

## Macroeconomic determinants of saving in South Asia: Evidence from panel ARDL



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### ABSTRACT

The basic purpose of this research is to explore the short and long run macroeconomic determinants of saving in South Asian countries while saving has been disaggregated into gross saving and gross domestic saving. The study applied the panel ARDL model to analyze the short and long run determinants of saving. The study focuses on only four South Asian countries i.e., Bangladesh, India, Pakistan, and Sri Lanka from 1980 to 2019. The results depicted that GDP per capita growth, export growth, and money supply have positive and significant, while foreign direct investment has a significant and negative effect on gross saving in the long run. On the other hand, GDP per capita growth, money supply, and working age population have positive and significant, while foreign direct investment has a significant and negative effect on gross domestic saving in the long run. Bidirectional causality exists among the gross saving and GDP per capita growth, while unidirectional causality exists from working age population to gross domestic savings. Government has to increase the investment projects that lead to an increase in the employment level and income of the people, as well the government has to encourage local investment by stabilizing the market and discouraging foreign direct investment.

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### 1. Introduction

The central problem in the theory of economic development is to understand the process by which a community that was previously saving and investing 4 or 5 percent of its national income or less, converts itself into an economy where voluntary saving is running at about 12 to 15 percent of national income or more (Deaton, 2010). This is the central problem because the central fact of economic development is rapid capital accumulation (including knowledge and skills with capital)" (Lewis, 1954).

Saving is a prerequisite for development and prosperity in developing as well as developed economies. Most developing economies have fewer savings proportions. Harrod-Domar's growth model explained that the development of an economy is directly proportional to the rate of saving in an economy, while Solow's growth model also

highlighted the importance of saving for higher growth in per capita income (Durlauf et al., 2001). The endogenous growth model highlighted the critical role of saving and population in the growth rate of an economy. In developed economies, the possibilities and accumulation of savings are very high which played a crucial role in the development and prosperity of the country, while the situation is reversed in developing economies. Lack of investment is the major reason why developing countries lag behind developed ones. Low saving rate forces developing countries to depend on foreign countries for investment (Bosworth et al., 1999). On the other hand consumption in most developing economies remain healthy. People spend more than 75% of their income on the basic necessities of life in South Asian countries. The majority of the population in developing economies belongs to the middle or lower middle class due to which consumption remains very strong and saving remains low. In developing countries, it is necessary to increase the pace and growth of saving rates for sustainable development.

In developing economies people save less and consume more due to which the marginal propensity to save remains low in these countries. Steady and sustainable growth can only be ensured with enhanced goods and services produced with the use

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of new extensive technologies. It can only be possible with increased investment in the real sector of the economy (Bernheim and Shoven, 1991). Direct investment with the support of local government provides the auspicious environment for the provision of the development and production of goods and services. Domestic resources attract investment in order to produce competitive goods and services. This can only happen with increased savings leading to increased investment and growth (Bairamli and Kostoglou, 2010). Different theories of saving have developed over time. The relative income hypothesis suggests that the spending pattern of individuals is influenced more by others (Duesenberry, 1949). The permanent income hypothesis considered permanent income as a determinant of consumption (Friedman, 1957). Friedman (1957) stated that a change in permanent income impacts choices and determines consumer consumption patterns. Life-cycle hypothesis emphasizes that individuals saving depend on their age and available resources (Modigliani, 1986). It forms a cycle of saving habits of people on their age and available resources. Horioka (1997) found that a negative relationship exists between the ratio of minors to the working age population and household saving rate. Gersovitz (1988), Deaton (1991), and Mikesell and Zinser (1973) found that the basic determinants of savings are income, wealth, government deficits, government savings, rate of return, foreign savings, and demographic variables.

A large number of research works are available on the macroeconomic determinants of saving in developed countries, however, there is scarce literature in the context of developing countries, especially South Asian countries. The aim of this study is to fulfill this gap by providing the long as well as short run macroeconomic determinants of saving in South Asian countries while saving has been disaggregated into gross saving and gross domestic saving. The major importance of this study is to provide the necessary evidence, better understanding, and information to researchers, policymakers, and individuals to enhance the saving rate. This paper will help the government, policymakers, and civilians in evaluating and understanding the problem required to increase the saving rate.

