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Research Paper

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STRUCTURAL SHIFT IN MACRO-ECONOMIC AGGREGATES OF INDIAN ECONOMY

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ABSTRACT

This paper tries to study structural shift in macro-economic aggregates in Indian economy. We have selected 10 indicators for this study. Structural change in the Indian economy is a highly debatable issue and an important one. Dummy variable regression model is applied for this study and 45 years of data have been taken. Regression results proved that the structural break happened in the year of 1991 when India adopted LPG policy. After the 1991 data shows an upward shift in Indian economic growth. Eight indicators tend to grow around 7% to 7.5% annually. And two of them shows around 10% growth rate.

KEY WORDS- *macro-economic, dummy variable regression model and LPG*

INTRODUCTION

India has recently completed 25 years of economic reform of 1991. Whether it is successful or not, is a debatable issue and has a different dimension to explain. The comprehensive reform of 1991 and its impact on Indian economy has been discussed for a long time. Many articles and research paper has been published and presented in this respect. Using the macroeconomic data, many researchers have tried to locate the structural break point in Indian economy. But most of the studies have undergone to study the structural break with the prime objective that whether break point is 1991 or not. The growth rate has been rising dramatically since the 1980's. Some of the studies found the break point was 1980's in India's long term growth in Gross Domestic Product (GDP) (see, Kumar, 1992, Dholakia, 1994, J.S.Wallack, 2003, Panchanan Das, 2007. Etc). And some of the economists found it in 1990's after the economic reforms (see, Arvind Pangariya, 2004, Agarwal, Mitra and Whalley, 2015, Agarwal and Sunandan Ghosh, 2015, etc). Therefore it is a long time intense debate on the structural shift of Indian economy. Rising growth rate of any economy seen as rising prosperity in that economy. India is one of the emerging economies in the World. Sustain growth rate of India make many economists and economic institutions to believe that India could be the Global economic leader in upcoming years. With the decentralisation of many sectors and open up the economy for the World, India became a global market. This study is another contribution to examining structural shift of macro-economic variables of Indian economy. In this work, we have chosen 10 indicators of growth and applying suitable econometric methods to examine our objective.

LITERATURE REVIEW

Suresh, K.G. and Shylajan C.S (2015) in their paper both the authors applied newly developed unit root test by Narayan and Popp (2010) to study structural breaks in Indian macro-economic variables. Their estimation models reveal that in both GDP and GNP, the initial intercept breaks 1989-1990 and 1996-1997. In their models- the first break was in 1985-86 for both the series and 1988-89 for GDP and 1990-91 for GNP. They also

provide various explanations for their founded breaks.

Gupta, S (Feb, 2014) : This paper tries to analyse how the economic reforms of 1991 in India have affected the GDP growth rate and how it has impacted the contribution of several economic and non-economic factors towards GDP growth rate determination. This paper examines and explains how these different economic and non-economic factors have influenced the GDP growth rate in India since 1970 and thus tries to explain how different economic policies can be channelized to promote economic growth.

Ghosh, M (2010) studied the structural break in Indian agriculture under the purview of economic reform of 1991. He had also taken 15 major states of India for the period 1960-61 to 2006-07 to analyse the structural change agriculture growth. Results show that the contribution of agriculture to India's GDP has drastically reduced. And all the 15 states follow this trend and their contribution of agriculture to state GDP had declined

Das, P (2007), analysed structural break in Indian economy using Unit root method. He found the structural break in the year 1979, much before the economic reform in India. For the agriculture sector, the structural break year was 1965. In the state level analysis, in most of the states, the break point was around in the year 1980. Few of the states showed break point at mid-1970, mid-1980 and mid-1990's.

Virmani, A (2005) has analysed the structural change in Indian growth with the rainfall. In his study, it was found that the break year for Indian economic performance was 1980-81 and growth rate increased after that period. And the effect of rainfall in growth becomes neutral after 1980-81.

Pangariya, A. (2004), through his paper, Pangariya tries to establish that the structural break of 1980's was fragile and unsustainable. The long lasting and significant break was in 1990's according to him. Criticising J.Bradford Delong (2001) and Rodrik (2002) for their sceptical views regarding economic reforms and structural breaks. The key question in his article was that, whether minor changes in either policies and attitudes in 1980's produced same output or same outcomes as major reforms in 1990's.

Wallack, J.S. (2003) has estimated structural break in Indian macro-economic data by taken into count all possible break year. Classical F test was used to estimate the structural break year in the economic performance of Indian economy. Wallack found in his analysis that the initial break year was 1980.

