Research Article

Carbon Tax On Fuels: India's New Initiative

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Abstract: India is the third-largest emitter of Greenhouse Gasses in the world, and about 57% of the deaths which occur in India are directly caused because of increased air pollution levels. The devastating effect which global warming is having on our climate and in turn on the India economy is now directly visible, and it is becoming more and more urgent that these emissions are reduced to stop us from exerting so much pressure on the planet. A carbon tax has proven to be one of the most successful and cost-effective methods of curbing pollution globally. At present India has only levied carbon tax on coal at Rs 400/ton while major emitters like diesel, petrol and other fuels are not yet covered. The present paper makes an attempt to determine the carbon tax rate that can be imposed on the various categories of fuel and the amount of revenue that can be generated from the imposition of carbon tax rates from each category of fuel.

Keyword: Carbon tax, fuel, India, Social Cost of Carbon

Introduction

A carbon tax "sends a price signal that gradually causes a market response across an entire economy, creating incentives for emitters to shift to less greenhouse-gas intensive ways of production and ultimately resulting in reduced emissions"(WorldBank, 2019). A carbon tax is a tax that is directly implemented on GHG emissions which includes carbon emissions too. Under this tax system, the companies paying tax would have to report on an annual basis their emissions and pay tax for each ton of emissions. This was initially set in motion by Finland in 1990. It is considered by some nations to be a productive, transparent and economic means of reducing carbon emission. For instance, since it was introduced in 1991 in Sweden, it has led to a significant emission reduction of 26% while its economy also grew at 2.2% each year during the period (Criqui, Jaccard and Sterner, 2019). The report produced by Danish Energy Agency for the Green Energy Package states that, a 5% cutback in carbon emissions was seen between 1996 and 2005 because of the Carbon tax which was implemented in 1992. Thus, the introduction of the carbon tax has proven to be one of the most successful and cost-effective methods of curbing pollution globally.

One of the major reasons for initiating carbon tax in India is climate change and its effects which are now clearly visible. Climate change has emerged as a global challenge and requires an integrated response from all the countries. The impact of climate change can be different across countries, but tropical countries like India are believed to be more affected by this. Air pollution in India has now become a serious health issue. As reported by the Union of Concerned Statistics, USA, emissions of greenhouse gases per capita are low, but the country as a whole is the third-largest greenhouse gas producer in the world after China and America. Out of the most polluted cities in the world, 22 out of 30 are located in India. According to Scruggs (2018), at least 14 crore people in India breathe air that is ten times or worse than the safe limit set by WHO. 51% of pollution in India is caused by industrial pollution, 27% by vehicles, 8% by crop burning, 5% by Diwali fireworks and the remaining by waste and crop burning. Climate change in India has reduced India's economy by 31%, which would have been otherwise according to a Stanford study. A report by World Bank (2018) predicts Climate change will shave off nearly 3% of India's GDP and decrease the living standards of almost half its population by 2050. Our country also has the highest number of deaths due to Chronic Obstructive Pulmonary Disease (COPD) in the world, which is a lung disease caused by exposure to particulate matter for a long duration of time. Reports by the magazine DownToEarth (2015) states the fifth-largest killer in India is outdoor air pollution, and around 6,20,000 early deaths occurred from air pollution-related diseases. Over two million children which is approximately equal to half the children population in Delhi have abnormalities in their lung function, according to a report published by the Delhi Heart and Lung Institute. Over the past decade air pollution has increased significantly in India and the most common health problem faced by Indians is asthma and it accounts for more than half of the health issues caused by air pollution

The present study is undertaken with the objective to determine the Carbon Tax rate and the amount of revenue that can be generated by imposing a carbon tax rate on different categories of fuel used in India. Since coal is already covered, this research seeks to propose implementation of a carbon tax on other types of fuels, namely,

LPG, Motor spirit (Petrol), Naphtha, SKO (kerosene), aviation turbine fuel, high-speed diesel, light diesel, fuel oil, lube oil and bitumen are considered for the study.
The structure of the paper is as follows. The literature review section examines the literature on the need for the carbon tax and the factors that influence the successful implementation of the carbon tax. The literature review section is followed by research methodology where the approach used for the determination of carbon tax rate is discussed. In the subsequent section, fuel consumption, carbon tax rate and the amount generated by the imposition of the carbon tax rate is computed. This followed by discussion and recommendation before concluding the paper.

