Impact of Real Effective Exchange Rate on Unemployment in Pakistan: An Empirical Investigation

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Abstract

This paper estimated impact of real effective exchange rate(REER) on unemployment rate in Pakistan for the period 1991-2015. Based on results of stationarity tests, Autoregressive Distributive Lag(ARDL) Model technique was applied. Bounds test applied on ARDL model confirmed cointegration among variables. Long run results showed that the money supply, trade openness and REER appreciation reduced unemployment in the long run, whereas, GDP growth had insignificant impact on unemployment. In short run model, negative and significant coefficient of lagged ECM term reconfirmed existence of long run relationship and high convergence speed of 67% was estimated. The crucial finding of the study is that positive relation between REER appreciation and unemployment does not hold in Pakistan instead appreciation affects unemployment negatively and growth in Pakistan does not affect unemployment significantly during the data period of this study. Based on findings of the study, policy implication is that monetary and fiscal policies designed towards realignment of REER towards equilibrium are although necessary to achieve macroeconomic goals but REER depreciation does not reduce unemployment.

Keywords: Real Effective Exchange Rate, Unemployment, Cointegration, ARDL

Introduction

Real Effective Exchange Rate (REER) is an important indicator to measure competitiveness of exports. An increase in REER represents appreciation of domestic currency in effective terms against currencies of trading partners and competitors. REER in Pakistan has upward trend since 2001 and it appreciated by 17.1 percent from 2013 to 2015. An upward trend in REER has invited attention of researchers and policy makers due to high significance of REER appreciation as indication of

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further deterioration of competitiveness of already declining exports in Pakistan.

Bloom and Meckenna (2015) estimated that globally the number of unemployed persons reached 197.1 million which is 1 million higher than previous year. The most alarming situation is that global unemployment is expected to rise by 2.3 million and 1.1 million in 2016 and 2017, respectively. Pakistan being 6th most populous country and 10th largest country according to size of labor force (61.04 million) has overall 3.62 million unemployed labor force thus recording unemployment equal to 5.9 percent in FY2015.

A large number of studies have empirically investigated the impact of REER on Unemployment but in case of Pakistan this area of research is relatively less explored. An increase in REER (appreciation of domestic currency in effective terms) may affect unemployment positively or negatively depending on type of economy under consideration. REER appreciation may increase unemployment through three channels: a) decrease in exports causing decline in production of exporting firms and thus increasing unemployment as employers reduce demand for labor (Chimnani, Bhutto, Butt, Shaikh, and Devi, 2012); b) appreciation shifts labor from tradeable to non-tradable sectors due to low wages in tradable thus increasing unemployment in the country; c) production becomes more capital intensive because of appreciation thus leading to high unemployment; d) REER appreciation curtails growth leading to loss of job opportunities thus increasing unemployment in the country.

Recent literature also provides justification for decrease in unemployment as a result of REER appreciation in countries like Pakistan due to following reasons: a) along with trade channel, impact of REER on unemployment through financial channel is opposite b) in developing countries imports are used as inputs for re-exporting commodities c) Labor intensity channel is only applicable when labor and capital are substitutes otherwise depreciation will not increase employment d) in case of Pakistan imports are double of exports which cause asymmetric pass through of REER changes on value of exports and imports.

Literature Review

Aqil, Qureshi, Ahmed, and Qadeer (2014) using time series data of Pakistan from 1983 to 2013 estimated relation of unemployment with GDP growth, inflation, FDI and population growth. Interestingly study has found no impact of growth and inflation on unemployment. However, FDI and population growth significantly and positively affected unemployment in Pakistan during the data period.

Thayaparan (2014) examined the effect of inflation and economic growth on unemployment in Sri Lanka by using annual data for the period 1990-2012. Johansen cointegration was applied to find existence of long run relationship between variables. Results suggested that inflation has negative and significant impact on unemployment. Meanwhile GDP has positive effect on unemployment but this was not statistically significant in case of Sri Lankan economy.

