SOCIAL SECTOR DEVELOPMENT AND ECONOMIC GROWTH IN HARYANA

Shiba Shankar Pattayat, Central University of Punjab
Poonam Rani, Central University of Haryana

ABSTRACT

This paper attempts to explore the impact of social sector development on economic growth in Haryana. And it also explains the short-run and long-run relationship between economic growth and social development in Haryana using time series data for the period of 1985 to 2016. Various indicators of social sector development, viz., education, health, Relief on natural calamities, sanitation, social security and labour welfare and welfare of Scheduled Caste (SC), Schedule Tribes (ST) and Other Backward Caste (OBC) etc. are used to measure the human capabilities and social development which has implications for long-run economic growth. The major findings of the paper suggest that there exists a high degree of correlation between economic growth and the expenditures on social sector development. Though Granger Causality shows significant results and designates that there is a short-run relationship between the NSDP and social sector Expenditure of Haryana state. The Johansen co-integrating regression suggests a long-run dynamics relationship between growth and social sector development in Haryana. Hence, the policy measures focusing on infrastructure development is highly desirable for initiating social sector development in one hand. On the other hand, provision for better healthcare, sanitation facilities and skill development measures, would sustain the process of long-run economic growth in Haryana.

Keywords: Social Sector, Economic Growth, Haryana.

JEL Code: O4 I0

INTRODUCTION

The social sector development has been considered as an essential prerequisite for sustained human development and economic growth of an economy (Sen, 1989). Because human capabilities provide a firm basis for evaluating living standards and quality of life (Sen, 1989 and 2000). Hence, deliberate attention to the enhancement of freedoms and capabilities would help in the process of economic development. Social[1] sector development sets the foundation for rising income and employment opportunities, productivity growth, technological advancement and hence, helps to enhance the quality of life of people. Development of the social sector is one of the most important components of the economic growth (Romer, 1986, 1989, 1990; Lucas, 1988; Quah and Rauch, 1990, Grossman and Helpman 1991, Rivera-Batiz & Romer 1991).

According to Alvi (2010) "No nation can progress without a strong human capital base". The studies like Nelson and Phelps (1966), Benhabib and Spiegal (1994), Lucas (1988), Mankiw et al. (1992) find that education plays an important role in the process of innovation and human capital accumulation, which helps to increase the labour productivity and hence boost economic

growth. Endogenous growth theory explains the causal connection between economic growth and human capital development (for example, Romer 1986, 1989, 1990 and 1991). Because social sector development needs a strong human capital base which could be built through quality education, better health facility, job opportunities in the organized sector with social security measures etc. Social sector development increases the capabilities of human beings which increases labour productivity and hence boosts economic growth (Strauss and Thomas, 1998). Increasing growth of output, on the other hand, it enables the government to increase the share of spending on social sector development which has implications for long-run socio-economic development.

This study tries to explore the impact of social sector development on economic growth in Haryana. This study has taken Haryana as the study area because of improving of expenditure on social sector in Haryana. The major reason is that this type of study has not been conducted in any states of India. Therefore, this study is different from others.

The rest of the paper is organized as follows. Section two explains about the previous literature related to social sector development and economic growth (that are both national level studies as well as international level studies). Section three explains the data and methodology which includes the variables used in the present study and outlines the regression model. Section four (it has divided into two sub-section descriptive statistics and econometric results) discuss about the empirical results of the study. And finally, section five concludes the paper and draws upon the policy measures based on the findings of the paper.

LITERATURE REVIEW

A review of earlier studies conducted in various parts of the world finds that social sector development and economic growth are closely inter-related. The studies like Hicks (1979), Streeten (1981), Goldstein (1985), Ram (1985), Strauss & Thomas (1995), Duflo (2001) Haddad et al. (2003) and Culter et al. (2005) & Baldacci (2008) have found that social sector development has positive implications for economic growth. Moreover, the empirical studies like Gerdham et al. (1992) & Hitris & Posnett (1992) in OECD countries, Gbesemete and Gerdtham (1992) & Schultz (2000) in Africa and South American region, Reza et al. (2014) in Iran and Pradhan and Hall (provide year) in Asia have found that social sector development has positive impact on economic growth.

Similarly, in India the earlier studies like Sen (2000); Hooda (2013); Gangal & Gupta (2013); Mohapatra (2013); Haldar et al. (2006) and Bhat & Jain (2004) explains that expenditure on health increases the economic growth through the improvement of health conditions of people which leads to productivity of the people. That productivity expands their percapita income (both in monetary percapita income[2] and real[3] per capita income) as well as their standard of living. Furthermore, it push towards the economic growth and development of the economy.

Datt and Ravallion (1998), explains about the poverty elimination in rural areas for different states of India. Mahal et al. (2000) find that 31 percent of public subsidies on health accrued to urban residents, somewhat higher than their share in the total population of about 25 percent. And the distribution of public health subsidies in a rural area is lower than the urban area in different states of India. This study also identifies that less amount of money spend of health which has negative impacts on the current social welfare and labour productivity, which reduces the per capita income and standard of living of the people. However, this has a negative impact on economic growth and economic development in future because this is a long-run concept. Therefore, this paper attempts to explore the impact of increasing social sector

expenditure (both private and public sector expenditure) on economic growth in Haryana using time series data for the period of 1985 to 2016.

DATA AND METHODOLOGY

This paper is based on secondary data which covers only for Haryana. These data are collected from various sources like Central Statistical Organization (CSO), EPW Research Foundation, Ministry of Human Resource Development, Government of India, Sample Registration System, Census of India, Directorate of Economics and Statistics, Government of Haryana (Handbook of Statistics on State govt. Finances, RBI), etc. All these data are collected over a period of 31 years (from 1985 to 2016) to get a time series. However, these data are covered variables like NSDP (Net State Domestic Product) in Haryana, ESAC (expenditure on Education, Sports, Art & Culture), FWMPH (expenditure on Family Welfare, Medical & Public Health), WSSO (expenditure on Welfare of SC, ST & OBC), LLW (expenditure on Labour & Labour Welfare), SSW expenditure on Social Security & Welfare), HUD (expenditure on Housing and Urban Development) and WSS (expenditure on Water Supply and Sanitation) for the state of Haryana. These variables are transformed into logarithm form to reduce the scale, which also helps to reduce the likely heteroscedasticity[4] in the data (Table 1).