Review of Literature

This section discusses the literature that stresses the need for the carbon tax and the factors that influence successful implementation of the carbon tax.
Jorgenson, D. (2014) in his interview with Harvard Magazine, said that the social cost of releasing greenhouse gases amounts to nearly $1.6 trillion annually worldwide. The best method to reduce this effect is to introduce a carbon tax which is not only efficient in reducing carbon emissions but also simultaneously promotes economic growth as compared to a cap-and-trade system. Hence the need to determine a suitably accurate carbon tax rate increase. Further, Stavins, J. E. (2012) in his study stated that the Carbon Tax rate set should be equal to the marginal benefit from emission reduction and this price should increase over time because of the fact that more greenhouse gasses that accumulate in the atmosphere, the more will be incremental damaged caused by an additional ton of CO2 and it is easier to govern if this tax is applied upstream at the level of producers and importers.
According to Beuret (2019), though there has been a growth in India's economy in recent decades, climate change has decelerated its progress by almost 30%. This is because India's agricultural sector has been affected majorly due to an increase in floods and droughts, which have increased over three times and this has reduced the crop yield and costed the Indian economy between $9-$10 billion per year. Also, India's economic hubs come to a standstill during coastal flooding and cyclones which force the roads and international airports to close down and again cost millions in property damage. A study by Balakrishnan (2019) states that global warming has shaved off 31% of India's economy. The estimates by UN's Office for Disaster Risk Reduction state that India has suffered $79.5 billion in economic losses in the past 19 years due to climate-change disasters. In Kodagu, the coffee-growing region in Karnataka farmers had delayed crop sowing as there was not enough rain in June- July. But unseasonal rain in August destroyed 1/4th of their crop and this trend is seen across the country. An International Labor Organization forecasts that India will lose nearly 3.4 crore full-time jobs due to global warming. This effect will mostly be seen in the agriculture and construction industry which are most vulnerable to climate change if the global temperature target of a 1.5-degree C is not met. But with the current level of emission temperature is forecasted to rise by 3C by 2100.
According to Patrick Criqui (2019), four important factors need to be considered for a carbon tax to be successful. The Combination of carbon tax with other policies appears to be logical and sensible. People should have confidence in their government and its ability to manage fiscal revenues in a clear, fair and effective way. There should be energy lobbyists like major industries in the system of carbon tax. And finally, a transformation of the national energy system which emits zero GHG emissions. This conclusion was drawn by doing an analysis of three countries – Sweden, Canada and France, who have made a great effort in terms of Carbon. Besides, Taxation. Mattauch (2018), finds political sciences and behavioural economic factors like political resistance, peoples' perspectives etc. also play a major role in determining the success of Carbon Tax.

Methodology

Secondary data forms the basis for data collection. The economic survey report and annual report of the Ministry of Petroleum and Natural Gas are the major sources of data collection. The study first determines the fuel consumption and emission factor levels for different types of fuels and further computes the carbon tax rate. This facilitates the estimation of the amount of revenue generated from the imposition of the carbon tax in India.
Social Cost of Carbon (SCC) approach is used for determining the carbon tax rate as it is the most accepted model globally and used by global agencies like the UNFCC. SCC is an estimate of the cost the society bears as a result of emission of one-ton CO2. The costs borne by the society include damage to human health, loss of property because of more frequent floods and droughts, reduction in agricultural productivity. In this approach, the carbon tax rate is equated to the social cost of carbon. The SCC approach is useful as it helps in balancing the costs of a carbon tax with the benefits of reducing CO2 emissions. The formula for calculation SCC for a particular country is given below:

Global SCC × The country's share to the global Co2 emissions.

Data Analysis

Table 1 displays the fuel consumption level and emission factor of fuels under study

Table 1: Fuel Consumption levels and Emission Factor of fuels

Fuel	Consumption (In TMT)	Emission factor (In KgCo2/ton)	Total CO2 emission (In million tons)
LPG	23,342	2,940	68.625
Motor Spirit (Petrol)	26,174	3,105	81.27
Naphtha	12,889	3,143	40.51
SKO (Kerosene)	3,845	3,165	12.17
Aviation Turbine Fuel	7,633	3,181	24.28
High Speed Diesel	81,073	3,210	260.24
Light Diesel	524	3,210	1.68
Fuel Oil	6,271	3,227	20.24
Lube Oil	3,884	3,165	12.29
Bitumen	6,086	3,165	19.26

Source: Fuel consumption data from the Annual report of Ministry of Petroleum and Natural Gas
The emissions factor for diesel and motor spirit (petrol) is obtained from India's Economic survey 2015.
For other fuels, UK emission factor has been used

The Social Cost of Carbon (SCC) in India is computed as follows:
Global SCC × India's share to the global Co2 emissions.
: 87 × 12%
: **$10/tCo2** (rounding off).
The revenue generated for each category of fuel is calculated by using the carbon tax rate of INR 715.2/tCo2 (converted using exchange rate of INR/USD=71.52).
Table 2 displays the revenue generated one-year post implementation of carbon tax

Table 2: Amount of Revenue Generated

Fuel	Revenue (INR- in Crores)
LPG	4,908.09
Motor Spirit (Petrol)	5,812.44
Naphtha	2,897.28
SKO (Kerosene)	870.35
Aviation Turbine Fuel	1,736.54
High Speed Diesel	18,612.67
Light Diesel	120.29
Fuel Oil	1,447.31
Lube Oil	879.18
Bitumen	1,377.63
TOTAL	38,661.78

Source: Computed by the authors

The following formula is used to determine the amount of revenue generated for each category of fuel:
[Emission factor of the fuel (In Tons) × SCC] × Consumption of the fuel (In Tons).
For instance, revenue generated for LPG is computed as follows:
[2.94 × ₹715.2] × 23,342,000 = ₹49,08,09,43,296. (₹4,908.09 crores)
Therefore, the total revenue generated in the first year is Rs. 38,661.78 crores.

