Testing the PHH in a Resource-cursed Country: The Case of Iran. An Input-Output Analysis

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International trade promotes economic growth and development. And economic growth is associated with energy use, which contributes to environmental degradation. So in essence free trade compromises environmental quality but favors distributional income improvements and economic prosperity. Iran is the world's ninth largest emitter of CO_2 according to a 2016 report by the International Energy Agency. An investigation into a CO_2 emission, as embodied in Iran's imports and exports is likely worthwhile. This paper aims at contributing to environment trade debate by evaluating the impacts of international trade on emissions of co2 (Carbon Dioxide), we have used an index of pollution terms of trade.

We examined changes in Iran's emissions of CO_2 as embodied in trade using Iran's (industry by industry) input-output accounts for 2006-2007 and 2011-2012. I thus examine whether Iran's economy leans toward being a pollution haven, an economy that has a particular set of factor endowments like oil production, neither, or both. This paper challenged the compatibility between environmental and international trade policies. Results show that the indices are below 100, indicating that Iran produced goods that are more environment friendly than goods it imports, thus challenging the pollution haven hypothesis for Iran.

Key words: International trade, environment, pollution haven, IO Analysis.

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Introduction

The dominant trend in the economy in the 1990s was toward liberalization of trade. At the global level the decade witnessed a new round of negotiation under the General Agreement on Tariffs and Trade (GATT) that resulted in the formation of World Trade Organization (WTO). At the regional level also, free trade agreement were initiated or strengthened in Europe, Asia, Latin America and North America. International trade plays an important role in shaping the industrial structure of a country and consequently in affecting country's environment. The WTO in its recent reports has analyze relationship between trade and environment (Nordstorm and Vahugan, 1999).

International trade allows a country to 'de-link' partially its domestic economic and ecological systems, as goods can be produced by other national systems (Daly 1993; Pearce and Warford 1993; Proops et al.1999) In such a cases, the impacts of producing goods harm the ecological system of exporting country (where production take place) rather than ecological system of the importing country (where consumption occurs). In this sense it might be possible for one country, but not for all, to 'save' its own carrying capacity by shifting away environmentally sensitive activities (natural resources and pollutant-intensive activities).

All goods and services produced in an economy are directly and or/ indirectly associated with energy use and, according to type of fuel utilized, with co2 emission as well. International trade is an important factor in shaping the industrial structure of a country and, consequently, in affecting a country's energy use and co2 emissions. The long-term increase in earth's temperature known as the global warming or the greenhouse effect. The accelerating use of fossil fuels since the industrial revolution, and the rapid deforestation cause a significant increase in the anthropogenic greenhouse gases. Among these anthropogenic greenhouse gases, Carbon dioxide (CO_2) is held responsibility for approximately 60% of the greenhouse gas effect (G.Ipec.Tunc,Serap turut-Asik,2005).

As a result of this extensive increase in the emission of greenhouse gases some international steps have been taken. As an important first step UN conference on Environment and development is held in Rio de Janeiro in 1992 and has formed the UNFCCC to protect the earth's climate system against the effects of greenhouse gases and global warming. Kyoto Protocol, signed in 1997 and enacted on February 16, 2005. (Gilpin 2000; Meyerson 1998; Ziesing, 2001).

A policy of trade liberalization is often suggested as a means of stimulating economic growth in developing countries. Trade liberalization consists of policies aimed at opening up the economy to foreign investment and lowering trade barriers in the form of tariff reduction. However, while trade may stimulate growth it may simultaneously lead to more pollution either as a result relocation of polluting industries from countries with strict environmental policy or owing to increased production in dirty industries (Kakali Mukhopadhyay and Debesh Chakraborty, 2005). Thus what happens to the environment when international trade is liberalized is a matter of debate. It is commonly assumed by economists and environmentalists alike that greater economic openness will lead to increased pollution in developing countries, as free trade will increase environmental degradation in developing countries. Recent economic literature on the relationship between international trade, economic growth and environment is more positive. It seeks to empirically test hypotheses about how growth or trade effects the environment, which is crucial for resolving current policy debates. One of the important hypothesis, that predict how international trade affects the environment called ‘’ *pollution haven hypothesis”* (PHH). The mentioned hypothesis (PHH) predicts that, under free trade, multinational firms will relocate the production of their pollution-intensive goods to developing countries, taking advantage of the low environment monitoring in these countries (Umed Temurshoev, 2006). Over time developing countries will develop a comparative advantage in pollution-intensive industries and become ‘‘havens’’ for the world’s polluting countries. Thus developed countries are expected to benefit in terms of environmental quality from trade, while developing countries will lose.

