

GROWTH AND CO-MOVEMENTS: A STUDY OF SOME MACROECONOMIC VARIABLES IN INDEPENDENT INDIA

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[Dominant mainstream economic thought, in a particular time period, has been very active in shaping economic policies for different countries through different multi-country institutions or through admirable experts in that particular time period. However, some concrete facts about the economy pave the way to unseat the dominance of a particular thought and thus bring another thought into prominence. So, facts are important for understanding the effectiveness of a particular policy. Gross domestic product of a country is thus very important in understanding the efficacy of policy. So are the constituents of GDP. In this paper an effort has been made to understand the behaviour of Indian economy using some macroeconomic variables. The variables used here are GDP, private final consumption expenditure, gross fixed capital formation and government final consumption expenditure. The period of study has been broadly 1952-53 to 2013-14.]

Key words: Growth, Gross Domestic Product, Consumption

JEL code: O49, E01, E21]

Introduction

The contemporary economics, through its mainstream version, after assimilation of different economic thinking has adopted that macroeconomics must be founded by microeconomics and the optimizing micro agents must satisfy the features of rational expectation. Besides, macroeconomics must consider price and wage rigidities. The policy prescription extended by supranational agencies of this, mainly financially, globalized world, like IMF

and World Bank, are privy of such thinking. However, discontent arising mainly due to mal-distribution of societal well being very often extends challenge to the existing mainstream thought, particularly by those who are non-committal to the current line of thinking. The recent crises, particularly of 2008, have widened the rift further. But, no conflicting side can ignore the cost of low growth or real instability that may be

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inflicted upon the society. Therefore, it is quite clear that a substantive growth rate, which would not lead to high inflation, is essential. Though New Keynesians have shifted their stance away from traditional Keynesianism, nobody can deny that in the moments of different crises, even in the contemporary world, across the continents, traditional Keynesian prescription has been adopted with varying degree. The 'bubbles' which have been the major ingredients of different crises throughout the world may be seen as a result of neglect in effective investment. So, it is quite unwise, even for the developed countries, to undermine the issue of effective demand and thus demand management. Therefore, not only the GDP but also the issue of 'C+I+G' with its usual meaning must be put under lens. Debates relating to this aspect cannot restrict itself only to the developed world but should extend also to the developing world. Discussions regarding those aspects are more pertinent, particularly in the contemporary world, where supranational agencies are ready to impose 'advice' with their 'same size fits all' formula. In the post-independence period Indian economy has undergone tremendous change in respect to its economic policy as well as in respect to its performance. It started its journey from very low growth in GDP and almost no growth in per capita income, in the period that preceded the independence of India, as a result of highly exploitative colonial rule. Since then India's economic policy ventured a long way. For the initial four decades, policy makers more or less relied on state or public sector based

development planning and investment planning. But, the emergence of balance of payment crisis led to the adoption of, Washington Consensus based, structural adjustment programme in 1991. The focus of the policy, then shifted from the public sector to private sector. To achieve efficiency- liberalization, privatization and globalization has been adopted. So, change in stance is quite visible for Indian economy. However, what is important and relevant for following a particular policy prescription is the fact and behavioral pattern of economic variables. Therefore, a detailed analysis of the behavior of some of the above mentioned macroeconomic variables would help us in understanding the behavioral pattern of the Indian economy during the period of study and thus, may help policy makers in determining further policy actions. This paper has attempted to study the behavior of such variables or its variants for the Indian economy covering the period of almost six decades. This paper also comprises of literature survey and objective, methodology adopted to conduct the study and analysis. Conclusion of the study is noted at the end.

