Economic Determinants of Unemployment in Pakistan: Co-integration Analysis

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Abstract

Among major and burning issues in Pakistan is the problem of unemployment. This study finds the determinants of unemployment by applying the ARDL bound approach using the time series data from 1973 to 2010.The results indicate that unemployment has statistically significant positive relationships with output gap, Productivity and Economic Uncertainty while it has statistically significant negative relationships with Gross Fixed Investment and Openness of Trade . At a policy level it is suggested that output gap should be decreased (i.e., policies focusing on increasing GDP should be adopted and implemented). Government should adopt depreciation policy along with reduction in trade restrictions. Not only should government himself undertake investment projects, but it should also encourage private investment.

Key Words: Unemployment; output gap; economic uncertainty; productivity; gross fixed investment; openness of trade; Pakistan

I. *Introduction*

Unemployment is a problem of great concern for policy makers of both developing and developed countries. More than 34 million people all around the world took out of job due to financial crises in 2007. After the worldwide crisis, the number of young unemployed has increased, from 73.5 million in 2007 to 77.7 million in 2010 (ILO, 2011). Thus, it affected the unemployment level and poverty reduction program badly. However, the unemployment rate is reducing after 2010.

According to Economic Survey of Pakistan (2010-11) Unemployment is a situation in which people are willing and able to work at the prevailing wage rate, but they are unable to find jobs. Unemployment is a key measure of economic health; a major factor in determining how healthy an economy is; if the economy maximizes efficiency everyone would be employed at some wage. An unemployed individual is both unproductive & a drain on society's resources (Rothiem, 2007).

Unemployment is a real matter of concern as it can yield devastating effect on economic welfare, crime, the erosion of human capital, misery and social instability (Kyei&Gyeke, 2011). The unemployment results in some psychological problems of hopelessness, frustration hostility & gradual drift of some visible unemployed youth into all manner of criminal behavior (Bakare, 2011).

Unemployment is also an ever increasing phenomenon in Pakistan too. The unemployment rate rose in 1990s as a result of fiscal tightening, low rates of economic growth and due to some other factors in Pakistan (Akhtar & Shahnaz, 2005). The decreasing trend in unemployment rate was observed during 2003 to 2009, but afterwards it again started to increase in Pakistan. It was highest as 8.3 percent in 2004 and lowest as 1.6 percent in 1975 in overall Pakistan's history. Pakistan is basically an agrarian economy which provides jobs to 45 percent of total labor force (Labor Force Survey, 2011). Some basic reasons of unemployment in this sector are backwardness of agriculture sector, low quality seeds, less use of fertilizers & pesticides, lack of education and less demand for labor due to technology improvement. These factors are mostly responsible for general & disguised unemployment in agriculture sector. Disguised unemployment means that people are looking like working but actually they are not contributing in productivity and their marginal productivity is zero.

Major reasons of unemployment in Pakistan are concerned with the backwardness of agriculture sector, and other reasons are worsening law and order situation, high growth rate of population, energy crisis, faulty educational system, poor governance and deep rooted corruption (Ali, 2010).

The Millennium summit was held in 2000 among 190 countries including Pakistan. Its aim is to achieve 8 goals. One of these goals is poverty reduction which is affected by unemployment adversely. Rafiq et al. (2010) found by using the time series data that Population growth, Inflation rate (CPI based), and FDI are important determinants of unemployment in Pakistan. But there is still gap. So this study aims at finding the relationships between unemployment rate and variables like Output Gap, Uncertainty, Productivity, Openness of trade, and Gross Fixed Investment in Pakistan.

The structure of the paper is as follows: Following introduction, the literature review is presented in the II section. The data and methodology are discussed in the III section, whereas the results are given in the final section.

II. Literature Review

Unemployment is a serious problem of developing as well as developed economies. To find the determinants of unemployment several studies have been conducted which are given below.

Valadkhani (2003) examined the main reasons of unemployment in Iran by utilizing annual time series data for a period of 1968 to 2008. The study used simultaneous equation model. The findings of this study are that increase in the output gap and uncertainty result in an increase in unemployment. Unemployment responds negatively to real investment. There is a tradeoff between unemployment and inflation for post 1979 which shows Philips curve hold for this period but high and the constant inflation rate lead to depreciation of the domestic currency and increase economic instability.

Baccaro and Rei (2005) studied institutional factors of unemployment in 18 OECD countries by using time-series data from 1969 to 1998. This research study utilized OLS technique. The findings of this study are real interest rate is positive predictor of unemployment and change in the consumer price index is negatively associated with unemployment. Changes in term of trade, and productivity are negatively associated with unemployment.

Noor et. al (2007) analyzed the existence of an Okun type relationship between unemployment and output in Malaysia by employing time series data from 1970 to 2004. The study used Okun's first difference method and Granger causality test and found that in Malaysia there is the existence of a negative relationship between output growth and unemployment. The study also showed the presence of two-way causality between output growth and unemployment rate in Malaysia.

Subhan (2008) examined the impact of price instability on economic growth and unemployment in Pakistan. The study used time series data from 1980 to 2000 and data was collected from Statistically Bulletins of Federal Bureau of Statistics, Economic Survey of Pakistan, annual reports of Asian Development Bank and publications of the State Bank of Pakistan. By using Ordinary Least Square method study found that price instability had a negative effect on economic growth and unemployment. There is an inverse relationship between economic growth and unemployment, while there is a direct relationship between manufacturing growth rate and nominal GDP. The study also showed that Foreign Direct Investment, large scale of manufacturing and exports had negative effect on unemployment, while there was positive relationship between imports and unemployment.

