# The Relationship between Poverty, Income Inequality and Unemployment: Evidence from ARDL and Bound Testing Approach

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**Abstract**

The paper explores the impact of development expenditure, military expenditure, debt, political stability, foreign direct investment and inflation on poverty, income inequality and unemployment in the context of Pakistan. Time series uninterrupted data is used for the period 1980 to 2014. Income inequality is havoc by which income gap increases between rich and poor of society. Pakistan has an alarming situation of income inequality, poverty and unemployment rate as compared to other developing nations. The empirical findings confirm that increase in development expenditure causes a decrease in poverty and unemployment but inequality increases due to capitalism. There is a negative relationship between military expenditure inequality and unemployment. Foreign direct investment decreases inequality and unemployment. Results also show that political stability is responsible for increasing poverty and unemployment.

**Keywords:** Income inequality, Poverty, Unemployment, Development expenditure, Military expenditure, Debt, Political stability, FDI, CPI, ARDL.

## Introduction

Nation development is a continuous phase of progression towards betterment. In terms of Economics, development is actually comprised of those efforts that tend to enhance the economic situation and quality of life for a community by generating and retaining jobs and supporting incomes. In last 14 years, the highest value for development expenditure in Pakistan was 0.63% in 2007. Poverty is a state of adequacy, where people even lack quality basic necessities, usually basic need comprise of the list with eatable including water, shelter and clothing but now many modern lists also add sanitation, education, and healthcare to basic necessities as well. In order to overcome poverty, states spend development expenditures. Poverty has several faces; absolute poverty is the standard gauge of measuring poverty which measures it in terms of basic necessities with comparing other countries globally. The figure of 21.04% of poverty in Pakistan is of absolute poverty (Development Indicators WDI). Relative poverty measures the condition of poor in the relevance of specific society. Developmental expenditures are government expenditures on any progressive work with an expected return to capital, for instance, by spending on industrialisation, along with the basic production benefits, employment is also generated.

In macroeconomics, the butter versus weapons model shows a relationship between a country's proportion of spending in defence and public goods. A country can buy either gun i.e. spend on defence, or butter i.e. spends on development sector. This can additionally be taken as a correlation for selections between protection and public spending in greater advanced economies.

Increase in the demand of nation's security expenditure can be handled by different method. First; reduction in other expenditures of an economy and second, by increasing taxes or borrowing from other countries. (Kalim & Hassan, 2014). Now there are certain consequences to the upper stated situation as decreased public spending will eventually increase income inequality, poverty and unemployment.

### Income Inequality

As we don't have any defined set of principle that elaborates the relationship among inequality and military spending. Different possibilities for structures showing the relation between inequality and military spending were discussed in previous literature. For instance, Keynesian school of thought firmly believes that high budget allocation on defence expenditure improves income opportunities in interconnected areas, increasing the aggregate demand and employments. The availability of employments in any nation plays a vital role in decreasing income inequality. Then, the upper stated path can be different due to the complexity of defence spending. Income inequality can only be reduced if the military expenditure is being used on unskilled or less skilled labour. On another hand, the major defence budget is being used to cater the employment only for skilled labour than income inequality will increase rather than decreasing. The real impact depends on the structure and defence spending being applied (Meng, Lucyshyn, & Li, 2013).

Vadlamannati analysed the income inequality and defence spending in four South Asian countries, which are Pakistan, Burma, Sri Lanka and Nepal. He used panel data ranging from 1975 to 2005. The empirical findings showed that increasing defence spending eventually results in increasing income inequality while considering some major macroeconomic variables (Vadlamannati, 2008). Another study conducted by Hirnissa and others, who analysed the increasing impact of defence spending on inequality in six varying nations, India, Indonesia, Singapore, Malaysia, South Korea and the Philippines. He used time series data ranging from 1970 to 2005. Researchers found that single directed positive impact exists between security expenditure and inequality in Malaysia. There was no relationship observed among defence expenditure and income inequality in India, South Korea, Indonesia and Philippines (Hirnissa, Habibullah, & Baharom, 2009). Kentor and others found the positive relationship among defence expenditure and income inequality. They used panel data for eighty-two developed and developing countries (Kentor, Jorgenson, & Kick, 2012). Likewise, a study on Turkey by Elveren revealed that cointegration exists between the variables and defence expenditure has an increasing effect on income inequality. Time series data ranging from 1963 to 2007 was used. (Elveren, 2012).