Literature Survey and Objectives

Nayyar (2006) argued that 1951 was an important year for India's economic growth like 1980. If the entire 20th century is kept under scanner to study the history of Indian economy, then the period 1950-1980 represents a substantive departure from the exploitative colonial past as far as economic growth is concerned. The study also pointed out that the growth of

India during that period by no means lower than most of the countries of the world for the same period. Though the study considered the period 1980-2005 as period of impressive economic growth, however it ceased to consider 1991 as a watershed in this regard. Mohan (2008) while studying Indian economic growth for the period 1950 to 2008 noted that enabling factor for the Indian growth is India's domestic saving as a ratio of GDP. The study expressed satisfaction regarding the value of incremental capital output ratio (ICOR) of about four percent for the Indian economy. It signified quite efficient use of resources and placed Indian economy at par with other best performing economies of the world in this regard. The contribution of investment by private sector and corporate growth found to be significant to the recent surge in economic growth. Therefore, it suggested more fiscal prudence for the sustainability of economic growth for Indian economy. Kohli (2006a, 2006b) conformed to the view that the growth of Indian economy from 1980 onward might be, at least partially, be attributed to changing composition of GDP. Betterment of efficiency of economy, to be more specific, improvement of efficiency of industrial economy led the surge in growth rate. The study indicated a relation of improvement of growth rate in that period with good foundation for the economy, namely sufficient demand, good tax base, accumulation of technology, entrepreneurial and management quality and trained workers. However, the shift of stance of development model in favour of alliance

of state and business rather than alliance of state and worker triggered the enhancement of growth rate. Panagariya (2004) argued that impressive growth exhibited prior to 1991 was characterized by fragility. In contrast, after 1991 growth overcomes that fragility to a large extent. The study suggested labour market reform allowing free run for the entrepreneurs to exit, to retrench and reassignments of workers. The researcher also opined that de-reservation of labour intensive industries mostly for small scale enterprises, incorporation of effective bankruptcy laws would be necessary to catch the growth rate of Chinese economy. Sen (2007) while analyzing the growth of Indian economy argued that policy stance in favour of private sector is not the primary factor for spurt in the growth rate, rather, at best, it may be the secondary factor. Though increase in growth rate in different period could be attributed to different factor, in totality three fundamentals that has generated impressive growth rate may be clubbed as-financial deepening, surge in public investment and decrease in relative price of necessary equipments. Ghosh & Narayana (2005) splitting the entire period of 1951 to 2002-03 into two parts on the basis of structural adjustment programme introduced in India during 1991, made a comparative study between the pre and post reform period. The study employed ARIMA model and techniques of intervention to analyze the economy. It found that the reform had an impressive impact on investment, private final consumption expenditure and on all GDP variables except service. They opined that

absence of reform would not have produced such favorable results. Babu (2005) noted that India's recent growth story has a striking difference with the previous episodes of impressive growth. It identified departure in respect to magnitude, sectoral pattern and source of growth. Rangarajan & Srivastava (2005) argued that interest payment and large structural primary deficit as a ratio of GDP inflicted an adverse effect on economic growth in India in contemporary years. Chand et al (2007) argued though early years of reform in India had produced positive result for agriculture, post-WTO period experienced reversal of it. Bhattacharya & Kar (2007) tried to estimate a macro model for Indian economy using a mixture of Keynesian, neo-classical and structural approach. The study used the data for the period 1970-71 to 1998-99 and argued that the model is a perfect fit for GDP and its components. Rao et al (1990) estimated the potential output for Indian economy using recursive approach and locked growth model. The study used annual data for the period 1950-51 to 1987-88 and concluded that average potential growth rate of 4.2 percent was higher than actual 3.8 percent. Bordoloi et al (2009) estimated potential output for Indian economy using various advanced econometric methods. It found that potential growth rate might vary in the range of 8.2 percent to 10 percent when estimated using monthly data. The period of study has been broadly 1996-97 to 2007-08. Goyal & Arora (2012) used monthly Index of Industrial Production

and Wholesale Price Index data for the period May 1990 to December 2012 and concluded in favour of horizontal supply curve. The study on the basis of supply shock and incremental capital output ratio noted that in 2007-08 actual output was at potential level. Blanchard & Fischer (2009) tested dynamics of long term growth of US economy by understanding the co-movements between output and other variables like, consumption, investment, government spending etc. They used the quarterly data for the period 1947Q4 to 1987Q2.