Gillani et al (2009) examined the relationship of unemployment, poverty and inflation with crime in Pakistan. The study used time series data from 1975 to 2007. By using Johansen cointegration technique and Granger Causality test study found that long run relationship exist among crime, inflation, poverty and unemployment. Granger Causality results showed that crime is caused by inflation, poverty and unemployment in Pakistan.

Rafiq et al (2010) estimated the determinants of unemployment in Pakistan by using time series data from 1998 to 2008. Data is taken from Economic Survey of Pakistan. The study used Simple single equation linear regression model (SELRM) & OLS technique and concluded that the relationship between unemployment & population is positive while Inflation & FDI have a negative relationship with unemployment. Results also show that there is tradeoff between unemployment & inflation in Pakistan.

Ashipala & Eita (2010) demonstrated the reasons of unemployment for the year of 1971-2007 in Namibia by using data from the Bank of Namibia and National Planning Commission. Engle-Granger method was used. The results showed that increase in prices decreased unemployment. So Philip curve was observed in Namibia. An increase in output gap and wages leads to the increases in unemployment.

There was statistically significant negative relationship between unemployment and investment, while positive relationship between unemployment and productivity but not statistically significant.

Mehmood et al (2011) studied the reasons of unemployment and the factors that affect unemployment amongst the educated segment in the Peshawar division of Pakistan. Primary data was used & taken from sampling of 442 people living in Peshawar & having at least graduation degree or capable for any technical or professional job. By using logistic regression study found that females are more unemployed than male because our social setup did not allow females to do job & women are less educated. The main reason of unemployment is high growth rate of population. The study also showed that shortage of resources, high growth of population are major factors while high growth of population*Role of attitude towards getting high level jobs, high growth of population*non coordination between education and job opportunity, Red ribbion*non coordination between education and job opportunity*role of attitude in getting high level jobs are interaction factors causing unemployment in educated segment. Graduates have a shorter unemployment duration if they have overall happy life. Other determinants of unemployment duration for graduates are work experience, financial support, financial difficulties during unemployment, job search training.

Ahmed et al (2011) analyzed the impact of unemployment on GDP in Nigeria using the time series data collected from 2000 to 2008. The result showed that there is negative relationship between unemployment and GDP.

Bakare (2011) studied the reasons of unemployment in urban areas of Nigeria. The study used time series secondary data for the period of 1978 to 2008 from Central bank of Nigeria, African Development Indicators and World Bank digest of Statistics. This study used OLS method and found that the high growth rate of population, increases in nominal wages and increase in the supply side of labor force are the main determinants of unemployment in Nigeria. Capacity utilization, private domestic investment and inflation have a negative impact on unemployment. Results also showed that the Philip curve of tradeoff between inflation and unemployment held in Nigeria.

Ray (2011) studied the relationship of inflation with output gap and expected inflation and also examined the applicability of the Phillips curve in India for the period of 1970 to 2010. The study employed Generalized Method of the Moment (GMM) and found that there was positive relationship between growth and inflation. Results also showed that there was no long run relationship between output gap, inflation and expected inflation. Existence of Phillip curve is only in the short run and not in the long run and it is vertical in the long run.

Zaman et al (2011) examined the existence of the Phillips curve in Pakistan. The study used annual data from 1975 to 2009 and data is taken from International Financial Statistics, Economic Survey of Pakistan and World Development Indicator. By using Granger Causality test study showed that there is causal and the long run relationship between unemployment and inflation in Pakistan. The study also showed that in short run temporary relationship while in the long run permanent relationship between both variables.

Umaru and Zubairu (2012) investigated the relationship between inflation and unemployment in Nigeria from 1977 to 2009. The study used Johansen Co-integration method and Grange Causality test. The result indicated that there was negative relationship between inflation and unemployment in Nigeria. Causality test showed that there was no causation between inflation and unemployment in Nigeria during the period under study.

Yousaf (2012) examined the determinants of duration of unemployment for first time job seeker in Bahawalpur. The study used primary data consisting of 350 employed individuals. By using simple single equation linear regression model study found that professional degree holders and higher education degree holders face less unemployment duration than general education and low degree holders respectively. Marital status, head of household and household size decrease the duration of unemployment but preference of government job enhance the unemployment duration.

III. Data and Methodological Frame Work

3.1data

Time series data for the period of 1973 to 2010 was used for finding the determinants of unemployment in Pakistan. It was taken from Hand Book of State Bank of Pakistan 2010, Economic Survey of Pakistan, International Financial Statistics (IFS) and Penn Word table.

Variables of the study

Five variables are used in this study for finding the determinants of unemployment. Variable unemployment rate is used as dependent variable while independent variables are output gap, economic Uncertainty, gross fixed investment, productivity and openness of trade.

Labeling and construction of variables are given in table 1

Table 1: Labeling & Construction of Variables

UNR	Unemployment rate	Number of Unemployed / Total Labor Force * 100
OG	Output Gap	(Potential GDP /Actual GDP)
EU	Economic Uncertainty	(Equilibrium Exchange rate / Actual Exchange rate)
GFI	Gross Fixed Investment	GFI(Public sector + Private sector)
PRD	Productivity	(Real GDP/ Total employment)
OT	Openness of Trade	(Exports + Imports)

Potential GDP and Equilibrium Exchange rate are calculated through HP Filter (Valadkhani, 2003) (Ashipala& Eita, 2010). Openness= (Exports + Imports). This variable was also used by (Hussain et al, 2010). Unemployment rate is used as dependent Variable.

