The Evolving Pattern of India's Iron and Steel Trade:

1991-2007

Dissertation submitted to the Jawaharlal Nehru University in partial fulfilment of the requirements for the award of the degree of

MASTER OF PHILOSOPHY

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DECLARATION

I declare that the dissertation entitled **"The Evolving Pattern of India's Iron and Steel Trade: 1991-2007"** submitted by me for the award of the degree of **Master of Philosophy** of Jawaharlal Nehru University is my own work. The dissertation has not been submitted for any other degree of this University or any other university.

Laysanglama

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CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

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Dedicated to

Appa, Ama and Bhai

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CHAPTER 1

Introduction

What iron was to ancient civilization; steel is to the modern world. Steel has been a key material in the transition of the world to its current developmental status. Steel is the most common material used for construction for creating infrastructure, be it roads, bridges, railways, industries, power plants, transmission lines, ports, buildings, and also for consumer durables viz. automobiles, appliances and other household gadgets. Iron and steel is one of the early and major industries established in the Indian economy. As per official estimates, the iron and steel industry contributes around 2 per cent of the Gross Domestic Product (GDP) and its weight in the Index of Industrial Production (IIP) is 6.2 per cent[1]. The Indian iron and steel industry also occupies an important position in the global economy today and is the fifth largest producer of steel in the world.

The economic reforms undertaken in India in the early 1990s gave a major boost to the steel industry and it grew considerably in terms of investment, production capacity and number of producers. Further trade liberalisation had a positive impact on steel exports. Before the 1990s the country used to resort to steel exports only if there were not enough takers in the domestic market but after liberalisation the country has established itself in the world steel market.

One noteworthy characteristic of the Indian economy is its abundant iron ore reserves. The local availability of cheap iron ore resources has played an important role in the development of the iron and steel industry. Moreover in this era of globalisation, access to cheap ore has provided some comparative advantage to the Indian iron and steel industry. This raises the question as to whether the ore should be reserved for the domestic industry or should be made available to India's international competitors as well. Initially, after independence iron ore exports were considered to be an important channel to earn foreign exchange as the country was endowed with abundant iron ore reserves. Thus, India has been a traditional exporter of iron ore. Subsequently there emerged a view that the finite reserves should be reserved for supporting an Indian

[1] Annual Report 2008-09, Ministry of Steel, GOI.

industry that would add value domestically. However, with the liberalisation of rules governing of the mining sector, there has been a huge spurt in iron ore exports.

Since the mid 2000s the Indian economy has been on a higher growth trajectory, with growth rates at around 9 per cent. Give such a scenario, if the country wants to attain higher level of growth or maintain the existing level, huge investments in infrastructure are required which need to be supported with higher availability of iron and steel. This makes a case for higher growth of the iron and steel industry. Moreover the current scenario of the Indian steel industry indicates that there is huge growth potential in this industry. The per capita-consumption of steel in India is only 48 kg (2008). This is much less compared to the global average of 214 kg (2007) and the developed world average of 350 kg (2007). Thus, the iron and steel industry is very critical from the point of view of development of the country.

This chapter proceeds as follows: section 2 provides a brief history of the evolution of Indian iron and steel industry. Section 3 highlights some of the important features of the industry. Section 4 and section 5 discuss the production processes involved in iron and steel making and the structure of the Indian iron and steel industry as it exists today respectively. Section 6 details the issues being researched. It provides a brief background from which emerges the research questions of the study. Further, this section also discusses the research objectives and the organisation of the main chapters of the study.

1.1 Brief History

In about 1500 BC the Hittites in West Asia were the first to learn how to use iron. They soon realised that iron weapons were better than bronze weapons and hence kept the secret of iron making to themselves for 400 years, until about 1100 BC, when the Dark Ages came to West Asia, and the secret of making iron got out to other people after the Hittite empire fell apart. The knowledge of iron making was brought to India by the Aryans around 800 BC. Thus the time period of around two thousand years before Christ is termed as the Iron Age as iron was vastly used in that period in each and every part of life. But, with the change in time and technology, people were able to find an even stronger and harder material than iron and that was steel. Steel

was discovered by the Chinese during the reign of the Han dynasty in 202 BC till 220 AD. From China, the process of making steel from iron spread to its south and reached India. High quality steel was being produced in southern India in as early as 300 BC. Around 9th century AD, the smiths in the Middle East developed techniques to produce sharp and flexible steel blades. Thus, gradually newer and improved technologies were developed and steel started to play an indispensable role in most of the economies of the world.

The establishment of Tata Iron and Steel Company (TISCO) in 1907 was the starting point of modern steel industry in India. At the time of independence of the country in 1947, India had only three steel plants – the TISCO, the Indian Iron and Steel Company (IISCO) and Visveswaraya Iron & Steel Ltd and a few electric arc furnace-based plants. These plants operated with a capacity of about 1 million tonne and were completely in the private sector. The successive governments laid huge stress on setting up of basic infrastructure and heavy industries in the country. Thus in terms of the Industrial Policy Resolutions of 1948 and later 1956, three public sector plants at Rourkela, Bhilai and Durgapur were established with technical and economic cooperation with West Germany, Soviet Union and Britain respectively. The modernization of the two private sector leaders and the program of public sector investment together raised Indian steel output from about one million tons a year in the 1940s to three million tons in 1960, then to six million tons only four years later. Soon another plant at Bokaro was set up with the Soviet collaboration in 1964.

In 1971 IISCO was nationalised and became part of public sector steel industry. The Steel Authority of India Ltd (SAIL) was established in January 1973 as an umbrella institution for the purpose of providing coordination to avoid duplication and to channel resources more effectively. SAIL was given control of all iron and steel production apart from TISCO and a number of small-scale electric-arc furnace units. In the 70s and 80s the only growth story of the steel industry in India was the expansion programmes of the SAIL plants at Rourkela, Bhilai, Durgapur and Bokaro along with the Vizag plant of RINL (Rashtriya Ispat Nigam Ltd). Steel capacity stagnated at around 10-15 million tonne per annum for a long time till the new economic reforms agenda started in the 1990s.

The steel industry was among the first industries to be decontrolled in 1991. This move saw the growth of a number of private sector plants. The new players included Essar Steel, Ispat Group, Jindals, Bhushan, Lloyds and others. The industry faced a downturn during the late nineties mostly on account of a global slowdown caused due to the financial crisis of the South East Asian countries but revived again by 2002. The expansion of the private sector delivered high growth in all segments of steel industry that is capacity, production, export and imports.

1.2 STEEL PRODUCTION PROCESSES

There are three stages in the production of steel namely, iron making, steel making and rolling (including surface treatment). Mainly there are three types of firms. One type is a steelworks that has all the three stages and is called an integrated steelworks. A firm that has one or more integrated steelworks is called an integrated firm. The second type of steelworks is the semi-integrated firm that has steel making and rolling processes in its plants. The third type of steelworks is a rolling firm. Rolling firms purchase semi-finished steel products such as billets and slabs and specialize in hot rolling or cold rolling processes. There are also firms that specialise in surface treatment, such as galvanizing, colour coating and tin coating, or in making tubes and pipes. The different processes for production of steel in India are as follows[2]:

Blast furnace/Basic Oxygen Furnace (BF/BOF): BF basically converts iron ore into liquid form of iron. Iron produced by BF contains high amount of carbon and other impurities, this iron is called pig iron. Pig iron due to its high carbon content has limited end use application such as covers of manholes. To make steel products out of pig iron it is further processed in the BOF where its carbon content and other impurities are burnt or removed through slag separation. Main inputs to BF are iron ore and coal/coke. The BOF is also called oxygen furnace because oxygen is the only fuel used in the process. Generally, integrated milling use BF/BOF routes to produce

[2] Public Enterprises, Government Policy and Impact on Competition (2009): Indian Steel Industry, Indicus Analytics, New Delhi.

finished steel. Producers that use this technology include SAIL, RINL, TSL and JSWL.

Electric Arc Furnace (EAF): Basic purpose of the EAF is remelting sponge iron or melting scrap, its main inputs, to produce finished steel. It uses electricity to the extent of as much as 400-500 kWh/ton. ISPAT, ESSAR, and the Jindal group are examples of producers, which use this technology. COREX or Cipcor Process is an advance process of making steel. Though few use this process, it is possible to use non-coking coal directly in smelting work and it also makes it possible to use lump ore and pellets as inputs. These two advantages allow steel producers to eliminated coking plants and sinter plants. The purpose of a coking plant is to convert non-coking coal into more efficient fuel and the purpose of a sinter plant is to purify lump ore or pellets for further processing. Jindal Iron & Steel Company (JISCO) uses COREX technology to produce finished steel.

Induction Arc Furnace (IAF): is one of the most advanced processes for making steel. Like EAF it uses electricity as its main fuel. IAF is the most environmentally friendly and efficient way of producing steel. However, its lack of refining capacity requires clean products as its inputs. Large numbers of small steel companies use this technology.

1.3 STRUCTURE OF STEEL INDIAN IRON AND STEEL INDUSTRY

The Indian Steel Industry is divided into the following segments[3]:

1. **Main Producers:** This group comprises of integrated steel producers and includes Steel Authority of India Ltd (SAIL), Tata Steel (capacity 3 Mt) and Rashtriya Ispat Nigam Ltd (RINL) (3 Mt). SAIL has four integrated steel plants at Bhilai (4 Mt), Bokaro (4 Mt), Durgapur (2 Mt) and Rourkela (1.8 Mt). The Main Producers have a combined capacity of around 19 Million Tonnes per annum with current capacity utilization rates exceeding 100% of their installed capacities.

[3] Indian Minerals Year Book 2008, Indian Bureau of Mines, Nagpur.

2. **Secondary Producers**: Secondary producers comprise of two groups namely, Major Producers and Other Secondary Producers.
   a) **Major Producers**: The group of Major producers includes the integrated steel plants (other than Main Producers) with crude steel capacity 0.5 million and above – irrespective of technology route. It comprises of the Ispat Group, Jindal Group, Lloyds and Essar. These are primary steel makers with diverse technology routes such as DRI-EAF, DRI/BF-EAF, COREX/BF- BOF etc.

   b) **Other Secondary Producers**: This group is comprised of the mini steel plants with Electric Arc Furnaces (EAF) and Induction Furnaces (IF) with capacity below 0.5 million tonnes. This category also includes the stand - alone processors without backward integration of steel making. Re-rolling units, Cold Rolling units, GP/GC sheets units and Pig iron & Sponge iron plants (other than those of main/major producers) fall under this group.

Thus the consolidated category of 'Secondary Producers' is highly heterogeneous in terms of scale of production, capacity in place, technology in use, integration of production processes and vintage of the plants.

1.4 FEATURES OF INDIAN STEEL INDUSTRY

2. **Abundant supplies of raw materials**: One of the basic features of the Indian steel industry is the abundant supply of high quality iron ore which is the basic raw material of the steel industry. With the total reserves of over 25 billion tonnes of hematite and magnetite, India is one of the leading producers as well as exporter of iron ore in the world. It also has many other minerals required for the steel industry, such as limestone and manganese ore.

3. **Development designated to public sector up to 1991**: Post independence the successive governments in the country designated the development of the iron and steel industry to the public sector. All the new steel plants namely,

Rourkela steel plant, Bhilai steel plant, Durgapur steel plant and Bokaro steel plant, that came up in the post-independence period, were in the public sector.

4. **Highly regulated and protected markets till 1991:** The steel plants operated in a highly controlled environment which included various regulations such as reservation of large plant capacities only for the public sector under capacity control measures; requirement of license for additional capacity creation; restrictions on foreign investment ; and price regulation and restrictions on imports as well as exports.

5. **Relatively slow technological up gradation:** Before independence iron making had developed but steel making was weak in India. Steel making developed after independence but the technological up gradation was relatively slow. The integrated steel makers followed the BF/OHF or BF/BOF route of steel making. However, after liberalisation there have been changes in technology with respect to the steel making process. In the case of iron making there has been rise in the production of Direct Reduced Iron (DRI) or sponge iron. In fact, today India is the largest producer of DRI in the world. In the case of steel making Open Hearth Furnace (OHF) has been replaced by Blast Oxygen Furnace/ Electric Induction Furnace (BOF/EAF) and it has also seen the introduction of CC.

6. **Economic liberalisation brought about structural changes in the iron and steel industry**. With the entry of the private sectors the share of the private sector in total steel production has been increasing over the years. Thus, today the steel industry can be divided into two main sectors: public sector and private sector. Before liberalisation the steel industry was dominated by the public sector. Further after liberalisation new types of integrated makers, EAF-rolling makers, iron makers, small EIF makers have come up. Today, the iron and steel industry is characterized by a dual structure of integrated and big EAF and small EAF and IF makers.

1.5 STRUCTURE OF RESEARCH

1.5.1 BACKGROUND

The Indian iron and steel industry has come a long way since independence and after liberalisation there has been significant development in this industry. From just 1.1 million tonnes at the time of independence, steel production increased to 16 million tonnes in 1993-94, and further to 56.7 million tonnes in 2007-08, making India the fifth largest producer of steel in the world. Similarly, liberalization of the foreign trade regime has had a favourable effect on Indian steel exports. Exports have grown fast and at a rate exceeding 25% per annum between 1991-92 and 2002-03. Thereafter, export levels have remained at around 4.9 to 5.5 million tonnes per year. On the other hand, iron ore production in the country increased from 75 million tonnes in 1999-00 to 180.9 million tonnes in 2007-08. Thus, in a short span the production of iron ore more than doubled. However, most of the increase has been diverted for exports. Iron ore exports increased from 33 million tonnes in 1999-00 to 93 million tonnes in 2007-08. Thus more than half of iron ore produced in the country is being exported.

Another notable feature of the iron and steel industry is that imports, which stood at around 1-2 million tonnes till 2003-04, have risen rapidly thereafter. When we look into the detailed structures of steel exports and imports we find that items from the same product categories are being exported and imported[4]. Had the imports and exports been taking place on the basis of competitiveness then the country would not have been importing items from the same product category, which it exports due to its cost competitiveness. This implies that exports and imports of "similar" products are taking place due to differences in attributes and quality. However, some amounts of imports do take place on the basis of price consideration. This phenomenon of the simultaneous export and import of goods within the same industry is known as the intra industry trade (IIT). IIT is further disentangled into horizontal IIT and vertical IIT. The former refers to trade among differentiated products of the same quality but with different characteristics or attributes. On the other hand, the latter refers to trade in close substitutes that are differentiated purely on the basis of quality. Vertical IIT

[4] Refer to Chapter 2.

can be divided further into vertical IIT in high quality goods i.e. the country exports high quality goods and imports low quality goods and vertical IIT in low quality goods in which a country exports low quality goods and imports high quality goods.

From the above discussion we find two paradoxical situations:

1. Firstly, we find that while in the post liberalisation period steel production and exports have shown a positive growth, the country has witnessed large amount of exports of iron ore which is the major raw material of the steel industry. Thus we are in a situation in which our domestic steel industry is expanding but at the same time the principal raw material of steel industry, iron ore, the availability of which provides a competitive edge to the domestic producers, is also being exported to an extent that is rising rapidly.

2. Secondly, with the increase in production, exports of iron and steel products have increased but the imports have continued as before. Thus we are in a situation in which we are simultaneously exporting and importing similar products.

1.5.2 RESEARCH QUESTIONS

Based on this background, the main research questions identified are as follows:

1. Considering the fact that India has a long history of steel making and that export of finished steel results in more value addition than export of raw iron ore; why has there been a shift towards increasing amount of export of iron ore in the post liberalisation phase rather than iron ore being processed into finished steel within the country itself?

2. The post liberalisation period has been characterised by simultaneous exports and imports of similar steel products pointing to the presence of intra-industry trade or to be more precise intra product trade within iron and steel industry; what is the extent of this intra industry trade and what is its nature i.e. whether it

is in the nature of horizontal IIT or vertical IIT in high quality products or vertical IIT in low quality products?

1.5.3 RESEARCH OBJECTIVES

The related research objectives are:

1. To analyse the sudden spurt in the exports of iron ore and to examine whether it is due to policy changes such as the liberalisation of regulations relating to the mining sector or due to some other specific factors.
2. To examine the implications of such huge increases in exports of iron ore on the domestic iron and steel industry.
3. To measure the extent of intra industry trade and to determine its nature.

1.5.4 ORGANISATION OF CHAPTERS

With a view to answer the above research questions the chapters are organised as follows:

Chapter two examines the performance of the iron and steel industry in the post liberalisation period. This chapter begins by looking into the contribution of iron and steel industry to engineering goods exports. Thereafter the performance of the iron and steel industry as a whole is analyzed followed by a further disaggregated view by dividing the iron and steel industry into the broad categories of semi finished and finished steel- flats and non-flats. The share of each product of steel in total steel exports and imports based on the Joint Plant Committee[5] classification is examined. Moreover, in order to analyze import substitution and export orientation in the steel industry, the chapter examines the trends in the structure of production, consumption, exports, and imports of various finished steel products. Lastly, the chapter discusses the various changes that have taken place in the iron and steel industry in the post liberalisation period.

[5] Joint Plant Committee is the authorised agency of the government to collect steel datas.

Chapter three seeks to answer the first research question that has been posed above. In doing so it first examines the reasons for such a massive spurt in iron ore exports after liberalisation. Further it looks at the detailed structure of iron ore production, consumption and exports of the country and analyzes the implications of such huge iron ore exports for the Indian iron and steel industry. The chapter also delves into the debate concerning iron ore exports i.e. whether it should be continued or banned.

Chapter four attempts to address the second research question of the study on the determinants of the extent and nature of intra industry trade. The chapter gives a brief overview of the intra industry trade theories followed by a detailed discussion of the methodology used for calculating IIT and determining its nature. Thereafter the chapter discusses the empirical findings of the research and then explains and analyzes the reasons behind such findings.

Chapter five is the concluding chapter.

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CHAPTER 2

Trade Performance of the Indian Steel Industry in the Post Liberalisation Phase

2.1 INTRODUCTION

The New Economic Policies which ushered in far reaching changes in the Indian economy affected the Indian steel industry as well and it became the first core sector to be completely freed from the regime of licensing and pricing and distribution control. Before liberalisation, the steel industry worked under highly regulated environment. The steel prices were set by the government and the policies regarding production and investment were mainly driven by the needs of the market leader, the Government owned SAIL.

The major developments that took place after liberalisation were:

1. Large scale capacities were removed from the list of industries reserved for the public sector. The licensing requirement for capacity creation was also abolished, except for certain locational restrictions.
2. Pricing and distribution control mechanisms were discontinued.
3. The iron and steel industry was part of the set of high priority industries identified for foreign equity infusion, implying automatic approval for foreign equity participation up to 100 per cent.
4. Freight equalisation scheme was replaced by system of freight ceiling.

The economic reforms have also been strongly associated with external trade liberalisation. Import and export of iron and steel is freely allowed with no quantitative restrictions on imports. The domestic steel industry has, since then, become market oriented and integrated with the global steel industry. The import tariffs have been reduced over the years from 100 per cent to 5 per cent. For steel makers, the opening up of the economy opened new channels for procuring their inputs at competitive rates from overseas markets and also new markets for their products. The chief purpose of trade liberalisation was to bring domestic relative

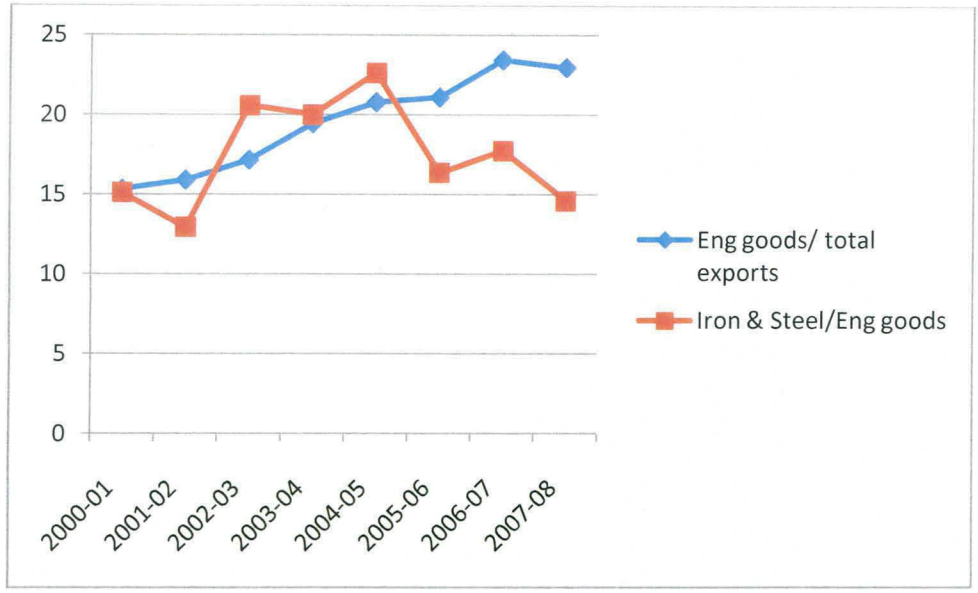
prices into line with the international prices, thereby creating conditions for greater efficiency and competitiveness of domestic production, which in turn was supposed to result in rapid increases in exports. Thus in this chapter we examine the India's performance in the steel trade in the post-liberalisation period.

The chapter is divided into the following sections: Section 2 examines the contribution of the steel industry to aggregate exports of engineering goods. Section 3 analyses the trade performance of the steel industry as a whole. In order to provide a detailed insight, the performance of Indian steel trade is examined at the level of various categories of steel. Hence section 4 talks about the different categories of steel products while section 5 looks at the steel trade performance at the level of semis and finished steel- flats and non-flats. Section 6 examines the share of different varieties of steel products in total steel exports and imports and the presence of intra industry trade (IIT) in the steel industry emerges from this discussion. Finally, Section 7 traces the trends in demand, supply, exports and imports in different products of the steel industry to determine the import substitution and export-orientation characteristics of the industry.

2.2 CONTRIBUTION TO ENGINEERING SECTOR EXPORTS

The engineering goods sector is the largest segment of the Indian industrial sector. It accounts for 3 per cent of India's GDP with 30.5 per cent weight in the index of industrial production (IIP). The engineering goods sector is broadly divided into machinery (which includes machine tools, machinery & instruments and transport equipment), iron and steel and other engineering items (which includes ferro alloys, aluminium other than products, non-ferrous metals, manufacture of metals and residual engineering items). India's export of engineering goods grew at 25.2 per cent (CAGR) during 2000-01 to 2007-08. The share of engineering goods in total exports was 12.4 per cent in 1990-91 and remained around 13 to 15 per cent throughout the 1990s. However, from 2000 onwards the engineering goods exports started rising rapidly and its share in total exports have increased to around 23 per cent in the last three years (Figure 1). Thus, today engineering exports are one of the largest foreign exchange earners for the country.

Figure 1: Share of Engineering Exports in Total Exports and Share of Iron and Steel in Total Engineering Exports (Per Cent)



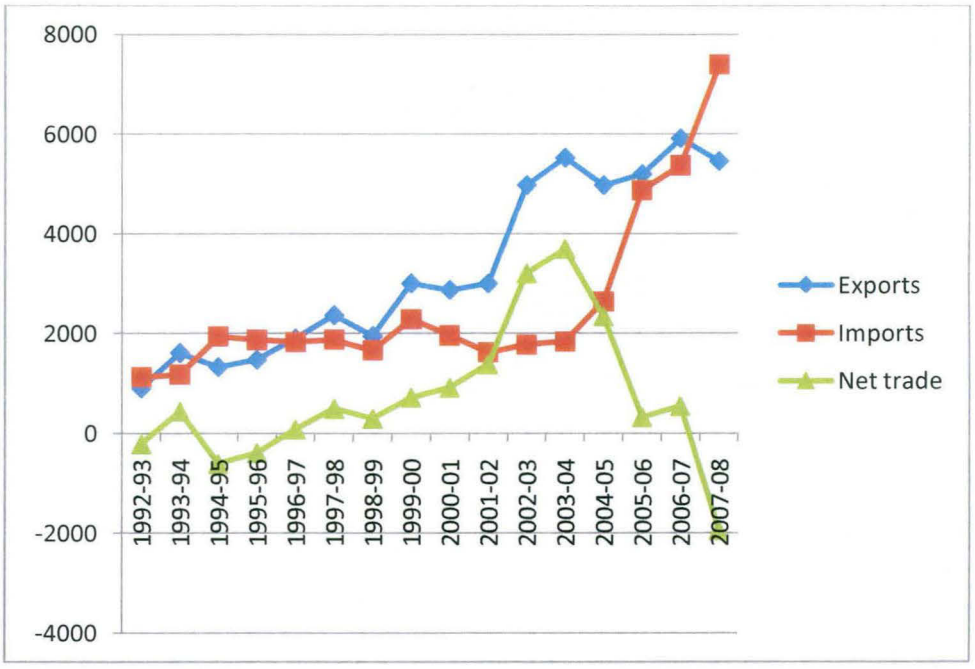
Source: RBI Database

Examining the contribution of iron and steel to the export growth of engineering goods, we find that the share of iron and steel in total engineering goods exports after liberalisation remained around 15 per cent in the 1990s. Over the three years from 2002-03 to 2004-05 there has been a massive increase in iron and steel exports which acted as the real source of the expansion in aggregate export in the engineering goods sector. Its share in engineering goods exports increased to 20 per cent in 2002-03 and further to 22.6 per cent in 2004-05. But since 2005-06 it has been showing a declining trend. In 2005-06 its share declined to 16.4 per cent and further to 14.6 per cent in 2007-08. While the share of engineering goods in total exports has been increasing the share of iron and steel has fallen, indicating that it is due to other items, such as machinery and other engineering goods, that the share of engineering goods in aggregate exports was rising.