We will test (PHH) hypothesis for Iran. The reason to choose Iran is as follow; first, according to report of (IEA) in 2016 ten countries; China, USA, India, Russia, Japan, Germany, South Korea, Canada, Iran and Saudi Arabia emitted more than 20 thousand million tons of co2, which is equal to two-third of the world’s total emissions. Iran is the 9^{th} largest emitters of the carbon dioxide (co2) which is the most prominent greenhouse gas (76%) in the earth’s atmosphere (IEA, 2016 Reports).Second, since Iran is an oil-reliant economy, therefore, it is a good sample of resource-rich developing country as it has a set of factor endowments like oil production could be appropriate choice for this study.

This study focuses on following main issues. Does Iran benefit from international trade in terms of pollution emissions? What is the tendency of these benefits (losses) over time? Here, especially, the consequences of Iran trade on its environments are of particular interests. The answers to these questions then shed light on whether the PHH is in line with the outcomes that are based on the real data. The plan of the paper is as follows.in the section 2, the literature review will be discuss. We present an underlying model and the input-output techniques in section 3. The empirical tests for Iran are carried out in section 4.sction 5 presents our conclusion and argues on hypothesis tests on Iran.

Survey of selected literature

In the late 1960s, some specialist brought IO analysis from economics to energy and environmental fields (Daly, 1968; Isard et al., 1968; Ayres and kneese, 1969; Leontief, 1970). The application of IO techniques in these fields allows one to trace, throughout an economy, the direct and indirect energy and environmental impacts of changes in the final demand. It means that one may attribute those impacts to the ultimate source of its demand. Such a techniques proved to be very useful for the development of the energy analysis tools during the 1970s and 1980s (Wright, 1974; Herendeen, 1974; Bullard and Herendeen, 1975; Bullard et.al, 1978; Costanza, 1981; Hannon et.al, 1983; Casler and Wibur, 1984). Moreover its usage has provided important insights to guide energy and environmental policies in several countries (see, for instance: Darmstader et al., 1977; Ostblom, 1982; Roop, 1987; Gowdy and Miller, 1987; US DOE, 1989; US Congress 1990; Casler and Blair, 1997).

To highlight what has been done in the empirical examination of the relationship between trade, growth and the environment we review the empirical literature next, which we divide into three categories.

The first branch of literature on the empirical testing of these issues examined relatively simple statistical exercises on trends of “dirty goods” production, consumption, or trade, and largely lacked a sound theoretical background. Authors first classified industries into dirty and clean industries on the basis of their emission intensity (emission per US dollars (USD) of output), toxic intensity (physical releases per USD of output), or pollution abatement costs as a fraction of value-added. In some cases they employed regression analysis where income differences, measures of openness and income growth rate were used as explanatory variables. Among other papers, this literature includes Low and Yeats (1992), Lucas et al. (1992), Mani and Wheeler (1997), Xu (1999).

Low and Yeats (1992) find that the share of "dirty" industries in exports from developed countries fell from 20% to 16% over the 1965-1988 period, while the share of dirty goods in exports from poor countries rose. The last numbers are different by regions: in West Asia the percent rises from 9% to 13%, in Eastern Europe from 21% to 28%, in Latin America from 17% to 21%, and in South-East Asia the share of dirty goods exports in total exports is flat at 11%.

