



## Impact of Exchange Rate Volatility on Unemployment in Pakistan



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### Abstract

*Unemployment is an alarming issue for both developed and developing countries, which sometimes varies from region to region as well. Unemployment accompanied with Exchange Rate Volatility (ERV, hereafter) worsens the situation. This paper tries to explore the relationship between ERV and unemployment and other selected factors in the case of Pakistan from 1980 to 2018. After necessary simulation, the study supported the analyses through the autoregressive distributed lag model. Where, long-run coefficient reveals that ERV and exports both are positively affecting unemployment; whereas, import is inversely related to unemployment. Alternatively, export and GDP are inversely affecting unemployment in the short run; further, stability tests also support the relationship between the selected variables to achieve the long-run equilibrium. The study further suggests that the Government of Pakistan need to stabilize exchange rate to control unemployment, which is 8 percent in the long-run and 11 percent in the short run.*

Pages: 49 – 66

Vol. VI, No. II (Spring 2021)

### Key Words:

Exchange Rate Volatility,  
Unemployment,  
Economy of Pakistan

### JEL Classification:

## Introduction

One of the serious economic and social problems is unemployment, faced by almost every developing country, including Pakistan. In these countries, the only method which can recover the poor economic situations is the active economy, which can influence the growth of the economy. Unemployment exists in those nations that fundamentally foretold the problems associated with economic and social structures with timely and necessary measures. It should be indicated in those nations, including Pakistan, in which the major portion of

government revenue is from foreign exchange earnings through exporting agricultural products.

In Pakistan, due to the increase in population, demand for labour fall short as compared to the supply of labour and this surplus portion is increasing slowly and a shortage of appropriate jobs in the human workforce, particularly for educated, uneducated, skilled and unskilled people. According to the report of the Pakistan Bureau of Statistics 2015, the average unemployment rate from 1985 to 2015 was

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5.46%, reaching an all-time maximum of 7.80% in 2002 and a record minimum of 3.10% in 1987. The unemployment rate in Pakistan reduced to 5.90% in 2015 from 6% in 2014. The report of [World Bank 2016](#) shows that in Pakistan, the average value of unemployment rate was 6.01% from 1991 until 2016, during that period a low of 4.26% unemployment rate in 1994 and a high of 8.3% in 2003.

The monetary policy of Pakistan has passed through various phases. First, the State Bank of Pakistan (SBP) introduced from 1973 to 7<sup>th</sup> January 1982 a fixed exchange rate system and per US dollar exchange rate was retained at 9.9 rupees. After that, the SBP followed a system of managed float exchange rate on 8<sup>th</sup> January 1982, but the rupee retained its descending trend. Finally, the State Bank of Pakistan adopted on 19<sup>th</sup> May 1999 a full float market-based system, determined by the demand and supply-side dynamics in the foreign exchange market. However, the worth of the rupee further dropped, and it depreciated from 58.03 to 62.55 per US dollar during the period 2000 to 2008 (SBP, 2005). Uncertainty in the exchange rate produces extensive problems, particularly in the economy of less developed nations. Though the rate of exchange has ever been of great sensitiveness and importance, the sensitivity of the problem proceeds when it is calculated wrongly ([Mohammadi and Masjedi, 1997](#)). So, the strategy for finding an exchange rate is a sensitive problem, and while calculating the rate of exchange, any type of error should be evaded. However, a reduction in the price of exports may attract the exotic market, and it can improve the competitive capability of a nation and consequently it would raise the number of exports. Therefore, the volume of demand in the nation rises, and with the attraction of supply and the steadiness of other conditions. As a result,

it increases national production. The export rate is directly preoperational to the rate of production.

In this study, the existing literature shows that in Pakistan, the impact of exchange rate fluctuation on different variables has been investigated. [Saqib et al. \(2012\)](#) empirically observed the influence of real exchange rate variation on exports of Pakistan. Their finding suggests that variation of the exchange rate has a no-positive influence on the volume of exports. [Javed and Farooq \(2009\)](#) empirically studied the impact of real exchange rate variability on the GDP of Pakistan. The outcomes of the paper revealed that short-term and long-term exchange rate variability has a negative impact on the Gross Domestic Product of Pakistan. [Azid et al. \(2005\)](#) observed the effect of exchange rate variation on the macro-economic variables in Pakistan. The OLS technique was utilized to find out the consequences. The findings of the study indicated that real exchange rate variation has a significantly positive effect on trade openness, Growth rate and GDP. [Alam and Ahmad \(2011\)](#) observed the effect of exchange rate variability on imports of Pakistan. The outcomes of the paper indicated that exchange rate variability has a significantly negative influence on imports.