The relationship between development and income inequality was first analysed by Kuznets. According to him, in short run high development expenditures increase income inequality, but in long run, development expenditures decrease income inequality (Kuznets, 1955). Hence, we can expect a positive relationship between development expenditure and inequality as Pakistan is a low or medium level investor of industrialisation. According to a research on Latin American countries, impact of development expenditures on income inequality depend directly on area where these expenditures are being utilised (Ospina, 2010). Albanesi found a strong positive relation between inflation and inequality (Albanesi, 2007).

### Poverty

In light of current literature, relationship among the defence expenditure and poverty were meagerly studied in Pakistan except (Kalim & Hassan, 2014); they found out that military expenditures are positively impacting poverty in both long and short run, hence increasing poverty in Pakistan. They concluded that the defence spending is increasing the poverty in Pakistan. They

put forward a feasible way out, in order to minimise poverty, defence spending and development expenditures need to be reallocated (Kalim & Hassan, 2014).

Zafar and Zahid analysed that due to high public expenditure, developing countries face a fiscal deficit, leading to inflation in the economy and ultimately adversely affecting the poverty (Zafar & Zahid, 1998). Beneath found that development expenditures are an effective tool of income redistribute and reduction in poverty (Benneth, 2007). Shamim and others found out the negative relation between FDI and poverty in case of Pakistan (Shamim, Azeem, & Naqvi, 2014). Far and Saeedi, in the case of Iran, they found quite a favourable impact of development expenditures on the unemployment rate (Far & Saeedi, 2015). According to the Keynesian point of view, an increase in the budget for defence increases employment opportunities, as by spending on defence, related employments are generated for that specific economy (Meng, Lucyshyn, & Li, 2013).

### Unemployment

Huang and Kao analysed the situation of Taiwan, time series data was used covering from 1966 to 2002. They used military expenditures, GDP, employment in the public sector, average monthly salary as variables. According to their findings, defence spending can increase the employment situation in the long run, but it surely damages employment in the short run (Huang & Kao, 2005). A study on a case of Malaysia was carried out by Shaari and others. The primary objective was to check the impact of foreign direct investment on the unemployment rate in Malaysia covering the time period from 1980-2010. To analyse the data the technique named Ordinary Least Square method was used in the study. They found out that FDI helps to decrease unemployment rate and increases economic growth in Malaysia (Shaari, Hussain, & Halim, 2012). In the case of Pakistan Habib and Sarwar examined the effect of FDI on employment covering the time period from 1970 to 2011. They used employment level, exchange rate FDI, and GDP per capita. To check long run relationship they used Johansen test of Co-integration between the variables. The results showed that FDI increases employment level in Pakistan (Habib & Sarwar, 2013).

The first major objective of developing countries is to redistribute the resources from anti-development sector like defence spending to development projects in order to remove unemployment, poverty and inequality. Inequality, poverty and unemployment are like anchors which always tend to pull economy downwards. The objective is to explore the relationship between foreign direct investment, inflation, political stability and debt on income inequality, poverty and unemployment and compare how the development expenditure and military expenditure influences major issues of developing economies for the case of a long and short run.

The results found from previous studies about inequality, poverty, unemployment development spending, and defence spending can be condensed as, there are mixed up results globally with development expenditure and military spending affecting inequality, poverty and unemployment positive in certain countries with certain conditions and vice versa as well. This paper tends to contribute to check the impact of development expenditure, military expenditure, foreign direct investment, inflation, political stability and debt on income inequality, poverty and unemployment and compare how the development expenditure and military expenditure influences major issues of developing economies. There is currently no study specifically exploring the impact of development expenditure, military expenditure, debt, political stability, foreign direct investment and inflation on poverty, income inequality and unemployment in the context of Pakistan in best of our knowledge. We are using nonlinear ARDL cointegrating sounds model. This model will explore the relationship and effect of determinants of poverty, income inequality and unemployment.

