and international level are available in the literature. But very few addresses different conclusions related to the non-Ricardian regime and inflation rate. Minford and Fan (2011) adopt the fiscal strategy of inflation. They imply FTPL model, co-integration analysis and use indirect inference method for the dynamics of inflation by using time series inflation behavior for the period 1970-IV-1978-IV. They concluded that fiscal policy behaves as exogenously and money growth as endogenously.

Moreira et al. (2007) formulate the transmission channels of monetary and fiscal policies in case of Brazil by using quarterly data from 1995 to 2006 and use fiscal IS curve, Philips curve and Leeper Model. They conclude that the Non-Ricardian model is sufficient in case of Brazil because fiscal policy dominance affects output gap directly while it indirectly affects inflation rate.

Afonso (2002) discuss the fiscal thought of inflation according to Leeper-Sims-Woodford (LSW). They apply fiscal theory of price level (FTPL) by using panel data; consist of 32 years of observation (1970-2001) for debt to GDP ratio and primary budget surplus in percentage of GDP for the in case of the EU-15 in time period 1970-2001. The results showed that FTPL is not good fit for EU-15 during this time period.

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Javid et al. (2008) investigate the interface among fiscal surpluses, debt accumulation and price dynamics. They use Vector Autoregressive Model (VAR) model and use time series data from 1971-2007. The study revealed that in case of Pakistan, inflation increased with the change in wealth that affects the nominal public debt whereas the positive result of high inflation is decrease in discount rate.

Khan and Agha (2006) formulate the long-standing relationship among fiscal indicators and high prices in case of Pakistan. They analyze time series annual data from 1973 to 2003, and for econometric technique, they developed Vector Error Correction Mechanism, Johansen co-integration technique, and VAR model. The study analyzed that inflation is also associated with money growth and development in monetary stance of an economy.

Malik et al. (2006) develop the relationship among economic growth of the country and fiscal devolution of Pakistan with the use of time series data from 1971 to 2005. It is accomplished that if the shares of expenditures of provincial government and government revenues get higher constantly can slow down the velocity of growth in the economy.

Awan (2011) states that changes are being taken place due to change in economic policies of world powers particularly the United States where rules have been developed to check discretionary powers of decision-makers. The experience proves that discretion of economic decision-makers have worsened the economy rather than improving. So it is advisable for developing countries to frame certain rules to bring changes in fiscal and monetary changes in order to create smooth flow of economic activity.

Awan & Anwar (2018) emphasized coordination between monetary and fiscal policy in order to control fluctuations in the economy. If the managers of fiscal and monetary policies take decisions independently to control inflation and generate

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unemployment the results would be contradictory and will cause more harm to economy and accelerate economic disturbances.

3. MODEL SPECIFICATION, DATA AND METHODOLOGY

3.1. Theoretical Background and model specification

Structural problems in developing countries become a big hurdle in controlling inflation through only money supply as suggested by monetarists. Similarly, central banks in developing countries are not fully autonomous and changes in money supply depict fiscal actions of the govt. A lot of studies concluded that fiscal action of the government affects money supply which results in increase in inflation. Akhtar (1975) has tested fiscal policy and foreign trade variables separately in structuralist model to show that changes in fiscal policy are significantly important to determine inflation. In developing countries budget deficit lead to higher prices by creating excess demand for goods and services. Side by side development and non-developing expenditures leads higher inflation. Similarly increasing government debt also contributes to inflation.

