Macroeconomic Instability and Its Impact on Gross Domestic Product: An Empirical Analysis of Pakistan

Ali, Amjad and Ur Rehman, Hafeez

National College of Business Administration and Economics, Lahore, Department of Economics, University of the Punjab, Lahore

December 2015

Macroeconomic Instability and Its Impact on Gross Domestic Product: An Empirical Analysis of Pakistan

AMJAD ALI[1]
Ph.D Scholar, National College of Business Administration and Economics, Lahore, E-mail: chanamajdali@yahoo.com
HAFEEZ UR REHMAN
Professor of Economics, Chairman, Department of Economics,
University of the Punjab, Lahore

Abstract. This study tries to answer the question, "has macroeconomic instability detrimental impact on gross domestic product of Pakistan over the period of 1980 to 2012?" For reviewing macroeconomic instability a comprehensive macroeconomic instability index is constructed by incorporating inflation rate, unemployment rate, trade deficit and budget deficit. Autoregressive Distributed Lag (ARDL) model has been used for examining the cointegration among the variables of the models and Vector Error-Correction model is used for short-run dynamics of the models. For investigating the causal relationship among the variables of the model Granger causality test has been applied. The empirical results of the study confirm the existence of cointegration between macroeconomic instability and gross domestic product in Pakistan. The results of the study show that macroeconomic instability has deep rooted and detrimental impact on gross domestic product of Pakistan. Hence, for achieving desired level of gross domestic product, Pakistan should make macroeconomic environment stable.

Keywords: Macroeconomic instability, Gross domestic product, Financial development, Secondary education, Foreign direct investment
JEL classification: E22, F63, G32, I21, P24

INTRODUCTION

The basic challenge for economics is to understand the nature and causes of economic progress. Ricardo (1817) refers that the total goods and services produced in a country are the best scale to know economic progress. The economy is like a machine which transforms inputs to outputs and the amount of inputs determines the amount of outputs. After World War II, most of the countries adopted aggressive economic policies to improve the growth rate of real gross domestic product (Crafts, 2000). Exogenous technological progress and accumulation of factors of production are considered to be main determinants of economic growth. Solow (1956) explains that with physical inputs there are some nonphysical (skill, knowledge) factors which determine steady state economic growth. Nelson and Phelps (1966) suggest that size and capability of labour absorb new technology which is discovered elsewhere. But the last decade of 20th century has changed the direction of research about economic growth when Lucas (1988), Romer (1990) and Grossman and Helpman (1991) developed endogenous growth theory.

[1] Amjad Ali, Ph.D. Scholar at National College of Business Administration and Economics (NCBAandE), 40-E/1 Gulberg III, Lahore, Pakistan. Cell no. 92 3016443063 Email: chanmjadali@yahoo.com

The policymakers and economists are much interested in sustainable level of economic growth and are much worried in downward movement of economic growth. Barro (1991), Baker (1998) and Caballero (2007) mention that internal and external factors are responsible for instable economic progress. There are three main sources of instable gross domestic product in developing countries like Pakistan. First, big exogenous shocks which come from financial markets and terms of trade. Second, less developed nations experience domestic shocks due to intrinsic instability and self-inflicted policy faults (Kharroubi, 2006). Lucas (1988), Barro (1991) and Kraay and Ventura (2007) explain that the specialization of developing countries with traditional technologies and unskilled labour make the output of these countries more volatile. Raddatz (2007) finds that domestic shocks in developing nations are more forceful for creating macroeconomic instability as compared to external shocks. Third and the most important factor is that the underdeveloped nations have weak shock absorption capacity (De Ferranti and Ferreira, 2000).

The economy of Pakistan has been facing external and internal shocks throughout its history but the magnitude of these shocks has become severe after 9/11. The downward and unsustainable trend of economic progress in Pakistan has made the policymakers and economists worried. In Pakistan fiscal deficit, high inflation, political instability, lack of human and physical capital, increasing foreign debt, low exchange rate, natural disasters and unfavourable law and order conditions for investments are responsible for instable economic progress. The main objective of this study is to find the impact of macroeconomic instability on GDP in Pakistan. This type of exercise is hardly done in case of Pakistan. So this study will be a healthy contribution in existing literature.

The organization of study is as follows: Section II presents review of literature. Theory and econometric methodology are presented in Section III. Empirical results and discussion are given in Section IV. The final section concludes the study.

LITERATURE REVIEW

Following the mid of the 20th century, the empirics of economic growth got especial attention by data collection agencies and policy makers. The main reason is that most of the researchers and policy makers have much concern to study the determinants of economic growth at national and international levels. The most studied determinants of economic growth in literature are factor productivity, financial development, domestic investment, foreign direct investment, savings, literacy rate and inflation rate. Some of the main and relevant studies are given below:

While discussing the determinants of economic growth, Mundell (1963) and Tobin (1965) mention that it is high inflation which increases the cost of holding capital. High inflation reduces investment and capital accumulation which further leads to low economic growth. Moreover, rising inflation work as helping hand for inflation tax and reduces incentive to work. Hence low incentives to work rise unemployment and process not only reduces national output but also lower economic growth rate. Goldsmith (1969), Shaw (1973) and McKinnon (1973) study the determinants of economic growth.

Fischer (1991) gives theoretical framework which elaborates how economic growth reacts to changing pattern of macroeconomic policies. The study concludes that for achieving sustainable

economic growth for a longer period macroeconomic stability is necessary. Moreover, government is interested in social and physical infrastructure which decide the pattern of economic growth.

Dornbusch and Edwards (1990) and Onis (1997) conclude that the situation of macroeconomic instability is occurred in developing countries because of bad fiscal and monetary management followed by structural features like inequality of income distribution. The results of both studies show that there is negative relationship between macroeconomic instability and economic growth. The results of the cross-country study of Easterly and Kraay (2000) show that macroeconomic stability and economic growth are positively related to each other. The results of the study support the findings of Dornbusch and Edwards (1990) and Onis (1997).

Shabbir and Mahmood (1992), Iqbal (1993; 1994), and Khilji and Mahmood (1997) investigate the determinants of economic growth in case of Pakistan. They find that real interest rate, foreign direct investment, trade openness, dependency ratios and terms of trade are responsible for ups and downs of economic growth in Pakistan.

Pagano (1993) mentions that positive and significant relationship exists between financial development and economic growth. The improved productivity of investment leads to less transaction costs on investment. Financial development increases the national savings and investment and ultimate desired economic growth is achieved. Cardoso (1993) investigates the impact of economic growth, terms of trade and real exchange rate on private investment in case of Latin American countries over the period of 1970 to 1985. The study finds that 74 percent private investment is explained by economic growth and there exists positive and significant relationship between them. The results show that rate of depreciation and exchange rate have no significant impact on private investment, whereas economic instability has negative and significant impact on private investment.

Iqbal (1994) examines the impact of structural adjustment programme lending on output growth in Pakistan. The results of the study show struc-tural adjustment programme lending has negative and significant impact on output growth in Pakistan. Moreover, this structural adjustment programme lending disturbs output by worsening terms and trade of Pakistan. The study suggests that real domestic saving and favourable weather condition enhance real output in Pakistan. Iqbal and Zahid (1998) investigate the determinants of economic growth using three gap model for Pakistan. The results of the study show utilization capacity, real devaluation and foreign direct investment determine economic growth in Pakistan.

Ramey and Ramey (1994) find that macroeconomic instability exerts heavy burden on poor class of the economy and it has negative relationship with economic growth. The study uses inflation as the proxy for macroeconomic instability. The results of the study show that there is negative relationship between government spending volatility and economic growth. Mobarak (2005) concludes that the welfare of the poor class is closely related to macroeconomic instability, as the consumption of the poor is very sensitive to their income. The results of the study show that there is a negative relationship between macroeconomic volatility and economic development in case of non-democratic Muslim countries. Ismihan (2003) highlights that macroeconomic instability creates fiscal slump in developing countries, because the government of developing

country faces budget constraints. So in the presence of high budget deficit the government is unable to make specific amount of public spending on development which is necessary for social progress. The study concludes that there is a negative relationship between macroeconomic instability and economic development in case of Turkey.

Khor (2000) argues that foreign direct investment enhances economic growth by improving the quality of factor of production and transfer of improved technology from developed countries to developing countries. This increases exports and savings which further stimulates investment and employment for higher economic growth.

