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STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

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APPENDIX/ANNEXURE

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EFFECTS OF INDIRECT SOURCES OF ENERGY ON AGRICULTURAL PRODUCTIVITY IN INDIA

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ABSTRACT

The study is an attempt to examine the causal relationship between select indirect sources of energy such as fertilizers, certified/qualified seeds and pesticides on agricultural productivity in India during the period of reference 1990-91 to 2006-07. For examination of this causal relationship Granger causality test has been used which attempt to address the question whether higher agricultural productivity in terms of yield per hectare causes more use of indirect sources of energy or more use of stated indirect sources of energy causes agricultural production to rise. Having analysed the empirical data in this regard it is found that in the case of seeds three is bidirectional causality between use of certified/qualified seeds and agricultural production in 3-lagged terms and in the case of fertilizer there exist unidirectional causality in 3-lagged terms. Whereas in the case of pesticides, it is found that it is independent of agricultural production in 3-lagged terms.

KEYWORDS

indirect energy souces, agriculture productivity.

1. INTRODUCTION

Agriculture is one of the most important sources of livelihood of the people in a country. Besides other determinants, standard of living of people depends on the volume of agricultural production and its productivity. The volume of agricultural production and higher agricultural productivity depends on several factors of which energy is most important one. *Ceteris paribu*s, higher the use of energy in agriculture implies higher agricultural production and *vice-versa*. The production function using energy as a variable factor may be stated as; Q = f (L, K, E). With usual notation Q: Output; L: Labour; K: Capital; E: Energy (Branson, Macroeconomics, 1979). Sources of energy used in agricultural sector are classified as direct and indirect. The direct sources of energy are those which release energy directly like human labour, animal power, machinery, etc. The direct sources of energy may be further classified as renewable and non-renewable depending upon their replenishment. Renewable direct source of energy are those energy source which are taken directly from nature but can be replenished. Example: human being, animal solar and wind energy, fuel wood and agricultural wastes, etc. Unlike renewable direct sources of energy, non-renewable direct sources of energy are those energy sources which are not renewable (at least in near future say, during next 100 years). Coal and fossil fuels are counted as non-renewable direct sources of energy.

The indirect sources of energy are those which do not release energy directly but release it by conversion process (Singh, Mittal., 1992). Seeds, manures (farmyard and poultry), chemicals, fertilizers, etc are classified under indirect sources of energy. Again, on the basis of their replenishment, these can be further classified into renewable and non-renewable indirect sources of energy. Seeds, manures, etc. can be termed as renewable indirect sources of energy as they can be replenished in due course of time, whereas chemicals, fertilizers, machinery, etc are counted as non-renewable sources of energy as they cannot be replenished. As stated, both direct and indirect sources energy are considered as vital for improvement in agricultural production and productivity. It is empirically tested world over that use of energy has impact on agricultural output. Implying, there exist a cause and effect relationship between the extent of different types of energy used in agriculture and volume of agriculture output and productivity of land.

On the above perspective, in this paper an attempt has been made to establish the degree and extent of causal relationship between use of indirect sources of energy such as fertilizer, certified/qualified seeds and pesticides and the volume of agricultural production in India during the period of reference 1990-91 to 2006-07.

2. RATIONALE AND DATA SOURCES

In the literature of Agriculture and Energy Economics, many studies have been undertaken by the social science researchers' world over on the broad issue of linking energy use/consumption with agricultural production and productivity and its consequent impact on economic growth for different geographical regions. In the available literature there are studies which focused on impact of indirect sources of energy on agriculture production. In the present study the focus is to examine the causal relationship between use of fertilizer, certified/qualified seeds and pesticides as indirect sources of energy and its impact on agricultural production in India during the reference period from 1990-91 to 2006-07. To test the causal relationship between the stated parameters such as fertilizers, seeds, pesticides and agricultural output, Granger causality test technique is adopted and data relating to these parameters for the reference period has been taken from Agricultural Statistics at a Glance, Ministry of Agriculture and Cooperation, government of India and Agricultural Data Book, ICAR, New Delhi. Besides, information relating to this research work as available on public domain and research work done by the other scholars in the field are also referred. However, due recognisation has been given in end of the paper to those scholars whose work has been referred in this study.

