DOI : 10.18843/ijms/v5i2(2)/03
DOI URL :http://dx.doi.org/10.18843/ijms/v5i2(2)/03

Carbon Credit Market in India: An Empirical Anaysis

Dr. Namita Rajput,

Principal,
Sri Aurobindo College (E), University of Delhi, India.

Dr. Ashwani Varshney,

Associate Professor,
Jaipuria Institute of Management,
Indirapuram, India.

Ms. Parul Chopra,

Assistant Professor,
Aditi Mahavidyalaya,
University of Delhi, India.

ABSTRACT

The world at present faces threat of slow extinction due to havoc attributed to climate change, of which rising natural temperature of the world is main concern. Nations all over the world are expressing their concern and solidarity to curb this gigantic menace. The U.N.F.C.C.C. developed a protocol at Kyoto that associates financial implications for carbon emissions by nations. The outcome of the protocol was germination of trading in carbon market by introduction of Carbon emission reduction (C.E.R) units. The carbon trade began in our country in year 2008 with carbon being listed as a commodity on Multi Commodity Exchange of India. Many other developing countries followed same, with Chicago Climate Exchange and European Union trade as the benchmark indices of carbon trade. Carbon trade in India contributed to financial gains in tern of revenue generation by use of carbon reduction technologies as well as capital gains attributed to the trade. The paper shall try to study the impact of other similar indices suchas the greenex, I.I.P. powered and the population of our country on carbon market and vice versa.

Keywords: Emission trading; Carbon credits; Greenex, Powerex, I.I.P., Carbonex.

INTRODUCTION:

Global warming and climate change have been the topics of grave concern for economies all over the world since the onslaught of this century, which has witnessed ever rise in global temperatures since then. The mal effects of this warming phenomenon are being witnessed all across and its feared that continuation of same trend for a few more decades would lead to a rise in sea level submerging majority of coastal countries, and have catastrophic effect in the form of diseases, especially in developing countries. Since then many international agreements have been signed to combat this menace. United Nations Federation Convention on Climate Change (U.N.F.C.C.C) has chartered 'The Kyoto protocol' in 1997 as an international attempt to deal with the issue seriously. The protocol being a voluntary treaty was initially ratified by 141 countries many of which were developed nations of the world.

As per the treaty, the signatories are bound to reduce emissions of green house gases in their countries through adoption of mechanisms like the Emissions Trading System (E.T.S.), Joint Implementation (J.I.) and Clean Development Mechanism (C.D.M.). These systems allow the industrialized nations to meet their G.H.G. emissions obligations by purchase of credits generated from G.H.G. reduction from other countries, thereby imposing financial implications on carbon generation. It implies that if a nation is not able to meet its green house gas reduction target, it can buy credits from other countries which may have excess credits saved. This has made carbon a financial commodity, which like other commodities, is being traded in open market popularly known as the carbon market.

A carbon credit (C.E.R.) is issued when a ton of G.H.G. is saved from being released by the industry during a period of one year. On the other hand, it gives the buyer a right to emit one ton of G.H.G. into the atmosphere over a period of one year. Carbon offset certificates issued to
countries that have successfully reduced emissions of G.H.G. and are capable of being traded like stocks on the commodity exchange. Carbon credits create market for reducing green house emissions by assigning a monetary value to the cost of polluting the air and can be earned by following either of the two ways: i.e. either by carbon sequestration through activities such as afforestration, or by implementation of carbon saving projects such as the use of non conventional renewable energy sources like wind power, solar energy, biomass power, hydel power etc. Trade of carbon as a commodity began in European Exchange, got actively traded on stock exchanges of many countries, and at present the main market leader apart from European Union is the Chicago Climate Exchange.

OBJECTIVES:

Objectives of the Study can be enumerated as under:

1. To study the theory of evolution of carbon credit market in India and across the globe.
2. To study the impact of movement in power index on carbon market in India.
3. To study the impact of performance of greenex on carbon market in India.
4. To study the impact of performance of I.I.P. on carbon market in India.
5. To study the impact of population growth on carbon market in India.

