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The Relationship between Economic Sectors and Economic Growth: Evidence from India

Dr. A. Lakshmi
Assistant Professor
Department of Economics,
University College for Women, Koti

Abstract

This study examines the causal relationship between the economic growth, service sector, industry and agriculture for India for the period of 1980 to 2019. The study employed Johansen cointegration test and Granger causality test. The study divulged the existence of the long-run equilibrium relationship among the (economic growth, services sector, industry and agriculture) variables. The granger causality test found a unidirectional causality running from economic growth to industry and service sector to agriculture.

Keywords: economic growth, services sector, industry, agriculture, cointegration, India.

1. Introduction

Agriculture plays a vital role in the Indian economy. Over 70 per cent of the rural households depend on agriculture. Agriculture is an important sector of Indian economy. The primary sector contribution is declining year by year and during the period 2019 it contributes 15.96%. During the period 2019 the share of secondary sector in the GDP was 24.88. The services sector is the backbone of the Indian economy. This services sector contributing 54.3 %in the share of Indian GDP in 2018-19.

Wang et al. (2010) revealed that there is a positive relationship between agriculture and economic growth. They also identified that the share of agriculture in GDP has declined significantly during the last periods. According to Kaldor (1967), manufacturing is an engine of economic growth as industrial goods have a higher-income elasticity of demand.

The paper is organized as follows. Section 2 provides a literature review. Section 3 gives the data and methodology. Section 4 provides the empirical results and analysis. Section 5 provides the conclusions.

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2. Review of literature

Uddin (2019) investigated the relationship between agriculture, industry and services sectors to economic growth in Bangladesh during the period 1980 to 2013. His results show that services sectors, industry and agriculture have long-run equilibrium relationship during the study period.

Pattanayak and Mallick (2017) examined the nexus between agriculture and economic growth in India over the period 1991 to 2012. Their results confirm that production of tea, cereals and tobacco are significant and positive effect on economic growth. They also found that coffee and sugarcane production negatively correlated with economic growth.

Hussin and Yik (2012) examined the relationship between economic sectors and economic growth in China and India during the period from 1978 to 2007. They employed multiple regression model and the estimated results confirm that manufacturing sector contributing highest to China's economic growth. On the other hand, services sector is contributing highest in India's economic growth.

Zhang and Zou (1998) investigated how the allocation of fiscal resources between the central government and local governments that affects the economic growth of all provinces in China during the period from 1978 to 1992. The results reveal that Development expenditures of the federal government and regional economic growth show a positive and significant relationship. In contrast, the provincial government development expenditures are inversely related to real GDP growth of the regions.

Linden and Mahmood (2007) examines the long run equilibrium relationship between sectors (agriculture, manufacturing and services) and economic growth for 15 Schengen countries over the period from 1970 to 2004. They employed panel co-integration techniques, and estimated results confirm that there is a feedback relationship exists between services sector and economic growth.

3. Data and methodology

The study uses annual data of GDP, service sector, industry and agriculture. This study covers the annual sample period from 1980 to 2019 for India. The study measured the variables as follows: GDP (constant 2010 US$), service sector (services, value added (% of GDP), industry (including construction, value added % of GDP) and agriculture (agriculture, forestry, and fishing, value added % of GDP). The dataset is collected from the World Development Indicators (WDI). All the

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variables are converted into natural logarithms (Jalle and Gujjunuri 2016; 2018; Jalle et al. 2018a; Jalle et al. 2018b).

3.1. Unit root test

The study uses conventional unit root tests such as ADF and PP tests to check the stationary properties, because non-stationary data gives misleading results. Hence we apply ADF and PP tests check the stationary properties. The ADF test can be written in the AR (p) process as

$$\Delta y_t = \mu + \lambda t + \varphi y_{t-1} + \sum_{i=1}^{p} \alpha_i \, \Delta y_{t-1} + \varepsilon_t$$

Where y is the variable, μ is an intercept, λt is a linear time trend, p is the order of augmentation of the test and ε is the error term.

3.2. Cointegration test

Since the variables are considered to be the first order of integration. i.e., I (1), the cointegration more appropriate technique to estimate the long run relationship among the economic growth, services sector, industry and agriculture sector.