Trimurtiand Komalasari (2014) empirically examined determinants of unemployment rate in seven provinces of Indonesia. Unemployment, Inflation, GDP and minimum wage were considered as important determinants of unemployment and used as study variables in the model. Regression results proved that GDP growth and minimum wages has no effect on unemployment, while inflation is significantly affecting unemployment in the data period. Results suggested that economic growth is not guaranteed for lowering unemployment rate; therefore, other suitable policies should be adopted to create job opportunities for lowering unemployment rate.

Bakhshi and Ibrahimi (2016) investigated the relationship between exchange rate and unemployment in Iranian economy. By taking data from 1981-2012 and applying ARDL approach the study found a negative impact of depreciation of domestic currency on unemployment.

Xiangquan, Yuxue, Shisong and Yumei (2011) studied the effect of real exchange rate and foreign trade on employment by using data for the period 1985-2007 and Vector Autoregressive Model was used for measuring the effect of exchange rate variation, fiscal spending and currency supply on employment growth. To estimate the trade effect on employment, the output constrained model and capital constrained model was used. Results showed that a sound and competitive exchange rate policy promoted employment growth more actively than monetary and fiscal policies. Although expansionary monetary policy accelerated employment level but government spending exhibited reversal impact on employment. The study also revealed that export growth also increased employment growth.

Shaheen (2013) explored the effect of exchange rate on three main macro-economic variables including inflation, import and export balance for Pakistan. The data used in the study was consisting annual observations from 2000-2010 and binary response dependent variable technique was used. The study found significant association between exchange rate and inflation while insignificant relation was found between exports and exchange rate and the results of study suggested

that policy makers should consider exchange rate volatility and its impact on macroeconomic variables for stabilizing the currency of Pakistan.

Chemnani et al. (2012) empirically established evidence for South Asia on the impact of exchange rate on unemployment. By using Ordinary Least Square (OLS) and unbalanced panel data set for the time period 1995-2005 the study found positive and significant impact of exchange rate appreciation on unemployment. The study concluded that if sample countries control and manage their exchange rate they can handle the problem of unemployment.

Brincikova and Darmo (2015) explored the relationship between economic growth and unemployment for all EU countries. The purpose of this research was to find out the irregular association between output growth and gender based unemployment. To measure this relationship, Okun's Law was estimated for all EU countries and for specific groups of the union classified on the basis of same characteristics within the group and divergent with the other countries of the EU. The results showed that male unemployment was more sensitive to change in GDP as compared to female unemployment. Likewise, the results also showed that unemployment was more sensitive in those countries which economic performance was lower.

Galindo, Izquierdo and Montero (2006) investigated the significance of exchange rate volatility on employment and also checked the influence in case of differential in degree of freedom and liability dollarization. The results showed that real exchange rate depreciation positively affected employment but this became reverse when liability dollarization increases. In industry with high liabilities dollarization depreciation may cause negative impact on employment.

Shaari, Hussain, and Rahim (2013) investigated the impacts of oil price and exchange rate on unemployment in Malaysia. The effort to find long run relationship between exchange rate, oil price, and unemployment resulted in the confirmation of such a relationship. The examinations to find short run relationship gave the result that short run relationships were influenced by the estimated long run equilibrium and that oil price did not affect unemployment but exchange rate had an influence on unemployment. Therefore, they concluded that putting the exchange rate under control had to be implemented to control unemployment.

Methodology and Results

The study follows Frenkel and Ros (2006) to develop the following empirical model for estimating the impact of REER on unemployment in Pakistan for the data period from 1991-2015.

$$LUNEMP = \beta 1 + \beta 1\ LREER + \beta 2\ LGDPG + \beta 3\ LOPEN + \beta 4\ LM2 + \mu$$

Where,
LUNEMP: Unemployment rate in log form
LGDPG = Gross domestic product growth in log form
LREER= Real effective exchange rate in log form
LOPEN= Trade openness in log form
LM2= Broad money supply in log form
D: first difference

There are three main channels through which REER affects unemployment rate which are given as macroeconomic channel, development channel, and labor intensity channel.