Keeping in view the objectives of this research, this study develops a simple model by following Javid et al. (2008) to check the systematic relationship of inflation with number of fiscal explanatory variables. Contrary to Javid et al. (2008) we are using some additional variables in our model in case of Pakistan. Therefore, the equation of the Fiscal model is as under:

$$CPI_t = \alpha + \alpha_{1t} RGDP_t + \alpha_{12} INV_t + \alpha_{13} GREV_t + \alpha_{4t} BD_{tt} + \alpha_{5t} GEXP_t + \alpha_{tt} BOT_t + \alpha_{7t} ER_t + +\varepsilon$$

Where CPI is used as a proxy for inflation with base year 2000-2001 following Javid et al. (2008), Minford and Fan (2011), Agha and Khan (2006), Creel and Sterdyniak (2002), and Faridi (2011) who also adopted CPI as a proxy for inflation. Total investment (INV) is in Million rupees which is sum of domestic as well as foreign investment and is used as an explanatory variable with the hypothesis of a positive

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linkage among the inflation and investment. Following Sims (1997), Afonso (2002), Javid et al. (2008) and Agha and Khan (2006), the present study is also using real GDP growth rate in percentage. If government expenditures (GEXP) and government revenues (GREV) in millions of rupees' increases, as a result, the rate of inflation raises. Different studies also use it as an explanatory variable like Sims (1997), Afonso (2002). This study is also using this variable as independent to check its impact on inflation rate. Budget Deficit (BD) measured in Million rupees is used as an explanatory variable on the evidence provided by Moreira et al. (2007), and Afonso (2002). They assume a negative relationship between budget deficit and inflation. The previous studies have shown that if the balance of trade (BOT) in Million USD is in deficit then it has a negative relationship with inflation and if BOT is in surplus then it has the positive relation with inflation rate. Literature shows that the exchange rate (ER) (measured as LCU per USD) plays a significant role in the determination of the prices. As the exchange rate becomes high then it has a negative impact on the rate of inflation because it leads to increase in the import prices that will lead to increase in overall prices of goods and services in the country.

3.2 Econometric Analysis

It is essential to confirm the stationarity of time series data. For this purpose, we use unit root test that helps us to check whether the data is stationary or not. From several available unit root tests, this study is using Phillips Perron (PP) (1988) test to check the stationarity. ADF test assumed that error terms are uncorrelated and have constant variance. Philips and Perron (1998) followed ADF test procedure and allowed for mild assumption about error term distribution. According to Austerio (2006) test regression for PP test is AR (1) process is as under:

$$\Delta Y_{t-1} = \propto_0 + \gamma Y_{t-1} + \varepsilon_t$$

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The advantage of PP test over ADF test is that it instead of adding lagged differenced terms on right hand side, it makes correction in t-statics of the coefficient of y_{t-1} to take into account the problem of serial correlation in error term with less restrictive nature of error process. We check the stationarity of our data by applying PP test of unit root at 1%, 5% and 10% level of significance.

3.3 Autoregressive Distributed Lag (ARDL) Model

For econometric analysis, this study adopts Autoregressive Distributed Lag (ARDL) model. This ADRL approach was developed by Pesaran (1997), Pesaran*et al. (*2001) and Pesaran and Shin (1995, 1999). According to Pesaran*et al. (*2001) ARDL approach consists of two steps in estimation of long-run relationship. First step is the investigation of existence of long-run relationship. The second step is investigation of short-run bi-directional causality among the variables. According to Pesaranet *al. (*2001) the general form of ECM is as under:

$$\Delta y_t = \varphi_0 + \varphi_1 t + \tau_{yy} y_{t-1} + \tau_{yx.x} x_{t-1} + \sum_{i=1}^{p-1} \omega \Delta z_{t-1} + \delta \Delta x_t + u_t$$

Where $\varphi_0 \; and \; \varphi_1 \neq 0$. The null hypothesis for Wald test are $H_0; \; \tau_{yy} = 0 \; and \; H_0; \; \tau_{yx.x} = 0$ and alternate hypothesis are; $H_1; \; \tau_{yy} \neq 0 \; and \; H_1; \; \tau_{yx.x} \neq 0$. The null hypothesis of Wald test is no co-integration. Pesaran and Pesaran (1997) gave two sets of asymptotic critical values. The lower bound value assumes that all variables are stationary at level. While upper bound value assumes that all variables are stationary at first difference. One can reject the null hypothesis of no co integration if computed F-statistics value is greater than upper bound value and conclude that there exist long run relationship among our variables. We cannot reject null hypothesis if F-statistics value is less low bound critical value while we remain indifferent if F-stat value between upper and lower bound values. This framework is