**Data Description and Econometric Techniques**

The time series data is used for Pakistan from 1980 to 2014, including 34 observations. The data for the study is taken from the official website of World Bank official development indicators.

**Table 1: Definition of variables**

| Variable | Source | Definition |
|---|---|---|
| Income Inequality (INEQ) | World Development Indicators (WDI) | It is an uneven distribution of income among the population. |
| Poverty (POV) | (Haroon, 2006) (Amjad, 2012) | State of adequacy in which victim lacks a certain amount of material possessions or money. |
| Unemployment (UNEMP) | World Development Indicators (WDI) | When people are willing to work but the jobs are not available for them. |
| Military Expenditure (MILEXP) | World Development Indicators (WDI) | Financial expense of resources dedicated to a country for raising and maintaining armed forces for defence purposes. |
| Development Expenditure (DEVEXP) | World Development Indicators (WDI) | The money spent on creative work with an expected continuous return to the economy. |
| Political Stability (POLITY) | (LaFree, 2015) | Index measure for democracy and the dictatorship of any economy, and the measure of durability government regime. |
| Total Debt (DEBT) | World Development Indicators (WDI) | The total sum of money owed or due by a nation. |
| Foreign Direct Investment (FDI) | World Development Indicators (WDI) | Investment in any economy by an investor from another country. |
| Consumer Price Index (CPI) | World Development Indicators (WDI) | Weighted average of prices of a basket of consumer goods and services |

The study is using three different models and will use Unit Root and ARDL approach to finding out whether there exist cointegration in the models, using Microfit software for estimation and details to their respective variables are as under (Pesaran, Shin, & Smith, 2001); Following three models were discussed below.

$$LNINEQ = \alpha_0 + \alpha_1 LNMILEXP + \alpha_2 LNDEVEXP + \alpha_3 LNFDI + \alpha_4 LNCPI + \varepsilon_t$$
$$LNPOV = \beta_0 + \beta_1 LNMILEXP + \beta_2 LNDEVEXP + \beta_3 LNPOLITY + \beta_4 LNTDEBT + \delta_t$$
$$LNUNEMP = \gamma_0 + \gamma_1 LNMILEXP + \gamma_2 LNDEVEXP + \gamma_3 LNFDI + \gamma_4 LNPOLITY + \gamma_4 LNTDEBT + u_t$$

In above mentioned equation, there are three dependent variables named as Income Inequality (INEQ), Poverty (POV) and Unemployment (UNEMP), while the independent variables are Military Expenditure (MILEXP), Development Expenditure (DEVEXP), Consumer Price Index (CPI), Total Debt (TDEBT), Foreign Direct Investment (FDI) and Political Stability (POLITY). Natural log of whole data was taken for all variables.

**Results and Interpretation**

Descriptive statistics of variables is a tool to explore whether the data is normally distributed or not.

**Table 2: Descriptive Statistics**

|  | INEQ | UNEMP | POV | DEVE XP | MILEX P | TDEBT | FDI | CPI | POLI TY |
|---|---|---|---|---|---|---|---|---|---|
| Mean | 3.49 | 1.67 | 3.31 | 1.6 | 1.72 | 4.47 | -0.38 | 3.51 | 1.14 |
| Median | 3.49 | 1.71 | 3.38 | 1.57 | 1.73 | 4.51 | -0.44 | 3.62 | 5 |
| Maximum | 3.67 | 2.11 | 3.58 | 2.4 | 2.38 | 4.63 | 1.3 | 4.95 | 8 |
| Minimum | 3.4 | 1.12 | 2.85 | 0.53 | 1.18 | 3.78 | -2.28 | 2.21 | -7 |
| Std. Dev. | 0.07 | 0.29 | 0.17 | 0.47 | 0.4 | 0.17 | 0.79 | 0.82 | 6.45 |
| Skewness | 1.06 | -0.43 | -0.99 | -0.09 | 0.16 | -2.05 | 0.08 | 0.12 | -0.13 |
| Kurtosis | 3.48 | 2.15 | 3.28 | 2.53 | 1.68 | 8.19 | 3.17 | 1.89 | 1.15 |
| Jarque-Bera | 6.89 | 2.14 | 5.88 | 0.37 | 2.68 | 63.69 | 0.08 | 1.88 | 5.09 |
| Probability | 0.03 | 0.34 | 0.05 | 0.83 | 0.26 | 0.00 | 0.96 | 0.39 | 0.08 |
| Sum | 122.42 | 58.3 | 115.8 | 56.05 | 60.26 | 156.39 | -13.11 | 122.7 | 40 |
| Sum Sq. Dev. | 0.19 | 2.91 | 1.03 | 7.59 | 5.45 | 1.03 | 21.24 | 22.8 | 1414.3 |
| Observations | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |

