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# Mining export, industrial production and economic growth: A cointegration and causality analysis for India



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## ARTICLE INFO

## Article history:

Received 10 October 2013

Received in revised form

26 August 2014

Accepted 6 September 2014

Available online 29 September 2014

## JEL classifications:

Q 32

## Keywords:

Mineral export

Industrial production

Economic growth

Cointegration

Causality

## ABSTRACT

This paper investigates the relationship among mining export, industrial production, and economic growth in India using annual time series data from 1981 to 2010. It is based on the secondary sources of data extracted from Reserve Bank of India database. The multivariate cointegration technique has been employed to see the long run equilibrium relationship among variables. Further, Granger causality based on vector error correction model (VECM) has been adopted to see both short run and long run causality among the variables. The cointegration results confirm that mineral exports, industrial production and economic growth are cointegrated, indicating an existence of long run equilibrium relationship among variables. Similarly, the VECM Granger causality result holds that there is a long-run Granger causality relationship running from economic growth and industrial production to the mineral export of India.

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## Introduction

The debate on the relationship between resource dependence and economic growth is a drawn-out one which has gained considerable attention from a wide range of researchers over last couple of years. While one group of scholars argue that resource abundance and its extraction is helpful for the development of a country, the other group of scholars advocate that there is a negative relationship between resource abundance and socio-economic wellbeing of a country. In the area of natural resource economics, researchers have been fascinated about the study of “paradox of plenty” which states that resource rich nations unable to reap benefits from blessed resources. As a result of which endowment of natural resource becomes a curse rather a blessing for these nations. India is one of the developing countries which has endowed with huge natural resources among which mineral resource holds a significant position in the world mineral market. Being one of the major natural resources of India, mining resource contributes to national income in terms of foreign exchange earnings, employment generation and supporting to the industrial production of India. However, there has been debate on the relationship between mineral extraction and wellbeing of a nation. In this

context, the present study investigates the ongoing debate on mining development puzzle in Indian context.

Industrial classification of Reserve Bank of India has classified mining sector as a subsector of industry sector. The Indian mineral sector is comprised of four broad categories of minerals such as fuel minerals, metallic minerals, minor minerals and non-metallic minerals. Among which the contribution of fuel minerals accounted to be the highest in the total value of mineral production in India with a contribution of 68% followed by metallic minerals (19%), minor minerals (11%) and non-metallic minerals (2%). Being a sub-sector of the industry sector, mining and quarrying sector contribute 2.4% of the total Gross Domestic Product (GDP) with a total value of ₹ 2, 01,076 crore in the year 2011–2012 (IMY, 2012). The index of mineral production (base 2004–2005=100) has touched 128.45 in the year 2011–2012 showing an increasing trend of mineral production in India (IMY, 2012). India holds a significant position in the production of some minerals in the world mineral market. It produces one-fifth of barytes and one-sixth of talc and holds the position of second largest contributor in the world mineral market. Similarly, Indian economy is the third largest producer of chromite, zinc and coal and lignite. Furthermore, it holds fourth position in production steel, iron ore and sixth position in the production of bauxite and manganese ore in the list of mineral producing countries (IMY, 2012). India is a leading exporter of minerals and ores. In the year 2011–2012, mineral export accounts ₹ 1, 75,310 crore which is 12% of total value of merchandise export from India. The major exporting minerals from India in terms of

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total value generation are diamond, iron ore, alumina, zinc ore and granite. However, diamond alone holds 76.57% of total value of mineral export from India followed by iron ore (12.65%), granite (3.64%) and rest of the minerals individually less than 1%. Apart from the mineral production and export earnings, mining sector is considered as an important source for employment generation in India. In the year 2011–2012, the average daily employment generation by mining sector is estimated at 5, 33, 243 person from which 78% of employment are made in the public sector (IMY, 2012).

Developing countries more often depend upon natural resources due to lack of advancement in other sectors of the economy as well as relative advantages in the availability of natural resources. Lack of capital stock and technology are the two foremost constraints which induce for large dependence on primary resource sector of the economy. Foreign exchange earnings are basic necessity for a country to import capital goods as well as to upgrade technology base of the country. Moreover, for a developing country, investment in the industrial sector in terms of technological renovation is desirable to achieve higher economic growth. Mining sector is one of the important resource sectors in India which associates with foreign exchange earnings, employment generation, source of revenue and last but not the least, input to the industrial sector of the domestic economy. Foreign exchange earnings for the sake of technological advancement of the economy are necessary with respect to achieve higher economic growth. But substituting the exhaustible resources for the sake of foreign exchange earnings is unsustainable. The relationship between mineral export and economic growth is yet to be explored in purview of sustainability as a major concern in the context of Indian economy.