Lucas et al. (1992) empirically examine how the structure of manufacturing production varies, both across countries and over time, in relation to the toxic emissions of component industries. They find evidence for an inverse U-shape relationship between industrial pollution intensity and income. It is also concluded that the poorest economies have the highest toxic intensity growth, and pollution intensity has grown most rapidly in relatively closed developing economies, while for more open countries the opposite is true. The result is opposite to the PHH prediction, since under the PHH relatively closed poor economies should have a cleaner mix of industries, and it is trade that makes them dirtier.

Mani and Wheeler (1997) examine the PHH using international data on industrial production, trade and environmental regulation for the period 1960-1995. Their cross-country analysis gives a result that is consistent with the PHH. They find that pollution intensive output as a percentage of manufacturing has fallen consistently in the OECD economies and risen steadily in the developing world. Besides, it is revealed that periods of rapid increase in net exports of pollution-intensive product coincide with periods of rapid increase in the costs of pollution abatement in the OECD countries.

Xu (1999) examines whether stringent environmental standards reduce the international competitiveness of environmentally sensitive goods (ESGs – goods with high levels of abatement expenditures per unit of output), using data for 34 countries for the period of 1965-95 that accounted for nearly 80% of world exports of ESGs in 1995. The main empirical finding of the paper is that despite the introduction of stringent environmental standards in most of the developed countries in the 1970s and 1980s, export performance of ESGs ("dirty" goods) for most countries remained unchanged between the 1960s and 1990s.

We should note the following concerning the first group of empirical research. Firstly, the trend of dirty goods production is not necessarily a good measure of pollution levels. Over time the technology of production of dirty goods changes as well, thus an increase in dirty goods production is associated both with more and less pollution levels. And secondly, this literature lacks theoretical concern that resulted in not taking into account many other factors, which potentially affect pollution, limiting the analysis only to income levels as a major determinant of the change in trade patterns.

The second branch of empirical literature focus on the effect of stringency of environmental policy on trade flows, foreign direct investment flows, or plant location choices. These studies can be interpreted as a test of the PHH. And several of these studies attempt to estimate and then add up the so-called scale, composition and technique effects arising from trade liberalization (see below for details) These studies can be divided into groups that are consistent with the time of research as well. The earlier studies concluded that there is little or no effect of differences in environmental policy on trade or investments flows.

The second wave of these studies, accounting for endogeneity of pollution policy and unobservable industry- or country- specific variables, ended up with a complete reverse conclusion, i.e. differences in environmental regulation do affect trade and investments flows. In particular, we should note Tobey (1990),Grossman and Krueger (1993), Levinson and Taylor (2001), Antweiler et al. (2001), Dean (2002).

Grossman and Krueger (1993) is the first study that introduced the notion of scale, composition and technique effects. The authors argue that trade liberalization generally will affect the environment by expanding the scale of economic activity, by changing the composition of economic activity, and by bringing about a change in the technique of production. On the basis of their estimates, they conclude that any income gain created by NAFTA would lead to lower pollution in Mexico. And combining the evidence on scale, composition, and technique effects, the authors conclude that trade liberalization alone via NAFTA should be good for the Mexican environment, but if NAFTA led to increase capital accumulation, then the consequences are not quite clear.

Atweiler et al. (2001) develop a theoretical model, in which trade's impact is separated into scale, technique and composition effects, and then estimate and add up these effects using data on sulfur dioxide concentrations. Both the PHH and the FEH predict that openness of trade will change the composition of output in a way that depends on a nation's comparative advantage. In their estimation to account for this fact, the authors use the interaction of openness with relative income per capita (PHH) and relative capital to labour ratio (FEH). Their estimated effect is quite small indicating that the PHH and the FEH tend to roughly offset each other. That is rich countries are capital abundant, which leads them to become dirtier with trade, but they also have stricter environmental policy which leads to a comparative advantage in clean goods. Thus a small net effect is equivalent to the offsetting motives discussed above. Their estimates of the scale and technique elasticities show that a 1% increase in both output and income due to free trade will decrease pollution concentrations by approximately 1%. Summing up this with composition effects the authors conclude that free trade is good for the environment.