Clearly, the value of Jarque-Bera probability for development expenditure, military expenditure, foreign direct investment, and consumer price index are greater than 0.1, which suggests that data is normally distributed. Skewness should be near to 0 and Kurtosis should be near to 3, and in upper stated case it is quite right. The mean is the average of the given data set, which, actually, is sum of all the observations divided by the number of observations of data. Median is central value of series data. Maximum is the highest value in given series data. Minimum is the smallest or lowest value of data. Standard deviation is the dispersion of data around the mean and is denoted by sigma.

**Unit Root Test**
Since it is a time series data, we need to inquire what the nature of variables is. We use ADF test to check the nature (Dickey & Fuller, 1979). Unit root test is carried out in order to examine whether variables are stationary or not.

For this test hypothesis for the null case is that series does not have unit root issue whereas, the hypothesis for the alternative case is that series do have a unit root problem. In our case, at start all the variables were having an issue of unit root at level, but afterwards when we examined at first difference, variables become stationary hence null hypothesis is accepted as series doesn't have unit root problem.

**Table 3: Augmented Dickey Fuller Test**

| At Level | | | At First Difference | | |
|---|---|---|---|---|---|
| Variables | T-test | Prob. | Variables | T-test | Prob. |
| LNINEQ | 0.63 | 0.99 | LNINEQ | -3.88 | 0.01 |
| LNPOV | -1.5 | 0.52 | LNPOV | -5.9 | 0.00 |
| LNUNEMP | -1.76 | 0.39 | LNUNEMP | -7.55 | 0.00 |
| LNMILEXP | -0.97 | 0.74 | LNMILEXP | -5.47 | 0.00 |
| LNCPI | 0.69 | 0.99 | LNCPI | -2.75 | 0.08 |
| LNDEVEXP | -1.55 | 0.5 | LNDEVEXP | -5.81 | 0.00 |
| LNFDI | -1.89 | 0.34 | LNFDI | -5.04 | 0.00 |
| LNGDPPC | 0.76 | 0.99 | LNGDPPC | -6.06 | 0.00 |
| LNTDEBT | -1.75 | 0.4 | LNTDEBT | -7.63 | 0.00 |
| LNPOLITY | -1.68 | 0.43 | LNPOLITY | -5.35 | 0.00 |

### Autoregressive Distributed Lag Cointegration Test

Bounds test was performed, in order to check the relationship among the variables. The outcome of the co-integration test results in favour of alternative hypothesis as it rejects the null hypothesis at 10% significance level. The observed upper critical value is lower than $F$-statistic, which is 4.28, 4.54 and 4.1. So, there exists a long run relationship among the variables.

**Table 4: Bounds Test**

| Variables | F stat | Lower critical value | | Upper Critical value | |
|---|---|---|---|---|---|
| | | 10% | 5% | 10% | 5% |
| Income Inequality | 4.28 | 2.74 | 3.34 | 3.94 | 4.7 |
| Poverty | 4.54 | 2.74 | 3.34 | 3.94 | 4.7 |
| Unemployment | 4.14 | 2.52 | 3.03 | 3.79 | 4.5 |

