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Exploring the Causality Relationship between Manufactures Exports and CO_2 Emissions: An Evidence from India Empirical Estimates

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Abstract: ***This paper empirically examines the relation between manufactures exports and CO2 Emissions in a historical perspective for the case of India. Manufacturing exports constitute the lion's share of merchandise exports of countries. It shows higher investment in the manufacturing sector were associated with faster, increasing CO2 Emissions in context of India. The govt. of India has provided subsidies to their resource-intensive to manufacturing sectors that subsidies with potentially harmful environmental impacts are not declining in the recent period, despite the ongoing negotiations through the WTO framework and the UN forums. The study is conducted within the framework of causality using annual data for the period 1971-2011.There is unidirectional causality from manufactures exports and CO2 Emissions at the aggregate level. Explore that is feedback causality between manufactures exports and CO2 emission at the aggregate level in the long-run as well short-run. Unidirectional causality is indicated between manufacturing export and CO2 emissions. The Implication of the study will be that India should take a consistent policy adopted for sustainable, inclusive, faster and a high growth rate and at the same time to control emissions of CO2.***

Keywords: manufacturing Export, CO2, Granger Causality, Unit root test, ADF

JEL Classification: Q56, C22, H23, F18

1. Introduction

Economic Development is associated with export and domestic production. These links are manufacturing sector were associated with faster, increasing CO2 Emissions. India's manufacturing sector contributes about 16% of GDP. The Manufacturing industry of India is the backbone of the economy that strengthens employment, agriculture & the service sectors. CO2 emission from manufacturing industries and contains the emission from combustion of fuels in industries. However in the 1996 IPCC Guidelines, the IPCC category also includes emissions from industry auto producers that generate electricity (WB). CO2 emissions from manufacturing industries and construction (million metric tons) in India were last measured at 471.62 in 2011, according to the World Bank. CO2 emissions from manufacturing industries and construction contain the emissions from combustion of fuels in the industry. In 2009; India was the third largest CO2 emitter in the world after China and the United States (WEO, 2012). India's CO2 emissions in 2012 continued to increase by 6.8% to about 2.0 billion tones, making it the fourth largest CO2 emitting country, the increase in 2012 mainly was caused by a 10% increase in coal consumption, which accounted for two thirds of India's total emissions from fossil-fuel combustion and 55% of those from its electricity production.