OBJECTIVE

1. To study structural shift in macroeconomic aggregates of India, especially after the economic reform of 1991.

HYPOTHESIS

1. There is an upward shift of macroeconomic aggregates of India after the economic reform of 1991.

DATA AND METHODOLOGY

The study is to analyse the structural change in India's growth rate especially after the economic reform of 1991. As we divided the whole time series into two parts, post reform period and pre reform period. In our study, we have taken from 1970-71 to 1990-1991 as pre reform period and from 1991-1992 to 2014-2015 as the post reform period. It means that we have 21 observation in pre reform period and 24 observation in post reform period. In econometric models, for comparison between two time periods, dummy variable regression model is a suitable method. In our study, we are also using this technique.

Dummy variable regression model.

The study period of our study is from 1970-71 to 2014-15, which is divided into two sub periods- pre reform period and post reform period. Dummy variable regression model is very useful and popular in studying structural shift in any data series when we have two or more sub periods. We have assigned '0' as a dummy for the pre reform period, i.e. 1970-71 to 1990-91 and '1' as a dummy for post reform period, i.e. 1991-1992 to 2014-2015. Data has been taken from Handbook of Statistics on Indian Economy published by Reserve bank of India. In our study, we have selected 10 indicators for the growth of Indian economy. These are-

Table-1, Indicators

Macro-economic aggregates of Indian Economy at constant price	
Gross Domestic Product (GDP)	Market price & factor cost
Gross National Product (GNP)	Market price & factor cost
Net Domestic Product (NDP)	Market price & factor cost
Net National Product (NNP)	Market price & factor cost
Gross Domestic Capital Formation (GDCF)	
Net Domestic Capital Formation (NDCF)	

RBI has provided data in two base period. Up to 2011-12, the base period was 2004-2005, and from 2011-12 onwards the data is in the 2011-12 base period. For the application of any econometric or mathematical models, the data should be in one base period. Otherwise, it can give you false results. Therefore we transformed the data series into the 2011-12 base period. The formula that we have applied for the transformation is-

$$\frac{\text{data on } 2011-12 \text{ for base year } 2011-12 \; X \; \text{data on } 2010-11 \text{ for base year } 2004-05}{\text{data on } 2011-12 \text{ for base year } 2004-05}$$

Secondly, after making the whole series in on base period, we have taken log values for all the data. The reason for taking log form is that it eliminates the undue fluctuation in the data series.

The Regression Model

In our study, we have developed the following model-

$$\text{Ln } G_{t=} \alpha + \beta Di + \gamma t + \delta (Dit) + Ui$$

Here

G_t = GDP/GNP/NDP/NNP/GDCF/NDCF

α= intercept in the pre reform period.

β= Differential intercept in the post reform period.

T = time trend.

D1= first dummy for the period 1970-71 to 1990-1991.

D2= second dummy for the period 1991-92 to 2014-15.

γ= regression coefficient of time trend in pre reform period which shows the magnitude of the rate of response of G_t w.r.t. to time.

δ= differential coefficient of time trend in the post reform period to allow a shift/ break/ structural change in the magnitude of the rate of response of G_t w.r.t. time.

tD2= an interaction variable to capture the interaction effect of the presence of the attribute in the post reform period and time trend on the dependent variable.

U_i = error term.

From the above equation, the following results can be found-

(1) ($\gamma^*+\delta^*$), (*represent statistically significant) shows an upward shift in G_t w.r.t. to time in post reform period.

(2) ($\gamma^*- \delta^*$), shows a downward shift in G_t w.r.t. time in post reform period.

(3) (γ^* + or – δ^*), if δ^* becomes insignificant, it means that there is no change/ shift/ break/ structural shift in post reform period.

If we find present or absent of attributes in the pre reform period of the model, then the following model will be analysed-

$$E (G_t: Di=0) = \alpha + \gamma t$$

It means that γ is the growth rate of pre reform period. And if we found present or absents of any attributes in the post reform period, then we will analyse the following model-

$$E (G_t: Di=1) = \alpha + \beta + (\gamma+\delta)t$$

Here, $\alpha + \beta$ becomes the intercept value for the post reform period and ($\gamma+\delta$) shows the growth rate in G_t in this period.

RESULTS AND DISCUSSIONS

Using the data of 45 years, we have got the following results. Above mentioned 3 models were estimated with the use of dummy variable regression model. Following table-3 includes the values of the intercept term and the coefficients with the Standard Errors. The standard error is here to check whether the coefficient values are statistically significant or not.