**Table 5: Long Run Estimates**

| Variables | Unemployment (1, 0, 1, 1, 1, 0). | | | Inequality (1, 1, 1, 1, 1). | | | Poverty (1, 0, 1, 1, 1). | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficient | T Stat | Prob. | Coefficient | T Stat | Prob. | Coefficient | T Stat | Prob. |
| DEVEXP | -0.7 | -5.26 | 0.000 | 0.16 | 4.09 | 0.000 | -0.51 | -2.34 | 0.03 |
| MILEXP | -0.28 | -2.29 | 0.031 | -0.37 | -1.87 | 0.074 | -0.002 | -0.01 | 0.99 |
| POLITY | 0.036 | 3.32 | 0.003 | | | | 0.05 | 2.19 | 0.04 |
| FDI | -0.15 | -2.49 | 0.02 | -0.12 | -3.79 | 0.001 | | | |
| DEBT | -1.73 | -2.92 | 0.008 | | | | -2.45 | -2.19 | 0.04 |
| CPI | | | | 0.003 | 0.04 | 0.967 | | | |
| C | 10.94 | 3.86 | 0.001 | 3.77 | 6.96 | 0.000 | 15.06 | 2.92 | 0.01 |

Clearly, at 5% level all variables are significant except military expenditure. Development expenditure is decreasing poverty, by 1% increase in development expenditure; poverty will decrease by 0.51% in a long run. Military expenditure is insignificant. Political stability is significant and increasing poverty this can be due to bad governance, by 1% increase in political stability; poverty will increase by 0.05% in a long run. Total Debt is not a happy happening for a nation but by taking loan from IMF or World Bank, Government always tend or try to spend it on developmental sectors, by 1% increase in debt; poverty will decrease by 2.45% in a long run.

However, in case of inequality; military expenditure and foreign direct investment shows negative and significant impact on inequality, while development expenditure exhibits positive and significant impact on income inequality. Development expenditure is increasing the inequality because of capitalism as it increases the gap between rich and poor, here by 1% increase in development expenditure; inequality will increase by 0.16% in a long run. Military expenditure is decreasing inequality, by 1% increase in military expenditure; inequality will decrease by 0.37% in a long run.

**Short Run Estimation**

Table 6 reports the results of short run estimates. Military expenditure and total debt exhibit negative and significant impact on unemployment.

**Table 6: Short Run Estimates**

| Variable | Unemployment (1, 0, 1, 1, 1, 0). | | | Inequality (1, 1, 1, 1, 1). | | | Poverty (1, 0, 1, 1, 1). | | |
|---|---|---|---|---|---|---|---|---|---|
| | Coefficient | T Stat | Prob. | Coefficient | T Stat | Prob. | Coefficient | T Stat | Prob. |
| D(DEVEXP) | -0.21 | -1.64 | 0.113 | -0.02 | -1.27 | 0.25 | -0.02 | -0.27 | 0.79 |
| D(MILEXP) | -0.22 | -2.13 | 0.042 | 0.04 | 0.58 | 0.56 | -0.01 | -0.01 | 0.99 |
| D(POLITY) | 0.002 | 0.26 | 0.8 | | | | 0.01 | 0.37 | 0.71 |
| D(FDI) | -0.02 | -0.33 | 0.742 | -0.03 | -3.43 | 0.00 | | | |
| D(DEBT) | -1.36 | -2.9 | 0.008 | | | | -0.83 | -2.29 | 0.03 |
| D(CPI) | | | | 0.28 | 2.2 | 0.04 | | | |
| Ecm(-1) | -0.79 | -5.72 | 0.000 | -0.33 | -2.91 | 0.01 | -0.31 | -2.62 | 0.01 |

Keeping in view income inequality as dependent variable; foreign direct investment shows negative and significant impact on inequality, while inflation causes inequality negatively in short run. However, total debt reduces the level of poverty in short run. As ECM value is negative and between 0 and -1 and by viewing probability value short run model is significant and converging.

Convergence means that policy makers can use independent variables to control dependent variables or in other words model is useful for them.

### Diagnostic Tests

Diagnostic tests reveal that all three models do not have the problem of Heteroscedasticity, autocorrelation and functional form. As our sample size is more than 30 observations, that's why problem of normality resolved automatically. Problem of Serial correlation, Heteroscedasticity and functional form detected by LM, White and Ramsey tests.