2.3 TRADE PERFORMANCE OF STEEL INDUSTRY

The deregulation of the domestic steel industry eased the way for the entry of private players leading to massive capacity expansion in the steel industry within the country. Further, with globalisation the market for Indian steel products got widened. Thus, after having met the domestic demand, the surplus production started to be exported. In 1991-92, the year of liberalisation, the steel exports amounted to 368 thousand tonnes, which increased steadily year-by-year and reached to 2989 thousand tonnes in 2001-02. Thereafter, the steel exports increased rapidly during the period 2002-03 to 2004-05 with exports reaching 5519 thousand tonnes in 2003-04. From the turn of the new millennium the improvement in the market conditions contributed mostly by China, brought about new lease of life in the global steel industry. Since the domestic steel production of China was not enough to meet its rising demand it had to depend on huge imports and India emerged as a favourite source due to its locational advantage. However, steel exports have remained almost stagnant in the last four to five years at around 5200 tonnes partly because the Chinese steel industry grew rapidly in a very short period of time reducing its dependence on imports. Further, domestic demand rose significantly on account of the massive expansion witnessed by the Indian economy since the mid-2000s. The government also discouraged exports of certain steel products by imposing export restrictions.

Figure 2: Exports, Imports and Net Trade in Iron and Steel ('000 tonnes)



Source: Ministry of Steel Annual Reports 2007-08 and 2008-09; IndiaStats

On the other hand the imports of steel which amounted 1043 thousand tonnes in 1991-92 rose gradually to reach 1473 thousand tonnes in 2003-04. However, since 2004-05 steel imports have increased rapidly and almost tripled in the four-year period ending 2007-08, from 2632 thousand tonnes to 7396 thousand tonnes. At the time of liberalisation in 1991-92, the imports of steel in India exceeded the exports of steel. This trend started changing from the mid-90s with India becoming a net exporter of steel. After being a net exporter of steel for a decade, India turned into net importer of steel in 2007-08.

Steel imports by India have been driven by many factors. Firstly, now located in an open economy characterised by low import duties and no physical controls, domestic consumers have the option of importing steel if it is cheaper to do so. Therefore, low steel prices have smoothened the way for imports from Russia, Ukraine and Kazakhstan. Imports are resorted to not only to bridge the gap between domestic availability and demand but also because of price considerations encouraging substitution for dearer domestic supplies. Secondly, there are certain products for which the size of the demand is very small, so it is not viable technologically and economically on scale considerations to produce those products domestically[6]. Thirdly, imports also take place because of differences in attributes and qualities of the products produced domestically and those produced in other countries. Lastly, the huge increase in imports during the last few years is because of the failure of domestic production to keep pace with rising steel demand.

2.4 DIFFERENT CATEGORIES OF STEEL AND THEIR USES

As this chapter seeks to discuss in detail the structure of exports and imports of steel, it is imperative to delineate the different categories or segments of steel that constitute the steel industry. The different categories of steel that are produced are semi finished steel (alloy and non alloy) and finished steel (alloy and non-alloy). The finished steel can be divided into flat products and non-flat or long products, depending on the

[6] It will be seen later in this chapter that import of tinplates and electric sheets takes place because of this reason.

shape of steel manufactured. There are more than 3500 grades of steel available today.

Semi finished

Semi finished products include booms, billets and slabs that are converted to finished products in the processing plants and are to some extent sold to re-rollers for conversion into finished products.

Long or Non-flat Product

Steel long or non-flat products includes steel products in long, bar or rod shape like reinforced rods made of sponge iron. Long products are required to produce concrete, blocks, bars, tools, gears and engineering products. Long or non-flat products are generally used by the civil engineering and construction industry, and they are relatively difficult to differentiate from flat products. The domestic demand for long products is crucial, especially from government public works in developing countries. Exporting these products is often not competitive due to the freight costs. Thus, a decrease in domestic demand is not likely to trigger exports, but result instead in a decrease in production.

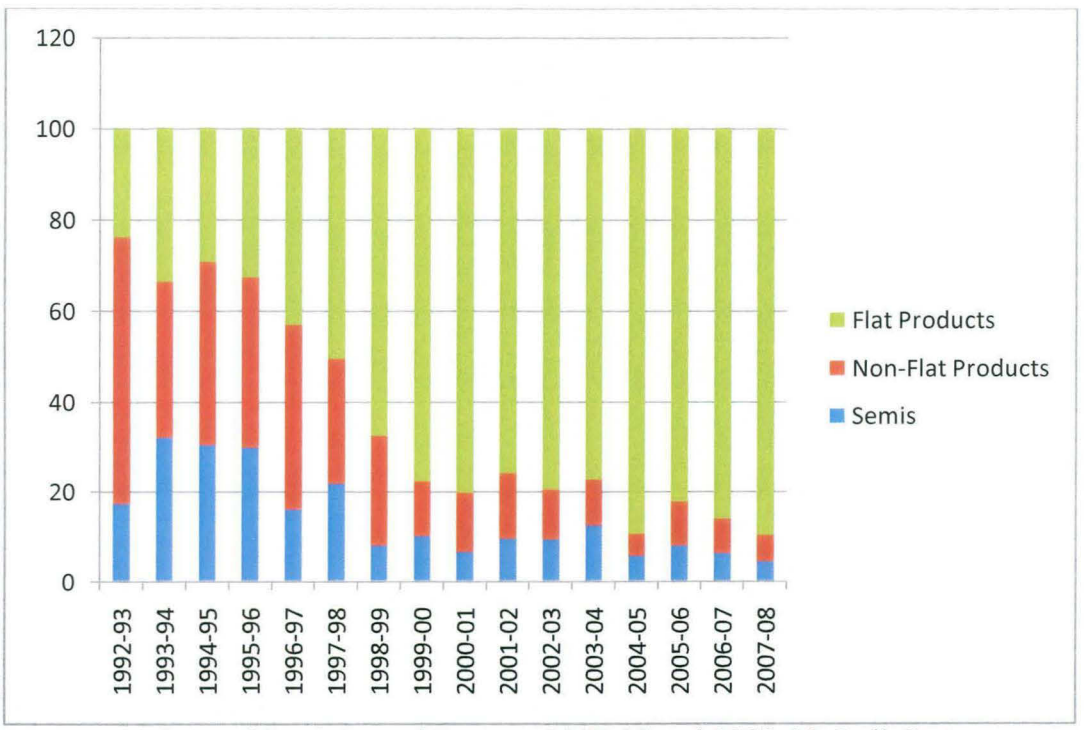
Flat products

Steel flat products include steel products in flat, plate, sheet or strip shapes. Flat products are rolled mostly from semi-finished forms called slabs. There are two streams of flat products originating either from a plate mill (Plates) or a hot strip mill/steckel mill (HR coils). Usually, plates are used directly. The HR coils are used directly too, but, most of them are further rolled and processed to produce items such as cold rolled (CR) sheets/coils, coated sheets and coils, pipes, etc. Cold rolled products are further processed into galvanised plain (GP) and galvanised corrugated (GC) sheets and tin plates. Thus HR coils are the most important intermediate products. Flats are mainly used in making automobiles, commercial vehicles and consumer durables. Unlike non-flat products, qualitative differences among flat products are relatively large from high value-added ones used for automobiles and electronics to general usage products such as pipes.

2.5 TRADE IN SEMIS AND FINISHED STEEL (NON-FLATS AND FLATS)

We now look into the trade performance of iron and steel industry by dividing it into semis, flat products and non-flat products. There are broadly two types of steel according to its composition: alloy steel and non-alloy[7]. In India, non-alloy steel constitutes about 95 per cent of total finished steel production and since category wise data of alloy steel is not available so we consider only non-alloy semi finished and finished steel in our analysis.

Figure 3: Share of Semis and Finished Steel (non-alloy) in Total Steel Exports (non-alloy) (Per Cent)



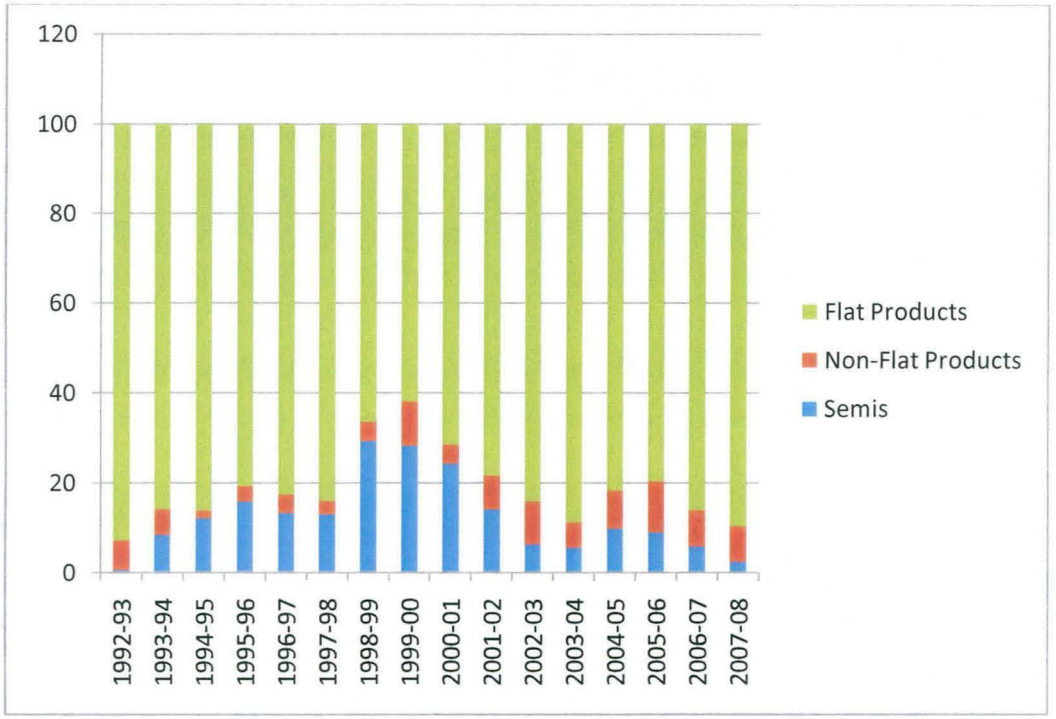
Source: Ministry of Steel Annual Reports 2007-08 and 2008-09; IndiaStats

From the above Figure 3 we find that the share of steel flats in the total steel exports was 23.8 per cent in 1992-93 and it increased significantly to reach 77 per cent in

[7] Alloying steel is produced using alloying elements like manganese, silicon, nickel, chromium, etc. Non-alloy steel has no alloying component in it except that are normally present, such as carbon.

1999-00. Thereafter its share has remained around 77-78 percent in the subsequent years. On the other hand the share of non-flat products has declined from 47.9 per cent in 1992-93 to 12.6 per cent in 2000-01 and further to just around 5 per cent in 2008-09. The share of semis in total exports of steel has also come down over the years from around 31 per cent in 1992-93 to 4 per cent in 2008-09. Thus we find that the steel export is dominated by finished steel and within finished steel flat products are the main drivers of export growth.

Figure 4: Share of Semis and Finished Steel (non-alloy) in Total Steel Imports (non-alloy) (Per Cent)



Source: Ministry of Steel Annual Reports 2007-08 and 2008-09, IndiaStats.

The share of semis in total finished steel imports increased gradually during the 1990s from 0.4 per cent in 1992-93 to 28 per cent in 1990-00. Thereafter, its share has fallen and fluctuated in the range of 5-8 per cent. The share of non-flat products has remained in the range of 3-11 per cent all through the period of study. The major share in imports has been that of flat products. Its share has always been more than 80 per cent barring the few years between i.e.1998-99 t0 2000-01.

2.6 SHARE IN EXPORTS AND IMPORTS AT THE DISAGGREGATED LEVEL

From the above discussion we find that the major portion of India's steel exports consists of finished steel exports (non-alloy). Therefore we now look into the share of different flat and non-flat products in total steel exports and imports.

Table 1: Share of various categories of Steel Products in Total Steel (Non-Alloy) Exports (Per Cent)

	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
Bars and Rods	52.01	32.42	34.72	31.74	40.61	25.04	21.63	11.40
Structurals	6.94	7.06	5.76	5.73	0.32	0.59	2.58	0.77
Plates	22.15	18.99	19.48	11.40	16.39	16.00	14.82	10.97
HR Coils/Sheets	0.34	15.62	5.00	11.13	20.78	23.64	35.78	49.08
CR Sheets/Coils	0.22	2.62	4.62	9.69	2.91	2.80	4.59	5.38
GP/GC Sheets	1.12	1.12	0.08	0.34	2.64	2.59	11.10	10.70
Pipes	0.00	0.00	0.00	0.00	0.00	1.49	0.93	0.40
Tin Plates	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.57
Semis	17.2	36.54	30.33	29.76	15.86	20.12	7.95	10.03

Source: Ministry of Steel Annual Reports 2007-08 and 2008-09, Joint Plant Committee, Annual Statistics 2001-02 to 2005-06.

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Bars and Rods	12.27	13.36	10.37	9.04	3.26	7.46	5.57	3.91
Structurals	0.94	1.18	0.70	1.16	1.41	1.72	1.27	1.34
Plates	5.07	6.11	5.62	6.43	3.18	2.89	1.80	2.81
HR Coils/Sheets	46.15	32.77	28.04	27.59	26.74	26.42	26.75	25.52
CR Sheets/Coils	6.82	10.72	11.56	13.96	12.48	8.68	6.54	9.36
GP/GC Sheets	20.59	23.25	32.42	26.93	37.11	35.51	36.79	37.17
Pipes	0.42	1.64	0.97	1.38	3.00	2.31	3.45	3.67
Tin Plates	0.63	0.80	0.67	0.53	0.72	0.83	0.63	0.66
Semis	6.50	9.40	9.27	12.40	5.26	7.46	5.57	3.91

Source: Ministry of Steel Annual Reports 2007-08 and 2008-09, Joint Plant Committee, Annual Statistics 2001-02 to 2005-06.

2.6.1 SEMIS

In the initial few years after liberalisation semis constituted a significant share of the country's steel exports though its share kept declining every year. It was 36 per cent in 1993-94, went down to 20 per cent in 1997-98 and then fell rapidly thereafter with some fluctuations. Its share was 3.91 per cent in 2007-08.

2.6.2 NON-FLAT PRODUCTS

1. **Bars and Rods**: The share of bars and rods in total steel exports, which was 52.01 in 1992-93, declined to 21.6 by 1998-99, but it remained an important item of steel exports till the late 90s. From 2000-01 onwards its share declined more rapidly and reached 5.5 per cent in 2006-07. In 2007-08 its share in total steel exports was only 3.9 per cent.

2. **Structurals:** In the initial years of liberalisation the share of structurals in total steel exports increased slightly till the mid-1990s but thereafter its share declined and has remained in the range of 0.5-1.5 per cent.

2.6.3 FLAT PRODUCTS

1. **Plates:** Plates constituted second important item of steel exports all through the 1990s though its share in the total exports declined from 22 per cent in 1992-93 to 16 per cent in 1997-98 and further to 10.9 percent in 1999-00. Since then its share declined rapidly to reach 1.8 per cent in 2006-07. Its share stood at 2.81 per cent in 2007-08.

2. **HR Coils/Sheets**: The share of HR coils/sheets in total steel exports increased from a negligible 0.33 per cent in 1992-93 to 21 per cent in 1996-97 and reached its peak at 49 per cent in 1999-00. Thereafter, its share declined reaching 28 per cent in 2002-03 and remained at around 27 per cent till 2007-08.

3. **CR Coils/Sheets**: The share of CR coils and sheets in total steel exports increased from meagre 0.22 per cent from 1992-93 and remained in the range of 2.5-5 per cent till the 1999-00. Its share gradually increased and reached 12.5 per cent in 2004-05. However, since 2005-06 its share has been fluctuating in the range of 6.5 to 9 per cent.

4. **GP/GC Sheets:** The share of GP/GC sheets increased from a 1.1 per cent in 1992-93 to 10 per cent in 1999-00. Thereafter, it has shown the fastest growth in exports and today constitutes the major part of India's steel exports. Its share increased from 20 per cent in 2000-01 to 36 per cent in 2008-09.

5. **Pipes:** Till 1996-97 India did not export pipes at all but after that it has started exporting the product and its share in total exports which remained around 1 per cent till 2003-04 has increased to around 3 per cent in recent years. Its share stood at 3.67 per cent in 2007-08.

6. **Tin Plates:** India has started exporting some amount of tin plates since 1999-00.

From the above discussion we find that the various category of steel that was exported in the 1990s was different from those exported after 2000. In the 1990s bars and rods, plates, structurals, HR coils/sheets, constituted important items of finished steel exports. However, this composition has changed completely after 2000. While in the 1990s bars and rods was the major item of export, its share in total steel exports came down drastically in the 2000s. Similarly, the share of plates came down significantly. On the other hand, the share of GP/GC sheets increased massively making it the single largest export item. Also there has been increase in the exports of CR coils/sheets and HR coils/sheets continue to remain as an important item of export. Further, the period after 2000 also saw the beginning of exports of pipes and tin plates. Thus, overall we find that after 2000 the steel export is dominated by the exports of flat products while the share of non-flat products and semis has come down drastically. In other words, India's export basket has changed in favour of more value added and sophisticated products.

Table 2: Share of Various Categories of Steel Products in Total Steel (Non-Alloy) Imports (Per Cent)

	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00
Bars and Rods	1.34	0.86	1.21	1.72	1.44	2.05	1.54	1.97
Structurals	0.43	0.16	0.25	0.59	1.60	0.53	1.20	3.73
Rly. Materials	4.54	4.38	0.29	0.85	0.82	0.29	1.31	3.51
Plates	6.41	5.95	5.70	7.80	6.34	9.47	5.53	3.29
HR Sheets	4.31	5.11	2.78	1.98	1.09	1.39	0.30	0.53
HR Coils/Skelp/Strips	38.71	32.06	45.02	34.91	34.52	35.10	25.29	26.33
CR Coils/Sheets	10.60	12.31	12.15	12.28	16.85	15.31	13.22	12.64
GP/GC Sheets	0.32	0.24	0.54	0.58	0.66	0.88	2.37	3.29
Elec. Sheets	5.03	5.09	4.29	6.31	5.43	4.43	5.29	3.07
TMBP	8.51	5.58	2.71	2.57	1.84	0.47	0.42	0.66
Tin Plates	4.45	2.63	2.38	2.55	3.28	0.00	0.00	0.00
Tin Plates W/W	8.12	9.82	5.65	5.89	5.91	10.33	7.50	6.06
Tin Free Steel	0.86	1.84	1.41	1.64	1.73	1.45	1.51	1.97
Semis	0.41	7.81	11.54	14.98	12.44	12.13	26.98	26.33

Source: Ministry of Steel Annual Reports 2007-08 and 2008-09, Joint Plant Committee, Annual Statistics 2001-02 to 2005-06.

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Bars and Rods	1.49	2.19	5.82	3.87	4.89	7.70	5.40	5.90
Structurals	2.41	4.07	2.64	0.95	2.52	2.04	1.61	1.02
Rly. Materials	0.17	0.58	0.01	0.01	0.08	0.01	0.05	0.27
Plates	7.91	13.70	20.74	23.11	16.07	16.26	20.95	19.77
HR Sheets	0.93	0.60	2.41	2.24	2.34	0.65	1.06	0.39
HR Coils/Skelp/Strips	29.58	22.43	17.93	22.55	31.03	31.35	29.28	39.85
CR Coils/Sheets	12.61	12.65	17.08	13.25	10.91	10.01	11.29	11.10
GP/GC Sheets	3.74	6.00	5.19	5.57	4.02	2.75	3.64	3.63
Elec. Sheets	3.37	3.82	2.94	4.40	4.21	4.43	4.70	3.27
TMBP	0.54	0.47	0.12	0.01	0.01	0.04	0.03	0.05
Tin Plates	3.10	3.93	2.74	1.93	1.60	1.56	2.31	1.36
Tin Plates W/W	2.73	2.69	1.34	0.89	0.52	0.46	0.47	0.63
Tin Free Steel	2.84	4.03	2.92	1.57	0.82	0.58	0.60	0.59
Semis	22.75	12.60	5.44	4.72	8.64	7.64	5.01	2.11

Source: Ministry of Steel Annual Reports 2007-08 and 2008-09, Joint Plant Committee, Annual Statistics 2001-02 to 2005-06.

2.6.4 NON-FLAT PRODUCTS

1. **Bars and Rods:** Bars and rods constituted a very small share in total steel imports of the country. Its share in total imports after liberalisation remained in the range of 1 to 2 per cent till 2001-02. Thereafter its share has increased slightly to 4 to 6 per cent in the following years (except for 7.7 in 2005-06).

2. **Structurals:** The share of structurals in total imports has been small, at around 0.5 to 2 per cent all through the post liberalisation period except in two particular years i.e. 1999-00 and 2000-01 when its share increased to above 3.5 per cent.

2.6.5 FLAT PRODUCTS

1. **PLATES:** The share of plates in total imports has been increasing over the years. It constituted 6.4 per cent of the total imports in 1992-93, reached 9.7 in 1997-98 and after that declined slightly in the next two years but picked up again reaching 13.70 in 2001-02. Thereafter, it has remained in the range of 16 to 20 per cent. It stood at 19 per cent in 2006-07. Today, it is the second most important item of steel import.

2. **HR COILS/SHEETS**: HR coils and sheets have been the major item of steel import. Its share in total imports has always remained high. Its share has remained in the range of 23 to 45 per cent over the years (except 1994-95 when its share was 48per cent). It stood at 40 per cent of in 2006-07.

3. **CR COILS/SHEETS**: CR coils and sheets have always been an important item of steel import of the country. Its share in total imports was 10 per cent in 1992-93 and has increased gradually to 15.31 in 1997-98. Thereafter its share has remained in the range of 10 to 13 per cent.

4. **GP/GC SHEETS**: The share of GP/GC sheets in total imports was less than 1 per cent till 1997-98. Thereafter, there has been some increase in its share and it has remained in the range of 3 to 6 per cent.

5. **ELECTRIC SHEETS**: The share of electric sheets has remained in the range of 3 to 5 per cent over the years except in 1995-96 when the share was 6.3 per cent.

6. **TIN PLATES**: The share of TMBP in total imports was 8.51 per cent in 1992-93 and has declined gradually over the years. Its share in 2007-08 is very negligible at around 0.05 per cent. In case of tin plates, the share in total imports was 4.45 per cent in 1992-93, which declined subsequently. There was no import during the three year period between 1997-98 and 1999-00. Thereafter its share increased again and has fluctuated in the range of around 1.5 to 4 per cent. Further in case of tin plates W/W the share in total imports was higher compared to other tin plates but its share has gone down steadily over the years from 8.12 per cent in 1992-93 to 0.47 per cent in 2006-07. In case of tin free steel its share remained around 1-2 per cent all through the 1990s, increasing slightly after that for the first three years of the 2000s, and then falling again to stand at 0.59 in 2007-08.

From the above discussion we find that non-flats are not imported much and hence their share in total imports is very small, while most of the imports consist of flat products. Within flat products we find that HR coils/skelp/strips are the major items of imports followed by plates and CR coils/sheets. The share of the three together in total finished steel import has always remained very high in the range between 65 per cent and 80 per cent.

