



ROLE OF SAVINGS IN ECONOMIC GROWTH OF PAKISTAN

Abbas Ali Chandio

PhD Scholar; Faculty of Economics and Management, Sichuan Agricultural University. Wenjiang
Chengdu Sichuan 611130, China

Feng Wei

Assistant Professor; Faculty of Economics and Management, Sichuan Agricultural University.
Wenjiang Chengdu Sichuan 611130, China

Jiang Yuansheng

Deputy Dean; Faculty of Economics and Management, Sichuan Agricultural University. Wenjiang
Chengdu Sichuan 611130, China

Abstract

This empirical study aims to examine the relationship between savings and economic growth of Pakistan over the period 1977-2013. Using the autoregressive distributed lag (ARDL) approach to co-integration, the results show that the empirical evidence strongly suggests that domestic savings played important role in economic growth and development of Pakistan in the long-run. The long-run and short-run elasticity of savings are estimated to be 3.072 and 2.071 respectively. Thus, domestic saving is positively and significantly associated to growth in Pakistan.

Keywords: Savings, Economic growth, ARDL approach, Pakistan

1. INTRODUCTION

The domestic savings played vital role in economic growth and development of the developing countries like Pakistan. The neoclassical Solow (1956) suggested that savings affected the economic growth because higher savings lead to capital increase, which in turn lead to economic growth. The new growth theories since the 1980s including Romer (1986, 1990) and Lucas (1988) and Barro (1990), reconfirm the view that the growth of physical and human capital are the drivers of long run economic growth and that high savings rates are important factor of the GDP growth rate as proposed by endogenous growth theories. According to theories of saving, in contrast, saving can be affected by many dynamics, including economic growth. Therefore, if economic growth increases, the saving increases too. According to these two point of views stated in economic theories, examining the association among saving and economic growth is an important as well as controversial problem for policy makers and economists. Several researchers have investigated it as cause and effect relationship. Husain (1995) recommended that much of the differences in economic performance between Pakistan and the rapidly growing Southeast Asian countries, over the last two decades, were because of the low rates of savings and investment in Pakistan. Thus, it was emphasized that difference in the growth rate of developed and developing countries was primarily because of the difference in savings rates. Therefore, World Bank (2012) asked the developing countries to adopt policies which were helpful to savings in order to enhance the economic growth

Corresponding author's

Name: Jiang Yuansheng

Email address: yjiang@sicau.edu.cn

(see [Sinha and Sinha, 1998](#)). According to this view, savings is one of the key determinants of economic growth and it occurs before growth. According to [Lewis \(1954\)](#) savings played important role in the internal resource mobilization and economic progress of developing countries. There exists a rich literature that observe the savings and growth relationship in both single and multi-country contexts for developed and developing countries and employing a diversity of assessment techniques. The economic growth of Pakistan stood low due to rising foreign debt, high inflation rate, and debt servicing, backwardness of human capital, less exports, political unrest, and a bad law and order condition in the country. The main objective of present study is to extend this debate to a country like Pakistan and determine the relationship between savings and economic growth and thus suggest appropriate growth policies. In an attempt to address this issue, we draw on recent savings-growth modeling literature and observe the impact of domestic savings on economic growth in Pakistan using time series data from the period of 1977 to 2013. This study employs Auto regressive distributed lag (ARDL) approach to co-integration to investigate both the short run and long-run effects of domestic savings on economic growth. The layout of the paper is as follows. Section two contains the review of literature. Section three contains data and methodology. Section four contains results and discussions and section five consists on conclusions and recommendations.