3.2Methodology

Before estimating the determinants of Unemployment model it is necessary to check the properties of time series step by step.

3.2.1Properties of Time Series Data

A data which consist of observation on one or many variables over time is called time series data. We mostly use time series data as monthly, quarterly, annually etc. The main difference between cross sectional and time series is that observation of time series depend across time. Most of the researchers use time series data to find the relationship between dependent and independent variables. There are lots of techniques to find the long run and short run relationship among variables, so it is very necessary to find the order of integration of variables. After finding the order of integration of variables study decides about the cointegration technique. Mostly time series data is non-stationary and non-stationary data give spurious results, so researchers use different unit root tests to check whether data is stationary or non-stationary.

3.2.2 Stationary and Non-Stationary

"In stationary time series shocks will be temporary and over time their effect will be eliminated as the series revert to their long run mean values. (Asteriou& Hall, 2006)"

A stationary time series have three properties.

(1) $E(Y_t)$ = constant for all t
(2) $Var(Y_t)$ = constant for all t
(3) $Cov(Y_t, Y_{t+k})$ = constant for all t & $k \neq 0$

If time series data has constant mean, variance & covariance then it is said to be stationary. It is very necessary to make sure that data is stationary otherwise it will give spurious results.

Mean and variance of non-stationary time series is not constant and depend upon time. Non stationary time series will give spurious results (meaning; signs of coefficient are not reliable and very high "t" ratio). Granger and New bold (1974) suggested following rule of thumb for detecting spurious regression. If $R^2 > DW\ statistics$ then the regression must be spurious.

3.2.3 Unit Root Test

Mostly time series data is non-stationary in level. Non stationary data give spurious results. So the first and important step in time series analysis is to check unit roots, the other step is to check and detect the order of integration of each variable in the model. There are different methods for unit root for example: DF, ADF & PP test etc. This study used Augmented Dicky Fuller and Philip perron test.

To see unit root we take an example by considering AR (1) model.

$X_t = \gamma X_{t-1} + e_t$…………… (1)

Where e_t being the white noise process and $|\gamma| < 1$ shows a stationary condition.

Generally there are three possible cases:

(1) When $|\gamma| < 1$, then the series is stationary.
(2) When $|\gamma| > 1$, then the series is explosive.
(3) When $|\gamma| = 1$, then series comprises unit root and the series is trendy and non-stationary.

If $|\gamma| = 1$ then X_t has a unit root.

When $|\gamma| = 1$, then by deducting X_{t-1} from both sides of equation (1)

$$X_t - X_{t-1} = \gamma X_{t-1} - X_{t-1} + e_t$$
$$\Delta X_t = e_t$$

Here e_t is a white noise process and ΔX_t is a stationary series. If a series X_t already has property of stationarity or it is stationary at level then it is written as I (0) and if the series is stationary after taking the first difference then it is written as I (1). This study utilized Augmented Dicky Fuller and Philip Perron test for verification of order of integration.

3.2.4 Augmented Dicky-Fuller (ADF) Test for Unit Roots

Augmented Dicky-Fuller (ADF) test is used to check the stationarity of each variable, and it is also used for order of integration of each variable. ADF is an extension of DF test, it contains an extra lagged term of the dependent variable in order to eliminate auto correlation among residuals. Lag length of extra term is either determined by Schwartz Bayesian Criterion (SBC) or by Akaike Information Criterion (AIC).

Augmented Dicky-Fuller (ADF) unit root test is based on following equations.

$$\Delta X_t = \gamma X_{t-1} + \sum_{i=1}^{p} \beta_i \, \Delta X_{t-i} + \varepsilon_t$$

Where

Δ = first difference operator
p = lag operator
t = time subscript
ε = the error term

Augmented Dicky-Fuller (ADF) test is based on following three possible forms.

(1) Without intercept and trend

$\Delta X_t = \gamma X_{t-1} + \sum_{i=1}^{p} \beta_i \, \Delta X + \varepsilon_t$…………………………….. (1)

(2) With intercept

$\Delta X_t = \alpha_0 + \gamma X_{t-1} + \sum_{i=1}^{p} \beta_i \, \Delta X + \varepsilon_t$……….. (2)

(3) With intercept and trend

$\Delta X_t = \alpha_0 + \gamma X + \beta t + \sum_{i=1}^{p} \beta_i \, \Delta X_{t-i} + \varepsilon_t$………………. (3)

This test was performed on level and 1st difference. The null hypothesis is that the variable under estimation has unit root and alternative hypothesis is that there is no unit root. Decision rule for testing these hypotheses is:

If t-statistics> ADF critical value, then null hypothesis was not rejected. It depicts that series is non-stationary.

If t-statistics< ADF critical value, then null hypothesis was rejected. It shows that series is stationary.

3.2.5 The Phillip-Perron Test

The Philip-Perron test is a generalization of Augmented Dicky-Fuller (ADF) test which is developed by Phillips and Perron (1988). Phillip Perron (PP) test equation is given as under

$$\Delta X_{t-1} = \alpha_0 + \gamma X_{t-1} + \mu_t$$

PP test makes amendment to the t-statistics of coefficient γ in order to remove serial correlation in μ_t (error term). PP test is a modification of ADF test that takes into account less restrictive nature of the error process.

3.2.6 Co Integration

The cointegration concept was first introduced by Granger (1981) and it was further explained by Engle Granger (1987), Engle & Yoo (1987), Stock & Watson (1988) etc. The main objective of cointegration is to discover the long run relationship among variables in the study. If series of the variable Y_t and X_t are stationary at first difference I (1) and error term μ_t from the cointegration regression is stationary at the level I (0) then the series Y_t and X_t are cointegrated of order I(1,0) (Hanson & Juselius(1995)).