Looking into the detailed structure of export and import of steel we find that similar products from the same group are being both exported and imported. For instance, we find that in 2006-07 the share of HR coils/sheets in total exports was around 26 per cent while its share in imports was around 30 per cent. Thus they constitute an important item of export as well as import. CR coils is a second important item in which there is amount of exports as well as imports. This trend can be noticed in almost all the other products though in smaller magnitude. This points to the fact that there is significant amount of intra industry trade taking place within the steel industry. This phenomenon of intra industry trade is discussed in detail in chapter 4.

2.7 ANALYSIS OF DEMAND, SUPPLY AND TRADE OF VARIOUS ITEMS OF FINISHED STEEL

Steel production is driven not only by domestic demand but also by foreign demand (exports). In other words, the level of import substitution can be seen by examining the extent of domestic demand supplied by domestic production, while export-orientation can be measured through observing the extent that foreign demand (exports) drives domestic production. Moreover the scale of domestic demand sets a basis for technological choice. This is because steel products, notably long products tend to be sold domestically. Furthermore the segmentation of steel market is related to the level of economic development. In general the higher the ratio of flat products to total finished steel, the higher is the share of the industrial sector in the country's domestic economy. Thus in this section we look into the trends in demand, supply and trade in various products of finished steel to examine the extent of domestic demand met through domestic production and the extent met through imports and the share of exports in total production.

Since the consumption pattern of long or flat products and per capita steel consumption are good indicators of a nation's development, in early stages of development, bulk of steel requirement is for long products for infrastructure and basic industries. Demand for flat products increases as the country gets developed and the need for white goods and consumer products rises. In the case of India we find that firstly, the current per capita steel consumption in India, at a dismal 30 kg, is only at the level of an under-developed country, let alone a developing one. It indicates that no meaningful infrastructural development has occurred in the country as a whole. Second, the current proportion of flat to long product consumption in India as can be seen from the table is tilted towards the flat products for the present level of development and is a consumption pattern found in near developed countries.

Table 3: Proportion of Flat and Non-flat Products in Total Finished Steel Consumption (Non-Alloy) (Per Cent)

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Flat products/Total finished steel consumption	53.61	52.80	52.97	47.84	49.08	50.30	52.04
Non-flat products/Total finished steel consumption	46.39	47.20	47.03	52.16	50.92	49.70	47.96

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09.

These two facts are significant and indicate that India has a very small pocket of high development where demand for cars and white goods are high, alongside a large part that is under-developed. Clearly, the infrastructural development that has taken place in the country is small and large amount of work remains to be done for the development of the country as a whole.

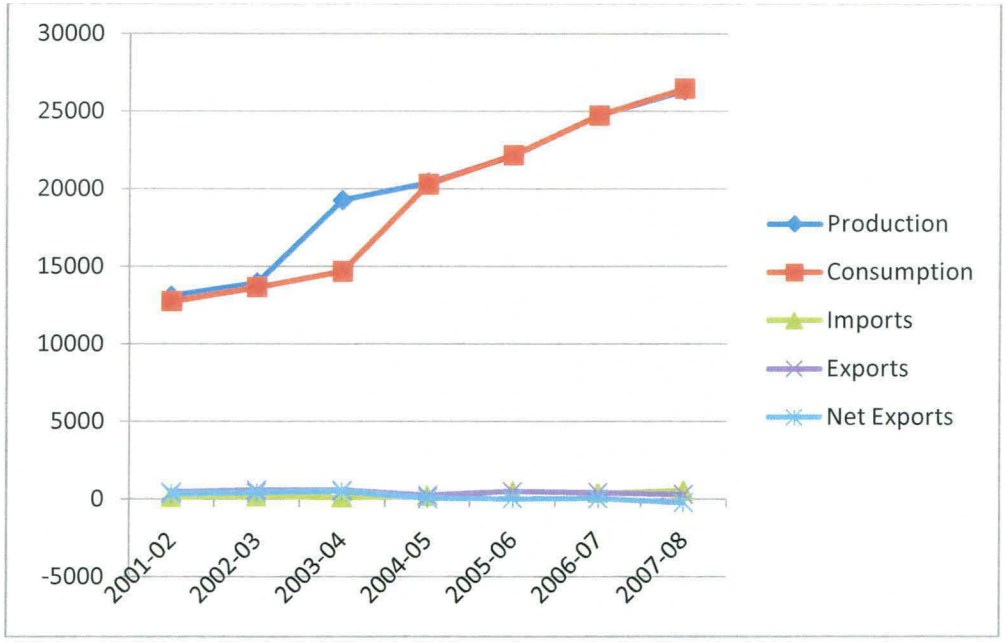
Now we will look into the trends in production, consumption and net trade at the level of flats and non-flat products. Thereafter we will look into the trends of different products of flats and non-flats.

Table 4: Production, Consumption, and Net Exports of Non-flat Products ('000 Tonnes)

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production	13071	13928	19229	20362	22133	24733	26317
Consumption	12730.2	13639	14658	20277	22169	24732	26454
Imports	110.2	150	88	197	474	378	532
Exports	434.6	550	563	232	476	404	286
Imports/Total Consumption (%)	0.87	1.10	0.60	0.97	2.14	1.53	2.01
Exports/Total Production (%)	3.32	3.95	2.93	1.14	2.15	1.63	1.09
Net Exports	324.4	400	475	35	2	26	-246

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09

Figure 5: Production, Consumption, and Net Exports of Non-flat Products ('000 Tonnes).



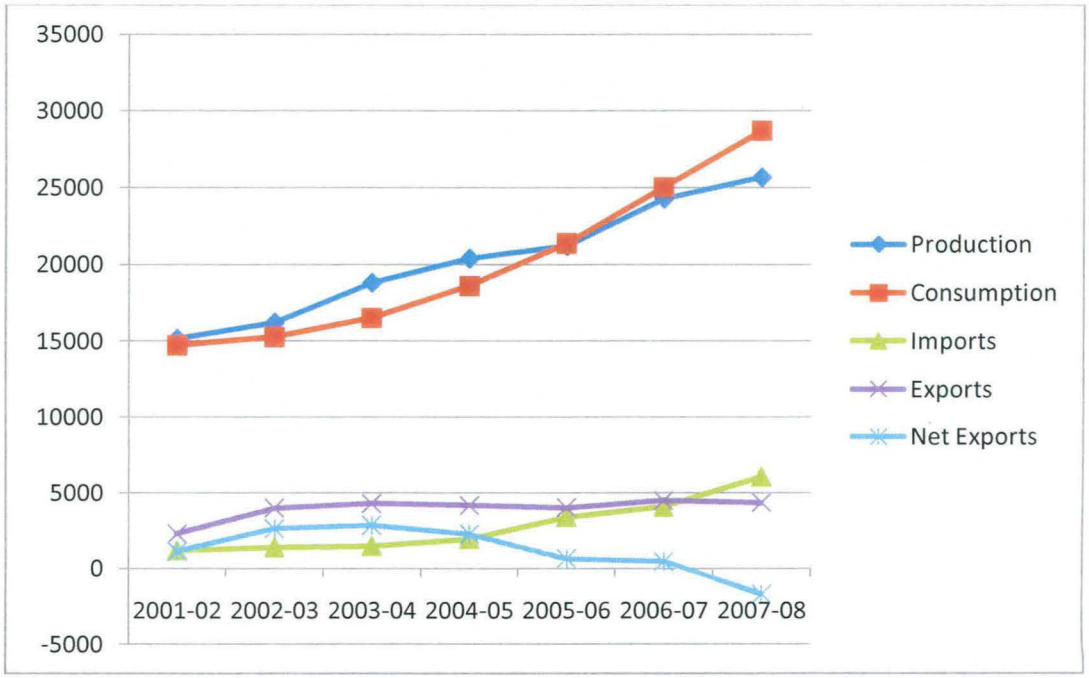
From the above Figure 5 we find that the production and consumption of the long products are moving in tandem with each other with no change in the net trade and the exports and imports in non-flat products is very minimal. This implies that most of the production increase of long products is aimed at meeting the domestic demand. The production of non-flat products was 10994 thousand tonnes in 1995-96 which increased steadily thereafter and reached 13900 thousand tonnes in 2002-03. In just one year in 2003-04 it increased massively and the production reached 19229 thousand tonnes. After that also there has been an increase in production of around 2000 thousand tonnes per year. Since exporting these products is often not competitive due to the freight costs it has been used domestically. The high growth rates witnessed by the Indian economy especially after mid-2000s were accompanied by huge increases in infrastructural development. Thus the construction boom that had occurred in the economy lead to higher production and consumption of long or non-flat steel products.

Table 5: Production, Consumption, and Net Exports of Flat Products ('000 Tonnes).

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production	15148	16206	18798	20368	21199	24265	25656
Consumption	14712	15258	16511	18594	21368	25032	28699
Imports	1161	1360	1452	1912	3376	4058	6049
Exports	2266	3956	4272	4149	4002	4489	4341
Imports/Total Consumption (%)	7.89	8.91	8.79	10.28	15.80	16.21	21.08
Exports/Total Production (%)	14.96	24.41	22.73	20.37	18.88	18.50	16.92
Net Exports	1105	2596	2820	2237	626	431	-1708

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09

Figure 6 : Production, Consumption, and Net Exports of Flat Products ('000 Tonnes).



In the case of flat products (Figure 6) the production of steel has been more than consumption from 2000-01 to 2005-06. Thus, there was surplus production which was being exported and hence net exports were positive. From this we can infer flat products in India are produced for export purpose also and are well accepted in the global market. However, the country's steel demand has been growing very rapidly

as a result of which the production has not been able to keep pace with demand and hence the net trade has turned negative in the last two years.

Thus we find that within finished steel it is the flat products that have found external markets while the non-flats are sold in the domestic market. Now we analyze the trend product wise.

2.7.1 NON-FLAT PRODUCTS

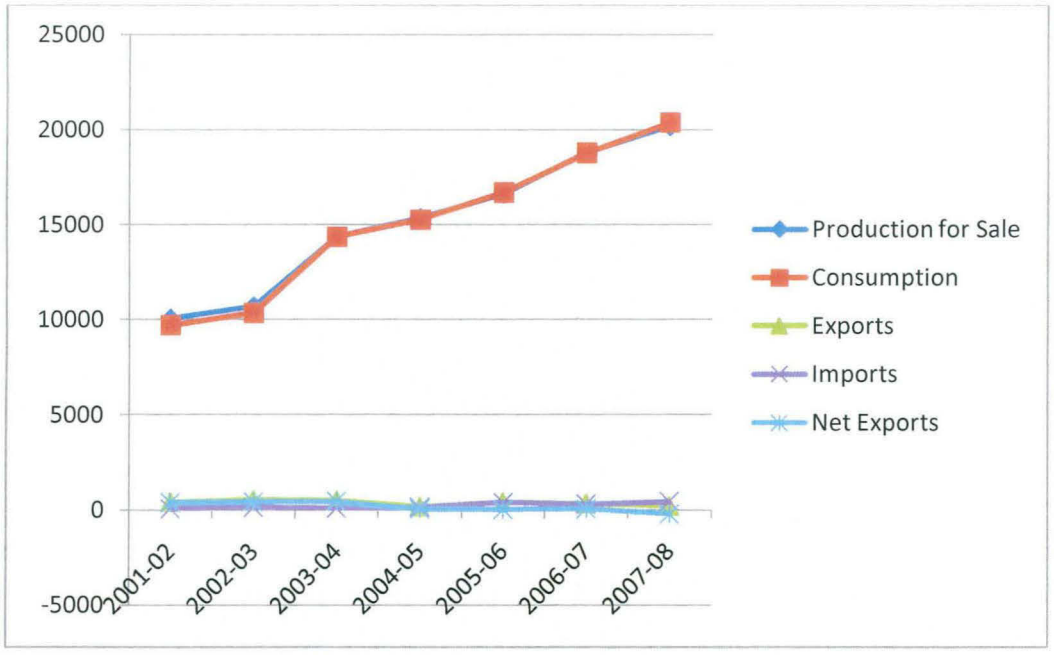
1. BARS AND RODS

Table 6: Production, Consumption and Net Exports of Bars and Rods ('000 Tonnes).

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production for Sale	10037	10676	14356	15347	16636	18811	20188
Consumption	9683	10337	14356	15259	16689	18782	20381
Exports	399.4	514.9	499	162	387	329	213
Imports	35.3	103.1	71	128.6	375	290.1	436.5
Imports/Consumption (%)	0.36	0.97	0.49	0.84	2.25	1.54	2.16
Exports/Production (%)	3.98	4.82	3.48	1.06	2.33	1.75	1.05
Net Exports	364.1	411.8	428	33.4	12	38.9	-223.5

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09.

Figure 7: Production, Consumption and Net Exports of Bars and Rods ('000 Tonnes).



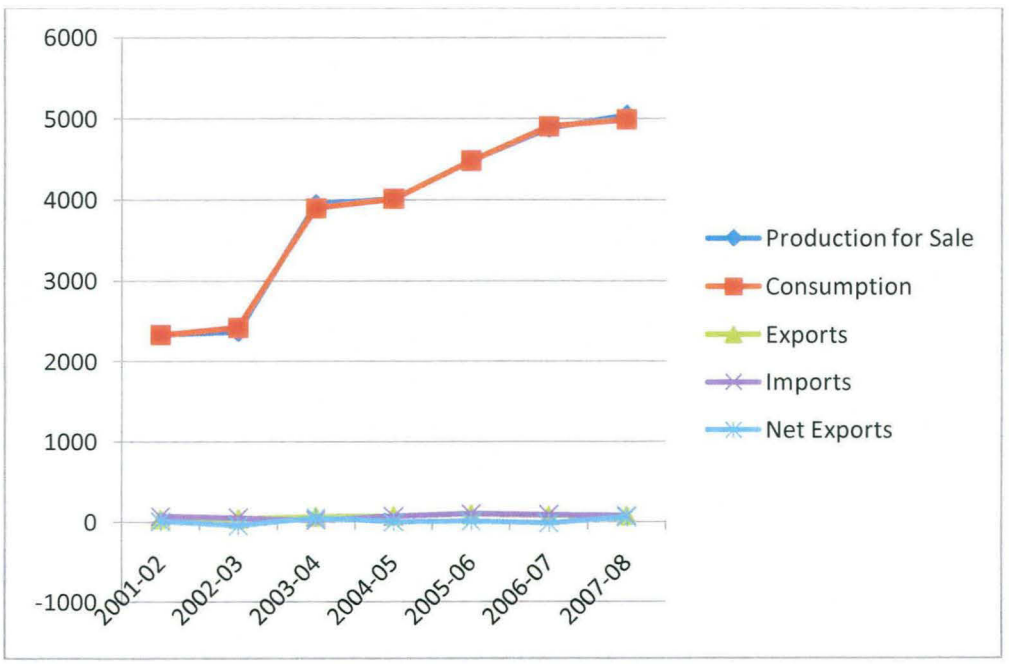
As discussed earlier, in India non-flat products are sold mostly in the domestic market because exporting these products is uncompetitive due to freight costs, hence there is very little trade taking place in these products. From Table 6 we find that in case of bars and rods the domestic production kept pace with the domestic demand till 2004-05. However, after that the domestic consumption has become more than the production which has resulted in increased imports. Thus, the share of imports in total consumption in recent years has increased to around 2 per cent. On the other hand the share of exports in total production which was around 4 per cent in 2000-01, has further been decreasing over the years and stood at 1.05 per cent in 2007-08. Similar is the case with structurals where around 98 per cent of the output is sold in the domestic market. However, in recent years the domestic production has not been able to keep pace with rising consumption as a result net exports are negative for these years.

Table 7: Production, Consumption and Net Exports of Structurals ('000 Tonnes).

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production for Sale	2332	2368	3944	4008	4484	4884	5043
Consumption	2329	2420	3897	4011	4482	4905	4990
Exports	35.2	35	64	70	89.4	75	73
Imports	65.6	47	17.4	66.4	99.1	86.2	75.7
Imports/Consumption (%)	2.82	1.94	0.45	1.66	2.21	1.76	1.52
Exports/Production (%)	1.51	1.48	1.62	1.75	1.99	1.54	1.45
Net Exports	-30.4	-12	46.6	3.6	-9.7	-11.2	-2.7

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09

Figure 8: Production, Consumption and Net Exports of Structurals ('000 Tonnes).



2.7.2 FLAT PRODUCTS

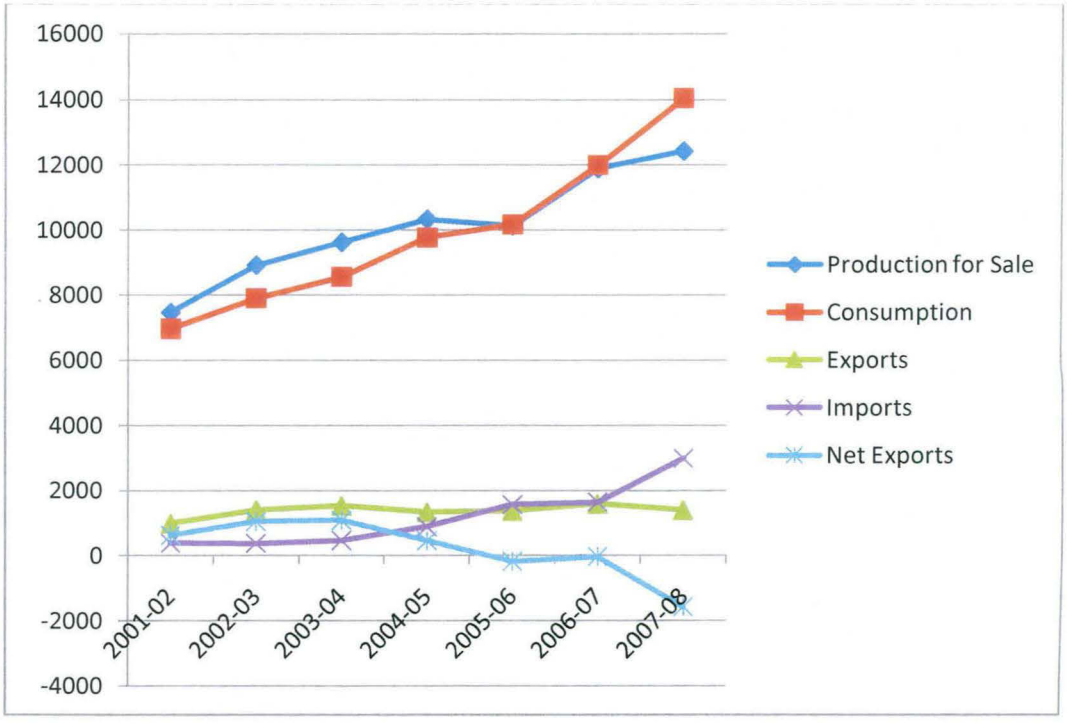
1. HR COILS/SHEETS/SKELP

Table 8: Production, Consumption and Net Exports of HR Coils/Sheets/Skelp ('000 Tonnes).

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production for Sale	7448	8904	9613	10325	10124	11884	12431
Consumption	6950	7890	8554	9768	10162	11993	14033
Exports	979.4	1392.5	1522	1328	1371.1	1580.3	1391
Imports	371.2	360.3	454.3	878.5	1558.3	1628.6	2976.5
Imports/Consumption(%)	5.34	4.57	5.31	8.99	15.33	13.58	21.21
Exports/Production (%)	13.15	15.64	15.83	12.86	13.54	13.30	11.19
Net Exports	608.2	1032.2	1067.7	449.5	-187.2	-48.3	-1585.5

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09.

Figure 9: Production, Consumption and Net Exports of HR Coils/Sheets/Skelp ('000 Tonnes).



The domestic production of HR coils/sheets was more than consumption till 2004-05 as a result we find that the net exports were positive. After that there has been a steep rise in its consumption and the domestic production has not been able to meet this increase. Thus in the period between 2005-06 and 2007-08 India has become a net importer of HR coils/sheets. Exports constitutes around 13-15 per cent of the total production. In 2007-08 it was 11 per cent. The domestic production meets around 85 to 87 per cent of the domestic demand and the rest are imported. Further with growing demand for HR coils in the economy the imports have increased significantly. In recent years the extent of domestic consumption met through imports has increased from 5.34 per cent in 2000-01 to 15 per cent in 2005-06. It stood at 21.21 per cent in 2007-08.

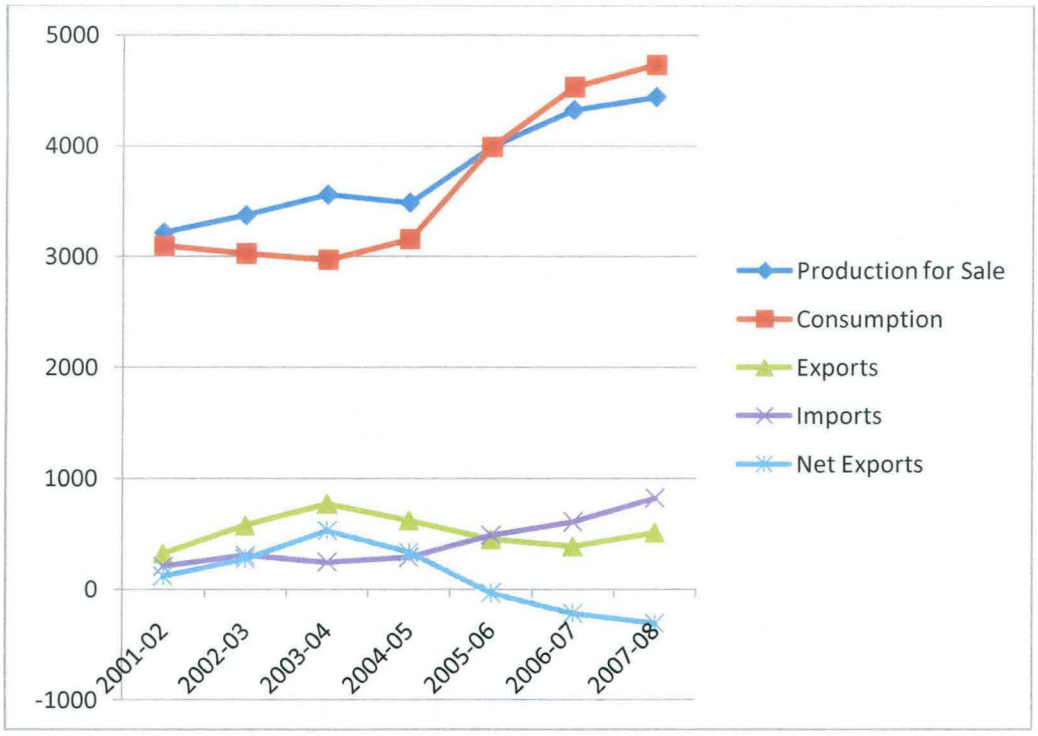
2. CR COILS/SHEETS

Table 9: Production, Consumption and Net Exports of CR Coils/Sheets ('000 Tonnes).

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production for Sale	3214	3370	3557	3485	3989	4322	4439
Consumption	3093	3025	2969	3153	3991	4530	4730
Exports	320.3	574.3	770	620	450.5	386.4	510
Imports	204	302.5	242.9	287.3	487.2	605.8	820.8
Imports/Consumption (%)	6.60	10.00	8.18	9.11	12.21	13.37	17.35
Exports/Production (%)	9.97	17.04	21.65	17.79	11.29	8.94	11.49
Net Exports	116.3	271.8	527.1	332.7	-36.7	-219.4	-310.8

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09

Figure 10: Production, Consumption and Net Exports of CR Coils/Sheets ('000 Tonnes).



The production of CR coils/sheets was more than consumption till 2004-05 and the net exports increased during the period between 2001-02 and 2004-05. However after that net exports have turned negative implying larger imports being undertaken to meet the rising domestic demand. Imports which constituted 7 per cent of total consumption in 2001-02 increased to 17 per cent in 2007-08. The share of exports in total production was 6.89 in 2001-02 and increased to 21.64 per cent in 2003-04. Thereafter it declined over the next three years and reached 8.94 per cent in 2006-07. It stood at 11.48 per cent in 2007-08.