From the above discussion, it is concluded that the association between unemployment and exchange rate uncertainty has not been analyzed from the perspective of Pakistan. Therefore, this study will consider this gap and investigate the impact of ERV on unemployment from the perspective of Pakistan. The core objective of this research is, first, to examine the impact of ERV on the unemployment rate of Pakistan second, whether this impact continues up to long-run or remain only in the short run. And finally checking the

impact of other macroeconomic indicators such as market size, inflation and trade volume of Pakistan.

Upcoming texts are organized as section 2 deals with the literature review about the impact of exchange rate variability on the unemployment rate. Section 3 discusses the data and econometric methodology used in the study. Section 4 highlights the empirical results, results and discussion.

## **Literature Review**

Theoretically, fluctuation in economic variables like exchange rate cause uncertainty in prices, the results of this uncertainty of price would cause a reduction in domestic investment, decrease in investment level, which in turn transfer to increase unemployment (Poza, 2001). In contrast, Ostry and [Ghosh \(1994\)](#) discussed that the ERV creates uncertainty in prices that encourage precautionary saving in nations. The results of this increase in savings of nations will cause more investment. Furthermore, Grauwe (1988) argue that if the investment level increases, it will lead to a decrease in unemployment. Considering the fact that fluctuation of exchange rate can cause variations in the trade volume and consequently in the quantity of production if devaluation occurs in the rate of exchange, it raises the import prices, the number of imports will decline, and inland products will change imports, and in turn, this will raise employment, expand factories and develop the industrial sector to employ more human work force, (Lee 2015). Similarly, an appreciation of the real exchange rate raises the relative price of labour against capital goods, which causes firms to reduce the amount of labour, thus increasing the unemployment rate.

Adjei (2019) observed the influence of exchange rate fluctuation on

unemployment and found that exchange rate fluctuation in Iran had a significantly negative influence on unemployment and also shown that the association between economic growth and unemployment is positive. [Akpan \(2009\)](#) empirically inspected the effect of exchange rate fluctuation on manufacturing sector employment in Nigeria. The results of the study indicated that low technology sector firms and other firms that has more dependency on imported inputs have their employment and competitiveness negatively affected by exchange rate fluctuation. [Aliyu \(2010\)](#) concluded that exchange rate uncertainty and unemployment are negatively related for the majority of the countries; this means an increase in the exchange rate can decrease the rate of unemployment and improve economic situations of the country.

For trade volume, Bahar & Abuzer (2017) investigated the influence of real effective exchange rate uncertainty on trade volume in Nigeria, and concluded that exchange rate significantly negative effect on export volume. [Mohammadi and Masjedi \(1997\)](#) empirically studied the effect of real effective exchange rate variability on unemployment in Iran. The key outcomes of this study show that economic growth had a significantly positive influence on rate of unemployment and also shown that the relationship between unemployment and real effective exchange rate is negative. Imran et al. (2017) conducted a study to observe the mechanisms of the real wages, real exchange rate and unemployment in terms of China and observed that unemployment rate decreased due to earnings in competitiveness when the real rate of exchange was more away from equilibrium. Devia (2019) conducted a study to observe the association between real exchange rate, GDP ratio, foreign interest rate, government deficit, real

money supply and inflation in Indonesia. The findings of the study indicated that real exchange rate variation has a negative and significant influence on the foreign interest rate, real money supply and expected inflation rate. While the real exchange rate variation has a positive influence on GDP ratio and government deficit. The study also suggested that for the estimation of expected exchange rate and inflation rate, a better method and large sample size might give better consequences in this regard.