An Autoregressive Distributed Lag (ARDL)

The major objective of this study is to determine long run relationship between "output gap, uncertainty, openness of trade, productivity & Gross fixed investment with Unemployment rate." There are different cointegration techniques e.g. Engle Granger, Johansen Jousilus and Auto Regressive Distributed lag. Selection of technique depends upon order of integration. If order of integration of variables is same and all variables are on level I(0), then OLS is used. If all variables are integrated of order I(1) and there is only one independent variable, then Engel Granger cointigration technique is applied. If the integration of order is same for all variables and there are more than one independent variable, then Johanson Juselious cointegration technique is used. If order of integration of all variables is not same, then ARDL is applied. In this study order of integration is I(0), & I(1), so this study applied ARDL model.

The major objective of this study is to determine long run relationship between "output gap, uncertainty, openness of trade, productivity & Gross fixed investment with Unemployment rate."

ARDL model deals with single cointegration and it was introduced by Pesaran and Shin (1999) and further explained by Pesaran et al. (2001).

The general form of ARDL (p, q) is as:

$$Y_t = \alpha_0 + \sum_{j=0}^{q} \beta_j \ L^J X_t + \sum_{j=0}^{p} \gamma_i \ L^J Y_t + \varepsilon_t$$

Where,

L stands for lag operator,
$L^J = X_{t-j}$ is a dynamic model in the level of the variable and their lags (Patterson, 2000.PP, 349)
ARDL approach to co-integration provides the error correction version of ARDL model.

$$\Delta LUNR_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \ \Delta LUNR_{t-i} + \sum_{i=1}^{p} \varphi_i \Delta \ LOG_{t-i} + \sum_{i=1}^{p} \gamma_i \Delta \ LEU_{t-i} \quad + \sum_{i=1}^{p} \delta_i \ \Delta LGFI_{t-i}$$

$$+ \sum_{i=1}^{p} \sigma_i \ \Delta LPRD_{t-i} + \sum_{i=1}^{p} \rho_i \ \Delta LOP_{t-i} + \lambda_1 LUNR_{t-1} + \lambda_2 LOG_{t-1} + \lambda_3 LEU_{t-1} + \lambda_4 LGFI_{t-1}$$

$$+ \lambda_5 LPRD_{t-1} + \lambda_6 LOP_{t-1} + \mu_t$$

Where :$\beta, \varphi, \gamma, \delta, \sigma$ & ρ shows short run dynamics of the model and all **λ**'s shows the long run relationship. The ARDL approach consists of two steps for estimation of the long run relationship among variables. In first step F-statistics is applied to check whether co-integration exists or not. F-statistics is compared with a critical value of F-tabulated by Pesaran (1997) or Pesaran et al .(2001)

There are two sets of critical values, one set suppose that all regressors in model are I (1) and the other supposes that all regressor are I (0) or there are two bounds of F-tabulated value. One is upper I(1) and the other is lower bound I (0). If calculated F-statistics is greater than the upper bound of F-tabulated then cointegration exist among the variables, if it falls within the upper and lower bound, then inconclusive. If the F-statistics is lower than the lower bound of F-tabulated then no cointegration occurs among variables. The null hypothesis and alternative hypothesis are constructed as (Shehbaz& Amir, 2008).
Null Hypothesis: No cointegration

$$\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$$

Alternative Hypothesis: Cointegration exist

$$\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0$$

This step estimates the long run relationship among regressors (Ellahi& Ahmed, 2011)

     The following estimated long run model;

$$LUNR_t = \alpha_0 + \sum_{i=0}^{m} \beta_{1i} LUNR_{t-i} + \sum_{i=0}^{n} \varphi_{1i} LOG_{t-i} + \sum_{i=0}^{o} \gamma_{1i} LEU_{t-i} + \sum_{i=0}^{p} \delta_{1i} LGFI_{t-i} + \sum_{i=0}^{q} \sigma_{1i} LPRD_{t-i}$$

$$+ \sum_{i=0}^{r} \rho_{1i} LOP_{t-i} + \mu_t$$

This approach has some advantages over other co integration techniques due to the following reasons. This is an OLS base approach, which treats together short run dynamics of model with the long run equilibrium of model while preserving with long run properties of data (Banerjee, et al., 1993). Other Co integration techniques necessitate that all variable's integrating order is same, but ARDL applies even though integration of order is different (I(1), or I(0)) or a mixture of both. To capture the process of generation of data from general to specific modeling sufficient lags are involved in this estimation technique. (Laurenceson & Chai, 2003). ARDL technique avoids problems resulting from non-stationary time series data (Laurenceson& Chai, 2003). This technique is strong for small samples so it is preferred on other techniques (Ghatak&Siddiki, 2001).

In conditional unrestricted ECM to test the significance of lagged levels of the variables F-statistics or Wald test is used (Pesaran et al, 2001).

After evaluation of the long run relationship the next step is to find the short run relationship between output gap, economic uncertainty, openness of trade, Productivity and Gross fixed investment with the unemployment rate. In other words we find short run elasticities through Error Correction Mechanism (ECM).