At the outset, all the transformed variables are checked for stationarity[5]. All the variables have been checked by various methods, viz., Augmented Dicky-Fuller (ADF) test (Equation 1), Phillips-Perron (PP) test (Equation 2), Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests (Equation 3). It is important to note that both ADF test and PP test are formulated to test the null hypothesis that the series is non-stationary, whereas the KPSS test is alternative to which has the null hypothesis is stationary. All the above tests suggest that all the variables are integrated of order, i.e., I (1) variables (Table 2). This means after the first difference they would become stationary or I (0) variables. The graphical representation of the stationary checking (using correlogram) is also given in Annexure 1. Since all the variable are I (1) we have tested the Granger causality (Engel, 1987); Granger, 1969) test (Equation 4) in the first difference form which is I (0) to avoid the likely spuriousness (Table 3). Moreover, a Johansen Co-integrating regression (Johansen, 1988) is also run using the I (1) series following Engel (1987) and Granger (1969) to find the long-run relationship (Equation 4 and Table 4).

$$\text{ADF test Equation: } \Delta R_t = \beta_1 + \beta_2 t + \rho R_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta R_{t-i} + \varepsilon_t \qquad (1)$$

Where, ΔR_t is the first difference of the R_t, β_1 is the intercept, β_2, ρ are the coefficients, t is the time or trend variable, m is the number of lagged terms chosen to ensure that ε_t is white noise, i.e., ε_t contains no autocorrelation, ε_t is the pure white noise error term and $\sum_{i=1}^{m} \alpha_i \Delta R_{t-i}$ is the sum of the lagged values of the dependent variable ΔR_t.

$$\text{Phillips Perron Equation: } \Delta Y_t = \alpha Y_{t-1} + x_t + \varepsilon_t \qquad (2)$$

$$\text{KPSS equation: } R_{Tt} = x_t \delta + u_t \qquad (3)$$

And $\alpha=\rho-1$

$$LNSDP_t = \alpha + \beta_1 LESAC_t + \beta_2 LFWMPH_t + \beta_3 LWSSO_t + \beta_4 LLLW_t + \beta_5 LSSW_t + \beta_6 LHUD_t + \beta_7 LWSS_t + \beta_8 LRANC + \varepsilon_t \quad (4)$$

Where

$LNSDP_t$=Log of Net State Domestic Product in Haryana
$LESAC_t$=Log of expenditure on Education, Sports, Art & Culture
$LFWMPH_t$=Log of expenditure on Family Welfare, Medical & Public Health
$LWSSO_t$=Log of expenditure on Welfare of SC, ST & OBC
$LLLW_t$=Log of expenditure on Labour & Labour Welfare
$LSSW_t$=Log of expenditure on Social Security & Welfare
$LHUD_t$=Log of expenditure on Housing and Urban Development
$LWSS_t$=Log of expenditure on Water Supply and Sanitation
$LRANC_t$=Log of Relief on Account of Natural calamities

Source: Author's Calculation

RESULTS AND DISCUSSION

Descriptive Statistics

To know the nature of the variable this paper tested all the variabls by using descriptive statistics. Then it explains the trends and patterns of growth rate and social expenditure in the state of Haryana. The study have plotted the trends of growth rate of NSDP and growth rates of expenditures on various heads of social sector development., It has used to get an idea about the relationship between Net state Domestic Product (NDSP) and expenditures on social sector development in Haryana. However, the compound annual growth rate of social expenditure and NSDP of Haryana is e positive. It was 19.95 (Social Exp.) and 6.92 (NSDP) percent over the study period. Since most of the state is following the recent campaign of "Make in India[6]", the state Haryana is not an exception. It is clear that in the recent years, particularly, since 2005 the growth rate of expenditures on social sector development is very high in Haryana. Though growth rate of NSDP is high during the last decade the growth rate of expenditure on social sector development is much higher than that of NSDP growth rate (Figure 1).

Table 1
EXPENDITURE ON SOCIAL SECTOR AND NSDP IN HARYANA, FROM 1985 TO 2015

Compound Annual Growth Rate	Social Exp.	NSDP
1985-2016	19.95	6.92
1985-2000	22.18	5.22
2001-2016	21.19	8.60

Sources: Authors' Calculation

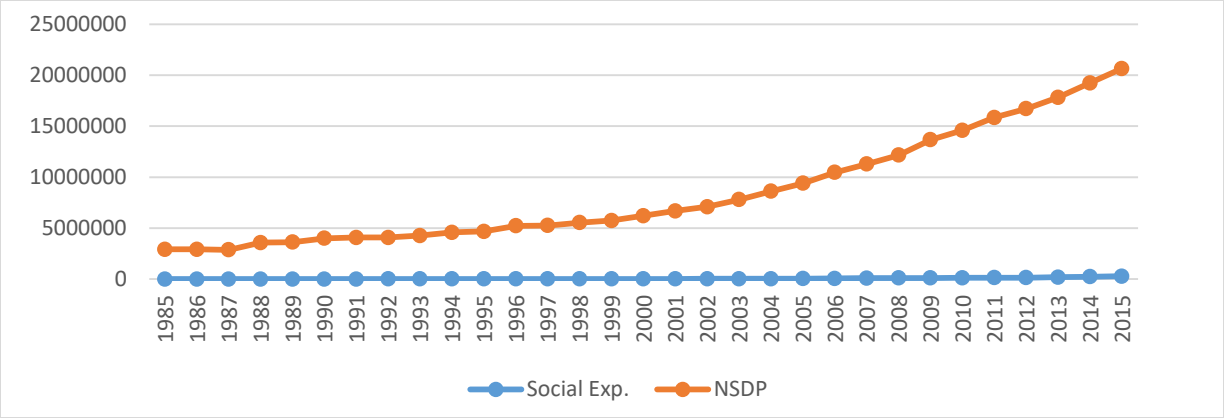
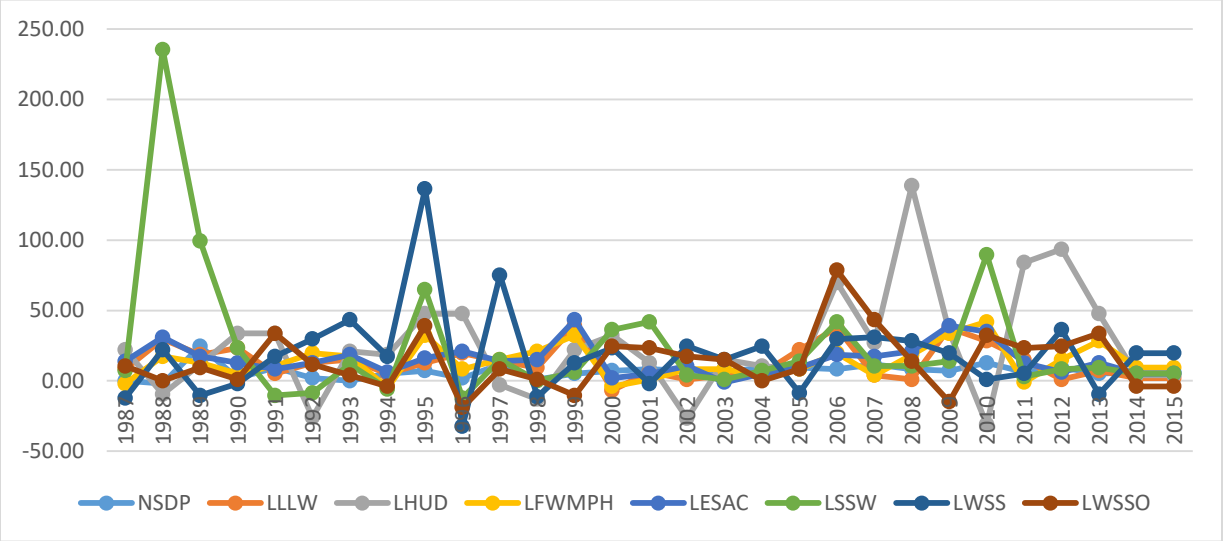