2. LITERATURE REVIEW

A lot of empirical works have been documented on savings and economic growth. Thus the theories concerning the relationship between economic growth and domestic savings are well known. Theoretically, by confirming significant savings an economy will benefit in terms of growth. [Harrod \(1939\)](#), [Domer \(1946\)](#) and [Solow \(1956\)](#) growth models support the assertions that increased savings stimulate economic growth. The conventional idea has been that increased savings leads to increased growth; based on the credence that higher savings enables increased investment. Proponents to this school of thought include [Giovannini \(1985\)](#); [Lahiri \(1989\)](#), [Bacha \(1990\)](#), [Carroll and Summers \(1991\)](#); [DeGregorio \(1992\)](#), [Jappelli and Pagano \(1994\)](#); [Fry \(1995\)](#); [Edwards \(1996\)](#) [Lean and Song \(2009\)](#), [Aghion et al. \(2009\)](#) have found a positive relationship between growth in savings and economic growth. These model estimates are supported by empirical findings by [Sinha and Sinha, \(1998\)](#); [Saltz, \(1999\)](#) along with [Anoruo and Ahmad \(2001\)](#). [Lean and Song \(2009\)](#) observed the relationship between domestic savings and economic growth in China from the period of 1955-2004 by using co-integration and causality methods. China has enjoyed high levels of economic growth and savings for a number of decades and they found that indeed, there existed a long run relationship between savings and economic growth in China, taking into account the two savings rates they employed; enterprise savings and household savings. They found the existence of joint causality between domestic savings and economic growth in the short run and a unidirectional causality from domestic savings growth to economic growth in the long run.

[Ekinci and Gül \(2007\)](#) explored the relationship among savings and economic growth for Turkey by using time series data from the period of 1960 -2004. The researchers applied VECM model and co-integration test. The result showed that there is a long-run relationship between saving and economic growth. However, the results of Granger causality analysis, in contrast to the traditional view, indicate that there is one indicator causality in Turkey from economic growth to the domestic saving rates.

[Misztal \(2011\)](#) tried to explore the relationship between saving and economic growth by using-integration and causality tests in terms of 150 developing countries and 34 developed countries and evolution economy. The results revealed that there was a one directional relationship between domestic savings and economic growth in both developing counties and transition economies.

[Muhammad et al. \(2012\)](#) have tried to estimate the impact of savings and credit on economic growth in Pakistan by using time series data for the period of 1973 to 2007, based on the autoregressive distributed lag (ARDL) approach. The results showed that one percent increase in credit to private sector, real gross domestic product will increase at 5.59 percent .The estimated coefficient of national saving was 1.015 indicated that one percent increase in national savings, real gross domestic

product will increase at 1.015 percent. Thus, the credit to private sector has positive and significant impact on economic growth in the long run and in short run.

Mohsen and Maysam (2013) have analyzed the relationship between saving and GDP in Iran by using time series data from the period of 1970-2010, based on ARDL bounds testing approach. The study finds a cointegrating relationship between national real GDP, savings, oil revenues labor force, and education. Compared to the other variables, labor force and human capital (education) have more significant influence on long -run economic growth. Furthermore, in short-run savings and oil revenues have the greatest influence on economic growth.

Mohan (2006) studied the relationship between savings and economic growth for high, middle and low income countries employing time series data from 1960-2001. The results showed that causality ran from economic growth to savings. The findings also show that in countries with a forced savings policy like Singapore, causality runs from savings to economic growth.

3. DATA AND METHODOLOGY

The current study is based on time series data covering the period from 1977 to 2013. To investigate the relationship between domestic savings and economic growth in Pakistan using the savings-growth literature as a basis and following from (Mohan, 2006; Tang and Chua, 2011), the variables considered are real gross domestic product (GDP) as a proxy economic growth, domestic savings measured as the ratio between gross domestic savings (GDS) and GDP. The annual Pakistan’s time series data are taken for 1977 to 2013 from the World Development Indicators (WDI) online database.

3.1. Model specification

The purpose of the model is to estimate the relationship between savings and economic growth in Pakistan. The model is as follows.

$$\ln GDP_t = \alpha_0 + \alpha_1 \ln GDS_t + \varepsilon_t \dots \dots \dots (1)$$

Where gross domestic product (GDP), GDS is the savings-GDP ratio. Both variables are specified in natural log form.