Error Correction Model

Error Correction Model approach is used to identify short run cointegration. First time this technique was applied by Sargan in 1964. Basically it is used to check the correctness of disequilibrium proportion from one period to the next period in an economic system. (Engel & Granger, 1987)

The general form of ECM is as:

$$\Delta Y_t = \alpha_0 + b_1 \Delta X_t - \pi \mu_{t-1} + Y_t$$

b_1 = impact multiplier (short run effect)

π =feedback or adjustment effect

Impact multiplier measures the instant impact that change in X_t will have on change in Y_t & feedback shows how much of disequilibrium is being corrected.

$$\mu_{t-1} = Y_{t-1} - \beta_1 - \beta_2 X_{t-1}$$

In this equation β_2 being the long run response (Asteriou & Hall, 2006).

The ARDL design of the short run dynamic can be resulted by building an error correction model of following form

$$LUNR_t = \alpha_0 + \sum_{i=0}^{p} \beta_{2i} LUNR_{t-i} + \sum_{i=0}^{p} \delta_{2i} LOG_{t-i} + \sum_{i=0}^{p} \gamma_{2i} LEU_{t-i} + \sum_{i=0}^{p} \rho_{2i} LGFI_{t-i} + \sum_{i=0}^{p} \sigma_{2i} LPRD_{t-i}$$

$$+ \sum_{i=0}^{p} \varphi_{2i} LOP_{t-i} + \text{Π} ECM_{t-i} + \vartheta_t$$

Where:

ECM_{t-i} Indicate the error correction term and Π shows speed of adjustment that is related to cointegration equation. ECM also checked the performance of coefficient that are significant or insignificant with negative or positive sign according to theory (Lal, 2010).

$$ECM_{t-i} = LUNR_t - \alpha_0 - \sum_{i=0}^{p} \beta_{1i} LUNR_{t-i} - \sum_{i=0}^{p} \delta_{1i} LOG_{t-i} - \sum_{i=0}^{p} \gamma_{1i} LEU_{t-i} - \sum_{i=0}^{p} \rho_{1i} LGFI_{t-i}$$

$$- \sum_{i=0}^{p} \sigma_{1i} LPRD_{t-i}$$

All coefficients of short run dynamic of models convergence and Ŋ showed the speed of adjustment.
Advantages of ECM are following:

It is a very appropriate model because it measures the correction from disequilibrium of previous period which is very good economic implication (Asteriou & Hall, 2006).If there is cointegration then error correction models are constructed in terms of first difference which eliminate the trend of variable and solve the problem of bogus/spurious regressions (Asteriou & Hall, 2006). It provides reliable parameters of assessment by including both short run and long run effects.It does not depend on the nuisance parameters because it contains a limit distribution (Narayan & Smyth, 2006).ECMs fit general-to-specific approach to econometric modeling. In fact it is searched for most parimonious ECM model that fits the given data in the best way (Asteriou & Hall, 2006).

3.2.6 Stability Test

The parameter stability test is performed by employing the cumulative sum of Recursive Residuals (CUSUM) and the cumulative sum of squares of Recursive Residuals (CUSUMSQ).

IV- Results and Discussion

For finding the determinants of unemployment in Pakistan, first of all this study estimated the unit roots. Then co integration technique was applied.

Unit Root

There are different methods for testing unit root for example: Dicky-Fuller (DF), Augmented Dicky-Fuller (ADF), Phillip-Perron (PP) etc. This study used Augmented Dicky-Fuller and Phillip-Perron for removing the serial correlation problem. This study checked the stationarity of variables; first "with intercept & no trend" then "with intercept and trend". The null hypothesis is that the series has a unit root or the series is non-stationary while alternative hypothesis is that the series is stationary.

Result of ADF and PP Tests

The Result of ADF Test Represent in Table 2

Variables	ADF TEST statistics				PP Test statistics			
	Level		1ST Difference		Level		1ST Difference	
	Without trend	With trend	Without trend	With trend	Without trend	With trend	Without trend	With trend
LUNR	-1.984	-2.037	-5.467*	-5.65*	-2.038	-1.869	-5.473*	-6.768*
LOG	-3.657*	-8.000*	-5.411*	-5.15*	-2.812	-6.615	-8.658	-6.789*
LEU	-2.910	-2.717	-5.365*	-5.27*	-2.038	-1.869	-5.473*	-6.768*
LGFI	-2.347	-4.998*	-3.889*	-4.01*	-2.102	-5.03*	-3.625**	-3.85**
LPRD	-0.004	-3.85**	-5.506*	-5.36*	0.0758	-3.89**	-7.106*	-6.846*
LOP	-2.032	-2.617	-7.799*	-8.11*	-1.932	-2.468	7.7989*	-8.906*

*Implies that coefficient is significant at 1% significance level
**Implies that coefficient is significant at 5% significance level
•All variables are in logarithmic transformation.

Augmented Dicky-Fuller and Philip Perron results show that some variables have integrated order I (0), and some have I (1). After testing the stationarity of variables next step is to check the long run relationship among the variables. All selected variables of this study having a mutual order of integration which provides justification for using of ARDL approach. In this study there is not a single variable with integrated of order I (2). Because the existence of I (2) the computed F-statistic become failure on the basis of an assumption of the regressors- I (0) or I (1).

Result of ARDL Approach

ARDL approach has to steps: First step is to identify the presence of the long run relationship by applying the F-statistic. Second step is to evaluate the long-term and short-term impact among the chosen regressors of the analysis (Ellahi and Ahmad, 2011).

Result of F-statistic of Co-integration Relationship

Result of F-statistics is given in table 4.

The F-Statistic results show that there is existing of a long run relationship among dependent and independent variables. The dependent variable is the unemployment rate (UNR) while independent variables are Output gap (OG), Economic Uncertainty (EU), Gross fixed investment (GFI), Productivity (PRD), Openness of trade (OP).