## 2. Literature review

Pandit (1985) examined the determinants of the saving propensity of households in India from 1950 to 1981. The results depicted that the marginal propensity to save households varies with income and income classes as well as the saving behavior of rural and urban households is different, while the marginal propensity to save (MPS) is higher for urban and lower for rural households. Carroll and Weil (1994) analyzed the association between savings and income growth across countries from 1958 to 1987. They found that higher income households save more as compared to lower income

households. They concluded that the positive effect of saving on economic growth is overstated. Ostry and Levy (1995) analyzed the determinants of the decline in private savings in France by using quarterly data from 1970 to 1993. They found that household expectations about the future course of income significantly influence consumption and saving decisions while saving is negatively related to the expected future growth rate of labor income.

Börsch-Supan et al. (2005) analyzed the triangular effect between population aging, saving, and capital markets for twenty-four OECD countries. They found that population aging increases savings which increases the investment in the capital market and increases the total factor productivity and efficiency of capital markets. Horioka and Wan (2007) examined the determinants of household savings in Chinese provinces from 1995 to 2005. They found that the main determinants of household savings are lagged saving rate, income growth rate, inflation rate, and real interest rate. They concluded that the permanent income hypothesis and life cycle hypothesis show mixed results in China, while household savings remain high in China. Sajid and Sarfraz (2008) examined the causal association between output and saving in Pakistan from 1973 to 2003. Results depicted that bi-directional long run causality exists among the output level and saving rate. The results also indicated that one way causality exists from GDP to public saving, while GNP to national and domestic saving as well as unidirectional causality exists among gross domestic product (GDP) and national saving in the short run.

Khan and Hye (2010) analyzed the connection between household savings and financial sector reforms in Pakistan from 1988 to 2008. They found that financial liberalization has negative relation with household saving in the long and short run. They concluded that household savings slid down due to financial liberalization instead of being increased. Haile (2013) analyzed the long and short run determinants of domestic saving in Ethiopia from 1970 to 2011. Results showed that the growth rate of income, inflation rate, and budget deficit ratio are the major determinants of domestic saving in the short run and long run in Ethiopia. Haile (2013) concluded that the effect of the inflation rate and budget deficit must be minimized, while the level of income must be increased for a sustainable increase in domestic saving. Shaikh and Sheikh (2013) examined the macroeconomic determinants of saving in Pakistan from 1981 to 2005. Results depicted that real GDP and market capitalization growth rate are directly proportional to the national saving rate, while inversely proportional to federal debt growth and inflation. They concluded that saving is a positive function of income in Pakistan.

Samantaraya and Patra (2014) analyzed the household savings determinants in India after the post-reform from 1972 to 2012. They found that GDP, inflation, dependency ratio, and interest rate have a significant influence on household savings in India in the short and long run. They concluded that

increased saving and sustained saving growth is directly proportional to price stability and avoiding any disruption in the growth process in India. [Kandil \(2015\)](#) examined the determinants of low household savings in the USA after the financial meltdown. The results of the study showed that the consumer sentiment index (CSI) has a significant effect on household saving in the long run and short run in the USA, while in the short run net wealth and productivity increase the saving rate. [Zhuk \(2015\)](#) examined the macroeconomic determinants of household savings in Ukraine from 1992 to 2013. The results of the study showed that gross national income and household consumption expenditure are major macroeconomic determinants of household savings in Ukraine. [Akram and Akram \(2016\)](#) examined the macroeconomic determinants of saving behavior in Pakistan from 1973 to 2013. They found that interest rate, foreign savings, and inflation, interest rate have a significant negative relationship with national, public, and private savings, while financial sector development and economic growth increase savings in Pakistan.

### 3. Model, methodology, and data

The theory of Keynes, life cycle, and permanent income is the basis of modern consumption theory. These theories referred to how consumption and investment influence the real economy. [Modigliani \(1986\)](#) and [Friedman \(1957\)](#) illustrated the process of decision-making on the lifetime consumption decision. It stated how the standard of living sustains with changes in income over the period of life. In the life cycle hypothesis, people save at a young to meet up the unexpected events of the future in life. The permanent income hypothesis depicted the level of income available to a consumer over a period of life. This study has utilized the following two models to measure the association between the macroeconomic variables and saving. The first model measures the relationship between gross savings and macroeconomic variables as:

$$GS = f(WAP, GDPPCG, M2, EG, FDI) \quad (1)$$

where, GS is gross saving, WAP is working age population, GDPPCG is GDP per capita growth, M2 is money supply, EG is export growth and FDI is foreign direct investment inflows.