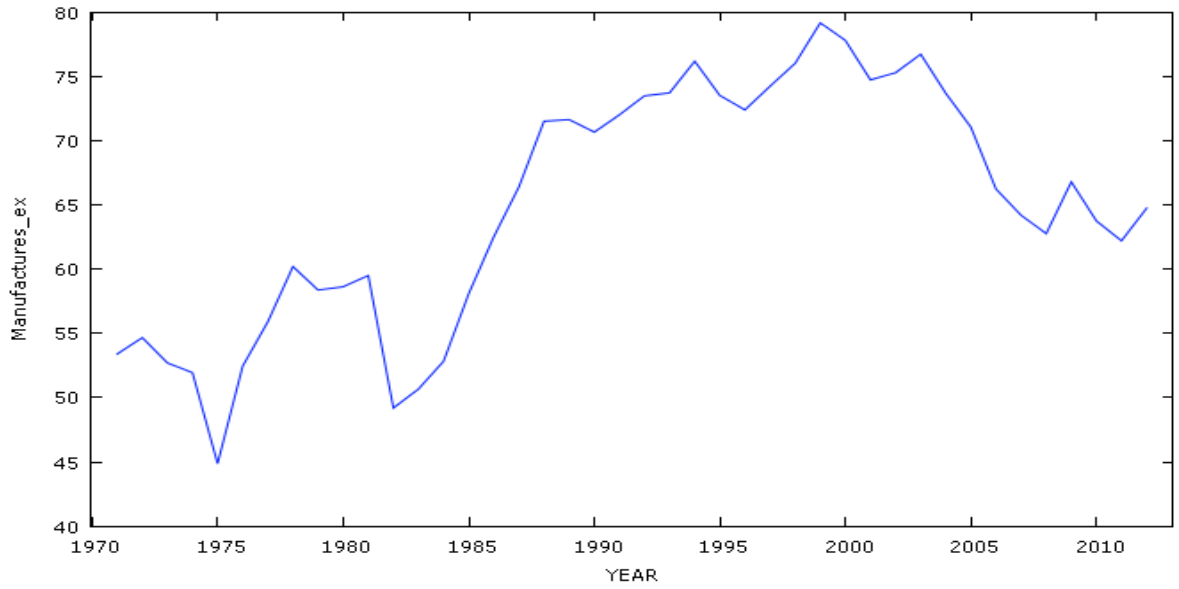

Figure 1: Manufacturing export

Manufacturing sector ,though increasing during 1990-2000,the share of manufacturing export rose steadily to almost 80% in 1999-2000.However the period from 2000-2011 marks a slowdown in its share in India's total merchandise exports in 2010-11, manufacturing exports constitute 65.5% of India's merchandise exports.

2. CO2 Emissions Profile in India

Figure below shows the net emissions of carbon dioxide from 1990 to 2012. The data indicate an increase in net carbon dioxide emissions from 0.7 billion tonnes in 1990 to 2 billion tonnes in 2012, representing a rise of 1.2%.

Trends in CO2 emissions in India 1990–2012 (unit: billion tonnes of CO2

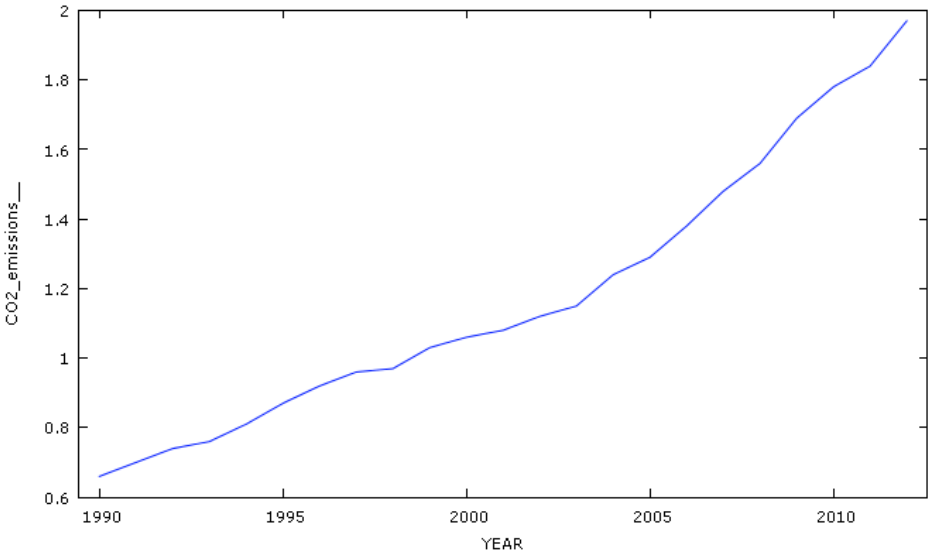

Figure 2: Trends in CO2 emissions

Objectives

1. To investigate the causal relationship between Manufactures exports and CO_2 Emissions (measured in Kt) in a Univariate framework.
2. To investigate how shock from Manufactures exports may affect CO2 emissions.

Hypothesis

1) Is bi-directional causality between MFE and CO2 mission H_0
2) Is unidirectional causality between the two variables H_1

3. Review of Literature

Tiwari (2011) has included electricity consumption a measure of energy consumption It is argued that higher economic growth rates pursued by developing countries are achievable only in association with the consumption of a larger quantity of commercial energy, which is one among the key factors of production and also which leads to environmental degradation. Energy consumption has a positive impact on CO2 emissions and GDP but its impact is negative on capital and population.

Saboori .B et.al. (2011) examines the dynamic relationship between carbon dioxide (CO2) emissions, economic growth and energy consumption based on the environmental Kuznets curve (EKC) hypothesis for Iran during the period 1971–2007. The results found that the existence of three forms of long-run relationship among variables when CO2 emissions, economic growth and energy consumption are the dependent variables. The results do not support the EKC hypothesis which assumes an inverted U-shaped relationship between income and environmental degradation. The result suggested that the estimated model is stable over the sample period.