Imran et al. (2020) extended a similar study to trading partners of Pakistan and found that long-run exchange rate variation has a negative effect on the imports of China. [Javed and Farooq \(2009\)](#) empirically observed the influence of real effective exchange rate variability on the economic growth rate of Pakistan from 1982 to 2007, and their finding indicates that real exchange rate variability has a significant and negative influence on the economic growth rate of Pakistan. [Alam and Ahmad \(2011\)](#) observed the influence of nominal effective exchange rate fluctuation on inflation and output in Pakistan. The findings of the study indicated that devaluation increased the price level and declined output in Pakistan. Further, [Bahmani et al. \(2016\)](#) added the inflation rate to the list of the variables and concluded insignificant relation between exports and exchange rate, while a significant association was found between the exchange rate and inflation. Jeelani et al. (2019) empirically studied the influence of real exchange rate variability on Pakistan's exports. The findings revealed the presence of a long-term equilibrium association between exchange rate variability, real exports, foreign income, and relative prices. While in the short run, they found a significantly negative influence of real exchange rate variability on the volume of exports. [Saqib et al. \(2012\)](#) observed the influence of real

exchange-rate instability on Pakistani exports growth rate. Their finding indicates that real exchange rate instability has a significantly negative influence on exports growth for the countries Australia, USA, India, Singapore, UK and Bangladesh because these nations are the main trading ally of Pakistan and also shown that there is no significant influence of real exchange rate instability on the growth rate of exports for the nations like Malaysia and New Zealand.

[Dhawan and Kumar \(1991\)](#) empirically inspected the relationship between real exchange rate fluctuation and the exports growth rate of Pakistan with its major trading partner countries. The findings of the paper indicated that the impact of real exchange rate variation on the exports growth rate of Pakistan varies with the trading partner countries.

[Aqeel and Nishat \(2004\)](#) observed in Pakistan the influence of uncertainty in the exchange rate on exports. The uncertainty of the rate of exchange was measured with the help of the sample moving standard deviation method, and the consequences of this study were consequent by the JJ co-integration method. Their finding indicates that exchange rate variability has a significantly negative effect on exports. Zubair et al. (2013) examined the influence of uncertainty in the exchange rates on prices in Pakistan. Their finding indicates that in Pakistan, both wholesale prices and consumer prices are affected by exchange fluctuations. It was further revealed that the influence of exchange rate on consumer prices was weak in flexible exchange rate system as compare to under managed floating exchange rate system.

Overall, the literature review indicates ambiguous consequences about the impact of exchange rate uncertainty on unemployment. Some studies show a

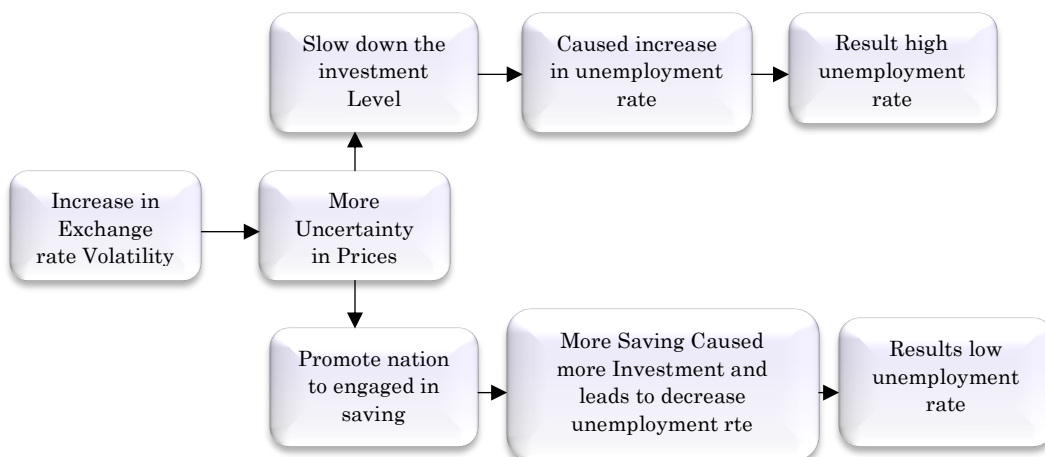
positive effect, while a few studies similarly indicated the negative effect of exchange rate uncertainty on unemployment rate. So by studying such like researches, we find out that exchange rate fluctuation have both positive as well as negative relationship with unemployment of a country. Therefore, the current study is an effort to investigate the impact of exchange rate variation on unemployment in Pakistan and then to observe the relative significance of the exchange rate stability in Pakistan.