FIGURE 1
TRENDS IN NSDP AND EXPENDITURE ON SOCIAL SECTOR DEVELOPMENT IN HARYANA, FROM1986-2015



Source: Author's plot after computing growth rates from the actual data

FIGURE 2
GROWTH OF NSDP AND GROWTH EXPENDITURE ON SOCIAL SECTOR DEVELOPMENT IN HARYANA, 1986-2015

Table 2
UNIT ROOT TEST RESULTS

Variables	Stationarity Test Result					
	At the Level form			First difference form		
	Without trend and intercept	*With intercept but no trend*	*With intercept and trend*	*Without trend and intercept*	*With intercept but no trend*	*With intercept and trend*
Augmented Dickey Fuller (ADF) Test						
LNSDP	7.8 (1.0)	0.9 (0.9)	-2.13 (0.5)	-1.06 (0.2)	-6.9 (0.0)	-7.13 (0.0)
LESAC	7.5 (1.0)	-0.9 (0.7)	-4.1 (0.01)	-1.9 (0.05)	-3.7 (0.00)	-3.7 (0.03)
LFWMPH	6.4 (1.0)	0.5 (0.9)	-4.3 (0.01)	-0.4 (0.4)	-5.7 (0.00)	-5.6 (0.00)
LHUD	3.5 (0.9)	0.5 (0.9)	-1.7 (0.7)	-3.6 (0.00)	-4.7 (0.00)	-4.8 (0.00)
LLLW	5.3 (1.0)	-1.3 (0.5)	-2.1 (0.5)	-2.7 (0.00)	-4.7 (0.00)	-4.9 (0.00)
LSSW	2.9 (0.9)	-2.04 (0.2)	-3.3 (0.07)	-3.4 (0.00)	-4.3 (0.00)	-4.5 (0.00)
LWSS	4.8 (1.0)	-0.3 (0.9)	-3.5 (0.07)	-0.9 (0.3)	-9.2 (0.00)	-9.02 (0.00)
LWSSO	3.4 (0.9)	0.8 (0.9)	0.1 (0.9)	-1.8 (0.6)	-4.8 (0.00)	-4.8 (0.00)
LRANC	1.1 (0.9)	-1.1 (0.7)	-6.8 (0.0)	-9.7 (0.00)	-9.9 (0.00)	-9.79 (0.00)
Phillips-Perron (PP) Test						
LNSDP	9.6 (1.0)	1.3 (0.9)	-2.05 (0.5)	-2.4 (0.01)	-7.01 (0.00)	-7.2 (0.00)
LESAC	5.8 (1.0)	-0.8 (0.7)	-2.2 (0.4)	-1.7 (0.08)	-3.7 (0.00)	-3.7 (0.03)
LFWMPH	7.4 (1.0)	0.6 (0.9)	-2.2 (0.4)	-2.6 (0.01)	-5.7 (0.00)	-5.6 (0.00)
LHUD	6.4 (1.0)	0.9 (0.9)	-1.6 (0.7)	-3.6 (0.00)	-4.6 (0.00)	-6.4 (0.00)
LLLW	4.9 (1.0)	-1.4 (0.5)	-2.2 (0.4)	-2.5 (0.01)	-4.9 (0.00)	-4.8 (0.00)
LSSW	2.6 (0.9)	-2.06 (0.2)	-3.4 (0.07)	-3.3 (0.00)	-4.2 (0.00)	-4.5 (0.00)
LWSS	3.0 (0.9)	-0.02 (0.9)	-3.5 (0.05)	-5.8(0.00)	-9.03 (0.00)	-8.8 (0.00)
LWSSO	4.2 (1.0)	0.16 (0.9)	-1.8 (0.6)	-3.7 (0.00)	-4.8 (0.00)	-4.8 (0.00)
LRANC	1.9 (0.9)	-2.08 (0.2)	-14.5 (0.00)	-10.7 (0.00)	-31.1 (0.00)	-27.02 (0.00)
Kwiatkowski-Phillips-Schmidt-Shin (KPSS) Test						
LNSDP	---	0.7 (0.4)	0.17 (0.14)	---	0.22 (0.46)	0.10 (0.14)
LESAC	---	0.7 (0.46)	0.05 (0.14)	---	0.08 (0.46)	0.06 (0.14)
LFWMPH	---	0.7 (0.46)	0.1 (0.14)	---	0.1 (0.46)	0.06 (0.14)
LHUD	---	0.7 (0.46)	0.6 (0.14)	---	0.1 (0.46)	0.07 (0.14)
LLLW	---	0.7 (0.46)	0.06 (0.14)	---	0.1 (0.46)	0.07 (0.14)
LSSW	---	0.7 (0.46)	0.06 (0.14)	---	0.2 (0.46)	0.11 (0.14)
LWSS	---	0.7 (0.46)	0.09 (0.14)	---	0.08 (0.46)	0.08 (0.14)
LWSSO	---	0.6 (0.46)	0.16 (0.14)	---	0.14 (0.46)	0.13 (0.14)
LRANC	---	0.7 (0.46)	0.5 (0.14)	---	0.32 (0.46)	0.32 (0.14)

Note: Entries in each cell shows Test Statistics and the probability of the Test Statistics is in the parentheses. In case of KPSS test 5% significant tabulated value of the test statics is in the parentheses
Source: Authors' Calculation by using E-views software

This could be due to the initiatives were taken in both 11th and 12th plan periods in order to achieve inclusive growth in India. Since the development of the social sector is indispensable for the achievement of inclusive growth in India. The government of Haryana has also spent substantially on education, healthcare, housing, sanitation and social security and labour welfare for the economic growth and development in Haryana. The result of the descriptive statistics found that though most of the variables do not follow the normal distribution, but they have low standard deviation and moderate skewness (Annexure 2). Furthermore, the high degree of correlation between NSDP with various expenditures on social sector development (Annexure 3) enables us for doing further econometrics analysis.

