ANALYSIS OF EFFECT OF COAL PRODUCTION ON GDP DURING 2012-2017

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ABSTRACT

In this paper we would like to discuss the relationship between the coal production and the GDP of the India. The time frame of observation is 2012-2017 for the same. The paper consists of the data which were procured from Prowess (From CMIE) and the regression analyses which were performed on the data. For accurate computation and to investigate casual relations between few other additional variables such as Research and Development Expenses and Environmental Expenses were taken into consideration. The results shows that there is a strong correlation between GDP and the industrial sales alone, but when we compare GDP with all three variables, there is no significant correlation with any of the parameters.

INTRODUCTION

From the energy perspective, India has always been considered a coal economy. The coal industry has become a vital part of the national development, and there is a wide range of industries which thrive using their raw material as coal.
The main purpose of the paper is to analyze the effect on GDP by the variables such as net sales of the industries which are operating in the coal producing segment, their Research and Development expenses, their environmental expenses and previous year GDP during the period 2012-2017.

LITERATURE REVIEWS

This paper sheds light on the performance of Coal Industries and its impact on the GDP of India over the period of 2008 to 2018. Our findings do not reveal a strong correlation between the performance of coal industry and the GDP of the Indian economy. Despite huge allocation of coal reserves in the country, it is required to import it from other countries. Thus, it becomes necessary for the government to explore advanced technologies for enhanced extraction and processing of coal. Also, the environmental problems caused due to coal-related activities are serious issues and, thus, needs to be checked. Therefore, it is critical for policy makers not only to consider and implement technologies that meet the near-term needs of the country, but also to set the coal-based power sector on a path that would allow it to better respond to future challenges. If there is a unidirectional causality running from coal consumption to economic growth, reducing coal consumption could lead to a fall in

economic growth. In contrast, if there is a unidirectional causality running from economic growth to coal consumption, it could imply that policies aimed at reducing coal consumption may be implemented with little or no adverse effect on economic growth. On the other hand, if there is no causality running in any direction, the neutrality hypothesis is accepted, and reducing coal consumption may not affect income and coal conservation policies may not affect economic growth. In contrast, if there is a bi-directional causality running between the two, coal consumption can stimulate economic growth and in turn economic growth may induce more demand for coal. The factors relating coal consumption to the GDP of the country are not restricted to the ones used in our model. Sharma (2014) suggested that the tariff barriers in India, like in other countries, have negative impacts such as inflationary pressures, government control and political considerations in economic matters, imbalance in demand-supply chain, strains on international trade relations. India's energy trade with its neighbors is very limited. Hoda et al. (2014) suggested that the present condition of India in international production networks had been compared by researchers with China, Malaysia, Thailand and South East Asia as a whole in this paper. It was found that India was lagging behind in logistics, labor laws, power supply and taxation initiatives. Also there were many entry and exit barriers in India as compared to other South-East Asian countries. This has resulted in less investment by international MNCs in the manufacturing sector.

METHODOLOGY AND MODEL

We have considered 3 different models including and excluding few variables to observe the relationship and their significance to GDP. The dependent variable is the country's GDP and the other variables are Net Sales, research and development expenses, Environmental Expenses. The inference and conclusion to be drawn from these models are to analyze the trend of GDP with respect to the inclusion of few other variables and to obtain which variable determines it the most.

Note: We are considering the logarithms of the values of the dependent and independent variables in the regression analyses so that smaller variations are captured.

Variable Name	Definition
GDP	Gross Domestic Product of Indian economy obtained from RBI
NETSALES	Net Industrial Sales of Coal Producing firms in India
R&DEXP	Net Research and Development expenses incurred by the firms operating in India
ENVEXP	Net Environmental expenses incurred by the firms operating in India

Table 1: Variable Definition

$$GDP = \beta_o + \beta_1 * NETSALES \tag{1}$$

$$GDP = \beta_o + \beta_1 * NETSALES + \beta_2 * ENVEXP \tag{2}$$

$$GDP = \beta_o + \beta_1 * NETSALES + \beta_2 * R\&DEXP + \beta_3 * ENVEXP \tag{3}$$

Year	GDP	Net Sales	R&D Expenses	Environmental Expenses
2012	11.21	11.37	8.08	9.84
2013	11.23	11.45	7.39	9.93
2014	11.26	11.49	8.60	10
2015	11.29	11.59	7.64	9.69
2016	11.32	11.62	7.58	9.77
2017	11.35	11.65	7.63	9.90

Table 2: Required Data: All values for expenses are considered in millions of Indian Rupees, and their logarithm is taken.