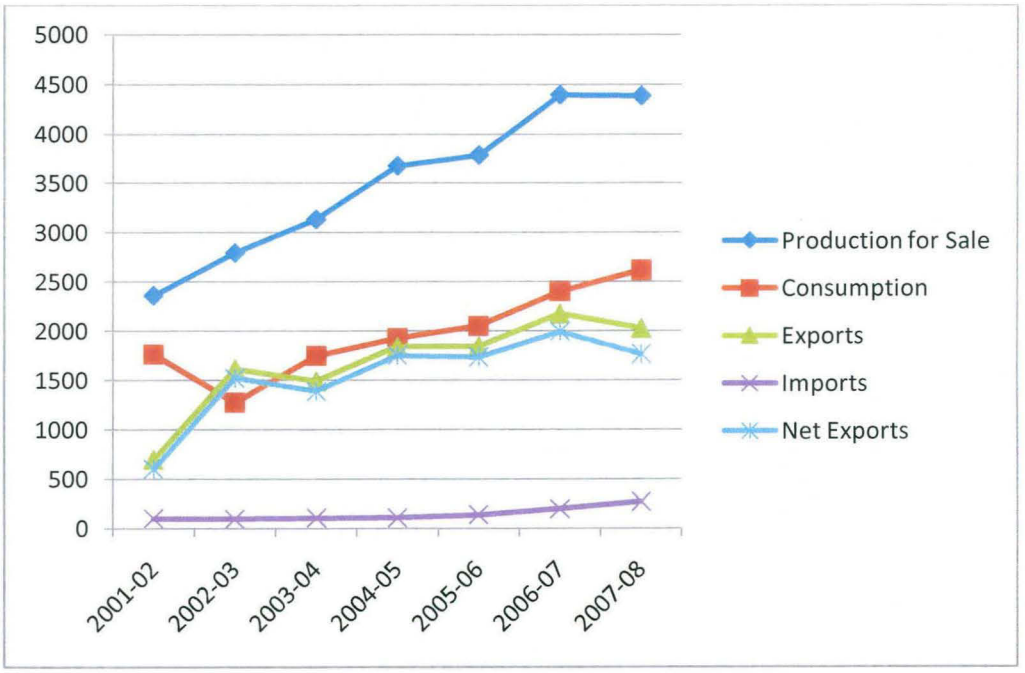
3. GP/GC SHEETS

Table 10: Production, Consumption and Net Exports of GP/GC Sheets ('000 Tonnes)

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production for Sale	2356	2790	3130	3672	3782	4391	4381
Consumption	1758	1272	1746	1926	2051	2400	2617
Exports	694.8	1610	1486	1843	1842.6	2173.3	2026
Imports	96.7	91.9	102.1	105.8	134.1	195.2	268.2
Imports/Consumption (%)	5.50	7.22	5.84	5.49	6.53	8.13	10.24
Exports/Production (%)	29.49	57.70	47.47	50.19	48.72	49.49	46.24
Net Exports	598.1	1518.1	1383.9	1737.2	1708.5	1978.1	1757.8

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09

Figure 11: Production, Consumption and Net Exports of GP/GC Sheets ('000 Tonnes)



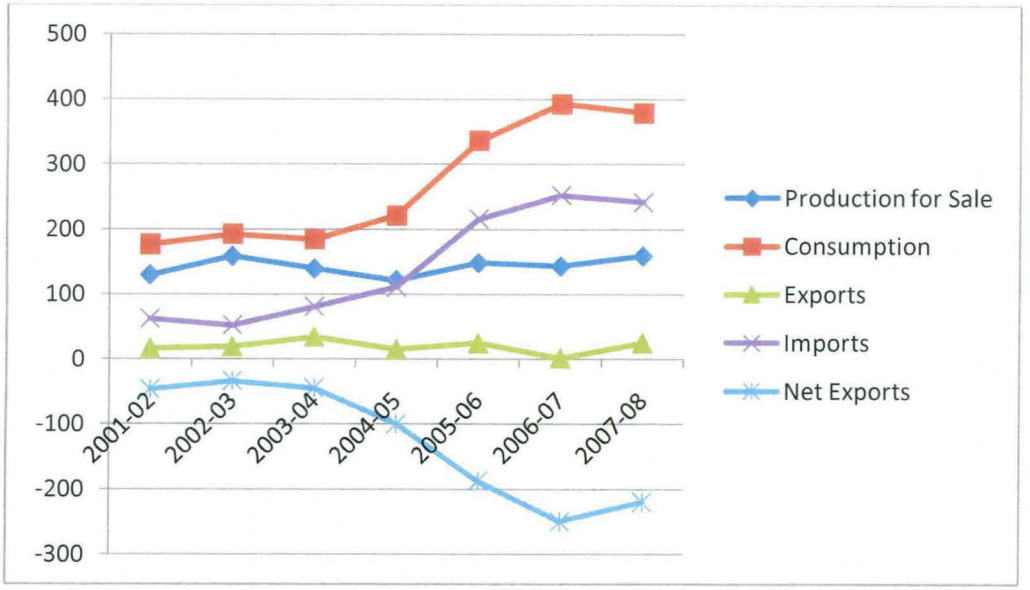
In the case of GP/GC sheets the production has always been more than the domestic demand implying that exports have been a major consideration for production. The share of exports in total production increased rapidly from 29.5 per cent to 50 per cent in 2004-05 pointing to the rising demand for GP/GC sheets in the world. Since 2005-06 there has been slight decline but still more than 45 per cent of total production is exported. Due to a rise in domestic demand there has been slight increase in share of imports in total consumption. All GP/GC sheets in India are produced by the private sector for whom export is a major consideration

Table 11: Production, Consumption and Net Exports of Electric Sheets ('000 Tonnes).

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production for Sale	129	158	139	121	148	143	159
Consumption	176	192	184	221	336	393	379
Exports	16	18.7	34	15	24.4	1.5	25
Imports	61.6	52	80.6	110.8	215.9	252.4	241.9
Imports/Consumption (%)	35	27.08	43.80	50.13	64.25	64.22	63.82
Exports/Production (%)	12.40	11.8	24.46	12.39	16.48	1.048	15.72
Net Exports	-45.6	-33.3	-46.6	-95.8	-191.5	-250.9	-216.9

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09.

Figure 12: Production, Consumption and Net Exports of Electric Sheets ('000 Tonnes).



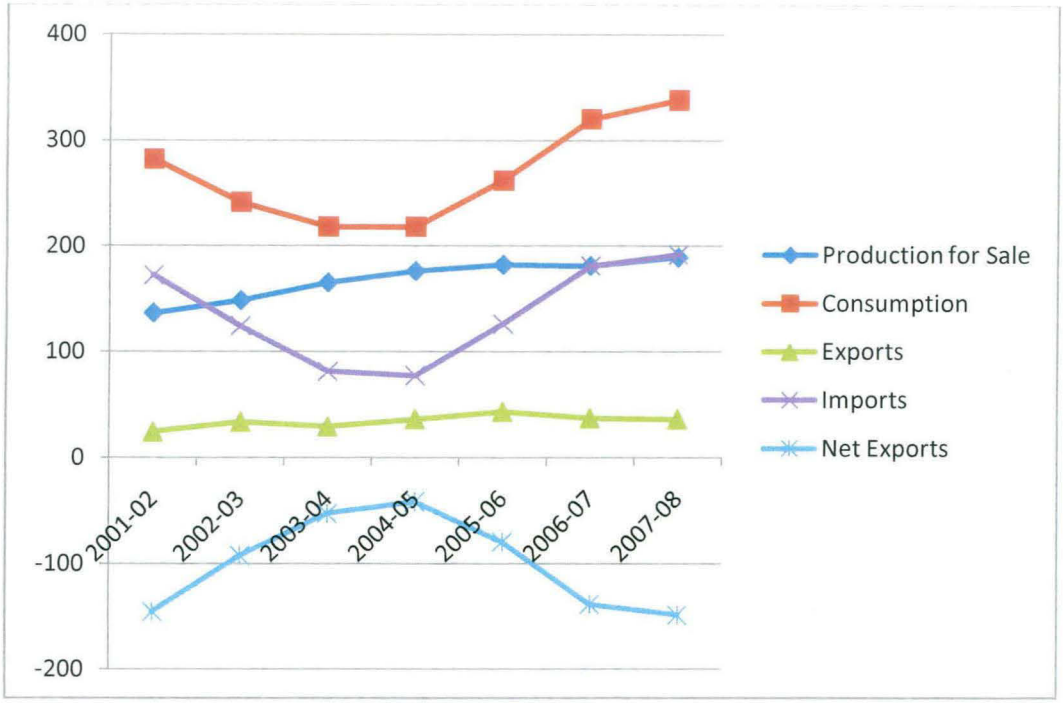
In case of tin plates and electric plates India has been a net importer all through. There is not much demand for these products in the country, it is around 2-3 hundred thousand tonnes. Given the small market for this product there is no large scale production of these items. Therefore these items are mostly imported from abroad. Tin plate imports constitute around 50-60 per cent of total consumption whereas in the case of electric sheets the share of imports in total consumption is rising continuously and is more than 60 per cent due to increasing demand for the product.

Table 12: Production, Consumption and Net Exports of Tin Plates/Tin Free Steel ('000 Tonnes).

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Production for Sale	136	148	165	176	182	181	189
Consumption	282	241	218	218	262	320	338
Exports	24	33.4	29	36	43	37	36
Imports	172	124	81	77	126	181	191.5
Imports/Consumption(%)	60.99	51.45	37.15	35.32	48.09	56.56	56.65
Exports/Production (%)	17.64	22.56	17.57	20.45	23.62	20.44	19.04
Net Exports	-148	-90.6	-52	-41	-83	-144	-155.5

Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09.

Figure 13: Production, Consumption and Net Exports of Tin Plates/Tin Free Steel ('000 Tonnes).



From the above discussion we can identify the following important trends:

1. In the case non-flat products i.e. bars and rods and structurals the production is mostly for the purpose of meeting domestic demand and very little trade takes place in these products. Thus the changes in domestic demand affect the production of non-flats directly. Imports are undertaken only when domestic production is not able to meet the demand. On the other hand apart from meeting domestic consumption requirements, flat products are produced for exports purposes as well. However, there are different trends for different products within the flat steel category.

2. In the case of HR coils/sheets and CR coils/sheets there is a strong correlation between the growth in domestic consumption and net export levels i.e. exports and imports are seen to respond to increases or decreases in domestic demand. From the earlier discussion it can be seen that with higher consumption growth since mid-2000 the net exports level of HR coils/sheets and CR coils/sheets

have decreased while before mid-2000 the net exports level were higher because the consumption growth was lower.

3. GP/GC sheets are produced for domestic consumption as well as for exports purposes. Major part of the production is exported and imports are very little and hence the net exports levels have been positive and very large all through the years considered.

4. In the case of products like tin plates and electric sheets, domestic demand is very small. Since the domestic market is very small it is not viable technologically and economically on scale considerations to produce those products domestically and hence the demand is met mostly through imports. Thus in these products the net exports have always been negative.

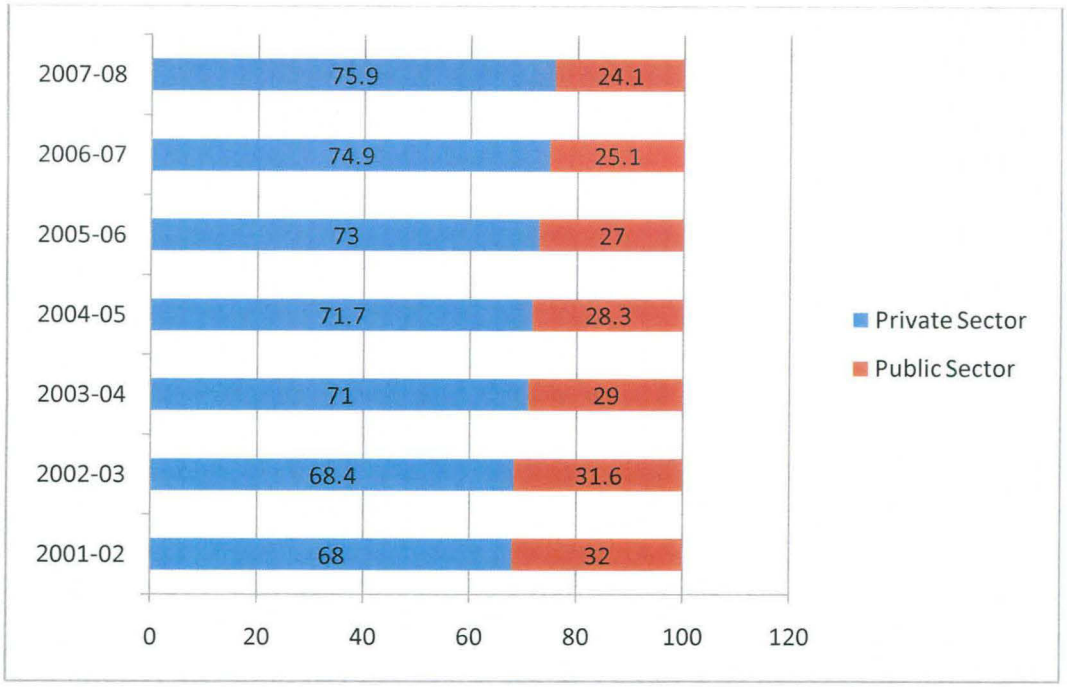
2.8 CHANGES IN THE STEEL INDUSTRY AFTER LIBERALISATION

After liberalisation the Indian iron and steel industry underwent several changes. Some of these notable changes are as follows:

2.8.1 STRUCTURE OF OWNERSHIP

Post-deregulation the Indian steel industry has seen significant changes in structure in terms of ownership. Liberalisation eased the way for entry of the private sector into the steel industry and as a result over the years the private sector has been contributing significantly to the production of finished steel. The share of the private sector in total finished steel production has been rising while that of the public sector has been declining. The private sector accounted for 68 per cent of the total production in 2001-02 which increased to 77.8 per cent by 2008-09. SAIL, a major public sector undertaking is the largest producer of steel in the country accounting for 17 per cent of total production followed by TSL and RINL with 8 per cent and 5 per cent share respectively.

Figure 14: Share of Private Sector and Public Sector in Total Finished Steel Production (in per cent)



Source: Joint Plant Committee, Annual Statistics 2001-02 to 2005-06 and Annual Statistics 2008-09.

2.8.2 PRICING TRENDS

With the deregulation of prices for integrated steel plants in 1991-92, the domestic prices of iron and steel have been market-determined ever since. Market prices remain closely related to international prices. An important feature of the de-regulated era is that the prices of both finished steel and its inputs have risen at a much faster rate and with a lot of volatility compared to the past. There was significant slump in prices during the period 1998-99 to 2001-02, in line with the global trend resulting from a series of financial meltdowns in various parts of the world which adversely affected the profitability of domestic steel firms. Steel prices have seen an upsurge from 2002 onwards as result of growing demand for steel in the world. The main policy instrument available to influence prices is the adjustment of the customs and excise structure. In a bid to curb domestic price rise and to offer user industries greater access to imported materials government has been reducing customs duty rates sharply in quick succession. Progressive reduction of customs duty rates has over the

years reduced the margin between landed costs of imports and domestic market prices.

Table 13: Wholesale Price Index of Indian Iron and Steel

Year	WPI
1990-91	94.86
1991-92	91.85
1992-93	92.09
1993-94	100
1994-95	106
1995-96	116.6
1996-97	124.1
1997-98	129.8
1998-99	132.8
1999-00	134.5
2000-01	136.8
2001-02	136.6
2002-03	143.5
2003-04	181.1
2004-05	232.9
2005-06	250.1
2006-07	254.4
2007-08	278.1

Source: GOI (2008) (Base Year: 1993-94-100)

2.8.3 EXPORTS BY THE PRIVATE SECTOR

The major portion of exports is undertaken by the private sector. The share of the private sector in total finished steel exports increased from 80 per cent in 2003-04 to 97 percent in 2008-09. The private sector steel export is dominated by GP/GC sheets followed by HR coils/sheets and CR coils/sheets. They also export some amount of tin plates, pipes, electric sheets, bars and rods and structurals. Exports

by the public sector include some amount of plates and bars and roads and HR coils/sheets. Exports in other items are very little.

2.8.4 CHANGES IN TECHNOLOGY

Technology up gradation in the Indian steel industry was relatively slow in the pre-liberalisation period. The production of iron and steel was mostly through the BF/BOF route. However, after liberalisation the private sector brought with it new production technologies. This brought about a significant change in the route-wise composition of the Indian steel industry. Capacities created in the aftermath of deregulation have been based on technologies as diverse as COREX (JSW Steel Ltd.), large-scale hybrid technologies combining Electric Steel making with BF hot metal with downstream rolling of flat products (Ispat Industries Ltd.) and large-scale integrated DRI-EAF-Flat products rolling capacities (Essar Steel Ltd.) etc. Today the integrated steel plants in the primary sector are involved in making iron and steel through BF/BOF route while the secondary sector which consists of firms in the private sector use the electric route of EAF and EIF. From the table below we find that the production through EAF and EIF routes has been increasing over the years. The combined production through these routes has become more than that by oxygen route.

Table 14: Production of Crude Steel by Route ('000 Tonnes)

	2003-04	2004-05	2005-06	2006-07	2007-08
Oxygen Route	21924	22250	24398	25394	25966
Electric Arc Furnace	6326	7994	8569	10033	10958
Induction Arc Furnace	10477	13193	13493	15390	16933

Source: Indian Minerals Year Book, 2008, Ministry of Mines, GOI

2.8.5 RAW MATERIAL SCENARIO

India is blessed with large reserves of iron ore, which takes care of a major part of Indian steel industry's raw material requirement but has very little reserves of high quality coking coal. Thus India has self sufficiency in iron ore but for coking coal it has to mainly rely on imports. One striking feature of Indian iron ore sector is that more than 50 per cent of iron ore production has been diverted to exports. Steel is a raw material intensive industry and iron ore provides the competitive advantage to it. India's vast but limited natural resources would require to be conserved for meeting the rapidly growing domestic demand. The next chapter delves into this situation of exports of iron ore and analyses the implications of such exports in the context of steel industry and looks into the issue of sustainability of such exports.

CHAPTER 3

Iron Ore Exports from India and its Impact on the Domestic Steel Industry

3.1 INTRODUCTION

India is one of the few countries endowed with some of the richest iron ore deposits in the world. The competitive strength of the Indian iron and steel industry largely depends on the availability of this iron ore. But the ore not only supports domestic production but is also exported. Based on GDP projections, the Ministry of Steel has set a target of 200 million tonnes of steel production by 2020 and 500 million tonnes by 2050. The availability of iron ore on long term basis is critical for meeting such a target which in turn will depend on government policies related to iron ore exports.

India has been a traditional exporter of iron ore in the world market, but since the early 2000s there has been a massive jump in such exports. Countries like China continue to follow and implement a strict policy of conservation of its natural resources like coking coal which is another important raw material for steel production. But in India, exports of iron ore have continued and in fact have expanded substantially in the last few years. Given the finite nature of iron ore reserves such huge exports will have large implications for the domestic iron and steel industry in the long run. Thus this chapter seeks to analyze iron ore exports in the context of the domestic iron and steel industry.

This chapter is divided into the following sections: section two examines the reasons behind the increase in iron ore exports from India. In order to provide a clear picture of overall the iron ore scenario in the country, section three examines in detail the structure of production, consumption and export of iron ore while section four examines and analyzes the impact of such huge exports on the Indian steel industry. Section five delves into the debate on whether iron ore exports should be continued or argument that iron ore exports should be restricted/ banned. Section six concludes the chapter.

3.2 REASONS FOR RISING IRON ORE EXPORTS

Before the 1990s, the mining industry in India did not attract sufficient investment. In order to infuse funds, technology and managerial expertise in this sector, the Indian government opened up the mining sector to the private sector and foreign direct investment in the New Mineral Policy, 1993. However, the iron ore mining industry did not attract much investment till the beginning of the current decade. From the mid 1990s till the beginning of the current decade the iron ore mining industry worldwide faced a severe crisis. This was mainly on account of low iron ore prices during this period resulting from sluggish demand due to the stagnation of the steel industry worldwide. Further due to strong forecasts made for steel demand, mining capacity had been significantly increased in the earlier period. However, with the steel market not meeting those expectations, the mining industry developed excess capacity everywhere and mining companies were going bankrupt. This facilitated the restructuring of this sector through consolidation, which occurred precisely when the steel industry started picking up. The immediate rise in steel demand could be met from the existing surplus capacity in the industry. Thereafter, the rise in iron ore demand from the steel industry worldwide, driven in particular by demand from China, was so high that the global iron ore capacity came under tremendous pressure. Thus the worldwide boom in the steel industry led to huge increases in the prices of iron ore, making iron ore mining an attractive activity.

With the upturn in the steel industry and the growing worldwide demand for iron ore, unprecedented opportunities for Indian iron ore companies were created. This made iron ore mining attractive in India for three reasons. First, India had huge reserves of unexplored and untapped iron ore. Second, India had the advantage of being located near to China, which was the principal source of increased demand. And, third, the ground had already been set for new investment in India with the introduction of the New Mineral Policy 1993, which allowed entry of private and foreign players into this sector. Thus the very activity which was unprofitable before suddenly turned lucrative, encouraging new investments. Exports which were unattractive before the boom became the magnet for the entry of private and foreign players into this sector. Thus exports became the sole consideration for many of the players who entered this sector.

The export of iron ore is not a recent phenomenon in India. The National Mineral Development Corporation (NDMC) and other government companies were earlier engaged in exports, principally because it was seen as an easy way to earn then scarce foreign exchange. However, it was only after the steel boom that exports turned extremely attractive resulting in existing mines making new investments and investors entering a large number of new mining areas. During the period between 2001-02 and 2005-06, out of the 1952 total mining leases granted by the government, only 28 were for iron ore. In terms of area, out of 40,944 hectares, iron ore mining leases were granted only for 892 hectares. Bulk of the leases was granted from the year 2005-06[8] . This is because initially the demand was met through the existing surplus capacity in this sector. In 2007-08, there were 300 reporting iron ore mines. Among them 35 mines were in the public sector and 265 in the private sector[9].

Table 15: Iron Ore Production by Sectors (in Million Tonnes)

Year	Public Sector	Private Sector	Total
1999-00	41.35 (55.18)	33.58 (44.81)	74.94 (100)
2000-01	43.49 (53.85)	37.27 (46.15)	80.76 (100)
2001-02	45.1 (52.30)	41.13 (47.70)	86.23 (100)
2002-03	49.69 (50.16)	49.38 (49.84)	99.07 (100)
2003-04	57.54 (46.84)	65.3 (53.16)	122.84 (100)
2004-05	57.03 (39.08)	88.91 (60.92)	145.94 (100)
2005-06	61.22 (37.05)	91.04 (62.95)	165.23 (100)
2006-07	60.4 (33.39)	120.5 (66.61)	180.9 (100)
2007-08	66.08 (32)	140.42 (68)	206.5 (100)

Source: Indian Bureau of Mines, Nagpur

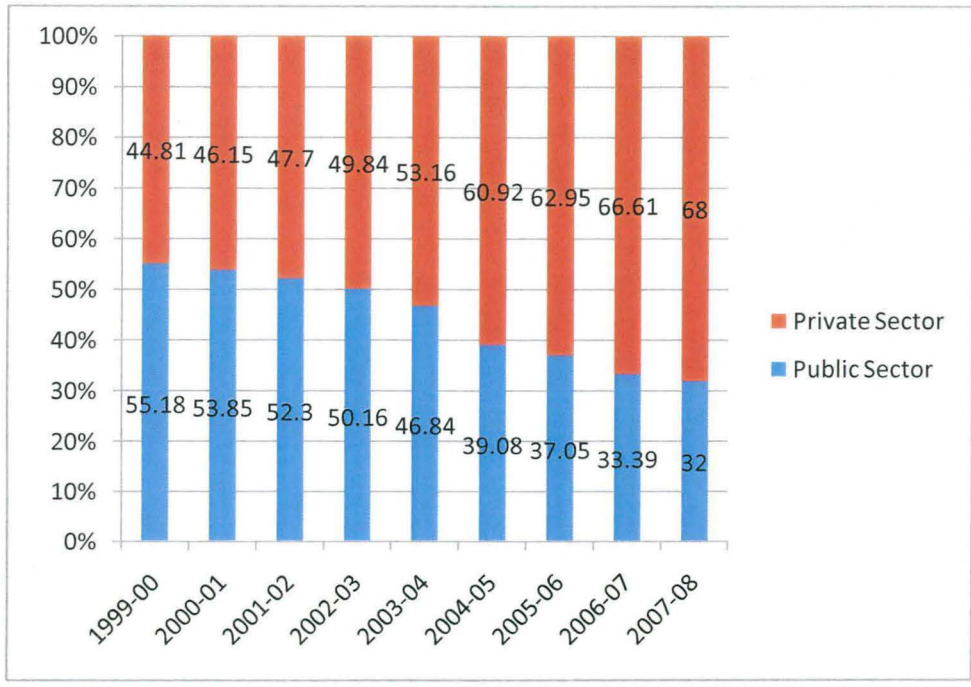
Note: Figures in parenthesis indicate the percentage to the total production.

