Relationship between Budget Deficit and Money Demand in Pakistan: An ARDL Approach

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Abstract: A highly debated issue in developing world is persistence of budget deficit. There have been some theories of fiscal policy to analyze the association between accelerating budget deficit and macroeconomic performance. Major harmful effects of it are increase in high rate of interest, low savings, low growth rates, large current account deficit. The objective of this study is to explore the relationship between these two variables for the case of Pakistan. ARDL approach to cointegration is applied to check the causality between these two major variables along with many other important macroeconomic variables incorporated in money demand function. Data used spans from 1970–2009. Findings of the empirical analysis verify the implications of Keynesians theory in Pakistan and rejection of Ricardian Equivalence Hypothesis(REH). Results show that there exists short run and long run relationship between budget deficit and money demand. And 1percent increase in LDEF leads to approximately 0.013percent increase in LM1. This stability of money demand function has many policy implications for monetary and financial authorities.

1. Introduction

Persistent budget deficit has been a major problem in developing economies. This is the reason economists have paid more attention towards the theories of fiscal policy to analyze the association between accelerating budget deficit and macroeconomic performance. The notable harmful effects of it are increase in high rate of interest, low savings, low growth rates and large current account deficit. Budget deficits and money demand have also received a considerable attention in recent years. There are three important schools of thought regarding the relationship between budget deficit and money demand; Keynesians, Ricardian and Neo-Classicals. Neoclassical and Keynesians argued that budget deficit has a positive

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impact on money demand. But Ricardians proposed that budget deficits have no effect on money demand. So, this debate over the impact of the budget deficits on money demand is a part of much wider discussion over the validity of the Keynesian and Ricardian paradigms. The objective of this study is to explore the relationship between these two variables for the case of Pakistan. Pakistan is also facing this dilemma since its independence. Its deficit is mounting every year. In 2008/09 it was 5.2 percent of GDP while in 2009-10 it reached at 6.3 percent of GDP.[1] Therefore, this study tries to see the effects of this rising issue on other economic variables. The rest of the study is organized as follows: Section II describes the theoretical foundations of the topic. Section III is devoted to have a summary of previous empirical works regarding the effect of the budget deficit on money demand. Section IV discusses the methodology used to test the effect of budget deficit on money demand Section V presents the empirical results and Section VI concludes the study.

2. Theoretical Background

David Ricardo was the first to propose this possibility in the early nineteenth century. Since the mid of 70's many empirical analysis have been done to test this theory. But there exists a contrast between conventional opinion which was advocated by Keynes and the view presented by Ricardo. Conventional theory says that increased budget deficit financed by tax cuts or issuing bonds in an economy increases national debt, and in turn effects several macro-economic variables such as real output, inflation, money demand, interest rates and current account deficit etc. According to Keynesian view, budget deficit has a positive effect on money demand. If the economy is working at less than full employment level, then due to expansionary fiscal policy budget deficit will be enhanced. The increased budget deficit will lead to a positive impact on aggregate demand. This rise in aggregate demand will increase the demand for money and if the government has used increased expenditure policy by the issuance of bonds for removing deficits, then net results of policy will be more fruitful because holding government bonds by private sector means that redistribution of wealth from public sector to private sector. It will lead

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[1]See Economic Survey issued by Ministry of Finance, Govt. of Pakistan

to increase the net wealth of the households. In turn, consumption expenditure will boost the national income through multiplier effect. And this increase in national income will lead to increase in money demand for transaction purposes. All this shows that money demand will be affected positively as people hold more government bonds. Although Neo-classicals support Keynesians theory but only in short run. But in long run there exists contradiction in their views because of the reason that Neo-classicals assumes full employment of resources in the long run. So, when we consider full employment of resources in an economy then it means output will not be affected by any change in the economy. Therefore, it will be independent from budget deficit. And the increase in their net wealth means reduction in other private expenditure. This shows that budget deficit will not be having any impact on money demand in the long run.