From the literature survey it is found that good number of studies has been carried out to understand the behavioral pattern of macroeconomic variables, like GDP and its constituents. Researchers have also put their endeavour to model the Indian economy. However, it is quite essential to update the understanding of economy, particularly observing the macroeconomic variables as mentioned above, like ours for adopting required policy. It is also noted that no study has been conducted to understand the co-movement between GDP and its constituents for Indian economy. The constituents elements referred here are those which form the effective demand.

Thus, the objective of this paper is to understand the growth trajectory of GDP along with its constituents like, private final consumption expenditure, gross fixed capital formation and government final consumption. Another objective is to understand the co-movement between GDP and its constituents.

Methodology and Data

The variables selected in this study are Gross Domestic Product at market price (GDP), Gross Fixed Capital Formation (GFCF), Private Final Consumption Expenditure (PFCE), Government Final Consumption (GFCE). For the test of stationarity of the variables the Augmented Dickey Fuller (ADF) equation has been used. It can be represented in general, with both intercept and trend terms, as

$$\Delta x_t = a_0 + \alpha x_{t-1} + \sum \gamma_k \Delta x_{t-k} + bt + \mu_t \dots\dots\dots (1)$$

where k is the lag length to be determined using information criterion. If α is equal to zero i.e. accept a null hypothesis $H_0 : \alpha = 0$ by comparing with appropriate critical value at a given level of significance, then it contains unit root, meaning thereby that the series is non-stationary.

It is known that to overcome the inappropriateness of usual structural model ARMA model is generally used. This type of model is combination of auto regression and moving average. Such model expresses the current value of a series x as a linear combination of its previous values and current and previous values of white noise error term (u). Thus an ARMA of the order p and q is expressed as

$$\Phi(L)x_t = \mu + \theta(L)u_t \dots\dots\dots(2)$$

where $\Phi(L)$ = Autoregressive operator = $1 - \Phi_1 L - \Phi_2 L^2 - \dots\dots\dots - \Phi_p L^p$ and

$\theta(L)$ = Moving Average operator = $1 + \theta_1 L + \theta_2 L^2 + \dots\dots\dots + \theta_q L^q$

with $E(u_t) = 0$; $E(u_t^2) = \sigma^2$ and $E(u_t u_s) = 0$ for $t \neq s$. L^n denotes n period lag operator.

The structure of ARMA or the appropriate order of the ARMA is determined using Akaike information criterion. However, it is also kept in mind that the selected process conforms with the stationarity and invertibility criteria. The residuals that remain after fitting appropriate ARMA for the relevant variables are used to measure the co-movements of variables. Before fitting the ARMA model for the required variable its stationarity is ensured.

To find out the co-movement between two relevant variables the extracted cycles of the respective variables are also used. From the time series of the requisite variables trend has been extracted using Hodrick-Prescott filter (Hodrick & Prescott, 1997) and the residuals are considered as cycle. Suppose x_t is a series in logarithmic representing the concerned variable and s is the smoothed series. Then, the Hodrick-Prescott (HP) filter can be said to be a two-sided linear filter that computes the smoothed series s of x by minimizing the variance of x around s , subject to a penalty that constrains the second difference of s . Thus, the HP filter chooses to minimize:

$$\sum_{t=1}^T (x_t - s_t)^2 + \lambda \sum_{t=2}^{T-1} ((s_{t+1} - s_t) - (s_t - s_{t-1}))^2 \dots\dots\dots (3)$$

where λ is the penalty parameter which controls the smoothness of the estimated series and t is time. Hodrick and Prescott suggested λ as 100 for annual data.

To calculate the year to year growth rate, difference of the logarithm value of the variable for two consecutive years is estimated. On the other hand, to estimate the trend growth rate of a variable x logarithm linear equation of the following type has been selected.

$$\text{Log } x_t = a + b t + u_t \dots\dots\dots (4)$$

where x_t is the value of x variable at time t and if the total time series data points are n then t can be 1 to n . Error term is represented by u_t . The intercept term is represented by a , estimated b reflects the annual trend rate of growth of the variable x .