Dewan and Hussein (2001) investigate the determinants of economic growth and mention that total labour force, technological advancement, low inflation rate and trade openness are main determinants of economic growth. The study claims that technological advancement increases the efficiency in developing countries but it depends on the public policies followed in developing countries. Moreover, the developing countries have large but labour intensive agriculture sector so the advancement in technology does not have significant impact on economic growth in developing countries.

Ismihan (2003) investigates the impact of macroeconomic instability on different types of investment in case of Turkey over the period 1963 to 1999. The study finds that macroeconomic instability has negative impact on economic growth and capital formation in case of Turkey. The study concludes that long-run macroeconomic instability damages the relationship between private investment and public investment. Klein (2003) explores the relationship between per capita income and financial development using quadratic interaction. There is positive and significant relationship between financial development, trade openness and economic growth in case of middle-income countries but it is *vice versa* in case of poor and rich countries. In case of developing countries, capital absorption capacity is low so financial development exerts negative impact on economic growth.

Subramanian and Satyanath (2004) investigate the determinants of macroeconomic stability. They conclude that democracy and economic growth have positive and significant relationship with macroeconomic stability. The study finds that conflicts either internal or external have negative impact on macroeconomic stability.

Iqbal and Satar (2005) examine the impact of workers remittances on economic growth in Pakistan. The results of the study show that worker remittances, public investment and private investment have positive and significant impact on economic growth. But external debt, rate of inflation and worsening terms of trade have negative and significant relationship with economic growth. Nelson (2005) investigates that there is negative relationship between inflation and living standard. So in the environment of macroeconomic instability when the increase in prices of household goods decreases the supply of these goods which further decreases the welfare or standard of living of the household. Wolf (2005) confirms that macroeconomic instability has negative relationship with future consumption through low output growth. The relationship between environment and economic performance is controversial. For achieving macroeconomic stability developing countries cannot ignore the pollution problems and global warming which directly affect the living standard of the people.

Holmes and Silverstone (2006) empirically test the Okun's Law for US for post war period. The coefficients of Okun's law are based on dynamic model that investigate the asymmetry relationship between unemployment and economic growth in US. The study has two main conclusions, first the cyclical output has positive impact on unemployment and second the cyclical output has negative impact on unemployment.

Shahbaz (2009) examines the relationship between some macroeco-nomic variables and economic growth in case of Pakistan. The study uses credit to private sector as a proxy for financial development. The results of the study show that financial development enhances economic growth in Pakistan over the long-run. The study concludes that investments and exports have positive whereas imports and inflation have negative impact on economic growth in Pakistan. Ismihan (2009) explores the relationship of potential growth and macroeconomic instability in case of Turkey over the period of 1960 to 2006. The results show that during the episodes of macroeconomic instability Turkey faces a significant loss of real output. On the other hand, during those episodes when macroeconomic instability shows downward trend real output has shown upward trend. The study concludes that if Turkey wants to maintain high economic growth it should reduce macroeconomic instability.

Rodrik (2012) analyzes how Turkish economy reacts during and after the global financial crisis. The financial crisis of 2008-2009 brings episode of macroeconomic instability in Turkey. Rodrik mentions that it is the need of hour for policymakers to find out the root cause of domestic and international shocks for Turkey. After financial crisis, domestic savings in Turkey have shown downward trend, on the other hand external deficit and unemployment have shown upward. So it is necessary for Turkey to control macroeconomic environment for sustainable economic growth. Piece (2012) mentions that economic growth is necessary as well as sufficient condition for generating employment; it also provides better opportunities to an economy to cope with other social and critical issues like clean drinking water and sanitation and other health services. The study concludes that immediate goal of macroeconomic policies is to achieve sustainable economic growth, and this immediate goal enables economies to achieve stability of intermediate variables like poverty reduction, income distribution which have very strong relationship with economic growth.

ECONOMIC THEORY AND ECONOMETRIC METHODOLOGY

The main objective of economic theory is to construct economic models that define the economic behaviour of an individual and society as whole. Normally, an economic model represents real economic situations of different units in the presence of some assumptions and abstractions. These abstractions depend on the purpose for which the economic model has been constructed. The basic objective behind the construction of an economic model is to analyze and predict. The predicting power, provided information, realism and simplicity of assumptions and generality decide the validity of an economic model. This study examines the impact of macroeconomic instability on social progress in Pakistan. Inflation rate, unemployment rate, trade deficit and budget deficit have been used for the construction of macroeconomic instability index and human well-being, under-five survival rate and income inequality are used for measuring social progress in Pakistan. The detail theoretical background of all four models provides strong basis for construction of these models.

MACROECONOMIC INSTABILITY INDEX (MII)

The study of business cycles remained under discussion since the late 19th century but these studies got a separate discipline of macroeconomics in 1930s when Keynes wrote his book "*General Theory of Employment, Interest and Money*". After that macroeconomics becomes a compulsory part of economic theory which mainly discusses fluctuations in overall business activities, determinants of interest rate, inflation and exchange rate following the fiscal and monetary policies at national level. So solution of macroeconomic instability becomes the center of concern of policy makers, but measuring the macroeconomic instability still needs discussion. Simply, everything going wrong with the above variables is called macroeconomic instability. Few economists have tried to define the precise conditions for macroeconomic instability but they do not have theoretical underpinning for precise policy implications. Fischer (1991), Shigoka (1994), Ramey and Ramey (1994), Drugeon and Wignolle (1996), Azam (1997), Azam (1999), Yiheyis (2000), Caballero (2007), Iqbal and Nawaz (2010) and Shahbaz (2013) have used inflation as a proxy for macroeconomic instability. Azam (2001) examines the determinants of macroeconomic instability. He suggests that an index of inflation and nominal exchange rate is used for measuring macroeconomic instability instead of relying on only inflation rate. Ocampo (2005) presents a concept of macroeconomic stability by involving price stability, fiscal policies and well working of real economies, public debt that is payable by government, and private as well as public sector balance sheets. Iqbal and Nawaz (2010) have used misery index as macroeconomic instability in Pakistan that consists of inflation rate and unemployment rate. Ali (2015) uses inflation rate, unemployment rate, budget deficit and trade deficit for measuring macroeconomic instability in Pakistan.

The above discussion reveals that only a single variable or the combination of two or more variables is not enough for explaining the whole macroeconomic situation of an economy. Very first time Ismihan (2003) constructs macroeconomic instability index for Turkey, using four indicators (inflation rate, external debt to GNP ratio, public deficit to GNP, exchange rate). Sanchez-Robles (2006) also have constructed macroeconomic instability index for Spain using inflation, public deficit and various types of public expenditure as a share of the GDP and market distortions for the period of 1962-1995. But they do not mention the criteria for the selection of variables for macroeconomic instability index. For the better understanding of macroeconomic instability this study uses early warning system for the selection of macroeconomic variables. This study has strong theoretical and valid empirical reasons for the selection of variables as compared to Ismihan (2003) and Sanchez-Robles (2006).

In theoretical and empirical economics normally Probit or Logit Multi-variable models are used for the selection of the variables, because it has the best predicting power for the occurrence of the crisis in a time period. One of the main advantages of these models is that they give complete information about the probability of crisis occurrence. Secondly, these models consider the behaviour of all variables simultaneously and remove those variables which do not have enough explaining power in the model. Kaminsky *et al.* (1998) mention that these models have not provided specific mechanism for ranking and valuating different types of variables, on which they measure the accuracies of actual and predicting crisis. These models can simply give the opinion that the selected variable is insignificant or significant and they can only determine the reliability rate of the variables in specific predictions. When the econometric process is conducted on data the reliability of a variable may not clear and one cannot distinguish either the

calculated or estimated reliability that means the prediction of the major portion of the crisis with the considerable number of incorrect warnings or it means losing the major parts of the crisis as the results of producing the limited amount of incorrect warnings. These models cannot give enough interpretations for shortcomings and weak points of economic system.