Johansen suggests two test statistics to test the null hypothesis that numbers of characteristics roots are insignificantly different from unity.

$$\lambda_{trace}\,(r) = -T \sum_{i=r+1}^{n} \ln\left(1 - \hat{\lambda}_i\right)$$

$$\lambda_{max}\,(r, r+1) = -T \ln(1 - \hat{\lambda}_{i+1})$$

Where λ_i estimated characteristic and T is the number of usable observations. The λ_{trace} test the null hypothesis is $r = 0$ against the alternative of $r > 0$ and λ_{max} test the null hypothesis is $r = 0$ against the alternative of $r = 1$.

3.3. Pair wise Granger causality test

The ganger causality test was suggested by C.W.J. Granger (1969) for testing the causal relationship among the economic growth, services sector, industry and agriculture.

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4. Empirical results

4.1 Unit root Test Results

The Augmented Dickey-Fuller and Phillips-Perron unit root test results are reported in table 1. The results from both ADF and PP test show that economic growth, service sector, industry and agriculture sectors are not stationary at level, so the study do not reject null of unit root at level, but after first difference it becomes stationary and the study reject the null of a unit root. It concludes that all the selected variables are following first order of integration, i.e., I (1). Based on these results we expect that there is a long-run relationship between the variables.

Table 1: Unit root test results

	Augmented Dickey-Fuller Test				**Phillips-Perron Test**			
Variable	**Level**		**First Difference**		**Level**		**First Difference**	
	t-Statistic	Prob.	t-Statistic	Prob.	t-Statistic	Prob.	t-Statistic	Prob.
EG	1.713	0.999	-6.016	0.000***	5.537	1.000	-10.373	0.000***
SER	-0.729	0.827	-5.870	0.000***	-0.737	0.825	-5.874	0.000***
IND	-1.604	0.470	-5.819	0.000***	-1.632	0.456	-5.988	0.000***
AGRI	-1.097	0.706	-7.966	0.000***	-1.184	0.671	-7.730	0.000***

Note: *** indicates the rejection of null hypothesis of unit root at the 1% significance levels.

4.2 Cointegration Test Results

In order to explain the long-run equilibrium relationship between the variables, the study has applied the Johanson cointegration test. The results are reported in Table 2. The empirical findings confirm that the null hypothesis of no cointegration relationship between the variables is rejected against the alternative hypothesis of cointegration relationship among the variables. The study concludes that there is a long run cointegration relationship between the economic growth, service sector, industry and agriculture in India.

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Table 2: Johanson Cointegration test results

Hypothesized No. of CE(s)	Trace Statistic	Prob.	Max-Eigen Statistic	Prob.
None*	57.659	0.004**	36.332	0.002*
At most 1	21.326	0.337	14.749	0.306
At most 2	6.577	0.627	5.983	0.615

Note: * and **indicate rejection of the null hypothesis at 1 and 5 % level of significance, respectively.

4.3 Granger causality Test Results

After establish the long-run relationship among the economic growth, service sector, industry and agriculture, the study expect at least unidirectional causality between the variables. The pair wise granger causality test results are reported in Table 3. The estimated results confirm that there is a unidirectional causal relationship running from economic growth to industry. The study also reveal that a unidirectional causality running from service sector to agriculture sector during the study period in India.

Table 4: Pair wise Granger Causality test results

Null Hypothesis:	F-Statistic	Prob.
SER does not Granger Cause EG	1.303	0.285
EG does not Granger Cause SER	2.530	0.094
IND does not Granger Cause EG	1.364	0.269
EG does not Granger Cause IND	3.566	0.039**
AGRI does not Granger Cause EG	1.038	0.365
EG does not Granger Cause AGRI	0.717	0.495
IND does not Granger Cause SER	0.898	0.416
SER does not Granger Cause IND	0.788	0.463
AGRI does not Granger Cause SER	0.374	0.690
SER does not Granger Cause AGRI	3.832	0.031**
AGRI does not Granger Cause IND	2.713	0.081
IND does not Granger Cause AGRI	1.130	0.335

Note: ** indicate rejection of the null hypothesis at 5% level of significance, respectively.

5 Conclusion

This study examines the causal relationship between the economic growth, services sector, industry and agriculture for India for the period of 1980 to 2019. The study employed Johansen cointegration test and Granger causality test. The study divulged the existence of the long-run equilibrium relationship among the (economic growth, services sector, industry and agriculture) variables. The granger causality test found a unidirectional causality running from economic growth to industry and services sector to agriculture.

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