

Comparative Impact of Unofficial and Official Exchange Rates on the Economy of Pakistan

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The primary objective of the study is to find the impact of both real unofficial and official exchange rates on the economy of Pakistan. To this end, modified Edwards (1985) methodology has been employed by using fiscal year data from 1959-60 to 2000-01. The explanatory variables used in the model are real unofficial exchange rate and its lagged value along with some macroeconomic variables like money supply, TOT, net official development assistance and official aid received in US\$ and their lag values and GE/Y ratio, whereas the dependent variable is real GDP. The empirical results lead to the conclusion that the depreciation in the real unofficial exchange rate of Pak-rupee versus US\$ causes insignificant expansion in the economy in the current year but highly significant contraction in the following year. To find the impact of real official exchange rate on the economy of Pakistan only the variable, i.e. real unofficial exchange rate and its lag value has been replaced with real official exchange rate and its lag value in the model. All the remaining variables in the model are intact. The empirical results indicate that any devaluation in real official exchange rate has significant contemporaneously contractionary impact and continue causing contraction in the economy of Pakistan even after one year though it is not that significant. The comparison of the impact of real unofficial and official exchange rates on the economy of the Pakistan indicates that real official exchange rate has a bigger impact. Findings of this study have important implication for designing foreign exchange policy i.e. policy makers have to incorporate the changes in unofficial exchange rate to design official exchange rate policy to enhance economic growth of a developing country like Pakistan.

Keywords: Impact of Real Unofficial and Official Exchange rates on economy, Modified Edwards (1985) Methodology, Economic growth, Expansion and Contraction of Economy, Pakistan

1. Introduction

The economy of a nation is directly affected by both unofficial and official exchange rates as the emergence of unofficial(parallel/black/informal/open/kerb) markets for foreign exchange has been a well-known feature of many developing countries for several decades. Co-existence of unofficial and official exchange rates in developing countries like Pakistan is a normal phenomenon because of restricted access to the official foreign exchange markets (Gupta, 1981; Agenor, 1992;and Kiguel and O'Connell, 1995).

Governments in developing countries maintain check on capital flow and provide foreign currencies for imports. Further, they ensure control on foreign exchange rate, to realize the desired level of economic growth. The size of unofficial exchange market varies from country to country and depends on the nature of the exchange rate, imposition of trade

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Chaudhry & Butt

The economic growth of Pakistan has passed through many phases since fiscal year 1959-60 and unofficial and official exchange rates have been the key variables that affected the economy of the Pakistan. This provides the basis to investigate the impact of each exchange rate on the economy of Pakistan. During the period of analysis of this study, the State Bank of Pakistan was the only authority, which controlled and announced the official exchange rate of Pak-rupee. Whereas, the unofficial foreign exchange rate, which is determined by market forces, also affected the economy of Pakistan. A few studies such as Edwards, 1985; McPherson and Rakovski, 2000; Rautave, 2004; Avellan, 2004; Dosse, 2006; Abounoori and Zobeiri, 2010, have concluded that real exchange rates have impact on the economies of developing countries.

As the study attempts primarily to investigate the impact of both official and unofficial exchange rates on economic growth of Pakistan, therefore, this is the first study of its kind in the world. Studies such as Edwards (1985), Avellan (2004) and Dosse (2006) found that devaluation of real official exchange rate causes contemporaneous contractionary impact on the economy, whereas the present study finds the devaluation in the real official exchange rate causes contractionary impact on the economy even after current year. This makes the study different from the previous studies. In addition, the study emphasizes its significance by finding the impact of real unofficial exchange rate on the economies like Pakistan. An implication of this study recommends the incorporation of changes in unofficial exchange rate while designing official exchange rate policy.

2. Literature Review

Empirical studies have attempted to find the impact of official exchange rate on the economy. Existence of official and unofficial exchange rates and difference between them plays significant role in economic growth of developing countries. An important study by Edwards (1985) was carried out to examine relationship between real exchange rate and real output. For this purpose, he used Khan and Knight (1981) methodology. Edwards (1985) also extended this methodology to incorporate money surprises, fiscal factors, terms of trade and devaluations as independent variables and real output as dependent variable. Edwards (1985) used annual data of twelve developing countries: India, Malaysia, Philippines, Sri Lanka, Thailand, Greece, Israel, Brazil, Colombia, El Salvador, South Africa, and Yugoslavia, for the period from 1965 to 1980. Edwards (1985) found an inverse relationship between contemporaneous real exchange rates and real output of twelve developing countries, or in other words devaluation had contractionary impact on real output and also found that short term contraction in real output caused by contemporaneous real exchange rate was reversed after one year and devaluation has expansionary affect on real output. Edwards (1985) also concluded that real devaluation has no impact beyond one year on real growth of twelve developing countries.