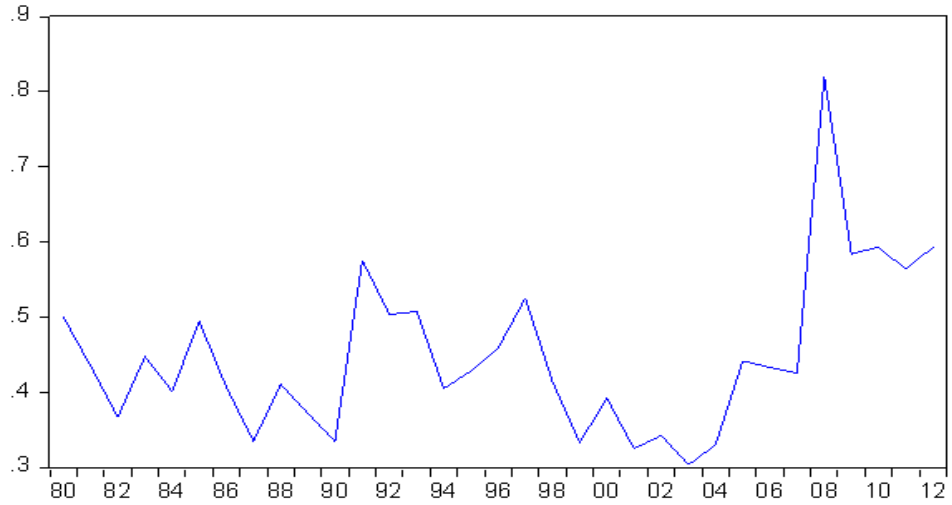
Kaminsky *et al.* (1998) present the most recent methodology for understanding the crisis prediction which is known as Warning Algorithm or the Early Warning System (EWS). This is the best method for evaluating the reliability of financial time series and regulating the business cycle and their turning points and give detailed guideline for the occurrence of crisis. Berg and Pattillo (1999), Berg and Rebecca (2004) and Berg *et al.* (2005) claim that EWS is a system which has behavioural control on economic variable over the time and the existence of the all variables passing through threshold limit is considered the occurrence of crisis over time period in future. On the basis of these arguments, this study will use EWS for determining the best predicting variables for the macroeconomic instability and for the construction of macroeconomic instability index in case of Pakistan. Warning variables are selected according to the theoretical and empirical literature. By following the methodology of Ali (2015), this study uses variables like inflation rate (*Inf*), unemployment rate (*Un*), trade deficit (*TD*) and budget deficit to GNP (*BD*). The equal weight is given to each variable following the standard deviation of that variable.

$$MII_t = \beta_1\left(\frac{Inf_t - \min Inf}{\max Inf - \min Inf}\right) + \beta_2\left(\frac{Un_t - \min Un}{\max Un_t - \min Un_t}\right) + \beta_3\left(\frac{TD_t - \min TD_t}{\max TD_t - \min TD_t}\right) + \beta_4\left(\frac{BD_t - \min BD_t}{\max BD_t - \min BD_t}\right) \quad (1)$$

The value of the index is in between zero and one, 1 means high macroeconomic instability and 0 means stability. The data for macroeconomic instability index variables is taken from various issues of *Pakistan Economic Survey* and World Bank databases *World Development Indicators*.

FIGURE 1

Macroeconomic Instability Index



Why does output of some countries grow faster than other? Most of theoretical and empirical literature of development economics revolves around this question. Kormendi and Meguire (1985) Grier and Tullock (1989), Barro (1991), Sala-i-Martin (1997), Fernández *et al.* (2001), Barro and Sala-i-Martin (2003), Hendry and Krolzig (2004) and Sala-i-Martin *et al.* (2004) have conducted time series and panel studies for investigating the determinants of economic growth. The main focus of above theoretical and empirical literature is to achieve sustainable level of economic growth.

For finding the impact of macroeconomic instability on economic growth the study uses the Cobb Douglas production function:

$$Y = f(KL) \qquad (2)$$

This shows that output depends upon total capital and total labour. Ghura (1997) and Ramirez (1998) analyze that finance and labour are two main factors which are responsible for economic growth in case of Cameroon and Mexico. Following the methodology of Ghura (1997), Ramirez (1998) and Christopoulos and Tsionas (2004) the model of this study becomes as:

$$GPD_t = f(SSE_t, FIN_t, TLF_t, MII_t, FDI_t) \quad (3)$$

GPD = gross domestic product
SSE = secondary school enrollment
FIN = financial development
TLF = total labour force
MII = macroeconomic instability
FDI = foreign direct investment
t = time period

For finding the responsiveness of dependent variable to independent variables, the equation can be written in the following form:

$$GPD_t = \alpha_0 SSE_t^{\alpha_1} FIN_t^{\alpha_2} TLF_t^{\alpha_3} MII_t^{\alpha_4} FDI_t^{\alpha_5} e^{t\alpha_6} \quad (4)$$

e = represent for the base of log

Following the log linear form of the function the model becomes as:

$$LGDP_t = \alpha_0 + \alpha_1 LSSE_t + \alpha_2 LFIN_t + \alpha_3 TLF_t + \alpha_4 MII_t + \alpha_5 LFDI_t + e_t \qquad (5)$$

The main objective of this study is to analyze the impact of macroeconomic instability on GDP of Pakistan from 1980 to 2012. The data for all variables is taken from various issues of *Pakistan Economic Survey* and *World Development Indicators* databases maintained by World Bank.

ECONOMETRIC METHODOLOGY

The use of econometric tools on macroeconomic models is one of the most important aspects within quantitative economic analysis. In most of macroeconomic data, the involvement of time trend makes the time series data non-stationary and the regression results of this data may be spurious. Nelson and Plosser (1982) mention that mostly time series data of macroeconomic variables have unit root problem. They conclude that existence or non-existence of unit root helps to check the authenticity of data generating process. Stationary and non-stationary data have some different features. The stationary time series data have temporary shocks which disappear over the time and series move back to their long-run means values. Whereas, shocks are permanent in non-stationary time series data. As a result, the variance and mean of a non-stationary time series depend upon time trend and series has: (*a*) no long-run mean to which the

series returns, and (*b*) variance will depend on time and approach infinity as time goes to infinity. In case if the time series data has only negative or positive shocks, the time series data is non-stationary (for details *see*, Dickey and Fuller, 1979). In literature, several unit root tests are available for making data stationary. For this purpose, the study uses Augmented Dickey-Fuller (ADF) unit root test (1981), Phillips Perron (PP) unit root test (1988) and Dickey-Fuller Generalized Least Squares (DF-GLS) unit root test (Illiott *et al.*, 1996).

AUGMENTED DICKEY-FULLER (ADF) TEST

Dickey and Fuller (1981) proposes the Augmented Dickey-Fuller (ADF). The general forms of the ADF can be written as:

$$\Delta X_t = \delta X_{t-1} + \sum_{j=1}^{q} \phi_j \Delta X_{t-j} + e_{1t} \quad (6)$$

$$\Delta X_t = \alpha + \delta X_{t-1} + \sum_{j=1}^{q} \phi_j \Delta X_{t-j} + e_{2t} \quad (7)$$

$$\Delta X_t = \alpha + \beta t + \delta X_{t-1} + \sum_{j=1}^{q} \phi_j \Delta X_{t-j} + e_{3t} \quad (8)$$

X_t is a time series for testing unit roots, t is the time trend and e_t is error term having white noise properties. If j = 0, it represents the simple DF test. The lagged dependent variables in the ADF regression equation are included until the error term becomes white noise. For checking the serial correlation of error terms LM test is used. The null and alternative hypotheses of ADF unit roots are:

H_0: $\delta = 0$ non-stationary time series; so it has unit root problem.

H_a: $\delta < 0$ stationary time series.

Applying OLS and computing τ statistic of the estimated coefficient of X_{t-1} and comparing it with the Dickey Fuller (1979) critical τ values, if the calculated value of τ statistic is greater than the critical value then reject the H_0. In this case the time series data is stationary. On the other hand, if we fail to reject H_0, the series is non-stationary. In this way by applying this procedure on all variables, we can easily find their respective orders of integration.

PHILLIPS AND PERRON (PP) UNIT ROOT TEST

Null hypothesis of PP and ADF have same normalized bias statistics and asymptotic distributions. PP has two main advantages over ADF. First PP test has strong power to predict the heteroskedasticity and serial correlation in error term. Second, it is not needed to specify the lag length of test regression.

THE DF-GLS UNIT ROOT TEST

Elliott et al. (1996) propose modifying DF test statistic using Generalized Least Squares (GLS) approach. They claim that modified DF test has best explanatory power for small sample size data as compare to simple DF and ADF. Moreover, DF-GLS unit root test has improved predicting power when an unknown mean or trend is present.