[8] Report of the Working Group on Minerals, 11tn Five Year Plan
[9] Indian Minerals Year Book 2008, Indian Bureau of Mines, Nagpur

As mining became attractive the production of iron ore in the country increased. Iron ore production, which stood at 57.5 million tonnes in 1992-93, increased gradually to reach 74.9 million tonnes in 1999-00 and thereafter grew rapidly to reach 122.84 million tonnes in 2004-05 and 206.5 million tonnes in 2007-08.

Looking at production by sector, we find that private sector production has increased more rapidly than public sector production. Total private sector production was 33.58 million tonnes in 1999-00 and increased gradually till 2003-04 after which it rose rapidly to 65.3 million tonnes in 2004-05 and further to 140.42 million tonnes in 2007-08. On the other hand growth in public sector production has been very slow compared to private sector, increasing from 41.35 million tonnes in 1999-00 to 66.08 million tonnes in 2007-08.

Figure 15: Iron Ore Production by Sectors (Per Cent)

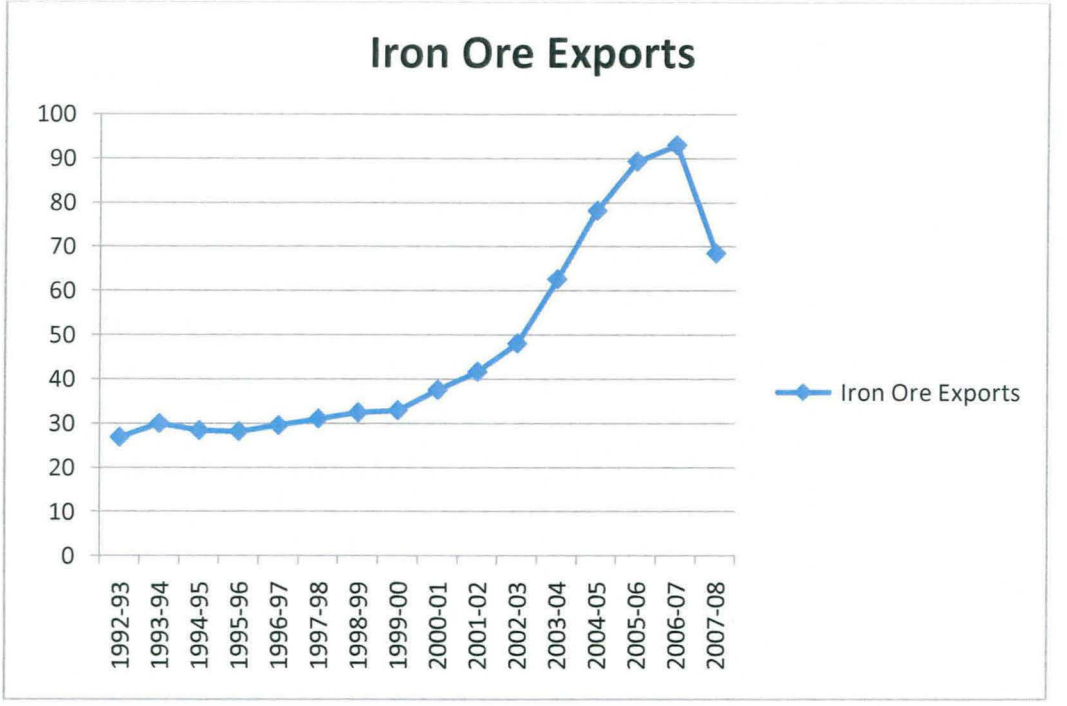


Source: Indian Bureau of Mines, Nagpur.

As a result, the share of the public sector in total production has declined over the years while that of the private sector has increased. The public sector contributed 55.18 per cent of the total production of iron ore in 1999-00, which decreased over the years to reach 33.39 per cent in 2006-07. On the other hand the share of private sector has increased rapidly from 44.81 per cent in 1999-00 to 66.61 per cent in 2006-07. From this it can be inferred that the new investments in the mining sector, especially

after 2003-04, which brought about the increase in production of iron ore in India has been mostly on account of the private sector.

Figure 16: Iron Ore Exports from India (in million tonnes)



Source: Indian Bureau of Mines, Nagpur

From Figure 2 it can be seen that India has been a traditional exporter of iron ore. All through the 1990s exports increased marginally every year from 26.8 million tonnes to 32.91 million tonnes in 1999-00. From 2000-01, export growth picked up and increased even more rapidly after 2003-04. Exports increased from 37.49 million tonnes to 93 million tonnes in 2006-07. There was a decline in exports in 2007-08 because of a hike in export duty to Rs 300 per tonne imposed by the government.

Table 16: Exports, Production, and Export Ratio of Iron ore (in Million Tonnes)

Year	Exports	Production	Export Ratio (%)
2000-01	37.49	80.76	46.42
2001-02	41.64	86.23	48.29
2002-03	48.02	99.07	48.47
2003-04	62.57	122.84	50.94
2004-05	78.15	145.94	53.55
2005-06	89.28	165.23	54.03
2006-07	93	180.9	51.41
2007-08	68.47	206.5	33.16

Source: Indian Bureau of Mines, Nagpur

From Table 16 it can be seen that the bulk of the production increase seems to have been triggered by rising exports. The export ratio has been increasing over the years. Since 2003-04 more than 50 per cent of total production is being exported excepting for 2006-07.

3.3 IRON ORE EXPORTS: IMPLICATIONS FOR INDIAN IRON AND STEEL INDUSTRY

In order to analyze and examine the impact of iron ore exports on the domestic steel industry, it is imperative to look in detail at the structures of production, consumption and exports of iron ore in India. Hematite and magnetite are the two important ores from which iron is extracted. Hematite iron ores are extracted in the form of fines, lumps and concentrates of different grades i.e. high grade (Fe +65%), medium grade (Fe 62-65 %) and low grade (Fe below 62%).The various grades of magnetite are metallurgical, coal washery, foundry and others.

3.1.TRENDS IN IRON ORE PRODUCTION

Table 17: Grade-wise Production of Iron Ore (In Million Tonnes)

YEAR	LUMPS	FINES	CONCENTRATES	TOTAL
2000-01	33.57	41.18	6.06	80.7
2001-02	34.57	45.2	6.43	86.2
2002-03	39.58	67.05	6.13	99.07
2003-04	48.96	67.68	6.2	122.84
2004-05	58.15	82.54	5.25	145.94
2005-06	68.3	93.3	3.6	165.23
2006-07	88.31	98.24	11.46	187.7
2007-08	97.01	114.02	5.26	206.5

Source: Indian Bureau of Mines, Nagpur

The iron ore production in India is mostly in the form of lumps and fines. Fines constitute more than 50 per cent of total iron ore production while lumps constitute around 40 per cent. The production of both fines and lumps has increased during the period between 2000-01 and 2007-08. The production of fines increased from 41.18 million tonnes in 2000-01 to 114.87 million tonnes in 2007-08 while the production of lumps increased from 33.57 million tonnes to 97.85 million tonnes in 2007-08. The increase in production of fines is mostly for export while the increase in production of lumps has been mainly to serve the increase in domestic demand, especially from sponge iron industry.

3.2.TREND IN IRON ORE EXPORTS

Table 18: Composition of Iron Ore Exports

	LUMPS	FINES	TOTAL
2003-04	13.45 (21.50)	49.12 (78.50)	62.57 (100)
2004-05	13.54 (17.33)	64.60 (82.67)	78.14 (100)
2005-06	14.3 (16.01)	74.97 (83.99)	89.27 (100)
2006-07	23.47 (25.67)	67.94 (74.30)	91.43 (100)
2007-08	17.65 (25.78)	50.82 (74.22)	68.47 (100)

Source: Indian Bureau of Mines, Nagpur

Note: Figures in parenthesis indicate the percentage to the total exports

Table 18 reveals the composition of exports. It can be seen that the major chunk of exports consists of iron ore fines. In 2003-04 around 13.45 million tonnes of lumps were exported, which increased to 23.47 million tonnes in 2006-07. On the other hand, the exports of fines which amounted to 49.12 million tonnes in 2003-04 increased to 67.94 million tonnes in 2006-07. However, in 2007-08 the exports of both lumps and fines declined slightly. The share of iron ore fines in total exports is more than 70 per cent. It was 78 per cent in 2003-04 and 82.67 and 84 per cent in 2004-05 and 2005-06 respectively. It stood at 74 per cent in 2007-08.

Table 19: Grade-wise Exports of Iron Ore in 2004-05 (In Million Tonnes)

Year	High Grade (Fe +65%)	Medium Grade (Fe +62-65%)	Low Grade (Fe <62%)	Total
2004-05	20.15 (25.78)	34.23 (43.80)	23.77 (30.42)	78.15 (100)

Source: Indian Bureau of Mines, Nagpur

Note: Figures in parenthesis indicate the percentage to the total exports

Exports consist mostly of medium and low grade iron ores (Table 19). In 2004-05, of the total exports, high grade ore constituted 25.78 per cent, and medium and lower grades constituted 43.8 per cent and 30.42 per cent respectively. In India, as per the existing policy, the ores with 65 per cent plus Fe have to be exported through a canalizing agency and therefore, the entire export of high grade ores must have been routed through the government-owned canalizing agency, Metals and Minerals Trading Corporation (MMTC). Therefore, merchant exports which involve largely medium and low grade ores with Fe content below 65 per cent accounted for 74.2 per cent of iron ore exports of the country in 2004-05.

3.4 TRENDS IN IRON ORE CONSUMPTION

Iron ore is consumed either directly in the form of lumps or as agglomerates. Agglomerates can be either pellets or sinters. Fines are used in the making of pellets or sinters. Sintering is done near the steel plants, whereas pelletisation is undertaken separately as it involves substantial cost. An economic size pellet plant of 1 million tonne costs about Rs 400-500 crore[10] which is beyond the capacity of stand-alone captive mines. The nature of demand for iron ore depends on the technology used in steel or iron making. Lumps are consumed in blast furnaces, sponge iron plants and Corex plants with or without agglomerates. Sinters are used in blast furnaces only, whereas pellets can be used anywhere.

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In the past steel producers paid very little attention to the use of fines because the steel plants were set up when resources were scarce; therefore they adopted technologies that would reduce their immediate capital costs. The steel plants had no incentive to invest in sinter plants to convert fines into sinters since in the process of mining both lumps and fines would be extracted and the lumps generated had to be used up in any case. Thus the percentage of lumps in total consumption of iron ore in India was much higher than global standards. However, in the last few years the steel plants have been setting up sinter and pellet plants as a result of which the consumption of fines has been increasing in the country (Table 30)

2.2 IMPACT OF IRON ORE EXPORTS ON STEEL INDUSTRY

Having discussed the trends in exports, production and consumption structures of iron ore in India we now turn to the implications of such iron ore exports for the iron and steel industry.

3.5.1 IRON ORE RESERVES POSITION

The steel industry is a raw material intensive industry and its competitive advantages are defined primarily by the cost of raw materials and energy, and then by that of other factors such as labour and managerial inputs, infrastructure and capital. The competitive strength of the Indian steel industry is derived to a large extent from its access to cheap iron ore. Therefore, it is important to analyze whether the country has sufficient reserves of iron ore to meet the long term requirements of the steel industry.

Table 20: Haematite Ore Availability as on 1.4.2005 (in Million Tonnes)

Grade	Reserves	Remaining Resources	Total
High Grade (Fe +65%)	1304.3	629.03	1933.33
Medium Grade (Fe 62-65%)	3544.03	3062.02	6606.05
Low Grade (Fe below 62%)	1989.75	1686.94	3676.69
Unclassified	159.23	743.67	902.9
Black Iron Ore	2.52	12.72	15.24
Others	1.62	5.05	6.67
Unclassified	1.98	0	1.98
Not-known	0.73	1486.79	1487.52
Grand Total	7004.17	7626.22	14630.39

Source: Indian Bureau of Mines, Nagpur

Table 21: Magnetite Ore Availability as on 1.4.2005 (in Million Tonnes)

Grade	Reserves	Remaining Resources	Total
Metallurgical	687	2185.05	2185.74
Coal Washery	3.33	5	8.33
Foundry	0.46	0.3	0.76
Others	0.97	24.16	25.13
Unclassified	52.64	8060.34	8112.98
Not Known	0.43	286.12	286.55
Grand-Total	58.5	10560.98	10619.48

Source: Indian Bureau of Mines, Nagpur

Hematite and magnetite are the most important iron ores in India. About 60% hematite ore deposits are found in the eastern sector. About 87% magnetite ore deposits occur in the southern sector, especially in Karnataka. Of these, hematite is considered to be superior because of its high grade. As per the United Nations Framework Classification (UNFC) system, the total resources of hematite as on 1.4.2005 are estimated at 14,630 million tonnes of which 7,004 million tonnes are under reserves category and 7,626 million tonnes under 'remaining resources'

category. Magnetite is another principal iron ore that also occurs in the form of an oxide, either in igneous or metamorphosed banded magnetite-silica formation, possibly of sedimentary origin. As per the UNFC system, the total resources of magnetite as on 1.4.2005 are estimated at 10,619 million tonnes of which reserves are merely 58 million tonnes while 10,561 million tonnes are remaining resources. Only 20% of the resources are of metallurgical grade while 79% resources are of unclassified, not known and other grades[11].

A high level committee under the Chairmanship of Shri Anwarul Hoda was set up by the government to look into various aspects of the minerals industries including iron ore. The committee on the basis of the iron ore reserves position of 2004 estimated that iron ore reserves would be enough for the country for the entire 21st century on the following basis:

"The demand for iron ore is a function of the demand for steel. The thumb-rule for ratio of iron ore to steel is 1.6:1. The world produces 1 billion tonnes of steel a year, for which it needs 1.6 billion tonnes of iron ore. The world's iron ore reserves are estimated to be 370 billion tonnes. So even ignoring the aspect of new finds, the world has resources for 230 years at current levels of production. Similarly, according to the National Steel Policy document, India produced 35 million tonnes of steel, for which it needed 54 million tonnes of iron ore. At 110 million tonnes of steel as envisioned by the Ministry of Steel for 2020, India will need 176 million tonnes of iron ore every year for the local industry. At the 2004–05 rate of production of 142 million tonnes per annum, the depletion of iron ore reserves would be about 2 billion tonnes until 2020, leaving a balance of 21.58 billion tonnes. If the domestic production grows and the exports also rise to 100 million tonnes by that year the level of resources would be about 21 billion tonnes in 2020. On the basis of these estimates, the annual depletion of reserves would be 276 million tonnes beyond 2020. At this rate, in 2020, India would have enough"[12].

[11] Indian Minerals Year Book 2008, Indian Bureau of Mines, Nagpur.
[12] National Mineral Policy, Report of the High Level Committee, 2006.

The committee's estimates are based on the steel production and iron ore consumption situation in 2004-05. However, the steel production and iron ore exports scenario changed significantly after 2004-05 with both increasing speedily. On the basis of this, the Ministry of Steel has changed its steel production forecast to 124 million tonnes by 2011-12 and 180 million tonnes by 2020 and further to 500 million tonnes by 2050. Using a method similar to that followed by the Hoda Committee, we can estimate how long the iron ore reserves of the country will last on the basis of the iron ore and steel production in 2006-07. UNFC's estimates of 25,249 million tonnes of iron ore reserves as on 1.04.2005 is taken as against the 2004 reserves of 23,580 million tonnes taken by Hoda Committee. At the 2006-07 rate of iron ore production of 180 million tonnes, the depletion of iron ore reserves would be 720 million tonnes till 2011-12. Thereafter, at the rate of 124 million tonnes of steel production envisioned, India will need 198 million tonnes of iron ore every year for the local industry given the 1.6:1 ratio of iron ore to steel. Assuming exports to remain at 100 million tonnes every year, then 298 million tonnes of iron ore will be required every year till 2020 i.e. 2980 million tonnes of iron ore will be depleted. At the rate of 180 million tonnes of steel production, 288 tonnes of iron ore will be required and adding to this 100 million tonnes of exports will give 388 million tonnes of iron ore that will be depleted every year after 2020. From 2020 to 2050, 11640 million tonnes of iron ore will be depleted. With steel production reaching 500 million tonnes and 100 million tonnes of exports, 900 million tonnes of iron ore will be required every year after 2050 so the remaining 9909 million tonnes of iron ores will be depleted within 11 years. On the basis of this estimate the iron ore will be exhausted by 2060.

However, this estimate also highly over estimates the period of exhaustion as the entire known reserves will not be available for mining. This is because firstly, in the above estimate we have considered both the haematite and magnetite reserves. The magnetite ores are not currently preferred by Indian steel makers and moreover, the entire magnetite resource is presently not available for extraction because of the ban imposed by the Supreme Court for reasons of environmental protection.[13] Secondly, the country's high quality reserves are limited (Table 22). Of the 7004.17 Million tonnes of hematite reserves only about 1304 million tonnes belong to the 65% plus Fe

[13] Report of the Working Group on Steel Industry for the Eleventh Five Year Plan .

grade. Given the strong demand for these both from the domestic steel and Direct Reduced Iron (DRI) industries and for exports, these 65 % plus reserves are expected to be depleted in less than 15 years[14].Thirdly, unlike the common belief that more exploratory efforts can increase the iron ore reserves as has happened in the past, the extraction of iron ore will be difficult due to hindrances on account of environmental, ecological and forest concerns, since most of the iron ore reserves are in thick forest and ecologically sensitive areas. Further land acquisition is another major issue. With rising worldwide environment and livelihood concerns for the tribal people inhabiting these areas, there will be limits to the access to such mining areas. Thus even though the country has 25 billion tonnes of reserves, the exploitable reserves will be much less on account of the above factors.

Table 22: Grade-wise Share of Reserves As on 1.4.2005

Grade	Approx % Share Recoverable Reserve
High Grade (Fe +65%)	18.6
Medium Grade (Fe 62-65%)	50.6
Low Grade (Fe below 62%)	28.4
Others	2.4

Source: Indian Bureau of Mines, Nagpur

Apart from the huge amount of legal exports, there is large amount of illegal exports that is taking place from the country. The magnitude of illegal exports taking place from the country can be inferred from the amount of illegal exports taking place from the state of Karnataka (Table 23). The Chief Minister of Karnataka made a statement on the floor of the Karnataka Assembly on 9.7.2010 regarding the extent of iron ore being transported and exported illegally. The year-wise details of the iron ore for which permits were granted, the total quantity exported and the quantity illegally exported without any permit, as stated by Chief Minister, Karnataka, are given in Table 9[15]:

[14] Ibid

[15] Report (interim) of the Central Empowered Committee in Writ Petition(civil) no. 562 of 2009 filed by Samaj Parivartana Samudaya and others regarding illegal mining and other related activities in forest areas of Karnataka.

Table 23: Permitted Exports, Actual Exports and Illegal Exports of Iron Ore from Karnataka

Year	Permitted	Exported	Difference or Illegally Exported
2003-04	25,27,001(55.21)	45,76,964 (100)	20,49,963 (44.79)
2004-05	64,51,665(55.18)	1,16,91,183(100)	52,39,518 (44.82)
2005-06	92,99,600(81.07)	1,14,71,092 (100)	21,71,492 (18.93)
2006-07	60,55,833(56.07)	1,08,00,478 (100)	47,44,645(43.93)
2007-08	89,73,490(60.90)	1,47,34,538(100)	57,61,048(39.10)
2008-09	76,64,125(69.29)	1,10,60,251(100)	33,96,126(30.71)
2009-10	60,71,482(46)	1,31,99,419(100)	71,27,937(54)
Total	4,70,43,196(60.67)	7,75,33,925(100)	3,04,90,729(39.33)

Source: Report (interim) of the Central Empowered Committee

Note: Figures in parenthesis indicate the percentage to the total exports

From Table 23 we find that the total quantity of exports has been more than the permits granted for exports. What is striking is that the total quantity that is illegally exported without any permit has been very high. During the period between 2003-04 and 2009-10, the share of illegal exports from Karnataka has been 39.33 per cent i.e. 304.91 lakh metric tonnes. The illegal exports as a proportion of legal exports have been in the range of around 40 to 80 per cent (except in 2005-06 when it was 23 per cent). However, in 2009-10 the illegal exports have exceeded legal exports.

If these illegal exports are also taken into consideration while estimating the total life span of iron ore reserves of the country, then the period of depletion of these resources will be very short. It is therefore crucial to conserve the valuable resource by allowing it to be used within the country rather than exporting it. If exports both legal and illegal continue at the present rate, Indian steel industry will be forced to purchase iron ore from the international markets at exorbitant rates very soon.

3.5.2 GAP IN DEMAND AND SUPPLY OF STEEL

Domestic steel demand has been rising owing to the robust economic growth of the country. Unfortunately, the Indian steel industry has not been able to keep pace with the demand and India became a net importer of steel in 2007-08. The Ministry of Steel's target of achieving a capacity of 124 million tonnes by 2011-12 and 180 million tonnes by 2020 will be fulfilled only if there is expansion in capacities of the existing steel industries or/and new steel plants are set up in the country.

There is however, little scope to increase production from the existing large steel plants as these are already operating at utilization levels exceeding 100% as can be seen from Table 24 below. Thus the increase in production has to come from new capacity addition or by setting up new steel plants in the country. Brown field projects can contribute to some capacity increase but these targets will be achieved only if green field steel plants are set up fast. Since no large green field project has taken off so far, the gap between supply and demand will become larger in the coming years and India will continue to be a net importer for a long time.

Table 24: Capacity and Production of Crude Steel in 2007-08 ('000 Tonnes)

	Annual Installed Steel Capacity of Crude Steel	Annual Crude Steel Production
Bokaro Steel Plant	4360	4127
Bhilai Steel Plant	3925	5055
Rourkela Steel Plant	1900	2093
IISCO Steel Plant	500	458
Visvesvaraya Iron Steel Plant	118	158
Visakhapatnam Steel Plant	2910	3129
Tata Steel Ltd	5000	5013

Source: Indian Bureau of Mines, Nagpur

One of the main reasons for the slow takeoff of the green field projects is the non-allocation of captive iron ore mines. Security of raw material sources has become critical for large investments to take place. During the last 5-6 years, over 150

Memorandum of Understandings (MoUs) have been signed by various state governments of the iron rich states of Orissa, Jharkhand, Chhattisgarh, Karnataka and Goa. However, no serious effort has been made to execute these MoUs . Further very few of the steel companies have been given mining leases.

The iron ore market at present consists of iron and steel companies that use their own captive resources like SAIL and Tata Steel, companies that partly obtain assured allocations from the National Mineral Development Corporation (NDMC) at government determined prices and partly from their own captive sources like JSW Steel, etc. and companies that buy their requirement fully from the merchant mining companies and traders at the market price. It is mostly the small and medium producers in the secondary sector that have to buy their requirement from the open market at high prices. These small and medium producers that account for around 40 per cent of total crude steel production have been adversely affected by shortages and the high cost of raw materials (mainly iron ore) and high transport costs which in turn hampers the production of steel in the country. It is therefore, important to give captive leases to these companies as well.

The Report of the Working Group on Steel Industry for the Eleventh Five Year Plan (2007-2012) has also emphasised the importance of granting captive mines:
"In order to assure the availability of iron ore to domestic steel producers, India has adopted a policy of granting captive mines. The necessity of such a policy framework is even more important in the context of tight supplies and sharp volatility in prices of inputs. However, due to the existing allocation criterion based on considerations of value addition within state and other constraints, not all steel producers have got the facility of captive mines. Therefore, these plants are disadvantaged in comparison to plants with captive mines. This anomaly needs to be corrected as freight costs are also significant due to poor transport infrastructure".