Table 4: Results of F-Statistics

F-Statistics	Lag Value
1.55	2
3.37	3
6.21**	4

F - statistic results were presented by using micro fit; 4.0
**Existence of co-integration;

Critical value of F-statistic at 95%**   =2.476 - 3.646
Critical value of F-statistic at 90%*   =2.141 – 3.250

•All variables are in logarithmic transformation

F-statistics on a fourth lag show that there is co-integration and existence of the long run relationship between dependent and independent variables because calculated F-statistic is 6.21 is greater than critical values 2.476 – 3.646 at the 5 percent level.

This output was helpful to decide that the null hypothesis of no-co integration can be rejected and co-integration relationship exists along with Unemployment rate (UNR) and its determinants. So the next step is to estimate the long run as well as the short run coefficients of the model.

Result of Long run Coefficients

After checking order of integration next step is to check long run relationship among variables. So this section gives long run coefficients result which is given below.

Table 5: Result of Long run Coefficients

The Result of long run Coefficients is given in table 5

Regressor	Coefficient	Standard Error	T-Ratio
LOUTP	1.5898	0.29394	5.4087**
LUNC	4.3195	0.69165	6.2453**
LGFI	-1.3192	0.34509	-3.8227**
LPRD	3.7127	0.86916	4.2716**
LOP	-0.87088	0.39422	-2.2091**
INPT	-9.2404	2.9943	-3.0859**

Dependent Variable is the unemployment rate.
Long-run result were presented using Microfit; 4.0
Note: ** indicates significant at the 5 percent significance level.
•All variables are in logarithmic transformation

Table 5 shows long run coefficient results, all variables are in logarithmic transformation so this table results also give long run elasticities.

There is a statistically significant positive relationship between Output gap (OG) and the unemployment rate (UNR). The results show that increase in the output gap by 1 percent, leads to 1.5 percent increase in unemployment. This result is consistent with those of (Valadkhani, 2003) and (Ashipala and Eita, 2010).

Economic Uncertainty (EU) also has a positive effect on Unemployment. Results show that 1 percent increase in economic uncertainty leads to 4.3 percent increase in the unemployment rate and this is significant at 5 percent significance level. This result is in line with that of (Valadkhani, 2003). But there is statistically significant negative relationship between Gross Fixed Investment (GFI) and Unemployment rate. The result shows that 1 percent increase in gross fixed investment leads to 1.3 percent fall in unemployment rate, and it is statistically significant at 5 percent level. This result is consistent with those of (Valadkhani, 2003), (Ashipala and Eita, 2010), (Kabakalarli, 2010). Productivity (PRD) is also an important determinant of unemployment rate and there is a positive association between them. The table shows that 1 percent increase in productivity per person leads to 3.7 percent fall in unemployment rate. This result is significant at the 5 percent level of significance.

This result is consistent with (Ashipalaand Eita, 2010) and (Kabakalarli et al, 2010) that it has a positive impact on Unemployment rate. According to this study the same relationship between unemployment and productivity was found in Turkey and Namibia. A variable- Openness of trade (OP) is measured as the total sum of exports and imports. Construction of the variable in this way was measured by Hussain et al, (2010). There is a negative relationship between Openness of trade and unemployment rates and this relationship is significant at the 5 percent level. In case of Pakistan, its imports are greater than exports, but most of its imports do not consist of consumer goods. Major imports of Pakistan are petroleum, petroleum products, plastic, machinery, transportation equipment, paper, paperboard, edible oil, iron and steel. These are usable in further production. So when there is an increase in openness of trade then the unemployment rate will decrease. This result is in line with Signorelli et al, (2010).

Result of Error Correction Model (ECM)

Result of Error Correction Model is given in table 6. The coefficient of error correction is significant at 1 percent significance level with correct or negative sign. The coefficient of ECM is (-1.20) which shows high speed of adjustment from short run fluctuations to long run equilibrium (120% discrepancy is corrected each year) approximately 120 percent of disequilibrium from the previous year's shock convergence back to the long run equilibrium in the current year. This result is in line with Khan and Hye (2010) in which ECM indicate very high speed of adjustment from short run oscillation to long run equilibrium (Ecm coefficient is -2.01 showing that 201% percent discrepancy is corrected in every year). This result is also in line with Ngbede et al, (2009) and Munir et al, (2011) in which coefficient of ECM is (-1.14) and (-1.55) respectively and it is showing that disequilibrium of previous period shock will be quickly adjusted to the long run equilibrium.

While results of short run coefficient show that change in output gap (OTP), (EU) and (PRD) have positive impact on change in unemployment rate (UNR). The coefficient of change in Gross fixed investment (GFI) and (OP) have negative impact on change in unemployment rate (UNR).

Table 6: Result of ECM regression or Short run Coefficients

The Result of short run Coefficients is given in table 6

Regressor	Coefficient	Standard Error	T-Ratio
dLUNR	0.3524	0.11338	3.1050(0.062)**
DLOG	1.9136	0.43081	4.441(0.001)**
DLEU	1.2748	0.50148	2.5506(0.032)*
DLGFI	-2.0231	0.39648	5.102(0.001)**
DLPRD	2.7494	0.68693	4.0025(0.003)**
DLOP	-0.64967	0.22070	-2.9437(0.016)**
dLINPT	-11.1218	3.2616	-3.4099((.005)**
ecm (-1)	-1.2036	0.14690	-8.1934(.000)**
R square	0.94371		
R-Bar Square	0.79984		
DW-Statistics	2.5251		
Dh-Statistics	-1.739		
F-Statistics	7.94080(0.000)		

The dependent variable is Unemployment rate

The short-run result was presented using Microfit; 4.0

Note: **, *indicates significant at the 1 percent, 5 percent significance level.