### Conceptual Framework and Model

Fluctuation in economic variables like exchange rate cause uncertainty in prices, the results of this uncertainty of price would cause a reduction in domestic investment, decrease in investment level, which in turn transfers to increased unemployment (Poza and Dorantes, 2001). In contrast, [Ghosh and Ostry \(1994\)](#) discuss that the ERV creates uncertainty in price that encourage precautionary saving in nations. The results of this increase in the savings of nations will cause more investment. Furthermore, Grauwe (1988) argue that if the investment level increases, it will lead to a decrease in unemployment. How the fluctuation of exchange rate can affect the

domestic level of investment? Hajilee and Oskooee (2013) claim that fluctuation of exchange rate is the cause of uncertainty in price and the price uncertainty have positive or negative effect on level of domestic investment. The domestic level of investment depends upon the degree of risk of investors, in case of risk-neutral investors they decline their process of investment because of increase in price fluctuation, while in order to avoid from future price fluctuation risk-averse investors invest more.

Theoretically, export is a function of exchange rate, production level and household prices. Considering the fact that fluctuation of exchange rate can cause variations in the quantity of import, export and consequently in the quantity of production, if devaluation occur in the rate of exchange it rises the import prices, the quantity of imports will decline and inland products will change imports and in turn, this will rise employment, expand factories and develop industrial sector to employ more human work force (Nakhjavani, 2002). Similarly, an appreciation of real exchange rate raises the relative price of labour against capital goods, which causes firms to reduce the amount of labour, thus increasing the unemployment rate.



**Figure 1:** Channel for the Effect of Exchange Rate Uncertainty on Unemployment

Source: (Grauwe, 1988; Ghosh and Ostry, 1994 and Dorantes and Pozo, 2001)

The current study intends to explore the effect of real exchange rate variability on the unemployment rate in Pakistan from 1980 to 2018. Unemployment rate “U” depends on inflation “INF”, real exchange rate volatility (RERVOL), import of value-added “IMP”, export of value-added “EXP” and domestic market “GDP” and  $\mu_i$  is a stochastic disturbance term.

$$U = f(\text{INF}, \text{RERVOL}, \text{IMP}, \text{EXP}, \text{GDP}) \tag{3.1}$$

$$\ln U = \alpha_0 + \alpha_1 \ln \text{RERVOL} + \alpha_2 \ln \text{GDP} + \alpha_3 \ln \text{EXP} + \alpha_4 \ln \text{IMP} + \alpha_5 \ln \text{INF} + \mu_i \tag{3.2}$$

Table 1 give the information used in this study about the definition of each variable, symbols and along with the data source.

$$\text{RERVOL}_i = \frac{\sum_{t=1}^n (\text{RER}_t - \overline{\text{RER}})^2}{n-1} \tag{3.3}$$

We used the autoregressive distributed lag (ARDL) model for co-integration to observe the impact of exchange rate uncertainty on the unemployment rate and the Average Moving Standard Deviation method used to calculate the ERV as mentioned in eq. 3.3.

**Table 1.** Definition, date Sources and Symbolic Representation of Variables

Variables	Definition	Source	Symbols
Unemployment Rate	The portion of the labour force that is without work but available for and searching employment.	World Development Indicators	U
Inflation Rate	Inflation, as measured by the CPI, reflects the annual percentage modification in the cost to the general (average) consumer of getting a services and basket of goods that may be changed or fixed at specified intervals, for instance yearly. The Laspeyre’s formula is usually applied.	World Development Indicators	INF
Exports	All movable goods involved in a change of ownership from residents to non-residents are called Goods exports. Data are in current U.S. dollars.	World Development Indicators	EXP
Imports	All movable goods involved in a change of ownership from non-residents to residents are called Goods imports. Data are in current U.S. dollars.	World Development Indicators	IMP
Gross Domestic Product	The sum of total market value of all products produced in a country during fiscal year. Data are in constant 2010 U.S. dollars.	World Development Indicators	GDP
Real Effective Exchange Rate	A measure of the worth of a currency against a weighted average of a number of foreign currencies. REER = Nominal effective exchange rate ÷ price deflator.	World Development Indicators	RER
Exchange rate volatility	Estimated by Average Moving Standard Deviation.	Author’s own calculation	RERvol

