DETERMINANTS OF UNEMPLOYMENT IN PAKISTAN: A STATISTICAL STUDY

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ABSTRACT

The current study has been designed to investigate the relationship between unemployment and the different factors having impact on unemployment directly or indirectly. The basic purpose of the study is to check that either their effects are significant or insignificant. At first, normality, independence, homoscedasticity and autocorrelation are checked. Stepwise regression with forward selection technique is utilized for the model selection. Model selection criteria used is to select a best fitted model. For the said purpose, yearly data of Pakistan from 1990 – 2010 is utilized. In the study, unemployment is the dependent variable and GDP, FDI, Budget deficit, Inflation, Literacy rate, population growth rate and Labor force are taken as explanatory variables. Our results revealed that the Labor force has a positively effect on the unemployment while inflation and FDI has a negative effect on the unemployment. SPSS, E-views, Mini tab and Microsoft Excel software's are used to analyze the data under study.

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Keywords: Foreign direct investment (FDI), Inflation, Population growth, Pakistan, Stepwise regression, Unemployment.

Contribution/ Originality

This study is one of very few studies which have investigated the potential factors such as (Gross Domestic Product, Foreign Direct Investment, Budget deficit, Inflation, Literacy rate, population growth rate and Labor force) that affect the unemployment rate in Pakistan and these factors are in line with the theory.

1. INTRODUCTION

In the recent times, there are three main problems generally faced by the developing and the under developed countries i.e. inflation or depression/soothing economic instabilities, improving fairness in income, inadequate economic growth and prosperity. The main cause of unemployment is the income instability, inadequate economic growth and poverty. The definition of employed is "do any work for pay, profit, or family gain during the past week, for at least one hour on any day" or "help to work for family gain in a family business or family farm during the past week" or "have a job or enterprise such as a shop, business, farm, or service establishment, even if did not work last week for some reason" (International Labour organization, 2001). Keynes (1936) defined it as "unemployment is an excess supply of labor resulting from a failure in the market economy". According to International Labour Organization (ILO) "unemployment is a situation of being out of work or need a job and continuously searching for it in the last four week or unemployed (age 16 or above) but available to join work in the next two weeks. People who voluntarily do not want to work, full time students, retired people and children are no included in unemployed category".

The global employment trend survey organized by ILO in 2012 and a news story (business week 2011) reported some of the figures of unemployment which are given as:

i. More than 200 million people globally are out of work. The unemployment rate of world in 2011 was 6% that is decreased by 0.1% in the later year.

ii. Similarly, the unemployment rate of south Asia in 2011 was about 3.8% that was 3.9 % recorded in 2010.

iii. Male unemployment of the world in 2010 was 5.8% whereas in South Asia it was 3.5% that remained the same in 2011.

iv. Female unemployment rate of world in 2011 was 6.4% that was decreased by 0.1% from the previous year.

v. Likewise, in south Asia, it was 4.8% in 2011 that got decreased by 0.2% from previous year.

vi. In 2010 world youth unemployment rate was 12.8% while the south Asian youth unemployment rate was 10.2%. In 2011 these figures were reported as 10.2% and 9.9% respectively.

vii. Adult unemployment rate of world and south Asia in 2010 were 4.6% and 2.3% and these figures also remained unchanged in 2011.

Pakistan has a large population (estimated as 179,572,000) and stands on 6th in the ranking of most populated countries. Pakistan shares 2.56% in world population, 9th in world ranking with 75,880,000 labor force (2011). According to US central intelligence agency unemployment in Pakistan is 5.50 and stands at 57th in world ranking (2011). Pakistan has an economy growth rate of just 2.6% which is the due to the political instability, growing security concern, impact of floods, high inflation and inadequate infrastructure. Pakistan stands at 113th out of 129 countries with a 7.73% youth unemployment rate, 153rd out of 230 countries with a 4.2% old age rate, 174th out of 257countries with 60.40% 15-64 years age rate, 59th out of 257 countries with 0-14 year age rate

35.40%, Pakistan stands on 17th out of main countries with 44.008 billion of US$ output in which 20.9% composition of GDP and 1% share in global agricultural output and 128th out of 185 countries with 2.4% GDP growth rate.

