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INVESTIGATION OF SANCTIONS AND OIL PRICE EFFECTS ON THE IRAN-RUSSIA TRADE BY USING THE GRAVITY MODEL

Sanctions introduced in 2006 are said to have had a crucial effect on the Iranian economy in the last decades and have affected the economic relations between Iran and the rest of the World. It has been asserted repeatedly that sanctions against Iran have been hindering its foreign trade and its access to the global market and that sanctions have caused Iran to become less globalized and more isolated. As Iran's economy is highly sensitive to oil prices due to its high reliance on oil revenues it might affect Iran's trade with other nations. Our study explores how much various sanctions (financial and non-financial) and oil price have affected the foreign trade of Iran with Russia during 1994–2013. The research provides a detailed study of the impact of financial and non-financial sanctions on Iran-Russia foreign trade and relation of oil price and Iran- Russia foreign trade. The findings show the negative relationship between financial, non-financial sanctions and oil price shocks with the Iran-Russia trade. Refs 37. Figs 6. Tables 7.

Keywords: sanction, oil price, Iran-Russia trade, gravity model.

Э. Расулинежад

ИССЛЕДОВАНИЕ ВЛИЯНИЯ САНКЦИЙ И РЕЗКИХ КОЛЕБАНИЙ МИРОВЫХ НЕФТЯНЫХ ЦЕН НА ВЗАИМНУЮ ТОРГОВЛЮ РОССИИ И ИРАНА НА ОСНОВЕ ГРАВИТАЦИОННОЙ МОДЕЛИ

Принято считать, что санкции, введенные в 2006 г., оказали негативное влияние на экономику Ирана и серьезно ухудшили его экономические отношения с другими странами мира. Действительно, введение санкций в отношении Ирана осложнило развитие его внешней торговли, ухудшило доступ к мировым рынкам и привело к определенной экономической изоляции страны. Из-за высокой зависимости Ирана от нефтяных доходов экономика этой страны крайне чувствительна к мировым ценам на нефть. Колебания цен на мировом рынке нефти оказывают значительное влияние на внешнюю торговлю Ирана. В данной статье рассматривается воздействие различных санкций (финансового и нефинансового характера), а также колебаний мировых цен на нефть на взаимную торговлю Ирана и России в период с 1994 по 2013 г. на основе использования гравитационной модели. Результаты исследования показали, что на двустороннюю торговлю наиболее негативное влияние из названных факторов оказывают финансовые санкции, тогда как отрицательное воздействие нефинансовых санкций и резких колебаний мировых нефтяных цен является менее значимым. Библиогр. 37 назв. Ил. 6. Табл. 7.

Ключевые слова: санкции, нефтяная цена, ирано-российская торговля, гравитационная модель.

Introduction

Trade between two countries depends on the range of various factors. Theoretically, the amount of capital, labor, technology, and even energy can be defined as the main production inputs affecting the power and capability of a country in foreign trade. There are a vast number of factors such as the financial crisis, trade liberalization, sanctions, wars, natural disasters, etc., which can make harsh changes in trade between nations. In fact,

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always some unpredictable and non-measurable variables determine the volume of trade between nations.

One of the above mentioned factors that may have a huge influence on the trade of nations is global oil prices. If we split the world's countries into two groups based on oil producing and oil consuming, then we may find out the crucial importance of the price of this kind of energy for all nations. For the oil producers, a high oil price means more revenues. On the contrary, a high oil price provides more expenditures in the oil importing nations. Since this research focuses on the trade between two oil-producing countries (Iran and Russia), the impact of oil price fluctuations is to be considered. Even so, both sharp changes in the oil prices (sharp increase or decrease) can immensely affect the economy of these countries through foreign exchange systems and public budget. It is widely discussed that without a convenient state control, a positive shock of oil prices can decrease economic growth, lead to a higher inflation and create inequality in trade of these countries. Vice versa, during a negative oil price shock, an imminent collapse in foreign currency earnings and acute shortage of foreign currency happens and eventually the trade deficit occurs in the oil exporting nations.

Another influential factor affecting foreign trade is various restrictions put in place against engagement of a country in foreign trade. One of the most crucial examples of these limitations is sanctions. Different penalties or stringent limited barriers generate an unstable situation overwhelmingly affecting and the trade system of a country [Jabalameli, Rasoulinezhad, 2012]. A brief glimpse at some sanctions cases reveals that they can push a country to decrease its exports and imports or make unfavourable restrictions prohibiting trade with other nations. However, the type of sanctions determines the restriction power on trade. According to the United Nations definition, there are six types of sanctions, which can be imposed by a country, a group of nations or an international organization against a targeted nation. These sanctions consist of diplomatic sanctions, economic sanctions (include all varieties of trade sanctions, banking and financial sanctions), communication sanctions, cultural sanctions, science & technology sanction and military sanctions [Laptev, 2012, p. 21]. All defined types of sanctions have a depressing impact on a target country. However, in regards to trade many scholars insist that the economic sanction has the most devastating implications for trade than others [Pavlov, 2013].