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used for long term and short term trends of causations and consistent among variables and in which this study builds a distributed lad that express one series leads to the other series. This approach is applicable when our variable of time series data lays under both I (0) and I (1) in the stationary test. General ARDL equation for Model is given below.

$$\Delta cpi_t = \alpha_0 + \sum_{i-1}^{n} \alpha_{1t}\ \Delta(rgdp)_{t-1} + \sum_{i-1}^{n} \alpha_{2t}\ \Delta(inv)_{t-1} + \sum_{i-1}^{n} \alpha_{3t}\ \Delta(grev)_{t-1} + \sum_{i-1}^{n} \alpha_{4t}\ \Delta(bd)_{t-1} + \sum_{i-1}^{n} \alpha_{5t}\ \Delta(gexp)_{t-1} + \sum_{i-1}^{n} \alpha_{6t}\ \Delta(bot)_{t-1} + \sum_{i-1}^{n} \alpha_{7t}\ \Delta(er)_{t-1} + \gamma_1(rgdp)_{t-1} + \gamma_2(inv)_{t-1} + \gamma_3(grev)_{t-1} + \gamma_4(bd)_{t-1} + \gamma_5(gexp)_{t-1} + \gamma_6(bot)_{t-1} + \gamma_7(er)_{t-1} + \varepsilon_t$$

Here Δ is the first difference operator. α_0 = Intercept term while $\alpha_1, \alpha_2, \alpha_3, \ldots\ldots, \alpha_8$ = short term coefficient of the variables of model and $\gamma_1, \gamma_2, \gamma_3, \gamma_4, \gamma_5, \gamma_6, \gamma_7$ long run coefficient Ɛt=error term that incorporate those variables that are ignored in the equation. Above equation can be seen as ARDL model of order $[\kappa_1, \kappa_2, \kappa_3, \kappa_4, \kappa_5, \kappa_6, \kappa_7, \kappa_8]$.

For the short-run analysis specific ARDL equation is as under;

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$$cpi_t = \delta_0 + \sum_{i-1}^{n} \delta_{1t}\ \Delta(rgdp)_{t-1} + \sum_{i-1}^{n} \delta_{2t}\ \Delta(inv)_{t-1} + \sum_{i-1}^{n} \delta_{3t}\ \Delta(grev)_{t-1} + \sum_{i-1}^{n} \delta_{4t}\ \Delta(bd)_{t-1} + \sum_{i-1}^{n} \delta_{5t}\ \Delta(gexp)_{t-1} + \sum_{i-1}^{n} \delta_{6t}\ \Delta(bot)_{t-1} + \sum_{i-1}^{n} \delta_{7t}\ \Delta(er)_{t-1} + \omega(ECM)_{T-1} + \varepsilon_t$$

$(ECM)_{t-1}$ is lag value of error correction mechanism and ω is coefficient of ECM which shows speed of adjustment towards equilibrium.

4. EMPIRICAL ANALYSIS

As a first step of the time series analysis, we check the stationarity of our data by applying PP test of unit root at different levels of critical values that are at 1%, 5%, and 10% for level and at first difference because regression, with non-stationary variables, can give spurious results as suggested by Granger and Newbold (1974). According to Afzal (2007) spurious regression do not take into consideration the serial correlation problem of the error term and make parameter estimates inconsistent. Table 1 reports the results of unit root test for all variables in the model.