In Pakistan there are a lot of factors that affect unemployment. Pakistan economy mostly depends on agriculture sector that contribute 20.9% in GDP and 43.5% people employed in that sector where male ratio is 34.9% and 74.2% females. In rural area ratio of employment is higher as compare to urban area that is 35.97% overall and with respect to gender 22.49% male and 13.48% females work in agriculture sector. Backwardness in this sector causes higher unemployment that is due to lack of knowledge, less availability of fertilizers, pesticides and low quality seeds (Pakistan Bureau of Statistics, 2011).

Industry is the second big sector in Pakistan that contributes 19% in GDP in which 21.8% people engaged where male ratio is 24.6% and female ratio is 11.5%.backwardness in that sector is due to Investors trend, political instability, bad law, lack of planning, terrorism and other crimes. Tax system is also responsible because in Pakistan ratio of direct tax is higher than indirect tax and government get less tax, due to this public projects will not develops that's why unemployment increases. One big factor is monetary and fiscal policies, Pakistan have fewer funds to invest on new project about jobs. Every year budget shows deficit, if government increase the rate of interest but it's not beneficial for investor to get loans from banks.

Educational system is also responsible for unemployment in Pakistan because there's no institute that provides knowledge and skills according to the relevant job. 63.9% literate person unemployed in Pakistan in which 63.59% get formal education and 0.31% person get non formal education. 28.43% person get primary and secondary education, 16.4% are those whose education level is matriculation, 9.29% and 9.38% are those whose education level is intermediate and postgraduate and PH.D respectively (International Labour Force Survey, 2010-11).

46.15% literate males are unemployed out of 65.38% males in Pakistan, in which 45.91% gets formal education and 0.24% gets non formal education. 22.04%, 12.13%, 6.2% and 5.54% are those males whose education level is primary and secondary education, Matriculation, Intermediate and postgraduate and PH.D respectively. Females play important role in economy of country 17.75% literate females are unemployed out of 34.62% females in Pakistan, in which 17.68% gets formal education and 0.07% gets non formal education. 6.39%, 4.35%, 3.09% and 3.85% are those females whose education level is primary and secondary education, Matriculation, Intermediate and postgraduate and PH.D respectively (International Labour Force Survey, 2010-11).

The unemployment with respect to age show u shape pattern. There is high unemployment among youth category, moderate values and high rates for the middle age and old age category respectively. In 2011 International Labor Organization defines about Pakistan that 10.28%, 1.56% and 14% unemployed people having age 4-10 years, 40-44 years and 65+ years respectively.

1.1. Objectives

The main objectives of this study are to determine

- The main determinants which affect the unemployment rate in Pakistan

- To present a model which helps in the planning and development of the country
- To help the policy makers in order to control the unemployment rate in Pakistan.

2. LITERATURE REVIEW

Phillips (1967) revealed that there is a negative correlation between unemployment and inflation. He also describes the two term prosperity index and misery index. Mortensen and Pissaride (1994) modeled the job specification process in the matching model of unemployment with non-cooperative wage behavior. They studied the properties of job creation and job destruction process. Their study showed that aggregate shock induces creates a negative correlation between job creation and job destruction as well as positive correlation by the dispersion shock induces. Job destruction process shows more volatile dynamics as compared to the job creation process. Amos (1995) introduced more market variables such as incentive wage theory of natural rate and general equilibrium linkages with unemployment. Phelps (1995) described the three models of unemployment rate with Government deficits, reflected interest rate and transfer payment respectively which showed the information of labor product capital markets etc. Then he combined all three models and made a good one equilibrium frame work. Foley (1997) described the determinants of unemployment in Russia using the data from the Longitudinal Survey of Russia. Applying discrete time waiting model, a competing risks and augmented to incorporate unobserved heterogeneity concludes that older individuals can expect to be unemployed longer than comparable younger workers. Married women are found to experience significantly longer unemployment sorcery before departing to a job compared to married men. Having children has no impact on the duration of unemployment; however they drop out the motivated women from the labor force, significantly decreasing the time spent finding for work. Persons with higher education do not have significantly longer unemployment sorcery than those with primary or even secondary education. Individual duration for entering the unemployment is significantly affected by the market demand conditions. Finally there was evidence in Russia about duration dependence in the re-employment hazard, first seven months showed positive duration and then decline occurs until eighteen months. These results were robust to the introduction of unobserved heterogeneity.