To understand the co-movement, correlation coefficients are calculated. To measure the dispersion of variables, standard deviation (SD) and coefficient of variation (CV) are measured.

Time period of the study is 1952-53 to 2013-14 and data source of the study is RBI.

Analysis

GDP and its Components

The revival of Keynesianism and its application is a matter of intense debate. But nobody can ignore the GDP and the

issue of 'C+I+G' with its usual meaning, be it developed or developing world. So, these macroeconomic variables must be put under lens. In our study an attempt has been made to unravel the behavior of such factors or factors which are some variants of it. Our variables here are Gross Fixed Capital Formation (GFCF), Private Final Consumption Expenditure (PFCE) and Government Final Consumption Expenditure (GFCE). In the table 1 the decadal average annual growth rate of GDP and its variations are reported. Immediate post independence, though truncated a little bit, decade has registered 4 percent average annual growth rate with dispersion, measured in term of CV, of almost 62 percent. The worst decade, as noted from the table, was 1970s with comparatively low growth rate and high CV. In the next decade average annual growth was almost two times with decreased CV. Same trend continued in 1990s and in the first decade of the new millennium growth rate has registered almost 1 percent increase in comparison to preceding decade. Overall, the average of annual growth rate in the entire period, starting from 1953-54 and ending to 2013-14, has been almost 5 percent with 60 percent CV.

Table 1: Average of Annual Growth Rate of GDP & Its Dispersions over Different Periods (in Proportion to 1)

Period	Average of Annual Growth Rate	SD	CV
1953-54 to 1959-60	0.0408	0.0252	0.6183
1960-61 to 1969-70	0.0393	0.0326	0.8292
1970-71 to 1979-80	0.0281	0.0407	1.449

Period	Average of Annual Growth Rate	SD	CV
1980-81 to 1989-90	0.0551	0.0176	0.3198
1990-91 to 1999-2000	0.0558	0.0208	0.3736
2000-01 to 2009-10	0.0664	0.0235	0.3537
2000-01 to 2013-14	0.0658	0.0226	0.3438
1953-54 to 2013-14	0.0490	0.0295	0.6018

Source: Calculated by author using RBI data.

The behavioral pattern in terms of average of annual growth rate in different sub-periods for GFCF, PFCE, and GFCE has been registered in tables 2 to 4.

Table 2: Average of Annual Growth Rate of GFCF & Its Dispersions over Different Periods (in Proportion to 1)

Period	Average of Annual Growth Rate	SD	CV
1953-54 to 1959-60	.0723	.0970	1.340
1960-61 to 1969-70	.0595	.0405	.6817
1970-71 to 1979-80	.0390	.0530	1.357
1980-81 to 1989-90	.0618	.0161	.2725
1990-91 to 1999-2000	.0672	.0626	.9314
2000-01 to 2009-10	.0977	.0743	.7605
2000-01 to 2013-14	.0859	.0712	.8286
1953-54 to 2013-14	.0653	.0597	.9142

Source: Calculated by author using RBI data.

After the initial spurt in the 1950s which was characterized by the second five year plan and initiation of investment planning, the average of annual growth rate of GFCF declined to 3.9 percent in the 1970s along with high volatility, measured by CV. The decade of 1980s registered both a rise in the growth rate

and decline in CV. Growth rate was improved further in the 1990s and in the new millennium. However, the CVs noted in those periods were in the higher side in comparison to 1980s. Overall the average of annual growth rate over the entire period was 6.53 per cent with a quite high CV.

From the table 3 it can be found that the average of annual growth rate of private final consumption expenditure (PFCE) for the seven years of the 1950s was 3.18 per cent with a higher CV. The dispersion however declined in the 1960s with growth rate remaining almost same.

Decade of 1970 had been worst in all respect. From the 1980 onward the growth rate has been increasing with a declining dispersion. Overall the growth rate for the entire period was 4.29 per cent with CV 62.57 per cent.