To identify the impact of exchange rate on the economic growth of Kenya McPherson and Rakovski (2000) used three different methods: (i) single equation estimation to investigate relationship between real output growth and real exchange rate, (ii) simultaneous equation estimation to examine structural macroeconomic model of the economy of Kenya modifying Khan and Knight (1991) methodology by adding open economy indicators such as exchange rate, exports and imports and, (iii) VAR approach to investigate long run relationship between real exchange rate and real income. They used annual data from 1970 to 1996. Statistical results of all three methods indicated no relationship between real exchange rate and economic growth. The estimated likelihood ratio indicates that cointegration does not exist between real growth rate and real exchange rate. However,

Chaudhry & Butt

statistical results indicated an indirect weak relationship in short run that implied that exchange rate was embedded indirectly in economy of Kenya via money supply, imports, agricultural production and foreign aid.

Rautava (2004) investigated impact of real official exchange rate and oil prices on the Russian economy. Rautava (2004) used Johansen cointegration approach with lag structure to examine long run relationship between Russian economy, oil prices and real exchange rate. For this purpose, Rautava (2004) used data from 1995Q1 to 2002Q4. The variables: GDP, revenues, real exchange rates, and international oil prices have been used in Rautava (2004). He found long run relationship between real official exchange rate and economic growth of Russia. Also found long run relationship between oil prices and real GDP of Russia. Rautava (2004) further found that real exchange rate and oil prices had impact on real GDP in the short run.

Avellan (2004) found evidence in favor of interdependence between unofficial exchange rate and economic growth in case of developing countries. He used annual data of 113 developing countries for the period 1971 to 2001. Avellan (2004) estimated system of equations using 2SLS and 3SLS, separately, to investigate impact of unofficial exchange rates on per capita GDP growth. Avellan (2004) concluded that existence of unofficial exchange rates dampens economic growth.

A study conducted by Dosse (2006) provided evidence of the relationship between misalignment of real exchange rates and economic growth of thirty-three developing countries by using annual data for the period 1985 to 1999. He concluded that the misalignment of real exchange rate caused contractionary impact on the economic growth of countries included in the sample. He also found that only the policies that stabilize the real exchange rate would decrease real exchange rate misalignment, which in turn will boost the economic growth in the developing countries.

Abounoori and Zobeiri (2010) investigated the impact of exchange rate premium on the economic growth of Iran. They estimated long run relationship between the premium and economic growth of Iran by using Johansen cointegration (1988) approach based on annual data of Iranian *Rial* per US \$ from 1961 to 2007. Abounoori and Zobeiri (2010) concluded from the statistical results that real exchange rate gap had long run contractionary impact on the economy of Iran.

The previous studies limited themselves to investigate impact of only one exchange rate on economy. Whereas, for countries where unofficial foreign exchange markets exist, the impact of unofficial exchange rate needs to be studied as well. Keeping this in mind, the present study investigates the impact of both unofficial and official exchange rates on the economy of the Pakistan as markets for both co-exist in this country.

3. Economic Outlook of Pakistan: 1961 to 2001

Economic stability was adversely affected by experiments made by various administrations during their regimes. Economic growth of Pakistan increased tremendously in sixties due to more involvement of the private sector in economic activity. But later in seventies nationalization shook the confidence of the private sector and it kept them a little away from business activity in Pakistan. In eighties, more emphasis was on Islamization with introduction of *zakat*, *ushr* and prohibition of *riba*. A shift from nationalization to privatization was initiated in eighties.

Chaudhry & Butt

Sluggish economic growth was mainly caused by small tax-network and slow export growth. Tax-to-GDP ratio remained low and was the key reason of fiscal deficits. Public debt both foreign and national, current account deficits, alarming inflation levels, fall in public sector investment, inadequate infrastructure, and persistently prevailing low social indicators dampened economic growth of Pakistan though the average annual economic growth rate of Pakistan was 5.47 percent from 1961 to 2001.

Balance of international payments problem is chronic in Pakistan. Persistently prevailing current account deficit along with trade account deficit were the main causes of deficit in balance of international payments. Devaluations prescription recommended by IMF failed to improve the balance of trade as both exports and imports of Pakistan are relatively inelastic. In turn, the balance of international payments also did not improve.