Qaiser Alam (2013) examine the response of agricultural productivity to climatic change and its long-run impact on economic growth in the Indian economy. The Auto Regressive Distributed Lag (ARDL) model and Error Correction Model (ECM) based techniques are applied to examine the long run and the short-run relationship between CO2 emissions, agricultural productivity and economic growth during the period 1971-2011.Results found that the relationship between agricultural productivity and economic growth in the country both in the long-run and in the short-run. However, the impact of CO2 emissions on economic growth is estimated to be negative and statistically significant in the long-run.it is also observed a bidirectional causality running from economic growth to CO2 emissions in the country. The rising economic growth enhances CO2 emissions and in turn it affects the agricultural productivity in the country.

Mugableh (2013) examined the relationship between CO2 emission and economic growth by using autoregressive distributed lag approach to reanalyze the CO2 emission. The data from 1971 to 2012 was collected. The findings are indicated that economic growth is dependent on energy consumption but energy consumption can be harmful to the environment as it can contribute to CO2 emission in Malaysia.

4. Methodology and Data

This study empirically examines causality between co2 emissions manufacturing export using a time-series data of India from the World Bank for the period 1971-2012. The study explains that there is a unidirectional causality between CO2 emissions manufacturing export. Empirical results underline the adverse influences of merchandise export flows on CO2 emission Consider the CO2 emissions from manufacturing industries and construction in terms of (million metric tons) and Manufactures exports in terms of (% of merchandise exports).

The effect of Manufacturing Export on co2 emission will be estimated in the analysis by using the model below
X=α +β + ε ……. 1.
MFE = α + βCO2

Conventional unit root tests such as the ADF. Whether the variables include unit-root or not will be tested as in the test of time series analysis Stationary of data will be analyzed with the help of the equation below.

$\Delta\, yt = \beta 1_{yt-1} + \beta 2\, \Delta\, y_{t-1} + \beta 3 \Delta y_{t-2} + \boldsymbol{\beta} 4 + \beta 5_t$
..... 2.

To test for causality between MFE and CO2 Emission, we shall estimate the following regression equations: That Y Granger-causes X. If Y causes X and X does not cause Y, it is said that unidirectional causality exists from Y to X.

$$y_t = \alpha_1 + \sum_{i=1}^{n} \beta_i x_{t-i} + \sum_{j=1}^{m} \gamma_j y_{t-i} + \varepsilon_t \quad \text{..... (3)}$$

$$x_t = \alpha_2 + \sum_{i=1}^{n} \theta_i x_{t-i} + \sum_{j=1}^{m} \delta_j y_{t-i} + \varepsilon_{t-1} \quad \text{..... (4)}$$

If the F statistic is greater than a certain critical value for an F distribution, then we reject the null hypothesis that Y does not Granger-cause X (equation (1)), which means Y Granger-causes X.

5. Results and Discussion

Table 1: Unit Root

Group unit root test: Summary				
Date: 02/12/15 Time: 10:25				
Sample: 1971 2011				
Series: CO2_EMISSIONS_FROM_MANUF, MANUFACTURES_EXPO RTS____				
Exogenous variables: Individual effects				
Automatic selection of maximum lags				
Automatic selection of lags based on SIC: 0				
Newey-West bandwidth selection using Bartlett kernel				
Balanced observations for each test				
			Cross-	
Method	Statistic	Prob.**	sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	5.52538	1.0000	2	80
Breitung t-stat	-1.86178	0.0313	2	78
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	4.78276	1.0000	2	80
ADF - Fisher Chi-square	1.21626	0.8754	2	80
PP - Fisher Chi-square	1.31376	0.8590	2	80
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	5.56599	0.0000	2	82
** Probabilities for Fisher tests are computed using an asympotic Chi				
-square distribution. All other tests assume asymptotic normality.				