Kooros (2000) provided an analysis of unemployment with the objective of empirically validating the long held unemployment theories. Their empirical study implemented cubic, linear, and quadratic regression functions, while the cubic function was determined to be the most accurate function. They concluded that other than unionization, all others are the predictive variables, such as GNP, technology, globalization, minimum wages, government employment, and a host of other variables. Aladkhani (2003) investigated the factors that affect unemployment in Iran by using time series data from 1968 to 2000. He revealed that the rate of unemployment showed negative relation with higher growth rates of real investment and inflation, positively to output gap and increasing economic uncertainty. He also supported the view that there exists amount of switch between inflation and unemployment. Kupets (2005) described the determinants of unemployment in Ukraine using the data 1997 to 2003 from the Ukrainian Longitudinal Monitoring Survey (ULMS). He utilized the conditional probability, gamma distributed unobserved heterogeneity and

independent competing risks framework with flexible baseline hazard rates. He revealed, there is no significant effect of receiving unemployment benefits but income from the casual activities, household income pension on the hazard re-employment and farming. To reduce the long-term unemployment he suggested to do focus on less educated person, old workers, resident of rural area and small towns having high unemployment rates.

Qayyum (2007) defined that the unemployment in NWFP region of Pakistan is affected by determinants such as education, poverty, early marriages, less industries, increase in technology, low income or wages, government policies and GDP. Subhan and Hayat (2008) identified the effect of price instability on unemployment and economic growth in Pakistan. Annually data of 1980 to 2008 of volumes of imports, volumes of exports, inflation (CPI), GDP growth, balance of trade, agriculture growth rate, service sector contribution in GDP, share of large scale manufacturing in GDP, foreign direct investment, gross fixed capital formation by public and private sectors and total consumption are used that purposed negative relation between price instability and economic growth and positive with unemployment. Rafiq et al. (2008) determined the unemployment in Pakistan economy for the period of 1998-2008 using simple Single Equation Linear Regression Model (SELRM). Population growth, inflation rate (CPI based) and FDI are used as explanatory variables. The population growth stimulated unemployment positively and inflation and FDI has negative impact on unemployment.

Eita and Ashipala (2010) investigated the determinants of unemployment in Namibia for the period 1971 to 2007 and concluded that unemployment reveals negative relation with inflation, investment causes, aggregate demand, wage demand and investment by using Engle-Granger two step econometric procedures and Phillips curve. Kyei and Gyekye (2011) defined the determinants of unemployment in Limpopo by utilizing regression principal component and cluster analysis. They introduced five independent variables race, age, education, gender and GDP categorized in to fifteen finally concluded that unemployment is focusing at qualifications below the degree. They also concluded that matriculation, GDP, youth, and male have no significant relationship with unemployment. Rather the model showed that primary, postgraduate studies, females, middle aged, race and incomplete secondary schooling are predictors of unemployment in Limpopo province in South Africa. Gillani et al. (2011) defined a study about relationship between unemployment and crimes in period of 1975 to 2008 by using co-integration analysis. They showed that there is long run relation and the technique Granger causality test shows that unemployment causes the theft, dacoity, robbery and cattle theft but there is no effect on burglary. Hou (2011) analyzed the determinants of unemployment, determinants of working in the formal sector, rate of return on education, and determinants of working hours.

Mahmood et al. (2011) determined the factors involved in unemployment rate of Peshawar, Pakistan. The study was based on 442 individuals. The final model concludes that more important determinants of unemployment is high growth of population, lack of resources, non-coordination between education and job opportunity, red ribbon and role of attitude in getting high level jobs. Katria et al. (2011) identified the relationship between unemployment and inflation by using Phillips curves. They utilized the annual panel data (1980-2010) of 6 expected SAARC countries

(China, Russia, Indonesia, Iran, Myanmar and South Africa) and 8 SAARC countries (Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Srilanka) and concluded that there is negative relationship between unemployment and inflation in all SAARC countries. Casares *et al.* (2012) showed that unemployment increases due to the difference between aggregate labor supply and demand. There are three determinants of unemployment that are Wage push shock, Demand shift and monetary policy. They also utilized clinical Dynamic stochastic general equilibrium (DSGE) model and determine that wages is higher, labor supply is low, Philip curve is flatter one and technology has increased that is why unemployment has increased.