Economic growth decreased to 0.47 percent due to political unrest, Indian invasion and secession of East Pakistan from Pakistan in December 1971. The new government took oath on December 1971 with new challenges to solve the chronic problems such as implementation of land and labor reforms, education, health, industry, banking legislation, agriculture sector reforms and administration. The government introduced Economic Reforms Order on August 1973, to take over management of 32 industrial units in ten basic categories that shook the confidence of investors in government and forced them to think twice before investing in new projects located in Pakistan. Despite this, more than 74 percent industries were owned by private sector. The government extended the horizon of nationalization and nationalized all banks after fourteen months with an excuse of national socio-economic objectives but it failed to facilitate small borrowers and to form capital accumulation due to bureaucratic, unprofessional and inexperienced attitude of newly appointed non-professional officers in nationalized banks.

Unforeseen factors such as floods and droughts also hampered economic growth in 1970s. The floods of 1976-77 damaged all sectors of the economy, especially, agriculture and industrial growth fell to alarming levels as agriculture and industrial growth are interdependent of each other in case of Pakistan.

Against a sluggish growth trend in 1971-80 a slightly better economic picture was painted in the regime of 1981-90 where average GDP growth remained 6.29 percent that is higher than that of 4.72 percent in 1971-80 yet lower than that of 7.24 percent in 1961-70. In addition, GDP per capita growth rate also increased in 1981-90 and was 3.495 percent, which was higher than that of 1.52 percent in 1971-80. Agriculture sector also showed recovery and average growth rate was 4.071 percent in 1981-90, which was much higher than that of 2.37 percent in 1971-80 but lower than that of 5.07 percent in 1961-70.

Economic recovery initiated in second half of the eighties because of introduction of structural reforms failed to sustain economic recovery in 1991-2001. The key role of workers' remittances in the economic growth of Pakistan was highlighted when they fell low to the alarming level of \$996 million in 1999 due to freezing foreign currency accounts, which was the result of nuclear explosion of Pakistan on May 28, 1998. Steep fall in remittances along with economic sanctions imposed on Pakistan after its nuclear test caused imbalances in balance of international payments and also slowed down economic growth of Pakistan in the following years. Furthermore, reforms were introduced by denationalization, privatization, and liberalization of industrial, fiscal, monetary and foreign exchange policies, which encouraged both domestic and foreign investments.

Chaudhry & Butt

The objective of the study is to find the impact of both real unofficial and official exchange rates on the economy of Pakistan. Annual data is used from fiscal year 1959-60 to 2000-2001. Further, to investigate and analyze the impact of real unofficial and official exchange rates on economic growth of Pakistan modified Edwards (1985) methodology has been used.

Before applying the modified Edward (1985) methodology, a brief historical picture of the trend of the three variables, real unofficial exchange rate, real official exchange rate and real GDP is shown in Figures 1 and 2.

Figure 1: Trend of Real Unofficial and Official exchange rates of Pak-Rupee versus US \$ from Fiscal Year of 1959M07-1960M06 to Fiscal Year of 2000M07-2001M06

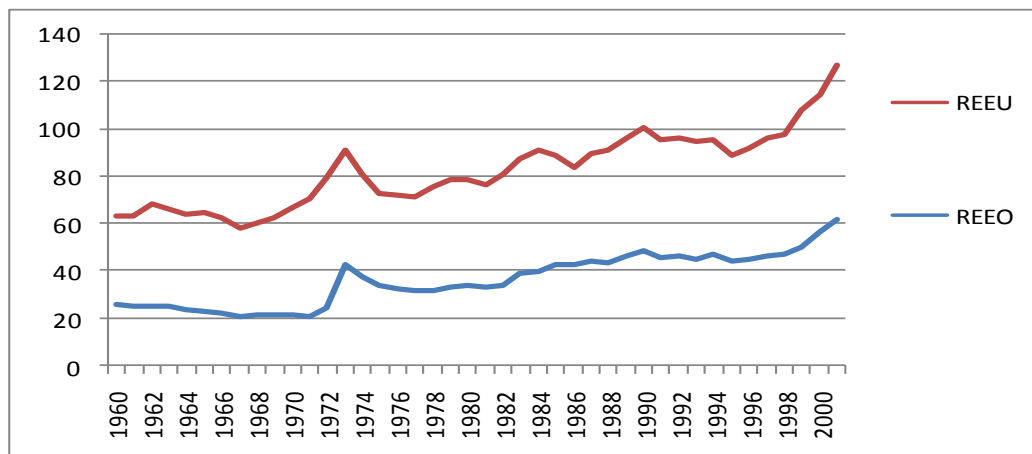
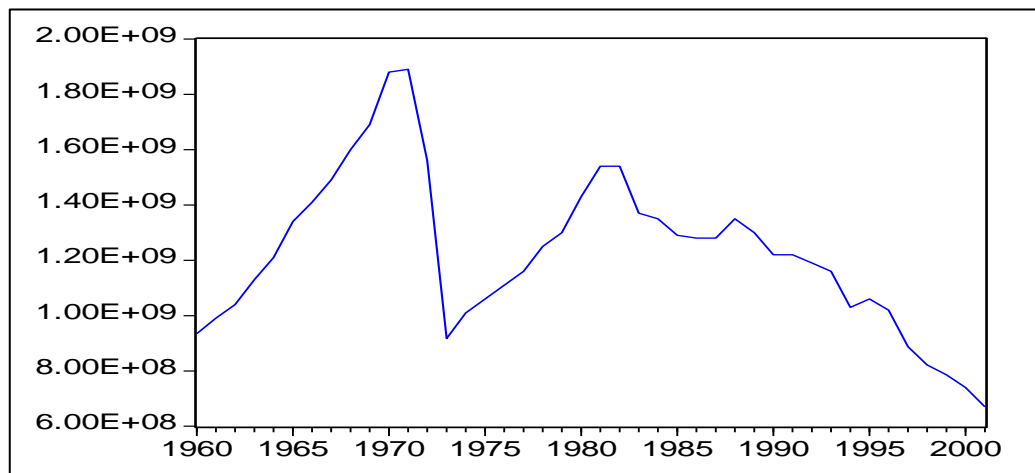