Macroeconomic channel: When domestic currency depreciates foreign demand and domestic demand component for exportable increases as imports becomes expensive for natives so demand switches to domestic goods and thus net exports increase (Krugman and Taylor, 1978). Firms demand for more labor to produce more to meet increasing demand and in this way unemployment decreases. On the other hand, due to depreciation in REER firms hire more workers and pay higher wages thus workers increase their supply and unemployment decreases. The net effect of the dollar appreciation is negatively significant for employment, wages and hours of work time (Bruneau, 2008).

Development channel: When real exchange rate depreciates economy grows faster and new jobs are created in this development process which negatively affects unemployment rate through job creation. A real depreciation also reduces the relative price of imported inputs which leads to higher production via improvements in technology and efficiency in production process and consequently economic development increases (Leung and Yuen, 2005).

Labor Intensity Channel: Real exchange rate affects labor intensity of output because firms change labor to capital ratio due to depreciation in domestic countries. Developing countries mostly rely on imported input components so firms substitute labor for capital whenever domestic country depreciates. Whenever demand for labor increases by firms, it creates upward pressure in wages. Due to incentive of higher wages, young population increase their education level and also lower the cross border mobility(low emigration) which results in accumulation of skilled labor force (Harris, 2011)

To estimate above model, the study has used time series data from 1991 to 2015. Main data sources include World Development Indicators, World Bank; Economic Survey of Pakistan (Various Issues) and Handbook of Statistics (2015), State Bank of Pakistan.

Before applying suitable econometric technique, stationarity of the data is checked to avoid spurious regression. Augmented Dickey Fuller (ADF) test is used to check stationarity of data.

Table 1: Augmented Dickey Fuller Test of Stationarity

	At level		At First Difference	
Variables	**Intercept**	**Intercept and Trend**	**Intercept**	**Intercept and Trend**
LUNEMP	-1.5733(0)	-1.5428(0)	-3.983(0)***	3.894(0)***
LREER	-1.1769(0)	0.3987(0)	-3.4132(0)**	-3.381(0)**
LGDPG	-3.665(0)**	-3.573(0)*	-------	--------
LM2	-0.8916(0)	-1.8187(0)	-4.092(0)***	-3.972(0)**
LOPEN	-1.7202(0)	-2.3791(0)	-5.815(0)***	-5.69(0)***

*,**,*** shows significance at 10%, 5% and 1% level of significance respectively.

Table 1 shows that variables are integrated of order I(1) except LGDPG which is stationary and no variable is I(2). This fulfils condition for applying Autoregressive Distributed Lag (ARDL) technique to test cointegration and estimation of long run and short run models.

In the first step, calculated F- test statistics is compared with tabulated F-values provided by Peasran, Shin, and Smith (2001). If calculated value of F-Stat is greater than upper and lower bounds then according to Bounds test cointegration exists. On the other hand, if calculated F-Stat is less than lower bound then cointegration does not exist. Finally, according to Bounds cointegration approach if calculated F-Stat falls between upper and lower bounds then test is considered inconclusive.

Table 2: ARDL Bounds Testing Analysis

F-Statistics	**3.9377**	
Selected Lag Length (Criteria)	**SBC**	
	Critical values from Pesaran, et al. (2001), table CV (v)	
Critical bound values	Lower	Upper
1%	3.74	5.06
5%	2.86	4.01
10%	2.45	3.52

Table 2 shows **3.9377 value of F-stat** is greater than upper critical bound at 10 percent level of significance thus confirming cointegration between LUNEMP and explanatory variables (LREER, LGDPG, LM2 and LOPEN). In the next step of ARDL technique, the long run and short run models have been estimated and results are reported in Table 3.