**Table 7: Diagnostic Test**

|  | Unemployment | | Inequality | | Poverty | |
|---|---|---|---|---|---|---|
|  | LM Version | F Version | LM Version | F Version | LM Version | F Version |
| Serial Correlation | 3.51 [0.06] | 2.65 [0.12] | 0.00 [0.95] | 0.00 [0.96] | 4.80 [0.03] | 3.95 [0.06] |
| Functional Form | 0.80 [0.37] | 0.56 [0.46] | 0.80 [0.37] | 0.55 [0.47] | 0.00 [0.96] | 0.00 [0.97] |
| Normality | 19.9 [0.00] | Not applicable | 0.71 [0.70] | - | 2.86 [0.24] | Not applicable |
| Heteroscedasticity | 0.74 [0.39] | 0.71 [0.40] | 0.24 [0.63] | 0.22 [0.64] | 0.29 [0.59] | 0.28 [0.61] |

[1]CUSUM and CUSUM Square graph shows the result of the mean and variance of coefficient stability. Our results suggests that variance of the coefficient is stable as the mean is within the straight bound lines. So, all three discussed models are reliable because they passed all diagnostic tests.

### Conclusion

This paper exhibits an attempt for exploring the effect of development and defence spending on poverty, inequality and unemployment in the scenario of Pakistan. Time series dataset was used annually for the upper stated purpose. The data was of period ranging from 1980 to 2014. Normally, while planning their expenditures, governments mostly tend to take the sectors that will add to the development of countries into consideration. However, this security is more vital due to the unrest faced in our country. Governments have to spare big shares to defence spending from their budgets. This, ultimately, leads them to allocate less resource to investments in education, health and infrastructure fields which will contribute to country development.

We have tested three varying models that are more often used in the development and military literature. All the models were of a single equation. In these further divided structures, we found the defence spending to be positively related to inequality, poverty and unemployment. In the case of income inequality, development expenditure increases income inequality due to capitalism as it increases the gap between rich and poor. Military expenditure decreases income inequality. Foreign direct investment decreases income inequality as it brings new opportunities in the country. In the case of poverty, development expenditure and debt decrease poverty whilst political stability increases poverty, in light of prior data, democratic government increases poverty. In the case of

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[1] See Appendix A, Appendix B and Appendix C

unemployment, development expenditure, military expenditure, foreign direct investment and debt decrease unemployment whereas political stability increases unemployment.

The government surely should pursue for peace talks to cut off the defence budget but this is not the only solution to the problem, as after Cold War when certain countries dropped their military budget to a minimum level, chaos and civil wars started due to a sudden change in the economy, which is still causing unrest around the globe.

The solution to this dilemma is that development sector should now work efficiently and policies are needed to be revised as no matter what the budget for development will be until that system of capitalism remains the inequality and poverty will prevail in the society. Development expenditure, foreign direct expenditure and debt are interrelated and casting a positive impact in the reduction of income inequality, poverty and unemployment so policy makers and the government should consider these solutions and focus on convincing foreign investors to invest in Pakistan. Long term participation of foreign investment in a country leads to vast opportunities for employment and development. Even military expenditure is reducing income inequality and unemployment, as by employing more than seven hundred thousand individuals military is actually the source of income for these seven hundred thousand houses, so critics should stop showing only one side of picture as the problem is not related to high defense spending, rather it is inefficient progress on development sector.