Figure 2: Trend of Real GDP from 1959M07-1960M06 to 2000M07-2001M06



The rest of the paper has been divided into three sections. Section 4 deals with Sources of Data and Methodology, whereas, Section 5 presents Empirical results and their Analysis. In the end, Section 6 provides Conclusions drawn from the empirical results.

4. Sources of Data and Methodology

4.1 Sources of Data

A monthly data on real unofficial and official exchange rates of Pak-rupee versus US\$ from 1959M07 to 2001M06 have been generated in three steps. First, a monthly data on nominal unofficial (EU) and nominal official exchange rates (EO) of Pak-rupee versus US dollar is collected from the websites of Professor Reinhart, International Financial Statistics (IFS) and Khanani and Kalia (a local money dealer).

The monthly time series data for the period 1959M07 to 1998M06 on both nominal unofficial and official exchange rates are obtained from the website of Professor Reinhart. She collected data on nominal unofficial and official exchange rates for the period 1959M07 to 1998M06 from Pick's Currency Yearbook, various issues of Pick's Black Market Yearbook, World Currency Reports and International Financial Statistics (IFS) of International Monetary Fund (IMF). The data beyond 1998M06 i.e. 1998M07 to 2001M06 on nominal unofficial exchange rate of Pak-rupee versus US\$ is obtained from the website of Khanani and Kalia. Whereas, the corresponding data on nominal official exchange rate of Pak-rupee versus US\$ are obtained from International Financial Statistics (IFS). In addition unofficial foreign exchange market existed from 1959M07 to 2001M06 in Pakistan as per Ghei and Kamin (1996) criteria. Furthermore, average annual premium is recorded Rs. 2.662 per US dollar or 39.725 percent throughout period of the empirical study. This indicates that unofficial exchange market prevailed even after introduction of free float exchange rate on July 20, 2000 by the State Bank of Pakistan and even after up to 2001M06.

In the second step, the annual data of nominal exchange rates is derived from the monthly data by taking twelve-month average. This was done to make the data on nominal exchange rates comparable with that of GDP.

In the third and the final step, both annual nominal exchange rates are transformed into the real exchange rates. This definition is used to investigate the impact of annual real unofficial exchange rate (ReEU) and real official exchange rate (ReEO) on the economy of Pakistan by using econometric models. Both real unofficial and official exchange rates have been computed by multiplying corresponding nominal exchange rates with the ratio of wholesale price index (WPI) of USA to consumer price index (CPI) of Pakistan. Both WPI and CPI are used as proxy of relative price of tradables to non-tradables. Further, data on economic variables (mentioned in methodology given below) for the comparable period are obtained from World Development Indicators (WDI), International Financial Statistics (IFS) and Statistics Division of Federal Bureau of Statistics, Pakistan.

4.2 Methodology

To investigate the impact of real unofficial and real official exchange rates on the economy of Pakistan, a methodology based on econometric approach devised by Khan and Knight (1981) and then extended by Edwards (1985) has been applied with appropriate modifications in the context of economy of Pakistan.