Dean (2002) comes up with a simultaneous equations system determining growth of income and growth of environmental damage, where the supply of clean environment is endogenous. The model describes the effect of trade liberalization on the growth of environmental damage through two mechanisms: direct effects via changes in relative prices and indirect effects via growth of income. The finding is then applied to Chinese provincial data on water pollution. The author finds that a fall in trade restriction (black market premium is a proxy) raises pollution directly, but since more free trade also raises income, via income growth the initial increase in pollution is mitigated. Overall the net effect of freer trade seems to be beneficial for the environment in China.

And finally, the third group of empirical literature on environmental damage of free trade includes research by specialists using input-output techniques as a main tool of study. Among others, these are Gay and Proops (1993), Wyckoff and Roop (1994),Hayami et al. (1997), Proops et al. (1999), Lenzen (2001), Machado et al. (2001), Dietzenbacher and Mukhopadhyay (2004), Mukhopadhyay and Forssell (2004).

Wyckoff and Roop (1994) argue that global warming policies based on reducing domestic greenhouse gas emissions ignore the importance of carbon embodied in international trade flows. The authors conclude that a significant amount (about 13%) of total carbon emissions of the six largest OECD countries is embodied in manufacturing imports. For policy implications the paper suggests: expanding the accounting of carbon emissions to include the carbon embedded in imports of non-energy goods; taking care of technological change for certain industries that are the main source of the carbon embodied in imported manufactured products; and including as many countries as possible in the treatment of solving problems of trade and environmental quality.

Hayami et al. (1997) focus on environmental management issues, and suggest a systematic approach involving both technology choice and consumer preference for controlling the total emission of global warming gases. Carbon dioxide and other global warming gases are produced when fossil fuels are burnt, which takes place in both the production and consumption of goods and services. The authors discuss how IO analysis can be used to estimate the entire production and consumption of global warming gases conditional on production technology and consumer preferences.

Gay and Proops (1999) discuss carbon dioxide in the UK, and find that a huge amount of this emission (more than 60%) is produced for the satisfaction of the indirect production demand for fossil fuels. This result justifies and strengthens the use of IO techniques, since the last method takes full account of indirect relationships among production sectors in the economy, thus is an ideal tool for the analysis of economic systems.

Machado et al. (2001) evaluate the effect of international trade on energy use and CO_2 emissions in the Brazilian economy. They conclude that in 1995 total energy and total carbon emissions embodied in the export of non-energy goods are larger than the appropriate amounts embodied in the imports of non-energy goods, which confirms the HH.

Dietzenbacher and Mukhopadhyay (2004) empirically examine the PHH for India as an example of a developing country. The authors calculate by how much pollution (CO_2, SO_2 and NO_x) will increase if exports are raised by one billion rupees, using the actual share of each commodity in total exports. This is then compared with the reduction of pollution due to an increase of India's imports by one billion rupees, using the actual commodity shares in total imports in computation. Under different assumptions of pollution from fossil fuel combustion (production-generated pollution and consumption generated pollution), the authors find that India gains considerably from extra trade, thus rejecting the PHH. The results show that over time this benefit only increased thus India has moved further away from being a pollution haven. This exercise is very similar to the test that was carried out by Leontief about fifty years ago in empirical examination of the Heckscher-Ohlin (HO) theory, where he compared the direct and indirect labor and capital requirements of one million US dollars of extra exports and imports (Leontief, 1953, 1956). His surprising result was later to become known as the "Leontief paradox". In contrast to Leontief's work, the authors compare emissions of carbon, sulfur and nitrogen dioxides of extra imports and exports. The inconsistency of the empirical results and the theory (i.e. the PHH), led them to introduce the term "Green Leontief Paradox".

