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Influence of Saving on Capital Formation in India During 1991-2010: A Granger and Co- Integration Analysis

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ABSTRACT

In this paper the attempt is made to investigate co-integration between Gross Domestic Saving and Gross Domestic Capital Formation, and also to identify the direction of causal relationship between these two variables. In order to examine long-term relationship and causality among these variables. In this paper we have used Johansen co-integration and Ganger causality test with time series data covering the period of 1991-2010 in India. Using annual data, the results show that the unidirectional causal relationship runs from gross domestic saving to gross domestic capital formation.

1. INTRODUCTION

In the days of Globalization many countries have achieved higher Economic Growth. Therefore many Economic Thinkers and academicians are writing papers and articles on influence of Saving on Capital Formation, because Economic Development depends upon Capital Formation depends upon Savings. Thus the root cause of higher Economic Growth is higher Capital Formation and higher Capital Formation depends on higher Saving. This is how it becomes necessary to know and study about the influence of Saving on Capital Formation. Savings have been improving over the years with rise in economic growth and incomes in India. Savings constituted 33.7% of GDP in 2010, though pre-crisis it was higher at 36.9% in 2008. Gross domestic Savings stood at 9.7% of GDP in 1951-1960. Savings improved gradually in the 1980s and 1990s as the economy started opening to reforms. Sharpest rise in Savings was in 2000-2010. Household Savings at present is 23.5% of GDP and constitutes around 70% of total Savings. With rise in incomes, household Savings have risen. Private Savings account for 24% of total Savings. It stood nearly around 10% of total Savings for four decades since independence. As India embraced a market-based economy, corporate Savings started increasing. Corporate Savings have risen sharply because open markets provided competition, market access and better efficiency. Economic reforms in the 1990s increased corporate Savings sharply to around 17% in the same decade. It improved further in 2001-2010 to 21%. Public sector Savings stood around 21% in 1951-1960 and increased to around 25% in the next two decades. In subsequent decades, it has came down. In the 1990s, it fell to 5.2% of total Savings. 1990s saw losses in public enterprises and huge deficits by government that pushed public Savings into negative territory. Capital formation in 1950s was low as 7.8% of GDP, which improved gradually in next few decades with constant focus on improvement in physical stock. Over time, Gross capital formation has more than quadrupled to the current 35.8% levels of GDP. Rise in capital formation has been particularly higher during post liberalisation period that began in early 1990s. In 2005, it rose to 30% and has stayed there since then. India also witnessed surge in economic growth during this period to 9% levels. There are many factors that have aided rise in Capital Formations, particularly increase in Savings and the process of de-licensing, among others. Savings improved due to rise in incomes and also due to factors such as spread of branch banking that extended the reach of banking to the remotest parts of the country. Moreover, the relationship between Savings and Capital Formation can have significant implication on the state of the economy. High Savings and Capital Formation gap can have resultant effect on balance of payment equilibrium. Although attracting foreign capital remain a necessity that cannot be avoided especially for a Developing economy like India.

The remainings of the paper are organised into nine sections including earlier introduction. Section two presents theoretical foundation of the study, Section three describes the objectives of study, Section four is about hypotheses, and Section five describes sources of data Section six is about methodology. Section seven, reviews literatures. The empirical findings are reported in Section eight, Section nine presents conclusions and recommendations.

2. THEORETICAL FOUNDATION

Increase in Income leads to increase in saving. Increase in saving leads to increase in Capital Formation. Increase in Capital Formation turns into increase in capital formation. Saving and Capital Formation are two key factors which play a significant role in economic growth of every country. Capital Formation is net addition to the existing stock of capital. Capital formation is the backbone of an economy. Saving which is defined as that part of income which is spent not immediately or consumed but reserved for future consumption, Capital Formation or for unforeseen contingencies like agricultural farmer does not consume or sale whatever is produced of any crops, but saves some of it to use as seeds for ploughing back otherwise he will not be able to produced crop next year. Thus it is unavoidable and indispensable for Capital Formation, economic growth and development. Its role is reflected in capital formation through increase capital stock and the impact it makes on the capacity to generate more and higher income (Temidayo 2011).Typically, Capital Formations are funded through domestic Savings mostly and the remainder through foreign capital. Domestic Savings are from three sources -- households, private and public sector. Household Savings form the largest part of total Savings. Corporate Savings have improved in recent years while public Savings have declined. As domestic Savings contributes the most to capital formation, it can also be a limiting factor to Capital Formations. Thus the importance of foreign Capital Formations gets highlighted. Foreign capital can bridge the gap in capital formation if domestic Savings are not sufficient enough. Savings rate has improved during post-liberalisation period to 36% of GDP in India, which points to rise in economic activity and national income in India. The country currently is among the high-saving economies of the world. However, India's saving rate is still far lower compared with saving rate of China, which is around 50% of GDP.