In the present paper following modifications have been made. First, money surprises or unexpected money growth used by Edwards (1985) has been replaced by M2. Second, the impact of independent variable, net official development assistance and aid received in

Chaudhry & Butt

US \$ (Net_Aid_\$) on real GDP of Pakistan is estimated. Third, Edwards (1985) model is modified, for the first time, to investigate the impact of real unofficial and official exchange rates on the economy of Pakistan, separately.

The impact of some macroeconomic variables: money supply, government consumption expenditures, terms of trade (TOT) and Net_Aid_\$ has been estimated in addition to that of real unofficial and official exchange rates by using modified Edwards (1985) methodology on the economy of Pakistan.

To avoid spurious results, the stationarity of all the variables included in the model has been checked by ADF test. The test results indicate that variables: y, M2, GE/Y, TOT, and ReEO are stationary at first difference, whereas, variables, ReEU and Net_Aid_\$ are stationary at level. The results of ADF test are given in the Appendix Table.

Using the results of ADF test the following two models have been specified.

$$\Delta y_t = \alpha + \beta_1 \Delta M_{2t} + \beta_2 \Delta M_{2t-1} + \beta_3 \Delta (GE/Y)_t + \beta_4 \Delta TOT_t + \beta_5 \Delta TOT_{t-1} + \beta_6 \text{Net_Aid_}\$_t + \beta_7 \text{Net_Aid_}\$_{t-1} + \beta_8 \text{ReEU}_t + \beta_9 \text{ReEU}_{t-1} + \varepsilon_t \quad (1)$$

$$\Delta y_t = \alpha + \beta_1 \Delta M_{2t} + \beta_2 \Delta M_{2t-1} + \beta_3 \Delta (GE/Y)_t + \beta_4 \Delta TOT_t + \beta_5 \Delta TOT_{t-1} + \beta_6 \text{Net_Aid_}\$_t + \beta_7 \text{Net_Aid_}\$_{t-1} + \beta_8 \Delta \text{ReEO}_t + \beta_9 \Delta \text{ReEO}_{t-1} + \varepsilon_t \quad (2)$$

Model 1 and Model 2 are used to estimate the impact, respectively, of real unofficial exchange rate and real official exchange rate along with that of other macroeconomic variables on the economy of Pakistan. The empirical results of the models are presented and discussed in the next section *i.e.*, Section 5. The variables used in the models are defined as: y represents real GDP in US \$, GE is government consumption expenditures in US \$, Y is nominal GDP in US \$, M2 is broad money supply, TOT is terms of trade which is equal to ratio of nominal value of exports in US \$ to nominal value of imports in US \$, Net_Aid_\$ is net official development assistance and aid received in US \$, ReEU is real unofficial exchange rate and ReEO is real official exchange rate. ReEU and ReEO have been generated in three steps as out lined above in the sources of data, ε is the error term and "t" is time subscript. Moreover, α is the intercept and β s are the coefficients associated with respective variables.

Models 1 and 2 estimate the impact, respectively, of real unofficial and official exchange rates along with that of some other macroeconomic variables on the economy of Pakistan. The empirical results of the models are presented and analyzed in the next section.

5. Empirical Results and Their Analysis

Before empirical results and their analysis are presented, the descriptive statistics of the variables included in the model are given below along with their correlation matrix.

Chaudhry & Butt

Table 1: Descriptive Statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev.
y	1.23E+09	1.22E+09	1.89E+09	6.70E+08	2.82E+08
M2	3.27E+11	1.03E+11	1.65E+12	6.96E+09	4.58E+11
GE/Y	0.114817	0.111500	0.168000	0.077800	0.017568
TOT	0.604690	0.555500	0.941000	0.243000	0.193141
ReEU	46.02143	45.30000	65.70000	36.80000	6.273387
ReEO	36.39762	35.75000	61.50000	21.00000	10.77883
Net_AID_\$	7.59E+08	7.17E+08	1.94E+09	2.53E+08	3.88E+08

Table 2: Matrix of Zero-Order Correlation Coefficients

	y	M2	GE/Y	TOT	ReEu	ReEo	Net_AID_\$t
y	1.000000	—	—	—	—	—	—
M2	-0.641733	1.000000	—	—	—	—	—
GE/Y	0.101677	-0.084964	1.000000	—	—	—	—
TOT	-0.395780	0.770179	0.132656	1.000000	—	—	—
ReEU	-0.320237	0.739412	0.042460	0.698396	1.000000	—	—
ReEO	-0.629941	0.790820	0.260426	0.744074	0.735992	1.000000	—
Net_AID_\$	-0.260388	0.518629	0.338542	0.510028	0.524135	0.725905	1.000000

The correlation coefficients matrix presented in Table 2 indicates the presence of multicollinearity problem in the model, which has important implication for the use of empirical results of the model.