Table 25: Iron Ore Production by Sectors: Captive Vs Non-Captive in 2007-08 (in Million Tonnes)

	Captive	Non-Captive	Total
Public Sector	25.5	34.9	60.4
Private Sector	12.7	107.8	120.5
Total	38.2	142.7	180.9

Source: Indian Minerals Year Book 2008, Indian Bureau of Mines, Nagpur

In India there are large numbers of non-captive merchant mines which account for a major part of iron ore production of the country. In 2007-08 out of 20 captive mines in the country, 14 were in the public sector and the remaining 6 in the private sector[16]. The production of non-captive mines in the public sector was 34.9 million tonnes in 2007-08 and that of the private sector was 107.8 million tonnes. In other words, around 60 per cent of total iron ore produced in the country comes from non-captive mines in the private sector whose main intention is to earn profits. Since export prospects are so bright, these non-captive mines in the private sector are merrily exporting away the valuable iron ore reserves of the country. If measures to ensure captive availability of essential raw materials to large domestic steel producers as well as the secondary sector are not employed, the situation is bound to get worse and the country will remain a net importer of steel forever.

3.5.3 BACK TO COLONIAL TIMES

The main reason why the Britishers colonised India was to benefit from its rich resources. The classic way in which they did this was through economic exploitation whereby they imported raw materials from India and flooded its markets with manufactured goods. India is not far from going back to the colonial times i.e. exporting raw iron ore and importing finished steel from China. From Table 26 it can be seen that most of India's iron ore is exported to China. Japan was the second major importer of steel but its share in total iron ore exports declined rapidly while that of China has increased massively. The share of iron ore exports to China was 19 per

[16] Indian Minerals Year Book 2008, Indian Bureau of Mines, Nagpur.

cent in 2000-01 which increased rapidly to 77 per cent in 2004-05 and further to around 90 per cent in 2007-08. This was mainly on account of the large Chinese demand for iron ore to feed their speedily growing steel industry.

Table 26: Iron Ore Exports by Destination (million tonnes)

Country	2000-01	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
China	19.22 (46.16)	26.27 (54.71)	42.06 (67.22)	60.46 (77.37)	74.13 (83.04)	76.50 (83.67)	61.25 (89.46)
Japan	15.62 (37.51)	15.75 (32.80)	13.10 (20.93)	10.91 (13.96)	10.33 (11.57)	8.89 (9.72)	4.84 (7.07)
South Korea	3.00 (7.20)	2.41 (5.02)	2.14 (3.42)	2.17 (2.78)	1.32 (1.48)	2.06 (2.25)	1.15 (1.68)
Total	41.64 (100)	48.02 (100)	62.57 (100)	78.14 (100)	89.27 (100)	91.43 (100)	68.47 (100)

Source: IBM Nagpur; Indian Minerals Year Book 2008, Ministry of Mines

Note: Figures in parenthesis indicate the percentage to the total exports

With production of steel at around 600 million tonnes, China has now entered the global steel market as a major exporter; while with growing demand for steel, India has already entered the league of net importers of steel. The export and import values of Indian steel with respect to China are given in Table 27 below. It can be seen that till 2005-06 the value of exports was greater than imports. However, the import value of Rs 320,238 in 2006-07 far exceeds the export value of Rs 216,200. This trend has continued in the successive two years as well, pointing to the growing reliance of India on steel imports from China. Thus, unless immediate actions are taken to expand steel capacity, the country will forever be dependent on China for steel imports. Currently we are exporting almost 90 per cent of our valuable iron ore to China and in return importing a huge amount of finished steel from China.

During the colonial times the British forced India to open up, while protecting its own manufacturing industries through a ban on Indian imports. However, today when the country has no external pressure on it and is free to decide on its own course of action, the country's decision to allow exports of iron ores with zero or very little export duty has led to a situation where the country is reverting back to the colonial times on its own accord.

Table 27: Steel Exports and Imports of China (in Rs Lacs)

Year	Exports	Imports
2005-06	188,046	118,953
2006-07	216,200	320,238
2007-08	89,971	587,679
2008-09	171,500	791,156

Source: Export-Import Databank, Ministry of Commerce, GOI

While China has deposits of only low grade iron ore, it has the largest reserves of coking coal in the world. Like iron ore, coking coal is also an essential raw material for steel making. China does use its low grade iron ore to some extent but a major share of its requirement is met by import of high grade iron ore from other countries like India, Australia and Brazil. Similarly, India is blessed with abundant iron ore reserves but has to depend on imports of coking coal. Since the beginning of the 2000s the Chinese economy witnessed massive growth which in turn required huge increase in steel production within the country to cater to heavy infrastructure development. Realising the importance of coking coal for its domestic industry, China initially reduced it but later stopped the export of coking coal to India in order to conserve the valuable resource for its domestic industry. China has levied an export duty of about 40%, besides other barriers, to discourage exports. On the other hand, instead of learning a lesson from its neighbour, India continues to encourage exports of its valuable iron ore resources to China at a nominal export duty of 10 per cent!

3.5.4 FLIGHT OF CAPITAL

The extremely tight supply conditions and sky rocketing prices of iron ore and coking coal in the global bulk material market has made producers realize the importance of assured sources of raw materials. Hence ensuring control over raw materials is becoming an important part of the overall business strategy and a necessity for sustainable growth. Global players are seeing immense potential in India owing to the availability of iron ores and its strategic location as far as demand is concerned. A

series of mega projects have been announced in the country. It started with Posco, followed by Arcelor Mittal. On the other hand, the Indian steel producers due to lack of adequate mining leases being granted in the country are looking outwards for greener pastures. Jindal Steel has announced plans to set up a steel mill in Bolivia and SAIL in Australia due to assurances of captive iron ore and coal mines respectively.

Foreign companies coming to India have been attracted mainly by the iron ore of the country. Once they get the mining leases they will use iron ores to feed their overseas steel plants thereby fuelling to the already high exports of iron ores from the country. On the other hand it will be unfortunate if India is not able to tap the potential and strengths of its own domestic industry to create more capacities within the country and thus face the problem of flight of capital from the country. However, some domestic producers like Tata Steel have acquired foreign companies, so the country should make sure that these companies are not exporting the iron ore from their captive mines to feed their foreign plants. Rather, iron ore should be processed into finished steel within the country itself to create more capacities, realise higher value addition and create more jobs in the manufacturing sector.

2.3 THE IRON ORE EXPORTS DEBATE

There has been growing policy debate on whether iron ore should be conserved for the use of the domestic industry as against exporting out of the country to feed the foreign steel industry at the cost of the growth of the domestic industry. This section looks into this debate and establishes the point that exports are bad for the country and hence it should be regulated.

2.3.1 EXPORTING THE EXCESS?

It is argued that while extracting lumps, fines are also extracted automatically. Another 10-12 per cent becomes fines at the time of converting it into sized ore, handling at mines, railway stations and ports. Thus supporters of iron ore exports argue that since the bulk of the export is in the form of fines for which adequate sintering or pelletisation capacities do not exist in the country, these fines should be

allowed to be exported as exports are not hampering the steel industry but rather helping the country to get rid of the excess.

However, it is to be noted that while it is true that fines are created while producing lumps, the entire increase in production of fines cannot be attributed to this. A look into the state wise production of fines and lumps shows that the share of lumps and fines in total iron ore varies from state to state and mine to mine. It can be seen from Table 28 that during the period between 2004-05 and 2007-08, while lumps accounted for nearly 55-60 per cent of the iron ore produced in Orissa, it ranged between 18-19 per cent in the case of Goa and 29-43 per cent in Karnataka. In other words fines constitute a higher share in the production of iron ore in Goa and Karnataka.

Table 28: State-wise Production: Ratio of Lumps, Fines and Concentrates ('000 tonnes)

	2004-05				2007-08			
	Lumps	Fines	Concentrates	Total	Lumps	Fines	Concentrates	Total
Chhastisgarh	10342	12776		23118	13032	17965		30997
Goa	4243	17526	903	22672	5730	24270	526	30526
Jharkhand	7538	9181		16719	9769	10983		20752
Karnataka	12288	21324	4350	37962	21532	27458		48990
Orissa	22884	18866		41750	41936	27947		69883
Others	857	2864		3721	5851	6247		12098
All India	58152	82537	5253	145942	97850	114870	526	213246

Source: Indian Bureau of Mines, Nagpur.

Along with the state wise production of lumps and fines, if the port wise exports is considered (Table 29), it can be seen that most of the export is from Goa and Karnataka, and these regions produce a much larger amount of fines than lumps. This implies that in these areas fines are extracted solely for export purposes. In other words, the fines have been produced not only as a result of extraction of lumps but they are extracted specifically for exports.

Table 29: India's Port-Wise Iron ore Exports (in Lakh Tonnes)

Port	2004-05	2005-06	2006-07 (P)
Belekeri	8.0	12.60	41.22
Chennai	95.45	82.60	103.50
Ennore	5.07	5.49	17.19
Goa	314.20	362.71	405.37
Haldia	49.66	79.50	78.49
Hazira	---	--	3.15
Kakinada	8.89	35.10	38.13
Karwar	24.00	16.90	14.90
Krishnapatnam	--	--	5.50
Mumbai Floating	0.40	1.04	--
New Mangalore	93.96	88.53	52.40
Paradeep	90.50	102.70	119.48
Redi Port	4.75	8.10	4.30
Vizag	86.50	97.50	54.27
Total	781.45	892.77	937.90

Source: GMOEA, KIOCL,MMTC and Private Exporters[17]

Thus the argument that the exports of iron ore have not taken place at the cost of domestic industry makes no sense because the increase in the production of fines was mostly with the intention to export. Thus comparing domestic production with domestic consumption and saying that there is no other option but to export the excess is totally wrong, since that excess has been generated solely for exports purpose. Rather than excess production triggering exports, it is a case of excess export demand triggering higher production of fines.

Looking into the issue of India not having adequate sintering and pelletisation capacity, we find that the proportion of sinter (and also pellets) used in blast furnaces in India has been on the rise. The gas based sponge iron units can take both lumps and DRI grade pellets. As discussed earlier , the proportion of lumps in total consumption of iron ore has been higher in India due to the initial constrains and the technology

[17] Secondary Source: A.S. Firoz, Mineral Policy Issues in the Context of Export and Domestic Use of Iron Ore in India

choice adopted by the steel industries but the steel firms are now upgrading their technology and are consuming a significant amount of fines.

Table 30: Consumption of Iron Ore by Steel Plants ('000 Tonnes)

	2006-07		2007-08	
Steel Plant	Lumps	Fines (In Sinters and Pellets)	Lumps	Fines (In Sinters and Pellets)
Bokaro Steel Plant	2113	4126	2341	4921
Bhilai Steel Plant	3017	5011	4286	5534
Rourkela Steel Plant	1110	2434	1093	2808
Durgapur Steel Plant	1165	2155	1127	2349
IISCO Steel Plant	1160	-	950	-
Visvesvaraya Iron and Steel Ltd.	488	-	440	-
Vishakapatnam Steel Plant	1947	-	4187	
IDCOL, Kalinga Iron Works	151	6	263	6
Total	11151	13732	14687	15618

Source: Indian Minerals Year Book 2008, Indian Bureau of Mines, Nagpur.

The consumption of fines by different steel industries given in Table 30 shows that consumption of fines in the country has been increasing. Further, the figure for the consumption of fines would be more if consumption by steel plants in the private

sector, such as Tata Steel, Essar, Ispat and JSW, were also included[18]. The pelletising and sintering capacity has also increased. There are six pelletisation plants in the country which have a total capacity of 19.35 million tonnes per annum. The new pellet plant of Jindal Vijayanagar Steel Ltd (now JSW Steel Ltd), at Vijayanagar, Bellary district, Karnataka, has annual capacity of 4.2 million tonnes. The eight sintering plants in the country have annual capacity of 28.62 million tonnes. All integrated steel plants except IISCO Steel Plant have their own sintering plants[19]. Pellets along with sinters have resulted in growth in utilisation of iron ore fines in the country.

But to expect the country to have sintering and pelletisation capacity for the entire increase in fines is illogical since, as already argued above, the increase in production of fines was mostly for export purposes. From the above argument it can be seen that both sintering and pelletising capacity and consumption of fines by the domestic steel industry has been increasing so the demand for fines within the country itself will go up in a few years.

3.6.2 FOREIGN EXCHANGE EARNINGS

It is argued that there should not be any ban on exports of iron ore since they provide valuable foreign exchange earnings and profits from iron ore export will bring about an increase in the investible capital of the country, which in turn would generate more employment and greater revenue for the government. However, it makes more sense to process the raw material in the country and export it in the form of finished steel. This would result in more value addition within the country and would create additional employment, when compared with relying on more than mining alone.

Iron ore exports were an important source of foreign exchange earnings when the country did not have other sources for the same. But now the country has established itself in the world market and earns foreign exchange through exports of many other goods and services so there is no need to export a valuable natural resource of the

[18] Could not be included due to unavailability of data.
[19] Indian Minerals Year Book 2008, Indian Bureau of Mines, Nagpur.

country. Iron ore export earnings constitute around just 3 per cent of the total export earnings of the country. Thus today India has other sources of earning foreign exchange as can be seen from Table 31 and does not need to depend on iron ore exports.

Table 31: Iron Ore Export and Total Export Values of India (in Rs Lacs)

	2006-2007	2007-2008
Iron Ore Export	1765624.81	2339969.98
India's Total Export	57177928.52	65586352.18

Source: Export Import Data Bank, Department of Commerce, GOI

The argument that the profits from mining would result in rise in investible capital in the country is far from reality. Instead of encouraging serious investors to set up large capacity steel plants by allocating iron ore leases, various state governments have preferred to grant mineral concessions to small investors and merchant miners. Valuable iron ore reserves are being wasted since mining by small miners is done in an unscientific manner. They only pick up good lumpy ores leaving nearly 50 per cent of iron ore fines as dump. They cannot afford to convert these fines into saleable products because of the investment involved. This kind of mining is harmful to the environment as well. Moreover, they have not invested anything on the ground and have undertaken mining only to earn huge profits by exporting it.

While miners earn huge profits from mining and exporting the iron ores, the government gets paid a very minuscule royalty. Apart from this the government faces huge amount of revenue losses on account of illegal mining. According to a report of the Karnataka Lokayukta on illegally mining, the state was getting a royalty of Rs 27 per tonne on the iron ore declared by the profiteers while the private exporters were earning Rs5000. Further the report highlights that there was huge amount of profits involved in mining and exporting the iron ores because the cost of mining, transportation and royalty was, at maximum, Rs 427 per tonne while the price was around Rs 5000 to 7000 per tonne. Moreover, the report reveals that the state suffered

losses worth of Rs 36000 crore in three years on account of illegal mining and in these the government did not even get the token royalty.

The rising cases of illegal mining points to the kind of investors that are entering into mining. Their sole motive is to earn profits through any means, legal or illegal. The country is being looted of rich resources to meet the greed of a few people. Thus the very process of allowing iron ore exports for the sake of earning foreign exchange has resulted in a situation whereby the country is facing more losses on account of unscientific mining and illegal mining. Moreover, if exports continue at this rate India will soon turn into a net importer of iron ores. So India's foreign exchange earnings would, in fact, be adversely affected in the long run.

3.6.3 SHUT DOWN OF STAND ALONE MINES

Some proponents of iron ore exports argue that if the exports are restricted or curbed then the stand-alone private mines which have come up mainly with the purpose of exporting will have no takers and hence close down rendering millions unemployed. However, even without the government curbing exports, the world situation especially that in China suggests that demand is going to slow down. Looking into the direction of Indian iron ore exports we find that India exports more than 80 per cent of iron ores to China. The Australian Commodities Report has noted that with increased consolidation in the Chinese steel industry, the steel makers will gradually move away from the spot to long term contract market. Currently the Indian iron ore is sold largely on the spot basis by the small and medium sized players. With a high degree of fragmentation and stringent regulation, Indian miners may find it difficult to enter into long term contracts with Chinese buyers.

Further in May 2010 China imposed a ban on the imports of low grade iron ore from India. The ban was applicable to traders and not on the steel plants. However, traders and steel plants each account for half of imports into China. Thus, the major source of demand is likely to dry up. Even so, we need not expect that the mine owners will shut down their businesses. The mining companies will adjust to the change in demand. They will be forced to process such ores domestically. They will come

forward to set up beneficiation plants to upgrade fines into lumps i.e. high grade for which there is more demand. Sesa Goa Ltd, owned by billionaire Anil Agarwal, is the largest iron ore exporter. It exports 93 per cent of its production and out of this 83 per cent is exported to China. Such rich profit motivated private players will try to change their production accordingly to adjust to the market requirements.

There are 265 mines in the private sector out of which 37 mines producing more than one million tonnes each annually accounted for about 59 % of total output of the private sector. The remaining 228 mines account for 40 per cent of total private sector output [20]. In case of those mining companies that cannot set up beneficiation facilities to upgrade iron ore on their own due to lack of funds, the government should encourage steel mills to come forward in association with mining companies to set up backward integration facilities. The high grade iron ore so produced will have demand within the country itself. Further, the processing of low grade ore domestically will generate more employment than in mining, and help steel mills to use high grade iron ore.

Thus to argue that the ban or restrictions on exports would lead to the closure of the merchant mines owners is just a way of protecting the narrow interests of these profit motivated companies. If they can adjust to a change/fall in world demand they can obviously change their production strategy to adjust to a restriction/ban on exports imposed to conserve the raw material for domestic use.

3.7 CONCLUSION

From the above discussion we find that iron ore is being exported instead of being converted into finished steel within the country. The root cause for this is the government's decision to allow the entry of profit motivated private players in this sector instead of granting captive mines to the domestic iron and steel industries. The mining boom that started from the early 2000s which created immense opportunities for the Indian mining industry attracted private players into this sector. These private stand alone miners merrily exported away the valuable iron ores at skyrocketing

[20] Indian Minerals Year Book 2008, Indian Bureau of Mines, Nagpur

prices to feed the steel industries in China. Further, such high profits was not able to satisfy the greed of these profit motivated private players. So they indulged in illegal mining without license, mining in reserved forest areas, and mining in excess of their licensed capacity, thereby resulting in the loss to the country of several thousand of rupees. While a huge amount of iron ore is being exported out of the country both legally and illegally, the domestic steel companies are not able to get mining leases within the country and are forced to look for mining avenues in other countries causing flight of capital from the country.

This is an alarming situation for the country as well as the domestic steel manufactures since finite iron ore reserves are being exported without encouraging value addition within the country. Most of the export of iron ore is to our neighbour China, which in turn exports steel to India. Given the finite reserves of iron ore in the country, if exports continue at the current rate then India will soon become a net importer of iron ore. Moreover, given the fact that India is dependent on import of both coking coal and even non-coking coal, once it has to import iron ore, the domestic industry will become totally unviable, making India dependent on the import of steel as well. Thus a country which has had a long history of steel making and which has been endowed with abundant iron ore reserves will be in a situation whereby it will be importing both iron ore and steel in the near future.

Thus the export of iron ore should be regulated and the raw material should be diverted to the domestic steel industry which in turn will create more value addition within the country. Justice Santosh Hegde, Lokayukta of Karnataka, has rightly observed that[21]:

"Export of iron ore should be banned. Why send a commodity that is not regenerable in this country to another country, for whatever price? If you stop export and encourage people to have mills as close to the mine as possible, the central government will get thousands of crores a day as central excise. State governments will get hundreds of crores by way of VAT. It gives employment to people whose land has been used for mining. One factory will do for the whole of Bellary. It will employ 40,000 to 50,000 people. Tell me one good reason why you want to export when it is

[21] In an Interview with Vijay Simha, Tehelka

not worth it economically, ecologically, and environmentally, and when it is not people-friendly."

There is an urgent need for the government to learn lessons from its neighbour China which follows the policy of conserving its natural resources for the future by importing from other countries in the present. The government should come up with a sound policy with respect to our mineral assets. The exports of iron ore should be immediately regulated. The fact that even after the Karnataka Lokayukta's submission of its report on illegal mining in 2008, the illegal exports of iron ore increased in 2009-10, points to the attitude of the government in tackling this major issue. Unless the government wakes up, the future seems to be dim not only for the steel industry but also for the economy as a whole.

CHAPTER 4

Intra Industry Trade in Iron and Steel Industry in India

4.1 INTRODUCTION

Intra industry trade (IIT) is defined as the simultaneous export and import of goods within the same industry. The two way exchange of goods occurs "within" the industry rather than "between" industries. In this type of trade similar products that differ either in terms of quality, or with respect to their attributes, are often exported or imported by the same country. Hence 'product differentiation' forms the basis of this type of trade. IIT is further decomposed into horizontal IIT and vertical IIT. The former refers to trade among differentiated products of the same quality but with different characteristics or attributes. On the other hand, the latter refers to trade in close substitutes that are differentiated purely on the basis of quality. In chapter 1 the discussion on the share of various steel products in total steel exports and imports has shown the presence of significant amount of intra industry trade in the Indian steel industry.

The steel industry in India has the potential to generate IIT in either form. The main driving forces are: Firstly, it is a very investment-intensive industry and the need for fixed capital is significant, implying that the industry is very capital intensive. This makes the scope for economies of scale considerable. Secondly, there is widespread production fragmentation with increasing importance of trade in intermediate steel products like semis, HR coils/sheets and CR coils/sheets (HR and CR coils/sheets are used both as intermediate products as well as finished products). And lastly, as a result of the liberalisation process that started in India from 1990s onwards, the Indian steel industry is well integrated with the world market.

This chapter attempts to study the trends in and pattern of IIT in the Indian steel industry in the era of liberalisation at the multilateral level from 1996-97 to 2007-08. Further, the chapter seeks to measure the extent of horizontal and vertical IIT to find out the intra-industry trade specialisation of the Indian steel industry. The chapter is organised as follows: Section two presents the fundamental theory of IIT. Section

three presents the measures used in the chapter for measuring aggregate IIT and horizontal and vertical IIT. Section four contains the empirical analysis that measures and describes the IIT in steel industry. Section five examines and analyzes the trend in IIT in steel industry on the basis of the theories relating to IIT. Section six summarizes and concludes the chapter.

4.2 INTRA-INDUSTRY TRADE THEORY

A series of studies in the 1960's and the 1970's established the existence and importance of intra industry trade (IIT). The first papers that looked into the issue of simultaneous export and import within the same industry were written by Verdoorn (1960), Balassa(1966) and Grubel (1967). The crucial step in the evolution of IIT-theory was a publication by Grubel and Lloyd (1975). They introduced an index of IIT and a methodology for studying and measuring IIT.

Unlike in the classical trade theory which associates trade between two countries with their differences in factor endowments, in intra industry trade theories IIT can take place between countries with similar factor endowments. Krugman (1979, 1983), Lancaster(1980) and Helpman (1981) tried to explain the nature of this phenomenon by establishing a theoretical framework that associated IIT with monopolistic competition and product differentiation. On the supply side, it is driven by increasing returns to scale and on the demand side it is driven by different consumer preferences and the desire for variety. Further later studies indicated that there existed different types of IIT. Thus there are mainly two strands in the theoretical literature explaining IIT: one dealing with horizontal IIT and the other dealing with vertical IIT.

4.2.1 VERTICAL INTRA INDUSTRY TRADE

Vertical IIT is defined as the simultaneous import and export of products in the same industry but of different quality. The various studies which have dealt with the vertical differentiation model are Finger (1975), Lipsey (1976), Falvey (1981), Falvey and Kierzkhowski (1987), Shaked and Sutton (1984) and Flam and Helpman (1987). According to these studies, traditional theories of comparative advantage i.e.

differences in factor intensity between countries could be used to explain intra industry trade among different quality goods. Thus the relatively capital abundant countries have comparative advantage in capital-intensive products and will export high quality products. On the other hand, the relatively labour-abundant countries have comparative advantage in labour intensive products and will export low quality products. Some vertical IIT models also consider the process of product fragmentation. In other words, vertical IIT can take place both in the production of final goods and in the production of components and parts, i.e. vertical specialization. Vertical IIT is common between countries with different factor endowments and hence, larger the difference in factor endowments, the larger the share of vertical IIT will be. Vertical IIT is expected to take place mainly between large countries with different factor endowments, at different levels of development (but not necessarily), geographically close to each other and economically integrated in some way.