The second model measures the impact of gross domestic savings on macroeconomic variables as:

$$GDS = f(WAP, GDPPCG, M2, EG, FDI) \quad (2)$$

where, GDS is gross domestic saving, WAP is working age population, GDPPCG is GDP per capita growth, M2 is money supply, EG is export growth and FDI is foreign direct investment inflows.

Panel data is used to measure the heterogeneity and cross-section specific effect due to which it is preferred over time series and cross-section data. Reliability of results as well as robustness increases

due to the large size of the sample in panel data. More efficiency, variability, information, and less collinearity among the variables are provided by large sample size data ([Wooldridge, 2010](#); [Gujarati, 2022](#); [Baltagi, 2008](#)). The stationarity of the variables is checked in the first step to avoid misleading results and spurious regression. The stationarity of the variable is examined by IPS, LLC, and the Fisher-ADF panel unit root test. [Levin et al. \(2002\)](#) gave a unit root test which was based on the pool data. When the number of countries lies between 10 to 25 and the time period is 5 to 250 then the LLC test is preferred. In IPS test variables have characteristics of zero mean and finite heterogeneous variance as proposed by [Im et al. \(2003\)](#). Fisher-ADF unit root test is presented by [Maddala and Wu \(1999\)](#) with the idea of [Fisher \(1932\)](#).

[Pesaran and Smith \(1995\)](#) and [Pesaran et al. \(1999\)](#) came up with a technique to estimate nonstationary dynamic panels called Pooled Mean Group (PMG). PMG is utilized to analyze the short and long run association among the variables as well as to investigate the heterogeneous dynamic issue across countries. The methodology which is used to test these associations is the Autoregressive Distributed lag (ARDL) model in the panel setting. The general form of the PMG model or ARDL can be specified as:

$$Y_{it} = \sum_{j=1}^p \lambda_{ij} Y_{i,t-j} + \sum_{j=0}^q \delta'_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it} \quad (3)$$

where,  $Y_{it}$  is dependent variable for group  $i$ , vector of explanatory variables for group  $i$  is represented by  $X_{it}$  is  $(k \times 1)$ , fixed effects are represented by  $\mu_i$ ,  $\lambda_{ij}$  is the coefficient of the lagged dependent variable,  $\delta_{ij}$  is  $(k \times 1)$  coefficient vector of independent variables,  $\varepsilon_{it}$  is the error term,  $i$  (1, 2, ..., N) depicted the number of cross-sections, and  $t$  (1, 2, ..., T) is the number of time.

The above model can be re-parametrized as a VECM system as:

$$\Delta Y_{it} = \theta_i ECT_{it} + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta Y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}^{*'} \Delta X_{i,t-j} + \mu_i + \varepsilon_{it} \quad (4)$$

where,  $ECT_{it} = \phi_i Y_{i,t-1} - \beta_i' X_{i,t-1}$ .

The speed of adjustment is represented by parameter  $\theta_i$  error correction term (ECT). Negative and statistically significant error term shows that variables indicate a convergence to long run equilibrium. Insignificant error correction term indicated the absence of long run relationship. Causality test is used under the framework of VECM if the variables have long run association. Significance of lagged ECT term in VECM is used to measure the long run association, while the direction of causality is determined by the granger causality test in the short run.

The data for South Asian countries i.e., India, Bangladesh, Pakistan, and Sri Lanka from 1980 to 2019 at annual frequency is used in this analysis. The study emphasizes only four countries due to the

unavailability of data for other countries. The main source of data is “World Development Indicators” published by the World Bank. The data of gross saving as a % of GDP (GS), gross domestic saving as a % of GDP (GDS), money supply as a % of GDP (M2), and foreign direct investment as a % of GDP are taken from WDI. GDP per capita growth (GDPPCG), working age population (WAP), and export growth (EG) are also taken from WDI.

#### 4. Results

The order of integration of the variable is examined by panel unit root test i.e., Levin et al. (2002), Im et al. (2003), and Fisher-ADF (F-ADF) test. Schwarz information criteria (SIC) is used for

the selection of lag length. Table 1 shows the results of the unit root test. Results showed that all the variables are stationary at I(0), while GS, GDS, and M2 are stationary at I(1). The assumption of ARDL is fulfilled by the results of the unit root test i.e., dependent variable GS and GDS are integrated of I(1) and none of the variables is I(2).

The results of the long run dynamics of model-I and model-II are reported in Table 2. The results of model-I depict that the working age population (WAP) has positive and insignificant relation with gross saving and implies that the working age population has an insignificant effect on saving in developing economies which are supported by Börsch-Supan et al. (2005).