3. OBJECTIVES OF THE STUDY

The main objective of this paper is to investigate causal relationship between Gross domestic saving and Gross Domestic Capital Formation in India. We want to empirically investigate the effect of domestic saving on capital formation and also examine the impact of capital formation on domestic saving in India during 1991 to 2010.

4 HYPOTHESES OF THE STUDY

The present paper aims at determining empirical causal relationship between Domestic saving and capital formation in India:

1. Increase in Domestic Saving leads to increase in Domestic Capital Formation.
2. Increase in Domestic Capital Formation Does not lead to increase in Domestic Saving.

5. SOURCES OF DATA

The study used secondary data available in published sources. The time series data on Gross Domestic Saving and Gross domestic capital formation was compiled from the Reserve Bank of India website.Data used in this paper are covering the 1991-2010 periods. Variables used in this study are GDCF (gross domestic capital formation) and GDS (gross domestic saving).

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6. RESARCH METHODOLOGY

To avoid fluctuations in the data natural logarithms of all the variables are used. In order to determine the order of integration of the time series variables we first conduct the unit root test, we employ the augmented Dickey-Fuller test to test for the Stationarity of data. After that we proceed to test the co-integration among the different variables with the help of Johansen co-integration test. Based on the results of co-integration test we perform Granger-Causality test.

7. REVIEW OF LITERATURE

A lot of studies have been done on the different aspects of saving and Capital Formation relation at national and international level. A few studies have been taken for review:

Rao: (1980), In this paper the objective of the author is to find out how far savings and capital formation in India have increased during planning period and their effect on economic and national income so that possible changes can be suggested in the formulation of policies for appropriate utilization of saving and capital formations in achieving national objectives of increasing economic growth to increase economic welfare.

Nancy and Richard Ruggles (1992) writers of this paper have investigated empirical evidence on the saving and capital formation of household sector and various business sectors in United states in this paper authors have tried to find out from where does saving arise and where it is used.

Alexious (2004) used pair wise Granger causality tests and variance decomposition functions to analyze the temporal relationship between personal saving and private saving and net investment in five EU countries: France, the UK, Belgium, Germany, and the Netherlands over the period 1972 to 1998. Results of the Granger causality analysis revealed no evidence of Granger causality between personal saving and net investment, but there is strong evidence of causality running from net investment to private saving in all five countries.

Himanshu (2007) examined the role of domestic saving and foreign capital flows in capital formation in India. This study found that both public and private savings are crucial for sustaining capital formation and they have highly positive long term impact on capital formation

Verma, Wilson, Pahlavani (2007) have estimated the interdependencies between capital formation, saving and output in Iran for period 1963-2003.The relationships were estimated using Johansen's FIML procedure which is appropriate for estimating the effects of non-stationary variables in a simultaneous setting. The estimates indicate a Solow style relationship where a one percent increase in saving will be associated with a 0.55 percent increase in the long run equilibrium level of output. The role of investment was found to be imprecise in the long run. The short run estimates show that saving has a short run equilibrating effect on output with elasticity −0.13, which further supports the Solow model whereby changes to saving have only transitory effects on the growth in output. The other important result found that investment dynamically Granger causes output growth with a short run elasticity of 0.17, consistent with the endogenous growth explanation. The structural change parameter estimates that the effect on the growth in output fell by around 10 percent after 1979.

Bordoloi(2008) Examined the relationship between saving and capital formation in India for period from 1950-51 to 2005-06. this study found that the domestic capital formation in India is mainly financed by the domestic saving. Evidence of existence of long-run equilibrium relationship between domestic capital formation and domestic saving has been found through the application of cointegration analysis.

Though this is not an exhaustive survey of the literature that has gone into this area, we feel that it does provide analytical framework for enabling us to undertake the present study. Moreover, a lot of studies have been done on the causal relationship between Saving and Capital Formation at national and international level. Our research study is somewhat unique in the sense that so far, no study has been covered during the period 1991 to 2010-11 at national level on Gross Domestic Saving and Gross Domestic Capital Formation. There is enough scope of research in this area.

8 RESULTS AND DISCUSSIONS

8.I Augmented Dickey Fuller (Adf) Unit Root Tests

We first examine the unit root test for gross Domestic saving and gross domestic capital formation.. For this analysis, we conducted the standard augmented Dickey-Fuller test (Dickey F., 1979), (Fuller, 1979) for variables (GDS and GDCF) simultaneously to test whether each variable taking individually was stationary or not. The results of ADF tests on the first differences of gross domestic capital formation (GDCF) and gross domestic saving (GDS) are given in table 1. It is clear from table that the variable GDCF and GDS are stationary on the first difference at 1%, 5% and 10% critical values because absolute ADF value is greater than absolute critical value at 1%, 5% and 10% level..