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Table 1: Unit Root Test (Phillips Perron)

	Phillips Perron Level		**Phillips Perron 1st Difference**		**conclusion**
Variables	**Without Trend**	**Without Trend**	**Without Trend**	**With Trend**	
CPI	5.08	0.66	0.66	1.99	I(0)
RGDP	4.79	10.03	10.03	9.64	I(0)
INV	2.29	3.84	3.84	4.58	I(1)
GREV	5.23	3.16	3.16	4.59	I(0)
BD	2.89	8.30	8.30	8.25	I(1)
GEXP	1.30	6.62	6.62	7.68	I(1)
BOT	0.49	6.01	6.01	6.16	I(1)
ER	1.71	5.34	5.34	5.89	I(1)

Note: 1%, 5% and 10% critical values for Phillips Perron (PP) level are 3.639, 2.951 and 2.614 for without trend. 1%, 5% and 10% critical values for with trend are 4.252, 3.548 and 3.207. While 1%, 5% and 10% critical values for Phillips Perron (PP) for 1st Difference are3.646, 2.954 and 2.615 for without trend. 1%, 5% and 10% critical values for with trend are 4.262, 3.552 and 3.209.

These results shows that CPI, RGDP, GREV become stationary at Phillips Perron level and at 1% of critical value, while the other variables including INV, BD, GEXP, BOT and ER become stationary at 1st difference of PP at 1% of critical values.

4.1 Bound Test Approach to Co-integration

As a second step of analysis of time series data, we check for long run relationship or co-integration among our variables. The PP test suggests that we have variables out of which some are stationary at level and some are stationary at first

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difference. So this study applied bound test approach to co-integration- Alam et al (2016). The results of bond test are shown in Table 2.

Table 2: Bound test Result for co-integration

Equation	F-statistics	Upper Bound Critical value	Conclusion
Model 1 Equation			
Cpi, Rgdp, inv, grev Bd, gexp, bot, er	6.5128825 (0.0005)	5.785 (99%)	Co-Integration exist

The result of bound test approach to co integration shows that the calculated F-stat value is 6.512 which is higher than the upper boundary critical value of 5.785 at 1% level of significance implying that cointegration exist among our concerned variables.

Table 3: Estimation Results of ARDL Model (1,1,1,1,1,1,1,1) based on Schwartz criterion

Dependent Variable: CPI				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	-3.21	4.05	-0.79	0.44
RGDP	-0.42	0.21	-1.91	0.07
RGDP(-1)	-0.37	0.19	-1.95	0.07
INV	-2.32	9.07	-2.55	0.02
INV(-1)	4.20	1.37	0.30	0.76

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GREV	7.18	1.89	3.80	0.00
GREV(-1)	-3.31	1.18	-0.28	0.78
BD	0.03	0.25	-0.14	0.88
BD(-1)	0.54	0.26	-2.07	0.05
GEXP	1.35	3.57	-3.76	0.00
GEXP(-1)	5.50	4.84	1.13	0.27
BOT	-0.001	0.00	-2.89	0.01
BOT(-1)	5.67	0.00	0.11	0.91
ER	0.08	0.18	0.44	0.66
ER(-1)	-0.41	0.21	-1.95	0.07
CPI(-1)	1.32	0.16	7.81	0.00
R-Square		0.99	**Prob (F-statistic)**	0.00
Daignostic tests				
Adjusted R-Square **0.97** Durbin-Watson stat: 2.05 F-statistic: 2733.24				
JB Normality test: 3.245 (0.258) BG Serial Correlation LM Test: 1.11 (0.35)				
χ^2 ARCH test: 0.875 (0.432) χ^2 WHITE test: 0.456 (0.365) χ^2 REMSAY test: 0.589 (0.785)				

Note: in parenthesis are given their corresponding probabilities

The results of ARDL model is reported as shown in Table 03. So according to the result table, our model including all variables shows that our results are highly significant. Table 03 reported that the value of adjusted R^2 is 97 percent that express the significance of our variables in the CPI model and the probability that should be less than 0.05 for an efficient model and our results shows that the probability is zero. According to the table 03, this study examines through coefficients of govt revenues and exchange rate that if we increase 1% unit of government revenues, and exchange

