The Impact of Export Restrictions on the Structure of Iran's Non-oil Export with an Emphasis on Mining Sector

By

ADELI, Abdolhamid

THESIS

Submitted to

KDI School of Public Policy and Management

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ABSTRACT

The present study investigated the factors affecting Iran's non-oil exports especially in exportation of mineral products with an emphasis on export restrictions. For this purpose and in the first step, the literature on the export restrictions was reviewed and the main restrictions imposed on Iran's non-oil exports in the recent decade were taken into consideration. In the next step and in a descriptive examination, the structure of Iran's non-oil export was considered in terms of factor intensity of production and the technology level, and the impact of international sanctions was identified as the main export restriction on this structure. In the last step, the demand for and the supply of Iran's non-oil exports in the period 1987-2017 were estimated in the framework of Simultaneous Equation Model (SEM) and using Two-Stage least squares (2SLS) for total Iran's non-oil exports and its mining sector for the purpose of modeling to determine the factors affecting the exportation and examining the impacts of sanctions.

The results show that Iran's non-oil exports have decreased as a result of the international sanctions despite the foreign exchange surge in Iran in 2012. In addition to these sanctions, the structure of Iran's non-oil export has not undergone any manifest change in terms of the extent of the factor intensity of production, while as far as technology is concerned, the exportation of higher-technology products has been impacted by the sanctions to a greater extent. According to the estimated coefficients in the function of demand for non-oil exports, the price of the foreign goods and the revenues of other countries are some of the main factors affecting the demand for Iran's exports, and the price and income elasticities in the minerals exportation sector have been obtained as higher than those of the total non-oil exports. The important point in estimating the demand function is that the coefficient of dummy variable is different in estimating the impact of the sanctions such that this coefficient is negative and significant for Iran's total non-oil exports indicating the effectiveness of the sanctions in restricting Iran's non-oil exports while the coefficient for the mineral products exports is positive for mineral product exportation. In conclusion, it should be mentioned that according to the achievements of the present study and the estimated model, more than two thirds of Iran's non-oil exports are composed of the raw and resource-based products, and the factors affecting the demand and supply in exportation show that Iran's non-oil exports are mainly demand-oriented and some factors such as the world prices, revenues of other countries and sanctions were more effective in restricting them than the supply factors such as investment or productivity. The results of the model and structure analysis show the small impact of the sanctions on raw materials sectors.

Keyword: export restrictions, non-oil export structure, export demand and supply, mineral products export, Two-Stage least squares (2SLS): JEL, F31 and F13

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1. INTRODUCTION

1.1 Background

The trade negotiations among the countries of the world have been held in the framework of General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO) in the last half-century. The bilateral and multilateral negotiations focused on decreasing the importation obstacles that were placed by the governments to preserve and protect the national market and to support domestic production. Upon achieving the acceptable results in decreasing the tariff and non-tariff obstacles in exportation, the range of this focus has extended over recent years, and placing obstacles for exportation and imposing export restrictions in the public and private sectors have received attention.

The present paper seeks to analyze the subject of export restrictions impacting Iran's non-oil exports. The reasons for and goals of the export restrictions will be explained in the following, and government's tools applied to use the exports restrictions will be also explained. However, the existence of different authorities to impose export restrictions should be addressed in the introduction. A government may place some obstacles on the way of exportation for some different reasons including protecting the natural resources or generating revenue, and at times one or more countries may impose some export restrictions on a certain country's exportation because of different political and economic reasons. The investigations suggest that Iran's foreign trade has been subject to both of these restrictions over the last decade. On the other hand, Iran's government has imposed some restrictions based on some considerations such as prevention from economic rent or creation of greater value added. Also, the international community has imposed some restrictions on Iran's foreign trade to put political pressure.

1.2 Objective of the Study

The restrictions imposed on Iran's trade mainly hit importation, and the relevant literature on exports restrictions is new. The novel and innovative approach adopted by the present research consists of reviewing the relevant literature and analyzing the mentioned restrictions on Iran's the non-oil exports in terms of applying factor intensity of production and technology level.

1.3 Significance of the Study

Identification of the main factors affecting demand for and supply of Iran's non-oil exports with an emphasis on the role of the sanctions is another reason necessitating conducting this research to make policies in the field of foreign trade.

1.4 Research Questions and hypothesis

Does the imposition of international sanctions have the same impact on all sections of Iran's exports? This is the question the present research tries to answer, and it is assumed that the sanctions have had the same impact on all sections.

1.5 Scope of the Study

To prove the research hypothesis and to find the answer to the research question, the present paper was designed as follows. The theoretical foundations and review of literature were included in the second section, also the definition of the export restrictions and the reasons for the restrictions and some instances of the case studies in some selected countries were provided in the same section. In this section, the structure of Iran's non-oil export was determined based on the factor intensity of production and technology level with the help of the common classifications in the international trade. Next, the impact of the main restrictions imposed on Iran's non-oil exportation was identified based on the statistics. In the third section, the model was specified in the framework of Simultaneous Equation Model (SEM) in order to evaluate the

main factors affecting the demand and supply in Iran's exportation, and the data used in the model and resources used to access them were introduced. The results of model estimation and the interpretation of the coefficients of the demand and supply functions of Iran's non-oil exports are analyzed in the fourth section. The conclusion and policy recommendations have been presented in the fifth section.

2. THEORETICAL FOUNDATIONS AND REVIEW OF LITERATURE

2-1. Definition of export restrictions

Kim addressed the literature on the trend in export restrictions on raw materials in a paper with the same title. According to this research, the definition of the export restriction is the first challenge in this field. The Dispute Settlement Body (DSB) of the World Trade Organization (WTO) has defined the framework of the export restrictions in the text of Subsidies and Countervailing Measures as follows: This is a borderline action in the form of the government's rules and regulations that leads to the restrictions in the volume or amount of exportation, or some certain conditions that affect the workflow in this field making the exportation contingent upon obtaining some license or some form of governmental fines or export taxes leading to some restrictions on the amount of exportation. Kim considers the reasons for and goals of the sanctions to be as follows:

1. Export restrictions for non-economic and security reasons, such as a UN Security Council resolution (such as sanctions against specific countries), the Chemical Weapons Convention, the Nuclear Non-Proliferation Treaty, and others.