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**Appendix A (Inequality)**
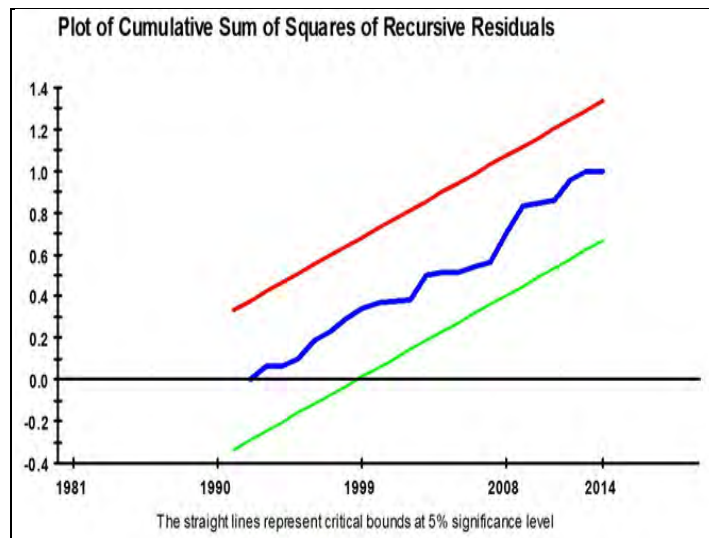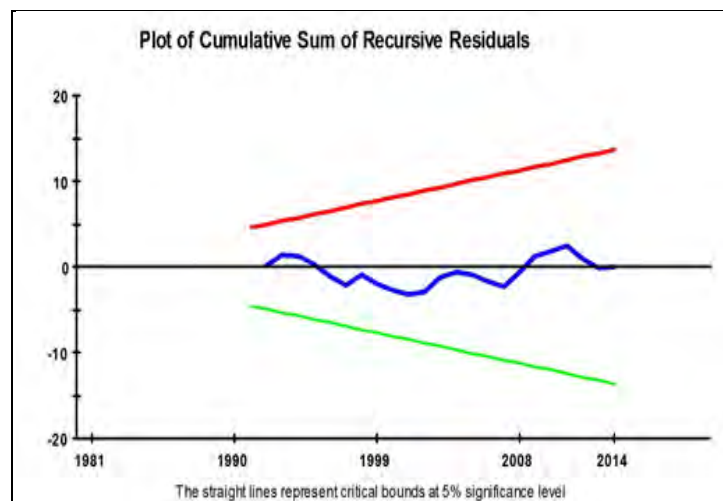