3.2. Autoregressive distributed lag (ARDL) Co-integration analysis

The ARDL bounds testing approach of co-integration was developed by Pesaran and Shin (1999), and Pesaran *et al.* (2001). The econometric advantages of this technique is to associate with other co-integration techniques such as the Engle and Granger (1987) and Johansen (1991) co-integration techniques in the following ways. Firstly, failure to test hypothesis due to endogeneity problems in Engle Granger technique that can be determine by ARDL approach. Secondly, the long-run and short-run parameters of the model can be predicted simultaneously. Thirdly, all variables are theoretical to be endogenous. Fourthly, the bounds test does not depend upon pre-testing of the series to investigate their order of integration since test can be conducted regardless of whether they are integrated at I (0) or I (1). Hence, ARDL model can be specified as :

$$\Delta GDP_t = \alpha_0 + \sum_{i=0}^k \alpha_{1i} \Delta GDP_{t-i} + \sum_{i=0}^k \alpha_{2i} \Delta GDS_{t-i} + v_1 GDP_{t-1} + v_2 GDS_{t-1} + \varepsilon_t \dots \dots \dots (2)$$

Where Δ denotes first difference operator, k is the lag length and ε_t denotes error term respectively. To estimate the long-run relationship F-tests are used. The null hypothesis of no co-integration association is defined as $H_0: v_1 = v_2 = 0$, and against the alternative hypothesis of co-integration is defined as $H_1: v_1 \neq v_2 \neq 0$. The co-integration test is based on Wald test or F-statistic. The F-statistic test has a non-standard distribution. Therefore, Pesaran *et al.* (2001) have provided two sets of critical values for co-integration test. The lower critical bound assumes that all the variables are

I(0), denotation that is no co-integration between the variables, whereas, the upper critical bound assumes that all the variables are I(1). If the calculated F-statistics is greater than upper bound, then the null hypothesis can be rejected indicating that there exists a co-integration association between the variables. If the F-statistics falls less the lower bound critical value, it suggests that there is no co-integration relationship. Finally, when the F-statistic lies between the lower and upper bounds, then the test is inconclusive. After co-integrating is confirmed, the long-run and short-run evaluations of the ARDL approach are obtained. The diagnostic tests of the nominated ARDL model can be assessed from the short-run estimates at this stage of evaluation procedure. Likewise, the test of the parameter stability of the model can be carried out. The error correction demonstration of the series can be specified as follows:

$$\Delta GDP_t = \beta_0 + \sum_{i=0}^k \beta_{1i} GDP_{t-i} + \sum_{i=0}^k \beta_{2i} GDS_{t-i} + \gamma ECM_{t-i} + \varepsilon_t \quad \dots \dots \dots (3)$$

4. EMPIRICAL RESULTS

4.1. Descriptive statistics

Table 1 represented the results of descriptive statistics of the selected variables over the sample period 1977 to 2013. The summary of descriptive statistics contains the means, maximum, minimum and standard deviation of each series after transformation in logarithms form.

Table 1: Summary of descriptive statistics

Variables	GDP	Savings
Mean	3.120	1.474
Maximum	3.415	2.323
Minimum	2.685	0.014
Std. Dev.	0.148	0.524
Observations	38	38

Source: Author’s own calculation using Eviews 9

4.2. Unit root tests

Before estimating the analyzed results for the ARDL approach to co-integration, the unit root tests are applied to evaluate the order of integration of the series. According to (Pesaran, 1997), the ARDL bounds testing method can be used irrespective of whether the variables are I (0) or I (1). The first step is to find out the stationarity characteristics of the series. This can be done using unit root tests like as Phillips-Perron (PP) and the popular Augmented Dickey-Fuller (ADF) Dickey and Fuller (1979, 1981). Therefore, the results of unit root tests indicate that both the variables .i.e. GDP and GDS are stationary at level which indicate that they are stationary of order zero I (0). The Phillips- Perron (PP) and ADF tests presented with Intercept and trend and intercept as in table (2).

