THE DYNAMICS OF RELATIONSHIP BETWEEN AGRICULTURAL EXPORTS AND GSDP IN KARNATAKA: AN EMPIRICAL INVESTIGATION

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Abstract

The present study examines the short and long run relationship between agricultural exports and Gross State Domestic Product (GSDP) in Karnataka. This study is based on the advanced time series techniques such as co integration, Vector Error Correction Model and Granger Causality test. The main objective is to test the dynamics of relationship between agricultural exports and GSDP in Karnataka. The study utilizes secondary information and the data period spans from 1996-97 to 2014-15. The co integration test confirms the long run relationship between agricultural exports and GSDP, whereas the result of the VECM indicates that there exists short run equilibrium relationship between agricultural exports and GSDP in Karnataka. Finally, the results of granger causality test exhibits the unidirectional relationship between agricultural exports and GSDP in the state, which reveals that agricultural export does granger cause GSDP and not the other way round.

Keywords: Agricultural exports, Economic Growth, GSDP, Cointegration, and Granger Causality.

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INTRODUCTION:

The theoretical arguments supporting an export-led growth strategy states that exports are a component of aggregate demand; they rendered both a direct and a multiplier effect on domestic production. Export growth, by allowing faster productivity growth, form an excellent vehicle for the international transfer of capital and technology. Accordingly, it was found that in most of the countries growth in exports led to the overall economic growth. These arguments focused on the fact that trade restrictions could reduce economic growth by distorting the pattern of resource allocation and by limiting the scope for innovation, technical progress.

Furthermore, export growth may promote the diffusion of technical knowledge and enhance efficiency through the international competition. It may allow the exploitation of economies of scale if domestic markets are too small for optimal scale. All these factors may lead to higher economic growth. With this backdrop, the main objective of this study is to find out the dynamic relationship between agricultural export and state GDP in Karnataka, for the period 1996-97 to 2014-15.

Objectives of the Study:

In the light of the above discussion, firstly, the present study attempts to examine the empirical relationship between agricultural exports and GSDP in Karnataka. Secondly, the study takes an attempt to measure the strength of the relationship between agricultural exports and SGDP in a multivariate framework taking the variables like Gross State Domestic Production, State Gross Capital Formation, Development Expenditure, and Irrigation into consideration.

Methodology and Data Base:

The present study utilizes the advanced time series techniques to test the above said objectives. In order to test the empirical relationship between agricultural exports and GSDP, the study has used the test of Granger causality. In order to test the long run relationship between agricultural exports and GSDP, the study employed the co integration techniques. Johansen test is used to trace the co integrating relationship between agricultural exports and GSDP. Beyond the analysis of the long run relationships among the system of variables, short run dynamics is also explored by Vector Error Correction Model.

The Vector Error Correction Model is used to account explicitly for the dynamics of short run adjustment towards long run equilibrium. The time series properties of the variables are tested using Augmented Dickey Fuller and Phillips-Perron test. It was found that both the variables are non stationary. For testing co integration, the variables were turned to be stationary by differencing once. The study is based on secondary information and the data period spans from 1996-97 to 2014-15. The data are collected from Karnataka Economic Survey and Handbook of Statistics on Indian Economy. In the present study all the variables are measured in terms of rupees and the variables are taken in logarithm form.

REVIEW OF LITERATURE:

M.B.Bulagi, J.J.Hlongwane and A.Belete(2015) analyzed causality between agricultural exports and its share of GDP in South Africa from 1994 to 2011. Apple, avocado, mango, and orange exports in tones were used to analyze Granger agricultural exports and agricultural GDP contribution. Macroeconomic variable such as trading partner's income, trade openness, infrastructural development, real exchange rate, government expenditure in agriculture, and real world market price of agriculture export were selected. The results of the Granger causality test showed a unidirectional causality between exports and GDP. The study suggests policies and programmes which can help farmers to enter the export markets which are ineffectual.