In the present study, we have investigated the relationship among mineral export, economic growth and industrial production. Since mineral resources are non-renewable in nature their judicious use is more concern than achievement of high growth with their unplanned extraction and utilisation. However, the most important aspect of concern is the place of utilisation of mineral resources. Foreign exchange earnings is necessary for a developing country but that should not be fulfilled through the export of exhaustible resources rather alternative mode of export should be considered based on sustainability principle. Development literature is endowed with huge literature on export-led growth and resource curse hypothesis but no systematic investigation has been made to know the causal relationship between mining export, industrial production and economic growth of India. In this paper, attempts has been made to examine the long run equilibrium relationship among the mineral export, industrial production and economic growth and tested for the possible existence of causal relationship among them in context to India.

The present study has immense importance in context to mineral abundance countries. In the previous studies, industrial sector of the domestic economy has not been considered as an important component in purview of export-growth relationship. However, in the mineral rich countries the industrial sector of the domestic economy is closely linked with the mineral resources being a raw material dependent on mining sector as well as supplier of capital goods to the mining sector. In this study, we have linked the industrial sector of the domestic economy to find out the relationship between mineral export, industrial output and economic growth of a country. Moreover, the proper utilisation of valuable mineral resources is one of the important questions in policy modelling for mineral abundant developing countries of the world. This study is unique and having significant contribution to the existing literature through bridging a gap by considering the neglected part of previous studies.

#### *Theoretical framework: mineral export, economic growth and industrial production*

Mineral resources are one of the important exhaustible natural resource in India. The produced mineral resources are used as a raw

material in the industrial sector of the domestic economy as well as exported to the rest of the world. The former causes to growth in industrial production whereas the latter generates foreign exchange earnings. However, both will ultimately contribute to stimulate the national income of the country. Developing countries are more endowed with labour resources which lead to adopt labour intensive production process. However, mineral extraction requires utilisation of advanced technology in addition to employment of labour resource in the production process. The need of technological adoption could be satisfied through either the industrial sector of the domestic economy or through import from rest of the world. The requirement of advance technology from rest of world could be fulfilled through the earning of foreign exchange reserve. This indicates that while on one hand mining export supports to the national income through foreign exchange earnings on the other hand it depends on foreign exchange reserve to adopt technology for mineral extraction. Against this background the present study tries to investigate the long run relationship among the variables in Indian context.

The paper is organised as follows: *Literature review* briefly presents the review of existing literature on export-led growth and resource curse hypothesis; *Methodology and Model Specification* discusses the methodology and model adopted for the present study; *Results and Discussion* analyses the empirical results and *Conclusion* concludes the study.

#### **Literature review**

The resource dependence and their developmental dimension is a fascinating area of research for natural resource economist. Mining resource has received the attention of researcher due to its exhaustible characteristics and various social impacts associated with mineral extraction. However, the studies specific to the relationship between mining export and economic growth are limited. As few number of studies available in this area, we have largely focused on the studies made on the relationship between exports and GDP. In addition, the literature on the resources abundance and economic growth is discussed in this section.

#### *Resource abundance and economic prosperity*

The possible explanations for the resource curse are many but it can be broadly classified into two categories i.e., Dutch disease model and Nigerian disease model. The former one concerned with allocation of resources from manufacturing sector to primary sectors during the boom period, as a result of which the huge export of primary products lead to appreciation of domestic currency, which disturbing both the domestic economy and external sector (Williams, 2011). In addition to this, the second effect of high dependence and resource allocation to primary extractive sector is destruction of traditional source of export (Davis and Tilton, 2005). On the other hand, the Nigerian disease model is concerned about utilisation of resource revenue from the extractive sector. It is the inefficiency of the Government towards proper utilisation of the wind fall gains, as a result of which economic growth gets hampered in resource abundant countries. In the last couple of decades a large number of studies have been carried out for the empirical verification of resource curse hypothesis in different countries. Many of the studies support for the existence of resource curse in resource rich countries (Gelb, 1988; Auty, 1993; Sachs and Warner, 1997, 2001; Gylfason et al., 1999).

'Point resource' and 'diffuse resource' have different impact towards the institutional structure. Point resource is more often concentrated on a particular geographical area, as a result of which it generates inequality among communities (Bulte et al., 2005). Developing countries with high dependence on the export of point resource fail to accrue growth as a result of the institutional failure

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