Table 2: Presents the results of ADF and Phillips-Perron unit root test

Variables	ADF Test			
	Levels		First Difference	
	Intercept	Intercept & trend	Intercept	Intercept & trend
LGDP	-4.333***	-4.465***	-3.368**	-3.282*
LSAVING	-3.988***	-2.783	-5.660***	-3.412*
Variables	Phillips-Perron			
	Levels		First Difference	
	Intercept	Intercept & trend	Intercept	Intercept & trend
LGDP	-4.377***	-4.468***	-7.670***	-7.453***
LSAVING	-3.988***	-4.672***	-22.635***	-22.608***

Note: ***, ** and * indicates significance at 1%, 5% and 10% level respectively

Source: Author’s own calculation using Eviews 9

4.3. Johansen and Juselius co-integration tests

The next step is to check co-integration analysis based on (Johansen and Juselius, 1990) two tests are used such as maximum eigenvalue and trace statistic at 5% level of significance which is presented in Table 3 which shows that there is long run association within all variables of the study and reject the hypothesis of no co-integration. The values of Trace Statistic and Maximum Eigen are greater than critical values which shows that the existence of 2 Co-integration equation(s) at five percent significant level.

Table 3: Results of unrestricted co-integration rank test (Trace and maximum eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Trace statistic	0.05 Critical value	Prob.
None *	0.368	22.154	15.494	0.004
At most 1 *	0.144	5.602	3.841	0.018
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)				
Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.
None *	0.368	16.551	14.264	0.021
At most 1 *	0.144	5.602	3.841	0.018

Trace test indicates 2 co integration eqn(s) at the 0.05 level
 *denotes rejection of the hypothesis at the 0.05 level
 **MacKinnon-Haug-Michelis(1999)p-values

Source: Author’s Calculation using Eviews 9

4.4. Bounds tests for Co-integration

The second step is to check the presence of the long-run relationship through the bounds test for co-integration technique which is presented in table (4) .By applying the ARDL bounds method, which the (GDP) as dependent variable, note that the computed F-statistics is above the upper bound and lower bound critical values provided by Pesaran et al. (2001). The computed F-Statistics is 11.05 while upper bound critical bound at 1% significance level lower bound is 6.84 and upper bound is 7.84. This implies that there is long-run relationship between GDP and GDS over the period of 1977 to 2013 in Pakistan.

Table 4: Results of bounds test

Significance level	F-Statistics Lower Bound	11.05 Upper Bound
1%	6.84	7.84
5%	4.94	5.73
10%	4.04	4.78

Note: Critical Values are obtained from Pesaran et al. (2001)

4.5. Results of the Long-run ARDL approach

Since GDP is co-integrated with the regressors in the model, then long-run parameters of the ARDL approach are investigated and the results represented in the Table 5 below. The empirical results are conducted to capture the effect of domestic saving on economic growth in Pakistan.

Table 5: Estimated Long-run coefficients using the ARDL approach: ARDL (1, 0) selected based on the Schwarz Bayesian Criterion, 1977 to 2013

Regressor	Dependent variable: LnGDP			
	Coefficient	Standard error	T-ratio	Prob.
LnGDS	3.072	0.951	3.228	[0.003]
Cons	-8.153	2.983	-2.733	[0.010]
R-Squared	0.521		R-Bar-Squared	0.493
S.E.of Regression	0.422		F(2.34)	18.561[0.000]
DIAGNOSTIC TESTS				

Test Statistics	LM Version	F Version
A: Serial Correlation	CHSQ(1) = 0.966[0.326]	*F(1,33) = 0.885[0.354]
D: Heteroskedasticity	CHSQ(1) = 2.041[0.153]	*F(1,35) = 2.044[0.162]

Note: Results are based Author’s calculations using Microfit 5.01

As shown in Table 5 the empirical regression results indicate that there is a positive relationship among savings and economic growth in Pakistan. The estimated parameter on Domestic Saving is statistically significant at 1% significance level. The value of regression coefficient of domestic saving-GDP ratio that is 3.07 which means that the one percent increase in domestic saving-GDP ratio, the economic growth will increase by 3.07 percent. This confirms that the domestic saving can lead to economic development of country. This finding consistent with Kafayat and Moyo (2013) who found positive relationship between savings and economic growth. The fitness of this model is good it can be viewed from the value of the coefficient of determination, R- Squared. The high value of R² is (0.52) which indicate that 52% of total change in economic growth is due to independent variable. Furthermore, the results indicate that the model passes all the diagnostic tests that show no evidence of serial correlation and heteroskedasticity.

