

Interrelation between Consumption by Demand, Inflation, Services Growth, Bank Deposit Growth and Gross Domestic Saving, an Empirical Study for India

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Abstract. The purpose of this paper is to explore the effect of Inflation – WPI (average), real GDP Growth Rates of India, Consumer Price Index, Consumption by Demand, Industry Growth, Services Growth, Bank Deposit growth, Short Term Debt on Gross Domestic Saving in India. The researchers floated a questionnaire to the representative sample of the population, which was based on the daily parameters affecting savings which were then related to the National Indicator parameters. The results of this lead to the creation of a mind-map, which structured the flow of the investigation. For this, the national indicators were then picked up from the Indian Government Website. Correlated indicators amongst these were then selected and a model was created. The study gave rise to a linear model between Gross Domestic Saving and Correlated National indicators. This model was then statistically tested.

Keywords: Inflation–WPI (average), Gross Domestic Saving, GDP, Consumption by Demand, Bank Deposit Growth.

1. Introduction

Indian economy observed important changes after the reform period and global integration of policy framework, market exposures and overall economic performance on a macro-level which resulted in financial markets with a broader base. Increasing global integration has resulted in significant transformations in terms of emoluments, expenditure patterns and residuals towards savings and investments thereof. The role of savings and investment in achieving and sustaining high economic growth is extensively laid out in the theories of economic growth. The “Harrod-Domar Growth Theory”, highlighted how economic growth depends on the rate of saving. Following this trajectory, the importance of Gross Domestic Saving was magnified and thereby it became imperative to analyse the factors affecting the Gross Domestic Saving.

2. Literature Review and Hypothesis Development

Iran Reza Najarzadeh [3], Michael Reed & Mona Tasan assessed the relationship between savings and total and non-oil economic growth for Iran.

Amareesh Samantaraya and Suresh Kumar Patra [4] in their research paper on Determinants of Household Savings in India: An Empirical Analysis Using ARDL Approach, revealed that GDP, dependency ratio, interest rate, and inflation have statistically significant influence on household savings in India, both in the long run and short run.

Dhanya Jagadeesh [5] in her research paper on The Impact of Savings in Economic Growth: An Empirical Study Based on Botswana conducted a test is based on Auto Regressive Distributed Lagged (ARDL) model by Pesaran, Shin and Smith (1999) to check the existence of a long run relationship between Gross Domestic Product and Gross Domestic savings in Botswana.

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Dr. Mohamed Sayed Abou El-Seoud [1] in his studies on The Effect Of Interest Rate, Inflation Rate And GDP On National Savings investigated the effect of Real Gross Domestic Product (GDP), interest rate, and inflation rate on national saving rate in kingdom of Bahrain over the last twenty years.

Perihan Hazel Er, Can Tansel Tugcu, Orhan Coban [7] Selcuk University in their paper: Investigating The Link Between Savings, Inflation And Economic Growth: An ARDL Analysis For The Case Of Turkey, investigated the short and the long-run relationship between saving, inflation, and economic growth in Turkey for the period 2003:1 to 2012:2. **However, no statistically significant relationship was found between the inflation and savings** in the short-run and the interest rates and savings in the long-run.

After going through the literature review and sample obtained through questionnaire we selected the national indicators, corresponding to study in our sample, for India. We used secondary data collected by government of India and published on the website <https://data.gov.in/>

The model which we tested was

H0: There is a linear relationship between Gross Domestic Saving and Inflation - WPI, real GDP Growth Rates of India, CPI, consumption by demand, Industry Growth, Services Growth, Bank Deposit growth, Short Term Debt.

Against

H1: There is no linear relationship between Gross Domestic Saving and Inflation - WPI, real GDP Growth Rates of India, CPI, consumption by demand, Industry Growth, Services Growth, Bank Deposit growth, Short Term Debt.

Using the data we could develop the model

$$GDS = 13.67794878 + 1.446796984 \times P - 0.929851161 \times D - 0.304412844 \times I + 0.004141069 \times C + 0.164665397 \times IG + 0.302982353 \times SG + 0.375836516 \times BD + 0.109154607 \times TD$$
which was further tested using Chi-square goodness of fit test.

2.1. Data and methodology

The study initially used the questionnaire method consisting of questions on household savings, monthly income and expenditure, kind of occupation, modes of savings etc. which was circulated amongst the sample (age based) representative of the population. The results obtained were abbreviated and represented in the form of a mind map. The factors which emerged from this study were then related to national indicators. The data was collected for these indicators using Government of India website <https://data.gov.in/> for all available years. (viz 1999-2000 to 2012-2013)

2.2. Elements chosen for the model

Elements chosen for the Model (values in % at 2004-05 prices), with abbreviations are listed below

GDS (Gross Domestic Savings): It is GDP minus final consumption expenditure is expressed as a percentage of the GDP.