Results of Stability Test

The stability test was conducted to determine the goodness of fit of the ARDL model. Brown et al. (1975) suggested two tests that are Cumulative Sum and Cumulative Sum of Square, to check the structural stability. CUSUM test captures the systematic changes in regression coefficients, while CUSUMSQ detain the departure of parameters from reliability.
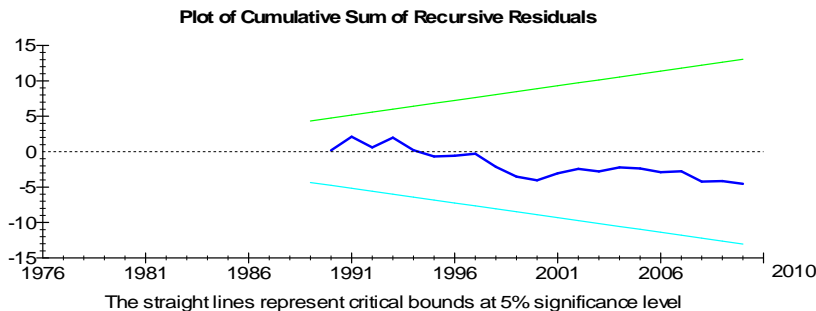
Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

Figure: 1 Cumulative Sum of Recursive Residuals

Plot of Cumulative Sum of Squares of Recursive Residuals

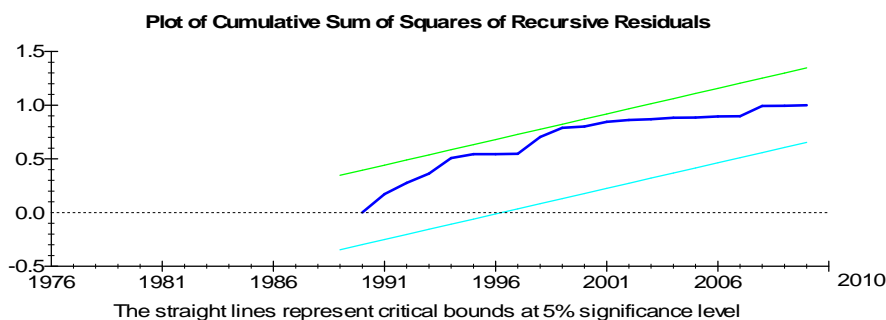The straight lines represent critical bounds at 5% significance level

Figure: 2 Cumulative Sums of Squares of Recursive Residuals

Hence, parameter reliability is checked by using these two tests. The above graphs show the long run stability of the model because test statistics are within the bound values of a model for 5 % significance level.

Conclusion and Policy Recommendation

Now a day's unemployment is a burning issue not only in developing countries but also in developed countries. There is a large literature review on unemployment at both national and international levels, but this study is different from other studies already done at national level of unemployment. This study uses those determinants of unemployment which are not already used in Pakistan. This research is based on the annual time series data over the phase of 1973 to 2010. This study applies augmented dicky fuller and Philips perron Unit Root tests to verify the stationarity of the data series. Order of integration of variables used in this analysis are I(0) and I (1) , so ARDL approach is used to investigate the long-run relationship and Error Correction Model to estimate the short run between unemployment and its determinants. The results show that in the long run as well as short run there is positive relationship between unemployment and the output gap. Economic uncertainty is an important determinant of unemployment in Pakistan and it has a statistically significant positive relationship with unemployment both in the long run and short run. Another important determinant of unemployment is gross fixed investment. As Gross fixed investment increases unemployment will decrease in both long run and short run and this relationship is statistically significant. Similarly there is statistically significant negative relationship between openness of trade and unemployment in the long run and in short-run.

But there is a positive relationship between productivity and unemployment rate in the long run and in the short run and this relationship is statistically significant at the 1 percent level. Study results give the idea or thinking about some policy implications or some recommendations which may be helpful in immediate reduction of the unemployment in Pakistan. Output gap should be decreased. In this connection it is suggested that policies focusing on increasing GDP growth should be implemented. Deprecation policies should be adopted. It will reduce our imports & increase our exports and this will ultimately decrease the unemployment level. Public sector as well as private sector investment is helpful for reduction of unemployment, so government should provide favorable environment for this purpose. Government should decrease trade restriction and this will result in an increase in openness of trade

Reference

Adewale, B. S. (2011). The determinants of urban unemployment crisis in Nigeria: An Econometric analysis. *Journals of Emerging Trends in Economics and Management Sciences, 2(3),* 184-192.

Akhtar, S., &Shahnaz, L. (2005). Understanding the Youth Unemployment Conundrum in Pakistan: Preliminary Empirical Macro-Micro Analysis. Centre For Research on Poverty Reduction And Income Distribution, Discussion Paper Series No. 4.

Ali, M. (2010).Causes of unemployment in Pakistan. Retrived April 8, 2012, from http://www.einfopedia.com/causes-of-unemployment-in-pakistan.php.

Adewale, B. S. (2011). The determinants of urban unemployment crisis in Nigeria: An Econometric analysis. *Journals of Emerging Trends in Economics and Management Sciences, 2(3),* 184-192.

Asteriou, D., & Hall, S.G. (1st) 2006.Applied Econometric, A Modern approach using Eviews and Microfit.1st Edition. Palgrave Macmillion, New York pp,: 288.