Model (1) has been used to estimate the impact of real unofficial exchange rate and some macroeconomic variables on the economy of Pakistan. Real unofficial exchange rate and some macroeconomic variables with one lag and without lag have been included in the model to find out contemporaneous and short run impact on GDP of Pakistan.

The analysis of this section has been divided into two parts. Part I and Part II deals with impact on the economy of Pakistan of real unofficial exchange rate and real official exchange rate along with that of some other macroeconomic variables, respectively.

5.1 Impact of Real Unofficial Exchange Rate and Other Macroeconomic Variables on Real GDP of Pakistan

In methodology section it has been stated that the impact on the economy of Pakistan is measured by the changes in the real GDP of Pakistan. The justification for this is that the best indicator for the economic performance of a country is its real GDP. In this section the impact on real GDP of real unofficial exchange rate along with that of some other macroeconomic variables has been estimated and analyzed.

Chaudhry & Butt

The estimated results of Model (1) are given in Table 3 below.

Table 3: Estimated Results of Impact of ReEU and Other Macroeconomic Variables on real GDP of Pakistan

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.34E+08	1.81E+08	4.605377	0.0001
ΔM_2	2.63E-05	0.000672	0.039159	0.9690
$\Delta M_2(-1)$	-0.000137	0.000670	-0.204087	0.8397
$\Delta (GE/Y)$	-3.13E+09	1.90E+09	-1.643326	0.1108
ΔTOT	-4.54E+08	1.94E+08	-2.341483	0.0260
$\Delta TOT(-1)$	54618577	2.00E+08	0.272768	0.7869
ReEU	124683.3	5343631.	0.023333	0.9815
ReEU(-1)	-20756697	6022513.	-3.446517	0.0017
Net_Aid_\$	0.159993	0.064907	2.464944	0.0196
Net_Aid_\$(-1)	-0.019609	0.067653	-0.289845	0.7739
R-squared	0.568329			
Adjusted R-squared	0.438828			
F-statistic	4.388602 (0.001007)			
Durbin-Watson stat	1.994264			

Statistical results presented in Table 3 indicate the impact of real unofficial exchange rate (ReEU) at level and with one lag on the real GDP of Pakistan. The coefficient associated with real unofficial exchange rate at level $\hat{\beta}_6 (=124683.3)$ has direct and insignificant impact on real GDP of Pakistan. In contrast, the coefficient associated with real unofficial exchange rate with one lag, $\hat{\beta}_7 (= -20756697)$ has significant inverse impact on real GDP of Pakistan. The value of $\hat{\beta}_7$ indicates that real unofficial exchange rate with one lag has inverse impact on real GDP of Pakistan that means one unit depreciation in real unofficial exchange rate of Pak-rupee versus US \$ in current year causes -20756697 units decrease in the difference of real GDP of Pakistan from its last year. Hence, it can be concluded from these two results that real unofficial exchange rate of Pak-rupee versus US \$ causes insignificant expansion in the economy in the current year but significant contraction in the following year.

The estimated coefficients associated with variables other than real unofficial exchange rate and its lag value need some discussion as well. Statistical results indicate that the coefficients associated with M_2 at level and with one lag $\hat{\beta}_1 (= 2.63E-05)$ and $\hat{\beta}_2 (= -0.000137)$, respectively, have positive and negative relationship with real GDP of Pakistan. Similarly, estimated coefficient associated with GE/Y ratio $\hat{\beta}_3 (= -3.13E+09)$ indicates negative impact on real GDP of Pakistan. Statistical results also indicate that the coefficients associated with TOT at levels and with one lag are $\hat{\beta}_4 (= -4.54E+08)$ and $\hat{\beta}_5 (= 54618577)$ and show inverse and direct relationship of TOT with real GDP, respectively. Statistical result concerning the coefficient associated with Net_Aid_\$ variable at level $\hat{\beta}_8 (=0.159993)$ shows positive relationship with real GDP. This indicates that one unit rise in net official development assistance and aid received in US \$ causes 0.159993 units increase in the difference of real GDP of Pakistan from that of its last year. In contrast, the coefficient associated with Net_Aid_\$ with one lag $\hat{\beta}_9 (= -0.019609)$ has negative

Chaudhry & Butt

relationship with real GDP of Pakistan. The value of $\hat{\beta}_9$ indicates that one unit increase in Net_Aid_\$ in the current year causes 0.019609 units decrease in the difference of real GDP of Pakistan from that of its last year.