LITERATURE REVIEW:

Maria Mansanet Bataller, Ángel Pardo Tornero and Enric Valor i Micó (2006) studied the impact of various weather and non weather factors on carbon credit prices by analyzing daily futures prices from January to November 2005 of Brent and Natural Gas(traded at International Petroleum Exchange,IPE), and electricity futures contracts traded at EEX. With application of various econometric tools as Kruskal-Wallis Statistic(for presence of abnormal returns), Newey-West covariance matrix estimator (for hetero scedasticity and autocorrelation) and least squares (multivariate linear regression analysis), they found emission intensive energy variables (as coal prices) to be most active determinants of carbon returns. It was found that though weather variables as temperature changes did affect carbon prices but were not as active contributors as non weather (energy) counterparts.
Julien Chevallier (2011) studied a great amount of literature available till date in determination of carbon prices, explaining impact of factors like institutional decisions (the emissions shortfall factor) and various energy markets (like oil, gas, coal, electricity). He analyzed many empirical studies pertaining to policy and regulatory issues, market fundamentals (including the emissions-to-cap ratio, the role of fuel-switching, weather) and macroeconomic activity variables and confirmed their strong impact on determination of carbon prices.
Julien Chevallier (2011) furthered his research on the subject by dissecting a model of carbon pricing by using two fundamental drivers of European Union Allowances i.e economic activity and energy prices. He applied Uni- variate Markov-switching model of the EUA Futures price and Markov-switching VAR on secondary data (for carbon prices, the EUA Futures price was gathered in daily frequency from the European Climate Exchange and for industrial production the EU 27 seasonally adjusted industrial production index were gathered in monthly frequency from Eurostat). Industrial production was found to impact positively (negatively) the carbon market during periods of economic expansion (recession), thereby confirming the existence of a link between the macroeconomic variables and the price of carbon, where as the brent price was confirmed to be the leader in price formation among energy markets.
Yundong Huang (2012) used structural equation modeling (SEM) using partial least squares (PLS) method on secondary data (Thomson Reuters's data base and data stream and Annual Financial Statements of various portfolio companies) to examine correlation between energy stock and carbon prices. It was found that the stock price of the conventional energy stock increased with an increase in carbon price whereas the stock price of new energy companies fell due to it.
Dr. Bhawana Bhardwaj (2013) discussed the business of carbon in international market with special reference to opportunities for the emissions market in Indian context, by systematic investigation of various aspects carbon trading using theoretical approach. She stated that the future size of carbon markets would depend on the extent to which the countries involved would agree on further reductions after the Kyoto Protocol expires in 2012.
Jan Bebbington and Carlos Larrinaga-Gonza´ Lez (2008) studied the subject matter of accountability of firms to various stakeholders by understanding long run implications of carbon market as a recluse to manage global climate change. The paper reviewed problems associated with carbon trade such as allowable limits, penalties to be borne for polluting beyond limits. The paper discusses relevance of development of financial accounting and reporting of carbon.

Jitender Kumar Singh in his paper discusses how development of CDM's in India would lead to economic, financial and environmental benefits for our nation. He states that India has huge potential in form of labour and other natural resources which is tapped properly can lead to generation of large carbon credits. He saw great demand of CDM's in India by taking case of energy efficient sectors, agricultural sector, power sector and transportation.

METHODOLOGY:

The study shall find the skewness as an indicator of sign of symmetry in the distribution. It implies a deviation from a normal distribution in case of positive skewness which also implies it is a rightward skewed distribution series. This means that distribution is majorly concentrated on left of the mean with extreme values to the right. Contrary a negative skewness implies leftward skewed distribution concentrated on right of mean with extreme values to the left. In case of skewness being zero, the distribution is considered to be symmetric. Kurtosis as a statistical tool is used an indicator of flatness or peakedness of a series. The distribution becomes leptokurtic for a kurtosis value greater than 3, and for a value less than 3, it becomes platykurtic i.e. flatter than normal distribution. Kurtosis value equal to 3 implies a normal distribution, and is called mesokurtic. The study shall try to investigate existence of correlation between the variables i.e whether the variables are positively related to each, negatively related or un related. A correlational study is a research writing that attempts to relate an event to another events or sets of causality which precipitate the event. The correlation coefficient from 0 – 0.3 implies slight degree of correlation; 0.3-0.7 implies existence of moderate correlation and 0.7-1 means presence of strong correlation between the variables. The study shall further run a regression on the distribution to gauge the degree of dependence of a variable on the other. A standard regression equation is represented as Y=a+bx, where,
a= the intercept
b= the slope
x= the variable that are using to predict y (the independent variable)
y= the variable that are trying to predict (the dependent variable)
In the study we shall deal with descriptive analysis, skewness, kurtosis, correlation and regression of the following:

- Between carbonex and greenex in India
- Between IIP and carbonex in India
- Between carbonex and powerex in India

Table 1: Table showing Averages

Year	Carbonex	Greenex	IIP	Carbon Credit	Population
2008		746.5429			1139.965
2009	999.5869	1129.775	168.2916	24.65	1155.38
2010	999.5869	1546.498	190.0496	3.473	1210.2
2011	970.24	1463.257	198.508	1.635	1241.49

Table (1): Table of Skewness

	Carbon Credit	Greenex	Powerex	Carbonex	I.I.P.	Population
Carbon Credit	0					
Greenex	0.076234	0				
Powerex	0.964585	1.353969	0			
Carbonex	0.484306	-1.56506	1.09695	0		
I.I.P.	0.022989	0.276183	1.017993	0.409868	0	
Population	0.008523	0.577437	1.011067	-2.46981	0.01149	0

Table (1) describes that relationship between carbon credit and greenex, carbonex and carbon credit, powerex and carbon credit, I.I.P. and carbon credits and population and carbon credits is skewed towards the right for its value being a positive one. Relationship between carbonex and greenex, carbonex and population being less than zero, is the skewed towards the left.