Concluding the review of literature above, it is apparent that the empirical results are different and ambiguous for PHH on different economy, thus it seems important and interesting to test the hypothesis in the example of developing and oil-reliant economy like Iran. Unfortunately a broad study have not been done in Iran. Ali Asghar Banouie, Elham Kamal (2007) studied the direct and indirect co2 contents in import and export of Iran, Vasfi Asfastani (2007) assessed the co2 emissions of energy consumption in economic sector of Iran, Torabi and Varesee (2007) reviewed the path of co2 emissions in industry sectors of Iran. The present work aims to contribute to the environment and trade debate by challenging the compatibility between environmental and international trade policies in oil-reliant economy as Iran.

Methodology

We start with the familiar Leontief input-output framework:

$$\mathbf{g} = \mathbf{A_d x} + \mathbf{f} \qquad (1)$$

or re-arranging

$$\mathbf{g} = (\mathbf{I} - \mathbf{A})^{-1}\,\mathbf{f} \qquad (1a)$$

where **g** is domestic output for n industries and **A** the $n \times n$ matrix of domestic direct requirements by industry, $(\mathbf{I} - \mathbf{A})^{-1}$ is the Leontief inverse of **A**, and **f** in the vector of total final demand for each of n industries.

I) Emission model

With slight modifications, a model of emissions can be elaborated based upon Equation (1a). The total amount of an emission from fossil fuel combustion can be calculated as a function of the output of industries. To estimate the carbon emission the model will be:

$$\delta = \mathbf{c'Eg} = \mathbf{c'E}\,(\mathbf{I} - \mathbf{A})^{-1}\mathbf{f} \qquad (2)$$

Here δ is a scalar that represents total CO_2 emissions from burning fossil fuels in Iran. The vector **c** relates the CO_2 emissions average release per physical unit each type of the k fossil fuels used in Iran. (the mark ′ denotes an array transpose). The matrix **E** ($k \times n$) reports the amount of physical energy units for each of the k fuels types consumed per monetary unit of output for each of the n industries. Thus, in Equation (2), $\mathbf{c'E}$ identifies the direct pollution per monetary unit of output by industry.

If $\mathbf{e} \equiv \mathbf{c'E}$ and $\mathbf{L} \equiv (\mathbf{I} - \mathbf{A})^{-1}$ then Equation (2) can be rewritten:

$\delta = \mathbf{eLf}$ (2a)

Trade model

To link trade to emissions we need only expand final demand so that isrepresented in matrix form **F**. That is, assuming the data are available, let $\mathbf{F} \equiv \{\mathbf{f}_d\ \mathbf{f}_x\ \mathbf{f}_m\}$ such that

$$\mathbf{f} = \mathbf{f}_d + \mathbf{f}_x - \mathbf{f}_m \quad (3)$$

where $\mathbf{f}_d$ is the vector of domestic final demand for each industry, $\mathbf{f}_x$ is the vector of export demand for each industry, and $\mathbf{f}_m$ is the vector imports by industry.

We assume that other countries also have Iran's technology by industry (an assumption first applied by Heckscher and Ohlin) in order to estimate the pollution content of imports from the rest of the world. In this vein, the pollution content of exports and imports can be defined as in equations (4) and (5).

$$\delta_x = \mathbf{eLf}_x \quad (4)$$

$$\delta_m = \mathbf{eLf}_m \quad (5)$$

If we diagonalize the *n*-dimensional final demand components such that they become $n \times n$ matrices denoted as $\hat{\mathbf{f}}_x$ and $\hat{\mathbf{f}}_m$. Then we can rewrite Equations (4) and (5) to obtain vectors $\boldsymbol{\delta}_x$ and $\boldsymbol{\delta}_m$ of dimension *n*, which layout the emissions by industry in Iran due to exports and imports, respectively:

$$\boldsymbol{\delta}_x = \mathbf{eL}\hat{\mathbf{f}}_x \quad (4^*)$$

$$\boldsymbol{\delta}_m = \mathbf{eL}\hat{\mathbf{f}}_m \quad (5^*)$$

Using these, a vector of *pollution terms of international trade* by industry, $\boldsymbol{\tau}$**,** for Iran can be derived:

$$\boldsymbol{\tau} = \boldsymbol{\delta}_x \oslash \boldsymbol{\delta}_m = \left(\mathbf{eL}\hat{\mathbf{f}}_x\right) \oslash \left(\mathbf{eL}\hat{\mathbf{f}}_m\right) \quad (6)$$

where $\oslash$ denotes Hadamard (element-by-element) division between two similar arrays.