4.2.2 HORIZONTAL INTRA INDUSTRY TRADE

Horizontal IIT refers to the simultaneous importing and exporting of differentiated products of the same quality but with different characteristics or attributes. Unlike the vertical IIT, horizontal IIT cannot be explained by traditional theories of comparative advantage. Horizontal IIT models have explained it in a framework of monopolistic competition on the basis of existence of economies of scale and product differentiation. Scale economies cause every firm in a certain industry to specialise in the production of a variety which is not produced by any other firm giving rise to horizontal IIT. Two types of theoretical explanations have been given for the exchange of varieties of goods with similar qualities and various other features and attributes. One of them is the favourite variety approach in which different consumers have different preferences for alternative varieties of a given commodity and each consumer prefers one variety to all others – Lancaster (1980) and Helpman (1981). The other is the love of variety approach in which consumers are assumed to endeavour to consume as many different varieties of a given product as possible and gain welfare from the amount of variety – Krugman (1979, 1980) and Dixit and Norman (1980). Horizontal IIT is mainly expected to take place between similar countries, i.e. countries with similar GDP, income distribution and factor

endowments, which are geographically close to each other and economically integrated in some way.

4.2.3 DETERMINANTS OF IIT, HIIT AND VIIT

Several studies and theories of IIT suggest that the level of IIT, and intra-industry specialization, will be higher between countries engaged in some form of economic integration. The positive relationship between integration and IIT is well established and fairly unquestioned. Further several studies point out that economic integration will increase the share of IIT via production fragmentation and FDI. Production fragmentation refers to the splitting up of the production process into two or more components or fragments. It need not be the case that different stages of production take place in the same plant but can take place in different plants of the same firm or a different firm. All the industry requires is that it should have factor requirement which allows it to be located anywhere. Moreover, the liberalisation of capital flows will increase the inflow of FDIs that specializes their production in different countries. Specialization on different varieties in different countries gives rise to horizontal IIT whereas vertical specialization and production fragmentation gives rise to vertical IIT Thus falling trade barriers, increasing ease of international capital movements, and increasing freedom of establishment have made international and regional integration possible which in turn results in intra-industry specialization.

Intra industry trade theories suggest that at the country level the share of IIT depends on the economic/market size of countries (gross GDP). The economic size of the country is positively correlated to the share of IIT resulting in higher IIT between larger countries. Furthermore the share of IIT is negatively correlated to the distance between the trading partners which is connected to rising transactions costs, especially that of transportation. Further according to intra industry trade theories relative factor endowments and the demand patterns (proxied by per capita GDP) determine whether IIT is horizontal or vertical as discussed above in detail. Thus the more similar the countries are in per capita GDP, the larger is the share of horizontal IIT. The more different the countries are in per capita GDP, the larger is the share of vertical IIT.

4.3 METHODOLOGY

The intensity of IIT is measured by the well-known Grubel Lloyd index. This index is based on the concept of "trade overlap". According to Grubel and Lloyd, intra industry trade is the value of exports which is exactly matched by the imports of the same industry.

Total Trade = IIT + Inter Industry Trade

$$\text{IIT} = (Xi + Mi) - |Xi - Mi|$$

Grubel Lloyd index represents the share of the absolute value of intra-industry trade in trade turnover in a particular industry i,

$$\text{GLi} = \frac{(Xi+Mi)-|Xi-Mi|}{(Xi+Mi)} \times 100$$

where GLi is the IIT index for industry i, and Xi and Mi are values of exports and imports in industry i. The value of GLi ranges from 0 to 100. If there is no IIT (i.e., one of Xi or Mi is zero) GLi takes a value of 0. If all trade is IIT (i.e., Xi = Mi), GLi takes a value of 100.

Grubel and Lloyd (1975) proposed the following weighted index to arrive at an overall measure of IIT:

$$\text{GL} = \sum_{i=1}^{N} Wi\ GLi \times 100$$

Here weights refer to the share of the trade of each industry in the total trade i.e.

$$Wi = \frac{\text{Xi+Mi}}{\sum_{i=1}^{N}(\text{Xi+Mi})}$$

$$\text{Hence, GL} = \frac{\sum(Xi+Mi)-|Xi-Mi|}{\sum(Xi+Mi)} \times 100$$

One major weakness of the GL index is that it is normally unadjusted for aggregate trade imbalance. This implies that for an increase in export (import) for a given level of import (export), the value of index, GL, diminishes. This implies that the aggregate GLI will underestimate the level of IIT since trade never can be of complete intra-industry nature when total trade is imbalanced. The larger the size of the overall trade imbalance becomes, the larger becomes the downward bias of the GL index. Many attempts have been made to find a method for correcting this bias but none have been widely accepted or without criticism. Several authors claim that there is no need (neither on theoretical nor empirical grounds) to correct this bias. Therefore, in this study the unadjusted Grubel Lloyd index is used for measuring IIT.

According to the Greenaway, Hine and Milner (1994) methodology the total intra industry trade (IIT) has been divided into its two types – horizontal intra industry trade (HIIT) and vertical intra-industry trade (VIIT) using the "product similarity criterion". This criterion is based on the ratio between the unit value in exports and the unit value in imports in trade between two trading partners.

$$TIIT = HIIT + VIIT$$

The method developed by Abd-el- Rahman will be used to measure the different trade types. Horizontal IIT (HIIT) is defined as a ratio between the unit value of exports UVxi and the unit value of imports UVmi for a particular industry i or i.e. UVxi /UVmi. More specifically, horizontal IIT is defined when the unit value index (UV) is inside the range of ±15%.

$$\text{i.e. } 0.85 \leq \frac{UVxi}{UVmi} \leq 1.15.$$

When the unit value index (UV) is outside the ±15% range, vertical IIT (VIIT) is defined for the particular industry. The share of vertical IIT (VIIT) is separated into the share of vertical intra industry trade in low quality products VIIT (LQ) and

vertical intra industry trade in high quality products VIIT (HQ) using the following condition:

$$\text{VIIT (HQ): } \frac{UVxi}{UVmi} > 1.15 \text{ and VIIT (LQ): } \frac{UVxi}{UVmi} < 0.85$$

It is assumed that the relative quality of each product is best defined by the achieved relative price for the same product. Hence the relative share of VIIT (HQ) represents trade in vertically differentiated products of higher quality, which are sold at a higher average price, and VIIT (LQ) represents trade in vertically differentiated products of lower quality, which are sold at a lower average price.

According to the presented methodology, in this paper the intra-industry trade will be divided into three types of trade:

a) HIIT – horizontal intra-industry trade when $0.85 \leq \frac{UVxi}{UVmi} \leq 1.15$; it means that country exports and imports goods within the same industry, which are of the same price (quality) but differ in some other features, such colours, country of origin, etc.

b) VIIT(LQ) – low quality vertical intra-industry trade when $\frac{UVxi}{UVmi} < 0.85$; it means that unit value of exports is relatively lower than unit value of imports . Therefore, the country exports low-quality goods and imports high-quality ones;

c) VIIT (HQ) – high quality vertical intra-industry trade when $\frac{UVxi}{UVmi} > 1.15$; it means that unit value of exports is relatively high in comparison with unit value of imports. Therefore, the country exports high-quality goods and imports low-quality ones).

4.3.1 DATA

The trade data that are used in this study are obtained from the Export-Import Databank of the Ministry of Commerce, Government of India. The data are available from 1996-97, therefore the study covers the period from 1996-97 to 2007-08. We analyze the intra-industry trade at the 4 digit level inside the steel industry; hence the concept intra industry is defined more at the level of product than at industry level. This study covers 26 iron and steel products (4-digit level) that are part of the iron and steel industry of the country. Products 7201, 7203 and 7204 are not included as IIT in these products is very low.

1. The level of aggregation is the two-digit and four -digit level with the groups studied being two digit 72 iron and steel and the groups under 4 digits are given below in table 1.

2. The formula used to calculate IIT is the Grubel and Lloyd measure of intra-industry trade. The index is calculated at the disaggregated four digit level and then aggregated up for the two-digit level (the total trade). To aggregate the IIT from the four-digit level and upwards the following method has been used:

$$IITi = \sum IITj / \sum (Xj + Mj)$$

Where i is the more aggregated level (i.e. two digit level or the total trade) and j is

the more disaggregated level (i.e. the four-digit level)

3. To identify HIIT and VIIT (high or low quality), the method developed by Abd-el- Rahman is employed (explained earlier). VIIT and HIIT are calculated using a range of ±15%.

Table 32: HS Code and Commodity Description of Iron and Steel Products

HS CODE	COMMODITY DESCRIPTION
7202	FERRO-ALLOYS
7205	GRNL & PWDR,OF PIG IRON,SPGLSN,IRON/STEEL
7206	IRON AND NON-ALLOY STEEL IN INGOTS/OTHER PRIMARY FORMS(EXCL IRON OF HD.NO.7203)
7207	SEMI-FINISHD PR0DUCTS OF IRON/NON-ALLOY STEEL
7208	FLAT-ROLLD PRDCTS OF IRON/NON-ALLOY-STEEL OF WIDTH OF>=600MM,HT-RLLD,NT CLD, PLATED/COATD
7209	FLAT ROLLED PRDCTS OF WDTH>= 600MM,COLD-RLLD (COLD-REDUCED),NOT CLAD,PLTD/COATD
7210	FLT-RLLD PRDCTS OF IRON/NON-ALOY STEEL OF WDTH >=600 MM,CLAD,PLATD/COATD
7211	FLT-RLLD PRDCTS OF IRON/NON-ALOY STL OF WDTH<600 MM,NT CLD,PLTD/COATD
7212	FLT-RLLD PRDCTS OF IRON/NON-ALOY STEEL OF A WDTH<600 MM,CLAD,PLTD/COATD
7213	BARS & RODS,HT-RLLD,IN IRREGULARLY WOUND COILS,OF IRON/NON-ALLOY STL
7214	OTHR BARS & RODS,FORGED,HT-RLLD,HT-DRWN/ HT-EXTRD,BT INCL THOSE TWSTD AFTR ROLNG
7215	OTHR BARS & RODS OF IRON/NON-ALLOY STL
7216	ANGLS,SHAPES & SCTNS OF IRON/NON-ALLOY STL
7217	WIRE OF IRON/NON-ALLOY STEEL
7218	STAINLESS STL IN INGOTS/OTHR PRIMRY FORMS;SEMI-FNSHD PRDCTS OF STAINLESS STL
7219	FLT-RLLD PRDCTS OF STAINLESS STL OF WDTH>=600 MM
7220	FLAT-ROLLED PRODUCTS OF STAINLESS STEEL, OF A WIDTH OF

	LESS THAN 600 MM
7221	BARS & RODS,HT-ROLLD,IN IRRGLRLY WOUND COILS,OF STNLS STL
7222	OTHR BARS & RODS OF STNLS STL;ANGLS,SHAPES& SECTIONS OF STAINLESS STEEL
7223	WIRE OF STAINLESS STEEL
7224	OTHR ALLOY STL IN INGOTS/OTHR PRMRY FORMS;SEMI-FNSHD PRDCTS OF OTHR ALLOY STL
7225	FLT-RLLD PRDCTS OF OTHR ALLOY STL OF WDTH 600 MM OR MORE
7226	FLT-RLD PRDCTS OF A WIDTH OF <600 MM
7227	BARS & RODS,HT-RLLD,IN IRGLRLY WOUND COILS,OF OTHR ALLOY STEEL
7228	OTHR BARS,RODS,ANGLS,SHPS,SCTNS OF OTHR ALLOY STL,HOLLOW DRILL BARS & RODS OF ALLOY OR NON-ALLOY STL
7229	WIRE OF OTHER ALLOY STEEL

Source: DGCI&S Website http://www.dgciskol.nic.in/

4.4 EMPIRICAL FINDINGS OF IIT IN INDIAN STEEL INDUSTRY

4.4.1 TREND IN INTRA INDUSTRY TRADE

Using the Grubel Lloyd index the extent of intra industry trade IIT in Indian steel industry is measured over the 12 years period taken in the study.

Table 33: Trend in Intra Industry Trade (Per Cent)

YEAR	INTRA INDUSTRY TRADE
1996-97	33.58
1997-98	43.31
1999-00	48.95
2000-01	53.76
2001-02	57.99
2002-03	50.67
2003-04	56.70
2004-05	60.73
2005-06	55.67
2006-07	56.82
2007-08	53.49

Source: Calculated using data from Export-Import Databank, Department of Commerce, GOI. http://commerce.nic.in/eidb/default.asp

India's intra-industry trade (IIT) in steel at the multilateral level has witnessed an increase during the 12 years period. The intra industry trade (GLI index) increased rapidly from 33.58 in 1996-97 to 57.99 per cent in 2001-02. It declined slightly to 50.67 per cent in 2002-03 and thereafter increased again reaching the peak of 60.73 per cent in 2004-05. It was 55.67, 56.82 and 53.49 per cents in the following three years respectively. Thus IIT in steel industry increased massively in the late 1990s while in the 2000s it has remained in the range of 50 to 61 per cent. Hence, since 2000-01 more than 50 per cent of total trade in steel is in the form of IIT.

4.4.2 AVERAGE IIT INDEX OF DIFFERENT PRODUCTS

We now look into the IIT index of each of the 26 products that constitute the iron and steel industry. There have been some fluctuations in the IIT of different products and hence it is not possible to get a clear trend of IIT in each product over the years. Therefore, in order to get a clearer picture we take the average of IITs of each product for the 12 year period.

Table 34: Average IIT of Different Products

PRODUCTS	AVERAGE IIT
7202	47.38
7205	45.46
7206	55.04
7207	44.01
7208	73.15
7209	70.27
7210	43.40
7211	57.61
7212	53.42
7213	49.34
7214	45.49
7215	35.33
7216	46.82
7217	46.55
7218	54.29
7219	59.02
7220	59.02
7221	33.16
7222	18.04
7223	16.84
7224	43.86
7225	38.69
7226	42.13
7227	29.95
7228	53.89
7229	65.91

Source: Calculated using data from Export-Import Databank, Department of Commerce, GOI. http://commerce.nic.in/eidb/default.asp

From the above Table 34 we find that the average IIT for the 12 years period in each product is more than 30 per cent except in two products 7222 and 7223. Average IIT for the 12 year period in these products stood at 18 per cent and 16 per cent respectively. Products 7208 and 7209 have very high average IIT at 73.15 per cent and 70.27 per cent followed by product 7229 which has an average IIT of 65.91 per cent. Seven products (7206, 7211, 7212, 7218, 7219, 7220, and 7228) have IITs above 50 per cent. Eight products (7207, 7210, 7213, 7214, 7216, 7217, 7224, and 7226) have average IIT above 40 per cent while three products (7215, 7221, and 7225) have

shown average IIT of more than 30 per cent. Thus it can be seen that not only in the steel industry as a whole but in individual products also there is significant amount of trade is in the form of intra industry trade.

4.4.3 SHARE OF IIT OF DIFFERENT PRODUCTS IN TOTAL IIT

The magnitude (absolute value) of IIT in each product depends not only on the IIT index but also on the total trade in that product. For example even though there are many items that have more than 50 per cent IIT, the size (absolute value) of IIT will differ depending on the total trade in that product. Table 35 shows the share of intra product trade of each product in the total intra industry trade.

Table 35: Share of IIT of different products in Total Intra Industry Trade

	1996-97	1997-98	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
7202	8.97	6.33	5.88	5.97	4.39	4.04	3.24	3.37	3.39	3.92	4.70
7205	1.07	0.09	0.13	0.23	0.22	0.10	0.67	0.47	0.15	0.29	0.37
7206	0.05	1.40	0.18	0.06	0.10	0.23	0.95	0.57	0.98	0.54	0.44
7207	6.32	22.16	3.39	2.59	7.70	5.18	4.36	4.70	8.84	9.79	5.08
7208	28.26	30.62	43.57	47.57	34.60	45.48	49.63	45.35	42.04	49.36	41.51
7209	10.55	8.07	15.40	14.86	14.69	13.02	9.89	9.96	10.07	7.76	9.23
7210	18.75	13.05	12.20	11.73	13.42	9.91	9.71	10.76	11.54	11.30	18.87
7211	2.19	1.54	0.54	0.69	0.58	0.42	1.00	0.85	0.97	0.78	1.20
7212	0.48	0.29	0.98	2.41	3.04	3.30	0.78	0.54	0.79	0.60	0.49
7213	4.76	2.92	1.22	0.73	1.83	2.46	2.18	2.84	6.07	2.82	1.38
7214	0.61	0.68	0.90	0.53	0.10	0.04	0.55	0.58	0.56	1.47	0.85
7215	0.80	1.60	0.37	0.18	0.25	0.24	0.17	0.20	0.79	0.43	0.56
7216	1.17	1.15	1.10	1.00	1.05	1.53	0.87	2.23	1.13	1.17	1.51
7217	0.62	0.54	0.38	0.41	0.90	0.89	0.81	0.82	1.20	1.27	0.85
7218	5.89	2.25	0.54	0.64	0.35	0.77	0.18	2.22	0.22	0.10	1.47
7219	1.80	1.22	0.88	1.73	4.60	3.45	4.25	3.28	3.88	3.75	4.46
7220	0.20	0.07	0.19	0.20	0.26	0.25	0.37	0.36	0.36	0.46	0.43
7221	0.40	0.19	0.23	0.13	0.08	0.14	0.14	0.17	0.58	0.25	0.28
7222	0.43	0.38	0.37	0.38	0.52	0.63	0.27	0.41	0.42	0.38	0.46
7223	0.17	0.17	0.27	0.15	0.18	0.12	0.10	0.10	0.10	0.11	0.09
7224	1.11	0.68	0.14	0.18	0.18	0.10	0.14	0.14	0.38	0.71	0.11
7225	1.31	1.25	6.27	4.56	6.64	5.06	6.51	7.79	3.48	1.28	2.82
7226	0.80	1.63	1.77	1.31	2.08	1.43	1.45	0.43	0.23	0.09	0.50
7227	0.76	0.09	1.60	0.29	0.33	0.14	0.31	0.28	0.22	0.14	0.07

7228	1.85	1.21	1.08	1.04	1.12	0.87	1.21	1.33	1.42	1.10	1.78
7229	0.67	0.40	0.42	0.44	0.80	0.19	0.26	0.23	0.20	0.12	0.49

Source: Calculated using data from Export-Import Databank, Department of Commerce, GOI
http://commerce.nic.in/eidb/default.asp

On the basis of the share of intra product trade of 26 items/products of steel in total intra industry trade (IIT) of steel we get the following three groups (Table 36):

1. The first group consists of products having more than 30 per cent share in total IIT: This group consists of just one product namely, product 7208 ('flat rolled products of iron/non-alloy steel of width of >= 600 MM, hot rolled, not cold rolled, plated/coated'). The share of intra product trade of product 7208 in total IIT was 28.26 per cent in 1996-97 and increased rapidly to reach 47.57 in 2000-01. It declined to 34 per cent in 2001-02 but it picked up again and stood at 49.36 per cent in 2006-07. Thus, out of the total IIT that took place in steel from 1999-00 onwards, share of intra product trade of product 7208 alone was 35 to 50 per cent

2. The second group consists of items having a share between 10 to 30 per cent in total IIT in iron and steel products. There are two products namely, 7209(" flat rolled products of iron or non-alloy steel, of width 600 mm or more, cold rolled, not clad, plated or coated") and 7210("flat rolled products of iron or non-alloy steel, of width 600 mm or more, clad, plated or coated") in this group. The share of intra product trade of product 7209 in total IIT increased from around 11 per cent in 1996 to 15.40 per cent in 2000-01. Thereafter, its share declined in the following years and stood at 9.23 in 2007-08 (Table 35). On the other hand, there was slight fluctuation in the share of product 7210 in total IIT in the range of 10 to 14 per cent over the years with the exception of 18.75 per cent in 1996-98 and 18.87 per cent in 2007-08 (Table 35).

3. The third group consists of items having a share of below 10 per cent in total IIT. There are 23 items in this group. The share of each product's intra product trade in total IIT has been in the range of 0.10 to 10 per cent over the years

(Table 35). These 23 products together accounted for 42.44 per cent of total IIT in 1997-98 but in the following years it has fluctuated in the range of around 29 per cent to 40 per cent (Table 36)

Thus, we find that bulk of the IIT in steel is constituted mostly by product 7208 followed by the products 7209 and 7210 because both the IIT index and the total trade in these items are very high (we get the share by multiplying IIT index by total trade in each item) whereas in case of the 23 products even though the IIT index is high enough the total trade is much less compared to the above three items, hence their share in IIT is less.

Table 36: Share of Intra Product Trade of the three Groups in Total Intra Industry Trade.

	No of products	1996-97	1997-98	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
More than 30 per cent	One (7208)	28.26	30.62	43.57	47.57	34.6	45.48	49.63	45.35	42.04	49.36	41.51
Between 10 and 30 per cent	Two (7209, 7210)	29.3	21.13	27.61	26.59	28.11	22.94	19.6	20.71	21.61	19.07	28.11
Below 10 per cent	Twenty Three	42.44	48.25	28.82	25.84	37.28	31.58	30.77	33.93	36.36	31.57	30.39

Source: Calculated using data from Export-Import Databank, Department of Commerce, GOI
http://commerce.nic.in/eidb/default.asp

4.4.4 HORIZONTAL AND VERTICAL INTRA INDUSTRY TRADE

Having analyzed the intra industry trade using the Grubel Lloyd Index we now analyze the three trade types i.e. horizontal intra industry (HIIT), vertical intra industry trade in low quality products (VIIT(LQ)) and vertical intra industry trade in high quality products (VIIT(HQ)) in order to differentiate the pattern of intra industry trade in the steel industry.

Table 37: Relative Shares of Horizontal IIT and Vertical IIT in Total IIT

	HIIT	VIIT(LQ)	VIIT(HQ)
1996-97	60.53	33.16	6.32
1997-98	62.01	36.68	1.31
1999-00	45.35	49.00	5.65
2000-01	64.34	30.81	4.85
2001-02	3.94	87.21	8.85
2002-03	54.12	21.42	24.46
2003-04	75.42	24.44	0.15
2004-05	72.25	26.05	1.70
2005-06	54.43	34.26	11.32
2006-07	81.90	11.99	6.12
2007-08	50.86	18.72	30.42

Source: Calculated using data from Export-Import Databank, Department of Commerce, GOI
http://commerce.nic.in/eidb/default.asp

From the above table we find that intra industry trade in steel in India is dominated by horizontal intra industry trade (HIIT). There have been some fluctuations but nevertheless its share in total IIT has remained very high i.e. more than 50 per cent for all the years except in one year i.e. 2001-02. Share of HIIT in total IIT stood at 60.53 per cent in 1996-97 and it increased to 64.34 in 2000-01. In the following year there was a huge decline but it started rising again from the next year and reached its peak of 81.90 per cent in 2006-07. It stood at 50.86 per cent in 2007-08.

In case of VIIT (LQ), its share in total IIT increased from 33.16 per cent in 1996-97 to 49 in 1999-00. Thereafter, it has remained in the range of 20 per cent to 34 per cent between 2000-01 and 2005-06 except in 2001-02 when it reached its peak of 87.21 per cent. It declined to 11.99 per cent in 2006-07 and stood at 18.72 per cent in 2007-08. In case of VIIT (HQ), there have been a lot of fluctuations. In some years its share increases while in others it falls. However, its share in total IIT is less and lies in the range of 0.15 to 25 per cent. It has reached its peak of 30.4 per cent in 2007-08.

Thus we find that all through the period under study, IIT in steel industry is mostly dominated by HIIT followed by VIIT (LQ) and little VIIT (HQ). However, 2000-01 is an exception as this year is characterised by a high share of VIIT (LQ).

4.4.5 THE NATURE OF TRADE SPECIALISATION IN DIFFERENT PRODUCTS

We look at how the trade specialisation changed in each of the products over the period of study. For this we take the three groups that we have considered before:

1. Product 7208("flat rolled products of iron/non-alloy steel of width of >= 600 MM, hot rolled, not cold rolled, plated/coated") which is included in group 1 has shown IIT in the nature of HIIT all through the years with the exception of one year, 2000-01 when it was in the nature of VIIT (LQ). Thus the most important item of intra industry trade within the steel industry i.e. the product that has the highest share in IIT is in the nature of HIIT. Hence product 7208 is exported and imported due to difference in characteristics or attributes and not on the basis of quality.

2. The second group consists of product 7209 ("flat rolled products of iron or non-alloy steel, of width 600 mm or more, cold rolled, not clad, plated or coated") and 7210 ("flat rolled products of iron or non-alloy steel, of width 600 mm or more, clad, plated or coated"). IIT in product 7209 was in the nature of VIIT (LQ) till 2001-02 except in 2000-01 when it was in the nature of HIIT. However, thereafter IIT in product 7209 was characterised by HIIT except in 2002-03 and 2007-08 when it was in the nature of VIIT (HQ). Similarly, in case of product 7210 IIT was in the nature of VIIT (LQ) till 2000-01 and thereafter it was in the nature of HIIT with the exception of two years 2002-03 and 2007-08 when it was VIIT (HQ). Thus IIT in these two items have over the years turned from being VIIT (LQ) into HIIT.