The ARDL model of co-integration technique is used because the other co-integration technique needs that the entire variable should be integrated of the

same order. Although such constraint has not been necessary in the ARDL model of co-Integration technique in order to estimate the equation. Therefore,

following our theoretical model, the ARDL model will be

$$\begin{aligned} \ln \Delta U_t = & \alpha_0 + \alpha_1 \ln U_{t-1} + \alpha_2 \ln RERVOL_{t-1} + \alpha_3 \ln GDP_{t-1} + \\ & \alpha_4 \ln EXP_{t-1} + \alpha_5 \ln IMP_{t-1} + \alpha_6 \ln INF_{t-1} + \sum_{i=0}^{p_1-1} \theta_{1i} \ln \Delta u_{t-i} + \\ & \sum_{i=0}^{p_2-1} \theta_{2i} \ln \Delta RERVOL_{t-i} + \sum_{i=0}^{p_3-1} \theta_{3i} \ln \Delta GDP_{t-i} + \\ & \sum_{i=0}^{p_4-1} \theta_{4i} \ln \Delta EXP_{t-i} + \sum_{i=0}^{p_5-1} \theta_{5i} \ln \Delta IMP_{t-i} + \sum_{i=0}^{p_6-1} \theta_{6i} \ln \Delta INF_{t-i} + \varepsilon_t \end{aligned} \quad (3.7)$$

In the above equation (3.7),  $\theta_{ji}$  shows the short-term coefficients and  $\alpha_i$  are the long-term coefficients in the model. We used Schwarz Bayesian Criteria for lag selection of the model. Moreover, we apply the Bounds test of co-integration (Pesaran et al. 2001) after the estimation of the ARDL equation.

The coefficients of Error Correction Model (ECM) is used for short-run co-integration. After the calculation of long-run coefficients the ECM is estimated. To observe the convergence of the model we make the series of lag residual series that are merged in Error Correction Mechanism after the calculation of long-term coefficients.

The model of ECM can be written as

$$\begin{aligned} \Delta \ln U_t = & \alpha_0 + \sum_{i=0}^{p_1-1} \theta_{1i} \ln \Delta U_{t-i} + \sum_{i=1}^{p_2} \theta_{2i} \ln \Delta RERVOL_{t-i} + \\ & \sum_{i=1}^{p_3} \theta_{3i} \ln \Delta GDP_{t-i} + \sum_{i=1}^{p_4} \theta_{4i} \ln \Delta EXP_{t-i} + \sum_{i=1}^{p_5} \theta_{5i} \ln \Delta IMP_{t-i} + \\ & \sum_{i=1}^{p_6} \theta_{6i} \ln \Delta INF_{t-i} - \pi \varepsilon_{t-1} + \varepsilon_t \end{aligned} \quad (3.8)$$

The ECM is  $t-1$  in eq. 3.8 and its coefficient  $\pi$  indicate the adjustment towards equilibrium level if we have disequilibrium in economy and  $\theta_{ji}$  indicate the short-run coefficients. The  $\pi$  should be significant and negative for co-integration relationships.

### Results and Discussion

this section discusses the trend and descriptive statistics of unemployment rate and other dependent variables. Trend and descriptive statistics of Unemployment Rate. The descriptive statistics for selected variable is given in Table 2.

**Table 2.** Descriptive Statistics of Unemployment Rate

Country	Min-Max	Mean	Standard Deviation
Pakistan	1.7-7.8	5.10833	1.5482

From the starting period of 1980 to 2018 show that unemployment rate of Pakistan reach to the lowest level (1.7) in 1989 and reach to the highest level (7.8) in 2002.

The standard deviation value in Table. 2 of descriptive statistics indicate that there is high variation occurs in the unemployment rate of Pakistan.

**Table 3.** Augmented Dicky Fuller Test Results

Variable	with intercept		with intercept and trend	
	Level	1 <sup>st</sup> difference	Level	1 <sup>st</sup> difference
LnU	-1.9202	-5.4235***	-1.9065	-5.3583***
Lngdp	0.37906	-5.9442***	-1.7134	-6.07019***
Lnpervol	-4.84806***	-6.7658***	-4.7477***	-6.9193***
LNEXP	-1.26192	-5.5134***	-1.3756	-5.4910***
Lnimp	0.2774	-5.6953***	-1.7177	-5.7657***
Lninf	-4.5930***	-6.5315***	-1.9955	-5.2357***

\* $P < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$

In ( ) *t*-statistics are mentioned

The present study reports the results with constant and trend as well as with constant and no trend. In this study, we used SB-Criteria (Schwarz Bayesian criteria) for lagged selection. To confirm that no one of the time series is I (2), the Augmented Dickey and Fuller test is conducted at different levels of variables. However, it is identified that some of the variables are integrated of order I (0) while others are I (1), ensuring that none of the variables is integrated of order I (2). The results of the current study of ADF test confirm to use of the ARDL model for co-integration. The Augmented Dickey and Fuller test outcomes are exemplified in Table. 3.