But when we analyse the situation from the perspective of Ricardian view, then Keynesian proposition does not hold because according to Ricardian Eqiuvalence Hypothesis(REH), deficit does not matter. It cannot affect money demand in both short run and long run. The logic behind this idea is that any tax cut at present would be equivalent to the future increase in taxes because government expenditure remains unchanged over the time according to the assumptions of Ricardian theory. Moreover it has also been pointed out that the issuance of bonds does not add to their net wealth, rather these are assets and sometimes these can be liabilities to households when government increases taxes in the future to buy back these bonds. And if equality remains in assets and liabilities then net wealth will remain unchanged. Due to unchanged wealth, consumption will remain same and aggregate demand will not be affected. On the one side, government savings will be reduced due to increase in budget deficit but on the other side there will be rise in private savings equal to the decline in public savings due to anticipated increase in future taxes. So, the net change will be zero in savings. Rate of interest will also remain unchanged because of the equality in saving and investment levels in the economy. This will lead to unchanged demand for money. Therefore, we can say that when budget deficit has not changed savings and interest rates, so it does not affect the overall money demand in the economy. In nut shell, if the government is lowering down taxes at present for financing budget deficit, it means that in future, higher taxes will be imposed. And on the basis of these expectations, people will not change their consumption and saving patterns

and interest rates will remain same, leaving demand for money unchanged. Therefore, budget deficit will not affect the macroeconomic variables.

Barro (1989) published his seminal work for the first time on Ricardian proposition. But it is a controversial theory. Because mostly it has been observed that its evidence are not present in real world. The reason is that it is based on few unrealistic assumptions which are not possible to hold in real life. This paper attempts to test the relationship between money demand and budget deficit in the case of Pakistan i.e. budget deficit leads to increase in the demand for money.

3. Literature Review

This section presents briefly the survey of past studies related to different approaches to check the relationship between these two variables. There is not extensive literature to see the nature of the relationship between these variables. Many authors have used different approaches to prove Ricardian or Keynesian theories but to see the existence of these theories, money demand function approach has not been applied frequently. So this study is a little contribution to the literature in this regard.

Bohn(1992) made a debt analysis using government spending as an exogenous variable. It was concluded that a rational consumer decision to response any government debt financed policy depend upon the behavior of that government. For example, if government decides to keep expenditures constant then any financial change in policy will not bring change in consumption pattern of society. This is the Ricardian view but if government is not able to fix its expenditure then results will be different. According to the analysis if current government spending is kept constant even then current change in financing policy will affect future real spending. Therefore, it can be concluded that debt policy has always real effects and Ricardian Equivalence can be observed when only in case of inelastic government spending. But it will not be valid if demand for public good is elastic because then they will consider the effect of debt financing policies as a net increase in their wealth and will consume more.
Chang (2004) investigated the relationship between budget balances and trade balances. He tested both propositions i.e. Twin Deficit and Ricardian

Equivalence. To test Keynesian proposition, three different time spans were used separated by exchange rate regimes and for REH data was used from 1967-2002. The findings of the model differentiated based on the source and time period of data. Modeling techniques like cointegration, VAR and Granger causality test have been applied. But it was observed that study supported Keynesian proposition when using whole time period data. But there was no support for REH in case of Taiwan, which means that they do not consider budget deficit as their future tax liabilities.

Siddiki (2010) examined the same hypothesis for Bangladesh using annual data for 1974-2001 using linear and non-linear techniques. Three different approaches were used. Firstly, the consumption approach results showed that government expenditure, budget deficit and rate of interests are negatively correlated with private consumption which means that consumers started saving and did not increase the consumption at the rate of equivalent to the tax cut or change in government expenditure. The second approach was to see the relationship between budget deficit and trade deficit. And empirical findings showed that budget deficit exerted a positive and significant impact on trade deficit (current account deficit) which shows violation of REH. Then non-linear model was applied to find the same hypothesis and found that the assumption of finite time horizon and imperfections of capital market were the main source of the non-confirmation of this hypothesis.

Evan et al., (2010) and Evans (1998) considered Ricardian Equivalence Hypothesis when expectations are not rational and are based on adaptive learning principal. The existence of this proposition was tested when its assumptions are violated. Two reasons were found using Ramsay model for the failure of this REH. First, when in any fiscal regime the government spending becomes completely endogenous under deficit financing scheme. And the second reason appears under adaptive learning expectations when agents put conditions on government debt financing policy variables such as taxes or debt to get fulfill their expectations.