3. The third group which consists of 23 products can be divided into different sub-groups on the basis of the trend in the nature of IIT over the years. They are as follows:

    a. **VIIT (HQ):** Product 7207("semi finished products of iron or non-alloy steel") exhibited IIT in the nature of VIIT (HQ) all through the years except in 1997-98 when it was VIIT (LQ).

b. **VIIT (LQ) all through the period of study**: Five products showed trade specialisation in the nature of VIIT (LQ) all through the years. The products are 7202 ("ferro alloys"),7222 ("other bars and rods of stainless steel: angles, shapes and sections"), 7225 ("flat rolled products of other alloy steel, of a width of 600 mm or more"),7226 ("flat rolled products of other alloy steel, of a width of less than 600 mm ") and 7228 (other bars and rods of other alloy steel").

c. **VIIT (LQ) all through the period of study except in one year**: There were six items which showed VIIT (LQ) in all the years of study except one year (the years of exception maybe different for different products). The products are 7220 ("flat rolled products of stainless steel, of a width of less than 600 mm"), 7221 ("bars and rods, hot rolled, in irregularly wound coils of stainless steel") 7223 ("wire of stainless steel), 7218("stainless steel in ingots or other primary forms, semi finished products of stainless steel"), 7229 ("wire of other alloy steel"),7224 ("other alloy steel in ingots or other primary forms, semi finished products of other alloy steel")

d. **VIIT (LQ) all through the period of study except in two years**: There were four products which showed VIIT (LQ) in all years except two (the years of exception maybe different for different products). The products are 7205 ("granules and powders of pig iron, spiegeleisen, iron and steel") 7213 ("bars and rods, hot rolled, in irregularly wound coils of iron and non-alloy steel"), 7215 ("other bars and rods of iron and non-alloy steel"), 7217 ("wire of iron or non alloy steel"),

e. **Products showing some fluctuations**: In case of other products there are some fluctuations. In case of product 7212 ("flat rolled products of iron or non-alloy steel, of width of less than 600 mm, clad, plated or coated") IIT has moved from being VIIT (LQ) to VIIT (HQ). IIT in product 7211("flat rolled products of iron or non-alloy steel, of width of less than 600 mm,

not clad, plated or coated") was in the nature of VIIT (LQ) till 2003-04 thereafter it was HIIT for the next two years and VIIT (HQ) in the last two years. For product 7219 ("flat rolled products of stainless steel of a width of 600 mm or more"), IIT was characterised by HIIT and VIIT (HQ) till 2002-03 thereafter it has become VIIT (LQ) in the following years. In case of product 7216 ("angles, shapes and sections of iron or non-alloy steel") it was VIIT (HQ) till 2001-02 thereafter in the following three years it was VIIT (LQ) and in the last two years it is HIIT. In case of 7227 ("bars and rods, hot rolled in irregularly, wound coils of other alloy steel") IIT was in the nature of VIIT (LQ) except in four years. In products 7214 ("other bars and rods of iron and non-alloy steel, not further worked than forged, hot rolled, hot drawn but including those twisted after rolling") and 7206 ("iron and steel in ingots and other primary forms") there has been lot of fluctuations.

Although we have found that the nature of IIT specialisation in steel industry is mostly HIIT, from the above discussion when we consider the nature of trade in each product we find that there are large number of products which have shown VIIT (LQ) over the years. Very few items contribute to HIIT. This becomes clear from Table 38 below.

Table 38: No of Products showing HIIT, VIIT (LQ), VIIT (HQ)

	HIIT	VIIT(LQ)	VIIT(HQ)
1996-97	3 (11.54)	21 (80.77)	2 (7.69)
1997-98	4 (15.38)	20 (76.92)	2 (7.69)
1999-00	3 (11.54)	19 (73.08)	4 (15.38)
2000-01	5 (19.23)	18 (69.23)	3 (11.54)
2001-02	4 (15.38)	19 (73.08)	3 (11.54)
2002-03	3 (11.54)	17 (65.38)	6 (23.08)
2003-04	6 (23.08)	18 (69.23)	2 (7.69)
2004-05	6 (23.08)	17 (65.38)	3 (11.54)
2005-06	5 (19.23)	16 (61.54)	5 (19.23)
2006-07	8 (30.77)	13 (50.00)	5 (19.23)
2007-08	7 (26.92)	12 (46.15)	7 (26.92)

Source: Calculated using data from Export-Import Databank, Department of Commerce, GOI
http://commerce.nic.in/eidb/default.asp

In 1996-97, IIT in 80.77 per cent of the products i.e. 21 out of 26 products was in the nature of VIIT (LQ). Over the years total number of items engaged in VIIT (LQ) has declined only marginally such that from 1996-97 to 2005-06 more than 60 per cent of the products were still engaged in VIIT (LQ). There has been some decline in the last two years. On the other hand the number of items showing HIIT and VIIT (HQ) has increased slightly over the years. The total number of items exhibiting IIT in the nature of HIIT increased from 3 in 1996-97 to 7 in 2007-08 while the numbers of items with IIT in the nature of VIIT (HQ) has increased in number from 2 in 1996-97 to 7 in 2007-08.

Therefore, it is important to note that the domination of HIIT in IIT of Indian steel industry is mostly on account of product 7208. As noted above, in case of this product, IIT was in the nature of HIIT in all years considered in the study except one year i.e. .2001-02. From table 4 it was seen that the share of intra product trade of 7208 in total IIT over the period of study ranged between 40 to 52 per cent. Since IIT of product 7208 in total trade is very high and the IIT in this product being in the nature of HIIT it constitutes a significant part of the HIIT. This fact becomes more evident when we look into the share of product 7208 in total HIIT over the given years. From Table 39 below we find that there have been some fluctuations in its share but nevertheless its share in total HIIT is on average very high. In 1999-00 it constituted 96.08 per cent of total trade in HIIT. In other years its share has ranged between 60 to 84 per cent. Further in 2001-02 the trade in product 7208 was in the nature of VIIT(LQ) so that year it did not contribute to HIIT as a result we see a huge decline in relative share of HIIT in total IIT that year i.e. it is only 3.94 per cent (see Table 37).

Table 39: Share of product 7208 in total HIIT (per cent)

Year	Share of 7208 in Total HIIT
1996-97	46.68
1997-98	49.38
1999-00	96.08
2000-01	73.94
2001-02	0.00
2002-03	84.05
2003-04	66.24
2004-05	63.07
2005-06	77.23
2006-07	60.85
2007-08	82.20

Source: Calculated using data from Export-Import Databank, Department of Commerce, GOI
http://commerce.nic.in/eidb/default.as

4.5 DETERMINANTS OF IIT IN INDIAN STEEL INDUSTRY: AN ANALYSIS

We now examine and analyze the trends in India's IIT on the basis of the IIT theories. The driving force behind IIT according to IIT theories are economic integration, economic/market size and geographical distance. Deeper forms of economic integration generate larger shares of IIT i.e. economic integration is positively correlated to IIT. Lower the barriers to trade, the higher the share of both types of IIT. Before liberalisation the Indian steel industry remained protected from foreign competition by high import tariff rates and physical restrictions operating via canalization and import licensing. On the other hand, exports took place only on rare occasions when domestic demand fell short of production. Liberalisation in the 1990s has freed the steel industry from all sorts of regulation and has effectively integrated it with the world economy. Import duty rates have been progressively reduced from above 100% to 5% over the years (Table 40). All quantitative controls on exports and imports stand withdrawn today and the exports and imports of steel are freely

allowed. Therefore, the integration of the Indian steel industry with the world market has been one of the factors which have facilitated IIT in steel industry.

Table 40: Changes in Customs Duty on Steel Items (Percentage)

	1993 -94	1996 -97	1999 -00	2002 -03	2003 -04	Jan'0 4	Feb'0 4	2004 -05	2005 -06	2006 -07
Structurals / Wire rods	85	30	35	30	25	20	15	10	5	5
Plates/HR Sheets	75	30	35	30	25	20	15	10	5	5
CR Coil	75	30	35	25	25	20	15	10	5	5
CR Sheet	75	30	35	25	25	20	15	10	5	5
HR Coils	50	25	25	25	25	20	15	10	5	5
GP/GC	85	30	35	30	25	20	15	10	5	5
Semis	30	20	25	25	25	20	15	10	5	5
Pig Iron	20	20	15	15	15	15	5	5	5	5

Source: Planning Commission (2007), Report of the Working Group for Steel industry, Eleventh Five Year Plan, 2007-12.

Economic/market size of the country is positively correlated to IIT so that larger the market size, higher is the share of IIT because in large markets many differentiated goods can be produced under conditions of economies of scale. Market size is measured in terms of gross GDP. Indian economy has been growing in size over the years especially from the turn of the millennium the country has moved to a higher growth trajectory. This has resulted in the expansion of market size which in turn has given boost to IIT. According to theory, geographical distance is negatively correlated to IIT so that longer the distance between trading partners, the smaller the share of IIT. In this analysis the world as a whole is taken as India's partner but a look into the major steel trading partners of India like China, UAE, Italy, Germany, etc reveals that India enjoys geographical distance and location advantages with some of its trading partners while with some it has well established trade routes in addition to strategic sea ports. Thus deeper economic integration, larger market size and advantage of geographical distance have all boosted India's IIT in steel industry.

4.6 DETERMINANTS OF HORIZONTAL AND VERTICAL INTRA INDUSTRY TRADE OF INDIAN STEEL INDUSTRY: AN ANALYSIS

In India the IIT is dominated by the presence of HIIT but this is accounted for mostly by one product 7208 (''flat rolled products of iron/non-alloy steel of width of >= 600 MM, hot rolled, not cold rolled, plated/coated) (IIT in this product is in the nature of HIIT in all years except one). HIIT is explained by modern trade theories taking into account such things as imperfect competition and scale economies. Traditional comparative advantage models of international trade and specialization are incompatible with HIIT. Product 7208 can be used either directly or as an input. Most of it is used as inputs for cold-rolled products and surface-treated products and are used in other industries as well such as automobiles and consumer durable goods. Thus it is the most important intermediate product. Given its usefulness it had huge demand within the country, which encouraged more production thereby helping in realising full economies of scale. Thus the existence of economies of scale which facilitates the production of differentiated products has resulted in IIT in the nature of HIIT in product 7208.

Though the overall IIT trend shows the dominance of HIIT, looking into product wise trends we find that there are a large number of products which exhibit IIT in the nature of VIIT and within VIIT it is mostly VIIT in low quality. According to the IIT theories quality is measured by the capital labour ratio used in production, with high quality products requiring more capital-intensive production techniques and having higher prices compared to low quality products. Since it is found that India exports mostly low quality products and imports high quality products, this implies that Indian steel industry is more labour intensive and less capital intensive compared to its partner (i.e. the world). In other words, the technological up gradation of the Indian steel industry has been relatively slow. Thus despite having such a long history of steel making, India continues to specialize in the production of low quality products which it exports in return for imports of high quality products.

4.7 CONCLUSION

In this chapter IIT in the Indian steel industry has been measured. The results show that IIT has increased over the years and that the share of IIT in total steel trade is very high. The liberalisation of the Indian economy which brought about deregulation in the steel sector aided the growth of production and exports. Thus along with imports, exports of iron and steel products also witnessed an increase, thereby boosting IIT.

This chapter has tried to examine the trade specialisation of IIT in iron and steel products by measuring the extent of the different types of trade. The empirical findings show that the relative share of HIIT in total IIT is the highest followed by of VIIT (LQ) and VIIT (HQ). All through the period HIIT has increased in all except one year. In other words it shows that most of the trade takes place due to differences in characteristics or attributes and not quality. However, from our analysis we find that one product namely 7208 (''flat rolled products of iron/non-alloy steel of width of >= 600 MM, hot rolled, not cold rolled, plated/coated'') contributed most towards this nature of IIT specialisation in iron and steel products because the share of IIT of this product in total IIT has been very high over the years.

Given that each of these products show very high presence of IIT in their respective total trade, looking at the relative share of the different trade types alone does not give the clear picture. Therefore this study has looked into to the nature of trade in each of the 26 products that constitute the iron and steel industry. Thus when we look at the number of product showing different types of trade over the years we find that in more than 62 per cent i.e. 16 out of the 26 products IIT is in the nature of VIIT (LQ). This means that India has been exporting low quality iron and steel products in return of imports of high quality products. In the twelve year period that we have considered there has been some improvement but still a large number of items exhibit IIT in the nature of VIIT (LQ). Theory suggests that VIIT depends on factor intensity i.e. capital labour ratio and a country abundant in labour will export low quality products (labour intensive) and import high quality products (capital intensive). The results seem to be in line with the theory as India being a labour abundant country, the capital labour ratio is low and hence in a majority of steel items India exports low quality iron and steel products and imports high quality iron and steel products.

CHAPTER 5

Summary and Conclusion

Trade liberalisation has brought about significant changes in India's steel trade. Before liberalisation exports were not an integral part of steel production but now exports have become an important consideration for steel production. It is mostly the private producers who have utilized this opportunity offered by the opening of the economy. The fact that in the post-liberalisation period steel exports have been increasing shows that the Indian steel industry has developed significant competitive strength, which has enabled it to sell in the world market. Further, the country's export basket has changed in favour of more value added and sophisticated products like GP/GC sheets, CR coil/sheets, HR coils/sheets etc. The export destinations have also broadened with the Indian steel reaching a very large number of countries in all the continents of the world. India's major market for steel products include Belgium, USA, Canada, Indonesia, Italy, Nepal, Sri Lanka, Thailand, West Asia etc.

On the other hand, with the removal of physical controls and lowering of import duties, the domestic prices are moving in tandem with international prices. As a result imports have been taking place due to price considerations as a substitute for dearer domestic products increasing the vulnerability of Indian domestic producers to cheap imports considerably. In last few years imports have also taken place to bridge the gap between demand and supply of steel. Further, there are products like electric sheets and tin plates, for which the demand is so low that it is not viable to produce them economically on scale consideration within the country that they have to be imported.

The detailed structures of exports and imports have revealed that a considerable amount of intra industry trade is taking place within the Indian steel industry. Using the Grubel Lloyd Index of intra-industry trade it has been found that IIT in the Indian iron and steel industry has increased significantly over the years. More than fifty per cent trade is in the nature of IIT in the steel industry. In line with the IIT theories the study finds that economic integration with the world economy, the growing GDP/ market size of the country, the advantage of being located near to some of the major

steel producing countries and having well established trade routes and ports have boosted India's IIT in steel products.

Further the study has also attempted to find out the nature of IIT. It has been found that overall IIT in the Indian iron and steel industry is dominated by horizontal IIT but product wise it is seen that vertical IIT dominates. The dominance of horizontal IIT is mostly due to the product 7208 (flat rolled products of iron/non-alloy steel of width of >= 600 MM, hot rolled, not cold rolled, plated/coated) which being the most important intermediate product of steel is produced on a large scale thereby facilitating economies of scale in its production. Hence these products are exported and imported due to differences in attributes and not due to quality differences. But in the case of a majority of products India exports low quality products and imports high quality products which is in conformity with the theory that a labour-abundant country specialises in low quality products due to lower capital labour ratio. This implies that most of the steel products produced in India are of inferior quality.

Most of the exports are done by the private sector. The fact that in most of the items India exports low quality products of lower prices and imports high quality products of higher price means that though the private sector in the country has been using newer technology for steel production than SAIL, whose technology upgradation has been rather slow, implies that even the private sector needs to upgrade their technology more to produce higher quality goods.

The Indian steel industry picked up after a long period of stagnation in the late 1990s on account of the expansion of the world economy and its own domestic economy. Worldwide expansion of the steel industry resulted in an increase in demand for its inputs particularly iron ore. Thus the world supply situation for iron ore came under pressure, which in turn brought about a boom in the mining sector. Extracting iron ore and exporting it became extremely attractive for miners in India as they got huge margins from export. Thus iron ore exports have gone up massively in the last few years. Such increases in exports of iron ore has raised serious concerns of sustainability of iron ore reserves for the domestic steel industries. It was found in this study that the iron ore reserves will be depleted very soon at the present level of extraction and exports. Further a lot of illegal mining has come to light which has made the reserves position even worse.

The study highlights that the country has already become a net importer of steel and if adequate steps are not taken to grant captive mines to the steel producers instead of allowing the ore to be exported to feed foreign plants, then the country will soon become a net importer of both steel and iron ore. Further, domestic producers are now making moves to establish steel plants in other countries where they get captive supplies of iron ore due to lack of the same in their own country. Such a case of flight of capital is bad news for a country whose domestic production is struggling to meet the growing domestic demand for steel. The study also shows that the country is now going back to a pattern observed in colonial times whereby it is exporting raw material i.e. iron ore to China and importing finished steel from it. What is more striking is the fact that unlike in colonial times, today the "exploitation" of the country is happening as a result of its own policies.

The study has also shown that all the arguments that have been advanced to support iron ore exports are far from truth. It shows that excess fines have been extracted solely for the purpose of exports and that the argument that exports consist of excess fines which have no demand within the country is baseless. On the other hand we have seen that the country's own sintering and pelletising capacity has been increasing and hence the demand for fines has been going up within the country itself. Further the study shows that the country is not in such a desperate situation that it needs to export its natural resource to earn foreign exchange. The country has well established itself in the world market that it has other sources of earning foreign exchange. Moreover allowing private mine owners to export has resulted in a lot of illegal mining which is draining the country of a valuable resource and causing huge loss to the exchequer. The study also establishes the point that the ban on exports will not lead to shut down of the private mine owners.

From this study it can be inferred that the major underlying factor which has been crucial in determining the state of the iron and steel industry till today has been the institutional set up under which it has been operating. Post independence the government played a proactive role and took upon itself the task of industrialisation of the country. Since the introduction of large integrated steelworks necessitates large initial investment and the private sector at that time had neither the resources nor the willingness to bear the burden of such risky enterprises, the mammoth steel projects were pursued as state projects. In the pre reform era, the ministry of steel played the

role of a key regulator and was involved in decision making related to pricing, allocation and distribution. Thus the government policies till the 1990s provided a strong foundation for the steel industry by establishing large integrated plants. In the 1990s the government decided to opt for liberalisation as a result of which a large number of controls were abolished, the private sector entered the industry, steel prices came to be market determined and exports and imports of steel began to be done freely. Such easing of regulations led to an expansion of India's steel trade. But, while the country has established itself in the world market, vulnerability to cheap imports has increased many fold. In this era of globalisation maintaining the competitiveness of the steel industry has become essential. Given that the steel industry in India derives its strength from the availability of iron ore, it is important that this competitive advantage be retained by the country. However, the institutional set up related to mining is such that government policies have encouraged exports of iron ore rather than conserving it for the domestic industry. Some of the major policies which have resulted in losses for of the country are detailed below.

1. Policy of allowing Private and Foreign Players to enter into Mining

The National Mineral Policy, 1993 opened up the mining sector to private and foreign players. Since then the FDI policy has been gradually liberalised over the last few years. In 1997 the automatic approval route for investments involving foreign equity participation up to 50% in mining projects and up to 74% in services incidental to mining was introduced. In February 2006, the mining sector was opened up to 100 per cent FDI. The government's decision to allow private and foreign players to enter mining is responsible for the present scenario of iron ore exports from the country. These profit motivated private players entered into mining to gain from the huge margin they would get by exporting iron ore at high international prices. They extracted huge amounts of iron ore and exported them. In such a critical area like mining the government should have adopted a prudent approach of strengthening its own public sector agencies such as the Geological Survey of India (GSI), Mineral Exploration Corporation Limited (MECL), and other state and central agencies for undertaking more exploration rather than liberalising rules related to entry of private sector and FDI.

2. Royalty Structure

The royalty rate structure of iron ore provided a favourable environment for undertaking more mining in order to profit hugely from selling it. The royalty rates for iron ore is fixed by the government of India and levied on iron ore consumed or removed from the lease area as per Section 9 of Mines and Minerals (Development and Regulation) (MMDR) Act, 1957. Royalty rates till 2007 were fixed on the basis of tonnage (per tonne) and grade of iron ore. The rates for various categories of iron ore lumps and fines from mines varied from Rs 11 to Rs 27 per tonne. In other words instead of curbing the excessive tendency for exports, the royalty rates encouraged more exports. Since the rates were based on tonnage, the states did not gain anything from the huge rise in global prices of iron ore. Thus the iron ore production of mineral rich states increased many fold but the revenue of the government did not increase much while the private stand alone miners were reaping substantal gains. The government should charge royalty rates on ad valorem basis instead of the specific duty basis to calibrate royalty rates with prices.

3. Export Duties

Like the royalty rates, the export policies related to iron ore facilitated exports from the country. As per the EXIM policy of India, the exports of iron ore with lower Fe content are free and do not need a licence. Exports of higher grades of iron ore (above 64 per cent Fe content, whether lumps or fines) are canalised through a State Trading Enterprise, MMTC ,and exports of iron ore of Goa origin for certain destination (China, Europe, Japan, South Korea, and Japan) and of Redi origin for all destinations are also free from export control, irrespective of Fe content. There were no export duties on iron ore exports till 2007-08. It was only in 2007-08 that the government introduced export duty of Rs 300 per tonne on iron ore. The effect of such a measure undertaken by the government is seen immediately in the decline in iron ore exports from India in that year.

4. Loopholes in laws

The Mines and Minerals (Development and Regulation) Act, 1957, (MMDR) and the Mines Act, 1952, together with the rules and regulations framed under them, constitute the basic laws governing the mining sector in India. However, the

provisions of the laws provide ample scope to be misused. For example Section 11(5) of MMDR,1957 gives overriding powers to the state governments to recommend grant of prospecting license/mining lease to an applicant who qualifies under section 11(3). This power is invariably misused by the state governments to grant licences to a chosen few. Thus granting of mining leases to genuine investors in the steel sector has been neglected

5. Regulatory framework

The inability of the government to set up a stringent and proper regulatory mechanism has encouraged the growth of illegal mining in India. The following illustrations by Santosh Hedge, the Karnataka Lokayukta who submitted a report on illegal mining in Karnataka stands witness to the fact:

> *"Right from the time when a mining lease is applied for, there are certain guidelines under the Central and the state enactments. At that stage itself, they have to give a sketch of the area where they are going to mine. I found out that sometimes the areas have nothing to do with the sketches that are given with the applications. Nobody crosschecks these things. Therefore, this is the first stage where illegality takes place. Then they take permission, say, for 150 hectares. Those 150 hectares may be in a prohibited area, like a forest area. But they show it as a revenue area, go to the forest area and start mining there. Therefore, you degrade the forest. Then there are Indian Bureau of Mines rules and regulations which control the type of mining you can do—like, you cannot go more than six metres because it may be dangerous ecologically. But they don't care. Therefore, where they are allowed to take 100 metric tonnes, they will take out 1,000 metric tonnes. The entire area surrounding the mining area is totally devoid of greenery and has no agricultural activity. People there have no other vocation. God knows what will happen to them when the mining is stopped or controlled. None of them goes to school or college. All of them have been provided with a motorcycle, a cell phone and a daily allowance. Their job is to just go around and see if any stranger has come to that area and to report it."*

The scenario is one and the same in every other state (Jharkhand, Andhra Pradesh, Orissa, and Chattisgarh). Large chunks of mining land are allotted by the state

governments to the chosen few taking advantage of the loopholes in the mining rules and regulations. Thus the rising iron ore prices have prompted a nexus between some greedy politicians and mine owners. These powerful people have monopolized control over mineral resources.

Thus there is huge scope for flouting the law and the policies of the government are more aligned towards providing benefits to private interests. In the present scenario when the domestic steel industry of the country is expanding, when the steel exports from the country ae rising and when the iron ore supply of the world has come under tremendous pressure due to rising demand, instead of conserving the finite resources for supporting domestic industry which would add value domestically, the country's decision to allow iron ore exports to feed its international competitors is absolutely absurd. While countries like US and China have been following the policy of conserving their natural resources, India chooses to allow its natural resource to be exported, and the benefits are reaped by few rich private and foreign players. Therefore, in the interest of the domestic steel industry and the country as a whole, there is urgent need for the government to wake up and gear its policies towards the conservation of this valuable resource for the domestic iron and steel industry by amending the present rules and regulations related to mining, fixing the royalty rate and export duties in such a way so as to curb excessive exports and establishing a stringent and efficient regulatory framework.

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