Econometrics Results

This study has used Granger causality test to find out the cause and effect relationship between NSDP and expenditure on social sector development in Haryana. This method explains about the short-run relationship among the variables which are included in this study. The causality test statistics suggest that NSDP causes the Family Welfare and Medical Facilities (FWMPH), Housing and urban development (HUD), the welfare of SC, ST&OBC (WSSO) and Relief on account of natural calamities (RANC). It indicates that there is a short run relationship between the same variable. But only one variable (Social Security Welfare) have an impact on NSDP (Table 3). This might have happened because of the fact that in the short-run, the government of Haryana could not able to spend on social sector development until 2005 (Figure 2). Furthermore, the increase of social sector development in Haryana could also be affected hugely by the central government schemes (social development schemes[7]) during the last decade, particularly, during the 11th and 12th five years periods. Hence the share of expenditure on social sector development was very high during that (post 2005) periods.

Table 3
GRANGER CAUSALITY TEST RESULTS

Null Hypothesis	F-Statistic	Prob.
Causality between NSDP and Exp. On Education, Sports, Art & Culture		
ESAC does not Granger Cause NSDP	1.47612	0.2485
NSDP does not Granger Cause ESAC	2.56358	0.0979
Causality between NSDP and Exp. On Family welfare & Medical facilities		
FWMPH does not Granger Cause NSDP	0.01656	0.9836
NSDP does not Granger Cause FWMPH	3.68726	0.0401
Causality between NSDP and Exp. On Housing & Urban development		
HUD does not Granger Cause NSDP	0.60846	0.5524
NSDP does not Granger Cause HUD	4.92423	0.0161
Causality between NSDP and Exp. On Labour & Labour welfare		
LLW does not Granger Cause NSDP	2.56176	0.0981
NSDP does not Granger Cause LLW	2.14206	0.1393
Causality between NSDP and Exp. On Water supply and Sanitation		
WSS does not Granger Cause NSDP	0.98816	0.3869
NSDP does not Granger Cause WSS	1.02539	0.3738
Causality between NSDP and Exp. On welfare of SC,ST&OBC		
WSSO does not Granger Cause NSDP	0.41101	0.6676
NSDP does not Granger Cause WSSO	4.51779	0.0216
Causality between NSDP and Exp. On Social Security Welfare		
SSW does not Granger Cause NSDP	7.87816	0.0023
NSDP does not Granger Cause SSW	28.6137	4.007
Causality between NSDP and Relief on account of natural calamities		
LRANC does not Granger Cause LNSDP	1.89986	0.1714
LNSDP does not Granger Cause LRANC	7.76846	0.0025
Number of Observations	29	

Source: Author's Calculation

Because of the focus on inclusive development in the last decade and initiatives for "Make in India" in recent years. It is expected that both the growth of NSDP and social sector expenditure would increase further in long-period. And more importantly, the increasing expenditure on social sector development would increase labour productivity through skill development. This skill development programme would encourage people (those who belong to women and socially marginalized groups including Muslims) to participate in labour market. Increament of labour force participation in labour market leads to increase parcapita income and standard of living which leads to growth of NSDP in Haryana. It is clear from the results of Johansen co-integration that growth of NSDP and social sector expenditure are significantly related in the long-run i.e. there is a long-run relationship between NSDP and social expenditure in Haryana. Both Johansen's Trace statistics and Maximum Eigen value test suggests that there exists six significant (at 5% level) co-integrating relations (Table 3). This implies the fact that in the long run NSDP and social sector development are inter-dependent and would cause each other.

Table 4
JOHANSEN CO-INTEGRATION RESULTS

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistics (#)	Critical Value at 5% (p-value)	Maximum Eigen Statistics ($)	Critical Value at 5% (p-value)
None	0.989936	445.79*	197.37 (0.000)	133.36*	58.43 (0.00)
At most 1	0.960702	312.42*	159.53 (0.000)	93.86*	52.36 (0.00)
At most 2	0.915105	218.56*	125.61 (0.000)	71.52*	46.23 (0.00)
At most 3	0.874540	147.03*	95.75 (0.000)	60.19*	40.07 (0.00)
At most 4	0.640992	86.84*	69.81 (0.000)	29.70	33.87 (0.14)
At most 5	0.612767	57.13*	47.85 (0.005)	27.51	27.58 (0.05)
At most 6	0.485702	29.61	29.79 (0.032)	19.28	21.13 (0.08)
At most 7	0.299610	10.33	15.49 (0.205)	10.32	14.26 (0.19)
At most 8	0.000254	0.007	3.84 (0.069)	0.00	3.84 (0.93)

*****denotes rejection of the hypothesis at the 0.05 level
Trace test indicates 6 co-integrating equations at the 0.05 level
$ Max-eigenvalue test indicates 4 co-integrating equations at the 0.05 level
Source: Authors Calculation

CONCLUDING REMARKS

In the context of inclusive growth and "Make in India" initiatives of the central government. The role of the state government of Haryana becomes very important for initiating various developmental strategies for the all-round development of the state. In the recent years, an increase in the public spending on various heads of social development has increased in Haryana. This paper examines both short-run and long-run relationship between economic growth and social sector development through human capital formation in Haryana. The major findings of the paper show that increased expenditure on social sector development has a strong and positive impact on growth of NSDP in Haryana. The results of the study also show that a significant relationship between growth and social sector development in the short-run (Granger causality result is significant). However, it suggests a long-run positive relation between the two (Johansen co-integration). The Ganger causality test identified that expenditure on some social factors is positively significant towards economic growth. Expenditure on Social Security

Welfare (SSW) unidirectional (only) and others are statistically insignificant. Though govt. of Haryana invested for social sector development but it does not reach to the poor section of the people who are in root in the economy.

Therefore, Govt. of Haryana should focus on public investment in human capital i.e. expenditure on social sector development that will encourage to the growth of the economy.