2. Export restrictions due to non-economical and public health, safety and environmental protection, such as the Basel Convention on the Transfer and Disposal of Hazardous Waste, the Montreal Protocol on Substances that Destroy the Ozone Layer, and others.
3. Export restrictions for economic reasons but in line with international or bilateral agreements or arrangements such as agreements on coffee, sugar, and petroleum.
4. Export restrictions for securing domestic supply of essential products; or to support downstream industries like Fishery products, Forestry products, Mineral products and Agricultural products.

Therefore, there are two main reasons accounting for the imposition of the export restrictions: one of the reasons for the export restrictions is the security and non-economic considerations, and the other one is the economic and security considerations. Iran's trade has experienced both these reasons over different years. On the one hand, Iran's government has imposed some restrictions on exporting some items particularly the minerals and agricultural products according to some considerations like securing domestic supply, preventing from raw material sales, and supplying the raw materials to meet the needs of the domestic industries and preventing from economic rent. On the other hand, Iran's exports have been always subject to America's sanctions and those of other countries around the world and also some of the international authorities and bodies. Thus, both these reasons will be reviewed in the review of literature, and some of the relevant studies will be mentioned.

2-2- A review of the literature on export restrictions for economic reasons

The imposition of export restrictions for economic reasons can be considered as a national trade policy in many countries. Using this policy to control raw materials exports has received more attention over recent years. This policy is implemented to encourage the economic firms to supply the domestic markets with the products they currently provide to foreign markets so that

they change into a source of revenue for the government. Holding the demand constant, this policy decreases the domestic prices. We should bear in mind that the results obtained from this policy differ depending on the size of the country. Implementation of this policy in the small countries decreases the price and transfers the resources to the consumer and government while the adoption of the policy to restrict the exports increases the world price and has a negative impact on global consumers' welfare. There are different types of export restrictions and the economic impacts of each restriction depend on different factors like the type of goods and the market. The export tax is the most common export restriction and other types of export restrictions have been presented in table1. The OECD databank in the field of export restrictions is one of the current rich resources in this field, and much information can be obtained from this databank concerning different types of export restrictions. According to the information provided by this databank, there has been a considerable increase in the use of this tool since 2006 despite the export restrictions for many consecutive years, and 65 countries out of 128 members of the World Trade Organization (WTO) have made use of export restrictions in the period 2003-2009. The greatest increase has been recorded in some regions of the Africa and Americas. The export duties have been mainly placed by the developing countries and underdeveloped countries in the period 2003-2009.

Table 1: Types of export restrictions

Export restriction	
Export tax	Export licensing requirement
Fiscal tax on exports	Captive mining
Export surtax	Dual pricing scheme
Export quota	Restriction on customs clearance point for exports
Export prohibition/ export embargo	Minimum export price/price reference for exports
Qualified exporters list	VAT tax rebate reduction/withdrawal
Other measures	

Source: OECD Inventory of Restrictions on Exports of Raw Materials

According to this report export tax, export quotas and export bans are some of the most common types of export restrictions used by the countries and China, Argentina, India and Pakistan are the countries having imposed the greatest export restrictions.

2-2-1- Evidence of the economic impacts of export restrictions; a case study of the selected countries

1. Tax on coconut export in the Philippines: Bautista (1996) and Warr (2002) examined the effect of the tax on coconut exports in the Philippines, focusing on the effects of export earnings and the welfare of unskilled workers. The currency depreciation of the Philippines in 1970 and the global growth of goods (1972-1974) resulted in significant profits for coconut producers and other major exporters of grain products. The export tax improved the Philippines' terms of trade, reduced inflationary pressure from foreign shocks, and more equitable distribution of income.

2. Rice Export Taxation in Thailand: Warr (2001) highlighted the adverse consequences of income distribution in a study that examines the impact of Thailand's rice export tax. Thai government has taxed rice exports until 1986 with the aim of distributing income. Results show poorer villagers and poorest urban populations have suffered this policy.

3. Argentina is one of the countries that has a long history of imposing export restrictions, especially on feedstocks. Nogues (2008) explores this issue in his study. He pointed out in this study that export taxes and food export restrictions would raise prices. According to data from Argentina, which imposes a heavy tax on food exports, this article suggests that such policies will worsen the country's social and economic performance, and by eliminating these restrictions, the

GDP of Argentina can increase by 2-4%. The most important findings of this research are: Removing barriers to exports in Argentina can increase the level of production and employment in agro activities of primary products: it boosts GDP by 2 to 4 percent and generates 300,000 jobs.

2.3 A review of the literature on export restrictions due to security and non-economic reasons:

As it was mentioned before, one of the reasons for the imposition of export restrictions is the non-economic and security issues that include the sanctions against a certain country, international treaties on non-proliferation of nuclear and chemical weapons and different protocols to protect the public health and environment. Therefore, the economic sanctions are one of the tools used to impose export restrictions that are placed by some countries or powerful authorities on some certain countries for different reasons. This tool has been used since ancient Greek (Hufbaur et al., 2007). They believe that the nature of the economic sanctions has changed over time, and it was just after the second world war that the economic sanctions received attention as a tool to replace military campaign, and it was employed both implicitly and explicitly to change the behavior of the country hit by the sanctions towards a particular issue. According to the published statistics used in the present study, the United States of America alone or along with its allies has used the economic sanctions for 109 times against other countries. Also, the United Nations, England and the European Union have imposed sanctions on some countries for 20, 16 and 14 times respectively. In the following, some of the studies conducted on this issue will be pointed out.

Dollery (1993) indicated that trade and financial sanctions designated have a negative effect on small country welfare. According to this study, capital-intensive import sectors and labor-intensive export sectors are the main which burden financial sanctions.

Bigdeli, Gholami, and Boldaji (2013) employed a gravity model to estimated the effects of economic sanctions imposed on Iran in the time period from 1973 to 2007. According to the results of this study, the the sanctions imposed against Iran had a small and negligible impact on bilateral trade with partners.

Faraji Dizaji (2014) estimated the economic sanctions on government revenue. Results showed that government revenue from oil exports decreased due to sanctions and this could affect government spending as an important factor in Iran's economic growth.