Buccaro, L., &Rei, D. (2005).Institutional Determinants of Unemployment in OECD Countries.A Time series Cross-sectional Analysis (1960-98).International Institute for Lab Studies.

Banerjee, V., Newman, A. F. (1993).Occupational choice and the process of Development.*Journal of Political Economy, 101,* 274-298.

Ellahi, N., & Ahmad, M. (2011).Testing the join impact of foreign aid and foreign direct investment on overtime economic growth of Pakistan. International Conference on Business and Economic Research (ICBER), 34-65.

Engle, R.F. & Granger, C.W. J. (1987).Cointegration and crror correction: Representation, estimation and testing. Econometrica, *55(2):* 251-276.

Ellahi, N., & Ahmad, M. (2011).Testing the join impact of foreign aid and foreign direct investment on overtime economic growth of Pakistan. International Conference on Business and Economic Research (ICBER), 34-65.

Eita, J. H., &Ashipala, J. M. (2010). Determinants of Unemployment in Namibia. *International Journal of Business and Management, 5(10),* 92-104.

Ghatak, S., &Siddiki, J.U. (2001).The use of the ARDL approach in estimating virtual exchange rates in India.*Journal of Applied Statistics, 28(5),* 573-583.

Gillani, S. Y. M,.Rehman, H. U., & Gill, A. R. (2009). Unemployment, Poverty, Inflation and Crime Nexus: Cointegration and Causality Analysis of Pakistan. *Pakistan Economic and Social Review, 47(1),* 79-98.

Hussain, T., Siddiqi, M. W., &Iqbal, A. (2010). A Coherent Relationship between Economic Growth and Unemployment : An Empirical Evidence from Pakistan. *International Journal of Human and Social Sciences, 5(5),* 332-339.

ILO (2011).Global employment trends.International Labour Organization.Geneva.

Government of Pakistan.(2011). Economic Survey of Pakistan.Ministry of Financ Pakistan.

Kabaklarli, E., Hazel, P. E., and Bulus, A. (2011). Economic determinants of Turkish youth unemployment problem: Co-integration analysis. International Conference on Applied Economics.(267-272). Perugia, Italy.

Kyei, K. A., &Gyekye, K. B. (2011). Determinants of Unemployment in Limpopo Province in South Africa : Exploratory Studies. *Journal of Emerging Trends in Economics and Management Sciences, 2(1),* 54-61.

Khan, R. E. and Hye, Q. (2010). Financial Sector Reforms and Household Saving in Pakistan: An ARDL Approach. African Journal Management, 4(16), 3447-3456.

Khan.T., Yousaf.F. (2012). Determinants of Unemployment Duration of First Time Job Seekers in Pakistan: A Case Study of Bahawalpur. *International Journal of Business and Economics, 1(1),* 1-12.

Laurenceson, J., & Chai, J. (2003).Economic development and financial reform in China. Edward Elgar, Cheltenham.

Lal, I. (2010). Impact of globalization on HDI (Human Development Index): Case study of Pakistan. *European Journal of Social Sciences, 13(1),* 118-134

Mahmood, Z., Akhtar, N., Amin, M., &Idrees, M. (2011). Causes of Unemployment Among The Educated Segments In Peshawar Division, Pakistan : A Statistical Study. *Sarhad J. Agric, 27(1),* 139-142.

Munir, R., Sial, M.H., Sarwar, G., Shaheen, S.(2011). *Asian Economic and Financial Review, 1(3),* 95-103

Narayan, P. K. & Smyth, R. (2006). Democracy and economic growth in China: Evidence from co-integration and causality testing. *Review of Applied Economics, 2(1)*: 81-98.

Nebede.,Ochoche. S., Akintola.,Olatunji, J.(2009). Co-integration and Error-Correction Modeling of Agriculture Output: A Case of Groundnut. *Journal of Researcher, 1(6),* 27-32.

Pesaran, M. H., Shin, Y., Smith, R.J. (2001). Biunds testing approaches to the analysis of level relationships. *Journal of applied Econometrics, 16,* 283-326.

Patterson, K. (1st) 2000. An Introduction to Applied Econometrics, A Time Series Approach. 1st Edition. Palgrave Macmillan, Basingstoke, United Kingdom, pp: 349.

Rotheim, R. (2007). Notes on Employment and Unemployment: A main stream perspective. Skidmore College. New York.

Rafiq, M., Ahmad, I., Asmatullah.,& Khan, Z. (2010). Determinants of Unemployment: A Case Study of Pakistan Economy. *Abasyn Journal of Social Sciences, 3(1),* 17-24.

Subhan, Q.A., & Hayat, M.A.(2008). Impact of Price instability on Unemployment and Economic Growth in Pakistan; An Econometric Approach. 8th International Conference 1-3 November 2010. Kuala Lumpur, Malaysia. www.umconference.um.edu.my

Shahbaz, M., & Amir, N. (2008). Direct foreign investment and income distribution: A case study for Pakistan. *International Research Journal of Finance and Economics, 21(3),* 1450-2887.

Umaru, A., &Zubairu, A.A.(2012). Effect of Inflation on the Growth and Development of the Nigerian Economy: An Empirical Analysis. *International Journal of Business and social Science, 3(10),* 183-191.

Valadkhani A. (2003). The causes of Unemployment In Iran: an empirical investigation. *International Journal of Applied Business and Economic Research, 1(1),* 21-33.

Zaman, K., Khan, M. M., Ahmad, M., & Ikram, W. (2011). Inflation, Unemployment and the NAIRU in Pakistan (1975-2009). *International Journal of Economics and Finance, 3(1),* 245-254.