3. LITERATURE REVIEW

The causality test as a tool to study the relationship between different variables has been very popular in 21th century particularly, after the seminal work of Kraft and Kraft (1978). Kraft and Kraft have examined the causal relationship between income and energy consumption in USA during 1947 – 1974 and found that there exist unidirectional relationship between incomes to energy consumption. The concept of causality test, in general, has been initiated by C.W.J. Granger (1969). In the literature on relationship between energy consumption and economic growth different views are emerged during different time periods. Some researchers argued that there exists 'unidirectional causality' between energy consumption and economic growth. Implying, the estimated coefficients on the lagged energy consumption are statistically significant while, in another way, estimated coefficient of economic growth is not statistically significant. There are many studies which justify the unidirectional causality from energy consumption to economic growth. Lee (2005) has examined the relationship between energy consumption and GDP in developing countries and found that energy consumption causes economic growth. Similarly, Narayan and Singh (2007) has investigated the nexus between electricity consumption and economic growth in Fiji, by using multivariate framework and found a unidirectional causality running from electricity consumption to economic growth. There are several researchers who justify this unidirectional relationship. Yu and Choi (1985) for the case of Philippines, Cheng (1997) for the case of Brazil, Shiu and Lam (2004) for the case of China, etc have supported this view.

The second view in the literature supported the 'unidirectional causality' between economic growth to energy consumption. That is, the estimated coefficients on the lagged economic growth are statistically significant, while in another way, estimated coefficient of lagged energy consumption is not statistically significant. The work of Ghosh (2002) has established unidirectional causality from economic growth to electricity consumption in India. Similarly, Wolde-Rufael (2006) has examined the causal relationship between electricity consumption and economic growth in 17 African countries and found a positive unidirectional relation running from real GDP/ GDP per capita to electricity consumption in 6 countries. Narayan and Smyth (2005) has examined the causality of electricity consumption, employment and real income in Australia and found that real income causes electricity consumption. There are number of studies, as such, justify the unidirectional causality between economic growth to energy consumption.

The third argument for causality test is 'bidirectional causality' from both sides. It is also known as 'feedback causality'. That is, estimated coefficients of lagged economic growth and estimated coefficient of lagged energy consumption are (both) statistically significant. Masih and Masih (1996) found the bidirectional relationship between energy consumption and economic growth in Korea and Taiwan. In the same fashion, Morimoto and Hope (2004) found a bidirectional relationship between electricity consumption and economic growth in Sri Lanka during the period 1960-1998. Likewise, Odhiambo (2009) has examined the causal relationship between economic growth and electricity consumption in South Africa in a simple trivariate framework using employment rate as an intermittent variable and found the bidirectional causality running from electricity consumption and economic growth during the period 1971-2006. In the same vein, others studies shows the bidirectional causality energy consumption and economic growth which includes the study of Jumbe (2004) for Malawi, Glosure and Lee (2006) for South Korea and Singapore.

The fourth and final argument is 'independence'. That is, there is no causality running in either way. In other words, there is no one statistical significant among lagged variables i.e. we can say that energy consumption and economic growth are neutral to each other. There are some previous studies have shown the empirical evidence of no causality between energy consumption and economic growth. Yu and Hwang (1984) for USA, Yu and Choi (1985) for USA, UK, Poland and others have found that there is no causal relationship between energy consumption and economic growth.

4. ESTIMATION TECHNIQUES

This study has the basic objective to trace the causality running between indirect sources of energy use/consumption and agricultural production. For the purpose, the indirect sources of energy that taken into consideration are fertilizers, certified/qualified seeds and pesticides. In order to study the causal relationship between stated indirect sources of energy and agricultural production the paper uses the Granger causality test . The Granger causality test based on the question whether higher agricultural production (yield per hectare) causes more use of indirect sources of energy or more use of stated indirect sources of energy causes agricultural production to rise.

The Granger causality test may be stated with the help of following regression equations:

$Y_t = \alpha_{1t} + \sum_{i=1}^{n} \beta 1X_{it-i} + \sum_{i=1}^{n} \beta 2Y_{t-j} + u_{1t}$

$X_{it} = \theta_{1t} + \sum_{i=1}^{n} \delta 1X_{it-i} + \sum_{i=1}^{n} \delta 2Y_{t-j} + u_{2t}$

Here,

Y_t: Agricultural production measured in terms of yield per hectare.

X_i: (i = 1, 2, 3): Energy applied in terms of HYV seeds, fertilizer and pesticides respectively.

Similar regression equations can be arranged in terms of Y_t on X_1 and Y_t on X_2.

The steps involved for applying the Granger causality test are:

Step-1: Regress current Y_t on all lagged Y_t terms, exclude the lagged X_i (i= 1, 2, 3) variables and obtain the restricted residual sum of squares (RSS_R).

Step-2: Run the regression including lagged X_i (i =1, 2, 3) variables, i.e. unrestricted residual sum of squares (RSS_{UR}).