AUTOREGRESSIVE DISTRIBUTIVE LAG (ARDL) APPROACH TO COINTEGRATION

In literature, a number of cointegration tests for econometric analysis are available. Most famous and traditional cointegration tests are the residual based Engle-Granger (1987) test, Maximum Likelihood based on Johansen (1991/1992) and Johansen-Juselius (1990) tests. One thing common in these tests is that they require same order of integration for their analysis. These cointegration tests become invalid and inefficient when the variables of the model have different level of integration. Moreover, the analysis based on these tests of cointegration do not provide information about the structural breaks of time series data and also have low power of prediction. With the passage of time structural changes have occurred in time series such as economic crises, new institutional arrangements and changes in policy regime. The problem with these traditional methods is that the testing of the null hypothesis of structural stability against the alternative of a one-time structural break only. If such structural changes are present in the data generating process, but not allowed for in the specification of an econometric model, results may be biased.

ARDL bound testing approach presented by Pesaran and Pesaran (1997), Pesaran and Shin (1999), and Pesaran, Shin and Smith (2001) has numerous advantages over traditional methods of cointegration. Firstly, ARDL can be applied regardless of the order of integration. Secondly, ARDL bounds testing approach to cointegration can be used for small sample size (Mah, 2000). Thirdly, this approach allows to take sufficient number of lags for capturing the data generating process in a general to specific modeling framework (Laurenceson et al., 2003). Lastly, ARDL gives efficient and valid detailed information about the structural breaks in data.

This technique is based on Unrestricted Vector Error Correction Model (UVECM) which have better properties for short and long-run equilibrium as compared to traditional techniques (Pattichis, 1999). Pesaran and Shin (1997) and later on Pesaran et al. (2001) mention that under certain environment long-run correlation among macroeconomic variables can be found with the help of Autoregressive Distributive Lag Model (ARDL). After lag order selection for ARDL procedure, simply OLS can be used for identification and estimation. Valid estimates and inferences can be drawn through the presence of unique long-run alliance that is crucial for cointegration.

$$\Delta \ln Y_t = \beta_1 + \beta_2 t + \beta_3 \ln Y_{t-1} + \beta_4 \ln X_{t-1} + \beta_5 \ln Z_{t-1} + ... + \sum_{h=1}^{p} \beta_h \Delta \ln Y_{t-h} + \sum_{j=0}^{p} \gamma_j \Delta \ln X_{t-j} + \sum_{k=0}^{p} \phi_k \Delta \ln Z_{t-k} + ... + u_{it} \quad (9)$$

At first the study will find the direction of relationship among the variables in case of Pakistan by applying the bounds test using Wald test. This study uses different proxies for social progress as dependent variable and every model has different control variable with macroeconomic instability.

H_0: $\beta_3 = \beta_4 = \beta_5 = 0$ (no cointegration among the variables)

H_A: $\beta_3 \neq \beta_4 \neq \beta_5 \neq 0$ (cointegration among variables)

If there exits long-run cointegration relationship among the variables, then for finding short-run relationship the study uses the Vector Error Correction Model (VECM). The VECM is explained as under:

$$\Delta \ln Y_{it} = \beta_1 + \beta_2 t + \sum_{h=1}^{p} \beta_h \Delta \ln Y_{it-h} + \sum_{j=0}^{p} \gamma_j \Delta \ln X_{t-j} + \sum_{k=0}^{p} \phi_k \Delta \ln Z_{it-k} + \omega ECT_{t-1} + u_t \quad (10)$$

For observing the causality among the variables, the study uses Granger causality test. For conserving time, effort and space the study avoids presenting the book material.

EMPIRICAL RESULTS AND DISCUSSION

For overviewing the temporal properties of data the descriptive statistics is presented in Table 1. The estimated results reveal that gross domestic product, financial development and macroeconomic instability are negatively skewed and secondary school enrollment, total labour force and foreign direct investment are positively skewed. The results show all variables have positive kurtosis. The estimated kurtosis and skewness are insignificant and different from zero so we reject null hypothesis of no normality. The values of Jarque-Bera show that all the variables of the model have zero mean and finite covariance, this confirms that selected data sets are normally distributed.

TABLE 1

Descriptive Statistics

	GDP	SSE	FIN	TLF	MII	FDI
Mean	12.687	4.167	8.631	3.617	0.449	19.903
Median	12.741	4.095	8.680	3.555	0.428	19.858
Maximum	13.360	4.553	9.198	4.083	0.819	22.444
Minimum	11.859	3.859	7.981	3.221	0.304	17.198
Std. Dev.	0.438	0.223	0.277	0.265	0.107	1.344
Skewness	–0.200	0.436	–0.221	0.265	1.280	0.074
Kurtosis	2.004	1.806	3.092	1.848	5.336	2.407
Jarque-Bera	1.585	3.004	0.282	2.209	1.838	0.513
Probability	0.452	0.222	0.868	0.331	0.398	0.773
Sum	418.680	137.534	284.855	119.365	14.819	656.813
Sum Sq. Dev.	6.162	1.592	2.460	2.251	0.370	57.870
Observations	33	33	33	33	33	33

Table 2 reports the correlation matrix of variables, the results reveal that gross domestic product has positive and significant correlation with secondary school enrollment, financial development, total labour force and foreign direct investment whereas it has positive but insignificant relationship with macroeconomic instability in case of Pakistan. Secondary school enrollment has positive and significant correlation with financial development, total labour force, macroeconomic instability and foreign direct investment. The results show financial development has positive and significant correlation with total labour force and foreign direct investment but it is insignificant in case of macroeconomic instability. Total labour force has positive and insignificant correlation with macroeconomic instability whereas it has positive and significant correlation with foreign direct investment. Macroeconomic instability has positive and significant correlation with foreign direct investment. The overall estimated results show that all the variables of the model have positive and significant correlation when gross domestic

product is dependent variable. The results of the correlation matrix shows there is no problem of multicolinearity among the explanatory variables.

TABLE 2 Pairwise Correlation

GDP	1.000					
SSE	0.962 (9.63)***	1.000				
FIN	0.916 (8.74)***	0.500 (9.01)***	1.000			
TLF	0.981 (8.72)***	0.587 (5.34)***	0.586 (10.67)***	1.000		
MII	0.716 0.255	0.183 (1.03)*	0.109 0.613	0.153 0.867	1.000	
FDI	0.916 (8.73)***	0.472 (9.96)***	0.639 (6.11)***	0.685 (10.60)***	0.242 (1.38)*	1.000
	GDP	SSE	FIN	TLF	MII	FDI

NOTE:The asterisks ***, ** and * denote the significant at 1%, 5% and 10% levels, respectively.

ESTIMATED RESULTS OF UNIT ROOT TESTS

The results of unit root tests of gross domestic product model are reported in Table 3. The results of ADF and PP tests show gross domestic product is stationary at level but it is non-stationary at level in case of DF-GLS test. The results of ADF, PP and DF-GLS tests reveal that macroeconomic instability is stationary at level. The estimated results of ADF, PP and DF-GLS tests highlight that secondary school enrollment, financial development, total labour force and foreign direct investment are not stationary at level. At first difference gross domestic product, secondary school enrollment, financial development, total labour force, macroeconomic instability and foreign direct investment are stationary in case of ADF, PP and DF-GLS tests. Hence there is mixed order of integration which is suitable condition for applying ARDL cointegration approach.

TABLE 3 Unit Root Tests

Variables	ADF	PP	DF-GLS
GDP	–3.147**	–2.653*	0.344
SSE	0.302	0.556	1.216
FIN	–1.286	–1.322	0.343
TLF	0.991	2.223	0.830
MII	–2.953**	–3.033**	–2.862***
FDI	–1.462	–1.502	–0.945
At First Difference			
ΔGDP	–3.545***	–3.514***	–2.999***
ΔSSE	–6.710***	–6.710***	–6.785***
ΔFIN	–4.882***	–4.882***	–3.890***
ΔTLF	–6.372***	–6.405***	–6.402***
ΔMII	–7.902***	–8.348***	–7.547***
ΔFDI	–4.546***	–4.584***	–4.352***

Note: The asterisks ***, ** and * denote the significant at 1%, 5% and 10% levels, respectively.

The figure in the parenthesis is the optimal lag structure for ADF and DF-GLS tests, bandwidth for the PP unit root test is determined by the Schwarz Bayesian Criterion.

LAG LENGTH SELECTION CRITERIA

By keeping in view the number of observations and variables the lag order selection criterions are reported in Table 4; maximum two lags are allowed to Vector Auto-Regressive process. The results show that all criterions allow optimal lag length 1, except Akaike information criterion. Thus, following the sequential modified LR test statistic, Final prediction error, Schwarz information criterion and Hannan-Quinn information criterion lag length 1, is used for the variables of this model.