Altogether, the objective of this research is to examine effects of sanctions and oil price shocks on the trade of countries. Our case study is trade between Iran-Russia in the period of 1994 to 2013. Trade between Iran and Russia as the two developing nations and rivals in the global natural resource markets has been influenced by above defined factors. We estimate a gravity model as a popular international trade theory by the VECM (Vector Error Correction Model) method to find out effects of sanctions (financial and non financial) and oil price shocks on the Iran-Russia bilateral trade. Actually, the aim of this article is to find out if the financial and non financial sanctions imposed against Iran and also the global oil price shocks have an effect on the Iran-Russia trade.

Following the objective of the research and assumptions of the gravitational theory and considering the sanctions and oil shock as an unfavorable event, the main research hypotheses are as follows:

H_1:

H0: There is a negative relationship between the non financial sanctions against Iran and the Iran-Russia trade.

H1: There is not a negative relationship between the non financial sanctions against Iran and the Iran-Russia trade.

H_{II}:

H0: There is a negative relationship between the financial sanctions against Iran and the Iran-Russia trade.

H1: There is not a negative relationship between the financial sanctions against Iran and the Iran-Russia trade.

H_{III}:

H0: There is a negative relationship between the oil price shocks and the Iran-Russia trade.

H1: There is a negative relationship between the oil price shocks and the Iran-Russia trade.

The outline of the research is as follows. Section 2 provides a brief description of the economy of Iran, bilateral trade between Iran-Russia, and a brief literature review of gravity model. Data and methodology are discussed in section 3. Section 4 discusses the research results and finally, section 5 concludes with a discussion and directions for further research.

1. Economic profile and bilateral trade between Russia and Iran

In this section, we try to present and describe briefly the economy of Iran and also review the bilateral trade between these two countries.

1.1. Economy of Iran

This country is one of the largest economies in the MENA[1] region and the Islamic world [Mamedov, 2012] with regard to the nominal GDP (367.098 billion $ in 2013), member of N-11 (Eleven countries with a high potential to become a large economy) and 18th economy in the world (based on PPP in 2013). Moreover, according to the World Bank ranking, Iran is placed in the group of developing nations and its economy is dominated by industry (including oil and others). The share of services in Iran's GDP has risen up to 52.8 % in 2013, higher than 46.6 % contribution in 1994. Non-oil industries also have an increased contribution to GDP from 18.3 % to 23.2 % during 1994–2013. The agriculture sector has accounted the smallest share — constantly around 9 % — of Iran's GDP over the period of 1994–2013.

Despite the consideration of oil industry as the magnitude sector of the Iran's economy, due to the several sanctions, the oil industry has experienced an increasing share of GDP from 20.2 % in 1994 to 28.2 % in 2005 and a declining share by roughly 17 % of GDP in 2013. The following figure shows the contribution of oil and non-oil industries to the Iran's GDP during 1994–2013. As seen in figure 1, share of the oil industry has decreased since 2006–2007. The most contributing factor to this fact is the imposition of various sanctions against Iran's oil industry. However, this country has tried to improve its non oil industries to reduce its dependency on oil revenues.

[1] Middle East and North Africa.

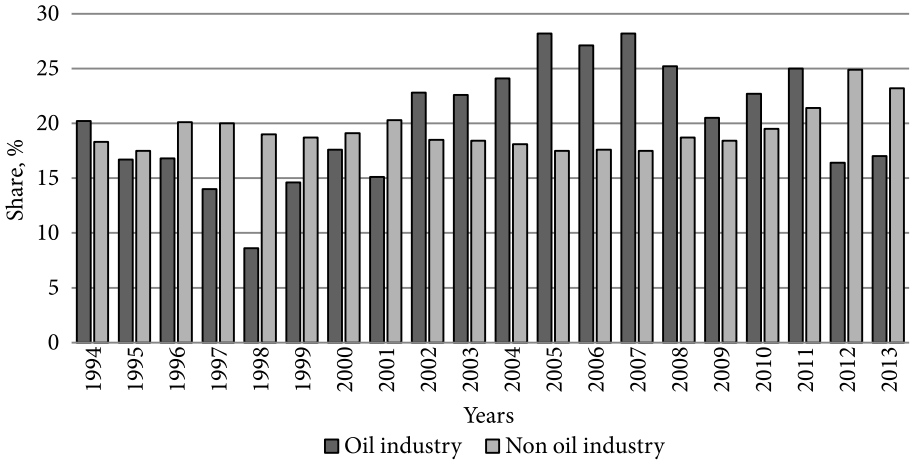

Figure 1. Share of oil and non oil industries in GDP of Iran during 1994–2013, %

Source: [Office of economic policy research… 2015].