P (Real GDP Growth Rates of India): It measures the value of economic output adjusted for price changes.

D (Consumption by Demand): It represents the demand for goods and services by individuals and households in the economy.

C (Consumer Price Index Average): Is a measure that examines the weighted average of the prices of a basket of consumer Goods and Services such as transportation, food and medical care. It is calculated by taking price changes for each item in predetermined basket of Goods and averaging them.

I (Inflation - WPI Average): Inflation is defined as a situation where there is sustained increase in the general price level and a fall in the purchasing power of money.

IG (Industry Growth - % at 2004 - 2005 Prices): Is Percent growth of gross domestic product by industry of origin.

SG (Services Growth - % at 2004 - 2005 Prices): Is Percent growth of sector, which provides a service, not an actual product that could be held in your hand. Activities in the service sector include retail, banks,

hotels, real estate, education, health, social work, computer services, recreation, media, communications, electricity, gas and water supply.

2.3. BD (Bank deposit growth)

Is Percent growth in Bank deposits which consist of money placed into banking institutions for safekeeping.

2.4. TD (Short term debt)

It is an account made up of any debt incurred by a company that is due within one year.

3. Objectives of the Study

- A. To investigate the relationship between Gross Domestic Savings over Inflation – WPI, CPI, real GDP Growth Rates, Consumption by Demand, Industry Growth ,Services Growth, Bank Deposit Growth, Short Term Debt
- B. To create a Model with these elements
- C. To test the Model over a Time Span

The general philosophy as revealed by various research investigations is that economic growth is governed by Domestic Savings. We wanted to investigate in this paper the determinants which influence/move the Gross Domestic Savings.

Empirical Data:

Table 1: Empirical data of the selected Elements for period 1999 – 2013, Source: <https://data.gov.in/>

<i>Years</i>	GDS	P	D	I	C	IG	SG	BD	TD
1999-2000	25.69	7.59	7.2	3.3	3.4	5.96	11.19	13.9	3.9
2000-2001	23.77	4.30	3.0	7.2	3.7	6.03	5.37	18.4	3.6
2001-2002	24.93	5.52	5.3	3.6	4.3	2.61	6.88	14.6	2.7
2002-2003	25.93	3.99	2.3	3.4	4.1	7.21	6.97	16.1	4.7
2003-2004	29.03	8.06	5.4	5.5	3.8	7.32	8.06	17.5	4.4
2004-2005	32.41	6.97	2.3	6.5	3.9	9.81	8.13	13.0	17.7
2005-2006	33.44	9.48	8.6	4.4	4.2	9.72	10.91	24.0	19.5
2006-2007	34.60	9.57	7.9	6.5	6.8	12.17	10.06	23.8	28.1
2007-2008	36.82	9.32	9.3	4.8	6.2	9.67	10.27	22.4	45.7
2008-2009	32.02	6.72	7.6	8.0	9.1	4.44	9.98	19.9	43.3
2009-2010	33.69	8.59	8.1	4.1	13	9.16	10.5	17.0	52.3
2010-2011	34.02	9.32	8.1	9.6	9.5	9.16	9.75	16.0	65.0
2011-2012	30.81	6.21	5.4	8.8	9.0	3.49	8.2	16.0	78.2
2012-2013	31.80	4.96	5.0	7.8	8.0	3.12	6.59	16.0	83.2

Table 2: Empirical Analysis

	<i>Coefficients</i>
Intercept	13.6779
Real GDP Growth Rates of India (at Factor Cost 2004-05 prices)	1.4467
Consumption by Demand (% YOY)	-0.9298
Inflation - WPI (Average)	-0.3044
CPI (Average)	0.0041
Industry Growth (% at 2004-05 prices)	0.1646
Services Growth (% at 2004-05 prices)	0.3029
Bank Deposit growth	0.3758
Short Term Debt	0.1091