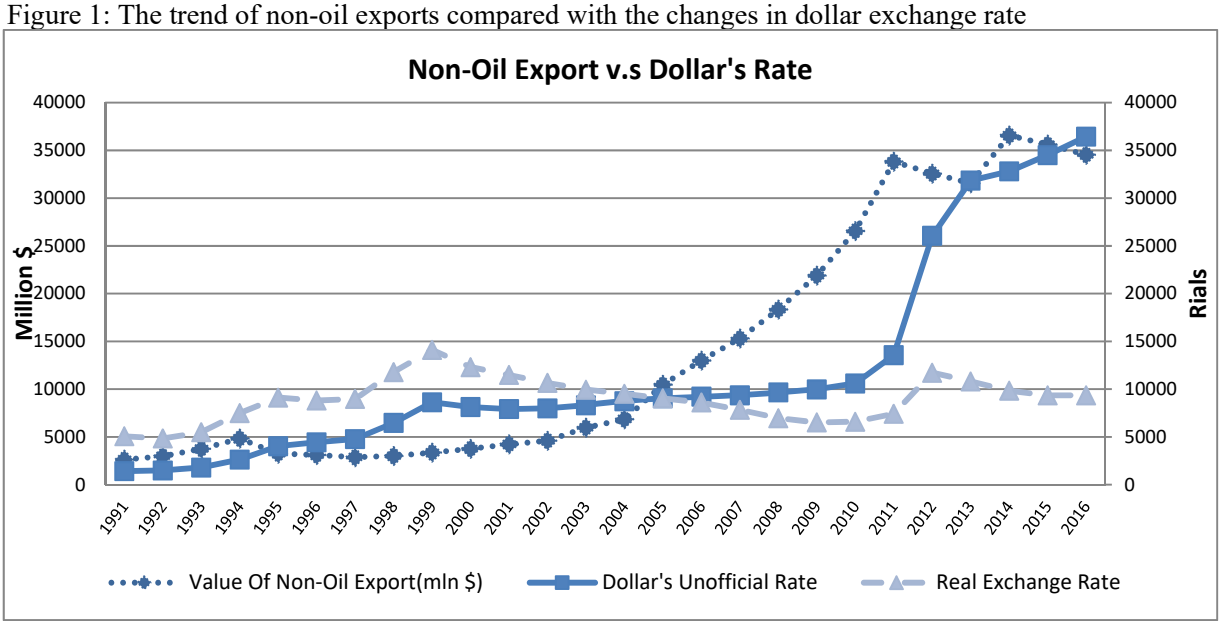
According to the results of Ibrahim Haidar's (2017) study, the imposition of sanctions in 2008 did not affect the trend of non-oil exports of Iran and only the export destinations of Iranian goods switched to countries with friendly political relations with Iran. He believes a country is able to impose sanctions on the export of a country when there are no alternative markets for the exporting country.

2.4 Statistical evidence and export restrictions imposed on Iran's non-oil export:

The trend of Iran's non-oil export in the period 1991-2016 has been presented in the following figure and the growth rate has been presented in the annex table to identify the effect of export restrictions imposed on Iran's non-oil export. It can be inferred from the chart trend and the figures presented in the table that the non-oil export declined at two intervals in the period under study. This is the case while Iran's non-oil export enjoyed a positive growth in the period 1991-1994, the export growth rate reached -33 in 1995. This negative growth also continued for two following years by a lower percentage. In the period when Iran's exportation flourished, the

average non-oil exports growth rate has been close to 20% in the late 1990s and 2000s. However, this positive trend assumed a different pattern in the early 2010s. Iran's non-oil exports growth rates were -3 and -4 in 2012 and 2013 respectively. Though there was a 16% growth in the exportation in 2014, and a negative growth of -3%, in the two following years i.e. 2015-2016, like that of 2012.

Figure 1: The trend of non-oil exports compared with the changes in dollar exchange rate



(Resource: Central Bank of the Islamic Republic of Iran).

Since foreign exchange rate is one of the factors playing an important role in the amount of exportation, it is necessary to analyze the trend of this variable to be able to analyze the non-oil export fluctuations. With regard to the fact that most of the non-oil exchanges are made using US dollar around the world, and the statistics of the non-oil exports is also based on US dollar, thus we base the analysis of foreign exchange rate on US dollar. According to the statistics published by the Central Bank, there are three types of US Dollar (USD) to Iran Rial (IRR) exchange rate in the period under study. The official US dollar exchange rate, the export exchange rate (this rate was calculated and announced by the Central Bank in the period 1987-2001 to support the

exporters) and the unofficial or free market US dollar exchange rate (the US dollar exchange rate in the free market). In addition, the real exchange rate has been calculated to more exactly understand the foreign exchange fluctuations.

As can be seen in the figure1 the non-oil exports growth was negative in the period 1995 and 2012; however, the growth in dollar exchange rate over these years set two historical records. According to the annex table, these two years represent the years when the growth in the dollar exchange rate reached a record peak in the free market. The growth in dollar exchange rate in 2012 set a 92% record in the free market and a 58% growth for the real exchange rate, and these figures increased by 53% and 35% respectively in 1995. The economic theories and International trade studies emphasize the point that the amount of exportation increases along with the devaluation of national currency and increase in foreign exchange rate. Though the highest growth in dollar exchange rate was achieved in the period 1995 and 2012, not only were non-oil exports not ascending in these two years, but they were also descending. This apparent paradox between the economic theories and Iran's non-oil export trend leads to the export riddle that should be solved by referring to the economic and trade policies in those years.

2.4.1 The export riddle in 1995

Iran's non-oil export stood at $3250 million in 1995, while Iran's non-oil export stood at $4824 million in the previous year i.e. 1994. The reason for the 33% decrease in the exports in that year should be sought in the foreign exchange policies. Over these years, the Central Bank of the Islamic Republic of Iran adopted the policy of keeping the foreign exchange rate fixed, thus the official US dollar exchange rate in 1995 was 1750 Iran rial. The export dollar rate was 2895 rial and dollar exchange rate was 3250 rial in the free market. The foreign exchange contracting was concluded in this year along with the initiation of Second Economic Development Plan, and the exporters were required to sell their foreign exchange to the banks at an unreal rate, and this

policy did a great damage to Iran's exports over those years.