ENDNOTES

1. It comprising of sub-sectors like education, health and medical care, housing, sanitation and water supply, etc.
2. Per capita income refers to the average income earned per person in a given area in a particular period of time. It is calculated by dividing the total income by total population.
3. Real per capita is adjusted with the inflation in a specific period of time.
4. When the variance of the residual is not constant, it makes difficult to precisely test the null hypothesis. For detail see Gujarati (2007), 3rd edition, chapter 11, p: 396-449.
5. A variable is said to be strongly stationary if its mean and variances are constant over the years and the covariance at each lag is constant. And it would be weak stationary if its mean and variances are constant over the years and the covariance at a constant lag is constant. For detail see Enders (2004).
6. Make in India, a type of Swadeshi movement covering 25 sectors of economy, was launched by the Government of India in 2014 to encourage companies to manufacture their products in India.
7. Sarva Shiksha Abhiyan (SSA) and Rashtriya Madhyamik Shiksha Abhiyan (RMSA) National Skills Qualifications Framework (NSQF), National Rural Health Mission (NRHM), Janani Shishu Suraksha Karyakram (JSSK), Janani Suraksha Yojana (JSY - GOI), Mukhiya Mantri Muft Ilaj Yojana (MMIY), Mukhya Mantri Anusuchit Jaati Nirmal Basti Yojana (MMAJNBY), Rural housing yojana like Priyadarshini Awaas Yojana (PAY), MGNREGS, Indiara Awas Yojana (IAY), National Rural Livelihood Mission (HSRLM), Rajiv Awas Yojana (RAY), Integrated Housing & Slum Devlopment Programme (IHSDP) and Swaran Jayanti Shahari Rozgar Yojana (SJSRY).

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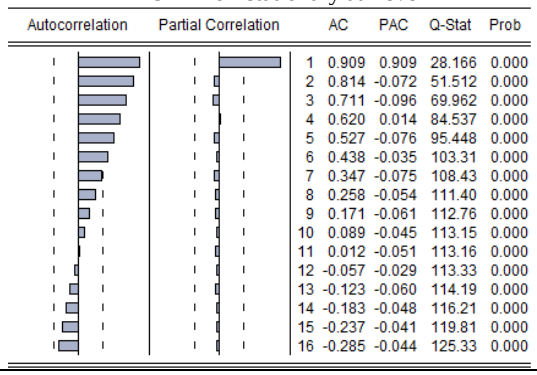
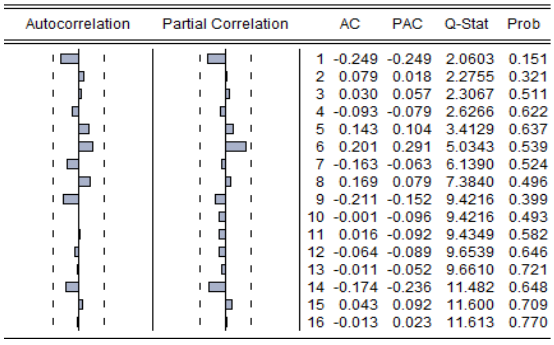
ANNEXURE 1

LNSDP non-stationary at Level



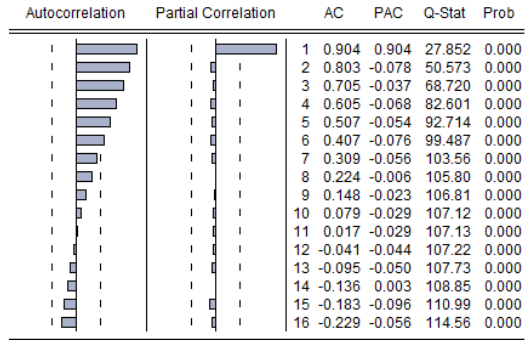
	AC	PAC	Q-Stat	Prob
1	0.909	0.909	28.166	0.000
2	0.814	-0.072	51.512	0.000
3	0.711	-0.096	69.962	0.000
4	0.620	0.014	84.537	0.000
5	0.527	-0.076	95.448	0.000
6	0.438	-0.035	103.31	0.000
7	0.347	-0.075	108.43	0.000
8	0.258	-0.054	111.40	0.000
9	0.171	-0.061	112.76	0.000
10	0.089	-0.045	113.15	0.000
11	0.012	-0.051	113.16	0.000
12	-0.057	-0.029	113.33	0.000
13	-0.123	-0.060	114.19	0.000
14	-0.183	-0.048	116.21	0.000
15	-0.237	-0.041	119.81	0.000
16	-0.285	-0.044	125.33	0.000

LNSDP stationary at First difference



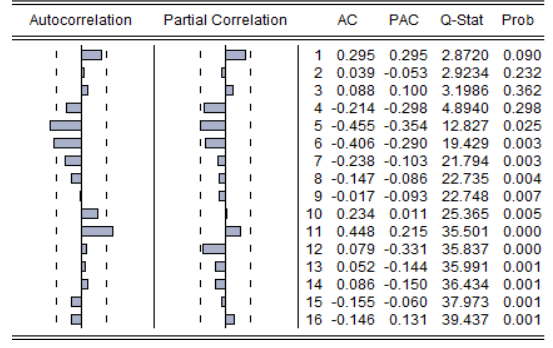
	AC	PAC	Q-Stat	Prob
1	-0.249	-0.249	2.0603	0.151
2	0.079	0.018	2.2755	0.321
3	0.030	0.057	2.3067	0.511
4	-0.093	-0.079	2.6266	0.622
5	0.143	0.104	3.4129	0.637
6	0.201	0.291	5.0343	0.539
7	-0.163	-0.063	6.1390	0.524
8	0.169	0.079	7.3840	0.496
9	-0.211	-0.152	9.4216	0.399
10	-0.001	-0.096	9.4216	0.493
11	0.016	-0.092	9.4349	0.582
12	-0.064	-0.089	9.6539	0.646
13	-0.011	-0.052	9.6610	0.721
14	-0.174	-0.236	11.482	0.648
15	0.043	0.092	11.600	0.709
16	-0.013	0.023	11.613	0.770

LESAC non-stationary at Level



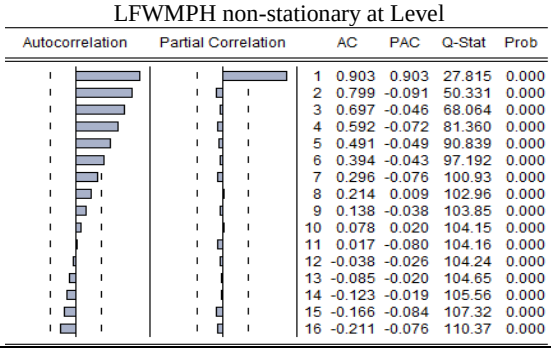
	AC	PAC	Q-Stat	Prob
1	0.904	0.904	27.852	0.000
2	0.803	-0.078	50.573	0.000
3	0.705	-0.037	68.720	0.000
4	0.605	-0.068	82.601	0.000
5	0.507	-0.054	92.714	0.000
6	0.407	-0.076	99.487	0.000
7	0.309	-0.056	103.56	0.000
8	0.224	-0.006	105.80	0.000
9	0.148	-0.023	106.81	0.000
10	0.079	-0.029	107.12	0.000
11	0.017	-0.029	107.13	0.000
12	-0.041	-0.044	107.22	0.000
13	-0.095	-0.050	107.73	0.000
14	-0.136	0.003	108.85	0.000
15	-0.183	-0.096	110.99	0.000
16	-0.229	-0.056	114.56	0.000