Table.1
AUGMENTED DICKEY FULLER (ADF) UNIT ROOT TESTS

VARIABLE	ADF TEST STATISTIC	ORDER OF INTEGRATION	LAG ORDER	CRITICAL VALUE
ΔlnGDCF	-5.518736 (0.0004)	Stationary at First difference	1	1% = -3.8572
				5%= -3.0400
				10%=-2.6608
ΔlnGDS	-4.965831 (0.0001)	Stationary at first Difference	1	1%=-3.8572
				5%= -3.0400
				10%= -2.6608

Source: Researcher's own calculation based on GDS and GDCF data 1991-2010.

8.II Johansen Based Co Integration Test

The second stage was to perform the cointegration test using the popular method developed by (Johansen S. , 1988) and (Juselius K. , 1990). The results of the con-integration test are reported here. The Trace-Statistic value is shown to be greater than the critical values at both 1% and 5% levels, thus indicating 2 co-integrating equations at both 1% and 5% levels.

Table.2
RESULTS OF THE JOHANSEN BASED CO INTEGRATION TEST

Lag Interval	Test assumption	Eigen value	Likelihood ratio/ trace Value	5%Critical Value	1% Critical Value	Hypothesized No. of CE(s)
1 to 1	Linear deterministic trend in the data	0.690107	26.90874	15.41	20.04	None**
		0.337238	6.992781	3.76	6.65	At most 1**

Source: Researcher's own calculation based on GDS and GDCF data 1991-2010.

8.III Granger-Causality Test
Table.3
GRANGER-CAUSALITY TEST

CASE	Null Hypothesis:	M (Lag)	F-Statistic	Probability
CASE I	ΔlnGDS does not Granger Cause Δln GDCF	1	4.72156	0.04622
CASE II	ΔlnGDCF does not Granger Cause ΔlnGDS	1	2.36759	0.14470

CASE III	ΔlnGDS does not Granger Cause Δln GDCF	2	3.896779	0.05109
CASE IV	ΔlnGDCF does not Granger Cause ΔlnGDS	2	1.73995	0.21701

Source: Researcher's own calculation based on GDS and GDCF data 1991-2010.

After finding out the results of co-integration tests and we now intend to find out the granger causality Methodology to determine the direction of causality between income, gross domestic saving and gross domestic capital formation in India. The F-statistics is measure at 4.72156 in case of GDS Granger causing GDCF in India and 2.36759 in case of GDCF in causing GDS. Since the critical F-statistics value at (1,13) degrees of freedom is 4.66, the null hypothesis of case II is accepted, It is same in case of IV. The F-statistics measured at 3.826779 in case of GDS Granger causing GDCF and 1.73995 in case of GDCF causing GDS could not be rejected because the critical F-statistics value at (2, 12) degrees of freedom is (3.88), The null hypothesis of the Case I and III is rejected. It is clear from above Table with the help Granger Causality test that there is unidirectional relationship between gross domestic saving and gross domestic capital formation in India or another words Savings are significantly influencing the Capital Formation where as Capital Formation is not influencing the Savings.

However, the results reveal that Gross Domestic Capital Formation growth does not Granger causes Gross Domestic Saving growth. In fact, the causality test illustrates a unidirectional causal relationship that runs from Gross Domestic Savings to Gross Domestic Capital Formation.

9. CONCLUSION AND RECOMMENDATIONS

The main objective of this paper is to analyze the relationship between Saving and Capital Formation in India using the recently Advanced Econometrics Methods, Unit Root Test, Co-integration Test and Granger Causality Test, utilizing Time Series Data covering the period of 1991-2010. Unit Root Test is conducted to test the Stationarity of Data and Co-integration Test is performed to test for the existence of the long-run relationships of the variables. The Econometric results show that Savings are significantly influencing the Capital Formation where as Capital Formation is not influencing the Savings. There is only one way or unidirectional causal relationship between Gross Domestic Savings and Gross Domestic Capital Formation in India. These results clearly indicate that Savings are independent of Capital Formation. Deaton (1995) pointed out that "the causation is important, not just for understanding the process, but for the designing of policy. If Saving is the mover of Capital Formation in the Economy then policies should be implemented which give Savings Incentives, such as Tax Breaks, more Tax Benefits, reducing Cash Reserve Ratio, compulsory Savings in employees Provident Funds. The results imply that policies should be implemented which are in favour of Savings. Network of National Savings Schemes, Micro Finance Institutions, Banks and Postal Savings should be expanded to far flung areas of the country.

One major limitation of this paper is that we have not examined relation of the Savings and Capital Formation in India with other economies. We are hope this issue will receive some empirical attention in future studies.

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