3. MATERIALS AND METHODS

For this study the data has been taken from secondary sources of International Labour Force Survey (2010-11) and publications of Ahmad and Cheema (2011). To test the normality of observations, Jarque Bera test is used. Its statistic is given as:

$$JB = \frac{n}{6}\left(S^2 + \frac{1}{4}(K-S)^2\right) \tag{3.1}$$

where n is the number of observation or degrees of freedom, K is the sample kurtosis and S is the sample skewness. The formulas of S and K are given as:

$$S = \frac{\mu_3}{\sigma^3} = \frac{\frac{1}{n}\sum_{t=1}^{n}(X_t - \bar{X})^3}{\left(\frac{1}{n}\sum_{t=1}^{n}(X_t - \bar{X})^2\right)^{\frac{3}{2}}} \tag{3.2}$$

$$K = \frac{\mu_4}{\sigma^4} = \frac{\frac{1}{n}\sum_{t=1}^{n}(X_t - \bar{X})^4}{\left(\frac{1}{n}\sum_{t=1}^{n}(X_t - \bar{X})^2\right)^{2}} \tag{3.3}$$

In this test null hypothesis is the joint hypothesis of the skewness being zero and excess kurtosis being zero with alternative that the skewness is not zero and excess kurtosis is not zero (Jarque and Bera, 1987).

When the residual variance of a variable in a regression model is not constant, that gives rise to heteroscedasticity. To check the heteroscedasticity in this study, White test is used. White test is a statistical test that establishes whether the residual variance of a variable in a regression model is constant (homoscedastic) or not. For more details, see (White, 1980). Godfery test (which is also used for the same purpose) is sensitive to the normality assumption but White test does not rely on the normality assumption and is also easy to implement. In this we assume that more than two variable are there in the regression. The numm hypothesis for the White test is that there is heteroscedasticity against the alternative that there is some heteroscedasticity of unknown general form. The test statistic is computed by auxiliary regression where we regress the squared residuals on all possible cross product of regressors. The test statistic is given as:

$$LM = NR^2 \tag{3.4}$$

The test statistic is asymptotically distributed as chi-square (χ^2) with degrees of freedom equal to the number of slope coefficients (excluding the constant) in the test regression. That test is used for both heteroscedasticity and for specification error(s).

To check the next assumption that there is no autocorrelation in observations; Durbin and Watson (1971) d statistic is used. Tintner (1965) defines that autocorrelation is the lag correlation of a given series with itself. He also defines that the serial correlation is the lag correlation between two different series. A simple specification for first order correlation would be:

$$e_t = re_{t-1} + v_t \qquad (3.5)$$

where v_t is a random term that is normally distributed with a zero mean and constant variance i.e. $v_t \sim N(0, \sigma^2)$ and r is the autocorrelation coefficient that define as:

$$r = \frac{\sum_{t=1}^{n}(X_t - \bar{X})(Y_t - \bar{Y})}{\sqrt{\sum_{t=1}^{n}(X_t - \bar{X})^2 \sum_{t=1}^{n}(Y_t - \bar{Y})^2}} \qquad (3.6)$$

The value of $|r|$ is always less than 1 i.e. $-1 \le r \le 1$. In Durbin Watson test, the null hypothesis is that there is no positive autocorrelation against the alternative that there is no negative autocorrelation. The test statistic is represented as d and is given as follows:

$$d = \frac{\sum_{t=2}^{n}(\mu_t - \mu_{t-1})^2}{\sum_{t=1}^{n}(\mu_t)^2} \qquad (3.7)$$

The value of d always lie between 0 and 4. The criterion for interpreting the results from the test statistic d is given as follows:
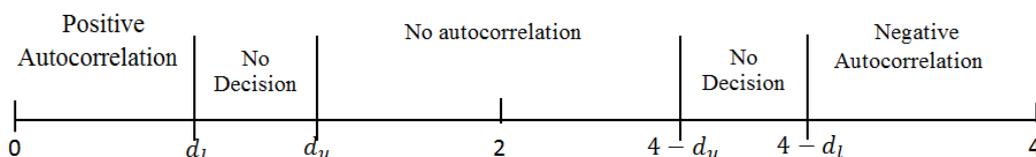
Most useful tool of the econometrician's kit is the linear regression model. Though to a rising degree in the current literature, it is often only the departure point for the full analysis, still it remains the device used to begin any kind of empirical research. The theory specifies a set of precise, deterministic relationships among variables. For example production functions, demand equations and macroeconomic models. The empirical investigation provides estimates of unknown parameters in the model (such as elasticity or the effects of monetary policy) and usually attempts to measure the validity of the theory against the behavior of observable data. Once suitably constructed, the model might then be used for prediction or analysis of behavior.