Table 6: Estimated Error Correction representation for the selected ARDL Model: ARDL (1, 0) selected based on the Schwarz Bayesian Criterion, 1977 to 2013

Dependent variable :LnGDP				
Regressor	Coefficient	Standard Error	T-ratio	Prob
dlnGDS	2.071	0.536	3.859	[0.000]
ecm(-1)	-0.674	0.132	-5.071	[0.000]
ecm = GDP -3.072*GDS + 8.153*C				

Note: Results are based Author’s calculations using Microfit 5.01

In Table 6 represents the results of short run coefficient of ECM. The estimated coefficient of Ecm-1(-0.67) is also negative and statistically at 1% confidence level which is evidence of long-run relationship exists (Bannerjee *et al.*, 1998). The values of ECM shows that the variables adjust to the long-run equilibrium in about 1.56 period following a short-run shocks As well, we have checked the stability test through the plot of cumulative sum of recursive residuals of square (CUSUMQ) and cumulative sum of recursive residuals (CUSUM) which proposed by Brown *et al.* (1975).The results of CUSUM and CUSUMQ in figures 1 and 2 indicate that all the coefficients of estimated model are stable over time within the critical bounds 5% of significance level. In our ARDL model, long-run and short-run estimates are stable over the period of 1971 to 2015.

5. CONCLUSION AND POLICY RECOMMENDATIONS

This study has empirically examines the relationship among savings and economic growth in Pakistan employing time series data from 1977 to 2013. The study used ARDL approach to co-integration; the results show that there is long-run relationship between savings and economic growth in Pakistan. The long-run and short-run coefficients of savings are estimated to be 3.072 and 2.071 respectively. In both the long-run and short-run, domestic savings is positively and significantly associated to economic growth. The role played by domestic savings and hence investment becomes an important in supporting the country’s diversified economic development. Therefore our study findings suggested that government of Pakistan should formulate the appropriate policies to promote the domestic savings and increases savings overall in the country.