Table3: Average of Annual Growth Rate of PFCE & Its Dispersions over Different Periods ((in Proportion to 1)

Period	Average of Annual Growth Rate	SD	CV
1953-54 to 1959-60	.0318	.0355	1.116
1960-61 to 1969-70	.0310	.0203	.6559
1970-71 to 1979-80	.0272	.0303	1.112
1980-81 to 1989-90	.0456	.0228	.4994
1990-91 to 1999-2000	.0465	.0176	.3786
2000-01 to 2009-10	.0622	.0205	.3305
2000-01 to 2013-14	.0636	.0202	.318
1953-54 to 2013-14	.0429	.0268	.6257

Source: Calculated by author using RBI data.

Table 4: Average of Annual Growth Rate of GFCE & Its Dispersions over Different Periods (in Proportion to 1)

Period	Average of Annual Growth Rate	SD	CV
1953-54 to 1959-60	.0406	.0399	.9824
1960-61 to 1969-70	.0841	.0644	.7658
1970-71 to 1979-80	.0484	.0455	.9405
1980-81 to 1989-90	.0668	.0223	.3341
1990-91 to 1999-2000	.0590	.0416	.7051
2000-01 to 2009-10	.0543	.0435	.8005
2000-01 to 2013-14	.0545	.0366	.6728
1953-54 to 2013-14	.0595	.0435	.7315

Source: Calculated by author using RBI data.

Table 4 shows that in case of government final consumption (GFCE) the initial sub-period consisting of seven years of 1950s the average annual growth rate was 4.06 per cent but the volatility in terms of CV was also the highest of all the CVs corresponding to the respective sub-periods. In terms of the growth rate the

1960s was the best but in the 1980s volatility was relatively less with reasonably high growth rate. However, in the 1990s and 2000s the growth rates were smaller and CVs were higher than those during the 1980s. The entire period registered a growth rate of 5.95 per cent with CV at 73.15 per cent.

Table 5: Trend Growth Rate of GDP at Market Price and Some of Its Components over Different Periods (in Proportion to 1)

Variables	Trend Growth Rate		
	1952-53-1990-91	1991-92-2013-14	1952-53-2013-14
GDP	.0382	.0659	.0472
GFCF	.0512	.0905	.0608
PFCE	.0327	.0601	.0407
GFCE	.0625	.0606	.0590

Source: Estimated by author using RBI data

Table 5 shows the trend growth rate in two sub-periods and for entire period. The sub-periods are formed on the basis of reform initiated in 1991. It is clear from the table that growth rate has improved substantially in the post-reform period in comparison to pre-reform period. Gross fixed capital formation has also registered quite a remarkable improvement in the post-reform period in terms of its growth rate. Growth rate of private final consumption expenditure has almost doubled in the post-reform period. However, the growth rate of government final consumption expenditure remains almost same in the two sub-periods.

Co-movements of GDP and Some of Its Components

The co-movement of the GDP and some of its constituents are also tested using three period lead and lags. Actually, the co-movements between the shocks or the innovations are estimated. The table 9 shows the correlation coefficients between the innovations of gross domestic product at market price and gross fixed capital formation and government final consumption expenditure at three period lag and lead. The innovations estimated are the residuals of the appropriately fitted ARMA structure on the relevant

variables. ARMA has been discussed with the help of equation (2). To ensure stationarity of the relevant variables first difference of log value of gross domestic product (GDP), gross fixed capital formation (GFCF) and government final consumption expenditure (GFCE) have been considered after testing for stationarity using ADF with a drift as one variant of equation (1). The transformed variables i.e. the first differences of the discussed variables are represented as DLGDP, DLGFCF and DLGFCE respectively. The appropriate ARMA structure has been selected mainly on the basis of Akaike information criterion provided it is stationary and invertible. However, to select the exact model the F-value (with level of significance 10%) and