Test of a unit root with differentiation. The Differentiated series has unit root. P-value is 1.000, which is less than 5%, which leads do not rejections of null hypothesis about the existence of the unit root. The unit root results above Table suggest that both series are stationary in first difference and thus integrated of lag1. Having found series exhibiting unit root in levels, the model is tested for the long run relationship between variables

Table 2: Granger Causality Tests

Pairwise Granger Causality Tests			
Date: 02/12/15 Time: 10:20			
Sample: 1971 2011			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Probability
MANUFACTURES_EXPORTS____ does not Granger Cause CO2_EMISSIONS_FROM_MANUF	40	6.50839	0.01500
CO2_EMISSIONS_FROM_MANUF does not Granger Cause MANUFACTURES_EXPORTS____		0.15577	0.69535

The results of the Granger causality tests of the model are shown in above table No.2 The table also shows the tests used to choose the lag lengths. The joint F-statistic value in equation 1 is 6.50839 with the probability value 0.01500.From this we reject the null hypothesis of MFE does not granger cause CO2 emission. Also the joint F-value on MFE from equation 2 is 0.15577 with the probability value 0.69535. So we can reject the alternative hypothesis at 5% level of significance. That is MFE Granger causes CO2 emission. The results in Table provide a convincing evidence of a unidirectional causality running from MFE to CO2 Emission for India at the 5% level of significance.

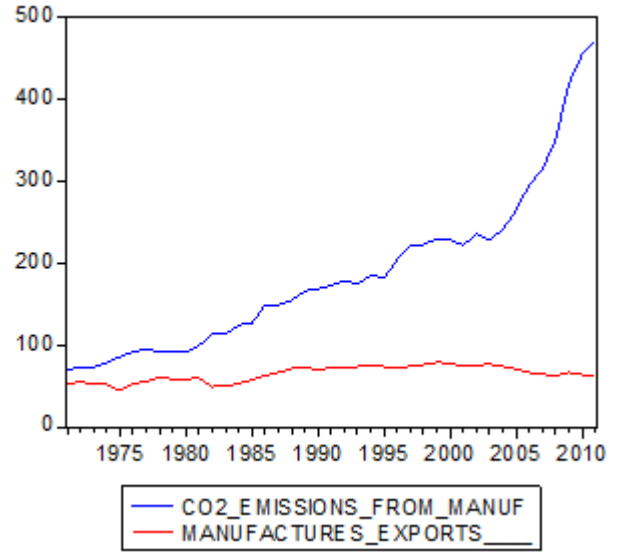

Figure 3: unidirectional causality

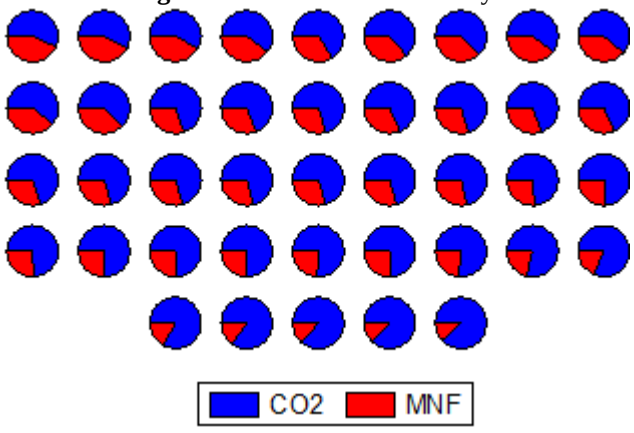

Figure 4: Residuals CO2 and MFE

6. Conclusions

This paper has analyzed the relationship between Manufactures exports and CO_2 Emissions Evidence from India in a historical perspective. Using time series analysis, results are indicated that the CO_2 emission trajectory is closely related to the Manufactures exports time path. It showed that a CO2 emission has been increasing over time. By estimating for the period 1961-2012, results suggest that India could not reduce its CO_2 emissions in the last four decades. Thus, as hypothesized the cost of degradation associated with exports grows over time. It suggests that the economic and human activities are having increasingly negative environmental impacts on the country relative to their economic prosperity.

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