4. Data and Methodology

4.1. Variables and Data Sources

Mostly data has been collected from World Development Indicators (WDI) and International Financial Statistics (IFS) by IMF. For example data for interest rate, budget deficit has been taken from IFS. While GDP, GEX and money demand data has been taken from WDI. In the present study, M1 has been used as money demand. It has been derived on the lines of definition by State Bank of Pakistan. All the nominal variables have been made real by dividing current values with GDP deflator. According to theory, the relationship of money demand with rate of interest should turn out to be negative. On the other hand real GDP and Government Expenditure(GEX) should have positive relationship with money demand. And if we see the coefficient of real budget DEF is zero. i.e.$\lambda_4 = 0$, then it will show the presence of Ricardian hypothesis While if its coefficients turns to be positive. i.e. $\lambda_4 > 0$, then Keynesian theory will hold.

4.2   Methodology and Model Specifications

After reviewing different approaches regarding Ricardian Equivalence Hypothesis (REH), methodology for this study has been designed. Microfit 5 is used for all estimations. The ARDL approach to cointegration (see Pesaran *et al.*, 2001), also known as bounds testing approach has been used because it involves estimating the unrestricted error correction (UEC) version of the ARDL model. Money demand (LM1) has been taken as dependent variable and budget deficit(LDEF), rate of interest(R), gross domestic product(LGDP) and government expenditure(LGEX) has been taken as independent variables i.e. the determinants of money demand in Pakistan.

$$\Delta LM1_t = \lambda_0 + \lambda_1 \sum_{i=0}^{p} \Delta LM1_{t-i} + \lambda_2 \sum_{i=0}^{p} \Delta LGDP_{t-i}$$

$$+ \lambda_3 \sum_{i=0}^{p} \Delta LGEX_{t-i} + \lambda_4 \sum_{i=0}^{p} \Delta LDEF_{t-i} + \lambda_5 \sum_{i=0}^{p} \Delta R_{t-i}$$

$$+ \delta_1 LM1_{t-1} + \delta_2 LGDP_{t-1} + \delta_3 LGEX_{t-1}$$

$$+ \delta_4 LDEF_{t-1} + \delta_5 R_{t-1} + \varepsilon_t \quad \text{... ... ...} \quad (1)$$

Where

LM1 = Log of Real M1 (RM1)

LGDP = Log of Real GDP (RGDP)

LGEX = Log of Real GEX (RGEX)
LDEF = Log of Real Deficit (RDEF)
R = Real Interest Rate (in percentage, so not transformed in log from)
Δ = First difference operator

'Bounds Test' is applied to check the presence of a long-run relationship between these variables; using an F-test on the joint null hypothesis that the coefficients on the level variables are jointly equal to zero i.e. H_0: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0$ against the alternative H_A: $\delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0$ (Pesaran *et al*., 2001). Instead of the conventional critical values, this F- test involves two asymptotic critical value bounds, from Pesaran *et al*., (2001) depending on whether the variables are I(0) or I(1) or a mixture of both. If the test statistic exceeds their respective upper critical values, then there is evidence of a long-run relationship, if below there is no cointegration and if it lies between the bounds, inference is inconclusive.

Once the existence of the cointegration (long-run relationship) is established, then the second step is to estimate the conditional ARDL $(p_1, q_1, q_2, q_3, q_4)$ long-run model for $LM1_t$ can be estimated as:

$$
\begin{aligned}
LM1_t &= \lambda_0 + \lambda_1 \sum_{i=0}^{p} LM1_{t-i} + \lambda_2 \sum_{i=0}^{p} LGDP_{t-i} + \lambda_3 \sum_{i=0}^{p} LGEX_{t-i} \\
&+ \lambda_4 \sum_{i=0}^{p} LDEF_{t-i} + \lambda_5 \sum_{i=0}^{p} R_{t-i} + \delta_1 LM1_{t-1} \\
&+ \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. \ldots. (2)
\end{aligned}
$$