The regression of a dependent variable (Y) on a single variable (X) is known as simple regression. Mathematically it is defined as:

$$Y = f(X) + \epsilon = \beta_0 + \beta_1 X + \epsilon \qquad (3.8)$$

where Y is the dependent or explained variable, X is the independent or explanatory variables and β_0 is intercept coefficient, β_1 is slope coefficient and ϵ is the random term that is assumed to follow $N(0, \sigma^2)$.

The Multiple Linear Regression Model (MLRM) is used to study the relationship between a dependent variable and two or more independent variables. The generic form of MLRM is given as:

$$Y = f(X_1, X_2, \dots \dots, X_k) + \epsilon = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots \dots + \beta_k X_k + \epsilon \qquad (3.9)$$

where Y is the dependent or explained variable, $X_1, X_2, \ldots \ldots, X_k$ are the independent or explanatory variables, ϵ is the residual term, β_0 is intercept coefficient and $\beta_1, \beta_2, \ldots \ldots, \beta_k$ are slope coefficients of explanatory variables $X_1, X_2, \ldots \ldots, X_k$, respectively.

In this paper forward selection and backward elimination techniques are utilized. The forward selection procedure starts with no independent variables while in backward elimination all explanatory variables are introduced first. In forward selection procedure, we add variables one at a time as long as a significant in the error of sum of squares can be achieved whereas in backward elimination one by one insignificant variables are excluded. McIntyre *et al.* (1981) Model selection criterion such as coefficient of determination (R^2), Adjusted R^2, Akaike Information Criteria (AIC) and Schwarz Bayesian Criteria (SBC) are used to select a best fitted model.

Information criteria are measures of goodness of fit or uncertainty for the range of values of the data. In the context of multiple linear regressions, information criteria measure the difference between a given model and the "true" underlying model.

Coefficient of determination R^2 provides the measure of how well future outcomes are likely to be predicted by model. If the intercept is included in the model the R^2 is simply the square of the sample correlation coefficient between the outcomes and their predicted values.

Coefficient of determination ranges between 0 and 1. The negative R^2 comes when regression is without intercept and when fitting nonlinear trends of data. It is defined as:

$$R^2 = \frac{SSR}{SST} = 1 - \frac{SSE}{SST} \tag{3.10}$$

where $SST = \sum_{t=1}^{n}(X_t - \bar{X})^2$, $SSR = \sum_{t=1}^{n}(\hat{X}_t - \bar{X})^2$, $SSE = \sum_{t=1}^{n}(X_t - \hat{X}_t)^2$ and $\bar{X} = \frac{1}{n}\sum_{t=1}^{n} X_t$. The model having high R^2 considered the best model.

The adjusted coefficient of determination R^2 is the percentage of the variability of the dependent variable that is explained by the variation of the independent variables after accounting for the intercept and number of independent variables. Therefore, the adjusted R^2 value ranges from 0 to 1 and is a function of SST, SSE, n and k (number of independent variables). The equation for adjusted R^2 is

$$\text{Adjusted} - R^2 = 1 - \frac{(n-1).SSE}{(n-k-1)SST} \tag{3.11}$$

The adjusted R^2 is calculated for all possible subset models. Using this technique, the model with the largest adjusted R^2 is declared the best linear model. This approach also includes the number of variables k in the model thus additional parameters will decrease both the numerator and denominator. However, several models often will have an adjusted $R^2 = 1$, so determining the best model among tied values is problematic.

Akaike (1974) introduced the concept of information criteria as a tool for optimal model selection which is further utilized by Akaike (1974) and Bozdogan (1987; 2000). AIC is a function of the number of observations n, SSE and k. The expression of AIC is

$$\text{AIC} = n \times \ln\left(\frac{\text{SSE}}{n}\right) + 2(k+1) \qquad\qquad (3.12)$$

The model's lack of fit is measured by the first term of (3.12) while the second term is a penalty term for additional parameters in the model. The model with the smallest AIC is deemed the best model since it minimizes the differences from the given model to the true model.