Model (1) presented above is significant as a whole as F-statistic is 4.388602 with p-value of 0.001007. The values of R-squared and adjusted R-squared are 0.568329 and 0.438828, respectively. These values indicate that explanatory power of independent variables is quite high.

To find out the most important determinant for the economic growth of Pakistan out of the variables included in Model (1) standardized coefficients have been computed and results are given in Table 4 below.

Table 4: Standardized Regression Coefficients for Model 1

Independent Variables	Un-standardized Regression Coefficients	SD of Independent Variables	SD of Dependent Variable	Standardized Regression Coefficients
C	834000000	0	140000000	0
$\Delta M2$	0.0000263	54900000000	140000000	0.010313357
$\Delta M2(-1)$	-0.000137	51100000000	140000000	-0.050005
$\Delta (GE/Y)$	-3130000000	0.009844	140000000	-0.220083714
ΔTOT	-454000000	0.09011	140000000	-0.292213857
$\Delta TOT(-1)$	54618577	0.09504	140000000	0.037078211
ReEU	0.159993	6.142637	140000000	7.01985E-09
ReEU (-1)	-0.019609	5.435486	140000000	-7.61317E-10
Net_Aid_\$	124683.3	380000000	140000000	338426.1
Net_Aid_\$ (-1)	-20756697	340000000	140000000	-50409121.29

Table 4 reveals that the most important and significant determinant for the economic growth of Pakistan is Net_Aid_\$ with one lag as the standardized coefficient associated with this variable has the biggest magnitude.

5.2 Impact of Real Official Exchange Rate (ReEO) and Other Macroeconomic Variables on Real GDP of Pakistan

In this section, the empirical results of Model 2 are presented. These results indicate the impact on real GDP of real official real official exchange rate along with that of some other macroeconomic variables included in the Model 2.

Chaudhry & Butt

Table 5: Estimated Results of Impact of Real Official Exchange rate (ReEO) and Other Macroeconomic Variables on Real GDP of Pakistan

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	43968023	35128595	1.251631	0.2204
ΔM_2	1.34E-05	0.000513	0.026123	0.9793
$\Delta M_2(-1)$	-0.000549	0.000518	-1.060639	0.2973
$\Delta (GE/Y)$	-2.49E+09	1.49E+09	-1.671874	0.1049
ΔTOT	-1.72E+08	1.58E+08	-1.084019	0.2870
$\Delta TOT(-1)$	1.33E+08	1.61E+08	0.829231	0.4135
$\Delta ReEO$	-31192484	3956079.	-7.884697	0.0000
$\Delta ReEO(-1)$	-6659161.	4295722.	-1.550184	0.1316
Net_Aid_\$	0.079767	0.048534	1.643511	0.1107
Net_Aid_\$ (-1)	-0.083127	0.054035	-1.538385	0.1344
R-squared	0.750256			
Adjusted R-squared	0.675333			
F-statistic	10.01368 (0.000)			
Durbin-Watson stat	0.988221			

Statistical results indicate the impact of real official exchange rate (ReEO) at level and with one lag on the real GDP of Pakistan. The estimated coefficient associated with real official exchange rate at level $\hat{\beta}_6$ (= -31192484) is significant at p-value of 0.0000. Further, the estimated coefficient associated with real official exchange rate with one lag is $\hat{\beta}_7$ (= -6659161) and significant at p-value of 0.1319. These coefficients indicate inverse impact on real GDP of Pakistan of real official exchange rate at level and with one lag.

This finding indicates that contemporaneously and with one lag real official exchange rate has inverse impact on real GDP. Therefore, it can be concluded from these two results that real official exchange rate of Pak-rupee versus US \$ causes contraction in the economy both in the current and the following year.

The estimated coefficients associated with macroeconomic variables other than real official exchange rate and its lag value deserve some discussion that is presented below. Statistical results in this regard shown in Table 5 indicate that coefficients associated with M_2 at level and with one lag are $\hat{\beta}_1$ (= 1.34E-05) and $\hat{\beta}_2$ (= -0.000549), respectively. These coefficients show direct and inverse relationship between M_2 and real GDP of Pakistan at level and with one lag, respectively. Estimated coefficient of real GDP with respect to GE/Y ratio is $\hat{\beta}_3$ (= -2.49E+09) indicates inverse impact on real GDP of Pakistan. Statistical results further indicate that coefficient of TOT at level $\hat{\beta}_4$ (= -1.72E+08) is negative but with one lag $\hat{\beta}_5$ (= 1.33E+08) is positive. Similarly, the coefficients of Net_Aid_\$ both at level and with one lag, $\hat{\beta}_8$ (= 0.079767) and $\hat{\beta}_9$ (= -0.083127), respectively, have direct and inverse relationship with real GDP of Pakistan. Model (2) presented above is significant as a whole as F-statistic is 10.01368. The values of statistics, R-squared and adjusted R-squared are 0.750256 and 0.675333, respectively. These values indicate that explanatory power of independent variables is quite high.