Mukherji Ronit and Pandey Divya(2014) try to answer the question does economic growth promote exports of a country or do exports lead to a higher growth in the context of India, using a three step procedure of first conducting a Vector Auto Regression analysis followed by a granger causality test and an impulse response function. Taking annual data from 1969-2012, the study found that the stable VAR model shows that the growth in exports of India between the periods 1969 and 2012 depended significantly and positively on the growth of exports. All other results are insignificant. The granger causality substantiates the fact that the GDP growth in India is not led by growth in exports. These results provide evidence against the export led growth hypothesis. Finally Impulse Response Functions generated show that there are much higher responses of export through a change in GDP. So unanimously they found that India backs the theory of growth led exports.

Deepika Kumari and Neena Malhotra (2014) provide a framework that allows to make comparision of India and China over the past 32 years. The main objective of the study is to analyse the trade led growth in both the countries. The study used time series data covers the period from 1980 to 2012. Moreover, the study used econometric techniques such as ADF and Phillips-Perron test for unit root, Johanson cointegration test, pair wise granger causality test to examine the relationship among variables. The empirical findings for India suggest unidirectional causality running from GDP per capita to exports. However, no causation was found between imports and GDP percapita. For China, a strong evidence of bi-directional causality was found from GDP per capita to export,import and vice versa. The study concludes that China performed better when compared to India. The difference in performance between India and China is not simply because of timings of changes in policies but the speed of reforms, implementation of policies and nature of political governance also mattered.

Deepika Kumari and Neena Malhotra (2014) explore the causal relationship between exports and economic growth by employing Johansen Cointegration and Granger causality approach. Annual time series data on India for the variables exports and GDP per capita stemming from 1980 to 2012 have been used in analysis. The tests on the long run and short run relationship between exports and economic growth are conducted. Based on the findings of Cointegration approach this paper concludes that there does not exist long run equilibrium relationship between exports and GDP per capita. Granger causality test exhibits bidirectional causality running from exports to GDP per capita and GDP per capita to exports. Thus the results of Granger Causality test support ELG hypothesis in case of India and policy reforms adopted seem to have affected the GDP and exports growth positively.

Arif Billah Dar et.al. (2013) revisited the export-growth nexus over the reform period ranging from January 1992 to October 2011 in India. Using the methodology of wavelet correlation and cross correlation it was found that export growth and output growth do not share any significant co-movement at lower time scales. Results showed that the relationship between export growth and output growth is not only positive in India but this relationship grows stronger as time horizons increases. These results based on wavelet cross-correlation show that causal relationship is bi-directional at higher time scales. At the highest time scale the study found the

relationship is bi-directional. Overall exports and output are not related in the short run but are related in medium and long run.

Unit Root Test:

The first step is to determine the order of integration of variable under consideration. The unit root test employed for testing the order of integration is Augmented Dickey Fuller test and Phillips and Perron test. The present study uses both test of unit root to examine the stationarity of the data series in a more accurate manner. It consists of running a regression of the first difference of the series against the series lagged once, lagged difference terms and optionally, a constant and a time trend. The results of unit root test are shown in the table 1.& 2.

Table 1 : Results of Augmented Dickey Fuller Unit root Test:

Variable	Level		First Difference	
	ADF T Statistic	P-Value	ADF T Statistic	P-Value
LNGSDP	-1.323010	0.5953	-4.255839*	0.0048
LNDEXPD	-1.757929	0.6821	-4.080548**	0.0261
LNAEX	-1.521449	0.5002	-3.472110**	0.0225
LNIRRIG	-0.538410	0.9819	-3.044224**	0.0504
LNSGCF	-2.217715	0.4527	-5.441755**	0.0023

Note: *, and **indicate the statistical significance at the 1%, and 5% levels of significance respectively.

Table 2 : Results of Phillips-Perron test for Variable:

Variable	Level		First Difference	
	Adj.T Statistic	P-Value	Adj. T Statistic	P-Value
LNDEXPD	-1.757929	0.6821	-4.081313**	0.0261
LNAEX	-1.431893	0.5436	-3.468603**	0.0227
LNGSDP	-2.396714	0.1562	-4.342494*	0.0041
LNIRRIG	-1.860358	0.6327	-2.742978***	0.0875
LNSGCF	-2.152889	0.4848	-5.410082*	0.0024

Note: *, **, and *** indicate the statistical significance at the 1%, 5% and 10% levels of significance respectively.