Where, all variables are as previously defined. This step involves selecting the orders of the ARDL $(p_1, q_1, q_2, q_3, q_4)$ model in the five variables using Akaike information criteria (AIC) and getting the long-run coefficients. In the third and final step, we obtain the short-run dynamic parameters by estimating an error correction model specified as follows:

$$\Delta LM1_t$$
$$= \lambda_0 + \lambda_1 \sum_{i=0}^{p} \Delta LM1_{t-i} + \lambda_2 \sum_{i=0}^{p} \Delta LGDP_{t-i} + \lambda_3 \sum_{i=0}^{p} \Delta LGEX_{t-i}$$
$$+ \lambda_4 \sum_{i=0}^{p} \Delta LDEF_{t-i} + \lambda_5 \sum_{i=0}^{p} \Delta R_{t-i} + \varphi_1 ECM_{t-1}$$
$$+ \varepsilon_t \ \dots \ \dots \ \dots \ \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots . (3)$$

Where, all variables are as previously defined, while λ_1, λ_2, λ_3, λ_4 and λ_5 are short-run dynamics coefficients, ECM is error correction term and φ_1 is speed of adjustment coefficient.

5. Estimations, Results and Discussions

5.1 Unit Root Test

Before we proceed with the ARDL bounds test, the stationarity status of all variables is checked to determine their order of integration. This is to ensure that the variables are not I(2) stationary because the presence of I(2) variables the computed F statistics provided by Pesaran *et al*. (2001) are not valid as the bounds test is based on the assumption that the variables are I(0) or I(1). The Table 1 given below shows that all the variables are I(1) at 1 percent level of significance and none of the variable is I(2) therefore, we can proceed further for ARDL bounds cointegration test.

Table 1: Results of Unit Root Test

Variables	ADF Statistic** (Level)	ADF Statistic** (1st Difference)
LM1	-0.818748	-3.827897*
LGDP	-0.036577	-9.652138*
LGEX	0.009405	-7.989803*
LDEF	-1.892000	-8.861942*
R	-2.567077	-6.264180*

* denotes the significance at 1percent level
** ADF Statistics with intercept and no trend

5.2   ARDL Bounds Cointegration Test

Table 2 shows the cointegration test result based on our estimated equation no. 1. The table shows the F – Statistics as 3.8788 which is greater than the upper bound value of critical values by Pesaran *et al*., (2001) at 10 percent level which is 3.367 as shown below in table 2. This result confirms that there is a long-run equilibrium relationship (cointegartion) between LM1 and all the regressors (LGDP, LGEX, LDEF and R).

Table 2: Results of Cointegration Test

Bounds Testing to Cointegration		
Estimated Equation	LM1 = f(LGDP, LGEX, LDEF, R)	
Optimal Lag Structure	ARDL(2,0,0,0,0) selected based on AIC	
F Statistics	3.8788	
Critical Values By Pesaran *et al*., (2001)		
Significance Level	Lower Bound, I(0)	Upper Bound, I(1)
1 percent	3.516	4.781
5 percent	2.649	3.805
10 percent	2.262	3.367

The next step is to estimate the long-run coefficients of the ARDL model (Equation 2).

5.3   Long-run Coefficients

Table 3 shows the estimated coefficients of long-run relationship. As our variables are in log form so these coefficients shows the long-run elasticities. These results show the positive relationship (significant at 10 percent level) between the LDEF and LM1 i.e 1 percent increase in LDEF leads to approximately 0.013 percent increase in LM1 whereas the relationship between R and LM1 is negative (at 5 percent level of significance). No significant relationship of LM1 is found with the rest of the variables (i.e. LGDP and LGEX). From table 3 it can be seen that budget deficit is positively and significantly related with money demand.

Table 3: Long-run Elasticities

Dependent Variable: LM1			
Regressors	Coefficient	Standard Error	T Ratio [Prob]
LGDP	0.036705	0.083878	0.43761 [0.665]
LGEX	0.072922	0.085776	0.85014 [0.403]
LDEF	0.012853**	0.0074936	1.7152 [0.098]
R	-0.0037596*	0.0015341	-2.4506 [0.021]
Constant	1.0016	0.061143	16.3813 [0.000]

* and ** denotes the significance at 5percent and 10percent level, respectively.