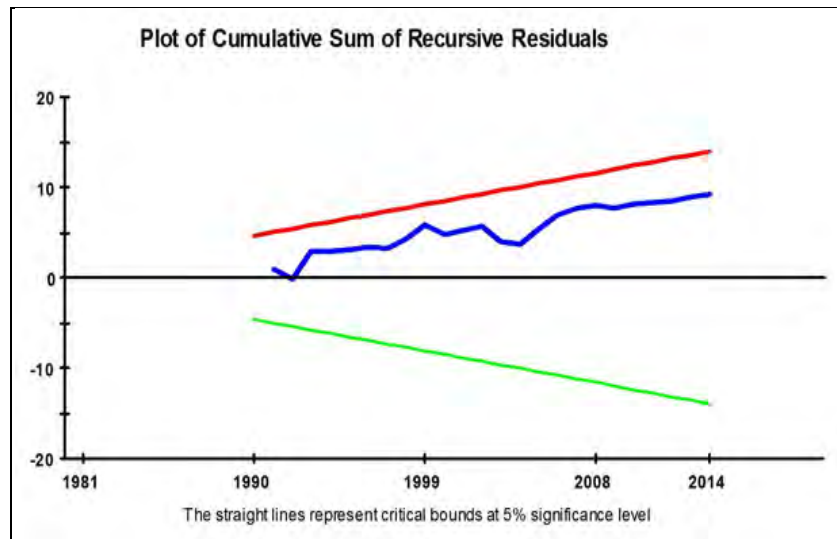**Figure 1: CUSUM Square Graph**



**Figure 2: CUSUM Graph**

**Appendix B (Poverty)**
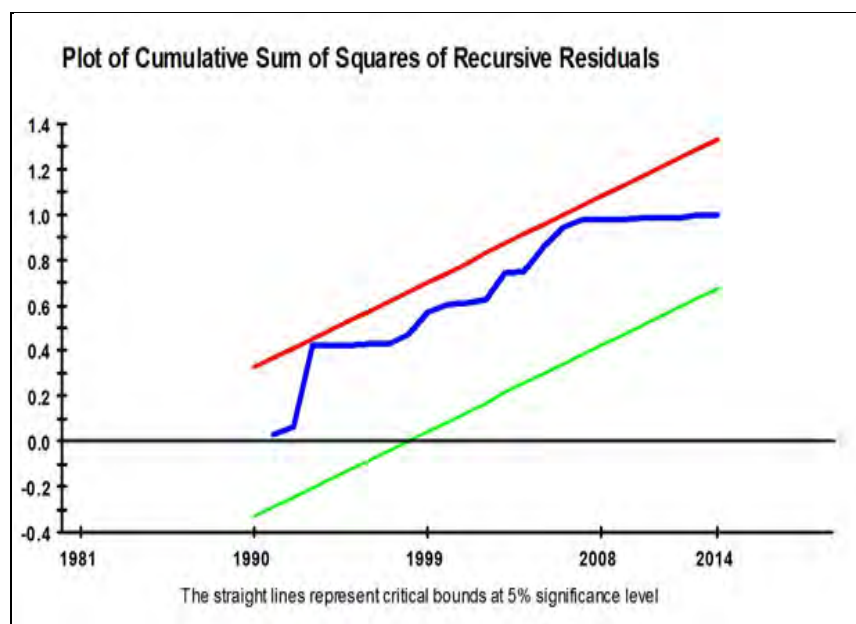


**Figure 3: CUSUM Graph**
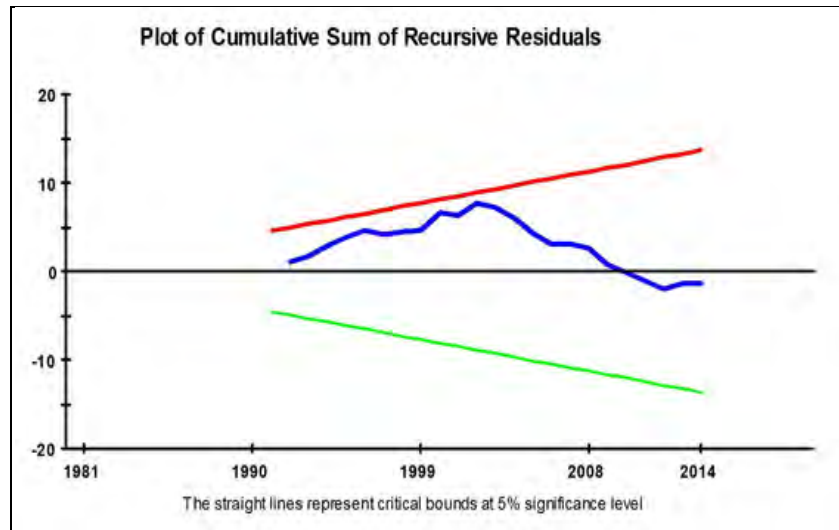


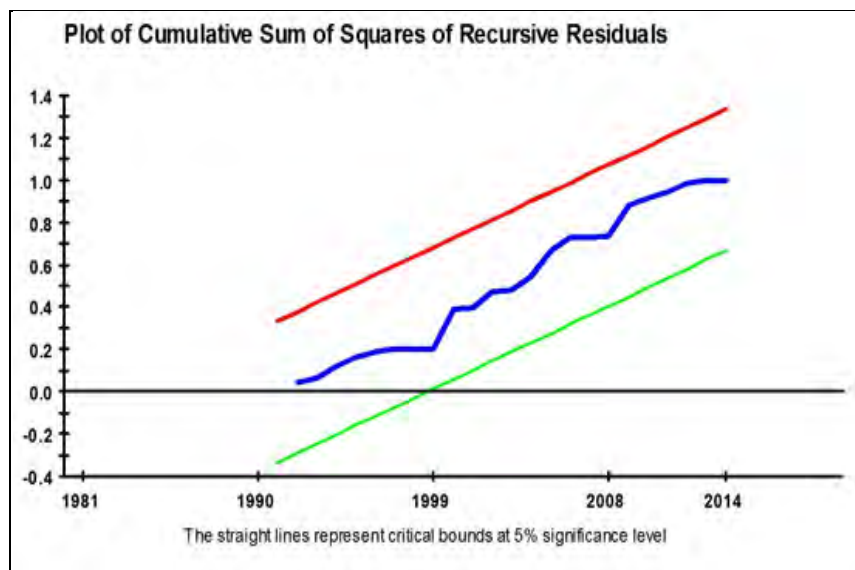**Figure 4: CUSUM Square Graph**

**Appendix C (Unemployment)**



**Figure 5: CUSUM Graph**



**Figure 6: CUSUM Square Graph**