Table 2: Table of Kurtosis

	Carbon Credit	Greenex	Powerex	Carbonex	I.I.P.	Population
Carbon Credit	3					
Greenex	-2.44518	3				
Powerex	-.0 48119	0.683333	3			
Carbonex	- 2.27338	3.400937	0.101524	3		
I.I.P.	-2.4695103	-2.02006	-0.34998	-2.18718	3	
Population	-2.77844	-1.75017	-0.58132	6.500508	-2.76896	3

Table (2) states that value of carbon credit and greenex being less than 3 is less than normal distribution i.e a platykurtic distribution. Similarly, powerex and carbon credits; I.I.P. and carbon credits; population and carbon credits exhibit platykurtic tendencies. Similar is the pattern exhibited by I.I.P and greenex; I.I.P. and powered; I.I.P. and carbonex. Carbonex and greenex; population and carbonex are the only indices exhibiting a leptokurtic tendency, their vaue being more than 3.

Table 3: Table of Correlation

	Carbon Credit	Greenex	Carbonex	Powerex	I.I.P.	Population
Carbon Credit	1					
Greenex	-0.22861	1				
Carbonex	-0.98803	0.962034	1			
Powerex	-0.56202	0. 585072	0.65944	1		
I.I.P.	-0.91573	0.934549	0.8696	0.204769	1	
Population	-0.743828686	0.479755	0.642572	0.270421	0.813415	1

Table (3) shows that greenex and carbon carbon credit indices are slightly negatively related to each other. Carbon credit is also negatively related to carbonex, powerex, Industrial Prudtion index and population. Greenex is positively correlated with carbonex, powered, I.I.P. and population; Carbonex also shows positive correlation with powered, I.I.P. and population; Industrial Production being positively related to population index of our country.

CONCLUSION:

In order to achieve the main goal of reduction of G.H.G. emissions that are a root cause of global warming, we need to create awareness among citizens about ways and means of carbon reduction. For example, India is a major contributor to global warming of the world, but most of the countrymen are not aware of the trade of carbon credit as a commodity tradable on stock exchange. In our country, carbon credit market was at a nascent stage before its decline in year 2011, as price of carbon credits crashed to a zero. However, while active it showed great response both positive and negative to other similar indices like the greenex, powerex, industrial production and population of our country. Though, the carbon is being actively traded in other emerging markets like Pakistan, Australia etc. its early demise in India, can be a great financial and ecological loss for our nation, since G.H.G. reduction projects undertaken under C.D.M. in our country would have not only provided us carbon reduction/sequestration technology and finance, but also, earned us revenue in the form of C.E.R. trade. Thus, revival of the carbon market in India would enable us to contribute our bit towards ecological sustainability. The paper describes existence of great movement in carbonex due to other economic factors such as greenex, powerex, I.I.P., and population of our country, so it becomes imperative for an investor to take informed decision regards the trade and mitigate the risk involved.

REFERENCES:

Bataller M., Tornero A.P.& Micó (2006). CO_2 prices, energy and weather, Available at https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=913964

Bharadwaj B. (2013). Future of carbon trading: A business that works for global environment, *International Journal of Science, Environment and Technology,* 2(1)

Carraro C. & Favero A. (2009). The Economic and Financial determinants of carbon prices, *Czech Journal of Economics and Finance,* 59(5), 396-409.

Chaklader, Barnali (2010). Spot and Future Prices of Carbon Emission Reduction Trading of NCDEX India: An Econometric Study. Available at SSRN: http://ssrn.com/abstract=1541636.

Chevallier, J. (2011). Carbon price drivers: An updated literature review, Available at SSRN: http://ssrn.com/abstract=1811963.

Kumari, Divya, Revanth, Shwetha (2013). Analysis of Carbon Credit Market in India, *Asia Pacific Journal of Marketing & Management Review,* 2(8), 62-67

Shyamal and Bhattacharya R. (2003). Energy intensity and carbon factor in CO_2 emission intensity, *Journal of Environmental Systems,* 29(4), 269-275.