All the results are same as expected. Positive relationship between budget deficit and money demand shows the violations of Ricardian Equivalence Hypothesis (REH) and presence of Keynensian proposition.

5.4   Short-run Dynamics and Causality: Error Correction Model

Table 4 shows the estimated results of Error Correction Model (Eq. No. 3).

Table 4: Short-run Dynamics & ECM

Dependent Variable: ΔLM1			
Regressors	Coefficient	Standard Error	T-Ratio[Prob]
ΔLM1(-1)	0.66383*	.17265	3.8450 [.001]
ΔLGDP	0.088227	.11915	.74047 [.465]
ΔLGDP(-1)	-0.12204***	.061182	-1.9947 [.056]
ΔLGEX	0.058066	.066704	.87050 [.391]
ΔLDEF	0.010235***	.0052140	1.9629 [.059]
ΔR	-0.0015664	.0011966	-1.3090 [.201]
ΔR(-1)	0.0029309**	.0011995	2.4433 [.021]
Constant	0.79755*	.18710	4.2628 [.000]
ECM(-1)	-0.79628*	.17062	-4.6671 [.000]
ECM = LM1 -0.036705*LGDP -0.072922*LGEX -0.012853*LDEF + 0.0037596*R -1.0016			

*, **, *** denotes the significance at 1percent, 5percent and 10percent level, respectively

The short-run coefficients of ΔLM1(-1), ΔLGDP(-1), ΔLDEF, ΔR(-1) while speed of adjustment coefficient (of ECM) is also significant at 1 percent level with required sign (-ve). The significant ECM coefficient also depicts the causality as significant error term indicates causality even if the (short-run) coefficients of lagged terms are insignificant (Husain & Mahmood, 2001). Our results indicate that causality runs from LDEF and other regressors to LM1. From these results it can also be seen there exists short run relationship as well.

6. Conclusions and Policy Recommendations

In the study, we have tried to see the relationship between budget deficit and money demand in case of Pakistan. For this purpose the paper has been divided in such a way that earlier part discussed the theoretical background of different budget deficit theories and then a brief literature review has been presented in this context. Autoregressive Distributed Lag (ARDL) model has been used for estimation technique. In past studies, mostly cointegration technique has been employed for this purpose but in recent literature ARDL model is getting more popularity for finding the relationship nature among different variables integrated of order (I). Different approaches have been used in past to prove this theory. But in this study an analysis has been carried out through money demand function approach to see the relationship of budget deficit with money demand by taking into consideration many other macroeconomic variables using annual data set from 1970 – 2009 for Pakistan. Short run and long run relationship has been observed by employing ARDL approach to cointegration. Our estimation results of model showed the existence of cointegration among money demand, budget deficit, government expenditure, gross domestic product and rate of interest. All the variables have their relationship with money demand in lines with Keynesian theory. On the basis of these results, it can also be concluded that there is no such evidence of REH in case of Pakistan. This is not very surprising. There are many theoretical reasons for the restrictiveness of Ricardian Equivalence Hypothesis in reality. Its assumptions provide the basis for its refutation. Finite time horizon, certainty about future and perfect capital markets are not realistic assumptions. And in case of developing countries the main reason of its absence is the imperfect capital markets. So far in all studies

conducted for developing countries, violation of this hypothesis has been observed.[2]

The stability of money demand gives many policy implications for monetary and financial authorities. The issue of financing of budget deficit is very important. Because the expectations of people regarding its financing may lead to instability of the economy. For example if the private business sector expects that it will be done through easy monetary policy then the economy will face the problem of inflation. And such expectations will result in crowding out of private investment leading to reduced growth of output. This situation will raise prices at high level causing inflation. And this is the same phenomenon prevailing in Pakistan now a days. So government should make right choice regarding the strategies for deficit financing so that aggregate demand could remain in control. Because in this way prices will not rise and inflation will be brought down.

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[2] See, Khalid, A.M. (1996), Ghatak&Ghatak (1996) Al-Qudair& Al Towaijri (2006), Drakos (2001) Siddiki, (2010).

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