Schwarz (1978) introduced a model selection criterion that was derived from a Bayesian modification of the AIC criteria. SBC is given as:

$$\text{SBC} = n \times \ln\left(\frac{\text{SSE}}{n}\right) + (k+1) \times \ln(n) \qquad\qquad (3.13)$$

The sample size n is incorporating by addition of $\ln(n)$ instead of $2(k+1)$ in the penalty term. So the model having fewer AIC and SBC is considered as the best linear model.

4. RESULTS AND ANALYSIS

This section provides the selected models and the analysis performed on those models. It is further divided into 3 sub-sections. In the first sub-section a model is selected using the forward selection technique while in the second sub-section backward elimination is used to find the most influenced variable that significantly affect the unemployment in Pakistan. Finally, in the third sub-section, a best model is chosen and Variance Inflation Factor (VIF) and residual analyses are performed on the selected model.

4.1. Model Fitting Using Forward Selection Technique

In forward selection technique, one by one, variables are added in the model. Variable that has high correlation with unemployment is firstly introduced in model. If that variable is significant, then the next highly correlated variable is added to the model and so on. At some stage, if a newly added variable proves to be insignificant then the previous model is selected. The finally selected model using the forward selection technique is given in the following equation and the details are provided in Table 1:

$$\text{Unemployment} = 8.938 + 0.339\,(\text{BD}) - 0.128(\text{Inflation}) \qquad\qquad (4.1)$$

Table-1. Details regarding the model selected by forward selection technique

Dependent variable Unemployment	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	β	Std. Error				Tolerance	VIF
(Constant)	8.938	.493		18.143	0.000		
Inflation	-0.128	.039	-0.489	-3.297	0.004	0.818	1.223
Budget Deficit	0.339	.104	0.484	3.266	0.004	0.818	1.223

There are two variables in the model i.e. Inflation and Budget deficit. Both of them are statistically significant with unemployment. Inflation revealed negative relation with unemployment while budget deficit depicted positive affect on unemployment. The model selection criteria's R^2, adjusted R^2, AIC and SBC resulted as 0.7065, 0.6739, 2.1141 and 2.2633

respectively. Similarly, the value of Durbin Watson statistic (1.5596) revealed that errors are independent. VIF is also close to 1 so there is no problem of multicollinearity (cf. Table 1).

4.2. Model Fitting Using Backward Elimination Technique

Backward elimination is a technique in which all variables are selected primarily in the model either highly or less correlated with depended variable. Variables that are statistically insignificant are one by one excluded from the model and finally those are variables included in the model that are highly influencing. Concluding model trough backward elimination given in Table 2 is summarized as:

$$\text{Unemployment} = 5.05 - 5.33 \times 10^{-10}\,(\text{FDI}) - 0.155(\text{Inflation}) + 6.52 \times 10^{-5}(\text{Labor Force})$$
(4.2)

Table-2. Details regarding the model selected by backward elimination technique

Dependent variable Unemployment	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	β	Std. Error				Tolerance	VIF
(Constant)	5.05	0.463		10.901	0.000		
FDI	-5.33×10^{-10}	0.000	-0.768	-5.401	0.000	0.398	2.512
Inflation	-0.155	0.024	-0.59	-6.327	0.000	0.924	1.082
Labor force	6.52×10^{-5}	0.000	0.951	6.857	0.000	0.418	2.392

FDI, Inflation and Labor force are those variables that are statistically significant with unemployment. Foreign direct investment and Inflation revealed negative relation with unemployment while Labor force illustrated positive affect on unemployment. R^2, adjusted R^2, AIC and SBC are the model selection criteria's that resulted as 0.8632, 0.8390, 1.4462 and 1.6451 respectively. Results of Durbin Watson statistic (1.9081) showed that there is no autocorrelation. There is no problem of multicollinearity because VIF is also close to 1 (cf. table 2).

4.3. Best Fitted Model

The two models using the forward selection and the backward elimination techniques are given in (4.1) and (4.2). After doing a thorough comparison between these two models, we have selected (4.2) as our best fitted model due to the following reasons:

   i.   Some important variables (theoretically) like FDI and Labor Force are missing in (4.1).

   ii.   Both the R^2 and adjusted R^2 are high for model given in (4.2).

  iii. AIC and SBC for the model given in (4.2) are smaller than those of (4.1).

Finally, for checking the assumption that the error is normally distributed with zero mean and constant variance, we have performed the residual analysis on the best selected model. Some of the summary statistics of the estimated residuals are given in Table 3 whereas standardized residuals are plotted against predicted values and the graph output is given in Figure 1.