TABLE 4

VAR Lag Order Selection Criteria
GDP, SSE, FIN, TLF, MII, FDI
Time Period: 1980-2012

Lag	LogL	LR	FPE	AIC	SC	HQ
0	123.684	NA	2.03e-11	–7.592	–7.314	–7.502
1	319.261	302.829*	7.20e-16*	–17.887	–15.945*	–17.254*
2	356.913	43.724	8.59e-16	–17.994*	–14.386	–16.818

* indicates lag order selected by the criterion
LR Sequential modified LR test statistic (each test at 5% level)
FPE Final prediction error
AIC Akaike information criterion
SC Schwarz information criterion
HQ Hannan-Quinn information criterion

ESTIMATED ARDL BOUNDS TESTING APPROACH

For investigating the cointegration among gross domestic product, secondary school enrollment, financial development, total labour force, macroeconomic instability and foreign direct investment ARDL bounds testing approach is used. The results of ARDL bounds testing approach are presented in Table 5.

TABLE 5

ARDL Bounds Testing Approach
Dependent Variable: GDP
ARDL (1, 0, 1, 0, 0, 0)

Critical Value	F-Statistics 4.536		W-statistic 27.218	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
95%	3.069	4.518	18.415	27.108
90%	2.559	3.788	15.357	22.730

The calculated F-statistic (4.536) is greater than the upper bound (4.518) value of Pesaran, Shin and Smith (2001) at 5 percent and the calculated W-statistic (27.218) is greater than the upper bound (27.108) value of Pesaran, Shin and Smith (2001) at 5 percent. So null hypothesis of no cointegration is rejected which confirms cointegration among the variables of the model. The calculated F-statistic and W-statistic have verified the existence of cointegration among the variables of model. Now long-run relationship among GDP, secondary school enrollment,

financial development, total labour force, macroeconomic instability and foreign direct investment can be examined. The estimated long-run results are presented in Table 6.

TABLE 6

Estimated Long Run Coefficients using the ARDL Approach
ARDL (1, 0, 1, 0, 0, 0)
Dependent Variable: GDP
Time Period 1981-2012

Regressor	Coefficients	Standard-Error	T-Ratio (Prob)
SSE	0.775	0.316	2.450 [0.022]
FIN	0.348	0.081	4.330 [0.000]
TLF	0.157	0.312	0.504 [0.618]
MII	–0.080	0.043	–1.846 [0.077]
FDI	0.089	0.014	6.221 [0.000]
C	4.409	0.613	7.189 [0.000]

The coefficient of secondary school enrollment shows there is positive and significant relationship between secondary school enrollment and GDP. The results show 1 percent increase in secondary school enrollment creates (0.772) percent increase in GDP in Pakistan and this relationship is significant at 5 percent. There is positive and significant relationship between financial development and GDP. The estimated results show 1 percent increase in financial development brings (0.348) percent increase in GDP and this relationship has 1 percent level of significance level. Total labour force has positive and insignificant relationship with GDP in case of Pakistan. The estimated results show that there is negative and significant relationship between macroeconomic instability and GDP in case of Pakistan. The results reveal that 1 percent increase in macroeconomic instability brings (–0.080) percent decrease in GDP and this relationship is significant at 10 percent. The coefficient of foreign direct investment shows that there is positive and significant relationship between foreign direct investment and GDP in Pakistan. The estimated results show that 1 percent increase in foreign direct investment brings 0.089 percent increase in GDP at 1 percent level of significance. The overall long-run results show that secondary school enrollment, financial development and foreign direct investment have positive and significant impact on GDP. Whereas macroeconomic instability has negative and significant impact on GDP in Pakistan. So we reject the null hypothesis that macroeconomic instability does not have impact on GDP in Pakistan. This shows that for increasing GDP the government should reduce the macroeconomic instability and increase secondary school enrollment, financial development and foreign direct investment in Pakistan.

ESTIMATED SHORT RUN DYNAMICS

The short-run dynamics are presented in Table 7, the study uses Vector Error-Correction Model (VECM) for investigating the short-run dynamic among GDP, secondary school enrollment, financial development, total labour force, macroeconomic instability and foreign direct investment in case of Pakistan. The estimates show that secondary school enrollment has positive and significant impact on GDP in Pakistan. The results show that in short-run there is negative and insignificant relationship between financial development and GDP and this relationship is opposite to long-run results. The estimates show that there is positive but insignificant relationship between total labour force and GDP in Pakistan. The estimated results show that there is negative and significant relationship between macroeconomic instability and GDP in

Pakistan. There is positive and significant relationship between foreign direct investment and GDP in Pakistan. The short-run dynamics show that secondary school enrollment and foreign direct investment are more fruitful for increasing GDP in Pakistan whereas by reducing macroeconomic instability the government can also achieve targeted GDP in Pakistan. The negative and significant coefficient (–0.252) of ECM is theoretically correct. The negative and significant value of ECM shows the speed of adjustment from short-run to long-run equilibrium. The estimates of ECM reveal that short-run needs three years and nine month to converge in the long-run equilibrium. Moreover, short-run deviations in the last period are corrected by 25.286 percent in future in case of Pakistan.

TABLE 7

Error Correction Representation
ARDL (1, 0, 1, 0, 0, 0)
Dependent Variable: dGDP
Time Period 1981-2012

Regressor	Coefficients	Standard-Error	T-Ratio (Prob)
dSSE	0.196	0.064	3.058 [0.005]
dFIN	–0.039	0.036	–1.071 [0.294]
dTLF	0.039	0.083	0.475 [0.639]
dMII	–0.020	0.011	–1.762 [0.090]
dFDI	0.022	0.006	3.754 [0.001]
ECM(–1)	–0.252	0.055	–4.586 [0.000]
R-Squared	0.727	R-Bar-Squared	0.647
S.E. of Regression	0.011	F-Stat. F (6, 25)	10.671 [0.000]
Mean of Dependent Variable	0.046	S.D. of Dependent Variable	0.019
Residual Sum of Squares	0.003	Equation Log-likelihood	102.68
Akaike Info. Criterion	94.683	Schwarz Bayesian Criterion	88.82
DW-statistic	2.193		

TABLE 8

Diagnostic Tests

Test Statistics	LM-Version	F-Version
A-Serial Correlation CHSQ(1)	0.502 [0.478]*F(1,23)*	0.366 [0.551]*
B-Functional Form CHSQ(1)	1.352 [0.245]*F(1,23)*	1.015 [0.324]*
C-Normality CHSQ(2)	1.333 [0.513]*	Not-applicable
D-Heteroscedasticity CHSQ(1)	0.329 [0.566]*F(1,30)*	0.311 [0.581]*

A Lagrange multiplier test of residual serial correlation
B Ramsey's RESET test using the square of the fitted values
C Based on a test of Skewness and kurtosis of residuals
D Based on the regression of squared residuals on squared fitted values

DIAGNOSTIC TESTS

The estimated results of diagnostic tests are shown in Table 8. The estimated results of Lagrange multiplier test of residual serial correlation show that there is no serial correlation among the variables of the model. Ramsey's RESET test using the square of the fitted values shows that the

model has correct functional form. Normality based on Skewness and Kurtosis explains that the time series data of all variables is normally distributed. The results show that there is no problem of heteroscedasticity.

MODEL SPECIFICATION

The stability of model provides information regarding the estimated model of Gross Domestic Product has been shifted or not over time. The results of Cumulative Sum (CUSUM) and the Cumulative Sum of the Squares (CUSUMSQ) tests are reported in Figures 2 and 3. These figures show that Cumulative Sum (CUSUM) and Cumulative Sum of the Squares (CUSUMSQ) lie between the two critical lines which indicates that the estimated model is stable.