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Appendix

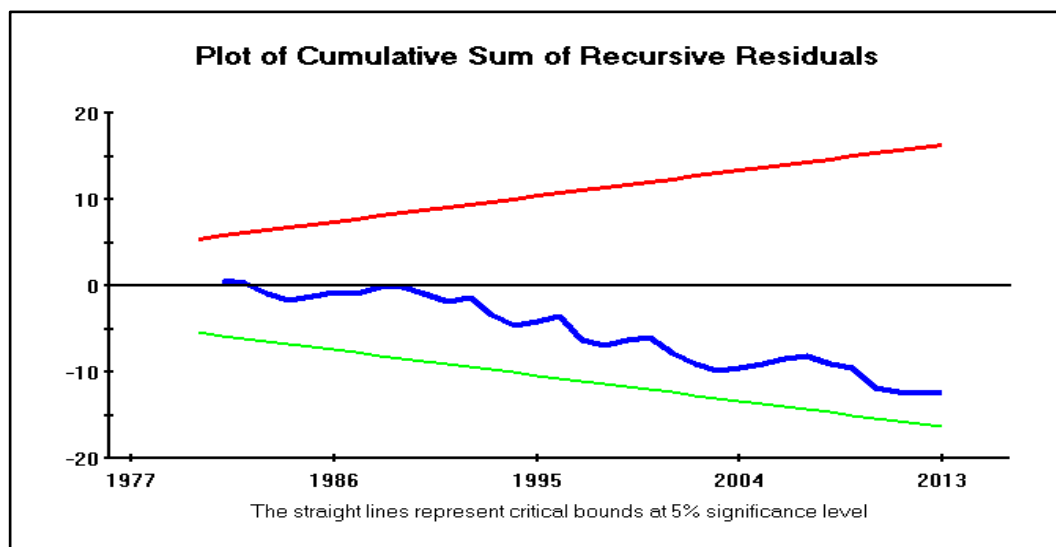


Figure 1: Plot of cumulative sum of recursive residuals

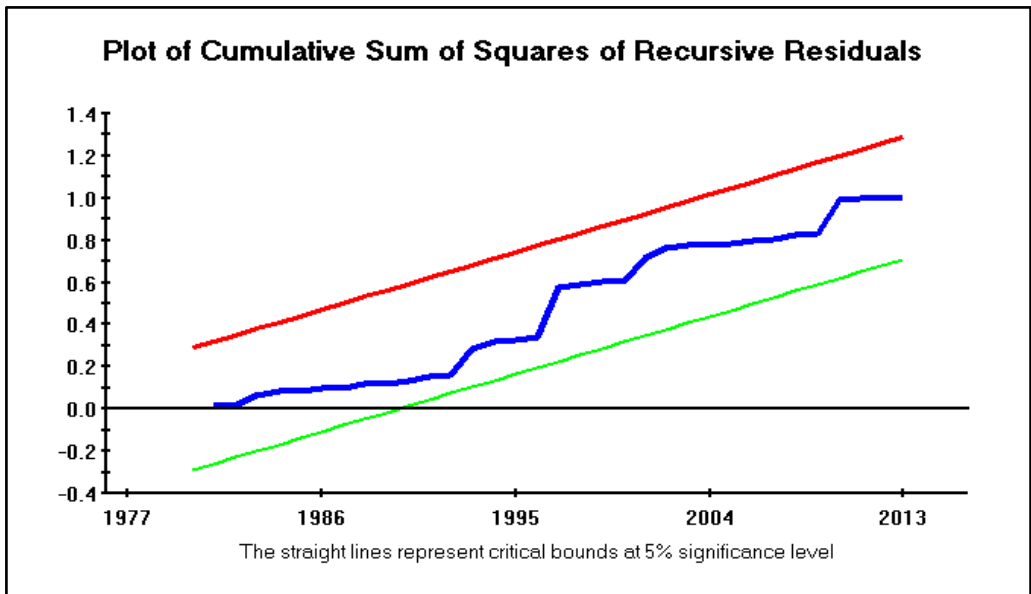


Figure 2: Plot of cumulative sum of squares of recursive residuals

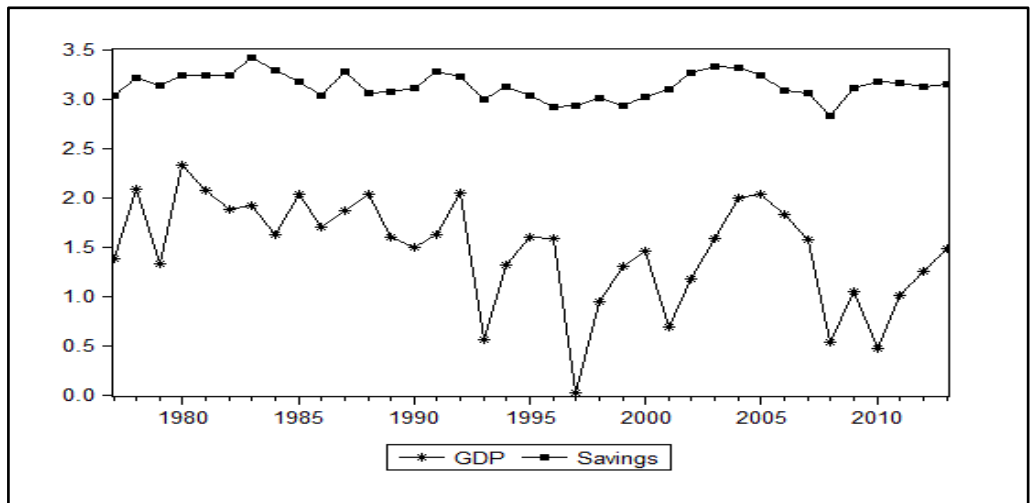


Figure 3: Gross Domestic savings (% of GDP) and growth rate of GDP.1977-2013

Source: World Development Indicators (Online)