Data

This study uses two input-output table of the Iranian economy for the years 2006-2007 and 2011-2012 prepared by the Parliament Research Center of Iran. Input-Output tables are industry by industry tables, consisting of 53 x 53 sectors. These 53 sectors are a proper mandate for Iran's exports and imports because it extensively covers all sectors of the economy. In order to acquire commensurability over time, the 2006-7 table was expressed in 2011-12 prices employing the proper price indices.

- **Data on Emissions of Pollutant**

The for CO_2 emissions from fossil fuel combustion have been estimated by IPCC (Inter government panel on climate change) guideline where, total emissions = (Actual fuel consumption) * (Carbon dioxide emission factor) * (Fraction of carbon dioxide) * (Molecular weight ratio).

Results and Discussion

The strategic interaction of environment and trade policy has been an important feature of the theoretical literature regarding the pollution haven hypothesis over the past 10 years. In this section we shall present the results of the application of the models developed in the methodology section to test the hypothesis for Iran and also analysis of the results.

Evidence on the pollution haven hypothesis from Iran's trade with the rest of the world

To test the pollution haven hypothesis we have used an index known as pollution terms of trade (equation 6). We have computed the pollution terms of trade of Iran with the world for co2 emissions in 2006-2007 and 2011-2012. Results are presented in table 1.

Is Iran gaining or losing environmentally by engaging in international trade? Using an index, which measures the pollution term of trade, the empirical assessment of environmental gains for India has been made.

From the model we have computed pollution terms of trade of Iran for co2 in 2006-2007 and 2011-2012 on the basis of Eq. (6) as described in model section. The result are presented in table 1.

The value obtained is 47.23% for CO_2 in 2006-2007 and went up to 55.37% in 2011-2012.the values of indices of Pollution Term of Trade (PTOT) of the pollutants have increased in Iran during this period. The values of indices is below 100 indicating that Iran export goods that are produced more environment friendly than goods it imports.

It is clear from Table 1 that imported related pollution is much larger than the export pollution in Iran. Therefore Iran gains in terms of emissions from trade. Thus Iran cannot be characterized as a pollution haven.

A look at the composition of export and imports in Iran (table 2), indicate several features. Exports are primarily dominated by petroleum products having share 14.18% in 2006-2007 and 17.22% in 2011-12. Natural gas (12.44% in 2006-7 and 14.55% in 2011-12) and chemical and plastic products (11.55% in 2006-7 and 12.10% in 2011-12 contribute the good share.) on the other hand, manufacturing (17.11% in 2006-7 and 20.34% in 2011-12 respectively), machine tools and other metal products (15.30% in 2006-7 and 18.33% in 2011-12) and electrical equipment and machinery (12.22% in 2006-7 and 13.11% 2011-12) are the major items in import basket. These products are the source of pollutant while the exportable generates less pollution (tables 1, 2 and 3).

It is evident from these tables petroleum products which are export items though generate higher levels of pollution are, however, outweighed by the pollution generated by import items like manufacturing products machine tools ,other metal products and electrical equipment and machinery sector.

Conclusion

Increased use of fossil fuels as a result of rapid industrialization can be cited as one of the reasons of global warming. Increased international consciousness regarding the long term implications of global warming, had led to international cooperation in the reduction of greenhouse gas emissions. In this context, it becomes extremely important to measure accurately the greenhouse gas emissions of counties.