LESAC non-stationary at Level



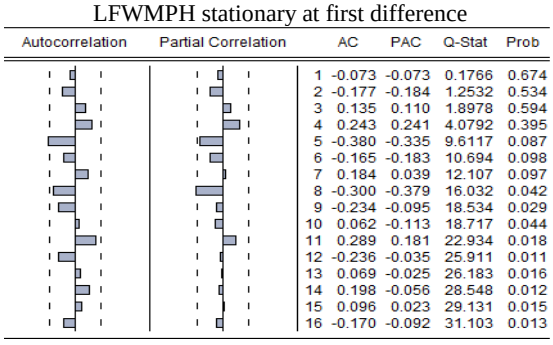
	AC	PAC	Q-Stat	Prob
1	0.295	0.295	2.8720	0.090
2	0.039	-0.053	2.9234	0.232
3	0.088	0.100	3.1986	0.362
4	-0.214	-0.298	4.8940	0.298
5	-0.455	-0.354	12.827	0.025
6	-0.406	-0.290	19.429	0.003
7	-0.238	-0.103	21.794	0.003
8	-0.147	-0.086	22.735	0.004
9	-0.017	-0.093	22.748	0.007
10	0.234	0.011	25.365	0.005
11	0.448	0.215	35.501	0.000
12	0.079	-0.331	35.837	0.000
13	0.052	-0.144	35.991	0.001
14	0.086	-0.150	36.434	0.001
15	-0.155	-0.060	37.973	0.001
16	-0.146	0.131	39.437	0.001

LFWMPH non-stationary at Level



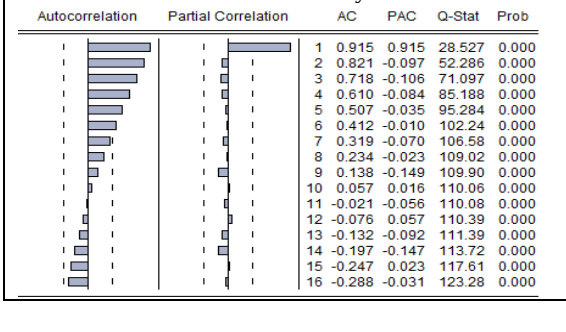
	AC	PAC	Q-Stat	Prob
1	0.903	0.903	27.815	0.000
2	0.799	-0.091	50.331	0.000
3	0.697	-0.046	68.064	0.000
4	0.592	-0.072	81.360	0.000
5	0.491	-0.049	90.839	0.000
6	0.394	-0.043	97.192	0.000
7	0.296	-0.076	100.93	0.000
8	0.214	0.009	102.96	0.000
9	0.138	-0.038	103.85	0.000
10	0.078	0.020	104.15	0.000
11	0.017	-0.080	104.16	0.000
12	-0.038	-0.026	104.24	0.000
13	-0.085	-0.020	104.65	0.000
14	-0.123	-0.019	105.56	0.000
15	-0.166	-0.084	107.32	0.000
16	-0.211	-0.076	110.37	0.000

LFWMPH stationary at first difference



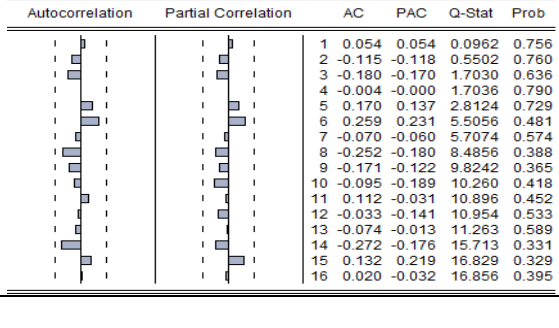
	AC	PAC	Q-Stat	Prob
1	-0.073	-0.073	0.1766	0.674
2	-0.177	-0.184	1.2532	0.534
3	0.135	0.110	1.8978	0.594
4	0.243	0.241	4.0792	0.395
5	-0.380	-0.335	9.6117	0.087
6	-0.165	-0.183	10.694	0.098
7	0.184	0.039	12.107	0.097
8	-0.300	-0.379	16.032	0.042
9	-0.234	-0.095	18.534	0.029
10	0.062	-0.113	18.717	0.044
11	0.289	0.181	22.934	0.018
12	-0.236	-0.035	25.911	0.011
13	0.069	-0.025	26.183	0.016
14	0.198	-0.056	28.548	0.012
15	0.096	0.023	29.131	0.015
16	-0.170	-0.092	31.103	0.013

LWSSO non-stationary at level



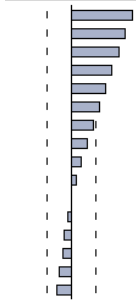
	AC	PAC	Q-Stat	Prob
1	0.915	0.915	28.527	0.000
2	0.821	-0.097	52.286	0.000
3	0.718	-0.106	71.097	0.000
4	0.610	-0.084	85.188	0.000
5	0.507	-0.035	95.284	0.000
6	0.412	-0.010	102.24	0.000
7	0.319	-0.070	106.58	0.000
8	0.234	-0.023	109.02	0.000
9	0.138	-0.149	109.90	0.000
10	0.057	0.016	110.06	0.000
11	-0.021	-0.056	110.08	0.000
12	-0.076	0.057	110.39	0.000
13	-0.132	-0.092	111.39	0.000
14	-0.197	-0.147	113.72	0.000
15	-0.247	0.023	117.61	0.000
16	-0.288	-0.031	123.28	0.000

LWSSO stationary at first difference



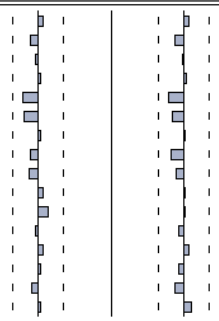
	AC	PAC	Q-Stat	Prob
1	0.054	0.054	0.0962	0.756
2	-0.115	-0.118	0.5502	0.760
3	-0.180	-0.170	1.7030	0.636
4	-0.004	-0.000	1.7036	0.790
5	0.170	0.137	2.8124	0.729
6	0.259	0.231	5.5056	0.481
7	-0.070	-0.060	5.7074	0.574
8	-0.252	-0.180	8.4856	0.388
9	-0.171	-0.122	9.8242	0.365
10	-0.095	-0.189	10.260	0.418
11	0.112	-0.031	10.896	0.452
12	-0.033	-0.141	10.954	0.533
13	-0.074	-0.013	11.263	0.589
14	-0.272	-0.176	15.713	0.331
15	0.132	0.219	16.829	0.329
16	0.020	-0.032	16.856	0.395