2.4.2 Export riddle in 2012

In this year, Iran's non-oil export reached $32567 million. In the previous year, Iran's non-oil export had reached a peak of $33818 million which was the greatest non-oil exports up to that point in the history of Iran. This 3% decrease in Iran's non-oil export took place while the foreign exchange rate followed a completely different trend. The dollar exchange rate set an unmatched record in this year by a 92% growth which made people again think of the riddle how the amount of exportation had decreased despite the considerable increase in foreign exchange rate. The trade policies and the domestic and foreign interference should be exactly investigated in the given period.

The export bans and Iran's government role: The official dollar exchange rate in 2012 was 12260 rial while dollar exchange rate in the unofficial market was more than twice as much, that is, 26590. At that point in time, according to the government, many goods that had been imported into Iran with official exchange rate were waiting to be re-exported to use the economic rent gained from the significant difference between the official dollar exchange rate and the unofficial one. Furthermore, the foreign exchange rate surge provided the exporters of raw materials with a windfall. The government issued the pricing permit for the relevant bodies. In the first week of November 2012, the government issued a decree to ban the export of 52 goods items. There are some different types of goods in the list from wheat flour to steel bar, scrap iron, copper cathode and wire. The lack of expertise in imposing the export restrictions and the negative reactions of the private sector to this decree made the government issues a new circular note two weeks after the issuance of the first one. According to the new decree the goods had been divided into two categories i.e. the goods that were subject to export bans and the ones that

were subject to export restrictions. This decree was adjusted along with the increase in the official dollar exchange rate over some months, and only 17 goods were subject to export ban after one year.

Also, it should be mentioned that the government has used the export restriction tool over different years for some various reasons including protecting the cultural heritage and genetic resources, supporting the infant industries, and supporting the domestic industries and creation of higher value added. However, the government has made use of it over short periods and this is the greatest export restriction in Iran's trade history.

The export sanctions and the role of International Community: Along with the domestic transformations and the government's interference in the exportation through imposing the above-mentioned export restrictions, other countries were also trying to impose some restrictions on Iran's exports to place economic pressures for political reasons. The United Nations passed a resolution in March 2008 imposing new sanction on Iran's non-oil export. This resolution warned the member states of the United Nations against new financial commitments to Iran. USA, the European Union, Canada and Australia were among the parties to implement this resolution by imposing sanctions on Iran's non-oil exports. The Iran's non-oil export trend in the figure 1 shows that it increased in 2008 and for some years on. Therefore, these sanctions did not apparently have any impact on Iran's exports. Jamal Ebrahim has addressed this issue in a paper titled, "Sanctions and Export Deviations: Some Evidence from Iran". He concluded through the use of the exportation statistics and exporters at the firm level that the imposition of sanctions on Iran's non-oil exports in 2008 has not impacted the total amount of Iran's exports and this sanction has exerted only some costs on Iranian exporters and the new export destinations.

In January 2012, the sanctions were approved against Iran's banking system, and SWIFT

disconnected Iranian banks from its international network as a sanction against Iran. These sanctions created major problems for Iran and some other countries in making financial exchanges upon which Iran's foreign exchange market underwent some fundamental changes in the following months. The trend unfolded in such a way that in the first month of the fall of the this year, the difference between the official foreign exchange rate and that of the free market grew more than twice. Also, as it was explained before, the government imposed some severe restrictions and bans to prevent the exportation of the goods that had been imported using the official foreign exchange rate, and also to prevent raw materials sales. These restrictions were cancelled by the foreign exchange rate adjustment by the government, but the descending trend of non-oil exports continued confirming the fact that the export sanctions have a more outstanding role in solving the posed riddle.

2.5 The structure of Iran's non-oil exports in terms of factor intensity of production and technology level

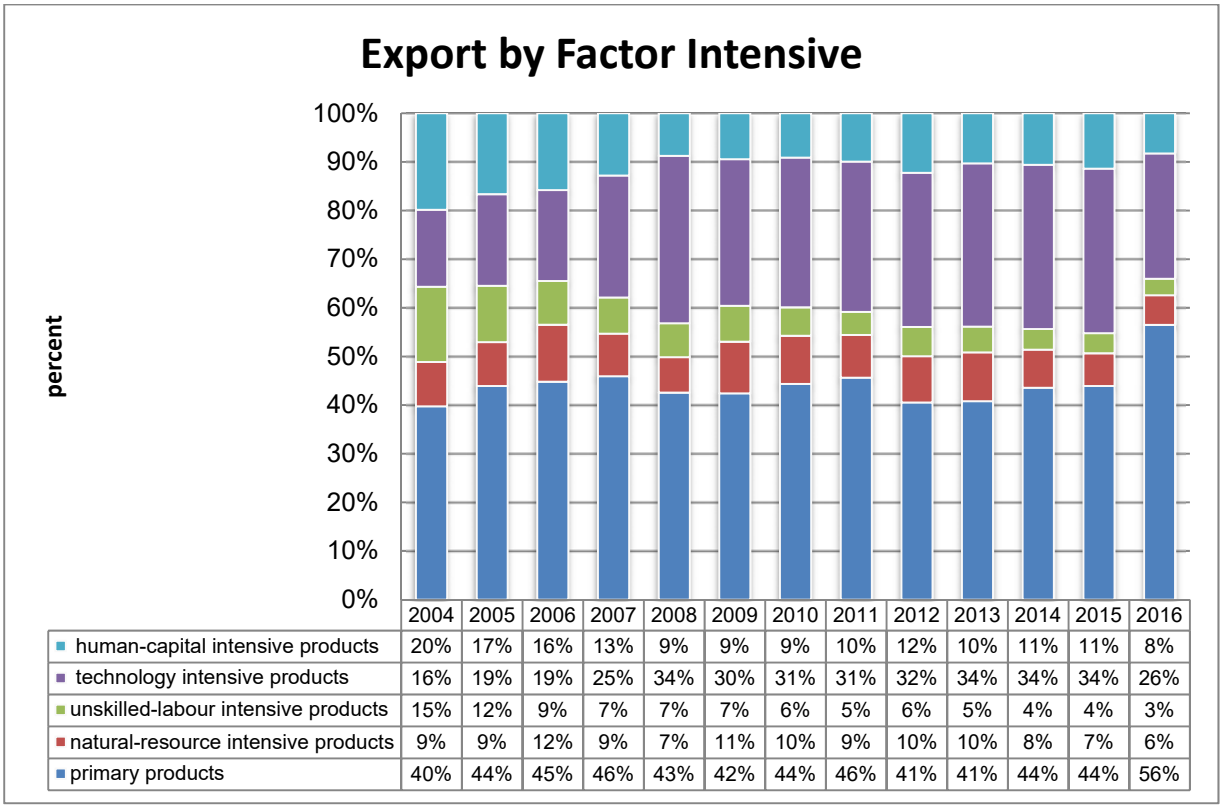
In evaluating the impact of the restrictions mentioned in the previous section, some different approaches including the impact of the restrictions on economic sectors or the level of welfare can be selected. The approach adopted by the present study involves evaluating the impacts of the restrictions on the structure of Iran's non-oil exportation and to reach this goal in the first step, it should be determined how the foreign trade is classified. The classification based on the factor intensity of production and technology level are two types of classification that form the basis of Iran's non-oil exports in the present research. It should be noted that using these classifications entails having access to Iran's foreign trade statistics based on the Standard International Trade Classification. The important point is that Iran's foreign trade statistics is issued by the customs and the statistics is issued based on the Harmonized System. Therefore, the present research calculated the statistics on Iran's non-oil exports at six-digit level of HS during the period 2004