In this study, an input-output model that focuses on trend of co_2 emissions on export and import of Iran is developed. The model is applied to Iranian economy by using 2006-7 and 2011-12 tables.

In this paper we have examined whether Iran is a pollution haven. We have calculated that how much the pollution CO_2 emissions in Iran will increase if exports are raised by 1 billion Rial, using the actual share of each sector in total exports.in the same way, it was calculated by how much Iranian pollution will fall due to an increase of its imports by 1 billion Rial. The emissions will be reduced because the goods that are now imported are no longer produced domestically.

The results showed that increase in pollution caused by the extra export is much smaller than the decrease in pollution due to extra imports.so in the terms of pollution, Iran gains from extra trade. According to the pollution haven hypothesis, we would expect that a developing country loses from extra trade, while its trading partner gains. Our finding clearly indicate that the pollution haven hypothesis should be rejected in the case of Iran.

Tables list

Pollution terms of trade for Iran (2006-2007)

(in mt. tonnes of CO_2)

(Table 1)

	(2006-2007)	(2010-2011)
Pollution content of exports	101.44	188.04
Pollution content of Imports	214.77	282.55
Pollution terms of trade	0.4723	0.5537
Pollution terms of trade*100	47.23	55.37

SHARE OF EXPORTS OF DIFFERENT SECTORS AND CO2 CONTENT

(Table 2)

Major Sectors	Export Share 2006-2007 (Share percentage)	Export Share 2011-2012 (Share percentage)	CO2 Content of Exports 2006-2007 Co2	CO2 Content of Exports 2011-2012 Co2
Petroleum products	14.18	17.22	11.44	14.26
Natural gas	12.44	14.55	10.22	13.30
Chemical,rubber and Plastic Products	11.55	12.10	11.21	13.01
Other Mining & Quarrying	11.13	14.24	10.33	14.20
Other services	10.66	11.55	8.77	11.98

Iron & Steel and allied activities	5.66	7.99	6.33	.866
Hand, machine tools and other metal products	4.22	7.66	6.31	8.98
textile	5.10	7.55	4.44	6.55
Transport Equipment	2.19	4.12	5.23	7.23
Electrical equipment & Machinery	2.44	3.77	3.66	5.42
Dairy, Bakery and Misc. products, Edible Oils	2.30	4.51	1.31	3.24
Trade & Transport	2.23	4.43	2.33	4.67
Financial sector	3.45	5.12	3.23	4.99
Processed Food Products	1.22	2.89	1.88	2.56
Agriculture	1.19	2.22	1.77	2.54
Forestry	1.21	2.10	1.06	1.10

SHARE OF IMPORTS OF DIFFERENT SECTOR AND CO2 CONTENT

(Table 3)

Major Sectors	Imports Share 2006-2007 (Share Percentage)	Imports Share 2011-2012 (Share Percentage)	CO2 Content of Exports 2006-2007	CO2 Content of Exports 2011-2012
Manufacturing	17.11	20.34	11.32	15.22
Hand, machine tools and other metal products	15.30	18.33	10.12	13.66
Electrical equipment & Machinery	12.22	13.11	10.89	12.44
Chemical Rubber and Plastic Products	11.10	12.56	10.50	12.34
Other Mining & Quarrying	11.06	13.44	10.46	13.26
Natural Gas	11.02	13.32	10.22	12.89
Iron & Steel and allied activities	10.89	13.04	10.12	12.66
Petroleum & Coal Tar products	10.80	12.87	9.89	12.21
Coal & Lignite	9.98	11.86	9.66	12.04
Transport Equipment	9.88	11.60	9.60	12.02
Dairy, Bakery and Misc. products, Edible Oils	8.80	10.59	8.54	11.90
Financial Services	7.20	9.87	7.56	10.34
Trade & Transport	7.11	8.94	7.46	9.76
Textiles	6.56	7.66	6.77	8.97
Paper Products & Publishing	6.43	7.45	6.87	8.45
Forestry	4.76	6.87	5.89	7.94

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