Chart 1: Graphical representation of the indicators

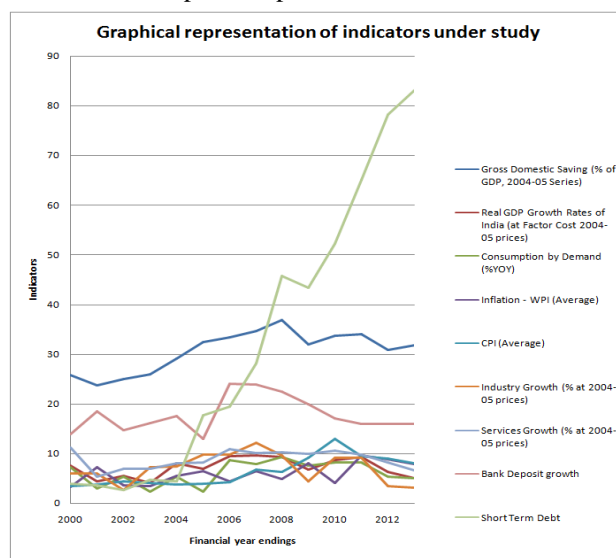


Table 3: Chi square calculations

<i>Years</i>	<i>Observed Gross Domestic Saving (% of GDP)</i> o_i	<i>Predicted Gross Domestic Saving (% of GDP)</i> e_i	<i>Residuals</i>	<i>Standard Residuals</i>	$(o_i - e_i)^2 / e_i$
1999-2000	25.69	26.9953	-1.3053	-1.0735	0.0631
2000-2001	23.77	24.8615	-1.0915	-0.8976	0.0479
2001-2002	24.93	23.9542	0.9758	0.8025	0.0397
2002-2003	25.93	26.1570	-0.2270	-0.1867	0.0020
2003-2004	29.03	29.3642	-0.3342	-0.2748	0.0038
2004-2005	32.41	30.5575	1.8525	1.5235	0.1123
2005-2006	33.44	34.1295	-0.6895	-0.5670	0.0139
2006-2007	34.60	35.2916	-0.6916	-0.5687	0.0136
2007-2008	36.82	35.1900	1.6300	1.3404	0.0755
2008-2009	32.02	29.8964	2.1236	1.7464	0.1508
2009-2010	33.69	34.1675	-0.4775	-0.3927	0.0067
2010-2011	34.02	34.3181	-0.2981	-0.2452	0.0026
2011-2012	30.81	32.6082	-1.7982	-1.4788	0.0992
2012-2013	31.80	31.4690	0.3310	0.2722	0.0035

$$\chi^2 = \sum \{(o_i - e_i)^2 / e_i\} = 0.63461 \ 2411$$

Hypothesis Testing:

The above results were tested for the so obtained model

$$GDS = 13.67794878 + 1.446796984 \times P - 0.929851161 \times D - 0.304412844 \times I + 0.004141069 \times C + 0.164665397 \times IG + 0.302982353 \times SG + 0.375836516 \times BD + 0.109154607 \times TD$$

Equivalently,

H₀: The above stated model fits well to the data for India or is there a linear relationship between Gross Domestic Saving and Inflation - WPI, real GDP Growth Rates of India, CPI, consumption by demand, Industry Growth, Services Growth, Bank Deposit growth, Short Term Debt.

Calculated $\chi^2 = 0.634612$. χ^2 table value for 13 degrees of freedom at 5% I.o.s.= 22.362. Hence we accept H₀ at 5% level of significance.

4. Empirical Conclusion

The results show linear relationship between Gross Domestic Saving and Inflation - WPI, real GDP Growth Rates of India, CPI, consumption by demand, Industry Growth, Services Growth, Bank Deposit growth, Short Term Debt. We observe a positive correlation between Gross Domestic Saving & Industry

Growth, Services Growth, Bank Deposit growth, and Short Term Debt and a negative correlation between Gross Domestic Saving & Consumption by Demand, Inflation- WPI (Average).

1% ↑ in GDP ⇨ 1.4467 % in GDS ↑	<p>The GDS governs the economic health of the nation as it is that, money which is invested back and plays a crucial role in Capital formation.</p> <p>The model we have obtained is using real life data from Government websites, it shows that the GDS is affected by GDP and consumption by demand the most.</p> <p>GDP affects GDS positively, viz 100% rise in GDP will increase GDS to 144.68%. On the other side consumption by demand affects GDS negatively, viz 100% increase in consumption by demand will decrease GDS to 92.99%.</p> <p>100% growth in Bank Deposit would give 33% rise in GDS</p>
1% ↑ in D ⇨ 0.9298 % in GDS ↓	
1% ↑ in I ⇨ 0.3044 % in GDS ↓	
1% ↑ in C ⇨ 0.0041 % in GDS ↑	
1% ↑ in IG ⇨ 0.1646 % in GDS ↑	
1% ↑ in SG ⇨ 0.3029 % in GDS ↑	
1% ↑ in BD ⇨ 0.3758 % in GDS ↑	
1% ↑ in TD ⇨ 0.1091 % in GDS ↑	

As seen from the Regression Coefficient in the above model Consumption By Demand has the most negative effect on savings (more than Inflation effect on GDS).

4.1. Further Study/Scope:

The interesting extension to this would be to further explore the factors affecting GDP and CBD in order to accelerate GDS via these factors.

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