(available on trade promotion organization website) to 2016. Then, the six-digit HS codes were converted to SITC codes.

2.5.1 Non-oil exports classification based on the factor intensity of production

The Empirical Trade Analysis Center (ETA Center) has classified the foreign trade based on factor intensity of production to analyze the structure of international trade and based on the common cooperation of Jeroen Hinloopen and Carles van Marrewijk. There are five groups in this classification including the primary products, natural-resource intensive products, unskilled-labour intensive products, technology intensive products, human-capital intensive products. Figure 2 represents the classification of Iran's non-oil exports with the help of this method.

Figure 3: Iran's non-oil exports based on the factor intensity of production



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
human-capital intensive products	20%	17%	16%	13%	9%	9%	9%	10%	12%	10%	11%	11%	8%
technology intensive products	16%	19%	19%	25%	34%	30%	31%	31%	32%	34%	34%	34%	26%
unskilled-labour intensive products	15%	12%	9%	7%	7%	7%	6%	5%	6%	5%	4%	4%	3%
natural-resource intensive products	9%	9%	12%	9%	7%	11%	10%	9%	10%	10%	8%	7%	6%
primary products	40%	44%	45%	46%	43%	42%	44%	46%	41%	41%	44%	44%	56%

According to the records presented in figure 2, the total structure of Iran's non-oil exports in the recent decade has not undergone any considerable changes in terms of the factor intensity of production. In this period of time half of Iran's non-oil exports has been exclusively primary products consisting mainly of propane, butane, asphalt, oil and pistachio in the period under study. The natural-resource intensive products account for almost 10% of the total exports where cement, copper cathode and non-conjugated aluminum are the main items in this group. The exportation of the goods requiring unskilled workforce has followed a downward trend and their share of the total exports decreased from 15% in 2004 to 3% in 2016. The carpet is one of the main items in the natural-resource intensive products group. The technology intensive products account for almost one third of Iran's non-oil exports and the noteworthy point is the dominant share of the petrochemical products in this class of goods. Table 2 presents the share of the technology intensive products compared with that of the petrochemical goods. As can be seen in the table, 85% of the high-technology goods

belong to the petrochemical products mainly consisting of the polymers of ethylene and acyclic alcohols.

Table 2: share of the technology intensive products compared with that of the petrochemical goods

Year / Group	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
technology intensive products(%)	16	19	19	25	34	30	31	31	32	34	34	34	26
The share of petrochemical producs (%)	12	14	14	21	29	25	26	27	27	29	30	30	22

The trend of human-capital intensive products exportation is similar to that of the goods not consuming skills. These goods accounted for 20% of Iran's non-oil exports in 2004, while the same figure decreased to 8% in 2016. The rolled products, solvents, compound diluents and ornaments were the main items having exported by the Iranian experts to the global markets. Generally, it can be concluded that the workforce share in Iran's non-oil exports has diminished in the period under study, and the share of the raw materials and high technology goods has increased. From factor intensity point of view, non-oil export has not experienced any significant changes before and after restrictions.

2.5.2 Non-oil exports classification based on the technology level

This classification is made based on the research conducted by Lall in 2000, and it generally includes five main groups of the raw materials, resource-based products, low-technology products, high technology products. Table 3 shows the classification of Iran's non-oil exports according to the level of technology in the period 2004-2015

Table 3: Classification of Iran's non-oil exports based on the technology level

Product \ Year		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Primary products(PP)		30%	33%	37%	38%	36%	33%	33%	36%	28%	26%	30%	29%	46%
Resource based manufactures(RB)	Agro/forest based products	4%	5%	6%	5%	4%	5%	5%	4%	4%	4%	4%	5%	4%
	Other resource based products	21%	21%	19%	22%	25%	24%	24%	22%	25%	28%	25%	26%	20%
Low technology manufactures(LT)	Textile/fashion cluster	15%	11%	8%	7%	6%	6%	5%	4%	4%	4%	3%	3%	3%
	Other low technology	11%	10%	10%	6%	5%	6%	5%	8%	9%	8%	8%	8%	6%
Medium technology manufactures(MT)	Automotive products	2%	2%	2%	3%	2%	2%	2%	1%	1%	1%	1%	0%	0%
	Medium technology process industries	12%	13%	12%	14%	16%	18%	20%	21%	24%	25%	25%	25%	20%
	Medium technology engineering industries	4%	3%	3%	3%	4%	5%	4%	3%	4%	4%	2%	2%	2%
High technology manufactures (HT)	Electronics and electrical products	1%	0%	1%	0%	1%	1%	1%	0%	0%	0%	0%	0%	0%
	Other high technology	1%	1%	1%	1%	0%	1%	1%	1%	0%	0%	1%	0%	1%

According to the figures presented in table 3, almost one third of Iran's non-oil exports are the Primary products. Propane, Butane, other gaseous hydrocarbons and pistachio are the four main items in this group. The noteworthy point is that about half of Iran's exports in 2016 belong to this group of products.