FIGURE 2

Plot of Cumulative Sum of Recursive Residuals

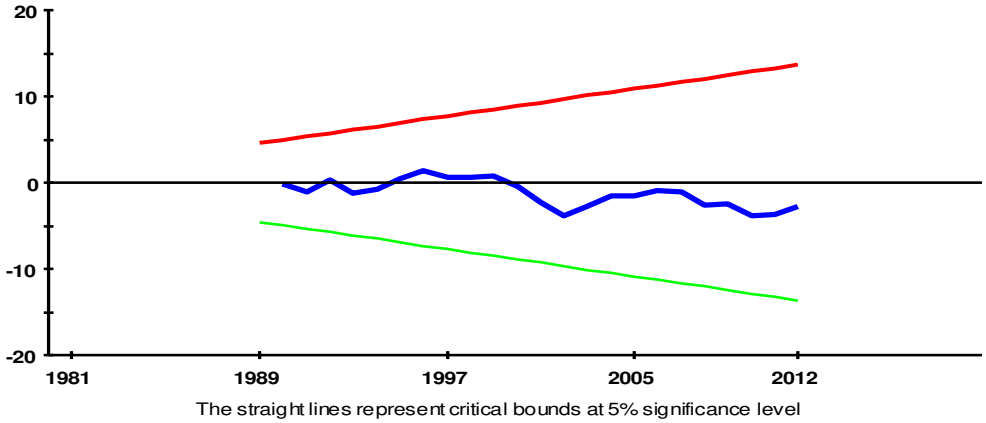
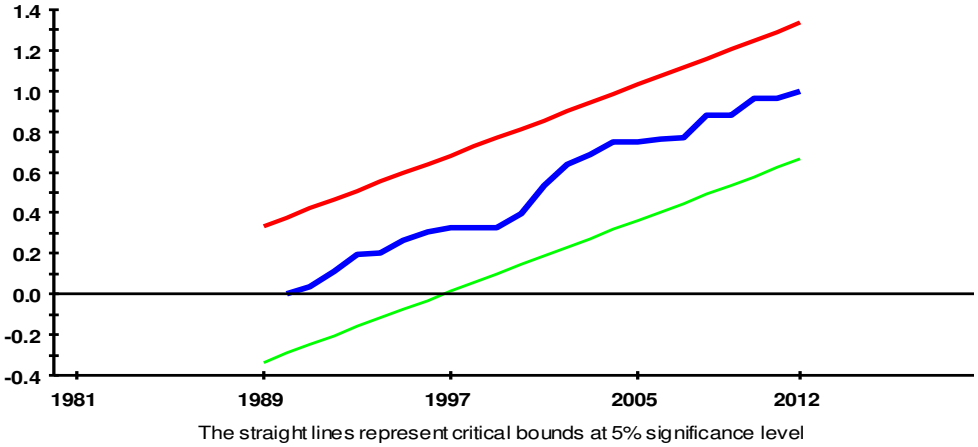


FIGURE 3

Plot of Cumulative Sum of Squares of Recursive Residuals



ESTIMATED GRANGER CAUSALITY TEST

Granger causality test results are presented in the Table 9. The estimated results reveal secondary school education does cause GDP but GDP does not cause secondary school education in Pakistan. This shows unidirectional causality running from secondary school education to GDP in Pakistan. The results show unidirectional causality also runs from GDP to financial development in Pakistan. The results show total labour force does cause GDP but GDP does not

cause total labour force in Pakistan. So there is unidirectional causal relationship between total labour force and GDP in Pakistan. The estimated results reveal that macroeconomic instability does cause GDP but GDP does not cause macroeconomic instability in Pakistan. This shows unidirectional causality running from macroeconomic instability to GDP in Pakistan.

TABLE 9

Pairwise Granger Causality Tests

Sample: 1980 - 2012

Null Hypothesis	F-Statistic	Prob.
SSE does not Granger Cause GDP	1.880	0.015
GDP does not Granger Cause SSE	0.327	0.889
FIN does not Granger Cause GDP	0.693	0.635
GDP does not Granger Cause FIN	2.870	0.046
TLF does not Granger Cause GDP	1.921	0.066
GDP does not Granger Cause LTLF	1.040	0.426
MII does not Granger Cause GDP	1.948	0.021
GDP does not Granger Cause MII	1.449	0.257
FDI does not Granger Cause GDP	2.951	0.042
GDP does not Granger Cause FDI	2.566	0.066
FIN does not Granger Cause SSE	0.657	0.660
SSE does not Granger Cause FIN	1.493	0.243
TLF does not Granger Cause SSE	2.811	0.049
SSE does not Granger Cause TLF	0.822	0.550
MII does not Granger Cause SSE	1.879	0.150
SSE does not Granger Cause MII	0.341	0.880
FDI does not Granger Cause SSE	0.557	0.730
SSE does not Granger Cause FDI	1.347	0.292
TLF does not Granger Cause FIN	1.450	0.257
FIN does not Granger Cause TLF	1.557	0.225
MII does not Granger Cause FIN	0.558	0.730
FIN does not Granger Cause MII	0.347	0.876
FDI does not Granger Cause FIN	3.161	0.033
FIN does not Granger Cause FDI	1.409	0.270
MII does not Granger Cause TLF	1.485	0.246
TLF does not Granger Cause MII	0.346	0.877
FDI does not Granger Cause TLF	1.390	0.277
TLF does not Granger Cause FDI	1.551	0.226
FDI does not Granger Cause MII	1.385	0.278
MII does not Granger Cause FDI	3.806	0.017

The results show that there is bidirectional causal relationship between foreign direct investment and GDP in case of Pakistan. The results show secondary school education has no causal relationship with financial development, macroeconomic instability and foreign direct investment in Pakistan. But unidirectional causality running from total labour force to secondary school education in Pakistan is observed. The estimated results reveal that foreign direct investment does cause financial development but financial development does not cause foreign direct investment in Pakistan. The results reveal that unidirectional causality running from

macroeconomic instability to foreign direct investment in Pakistan is observed. The results of Granger causality test suggest that for increasing GDP, the government of Pakistan should reduce macroeconomic instability and at the same time level of secondary education, financial development, quality of total labour force and foreign direct investment should be increased.

CONCLUSIONS

The results of the ARDL bound testing approach show that there is cointegration among the variables of the model. The long-run results show that secondary school education has positive and significant relationship with GDP in Pakistan. The long-run estimates show that there is positive and significant relationship between financial development and GDP in Pakistan. The total labour force has positive and insignificant impact on GDP in Pakistan. But macroeconomic instability has negative and significant long-run relationship with GDP in Pakistan. The estimated long-run results show foreign direct investment has positive and significant impact on GDP in Pakistan. The short-run dynamic shows that secondary school education and foreign direct investment have positive and significant relationship with GDP in Pakistan. Financial development has negative and total labour force has positive but insignificant short-run relationship with GDP in Pakistan.

The short-run coefficients reveal that macroeconomic instability has negative and significant impact on GDP in case of Pakistan. The negative and significant value of ECM shows the speed of adjustment from short-run to long-run equilibrium. The estimates of ECM reveal that short-run needs four year to converge in the long-run equilibrium. The diagnostic tests results reveal that there is no serial correlation, heteroscedasticity and model has correct functional form with normally distributed data. The results of the Granger causality test show all the independent variables have causal relationship with GDP in Pakistan. This confirms that for getting a targeted GDP, Pakistan should make macroeconomic environment stable with suitable financial development and education level.

The study concludes that the government has to play its role in raising the pace of economic growth in Pakistan. For this purpose, appropriate policies need to be formulated and implemented for making the economic environment conducive to economic growth. These policies may also help in bringing macroeconomic stability. It helps in reaping the full fruit of economic development in the country.

REFERENCES

Alam, I. and R. Quazi (2003), Determinants of capital flight: An econometric case study of Bangladesh. *International Review of Applied Economics*, Volume 17(1), pp. 85-103. http://dx.doi.org/10.1080/713673164

Ali, A. (2015), The Impact of Macroeconomic Instability on Social Progress: An Empirical Analysis of Pakistan. Doctoral dissertation. National College of Business Administration and Economics (NCBAE), Lahore (Pakistan).

Azam, J. P. (1997), Public debt and the exchange rate in the CFA Franc Zone. *Journal of African Economies*, Volume 6(1), pp. 54-84.

Azam, J. P. (1999), Dollars for sale: Exchange rate policy and inflation in Africa. *World Development*, Volume 27(10), pp. 1843-1859. http://dx.doi.org/10.1016/S0305-750X(99)00088-1

Azam, J. P. (1999), Institutions for macroeconomic stability in Africa. *Journal of African Economies*, Volume 8 (Supplement 1), pp. 6-29. http://dx.doi.org/10.1093/jafeco/8.suppl_1.6

Baker, D. (1998), *Getting Prices Right*: *The Debate Over the Accuracy of the Consumer Price Index*. New York: M. E. Sharpe, Armonk.