In the above Table. 2, the outcomes of the ADF test indicate that with intercept and trend, the Real Effective ERV is integrated of order zero (stationary at level), and all of the other remaining variables are integrated of order one (stationary at 1<sup>st</sup> difference). After concluding the ADF test results, this study

accepts alternative hypotheses (H<sub>1</sub>), which states that the data is stationary and reject the null hypothesis (H<sub>0</sub>). Subsequent to ensuring that none of the variables is integrated at second order, the study progresses for testing of co-integration through ARDL model.

### Results of Autoregressive Distributive Lag Model

The Augmented Dickey-Fuller test results indicate that the variables are integrated of I (0) or integrated of I (1). If the variables are integrated of I (1) or more than I (1), then it is better to have co-integration analysis to observe the long term associations between variables. Here we are estimating the Autoregressive Distributive Lag model for co-integration analysis.

First, we analyze the ARDL model in the Autoregressive Distributive Lag co-integration approach, and then we apply the Bounds test of co-integration to check co-integration between the variables.

**Table 4.** Bound Test of Cointegration

$$lnU = \alpha_0 + \alpha_1 lnRERvol + \alpha_2 lnGDP + \alpha_3 lnEXP + \alpha_4 lnIMP + \alpha_5 lnINF + \mu_t$$

Country	ARDL Equation	Calculate d F-value	Lower Bound Test at 5%	Upper Bound Test 5%	Number of Explanatory Variables	K-value
Pakistan	ARDL (1,0,2,1,2,1,1)	5.25	2.27	3.28	6	6

The alternative and null hypotheses for the Bound test of co-integration are.

Null Hypothesis  $H_0$ : There is no co-integration. Once the ADF test for stationarity of data is applied and it is confirmed that none of the variables is integrated at I (2), the study applies the Autoregressive Distributive Lag (ARDL) bounds testing approach to co-Integration. In order to check the hypothesis developed for this study, all the established models are tested. The values of F-statistics developed for the bound testing approach

are checked with the upper and lower bound critical values at a 95% confidence level. In case if the value of F-statistics is above upper bound value, the  $H_1$  hypothesis will be accepted. If the values of F-Statistics are below the upper bound at 95%, and then the  $H_0$  will be accepted. In case if the value of F-statistics falls between the upper and lower bound, the finding of co-integration or no co-integration cannot be concluded. [Pesaran & Shin \(1996\)](#) argue that Schwarz Bayesian Criteria (SBC) is a consistent



criterion for the selection of model in ARDL framework. The results of Bounds test of co-integration are illustrated in Table. 4. We used Schwarz Bayesian Criteria for lag selection.

The Bounds test of co-integration results accept the alternative hypothesis of long-run associations and reject the  $H_0$  hypothesis that shows there happen no long-run associations.

The Bounds test of co-integration results computes that there exists a long-run association in all cases between the unemployment rate and the explanatory variables. The computed F-value with a level of 5% for lag 1 was greater than the lower and upper bounds test value presented by [pesaran et al. \(2001\)](#); then the existence of  $H_0$  hypothesis of no long-term association among variables was rejected. Consequently, it could be declared that there was a long-term association between the variables of the study. We analyze the long-run coefficients after the proof of co-integration in the coming step of the

Autoregressive Distributive Lag approach.

### Long Run Coefficients of ARDL Model

The present study analyzes the short-term and long-term coefficients through the Autoregressive Distributive Lag co-integration model. We can move to the coming step of the Autoregressive Distributive Lag technique of co-integration, where we conclude the long-term coefficients for the effect of exchange rate uncertainty on the unemployment rate of Pakistan from the estimated Autoregressive Distributive Lag approach after the confirmation of co-integration relationships. The long-run association was tested using the bounds test of co-integration. According to the bounds test of co-integration, the computed F-value was higher than the lower and upper bounds test value presented by [Pesaran et al. \(2001\)](#); then the existence of  $H_0$  hypothesis of no long-term association between variables was rejected in favour of the  $H_1$  hypothesis.