The above Augmented Dickey-Fuller and Phillips-Perron of unit root test results show that, all time series are non-stationary at level, which indicates we do not reject the null hypothesis of unit root at 5% level of significance. Because The ADF and PP test values lesser than the test critical value, therefore we accept null hypothesis (H_O) of a unit root i,e the existence of non stationarity.

But the time series have been found to be stationary at first difference, therefore we do reject null hypothesis of unit root at 5%level of significance. Because the ADF and PP test values are greater than the test critical value, therefore we reject null hypothesis (H_O) of a unit root i,e the existence of non stationarity.

Co integration Test:

After testing for integrated order of data series, next logical step is to estimate the long run relationship with appropriate econometric techniques that is Co-integration test in order to know the long run relationship between Agricultural exports, State Gross Domestic Product, State Gross Capital Formation, Developmental Expenditure, and irrigation. In the present study, Johnson co-integration test has been used for estimating long run relationship among variables. The result of co integration test to determine the long run relationship between agricultural export and other variables are presented in the table 3&4.

Table 3 : Results of Johansen Tests for Co integration:

Selection Order Criteria

Number of observation: 15

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	78.1336				4.0e-11	-9.75115	-9.75366	-9.51513
1	148.076	139.88*	25	0.000	1.3e-13	-15.7434	-15.7585	-14.3273
2			25		-4.5e-28			

3	2315.15		25			-298.687	-298.725	-295.147
4	2328.06	25.81	25	0.418		-300.408	-300.445	-296.867

To select the lag order for estimating co integration, the study has selected the lag order one. On the basis of log likelihood ratio test (LR), which are statistically significance and also AIC, HQIC and SBIC criteria.

Table 4 : Results of Johansen tests for Co integration

Maxi. Rank	LL	Eigen Value	Trace Statistic	5%Critical Value	1%Critical Value
0	122.29981		79.4749*1*5	68.52	76.07
1	135.16391	0.76053	40.7467	47.21	54.46
2	144.63132	0.65074	21.8119	29.68	35.65
3	150.49557	0.47878	10.0834	15.41	20.04
4	154.61455	0.36724	1.8454	3.76	6.65
5	155.53727	0.09744			

The results of Johansen Co integration test reveals that, the null hypothesis of no co integration is rejected at both 1% and 5% level of significance, which implies that there is one co integrating relationship exists between the selected variables. But, the study cannot reject the hypothesis of more than one co integrating relationship, since the calculated value of trade statistics is less than (40.7467) critical value both at 5% and 1% level of significance. Hence, it can be concluded that there is only one co integrating relationship, which means there is long run relationship between our chosen variables.

Table 5 : Normalized Co integrating Coefficients (Standard Error in Parentheses)

LNGSDP	LNAGR.EXP	LNSGCF	LNEDEXP	LNIRRIAT
1.000000	0.2035	0.5131	0.9331	0.25056
	0.0126	0.2039	0.3467	0.0727

The above result shows the long run effect between the chosen variables. 1% increase in agricultural exports, GSDP in the long run would lead to.20%, on the other hand 1% increase in SGCF that would lead to .51%. in GSDP. It can also see that, 1% increase in development expenditure that tends to increase in GSDP by .93%, besides, 1% increase in irrigation that would lead to.25% in GSDP.

Vector Error Correction Model:

Once the Co integration is confirmed to exist between variables, then the third step entails the construction of error correction mechanism to model dynamic relationship. The purpose of the error correction model is to indicate the speed of adjustment from the short run equilibrium to the long run equilibrium. It provides a means where by a proportion of the disequilibrium is corrected in the next period. So, error correction mechanism is meant to reconcile the short run and long run behavior. Results of VECM are presented in the table 6.