the number of significant coefficients are also taken into consideration. From table 6 to table 8 the AIC values for different ARMA (p, q) structures for DLGDP, DLGFCF and DLGFCE are shown. For each variable 35 different combinations of ARMA up to the order (5, 5) has been tested. For DLGFCE ARMA (1,5) and ARMA(5, 5) produce better AIC values with other required conditions but since for ARMA (3, 2) all the coefficients are significant at 10 per cent level, this ARMA structure has been considered as appropriate. For ARMA (1, 5) & ARMA (5, 5) all the coefficients are not significant. Therefore, the selected ARMA structure for the DLGDP, DLGFCF and DLGFCE are ARMA (1,1), ARMA (4,4) and ARMA (3,2) respectively.

Table 6: AIC Values for ARMA (p, q) Structure of DLGDP

		P					
		0	1	2	3	4	5
q	0		-4.143	-4.096	-4.075	-4.023	-4.056
	1	-4.158	-4.257#	-4.234*	-4.147	-4.111*	-4.030
	2	-4.130	-4.249*	-4.346*	-4.288*	-4.240*	-4.215*
	3	-4.114	-4.167	-4.125	-4.238*	-4.199*	-4.345*
	4	-4.093	-4.134	-4.101*	-4.282*	-4.044*	-4.481*
	5	-4.138	-4.230#	-4.255#	-4.223*	-4.177*	-4.126*

Source: Estimated by authors

*either absolute value of inverted AR root/s is/are not less than 1 or absolute value of inverted MA root/s is/are not less than 1 or both despite F value being significant;

both stationary and invertible along with significant F value.

For unmarked values F is not significant

Table 7: AIC Values for ARMA (p, q) Structure of DLGFCF

		p					
		0	1	2	3	4	5
q	0		-2.743	-2.708	-2.692	-2.734	-2.812
	1	-2.759	-3.036*	-2.705	-2.678	-2.756	-2.798
	2	-2.728	-2.725	-2.674	-2.786#	-2.937#	-2.783
	3	-2.695	-2.931*	-2.806#	-2.810#	-2.937#	-2.912
	4	-2.663	-2.659	-2.779#	-2.775#	-3.024#	-2.846
	5	-2.630	-2.628	-2.745	-2.743	-2.994#	-2.949#

Source: Estimated by authors

*either absolute value of inverted AR root/s is/are not less than 1 or absolute value of inverted MA root/s is/are not less than 1 or both despite F value being significant;

both stationary and invertible along with significant F value.

For unmarked values F is not significant

Table 8: AIC Values for ARMA (p, q) Structure of DLGFCE

		p					
		0	1	2	3	4	5
q	0		-3.536#	-3.509#	-3.529#	-3.492#	-3.455#
	1	-3.521#	-3.505#	-3.646*	-3.626*	-3.458#	-3.494#
	2	-3.527#	-3.483#	-3.608#	-3.736#	-3.620#	-3.659#
	3	-3.494#	-3.604*	-3.617#	-3.596*	-3.793*	-4.032*
	4	-3.507#	-3.622*	-3.596*	-3.613*	-3.582*	-3.533*
	5	-3.824*	-3.743#	-3.568*	-3.574#	-3.682*	-3.819#

Source: Estimated by authors

*either absolute value of inverted AR root/s is/are not less than 1 or absolute value of inverted MA root/s is/are not less than 1 or both despite F value being significant;

both stationary and invertible along with significant F value.

For unmarked values F is not significant

Table 9: Correlation Coefficients at Three Period Lag/Lead of Innovations of first difference of LGDP, LGFCF and LGFCE

Innovations in First Difference of	Innovation in First Difference of LGDPMP at time [@]						
	-3	-2	-1	0	1	2	3
LGFCF	-.0859	.1060	.0417	.2517 ^{***}	.1899	.1503	-.1987
LGFCE	-.0699	.1721	.1014	.0543	.1787	.2159	-.2862 ^{**}

Source: Authors' own estimations

@ Minus Three Means Three Period Lag of innovations of first difference of LGDP

significant at 5 %; * significant at 10 %

The table 10 shows the correlation coefficients between the shocks of gross domestic product at market price and gross fixed capital formation, private final consumption expenditure and government final consumption expenditure at three period lag and lead. The cyclical part extracted after applying HP filter given in equation (3) treated as the shocks of the relevant variables. In this

case also logarithm values of the required variables are used for extracting the cycles and smoothing parameter 100 is considered for HP filter. The shocks thus estimated for gross domestic product, gross fixed capital formation, private final consumption expenditure and government final consumption expenditure are designated as LGDPCY, LGFCFCY, LPFCECY and LGFCECY.