In order to achieve the World Bank reported figure of $50/tCO2 by 2030 to meet temperature targets of the Paris Agreement (Ramstein, 2019), the tax rate would have to grow at 17.5% each year till 2030. Hence, the new carbon

tax rate for the year **2021** would be $11.75/tCo2 or INR 840.36 (converted using an exchange rate of INR/USD=71.52).
And hence, the implication of an increased Carbon Tax will lead to a reduction in the quantity of fuels consumed in the subsequent years, assuming a reduction of 5%, 8% and 10%. Table 3 presents the

Table 3: Fuel consumption and amount of revenue generated in Year 2

Fuel	5%		8%		10%	
	Consumption	Revenue	Consumption	Revenue	Consumption	Revenue
LPG	22175	5478.7	21474.6	5305.6	21007.8	5190.3
Motor Spirit	24865.3	6488.1	24080.1	6283.3	23556.6	6146.7
Naphtha	12244.6	3234.1	11857.9	3132	11600.1	3063.9
SKO	3652.8	971.5	3537.4	940.9	3460.5	920.4
Aviation Turbine Fuel	7251.4	1938.4	7022.4	1877.2	6869.7	1836.4
High Speed Diesel	77019.4	20776.4	74587.2	20120.3	72965.7	19682.9
Light Diesel	497.8	134.3	482.1	130	471.6	127.2
Fuel Oil	5957.5	1615.6	5769.3	1564.5	5643.9	1530.5
Lube Oil	3689.8	981.4	3573.3	950.4	3495.6	929.7
Bitumen	5781.7	1537.8	5599.1	1489.2	5477.4	1456.8
Total		43156.3		41793.4		40884.8

Source: Computed by the authors

The carbon tax rate is so designed that it gradually increases every year. This increase will contribute to the achievement of the World Bank reported figure of $50/tCO2 by 2030 to meet temperature targets of Paris Agreement. Hence, based on the above calculation of 17.5% increase in tax rate each year, the subsequent tax rates for the period 2021 to 2030 is presented in table 4.

Table 4: Carbon Tax Rates from 2021 to 2030

Year	Rate (INR)	Rate (USD)
2021	840.4	11.75
2022	987.4	13.81
2023	1160.2	16.22
2024	1363.3	19.06
2025	1601.8	22.4
2026	1882.2	26.32
2027	2211.5	30.92
2028	2598.5	36.33
2029	3053.3	42.69
2030	3587.6	50.16

Source: Computed by the authors

Discussion and Recommendations

While implementing the Carbon Tax rate of $10/tCO2 on various fuels, we suggest that it should be implemented using another term such as 'Carbon Levy' or 'Carbon Reduction Contribution' etc, since there is a certain stigma attached to certain words. This may be the case for Carbon Tax also, since the public may strongly oppose the introduction of a new "tax" in the country. And the government should be strict in implementing this growth rate of 17.5% each year in order to reach the World Bank Reported Figure. It is also suggested in order to increase public acceptance of this tax that the revenue generated can be recycled using a transparent, trust boosting strategy like reducing income tax rates and undertake public investments in the field of renewable energy so that direct benefits to the people as a result of this tax are visible.

The biggest challenge for implementing a carbon tax in India would be its political acceptability. If its implication faces high political resentment or public distrust, the tax may not even come into existence in the first place. Hence, the best way to overcome this major barrier would be that, in the first year of its implication other taxes and cess's on fuel should be reduced and the rate of carbon tax applied should be such that, the new price of fuel, after adding carbon tax should be approximately equal to its old price. This method was followed in Sweden when Carbon Tax was first implemented there in 1991. Since then, Sweden has been the most successful country in implementing carbon tax, and the carbon tax rate currently stands at €114/tCo2. By increasing the tax rate gradually and in a stepwise manner, it gives more time for households and businesses to adapt to it, which increases the political feasibility of tax increases.

The point of levy of this tax should be upstream, where the importers and refiners of fuel are taxed based on its carbon content. As the fuel suppliers are faced with this tax, they will likely increase the price of fuel and pass this tax down to the final user thus creating an incentive for fuel switching and investment in more energy efficient technologies This makes the tax collection process much easier and cheaper, and hence reducing its cost. This also makes it difficult for carbon tax to be evaded.

Conclusion

With climate change becoming a global threat and India being a prime contributor to this inevitable phenomenon, India must take the necessary steps in order to reduce the drastic effects of climate change and its impact on the environment. The consequences of a 2°C rise in global temperatures can make India's summer monsoon highly unpredictable. A 2.5°C, melting glaciers and snow cover reduction are expected to reduce the reliability of northern India's primarily glacier-fed rivers. Therefore, implementation of the carbon tax in India not only reduces the financial costs borne by the economy as a direct result of carbon emissions but also contributes in helping industries thrive better due to increased efficiency of operations which result from a cleaner environment.

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