Table 6 : Results of Vector Error Correction Model:

DLNGSDP	Coefficient	Std. Error	Z	P>Z
U_{t-1}	-.6616861	.2815196	-2.35	0.019
Dlngsdp	.1204851	.2578643	0.47	0.640
Dlnagrex	-.1703829	.2773954	-0.61	0.539
Dlnsgcf	.5102707	.310035	1.65	0.100
Dlnexped	-.0082372	.7804691	-0.01	0.992
Dlnirrig	-4.089657	2.917883	-1.40	0.161
Constant	.1217397	.1117176	1.09	0.276

The error corrects the short run disturbance of the long run equilibrium. The value of lag error term in the result is negative with a value of -.6617 and statistically significant at 5% level of significance. It means that the error in the short period is corrected by .6% for every period and the variable tends towards long run equilibrium.

Precisely, the speed of adjustment of any disequilibrium towards a long run equilibrium is that about .6% of the disequilibrium in each year. Furthermore, the negative and statistically

significant value of error correction coefficient indicates the existence of a long run causality among the variables.

Granger Causality Test:

Since the Co integration test investigates only long run relationship between selected variables, it never traces out the cause and effect relationship between the variables. Therefore, Granger causality test has been employed in order to find the causality. It is a statistical hypothesis test for determining whether one time series is useful in forecasting another. In the Granger sense x is a cause of y if it is useful in forecasting y. In this framework useful means that x is able to increase the accuracy of the prediction of y with respect to a forecast, considering only past values of y. Results of Granger causality test are presented in the table 7.

Table 7 : Pairwise Granger Causality Tests

Null Hypothesis	Obs	F-Statistic	Probability
LNEXPORTS does not Granger Cause LNGSDP	18	3.51036	0.0806
LNGSDP does not Granger Cause LNEXPORTS		0.43524	0.5194
LNSGCF does not Granger Cause LNGSDP	17	1.47618	0.2672
LNGSDP does not Granger Cause LNSGCF		1.83912	0.2010
LNIRRIGT does not Granger Cause LNGSDP	17	1.36458	0.2924
LNGSDP does not Granger Cause LNIRRIGT		0.07940	0.9241
LNDEV.EXPD does not Granger Cause LNGSDP	17	0.70397	0.5139
LNGSDP does not Granger Cause LNDEVEXPD		0.55029	0.5907

For the null hypothesis 1, in the above results depicts reject the null hypothesis, therefore alternative hypothesis has been accepted which means agricultural export does granger cause GSDP. Whereas, for the null hypothesis 2, we accept the null hypothesis that means GSDP does not granger cause agricultural exports. The third null hypothesis is also accepted which means SGCF does not granger cause GSDP. As for as fourth null hypothesis is concerned it is accepted null hypothesis is accepted which means GSDP does not granger cause SGCF. The fifth null

hypothesis also accepted which means irrigation does not granger cause GSDP and the sixth one is also accepted which says GSDP does not granger cause irrigation. Finally, The 7th and 8th null hypothesis is also accepted, it means development does not granger cause GSDP and GSDP does not granger cause development expenditure respectively.

From the above granger causality test, it can be concluded that only the agricultural exports granger cause GSDP but the effects of other variables on GSDP and the reverse are not statistically significant. Therefore, only agricultural exports Granger cause GSDP. Hence, this proves that the above cause and effect relationship between agricultural exports and GSDP is unidirectional.

Conclusion:

The present study examines the dynamic relationship between agricultural exports and GSDP by using popular time series methodologies. There is still a debate among economists regarding the dynamic relationship between agricultural exports and economic growth. The results of the co integration test based on Johansen's procedure indicate the existence of long run relationship between agricultural exports and GSDP in Karnataka. Therefore, the two variables of the study have a long run equilibrium relationship between them, although they may be in equilibrium in the short run. The VECM indicates that about 0.6 percent of equilibrium is corrected every year. Furthermore, the result of Granger causality test indicates the existence of a unidirectional running from agricultural exports to GSDP which means agricultural export does granger cause GSDP but, GSDP does not granger cause agricultural exports in Karnataka.

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