**Table 5.** Long-run Coefficient of Autoregressive Distributive Lag Model

Variable	Coefficient
Logpervol	0.086* (-1.704)
Logexp	8.137*** (3.970)
Logimp	-7.300*** (-3.749)
Loggdp	1.2248 (0.4905)
Loginf	-0.3695 (0.7758)

\* $P < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$   
In ( ) t-statistics are mentioned

Consequently, it could be declared that there was a significant long term relationship between the variables of the study. After the confirmation of long-term association, the nature of the association (positive or negative relationship) among

variables was determined. The long term coefficients of the Autoregressive Distributive Lag Model are shown in Table. 5.

According to the outcomes as shown in the above Table. 5, it can be declared that

in the long run, exports and imports had a significant influence on unemployment. Because in the long-term, the influence of exports and imports on the unemployment rate exists in Pakistan. The results of the Autoregressive Distributive Lag model indicate that in the long run, there was insignificant association between unemployment and several other variables that as Gross Domestic Product and. In the long term, the co-efficient of ERV was 0.086, which showed that exchange rate uncertainty had significant and positive impacts on unemployment in Pakistan because the exchange rate variability and its effect on the price occur in Pakistan in the long term.

We can say that for theoretical justification of the results, in the long run, the instability of exchange rate creates a fluctuation in prices that generates uncertainty in household investor's and slow down the household investment level; the low level of investment in the country causes the increase of unemployment rate. These results verified the findings of Rahman et al. (2019) and [Lindblad and Sellin \(2008\)](#) who asserted that ERV had positive impact on unemployment. However, the findings of the current study verified [Nyahokwe and Ncwadi's \(2013\)](#) results claiming the existence of a long-term association between rate of exchange and unemployment. The co-efficient of inflation was -0.3695 and consequently it

had a negative and significant association with unemployment in Pakistan. This is the statement of Philips curve also. After the estimation of long-run association, ECM was applied to examine the association between short-term variations and equilibrium values of long-term model. The data associated to ECM is presented in Table. 6.

### Error Correction Mechanism (ECM)

The coefficients of ECM we used for short-run relations in Autoregressive Distributive Lag approach of co-integration. After the calculation of long-run coefficients the Error Correction Mechanism is estimated. To observe the convergence of the model we make the series of lag residual series that are merged in Error Correction Mechanism after the calculation of long-term coefficients. The findings of Error Correction Mechanism are shown in Table. 6.

According to the short-run outcomes of the study as shown in the above Table. 6, revealed that imports had significant and negative effect on unemployment rate but the relationship between inflation and unemployment rate was positive with a coefficient of 0.2256 which showed a positive influence of inflation on unemployment. After this, export and GDP had a negative and insignificant influence on unemployment.

**Table 6.** Short Run Coefficient of Autoregressive Distributive Lag Model

Variable	Coefficient
D(logpervol)	0.1168*** (0.0558)
D(logexp)	-4.3944*** (-3.970)
D(logimp)	-2.6926*** (-4.612)
D(loggdp)	-4.3944*** (-3.970)
D(loginf)	0.2256 (1.519)

Variable	Coefficient
Cointeq (-1)	-0.6815*** (-7.445)

\* $P < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$   
 In ( ) *t*-statistics are mentioned

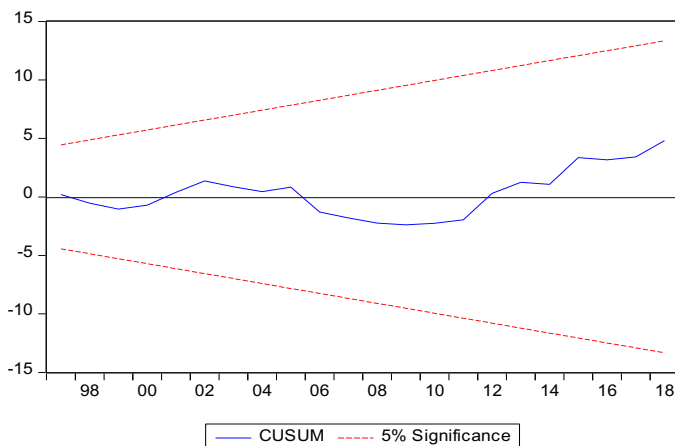
In the short run, the co-efficient of the exchange rate was 0.116856, which revealed that exchange rate uncertainty had significant and positive impacts on unemployment in Pakistan. In the short run, the unemployment rate of Pakistan is positively affected by exchange rate variability because, in Pakistan, the ERV is the cause of price instability in the short run. The results of this uncertainty of price would cause a reduction in domestic investment, decrease in investment level, which in turn transfers to an increased unemployment rate. Similar results are obtained in the long run coefficients of ARDL.