Since the main part of the Iran's industry sector is provided by the oil industry, thereby, global oil price and its sharp and unpredictable fluctuations are so crucial for Iran's economic life. On the one hand, under normal circumstances, a sharp positive oil price fluctuation generates a higher revenues, funds more infrastructure projects and pays off more foreign debts. On the other hand, any drastic decline in oil prices makes overt budget deficit and also may severely jeopardize wipe off foreign debts.

In regards to oil price fluctuations, it may be seen that four oil price shocks have occurred since 1994 till 2013 which were in 1998, 2003, 2007–2009 and 2011. Two of them (2003 and 2011) notably made the oil prices jump rapidly and hence the oil revenue of Iran extraordinarily raised up, while the Asian financial crisis generated the negative oil price shock in 1998. Furthermore, the 2007–2009 oil price shock led to a positive-negative change in the oil revenue of Iran. Figure 2 displays these drastic price fluctuations through

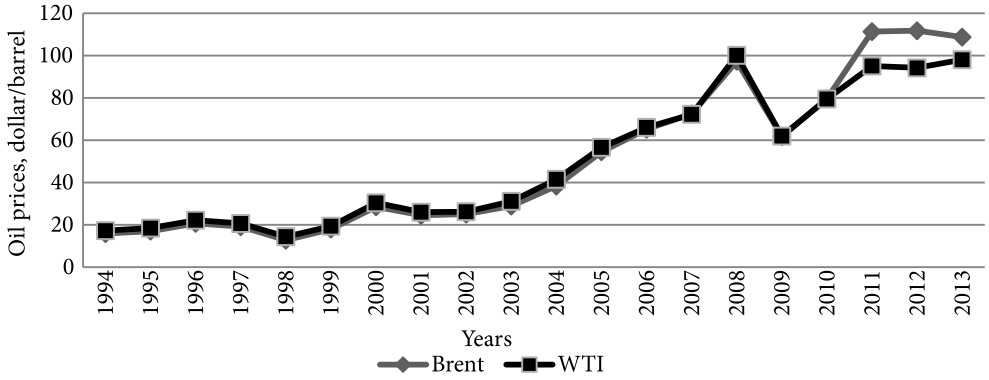

Figure 2. Brent and WTI oil prices during 1994–2013, U.S. Dollar per barrel

Source: [U.S. Energy Information…].

the annual Brent and WTI[2] oil prices over the period of 1994–2013. It can be seen that all the two oil prices had steep volatilities in 1998, 2003, 2007–2009 and 2011. Meanwhile, the important thing to recognize is that the size of two last shocks was bigger than the 1998 and 2003 — oil shocks.

Moreover, aside from the above described importance of oil prices, it should be noted that the economy of Iran has experienced various long run nasty sanctions since 1951 when Iran nationalized its oil industry till the unprecedented nuclear program sanctions imposed by the United Nations and Western countries from 2006 up to now. A high number of these sanctions have targeted Iran's energy sector and financial activities. However, the Joint Comprehensive Plan of Action (JCPOA) on the nuclear program of Iran, which is signed by Iran and P5+1 in July 2015 would be a way to decrease and lift sanctions against Iran. According to this agreement, Iran restricted its nuclear program in exchange for the energy, trade and financial sanctions relief.

Anyway, it is always mentioned that the crippling sanctions have taken a critical toll on Iran's economy because of some harsh hit such as disconnecting from the SWIFT, freezing the assets of Iran's Central bank and heavy oil embargo in 2012. But many scholars believe that these sanctions have been perfectly counterproductive and created the specific structure called "Resistive economy of Iran" which shrewdly mitigates the negative effects and helps Iran to go to reach an acceptable living standard, decrease its dependency on oil and also modernize its industries under the existing sanctions [Jafari, Ahangari, 2012]. Thus, due to the existence of different views, the actual effects of sanctions on the Iran's economy are dim and non-measurable, but as we pointed out before, some of the imposed sanctions like financial ones (which includes disconnecting Iran from the Swift system, restrictions on letter of credit transactions, boycott of Iran's Central bank, banning the Iranian banks from accessing the global financial market, freezing assets, etc.) typically have had harsher effects on the Iran's foreign trade.