The export goods that are agro/forest based products account for about 5% of the structure of Iran's exports over the last decade. The preserved tomato and the confection containing no cocoa were the main items in this class.

The products that are based on other resources also have an important role in the composition of Iran's non-oil exports with a 25% share of the total export. Asphalt, iron ore and petroleum oils account for the main portion of the exports in the period 2004-2016 in this group.

Though at the beginning of the period under study textile and fashion groups in the low technology class accounted for 15% of the exports in this class, this figure decreased to 3% at the end of the period under study. The carpet or other types of mats and tanned skins accounted for a considerable portion of the exportation from this group. As for other low technology products, this trend was noticeably descending. In this group, the rolled products of iron and steel, ornaments and kitchenware account for the main exported items.

In the medium technology class, the automotive group accounted for a little portion of the exports and it followed a descending trend. On the other hand, the processing products group experienced an ascending trend accounting for 20% of the non-oil exports. The petrochemical goods make up the majority of the products in this group where polyethylene, acyclic alcohols, halogenated derivatives and chemical fertilizers account for the majority of the exports in this group. In the engineering products group that experienced an ascending trend in 2009 and reached a share of 5% of the total exportation, we can also see the descending trend in the following year. The mechanical devices, submersible platforms and turbojets are the main items in this group.

The share of the high technology goods in Iran's export structure has not exceed 1%. In the electronic products group, the transformers and electric generators and the electronic devices required in medicine were among the main items the exportation of which has gradually

decreased in the last years of the period under study. In the group of other high technology products that has the same share as the previous group where the drug is one of the main items.

To put in nutshell, from technology point of view, export of higher-technology products has been impacted by the sanctions to a greater extent. Next section tries to specify a model to assessment the impact of sanctions on Iran's non-oil exports, especially in the mineral exportation sectors, with determining main variables of export demand and supply.

3. DATA AND METHODOLOGY

3.1 Model specification

The standard and basic model proposed by Goldstein and Khan (1985) is used identify the factors affecting the exportation which estimates the demand and supply in exportation. In this model, the export demand function is a function of the country's volume of export that is represented as X^d, the ratio of the export prices to the global export prices $\frac{Px}{Pw}$ and global income

Y_w.

$$+ \quad - \quad +$$

$$X^d = f(Px, Pw, Y_w) \tag{1}$$

In this model, the changes in the foreign exchange rate are explained indirectly and by the price and monetary variables. The economic theories explain the impacts of each variable in the equation (1). The increase in the global revenue can have both positive and negative impacts on countries' exportation. Though such impacts are generally evaluated as positive, it is expected that. The increase in the real activity of the global economy increases, *ceteris paribus*, the foreign demands from a country's exportation. The higher prices of the of exporter country in relation to those of other countries, if other conditions are held constant, decreases the amount of exportation of the country and vice versa, that is, higher price in the rest of the world is, higher demand for exporter country.

On the other hand, and on the supply side, the amount of export as the dependent variable, in addition to the prices of exported goods, depends on the prices of the domestic goods as a substitute of the actual cost of the domestic goods and the domestic capacity of the country for export. By extract from Sharma (2003) the investment and productivity have been used as the indices determining the amount of domestic capacity.

$$\neq \quad - \quad + \qquad\qquad + \qquad\qquad +$$

$$X^s = g(Px, Pd, Invesment, Productivity) \tag{2}$$

Since we intend to estimate the functions of export demand and supply, in the following to estimate the price and income elasticities, thus the structure of the equations (1) and (2) are defined as the linear logarithm and the dummy variable are added to the right side of the equation(1) to determine the impacts of sanctions on Iran's non-oil exportation. The error term is also added to the equations.

(3) $$LnX_t^d = a_0 + a_1 LnP_{xt} + a_2 LnP_{wt} + a_3 LnY_{wt} + Dsanction_t + e_t$$

(4) $$LnX_t^s = b_0 + b_1 LnP_{xt} + b_2 LnP_{dt} + b_3 LnInv_{wt} + b_3 LnPro_t + \nu_t$$

There are some considerations in International trade (for instance: long distance between the exporters and importers, stable behavior of the foreign consumers, long terms contracts and customs formalities) which cause the prices, costs and incomes do not change instantaneously. Thus, in order to capture these lags and to create a mechanism explaining the above-mentioned adjustments, Goldstein and Khan (1985) and Koshall et al. (1992) defined the dynamism model where export quantities are assumed to adjust to the discrepancy between world demand for a country's exports in the current period and in the previous period. In other words, adjusting the amount of expor is determined in relation to the surplus of the global demand. In addition, it is assumed in specifying the supply price that the expor price is adjusted in relation to the supply surplus conditions. The dynamic model developed for the export demand and supply is defined as follows:

(5) $$\Delta X_t = \gamma[X_t^D - X_{t-1}]$$

(6) $$\Delta PX_t = \lambda[X_t - X_t^s]$$

where γ and λ are the coefficients of adjustment and Δ is first difference pause operator. In the equation (6), the supply surplus decreases the prices of exported goods.

Considering the structural form and supposing $LnX_t^d = LnX_t^s = X$, while the summarized form of the equations 5, 6, in 3 and 4 are as follows:

(7) $$X_t = h(LnP_{wt}, LnY_{wt}, Dsanction_t, LnP_{dt}, LnInv_{wt}, LnPro_t, , LnX_{(t-1)}, LnP_{x(t-1)})$$

(8) $$P_{xt} = \bar{h}(LnP_{wt}, LnY_{wt}, Dsanction_t, LnP_{dt}, LnInv_{wt}, LnPro_t, LnX_{(t-1)}, LnP_{x(t-1)})$$

Khan (1974) argues that using ordinary least square in the demand and supply models to determine the price and amount of the export lead to bias and inconsistency in the model. Thus, to remove these problems, Two-Stage least square (2SLS) is used to estimate Iran's non-oil exportation supply and demand. In the above equations, Xt and Pxt are the endogenous variables of the model. The variables $\mathrm{LnY_{wt}}, \mathrm{Dsanction_t}, \mathrm{LnP_{dt}}, \mathrm{LnInv_{wt}}, \mathrm{LnPro_t}, \mathrm{LnX_{(t-1)}}, \mathrm{LnP_{x(t-1)}}$ are defined as exogenous.