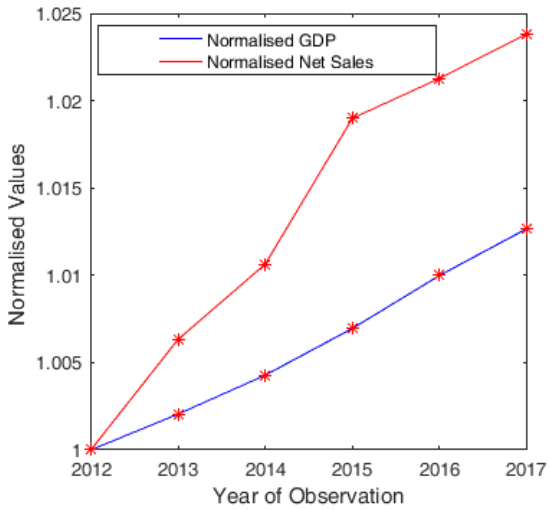

Figure 1: Normalized GDP and Net Sales plotted with Observation year

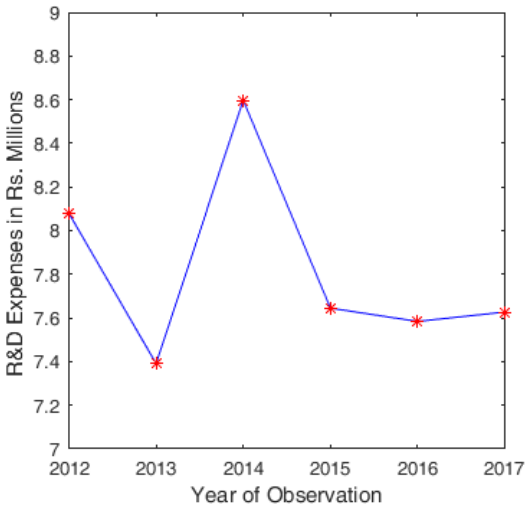

Figure 2: Research and Development Expenses

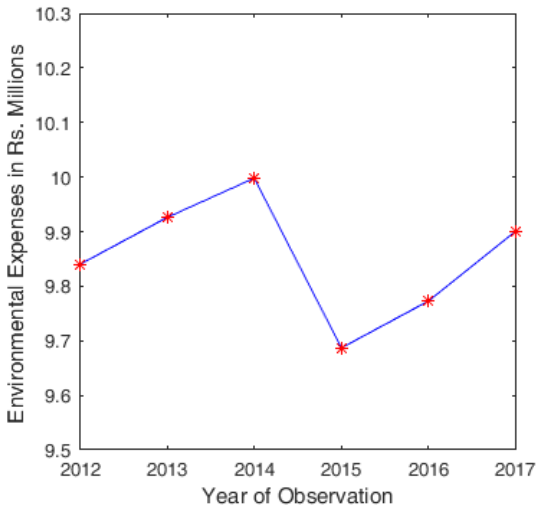

Figure 3: Environmental Expenses

INFERENCES

Given below are the actual estimates for the various models:

Variable	Model 1	Model 2	Model 3
Constant	5.601***	4.801**	4.797
	(0.677)	(1.088)	(1.313)
NETSALES	0.492***	0.513**	0.51**
	(0.059)	(0.063)	(0.079)
ENVEXP	-	0.057	0.065
		(0.06)	(0.079)
R&DEXP	-	-	-0.005
			(0.02)

Table 3: Regression analysis Data

CONCLUSION

In the first model, we have performed a regression analysis only between GDP (dependent variable) and the net industrial sales (NETSALES). We calculate the R-squared value as 0.946 and the adjusted R-Squared value as 0.933. The confidence bound is 99%. This shows a

strong positive correlation between GDP and the net industrial sales.

In the second model, we have performed a regression analysis between GDP (dependent variable) and two variables: net industrial sales (NETSALES) and Environmental Expenses (ENVEXP). We calculate the R-squared value as 0.959 and the adjusted R-Squared as 0.931. The confidence interval for Environmental expenses is **not significant**.

In the third model, we have performed a regression analysis between GDP (dependent variable) and all three variables: net industrial sales (NETSALES), Environmental Expenses (ENVEXP) and R&D Expenses (R&DEXP). We calculate the R-squared value as 0.96 and the adjusted R-Squared as 0.9. **None of the parameters are significant** in this model.

CASE STUDY ON ENVIRONMENTAL EXPENSES

Case study on disclosing environmental Expenses: From the data obtained from its clear that very few industries operating in the coal production reveal their environmental expenses. There should few factors associated with it, the reason why they wanted or why they revealed their environmental expenses. As environmental expenses is a negative factor to the company as it's spoiling or degrading the environment surrounding the firm, very few companies are ready to disclose it. When the environment expenses are compared and the one it implies that the firm is polluting the environment more than the other.

Only Jaiprakash Power Ventures Ltd., Global Coal Mining Pvt. Ltd., Mahanadi Coalfields Ltd., and Northern Coalfields Ltd. have disclosed the environmental costs for more than four years. One possible reason is the ***Pollution Haven Hypothesis***. If foreign firms - which pollute the environment themselves - see that a particular firm is willing to disclose the details then they will be more willing to collaborate with these Indian firms.

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