**Table 1:** Results of LLC, IPS, and F-ADF panel unit root test

Var	LLC		IPS		F-ADF		Results		
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	LLC	IPS	F-ADF
GS	-0.8075	-3.6708***	-0.1730	-6.3277***	11.1233	52.7458***	I(1)	I(1)	I(1)
GDS	-0.0906	-8.1140***	0.6955	-6.5743***	4.1668	55.0326***	I(1)	I(1)	I(1)
WAP	-3.7842***	----	-1.7603**	----	15.5384**	----	I(0)	I(0)	I(0)
GDPPCG	-2.7993***	----	-4.2463***	----	31.9919***	----	I(0)	I(0)	I(0)
M2	0.3789	-4.7673***	2.6789	-4.5538***	2.0789	37.6842***	I(1)	I(1)	I(1)
EG	-3.1256***	----	-4.9353***	----	38.4514***	----	I(0)	I(0)	I(0)
FDI	-1.6524**	----	-2.6968***	----	21.3751***	----	I(0)	I(0)	I(0)

\*\*\*, \*\*, and \* show significance at 1%, 5%, and 10% level respectively

GDP per capita growth (GDPPCG) has a significant and positive relation with gross saving which is supported by Carroll and Weil (1994). It shows that when the per capita income of people increases then people tend towards more saving. Money supply (M2) has a positive and significant relation with gross savings. Whenever the money supply increases then people have more money to consume and feel comfortable saving more for an unexpected event in the future. Export growth (EG) has a positive and significant relation with saving. Foreign direct investment (FDI) has a negative and significant relation with gross saving which implies that an increase in FDI discourages saving at the local level.

In model-II gross domestic saving has a positive and significant relationship with the working age population. An increased working age population causes to increase in the income level of the household. This increase in the level of income causes to increase in the marginal propensity to save. On the other hand money supply, and GDP per capita growth has a positive and significant relation with gross domestic saving. FDI has a negative and significant relationship with the domestic saving whereas export growth has no influence on the gross domestic saving.

**Table 2:** Long run dynamics

Variables	Model-I Dependent Var: GS ARDL (1,1,1,1,1,1)	Model-II Dependent Var: GDS ARDL (1,1,1,1,1,1)
WAP	-0.36336 (0.2394)	0.1374** (0.0550)
GDPPCG	0.91837*** (0.2879)	1.8398*** (0.6719)
M2	0.31078*** (0.0996)	0.1891** (0.0980)
EG	0.20313*** (0.0599)	-0.0299 (0.0905)
FDI	-2.2357*** (0.7540)	-3.6816** (1.7889)

\*\*\*, \*\*, and \* show significance at 1%, 5%, and 10% level respectively; Standard errors are in parenthesis

Panel ARDL model is converted into an error correction model (ECM) for analyzing short run dynamics. Error correction term (ECT) represents the speed of adjustment of the variable toward equilibrium while convergence in the short run is depicted by the negative sign. Table 3 shows the results of short run dynamics. The negative and significant ECT term in both the models shows that

long run association exists among the variables. Results of model-I shows that the working age population (WAP) and money supply (M2) has a positive and insignificant effect on gross saving, while foreign direct investment (FDI) has a negative and insignificant effect on gross saving in the short run in the South Asian countries. On the other hand, GDP per capita growth (GDPPCG) has a positive and



significant effect on gross saving which is supported by [Carroll and Weil \(1994\)](#), while export growth has a significant and negative effect on gross saving in the short run. Results of model-II show similar results as model-I in the short run except for export

growth (EG) and foreign direct investment (FDI). FDI has a negative and significant effect on gross domestic savings, while export growth has a negative and insignificant effect on gross domestic savings in the short run.

**Table 3: Short run dynamics**

Variables	Model-I Dependent Var: $\Delta GS$ ARDL (1,1,1,1,1)	Model-II Dependent Var: $\Delta GDS$ ARDL (1,1,1,1,1)
$\Delta WAP$	0.3722 (2.2295)	0.5174 (1.2605)
$\Delta GDPPCG$	0.1227*** (0.0353)	0.1453** (0.0662)
$\Delta M2$	0.0713 (0.1221)	0.0060 (0.1408)
$\Delta EG$	-0.0575*** (0.0203)	-0.0099 (0.0289)
$\Delta FDI$	-0.2377 (0.2986)	-0.5708* (0.3008)
ECT(-1)	-0.3704*** (0.1219)	-0.1945*** (0.0593)

\*\*\*, \*\*, and \* show significance at 1%, 5%, and 10% level respectively; Standard errors are in parenthesis

**Table 4** describes the results of the granger causality test. The result shows that bidirectional causality exists among gross saving and GDP per capita growth, while unidirectional causality exists from gross saving to export growth and foreign direct investment. On the other hand, bidirectional

causality exists between money supply and gross domestic saving, while unidirectional causality exists from working age population to gross domestic saving. Unidirectional causality also exists from gross domestic saving to GDP per capita growth and foreign direct investment.