Barro, R. J. and X. Sala-i-Martin (2003), *Economic Growth*. MIT Press Books, 1.

Barro, Robert J. (1991), Economic growth in a cross section of countries. *The Quarterly Journal of Economics,* Volume 106(2), pp. 407-443. http://dx.doi.org/10.2307/2937943

Berg, A. and C. Pattillo (1999), Predicting currency crises: The indicators approach and an alternative. *Journal of International Money and Finance*, Volume 18(4), pp. 561-586. http://dx.doi.org/10.1016/S0261-5606(99)00024-8

Berg, A. and Rebecca N. Coke (2004), Autocorrelation-corrected standard errors in panel Probits: An application to currency crisis prediction. *IMF Working Paper* 04/39, International Monetary Fund, Washington, DC.

Berg, A., E. Borensztein and C. Pattillo (2005), Assessing early warning systems: How have they worked in practice? *IMF Staff Papers*, Volume 52(3), pp. 462-502.

Brock, W. A. and M. S. Taylor (2005), Economic growth and the environment: a review of theory and empirics. *Handbook of Economic Growth*, Volume 1, Part B, pp. 1749-1821. http://dx.doi.org/10.1016/S1574-0684(05)01028-2

Caballero, R. J. (2007), *Specificity and the Macroeconomics of Restructuring*. Cambridge University. The MIT Press.

Cardoso, E. (1993), Private investment in Latin America. *Economic Development and Cultural Change*, Volume 41(4), pp. 833-848.

Christopoulos, D. K. and E. G. Tsionas (2004), Financial development and economic growth: Evidence from panel unit root and cointegration tests. *Journal of Development Economics*, Volume 73(1), pp. 55-74. http://dx.doi.org/10.1016/j.jdeveco.2003.03.002

Crafts, N. F. (2000), *Globalization and Growth in the Twentieth Century*. International Monetary Fund.

De Ferranti, D. M. and F. H. Ferreira (2000), *Securing Our Future in a Global Economy*. World Bank, Washington, D.C.

Dewan, E. and S. Hussein (2001), Determinants of economic growth (Panel data approach). Economics Department Reserve Bank of Fiji *Working Paper* 01/04.

Dewan, E. and S. Hussein (2001), *Determinants of Economic Growth* (*Panel Data Approach*). Economics Department, Reserve Bank of Fiji.

Dickey, D. A. and W. A. Fuller (1979), Distribution of estimators for autoregressive time series with unit root. *Journal of the American Statistical Association*, Volume 74(366a), pp. 427-431. http://dx.doi.org/10.1080/01621459.1979.10482531

Dickey, D. A. and W. A. Fuller (1981), Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica*, Volume 49(4), pp. 1057-1072. http://www.jstor.org/stable/1912517

Dornbusch, R. and S. Edwards (1990), Macroeconomic populism. *Journal of Development Economics*, Volume 32(2), pp. 247-277. http://dx.doi.org/10.1016/0304-3878(90)90038-D

Drugeon, J. P. and B. Wigniolle (1996), Continuous-time sunspot equilibria and dynamics in a model of growth. *Journal of Economic Theory*, Volume 69, Issue 1, pp. 24-52. http://dx.doi.org/10.1006/jeth.1996.0036

Easterly, W. and A. Kraay (2000), Small states, small problems? Income, growth, and volatility in small states. *World Development*, Volume 28(11), pp. 2013-2027. http://dx.doi.org/10.1016/S0305-750X(00)00068-1

Elliott, G., T. J. Rothenberg and J. H. Stock (1996), Efficient tests for an Autoregressive Unit Root. *Econometrica*, Volume 64(4), pp. 813-836. http://dx.doi.org/10.2307/2171846

Engle, Robert F. and C. W. J. Granger (1987), Co-integration and error correction: Representation, estimation, and testing. *Econometrica*, Volume 55(2), pp. 251-276. http://www.jstor.org/stable/1913236

Fernández, C., E. Ley and M. F. J. Steel (2001), Model uncertainty in cross-country growth regressions. *Journal of Applied Econometrics*, Volume 16(5), pp. 563-76. http://dx.doi.org/10.1002/jae.623

Fischer, S. (1991), Growth, macroeconomics, and development. In *NBER Macroeconomics Annual*, Volume 6, pp. 329-379.

Ghura, D. (1997), Private investment and endogenous growth: Evidence from Cameroon. *IMF Working Paper* 97/165.

Goldsmith, R. W. (1969), *Financial Structure and Development*. Yale University Press, New Haven, CT.

Granger, C. W. J. (1969), Investigating causal relations by econometric models and cross-spectral methods. *Econometrica*, Volume 37(3), pp. 424-438. http://www.jstor.org/stable/1912791

Grier, K. B. and G. Tullock (1989), An empirical analysis of cross-national economic growth, 1951-1980. *Journal of Monetary Economics*, Volume 24(2), pp. 259-276. http://dx.doi.org/10.1016/0304-3932(89)90006-8

Grossman, G. M. and E. Helpman (1991), Trade, knowledge spillovers, and growth. *European Economic Review*, Volume 35(2-3), pp. 517-526. http://dx.doi.org/10.1016/0014-2921(91)90153-A

Hendry, D. F. and H. M. Krolzig (2004), We ran one regression. *Oxford Bulletin of Economics and Statistics*, Volume 66(5), pp. 799-810. http://dx.doi.org/10.1111/j.1468-0084.2004.102_1.x

Holmes, M. J. and B. Silverstone (2006), Okun's law, asymmetries and jobless recoveries in the United States: A Markov-switching approach. *Economics Letters*, Volume 92(2), pp. 293-299. http://dx.doi.org/10.1016/j.econlet.2006.03.006

Iqbal, N. and S. Nawaz (2010), *Fiscal Decentralization and Macroeconomic Stability*: *Theory and Evidence from Pakistan*. Pakistan Institute of Development Economics, Islamabad.

Iqbal, Z. (1993), Institutional variations in savings behaviour in Pakistan. *The Pakistan Development Review*, Volume 32(4), pp. 1293-1311. http://www.jstor.org/stable/41259735

Iqbal, Z. (1994), Macroeconomic effects of adjustment lending in Pakistan. *The Pakistan Development Review*, Volume 33(4), pp. 1011-1031. http://www.jstor.org/stable/41259808

Iqbal, Z. and A. Sattar (2005), *The Contribution of Workers' Remittances to Economic Growth in Pakistan*. Pakistan Institute of Development Economics, Islamabad (Research Report No. 187).

Iqbal, Z. and G. M. Zahid (1998), Macroeconomic determinants of economic growth in Pakistan. *The Pakistan Development Review*, Volume 37(2), pp. 125-148. http://www.jstor.org/stable/41260096

Ismihan, M. (2003), The role of politics and instability on public spending dynamics and macroeconomic performance: Theory and evidence from Turkey. Doctoral dissertation, Middle East Technical University.

Ismihan, M. (2009), Chronic unstability and potential growth rate: Turkish experience, 1960-2006. *Dokuz Eylül University Journal of Faculty of Economics and Administrative Sciences*, Volume 24(1), pp. 73 -91.

Johansen, S. (1991), Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. *Econometrica*, Volume 59(6), pp. 1551-1580. http://www.jstor.org/stable/2938278

Johansen, S. (1992), Cointegration in partial systems and the efficiency of single-equation analysis. *Journal of Econometrics*, Volume 52, Issue 3, pp. 389-402. http://dx.doi.org/10.1016/0304-4076(92)90019-N

Johansen, S. and K. Juselius (1990), Maximum likelihood estimation and inference on cointegration — With application of demand for money. *Oxford Bulletin of Economics and Statistics*, 52(2), 169-210. http://dx.doi.org/10.1111/j.1468-0084.1990.mp52002003.x

Kaminsky, G., S. Lizondo and C. Reinhart (1998), Leading indicators of currency crises. *IMF Staff Papers*, Volume 45(1), pp. 1-48.

Kharroubi, E. (2006), *Illiquidity, Financial Development and the Growth-Volatility Relationship*. Université de Banque de France.

Khilji, N. M. and A. Mahmood (1997), Military expenditures and economic growth in Pakistan. *The Pakistan Development Review*, Volume 36(4), pp. 791-808. http://www.jstor.org/stable/41260069

Khor, M. (2000), *Globalization and the South*: *Some Critical Issues* (Volume 147). Malaysia: Third World Network.

Klein, M. W. (2003), Capital account openness and the varieties of growth experience. National Bureau of Economic Research *Working Paper* W9500.