Table 10: Correlation Coefficients at Three Period Lag/Lead of Shocks in LGDP, LGFCF, LPFCE, LGFCE

Shocks in	Shocks in LGDP at time [@]						
	-3	-2	-1	0	1	2	3
LGFCF	-.2156	.05991	.007 ^{**}	.4372 [*]	.1322	-.0616	-.1005
LPFCE	-.0626	.11005	.2188 ^{***}	.7655 [*]	.0283	-.2240 ^{***}	-.1999
LGFCE	.1344	.3698 [*]	.3925 [*]	.2474 ^{***}	.0522	-.21105	-.4755 [*]

Source: Authors' own estimations

@ Minus Three Means Three Period Lag of shocks of LGDP

*significant at 1 %; **significant at 5 %; *** significant at 10 %

The table 9 shows significant positive correlation contemporaneously between output and gross fixed capital formation as expected but no other significant correlation except at the three period lead between GDP and government final consumption and the correlation is negative.

However, the table 10 indicates not only significant contemporaneous correlation but also significant positive correlation at one period lag for all variables. Interestingly, the significant positive correlation between LGDPCY and LGFCECY at two period lag turns to significantly negative correlation at three period lead. It means higher government final consumption at current period may relate negatively, after three periods, with future output. The negative and significant correlation between output and private final consumption expenditure at two period lead to some extent signifies that crowding out of resource by private consumption may affect future output adversely.

Conclusion

The colonial baggage inflicted a serious damage to the Indian economy, which may be visible from the mere 0.9 percent growth rate of Indian economy during 1900-01 to 1946-47 (Dreze & Sen, 2013). So, it was quite uphill task for the Indian establishment to set the Indian economy in motion. In the last almost six decades major policy changes have also been incorporated following the contemporary tone of the dominant economic views. In the post-independent India performance

of Indian economy in 1970s has been worst in terms of growth rate of GDP, gross fixed capital formation and private final consumption expenditure. Volatility measured by coefficient of variation has also been very high in this period for the aforesaid macroeconomic variables. The performance of the economy in the 1980s, in terms of average annual growth rates and CVs of GDP, GFCF, PFCE and GFCE were quite satisfying. The growth rate of GDP, comparatively, seems to be settling down at a higher rate in the new millennium. This is also true for private final consumption expenditure. However, though gross fixed capital formation has registered a remarkably high growth rate, the coefficient of variation has also been quite high in the new millennium. Average annual growth rate of government final consumption expenditure decreased marginally in the new millennium relative to the last decade of last millennium but, CV has remained almost same. Trend growth rate for all variables, except for government final consumption expenditure, has registered improvement in the post-reform period in comparison to pre-reform period. Given that the decades of immediate post-independent period inherited almost a stagnant economy, building a base of strong economy and reversing the devastation of colonial past in the later periods is quite remarkable. The co-movement of GDP with respect to other constituent variables seems to be mainly contemporaneous. At best, only at one period lag, significant co-movement in terms of correlation coefficients has been found. However, the change in sign of

significant correlation coefficients between GDP and government final consumption expenditure due to movement from lag to lead position signifies higher GDP may lead to higher GFCE in future but higher GFCE may affect GDP in future, after three period, adversely. One period lag significant correlation coefficients between GDP and gross fixed capital formation indicates GDP may lead to more future GFCF. However, absence of any significant correlation between these two variables, at all three leads considered here, may raise serious question about the quality and gestation period of investment.

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