LLLW non-stationary at level



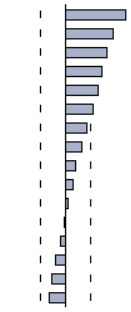
	AC	PAC	Q-Stat	Prob
1	0.903	0.903	27.812	0.000
2	0.799	-0.088	50.353	0.000
3	0.701	-0.027	68.307	0.000
4	0.603	-0.060	82.064	0.000
5	0.508	-0.038	92.231	0.000
6	0.409	-0.093	99.074	0.000
7	0.314	-0.041	103.28	0.000
8	0.229	-0.022	105.62	0.000
9	0.154	-0.016	106.73	0.000
10	0.079	-0.069	107.03	0.000
11	0.008	-0.049	107.04	0.000
12	-0.050	0.000	107.17	0.000
13	-0.100	-0.027	107.74	0.000
14	-0.135	0.015	108.85	0.000
15	-0.179	-0.103	110.89	0.000
16	-0.223	-0.062	114.28	0.000

LLLW stationary at first difference



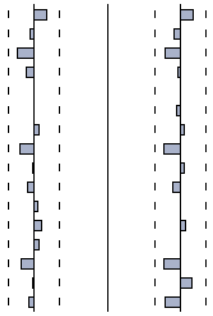
	AC	PAC	Q-Stat	Prob
1	0.071	0.071	0.1663	0.683
2	-0.114	-0.120	0.6125	0.736
3	-0.040	-0.022	0.6681	0.881
4	0.041	0.033	0.7293	0.948
5	-0.208	-0.226	2.3927	0.793
6	-0.191	-0.160	3.8526	0.697
7	0.035	0.013	3.9027	0.791
8	-0.105	-0.187	4.3856	0.821
9	-0.116	-0.113	5.0002	0.834
10	0.067	0.015	5.2173	0.876
11	0.142	0.010	6.2383	0.857
12	-0.035	-0.076	6.3019	0.900
13	0.070	0.067	6.5787	0.923
14	0.040	-0.076	6.6733	0.947
15	-0.088	-0.123	7.1685	0.953
16	0.032	0.105	7.2390	0.968

LSSW non-stationary at level



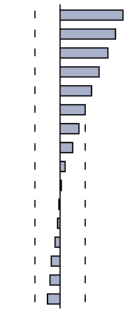
	AC	PAC	Q-Stat	Prob
1	0.856	0.856	25.015	0.000
2	0.697	-0.139	42.135	0.000
3	0.592	0.119	54.932	0.000
4	0.524	0.048	65.329	0.000
5	0.464	0.001	73.801	0.000
6	0.391	-0.062	80.045	0.000
7	0.302	-0.082	83.935	0.000
8	0.229	-0.002	86.266	0.000
9	0.155	-0.092	87.379	0.000
10	0.102	0.029	87.886	0.000
11	0.040	-0.103	87.967	0.000
12	-0.013	0.008	87.977	0.000
13	-0.074	-0.101	88.288	0.000
14	-0.140	-0.075	89.474	0.000
15	-0.192	-0.020	91.823	0.000
16	-0.230	-0.049	95.430	0.000

LSSW stationary at first difference



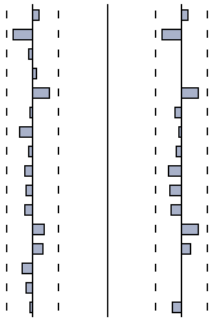
	AC	PAC	Q-Stat	Prob
1	0.175	0.175	1.0128	0.314
2	-0.051	-0.084	1.1010	0.577
3	-0.245	-0.229	3.2281	0.358
4	-0.110	-0.033	3.6727	0.452
5	0.002	0.005	3.6728	0.597
6	0.005	-0.062	3.6739	0.721
7	0.073	0.054	3.8960	0.792
8	-0.198	-0.244	5.6020	0.692
9	-0.013	0.060	5.6098	0.778
10	-0.088	-0.104	5.9774	0.817
11	0.055	-0.002	6.1326	0.864
12	0.103	0.075	6.6952	0.877
13	0.068	0.001	6.9560	0.904
14	-0.179	-0.243	8.8883	0.838
15	-0.017	0.172	8.9062	0.882
16	-0.075	-0.210	9.2936	0.901

LHUD non-stationary at level



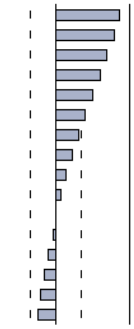
	AC	PAC	Q-Stat	Prob
1	0.900	0.900	27.615	0.000
2	0.793	-0.086	49.821	0.000
3	0.681	-0.088	66.780	0.000
4	0.563	-0.096	78.809	0.000
5	0.454	-0.026	86.935	0.000
6	0.361	0.007	92.264	0.000
7	0.274	-0.041	95.455	0.000
8	0.174	-0.147	96.797	0.000
9	0.081	-0.047	97.104	0.000
10	0.025	0.118	97.133	0.000
11	-0.017	0.019	97.149	0.000
12	-0.044	0.003	97.255	0.000
13	-0.082	-0.141	97.634	0.000
14	-0.119	-0.058	98.492	0.000
15	-0.147	0.042	99.864	0.000
16	-0.185	-0.090	102.19	0.000

LHUD stationary at first difference



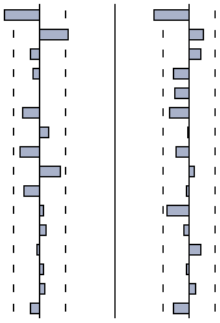
	AC	PAC	Q-Stat	Prob
1	0.088	0.088	0.2547	0.614
2	-0.264	-0.274	2.6488	0.266
3	-0.050	0.004	2.7370	0.434
4	0.065	-0.003	2.8920	0.576
5	0.235	0.235	5.0102	0.415
6	-0.048	-0.094	5.1008	0.531
7	-0.175	-0.043	6.3743	0.497
8	-0.057	-0.080	6.5183	0.589
9	-0.105	-0.176	7.0175	0.635
10	-0.089	-0.160	7.3940	0.688
11	-0.099	-0.145	7.8873	0.723
12	0.171	0.229	9.4464	0.664
13	0.154	0.115	10.792	0.628
14	-0.141	-0.002	11.985	0.607
15	-0.083	0.006	12.430	0.646
16	-0.033	-0.130	12.506	0.708