According to the findings shown in the above Table. 6, it can be asserted that the co-efficient of ECM (CointEq) was significant and negative with an a level of 0.05. Furthermore, other computed co-[Brown et al. \(1975\)](#).

efficient of the variables in the model were not excluded with a significant level of 90%. In addition, ECM tells about the long run speed of adjustment; hence, the results of adjustment factor revealed that every year 68% deficiency of equilibrium was adjusted. After the estimation of short run results, we applied CUSUM and CUSUMSQ tests in our analysis to test the stability of the coefficients of the model used. These indications clearly showed through Figures 2 and Figure 3 respectively.

### Stability Tests

Finally, we have investigated the stability of the coefficients of the selected Autoregressive Distributive Lag based on ECM using CUSUM and CUSUMQ stability testing procedure presented by



**Figure 2:** Plot of Cumulative Sum of Recursive Residuals

This same technique has been used by [Pesaran \(1997\)](#) to test the stability of the coefficients over the entire study period.

The cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals plots (recursive lines)

have been shown in Figure 2 and Figure 3, respectively. In the above Figure 2 and Figure 3, respectively, we see that both the plots (recursive lines) remain within critical bounds at a significance level of 5%. The results of these tests verified that the coefficients of the model are structurally stable over the entire study period.

We discuss in this chapter the results of unit root test and Autoregressive Distributive Lag co-integration approach. The results of the Autoregressive Distributive Lag approach of co-integration declare that both in the short-run and long-run the unemployment rate of Pakistan are significantly positive affected by real ERV

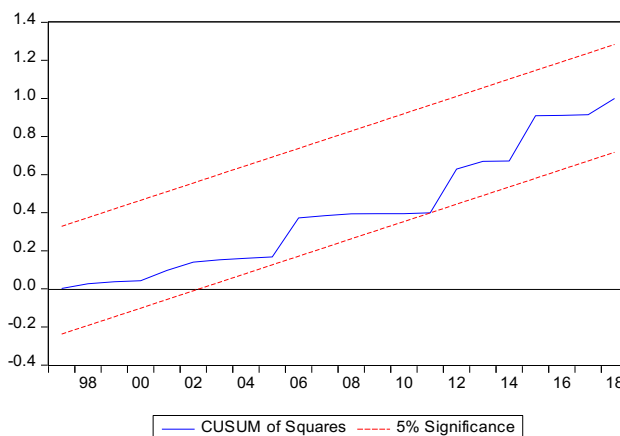


Figure 3: Plot of Cumulative Sum of Recursive Residuals

### Conclusion and Suggestion

The key objective of our study is to observe the impact of ERV on the unemployment rate of Pakistan. The literature section of this study shows that the shift in demand for labour because of the variation in exchange rate depends on the external exposure of the firm. The current study used annual data from 1980 to 2015 to obtain the results, and all the data are collected from World Development Indicators. The ERV is estimated through the Average Moving Standard Deviation (AMSD) method. Thus the Average Moving Standard Deviation (AMSD) method captures the conditional volatility in the exchange rate.

In many countries such as Pakistan, the emergence of mass unemployment can have a variety of reasons. In the current study, five variables, namely GDP, Inflation, import, export and ERV, which

could have some impacts on unemployment, were observed. This study used the ADF test to check the data stationarity. Furthermore, for the analysis, the study used the ARDL approach of co-integration. Finally, we applied CUSUM and CUSUMSQ tests in our analysis to test the stability of the coefficients of the model used.

The results of the ARDL approach of co-integration revealed that in both the short and long run, the exchange rate had a significant and positive impact on the unemployment rate in Pakistan and Inflation had a significant and negative effect on unemployment, and there was an insignificant association between unemployment and other variables of the study containing export, import and gross domestic product, implying such fact that Pakistan has more depend on imported goods as compare to exported goods. In

addition, the results of the CUSUM and CUSUMQ tests verified that the coefficients of the model are structurally stable over the entire study period.

In the light of the above findings, the researcher recommended that if Pakistan

maintains their exchange rate, then they can control the unemployment rate, because the exchange rate between two countries is one of the essential factors of trade. The stability of the exchange rate has much importance for the economic policies makers in Pakistan.

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