Table-3. Residual statistics

	Minimum	Maximum	Mean	Std. Deviation	n
Predicted Value	4.833	8.563	6.181	1.061	21
Residual	-0.588	.8853	0.000	0.422	21
Std. Predicted Value	-1.271	2.245	0.000	1.000	21
Std. Residual	-1.284	1.932	0.000	0.922	21

Standardized residual is the ratio of residual and variance of raw residual. Standardized residual are the unit free values. Almost 68% standardized residuals fall in ±1 range, 95% in ±2 range and almost all Standardized residual fall in ±3 range. Any standardized residual that is greater than 3 is potentially outlier. Results in Table 3 depicted that residual are approximately normally distributed with zero mean and constant variance (0.42). Also, the maximum and the minimum of the standard residuals lie between ±3 which indicate that there is no outlier in the residuals.
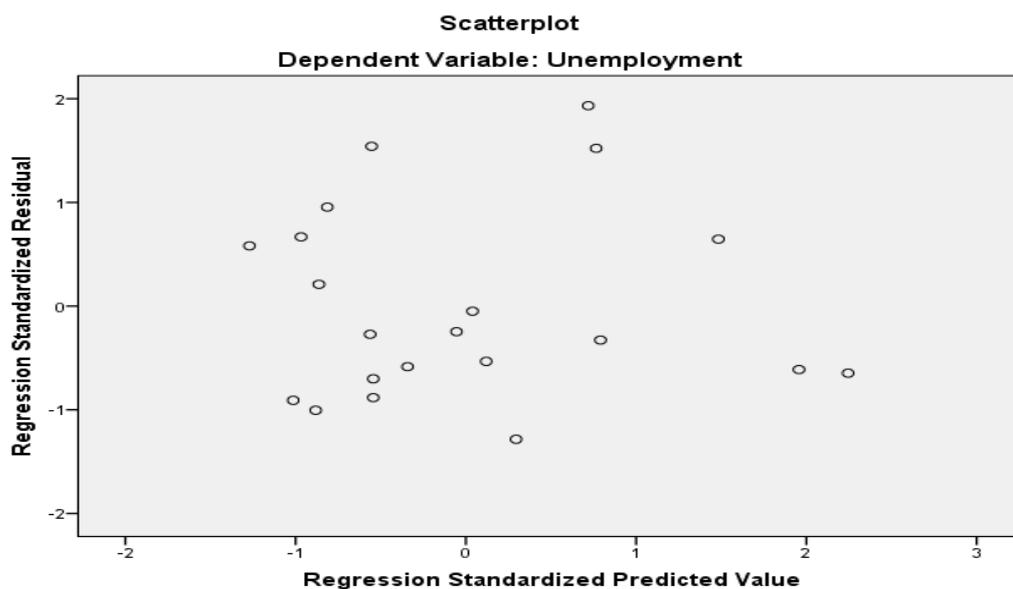
Figure-1. Scatter plot of standardized residual with standardized predicted value

To check whether the variance is constant or not standardized residual are plotted against predicted values. Figure 1 revealed that points appear randomly and the vertical width of the scatter does not appear increasing or decreasing across the fitted values. That evidence clearly supports that the variance in the error term is constant.

5. CONCLUSIONS AND RECOMMENDATIONS

Unemployment is one of the foremost globalized problems particularly in fewer developed countries. It has been very stable problem and remnants difficult to cope in many countries. Unemployment can be viewed from various dimensions but this paper emphasizes on the determinants of unemployment. Our finding depicts that foreign direct investment, inflation and labor force are those

variables that are statistically significant with unemployment. Foreign direct investment and inflation revealed negative relation with unemployment while labor force illustrated positive affect on unemployment.

To defense and repossess unemployment from rising, it is necessary to take immediate remedial measures so that economy of Pakistan could withstand this reprehensible scourge. The final recommendations of the paper are:

- Increase in GDP in such a way that it reveals increase in the employment opportunities, investment and productivity. Through this, economy growth will boost rapidly.

- To do operation against black marketers who stock the commodities and then sale with high rates, which is the main cause of inflation in Pakistan.

- All possible steps are needed to capture investor from abroad because FDI plays very vital role in decreasing unemployment. Government should try attracting foreign investor.

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