3.2 Data

The present study aims to identify the factors affecting Iran's non-oil exportation with an emphasis on determining the impacts of international sanctions, especially in importing minerals. After the Islamic Revolution in 1979, Iran has been always subject to sanctions, but the severity of the sanctions reached the peak in 2012. For this purpose, the period 1987-2017 was considered to estimate the specified model in the previous section.

X stands for the export value index, Px stands for the export price index; the information of which has been obtained from the World Bank and Central Bank of the Islamic Republic of Iran. Also, world GDP (Yw), export price index of the USA as the proxy of the world's export prices (Pw) and lag of export value index $\mathrm{X_{t-1}}$ are other variables. Dsanction is the dummy variable for the estimation of the impacts of international sanctions that were imposed in 2012 where number 1 is allocated to the number of years the sanctions were in place, and zero is allocated to other years.

Similarly, on the supply side, price index of wholesale (Pd) as a prpxy of domestic price, investment (Inv) and productivity (Pro) are in supply equation. Moreover, since the present study intends to examine the impacts of the sanctions of the mineral sector of the country, Xmining

stands for the volume of export of the mineral resources and Pxmining stands for the export price in the mining industry, and a separate model will be estimated for the mining sector.

The domestic statistics were obtained from the Central Bank of the Islamic Republic of Iran, Statistical Center of Iran, and Trade Promotion Organization of Iran, and foreign statistics issued by the World Bank (World Development Indicators), and they were calculated based on the base price in (2010=100).

3.2.1 Test of stationary

The first stage of estimation techniques is to check if the all variables under investigation have unit root or not. The Augmented Dickey Fuller unit root test was used in the present study to examine the inhabitability of the variables. The results obtained from the unit root have been presented in the table below. As can be seen in the table, all variables used in the model are stationary by one differentiation.

Table 4: Augmented Dickey-Fuller test for unit root

variable	Level	test-statistic	1st difference	test-statistic
LnXD	-.0521703	-1.000	-1.288762*	-4.532
LnPx	-.4075685	-2.664	-1.063836**	-4.347
LnPd	-.1223975	-1.234	-.536966***	-3.113
LnPw	-.3024803	-2.027	-1.127176**	-4.038
LnYw	-.4131459	-2.863	-1.076453**	-4.247
LnInv	-.3160647	-2.223	-1.110192**	-3.960
LnPro	-.259008	-1.928	-1.582767*	-5.166
LnFdi	-.3898395	-2.053	-1.478159**	-4.250
LnPxmining	-.2591283	-2.282	-.8737227**	-3.687
LnXmining	-.3174102	-2.103	-1.352603**	-4.222
Note:*,** and ***denotes reject of unit root hypothesis based on MacKinnon's critical value at 1%, 5%,10% respectively				

4. EMPIRICAL RESULTS AND DISCUSSION

In this section the equations specified above were estimated and the results were presented. In additions, the tests required for the significance of the model and the criteria were included in the table.

4.1 Demand for non-oil exports results

The results obtained from the estimation of Iran's non-oil exports demand have been presented in table 5.

Table 5 Two-stage least squares estimates of the demand for exports

Demand	Variable	Coefficients	t-statistics
Dependent Variable: X	Constant	-83.49632*	-5.38
	P_x	-0.3533713*	-2.58
	P_w	3.358221*	6.80
	Y_w	4.125115*	4.42
	Dsanction	-0.4674316*	-5.20
	X_{t-1}	.3993474*	-5.38
Diagnostic tests	R^2=0.969	DW = 1.62	B-G test=4.3

1. *,** and *** denotes significant at 1%, 5%,10% level of significance respectively
2. The value of DW is provided to check the presence of serial correlation. DW value in demand equation is less than the critical value of the normal distribution at 5 percent level (1.645 for a one-tailed test), we can safely conclude that there is no serial correlation problem.
3. B-G test is Breusch- Godfrey test for heteroskedasticity.

The noteworthy point in the estimated coefficients is that they have the signs expected by the economic theories and they are significant at 99% level. The demand for Iran's non-oil exports is inelastic to export prices, whereas it is relatively elastic to the global prices. 10% increase in the prices of Iran's export decreases the demand for its exportation by 3% while a 10% increase in the prices of the exported goods in other countries around the world decreases Iran's export by 33%. The demand for Iran's non-oil export has high income elasticity such that a 1% increase in the global revenue increases Iran's exportation revenue by 4%. As it was mentioned before, the demand for export is not adjusted over a single period. Results confirm this and state that amount of the export in the current year is adjusted with the adjustment coefficient 0.39 in relation to the previous year. The sign of the dummy variable shows that the international sanctions that were

imposed on Iran's economy in 2012 have had some negative impacts on demands for Iran's exportation.

4.2 supply for non-oil exports results

The results of estimating the function of nonoil export supply has been presented in table 6.

Table 6: Two-stage least squares estimates of the supply for exports

Supply	**Variable**	**Coefficients**	**t-statistics**
Dependent Variable: Px	Constant	-.3914494	-1.48
	X	.0265894	0.25
	P_d	1.052665 *	29.64
	$Inv_{(t-1)}$	.3699373	1.21
	$Pro_{(t-1)}$	.0051586	0.840
	$Px_{(t-1)}$	.3125524 *	2.60
Diagnostic tests	R^2=0.9957	DW = 1.43	B-G test=5.6

1. *,** and *** denotes significant at 1%, 5%,10% level of significance respectively
2. The value of DW is provided to check the presence of serial correlation. DW value in supply equation is less than the critical value of the normal distribution at 5 percent level (1.645 for a one-tailed test), we can safely conclude that there is no serial correlation problem.
3. B-G test is Breusch- Godfrey test for heteroskedasticity.

The price elasticity of export supply is obtained through the equation $(0.026)^{-1}$ where this variable is not statistically significant. The coefficient of Pd is approximately equal to one and it is statistically significant i.e. the increase in the domestic prices is reflected in the exportation prices to the same extent. With regard to the exportation prices, it is determined in this equation that one third of the price changes in the current year are accounted by the last year's prices. It should be mentioned that investment in the previous period and productivity are some of the factors affecting the prices of the exported products that are not significant in this model.