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rate it will lead to an increase in CPI by 7.18, and 0.08 respectively that shows a positive relationship of inflation with govt revenues and exchange rate. Interesting result can be depicted from the table related and GDP and inflation. Our result shows that there is negative significant relationship exists between GDP and inflation. Our result is in line with Dewan and Hussein (2001) who found inflation is negatively correlated with growth in 41 middle income developing countries. Similarly, Nasir and Saima (2009) argued that there is a nonlinear relationship between investment and inflation. Investment has also a negative significant coefficient which is supported by Nasir and Saima (2009). Budget deficit has positive and according to theory relationship with inflation supported by Ishaq and Mohsin (2015). Govt expenditures are inflationary according to the coefficient value which is positive and significant. Balance of trade has a negative significant relationship with inflation but the impact is very minimal (coeffienct value is 0.001). One period lagged exchange rate significant but current period exchange rate is not significant which suggest that exchange rate pass through is slow in Pakistan Economy. Diagnostic test confirms that overall model is stable. So the overall results of this model show that the fiscal variables have a significant impact on inflation. It means non-Ricardian regime of fiscal theory influences the price level in Pakistan than the Ricardian theory of monetary policy.

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4.2 Short Run Results

Table 4: Short run estimates

Dependent Variable: CPI			
Variable	**Coefficient**	**t-Statistic**	**Prob.**
C	-3.21	-0.79	0.44
dRGDP	0.324	3.11	0.07*
dINV	1.39	3.69	0.02
dGREV	0.14	2.89	0.00
dBD	0.03	-0.14	0.88
dGEXP	1.35	0.37	0.48
dBOT	1.65	1.14	0.91
dER	0.095	2.14	0.066*
ecm	-0.32	2.00	0.00
R-Square: 0.96	***Prob (F-statistic) 0.000***		
Diagnostic tests			
Adjusted R-Square 0.94 Durbin-Watson stat**:** 2.28 F-statistic**:** 3.2744.24			
JB Normality test: 2.362 (0.374) BG Serial Correlation LM Test: 2.01 (0.46)			
χ^2 ARCH test: 0.125 (0.533) χ^2 WHITE test: 0.564 (0.255) χ^2 REMSAY test: 0.670 (0.854)			

Note: * shows 10 percent level of significance

Short run results show that model is quite stable as suggested by the diagnostic tests. ECM term has negative and less than one coefficient value which suggests that

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32 percent disequilibrium of the previous year is eliminated or corrected in current year. Individual coefficients show long run relationship. Investment and govt expenditure are significant at 5 percent level of significance while real GDP and exchange rate are significant at 10 percent level of significance.

5. Conclusion and Policy Recommendation

This study analyzed the relationships among inflation and non-Ricardian regime through empirical evidence, in case of Pakistan. The salient aim of this study was to check the crucial role of fiscal policy and its impact on determination of the inflation rate in long term and short term analysis. Results of the study support the argument that non-Ricardian regime influence the price level in open economy like Pakistan. Fiscal variables play a crucial role to influence the price level in Pakistan because in our country monetary policy remain under pressure due to budget deficit, political instability and other economic crisis. After applying statistical and econometric techniques, this study originates mixed type of results as; fiscal variables like government revenues, and exchange rate has positive long run relationships. On the other hand, RGDP, INV, BD, GEXP and BOT have negative impact in determination of the price level. But the lag values show that investment, government expenditures and balance of trade may also influence rate of inflation sometimes. As the government increase the revenues, investment and spend more income on development for the country that will lead to high investment in the country will lead towards higher production and higher aggregate demand and high level of the prices.

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CONTRIBUTION OF AUTHORS AND CONFLICT OF INTEREST

This research work was carried out in collaboration between two authors.

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Author 2: Dr.Farah Yasmeen is M.Phil in Economics She contributed in this research by way of reading, proofing and giving final shape to the manuscript. Both authors carefully read the manuscript and they have no conflict of interest with any institution or any person.