Step-3: Take null hypothesis

H_0: $\sum \beta 1i = 0$; i.e. lagged X_i (i =1, 2, 3) do not belong in the regression.

Step-4: To test this hypothesis, apply F-test

$$F = \frac{[RSS(R) - RSS(UR)]/m}{\frac{RSS(UR)}{(n-k)}}$$

Here,

m = number of lagged term of X_i

k = number of parameters estimated in the unrestricted regression.

Step-5: If the calculated F-value exceeds the critical value at the chosen level of significance, then reject the null hypothesis. That is, lagged X_i terms belong in the regression. In other words, we can say that X_i (indirect sources of energy) causes Y_t (agricultural production). In another way, if calculated F-value does not exceed the critical value, then we accept the null hypothesis and conclude that X_i can't cause Y_t.

Step-6: Step 1 to 5 can be repeated to test the above model whether it is unidirectional causality or bidirectional causality and (or) independence.

Following precautions are necessary for Granger causality test:

i. Variables used in the model are stationary.
ii. Adding lagged variables must be checked by either AIC (Akaike Information Criterion) and SIC (Schwarz Information Criterion).
iii. Errors terms in the causality test must be uncorrelated.

For the use of Granger Causality, this study starts with the stationary test of the variables. The stationary test, here, checked by Dickey Fuller test (DF test) which is shown in following table:

TABLE 1: STATIONARY TEST OF THE VARIABLES BY DF TEST

Variables	Y_t	X_1	X_2	X_3
No Trend	44.5	67.1	71.9	68.5
Trend	16.64	12.94	22.1	40.68

All variables in above table are stationary at any level of significance.

5. LINKING INDIRECT SOURCES OF ENERGY AND AGRICULTURAL PRODUCTION

Objective of this study is to find out any causality between indirect source of energy and agricultural production in India during the time period 1990-91 to 2005-06. To show that the Granger Causality test depends critically on the number of terms, such terms are introduced in the model. This lagged term is chosen by the AIC or SIC. In each case, the null hypothesis is that the indirect source of energy does not cause (Granger) agricultural production (yield per hectare) and vice versa. The following table shows the relation between indirect source of energy and agricultural production:

TABLE 2: CAUSALITY BETWEEN X_1 AND Y_t

No. of Lags	F-Value	Direction of Causality	Decision
2	1.906	$Y_t \rightarrow X_1$	Accept H_0
2	0.066	$X_1 \rightarrow Y_t$	Accept H_0
3	3.307	$Y_t \rightarrow X_1$	Reject H_0
3	4.17	$X_1 \rightarrow Y_t$	Reject H_0

In the above tabe-2, it is shown that null hypothesis is rejected at the 10% level of significance using 3- lagged terms. That is, it is statistically significant. The direction of causality indicates the bidirectional causality. Implying, qualified/certified seeds as well as agricultural production (yield per hectare) causes to each other. However, in the case of 2-lagged terms no one is statistically significant. Choosing 3-lagged terms are appropriate by AIC and SIC *i.e.* it has the minimum value (AIC = 4.623, SIC = 4.883 for 3-lagged and AIC = 4.927, SIC = 5.109 for 2-lagged terms).

TABLE 3: CAUSALITY BETWEEN X_2 AND Y_t

No. of Lags	F-value	Direction of Causality	Decision
2	1.609	$Y_t \rightarrow X_2$	Accept H_0
2	0.324	$X_2 \rightarrow Y_t$	Accept H_0
3	3.307	$Y_t \rightarrow X_2$	Reject H_0
3	0.462	$X_2 \rightarrow Y_t$	Accept H_0

In the above tabe-3, it is shown that null hypothesis is rejected at the 10% level of significance using 3- lagged terms in the direction of Y_t to X_2. But it is not significant in the direction of X_2 to Y_t. However, in the case of 2-lagged terms no one is statistically significant. The direction of causality indicates the unidirectional causality from Y_t to X_2. Implying, use of fertilizer causes for the agricultural production. Choosing the 3-lagged terms are appropriate by AIC and SIC *i.e.* it has the minimum value (AIC = 4.628, SIC = 4.986 for 3-lagged and AIC = 4.971, SIC = 5.153 for 2-lagged terms).