4.3 Estimation of demand and supply functions of mineral exportation:

In this regard, finding the answer to the research question, that is, whether the sanctions are effective on export of minerals or not, the specified demand and supply model for the mineral field was also estimated. In fact, the export volume of the mineral products is used in place of exports value index, and minerals price index is used in place of export price index. The amounts

of these two variables are classified by Central Bank of Islamic Republic of Iran. The results obtained for the estimation of demand for and supply of Iran's minerals export has been reported in table 7.

Table 7:Two-stage least squares estimates of the demand and supply for mining exports

Demand			supply		
D. Variable:	**Variable**	**Coefficients**	**D. Variable:**	**Variable**	**Coefficients**
$\mathbf{X_{mining}}$	Constant	-154.2671 * (47.04455)	$\mathbf{Px_{mining}}$	Constant	-.9507476* (0.1241495)
	P_{mining}	-1.095979 * (0.4859605)		X_{mining}	-0.2252328** 0.1078934
	P_w	12.75531 * (1.857978)		P_d	.8378731* (0.0537396)
	Y_w	5.92536 *** (2.515473)		Pro_{t-1}	-.0055637 (0.0393641)
	Dsanction	.7048844 * (0.2682997)		Inv_{t-1}	1.019582 (0.4601573)
	$X_{mining(t-1)}$	0.7177054 * (0.1480919)		$Px_{mining(t-1)}$	.4059469* (0.1077234)
Diagnostic tests	R^2=0.9298 DW = 0.93 B-G test=5.6		R^2=0.9872 DW = 0.88 B-G test=3.2		

1. *,** and *** denotes significant at 1%, 5%,10% level of significance respectively
2. Values enclosed in parentheses represent standard error
3. The value of DW is provided to check the presence of serial correlation. DW value in demand and supply equation is less than the critical value of the normal distribution at 5 percent level (1.645 for a one-tailed test), we can safely conclude that there is no serial correlation problem.
4. B-G test is Breusch- Godfrey test for heteroskedasticity.

The sign of the variables is in accordance with the economic theories. The price elasticity of minerals export is almost constant, and the 1% increase in the minerals decreases the demand for the export of minerals by 1%, while the elasticity to the world prices is positive and significant, and a 1% increase in the price of minerals in other countries increases the demand for the minerals in Iran by 12% which is much more elastic in comparison to whole non-oil export. Furthermore, Iran's minerals have high income elasticity such that 10% of the increase in the income of other countries increases the demand for minerals in Iran by 50%. The coefficients of these three variables show that the export of the minerals in Iran is completely impacted by Iran's trade partners. In the short run, the current export of the minerals depends on the export in the

previous period with a coefficient of 0.71. However, the noteworthy point in this estimation is the coefficient of dummy variable is positive for the mineral products, while this coefficient was negative for the total non-oil export (including the export of industrial, agricultural and mineral products. This indicates that Iran's export of minerals has increase in spite of the sanctions. It could be a testament to the claim that with rising mineral prices since the mid-2000s and growing demand from countries, especially China, as Iran's main trading partner, restricting the export of minerals through sanctions has not functioned and demand leads this section of non-oil export. On the supply side, the price elasticity is elastic and it is equal to 4.5. Also, the factors affecting the exportation supply like investment and productivity are not significant in this model.

5. CONCLUSION AND POLICY RECOMMENDATIONS

The present study was conducted to evaluate the impact of the international sanctions as the most effective export restriction imposed on Iran's non-oil export. The results show that the trend of Iran's non-oil export declined since 2012 upon the imposition of international sanctions and this decline has occurred while the foreign exchange rate had dramatically decreased in 2012. This event that does not align with the economic logic is explained by the export restrictions including the export bans that have been levied by Iran's government and the export sanctions that have been imposed by the international community in 2012. The bans placed by the government were relaxed by adjusting the foreign exchange rate. However, the decreasing trend of the export continued indicating the effectiveness of the economic sanctions on Iran.

In this regard, identification of Iran's export structure and in the framework of a descriptive analysis, the non-oil export is classified based on the factors intensity of production and

technology level where the results showed that two thirds of Iran's non-oil export are composed of the raw materials and low technology goods and the higher technology products are more impacted by the sanctions as far as level of technology is concerned. The demand and supply functions of Iran's non-oil export was estimated using Simultaneous Equation Model (SEM) and using Two-Stage least squares (2SLS) where the results indicated that Iran's non-oil export is sensitive to the prices of the exported goods from other countries and the global revenues. The negative coefficient of dummy variable in the demand function shows that Iran's non-oil exports were impacted by the sanctions imposed in 2012. The equations used to estimate the demand and supply in the export of raw minerals also indicates the high price and income elasticity of demand, and the noteworthy point is that paying attention to the positive coefficient of the dummy variable of sanctions. This indicates that Iran's export of minerals has not affected by sanctions.

In conclusion, the results show that Iran's non-oil exports are demand-oriented and the factors affecting the demands determine the amount of Iran's export. The descriptive analyses showed that two thirds of Iran's non-oil exports are composed of the raw and resource oriented goods that generally provide the raw materials of the industries of other countries. With regard to the strong role of the demand factors, the export policymakers should pay attention to the fact that the non-oil exports in general and the mineral exports in particular are affected by the external factors. Thus, considering the calculated price and income elasticities, non-oil exports require a roadmap to drive the structure of the country's exports from primary products to the higher added value products.

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Annexe:

Table 8: Trend of non-oil export, growth of official, unofficial and real rate of Dollar

Year / Growth %	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Non-oil Export	100	14	25	29	-33	-4	-7	5	12	12	12	9	30	15	53	24	18	20	19	21	27	-4	-3	16	-3	-3
Growth of unofficial Dollar	1	5	21	46	53	10	8	35	33	-6	-3	1	4	5	3	2	1	3	3	6	28	92	22	3	5	6
Growth of official Dollar	1	2051	13	6	0	0	0	0	0	0	0	353	4	5	3	2	1	3	4	4	6	12	73	25	12	6
Growth of export market of Dollar	139	5	13	42	24	4	36	31	47	2	-2															
Growth of real rate of dollar	-2	-5	14	36	22	-3	2	31	20	-13	-7	-7	-7	-4	-5	-5	-9	-11	-6	1	12	58	-8	-9	-5	0