Kormendi, Roger C. and Philip G. Meguire (1985), Macroeconomic determinants of growth: Cross-country evidence. *Journal of Monetary Economics*, 16(2), 141-163. http://dx.doi.org/10.1016/0304-3932(85)90027-3

Kraay, A. and J. Ventura (2007), Comparative advantage and the cross-section of business cycles. *Journal of the European Economic Association*, Volume 5(6), pp. 1300-1333. http://dx.doi.org/10.1162/JEEA.2007.5.6.1300

Laurenceson, J., C. Joseph and H. Chai (2003), *Financial Reform and Economic Development in China*. Cheltenham, UK: Edward Elgar.

Leybourne, S. and P. Newbold (2003), Spurious rejections by cointegration tests induced by structural breaks. *Applied Economics*, Volume 35(9), pp. 1117-1121. http://dx.doi.org/10.1080/0203684032000082068

Lucas, Robert E. (1988), On the mechanic of economic development. *Journal of Monetary Economics*, Volume 22(1), pp. 3-42. http://dx.doi.org/10.1016/0304-3932(88)90168-7

Mah, J. S. (2000), An empirical examination of the disaggregated import demand of Korea — The case of information technology products. *Journal of Asian Economics*, Volume 11(2), pp. 237-244. http://dx.doi.org/10.1016/S1049-0078(00)00053-1

McKinnon, R. I. (1973), *Money and Capital in Economic Development*. Brookings Institution Press, Washington, DC.

Mobarak, A. M. (2005), Democracy, volatility, and economic development. *Review of Economics and Statistics*, Volume 87(2), pp. 348-361. http://dx.doi.org/10.1162/0034653053970302

Mundell, R. (1963), Inflation and real interest. *Journal of Political Economy*, Volume 71(3), pp. 280-283.

Narayan, P. K. (2005), The saving and investment nexus for China: Evidence from cointegration tests. *Applied Economics*, Volume 37(17), pp. 1979-1990. http://dx.doi.org/10.1080/00036840500278103

Nelson, C. R. (2005), *Macroeconomics*: *An Introduction*, Chapter 4, the Cost of Living and Living with Inflation. Internet Edition as of December 22, 2005.

Nelson, Charles R. and Charles R. Plosser (1982), Trends and random walks in macroeconomic time series. *Journal of Monetary Economics*, Volume 10(2), pp. 139-162. http://dx.doi.org/10.1016/0304-3932(82)90012-5

Nelson, Richard R. and E. S. Phelps (1966), Investment in humans, technological diffusion, and economic growth. *The American Economic Review*, Volume 56(1/2), pp. 69-75. http://www.jstor.org/stable/1821269

Newey, W. K. and K. D. West (1987), A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. *Econometrica*, Volume 55(3), pp. 703-708. http://dx.doi.org/10.2307/1913610

Ocampo, J. A. (2005), A broad view of macroeconomic stability. DESA Working Paper No. 1 ST/ESA/2005/DWP/1.

Onis, Z. (1997), Democracy, populism and chronic inflation in Turkey: The post liberalization experience. *Yapi Kredi Economic Review*, Volume 8(1), pp. 33-50.

Pagano, M. (1993), Financial markets and growth: an overview. *European Economic Review*, Volume 37(2-3), pp. 613-622. http://dx.doi.org/10.1016/0014-2921(93)90051-B

Pattichis, C. A. (1999), Price and income elasticities of disaggregated import demand: Results from UECMs and an application. *Applied Economics*, Volume 31(9), pp. 1061-1071. http://dx.doi.org/10.1080/000368499323544

Perron, P. (1989), The great crash, the oil price shock, and the unit root hypothesis. *Econometrica*, Volume 57(6), pp. 1361-1401. http://www.jstor.org/stable/1913712

Perron, P. (1997), Further evidence of breaking trend functions in macroeconomic variables. *Journal of Econometrics*, Volume 80(2), pp. 355-385. http://dx.doi.org/10.1016/S0304-4076(97)00049-3

Pesaran, M. H. and B. Pesaran (1997), *Working with Microfit 4.0*: *Interactive Econometric Analysis*. Oxford: Oxford University Press.

Pesaran, M. H. and Y. Shin (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. In Strom, S. (ED), *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium, Cambridge*: Cambridge Unbiversity Press.

Pesaran, M. Hashem, Yongcheol Shin and Richard J. Smith (2001), Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, Volume 16(3), pp. 289-326. http://dx.doi.org/10.1002/jae.616

Phillips, P. C. B. and P. Perron (1988), Testing for a unit root in time series regression. *Biometrika*, Volume 75(2), pp. 335-346. http://www.jstor.org/stable/2336182

Piece, T. T. (2012), Macroeconomic stability, inclusive growth and employment. ILO, UNCTAD, UNDESA, WTO.

Raddatz, C. (2007), Are external shocks responsible for the instability of output in low-income countries? *Journal of Development Economics*, Volume 84(1), pp. 155-187. http://dx.doi.org/10.1016/j.jdeveco.2006.11.001

Ramey, G. and V. A. Ramey (1994), Cross-country evidence on the link between volatility and growth. *NBER Working Paper* # W4959.

Ramirez, M. D. (1998), Does public investment enhance productivity growth in Mexico? A cointegration analysis. *Eastern Economic Journal*, Volume 24(1), pp. 63-82. http://www.jstor.org/stable/40325822

Ricardo, D. (1817), *The Principles of Political Economy and Taxation*. Dover Publications (2004).

Rodrik, D. (2012), The Turkish economy after the global financial crisis. *Ekonomi-tek*, Volume 1(1), pp. 41-61.

Romer, Paul M. (1990), Human capital and growth: Theory and evidence. Carnegie-Rochester Conference Series on Public Policy, Elsevier, Volume 32(1), pp. 251-286. *NBER Working Paper* # 3173. http://dx.doi.org.10.3386/w3173

Sala-i-Martin, X. X. (1997), I just ran two million regressions. *The American Economic Review*, Volume 87(2), pp. 178-183. http://www.jstor.org/stable/2950909

Sala-i-Martin, X., G. Doppelhofer and Ronald I. Miller (2004), Determinants of long-term growth: A Bayesian averaging of classical estimates (BACE) approach. *The American Economic Review*, Volume 94(4), pp. 813-835. http://www.jstor.org/stable/3592794

Sanchez-Robles, B. (1998), Macroeconomic stability and economic growth: The case of Spain. *Applied Economics Letters*, Volume 5(9), 587-591. http://dx.doi.org/10.1080/758529505

Shabbir, T. and A. Mahmood (1992), The effects of foreign private investment on economic growth in Pakistan. *The Pakistan Development Review*, Volume 31(4), pp. 831-841. http://www.jstor.org/stable/41259603

Shahbaz, M. (2009), A reassessment of finance-growth nexus for Pakistan: Under the investigation of FMOLS and DOLS techniques. *The ICFAI University Journal of Applied Economics*, Volume 1, pp. 65-80.

Shahbaz, M. (2013), Linkages between inflation, economic growth and terrorism in Pakistan. *Economic Modelling*, Volume 32, pp. 496-506. http://dx.doi.org/10.1016/j.econmod.2013.02.014

Shaw, E. S. (1973), *Financial Deepening in Economic Development*. Oxford University Press, New York.

Shigoka, T. (1994), A note on Woodford's conjecture: Constructing stationary sunspot equilibria in a continuous time model. *Journal of Economic Theory*, Volume 64(2), pp. 531-540. http://dx.doi.org/10.1006/jeth.1994.1081

Solow, R. M. (1956), A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, Volume 70, Issue 1, pp. 65-94. http://dx.doi.org/10.2307/1884513

Subramanian, A. and S. Satyanath (2004), What determines long-run macroeconomic stability? Democratic institutions. *International Monetary Fund Working Paper* # 04/215.

Tobin, J. (1965), Money and economic growth. *Econometrica*, Volume 33, pp. 671-684. http://dx.doi.org/10.2307/1910352

Wolf, H. (2005), Volatility: Definitions and consequences. In J. Aizenman and B. Pinto (eds.), *Managing Economic Volatility and Crises*. Cambridge: Cambridge University Press.

Yiheyis, Z. (2000), Fiscal adjustment to currency devaluation in selected African countries: An empirical analysis. *African Development Review*, Volume 12(1), pp. 1-23. http://dx.doi.org/10.1111/1467-8268.00013