TABLE 4: CAUSALITY BETWEEN X_3 AND Y_t

No. of Lags	F-value	Direction of Causality	Decision
2	3.79	$Y_t \rightarrow X_3$	Reject H_0
2	0	$X_3 \rightarrow Y_t$	Accept H_0
3	2.4	$Y_t \rightarrow X_3$	Accept H_0
3	2.34	$X_3 \rightarrow Y_t$	Accept H_0

In the above tabe-4, it is shown that null hypothesis is rejected at the 10% level of significance using 2- lagged terms in the direction of Y_t to X_3. But it is not significant in the direction of X_3 to Y_t. However in the case of 3-lagged terms, no one is statistically significant. The direction of causality indicates the unidirectional causality from Y_t to X_3. Implying, use of consumption of pesticides of technical grade causes the agricultural production. Choosing the 3-lagged terms are appropriate by AIC and SIC i.e. it has the minimum value (AIC = 4.8775, SIC = 4.469 for 3-lagged and AIC = 5.036, SIC = 4.49 for 2-lagged terms). In the case of 3-lagged terms, these two variables are independence to each other.

6. CONCLUSION

This study shows the causal relationship between indirect source of energy consumption and agricultural production per hectare in India during the time period 1990-91 to 2005-06. The empirical study reveals the various results of this causation. In the case of seeds, it shows the bidirectional causality between use of certified/qualified seeds and agricultural production in 3-lagged terms. But in the case of fertilizer use, it shows the unidirectional causality from fertilizer use to agricultural production in 3-lagged terms. However, in the case of pesticides use, it is independence in 3-lagged terms but it is unidirectional causality from pesticides use to agricultural production.

REFERENCES

1. Branson W.H.,(1979), “Macroeconomic Theory and Policy”, Harper and Row Publishers, Second Edition, New York
2. Cheng B.S., (1997), “Energy Consumption and Economic Growth in Brazil, Mexico and Venezuela: A Time Series Analysis”, Applied Economics Letters, Vol. 4 (11), pp. 671-674.
3. Ghosh S. (2002), “Electricity Consumption and Economic Growth in India”, Energy Policy, Vol. 30 (2), pp. 125-129.
4. Glasure Y.U., Lee A., (1998), “Cointegration, Error-correction and the Relationship between GDP and Energy: The Case of South Korea and Singapore”, Resource and Energy Economics, Vol. 20(1), pp. 17-25.
5. Granger C.W.J., (1969), “Investigating Casual Relations by Econometric Models and Cross Spectral Methods”, Econometrica, pp. 424-438.
6. Gujarati D.N., Sangeetha, (2007), “Basic Econometrics:, Tata McGraw Hill, First Edition, New Delhi.
7. Jumbe C.B.L., (2004), “Cointegration and Causality between Electricity Consumption and GDP: Empirical Evidence from Malawi”, Energy Economics, Vol. 26(1), pp. 61-68.
8. Kraft J., Kraft A., (1978), “On the Relationship between Energy and GNP”, Journal of Energy and Development, Vol. 3, pp. 401-403.
9. Lee, C (2005), “Energy Consumption and GDP in Developing Countries: A Cointergrated Panel Analysis”, Energy Economics, Vol. 27 (3), pp. 415-427.
10. Masih A,. Masih R., (1996), “Energy Consumption and Real Income Temporal Causality Results for Multi-country Study based Cointegration and Error-correction Techniques”, Energy Economics, Vol. 18, pp. 165-183.
11. Morimoto R., Hope C., (2004), “The Impact of Electricity Supply on Economic Growth in Sri Lanka”, Energy Economics, Vol. 26(1), pp. 77-85.
12. Narayan P.K, Smyth R., (2005), “Electricity Consumption, Employment and Real Income in Australia from Multivariate Granger Causality Tests”, Energy Policy, Vol. 33 (9), pp. 1109-1116.
13. Narayan P.K., Singh B.,(2007), “The Electricity Consumption and GDP nexus for the Fiji Islands”, Energy Economics, Vol. 29(6), pp. 1141-1150.
14. Odhiamabo N.M., (2009), “Electricity Consumption and Economic Growth in South Africa: A Trivariate Causality Test”, Energy Economics, Vol. 31(5), pp. 635-640.
15. Shiu A, Lam P., (2004), “Electricity Consumption and Economic Growth in China”, Energy Policy, Vol. 32 (1), pp. 47-54.
16. Singh S., Mittal J.P.,(1992), “Energy in Production Agriculture”, Mittal Publication, First Edition, New Delhi.
17. Wolde-Rafael, Y.,(2006), “ Electricity Consumption and Economic Growth: A Time Series Experience for 17 African Countries”, Energy Policy, Vol. 34(10), pp. 1106-1114.
18. Yu E.S,H., Choi J.Y., (1985), “The Causal Relationship between Energy and GNP: An International Comparison”, Journal of Energy and Development, Vol. 10, pp. 249-272.
19. Yu E.S.H., Hwang B., (1984), “The Relationship between Energy and GNP: Further Results”, Energy Economics, Vol. 6(3), pp. 186-190.

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