**Table 4: Results of the causality test**

Model	F-Statistics	Causality
Working Age Population $\rightarrow$ Gross Saving	2.9580	No
Gross Saving $\rightarrow$ Working Age Population	1.4779	No
GDP per capita growth $\rightarrow$ Gross Saving	6.4759***	Yes
Gross Saving $\rightarrow$ GDP per capita growth	11.2041***	Yes
Money Supply $\rightarrow$ Gross Saving	3.1689	No
Gross Saving $\rightarrow$ Money Supply	7.0536	No
Export Growth $\rightarrow$ Gross Saving	2.5656	No
Gross Saving $\rightarrow$ Export Growth	4.7078**	Yes
Foreign Direct Investment $\rightarrow$ Gross Saving	1.5143	No
Gross Saving $\rightarrow$ Foreign Direct Investment	9.0224***	Yes
Working Age Population $\rightarrow$ Gross Domestic Saving	4.6846**	Yes
Gross Domestic Saving $\rightarrow$ Working Age Population	2.2681	No
GDP per capita growth $\rightarrow$ Gross Domestic Saving	2.4912	No
Gross Domestic Saving $\rightarrow$ GDP per capita growth	6.6212***	Yes
Money Supply $\rightarrow$ Gross Domestic Saving	4.3712**	Yes
Gross Domestic Saving $\rightarrow$ Money Supply	5.0913**	Yes
Export Growth $\rightarrow$ Gross Domestic Saving	1.3568	No
Gross Domestic Saving $\rightarrow$ Export Growth	3.9983	No
Foreign Direct Investment $\rightarrow$ Gross Domestic Saving	1.3302	No
Gross Domestic Saving $\rightarrow$ Foreign Direct Investment	6.9364***	Yes

\*\*\*, \*\*, \* show significance at 1%, 5%, and 10% respectively

## 5. Conclusion

Saving is a prerequisite for sustainable economic growth and prosperity. Harrod-Domar's growth model, Solow's growth model, and the endogenous growth model emphasized the critical role of saving for higher economic growth. People save less and consume more in developing economies and therefore the marginal propensity to save remains low in these countries. The objective of this paper is to explore the long run and short run macroeconomic determinants of savings in South Asian countries while saving has been disaggregated into gross saving and gross domestic saving. The major importance of this study is to provide a better understanding, necessary information, and evidence

to researchers, policymakers, and individuals to enhance the saving rate. Panel data is used because it provides less co-linearity, more information, and efficiency among the variables. Whereas the panel ARDL model is used to analyze the short as well as long run determinants of saving. The study focuses on four South Asian countries' unavailability of data i.e., Bangladesh, India, Pakistan, and Sri Lanka from 1980 to 2019.

Results of the first model showed that GDP per capita growth, export growth, and money supply have a significant and positive effect on gross saving, while foreign direct investment has a negative and significant and the working age population has an insignificant effect on gross saving in the long run. Results of the second model showed that GDP per

capita growth, money supply, and working age population have a positive and significant effect on gross domestic saving, while foreign direct investment has negative and significant and export growth has an insignificant effect on gross domestic saving in the South Asian countries in the long run. The negative and significant ECT term in both the models shows that long run association exists among the variables. The Granger causality test shows that bidirectional causality exists among gross saving and GDP per capita growth, while unidirectional causality exists from gross saving to export growth and foreign direct investment. Bidirectional causality exists between money supply and gross domestic saving, while unidirectional causality exists from working age population to gross domestic saving. Unidirectional causality also exists from gross domestic saving to GDP per capita growth and foreign direct investment.

The study suggests the following policy recommendations in the light of the above results: firstly, saving is directly proportional to GDP per capita growth, therefore the government has to increase the investment projects that lead to an increase in the employment level and income of the people, and secondly, foreign direct investment is inversely proportional with saving, therefore the government has to encourage the local investment by stabilizing the market and discourage the foreign direct investment.

## Compliance with ethical standards

## Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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