Chaudhry & Butt

To find out the relative importance of determinants of economic growth of Pakistan included in Model (2) standardized coefficients have been computed and results are shown in Table 6 below.

Table 6: Standardized Regression Coefficients for Model 2

Independent Variables	Un-standardized Regression Coefficients	SD of Independent Variables	SD of Dependent Variable	Standardized Regression Coefficients
C	43968023	0	140000000	0
$\Delta M2$	0.0000134	54900000000	140000000	0.005254714
$\Delta M2(-1)$	-0.000549	51100000000	140000000	-0.200385
$\Delta (GE/Y)$	-2490000000	0.009844	140000000	-0.175082571
ΔTOT	-172000000	0.09011	140000000	-0.110706571
$\Delta TOT(-1)$	133000000	0.09504	140000000	0.090288
$\Delta ReEO$	-31192484	3.616625	140000000	-0.805796553
$\Delta ReEO(-1)$	-6659161	3.548267	140000000	-0.168774866
Net_Aid_\$_	0.079767	380000000	140000000	0.216510429
Net_Aid_\$_ (-1)	-0.083127	340000000	140000000	-0.201879857

Table 6 reveals that the most important determinant for economic growth of Pakistan is ReEO as the standardized coefficient associated with this variable has the biggest magnitude.

6. Conclusions

The present study is the first of its nature, which estimated the impact of both real unofficial and official exchange rates on the economy of Pakistan.

Using modified Edwards (1985) methodology first, the impact of real unofficial exchange rate has been estimated. Some macroeconomic variables like money supply and its lagged value, GE/Y ratio, TOT and its lagged value, net official development assistance and official aid received and its lagged value have been included as additional explanatory variables in the model. The empirical results of this study reveal that any depreciation in real unofficial exchange rate has insignificant contemporaneous expansionary impact on the economy of Pakistan. Whereas, the depreciation in real unofficial exchange rate has significant contractionary impact after one year on the economy of Pakistan.

The use of modified Edwards (1985) methodology has been repeated to estimate the impact of real official exchange rate on the economy of Pakistan. The additional explanatory variables included in the model are the same as used before. This study has found that any devaluation in real official exchange rate has significant contemporaneous contractionary impact on the economy of Pakistan. These findings are in line with Edwards (1985), Avellan (2004) and Dosse (2006). The statistical results further reveal that devaluation in real official exchange rate continue causing contraction in the economy of Pakistan even after one year though it is not that significant and these findings differ from those of Edwards (1985), Avellan (2004), and Dosse (2006).

The statistical results of the present study lead to the conclusion that the economy of Pakistan is affected by the fluctuations in both real unofficial and official exchange rates of

Chaudhry & Butt

Pak-rupee versus US \$. These results further indicate that the impact of real official exchange rate is bigger on the economy of Pakistan than that of real unofficial exchange rate. Therefore, one of the implications of this finding is that the policy makers cannot overlook the role of unofficial exchange rate on the economy while designing the foreign exchange policy, especially for developing countries like Pakistan.

At the end of conclusion, a limitation of the study needs its mention. As time series data of the explanatory variables suffer from multicollinearity problem as indicated in matrix of zero-order correlation coefficient (Table 2) the readers are advised to use the models of the study only for forecasting purpose.

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Chaudhry & Butt

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Chaudhry & Butt

Appendix Table

Results of Augmented DickeyFuller (ADF) Test for Unit Root

Variable	Intercept	Intercept and Trend
Y	-0.670(0.842)	-2.271 (0.439)
Dy	-4.490 (0.000)	
M2	0.590 (0.987)	-2.630 (0.269)
DM2	-5.747 (0.000)	
GE/Y	-1.317 (0.612)	-0.404 (0.984)
DGE/Y	-5.542 (0.000)	
TOT	-1.444 (0.551)	-2.836 (0.193)
DTOT	-7.655 (0.000)	
ReEU	-1.637 (0.454)	-3.829 (0.025)
ReEO	-0.463 (0.888)	-2.865 (0.183)
DReEO	-5.748 (0.000)	
Net_AID_\$	-2.185 (0.214)	-3.830 (0.024)

Note: Numbers in parentheses represent p-values