Table-2, Intercept, Coefficient and standard Error values

	Intercept (c) (α)	Time (γ)	D1 (β)	D2 (δ)
GDPMP	9.088870 (0.016596)*	0.042517 (0.001322)*	-0.542704 (0.040547)*	0.024083 (0.001708)*
GDPFC	9.002724 (0.015960)*	0.041880 (0.001271)*	-0.576802 (0.038993)*	0.025754 (0.001642)*
GNPMP	9.085915 (0.015856)*	0.042297 (0.001263)*	-0.549312 (0.038741)*	0.024322 (0.001632)*
GNPFC	8.999492 (0.015222)*	0.041633 (0.001212)*	-0.584332 (0.037190)*	0.026032 (0.026032)*
NDPMP	9.023461 (0.016672)*	0.041546 (0.001328)*	-0.530155 (0.040733)*	0.023703 (0.001716)*
NDPFC	8.931194 (0.016000)*	0.040734 (0.001274)*	-0.567422 (0.039093)*	0.025548 (0.001647)*
NNPMP	9.019946 (0.017452)*	0.041357 (0.001390)*	-0.499701 (0.042640)*	0.022920 (0.001796)*
NNPFC	8.927661 (0.015232)*	0.040464 (0.001213)*	-0.575361 (0.037215)*	0.025836 (0.001567)*
GDCF	7.391499 (0.044459)*	0.052421 (0.003541)*	-1.032696 (0.108623)*	0.043164 (0.004573)*
NDCF	6.925320 (0.066231)*	0.051432 (0.005275)*	-1.266170 (0.161817)*	0.053225 (0.006815)*

*significant at 1% level of significance.

Above table depicts the values for all the coefficients and intercepts. All the calculated values are significant at 1% level of significance. Here γ is the growth rate of G_t at pre reform period. And as we mentioned earlier (γ+ δ) is the growth rate at post reform period. From the above table-2, we can calculate and compare the growth rate in these macroeconomic aggregates in pre and post reform period.

Table-3, growth rates of macroeconomic aggregates.

	Pre reform period	Post reform period
GDPMP	4.25	6.66
GDPFC	4.19	6.76
GNPMP	4.23	6.66
GNPFC	4.16	6.77
NDPMP	4.15	6.52
NDPFC	4.07	6.63
NNPMP	4.14	6.43
NNPFC	4.05	6.63
GDCF	5.24	9.55
NDCF	5.14	10.47

From the above table-3, it is clear that the structural break point in Indian economy was 1991 i.e. after the economic reform. The growth rates are around 4% for most of the aggregates in the pre reform period. After the 'Hindu Growth' rate of 3.5% annually for the period of 1970's, the growth rate rises a little over that

and averaging around 4% annually. For the Gross Domestic Capital Formation and Net Domestic capital Formation, the growth rate was 5.24% and 5.14% respectively. Most of the economists argued that the structural break point for Indian economy was 1991, after the adoption of new economic reforms. Few of the economist has opposite views, and said that this not true. They have found different break points in their respective studies. They also have their own justification for their findings. But in our case, we have found the break point was 1991. Open up of the Indian economy, more FDI's and FII's, rising investment, the boost of service sectors etc. are the reasons that we have seen a drastic change in the growth rates in every aggregate after the economic reform of 1991. First eight aggregates increase at a growth rate of around 6.5%. Which means rising economic prosperity in India. Gross domestic Capital formation and Net domestic Capital Formation are rising almost double than to pre reform period. The Respective growth rate for GDCF and NDCF are 9.55% and 10.47%. Positive values of all the coefficients of δ represent that the growth rate in the post reform period is upward rising.

In our model, the $\alpha+\beta$ depicts the intercept values for the post reform period. From the table-2 it can be seen that the values of all the β carry a negative sign. And the constant values are in positive. Therefore the values of the intercept in the post reform period have been decreasing due to the negative values of βs. The constant term or the intercept value represents an autonomous growth in aggregates. Autonomous growth is results of government involvement in the economic activities in a country. From our analysis, it is clear that after the economic reforms, the role of government gradually decreases. It proves the fundamental objective of liberalisation and privatisation policy to reduce government role in an economy and private players to boost the economic growth.

CONCLUSIONS

This study has the objective to examine the structural shift of macroeconomic aggregates of the Indian economy. Using a large data set of the Indian economy, we have found that the results are parallel to the objectives that taken by the Indian government in 1991 with the view of rapid economic growth after the adoption of Liberalisation, Privatisation and Globalisation (LPG) policies. All the aggregates that we have incorporated in our study, have showing an upward shift after 1991. Studying the nature of intercept values from our model, we can conclude that the role of government has gradually reduced. Criticising any policy is bad if it is not supported by any proper logic or arguments. This work is a small contribution to the academic forum by proving that the LPG policy of 1991 is a catalyst for the rapid growth in Indian economy. Second very important finding of this paper is that the actual break point of Indian economy is in the year of 1991. Therefore government should focus on initialising the proper infrastructure for the LPG policies that can boost the growth of India by many folds in upcoming years.

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