Table 3: Long Run and Short Run Analysis

	LongRun Analysis		
	Dependent Variable: LUNEMP		
Variable	Coefficient	t-statistics	Prob
Constant	15.62***	4.99	0.0002
LREER	-0.9681*	-1.956	0.0707
LGDPG	0.0397	0.7019	0.4943
LM2	-0.1135**	-2.9533	0.0105
LOPEN	-1.7413***	-3.0935	0.0079
	Short Run Analysis		
DLUNEMP(-1)	0.2453	1.2088	0.2468
DLREER	0.3093	0.6013	0.5572
DLGDPG	0.0266	0.6595	0.5202
DLM2	-0.0760**	-2.7509	0.0156
DLOPEN	-0.5980**	-2.1591	0.0487
ECM(-1)	-0.6704***	-3.8551	0.0017

*Note: The asterisks ***,**,*denote the significance at 1% .5%, and 10% level of significance respectively.*

The above results show that LREER, LM2 and LOPEN affect LUNEMP negatively and significantly in the long run,whereas, LGDPG does not affect LUNEMP in the long run. Our finding that GDP growth does not affect unemployment in Pakistan is consistent with a large number of previous studies (Thayaparan, 2014; Brincikova and Darmo,2015; Trimurti and Komalasari,2014 and Aqil et al., 2014). Negative and significant impact of trade openness on unemployment is also consistent with the findings of Cheema and Atta (2014). Our finding that money supply affects unemployment negatively is supported by Xiangquan et al. (2011). Finally, negative impact of REER on unemployment as found in this study is supported by Chemnani et al.(2012).

In the short run, results show that money supply and openness affect unemployment significantly and negatively. The significant and negative value of the coefficient of lagged ECM term reconfirmed long run relationship and convergence towards longrun. The coefficient value -0.6704 shows that 67percent deviation from long run is reduced in one year.

Above discussed empirical results given in Table 3 are only authentic if diagnostic tests confirm prerequisite assumptions regarding estimated residuals, coefficients and stability of the model. For this purpose, the study has applied LM serial correlation test, heteroscedasticity ARCH test, Ramsey RESET test and Jarque Bera Normality tests. The results of diagnostic tests are reported in Table 4 and discussed below.

Table4: Diagnostic Tests

Diagnostic Test	Test Stat (Prob.)	Null Hypothesis	Decision
Jarque- Bera	4.7292(0.094)	Residuals are normally Distributed	Do not Reject H0
Breusch-Godfrey Serial Correlation LM Test- Chi-Square	1.9859(0.3705)	Residuals are not serially correlated	Do not Reject H0
Heteroscedasticity Test- ARCH- Chi-Square	0.942(0.3318)	Residuals have no ARCH effect	Do not Reject H0
Ramsey RESET Test F-statistic	0.0341(0.8563)	Model is stable	Do not Reject H0

J-B test statistics (4.7292) has probability (0.094) greater than 0.05, so residuals are normally distributed. Langrange Multiplier test is used to check autocorrelation. The probability of LM test in our results is greater than 0.05 i.e. 0.3705 indicating no serial correlation. The Autoregressive conditional heteroscedasticity (ARCH) test shows existence of no heteroscedasticity. The probability of ARCH test is 0.3318 which is greater than 0.05, accepting the null hypothesis of non-existence of heteroscedasticity. The results of Ramsey RESET test showed that model is correctly specified.

Conclusion and Policy Recommendations

This study was conducted to empirically investigate the impact of REER changes on unemployment in Pakistan for the data period from 1991-2015. Following Frenkel& Ros (2006)the study included money supply, trade openness, real GDP growth and REER as independent variables and unemployment as dependent variable. The literature has provided possibility of affecting unemployment by REER changes in both ways positive and negative depending on the nature of economy under consideration.

The main findings of the study are that money supply, trade openness and REER appreciation reduced unemployment in Pakistan during the data period, whereas, GDP Growth is not reducing unemployment significantly. Negative and significant coefficient of lagged ECM term reconfirmed existence of long run relationship with 67% convergence speed in one year.

Popular myth related to negative relation between REER depreciation and unemployment does not hold in Pakistan and GDP growth is also not reducing unemployment significantly during the data period. Based on findings of the study, policy implication is that monetary and fiscal policies designed towards realignment of REER towards equilibrium are although necessary to achieve macroeconomic goals like full employment and equilibrium in BOP but REER depreciation does not affect unemployment in desired manner.

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