LWSS non-stationary at level



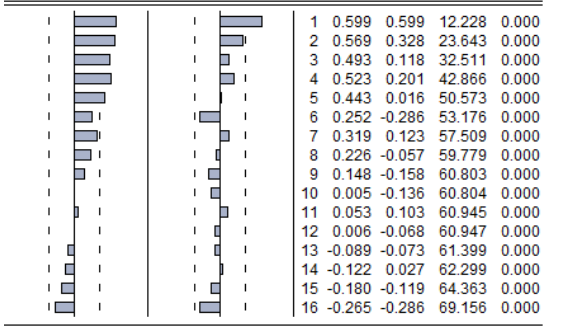
	AC	PAC	Q-Stat	Prob
1	0.909	0.909	28.146	0.000
2	0.821	-0.027	51.907	0.000
3	0.727	-0.082	71.216	0.000
4	0.629	-0.079	86.211	0.000
5	0.519	-0.133	96.800	0.000
6	0.415	-0.036	103.85	0.000
7	0.318	-0.028	108.16	0.000
8	0.222	-0.067	110.35	0.000
9	0.135	-0.019	111.20	0.000
10	0.073	0.064	111.46	0.000
11	0.006	-0.094	111.46	0.000
12	-0.040	0.046	111.55	0.000
13	-0.102	-0.158	112.15	0.000
14	-0.157	-0.059	113.63	0.000
15	-0.206	-0.029	116.35	0.000
16	-0.256	-0.082	120.81	0.000

LWSS stationary at first difference



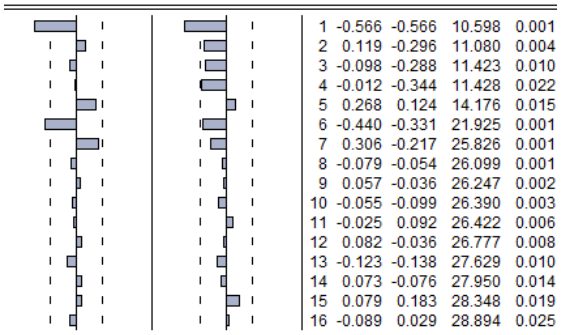
	AC	PAC	Q-Stat	Prob
1	-0.491	-0.491	7.9741	0.005
2	0.389	0.195	13.152	0.001
3	-0.123	0.172	13.693	0.003
4	-0.086	-0.221	13.966	0.007
5	-0.005	-0.204	13.967	0.016
6	-0.236	-0.270	16.187	0.013
7	0.120	-0.020	16.790	0.019
8	-0.273	-0.186	20.037	0.010
9	0.281	0.081	23.647	0.005
10	-0.206	-0.041	25.677	0.004
11	0.059	-0.296	25.856	0.007
12	0.093	-0.070	26.316	0.010
13	-0.028	0.158	26.359	0.015
14	0.063	-0.032	26.596	0.022
15	0.079	0.094	26.999	0.029
16	-0.131	-0.214	28.171	0.030

LRANC non-stationary at level



	AC	PAC	Q-Stat	Prob
1	0.599	0.599	12.228	0.000
2	0.569	0.328	23.643	0.000
3	0.493	0.118	32.511	0.000
4	0.523	0.201	42.866	0.000
5	0.443	0.016	50.573	0.000
6	0.252	-0.286	53.176	0.000
7	0.319	0.123	57.509	0.000
8	0.226	-0.057	59.779	0.000
9	0.148	-0.158	60.803	0.000
10	0.005	-0.136	60.804	0.000
11	0.053	0.103	60.945	0.000
12	0.006	-0.068	60.947	0.000
13	-0.089	-0.073	61.399	0.000
14	-0.122	0.027	62.299	0.000
15	-0.180	-0.119	64.363	0.000
16	-0.265	-0.286	69.156	0.000

LRANC stationary at first difference



	AC	PAC	Q-Stat	Prob
1	-0.566	-0.566	10.598	0.001
2	0.119	-0.296	11.080	0.004
3	-0.098	-0.288	11.423	0.010
4	-0.012	-0.344	11.428	0.022
5	0.268	0.124	14.176	0.015
6	-0.440	-0.331	21.925	0.001
7	0.306	-0.217	25.826	0.001
8	-0.079	-0.054	26.099	0.001
9	0.057	-0.036	26.247	0.002
10	-0.055	-0.099	26.390	0.003
11	-0.025	0.092	26.422	0.006
12	0.082	-0.036	26.777	0.008
13	-0.123	-0.138	27.629	0.010
14	0.073	-0.076	27.950	0.014
15	0.079	0.183	28.348	0.019
16	-0.089	0.029	28.894	0.025

Source: Plotted by using data from EPW Research Foundation

Annexure 2
DESCRIPTIVE STATISTICS

Statistics	**LNSDP**	**LESAC**	**LFWMPH**	**LHUD**	**LLLW**	**LSSW**	**LWSS**	**LWSSO**	**LRANC**
Mean	13.46	9.45	8.03	6.87	6.27	8.11	8.15	6.19	6.46
Median	13.36	9.50	8.03	6.49	6.30	8.24	8.17	5.83	6.77
Maximum	14.51	11.33	9.95	10.02	7.81	10.16	10.41	8.12	8.92
Minimum	12.55	7.35	6.34	4.60	4.37	4.98	5.92	4.70	3.30
Std. Dev.	0.62	1.23	1.11	1.75	1.07	1.41	1.46	1.14	1.40
Skewness	0.24	0.03	0.16	0.58	-0.06	-0.30	-0.17	0.45	-0.28
Kurtosis	1.78	1.86	1.93	2.10	1.88	2.57	1.76	1.76	2.29
Jarque-Bera	2.22	1.69	1.63	2.77	1.64	0.69	2.13	3.03	1.06
Probability	0.33	0.43	0.44	0.25	0.44	0.71	0.34	0.22	0.59
Sum	417.11	292.82	249.00	213.11	194.46	251.45	252.76	192.01	200.14
Sum of square deviation	11.42	45.21	37.19	91.56	34.56	59.76	63.83	39.22	58.87
Observations	31	31	31	31	31	31	31	31	31

Source: Author's Calculation

Annexure 3
PEARSON'S COEFFICIENTS OF CORRELATION

Variables	**LESAC**	**LFWMPH**	**LHUD**	**LLLW**	**LSSW**	**LWSS**	**LWSSO**	**LRANC**
LNSDP	0.99	0.99	0.98	0.98	0.97	0.97	0.98	0.86
Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00

Correlation is significant at the 0.01 (2-tailed)
Source: Authors Calculation