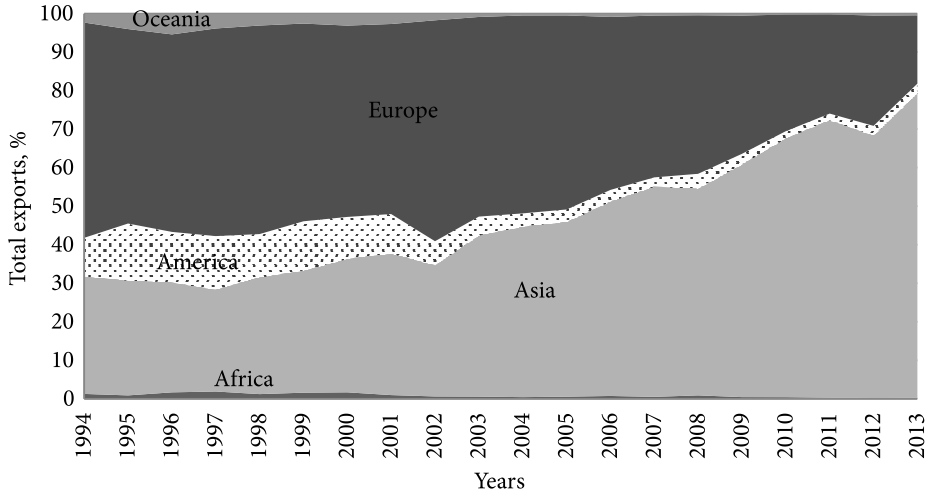

Figure 3. Total exports to Iran during 1994–2013, %

Source: [The Islamic Republic of Iran Customs Administration].

[2] West Texas Intermediate (WTI).

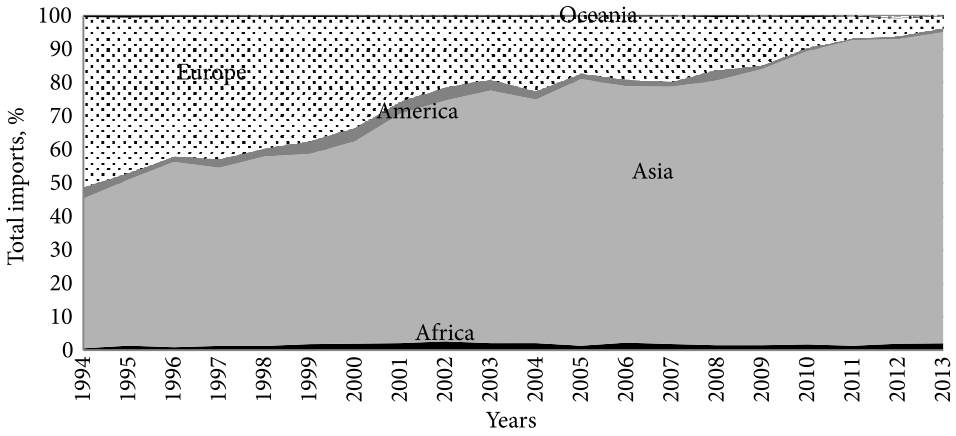

Figure 4. Total imports from Iran during 1994–2013, %

Source: [The Islamic Republic of Iran…].

In case of foreign trade direction, Iran has switched its relations from European region towards Asia. The shift of Iran's trade was caused mainly by imposition of the onerous sanctions as well as by GDP growth of some Asian nations such as India and China. Historically, in the early of 2000s, Iran focused on trade with European countries, particularly Germany, but since 2006, Iranian exports to various Asian countries such as Japan, China, India and South Korea have been expanded due to the imposition of nuclear-related sanctions against Iran and also considerable potential of the Asian markets. Furthermore, Iran has found some new markets such as Iraq, Afghanistan and Pakistan for its non-oil products. Figures 3 and 4 represents this trade shift in both cases of Iran's imports and exports. As it can be seen from the figures, Iran has reduced its imports from Europe and ramped up its purchasing from Asian nations. This shift similarly has been performed in regard to the Iran's exports and thus Iran's share of imports of Asia has risen up over the period of 1994 to 2013. However, as we mentioned before, the intensification of Iran's exports to Asia in 2006 was the response to the remarkable increase and expansion in imposing horrific sanctions against Iran. Since 2006, Iran has found and substituted new oil and gas importers in Asia instead of Europe. Over time, Asian countries have become generally far larger importers of Iranian energy and non energy goods than the European region.

1.2. Iran-Russia trade review

Economic relations between Iran and Russia have mostly concentrated on the Russian-made military weapons and technological cooperation [Farkhutdinov, 2012] to build up nuclear reactors. Nonetheless, over the last years trade between these two countries had been eroded. The predominant reason for the reduction would be counted as the sanctions against Iran. Despite these two countries had various remarkable attempts and priorities to prop up and improve the trade turnover through some economic cooperation agreements (agriculture agreement in 2009, telecommunication contract in 2008, agreement to increase cooperation in the energy sectors in 2010, joint trade commission meeting in 2014) and also several efforts such as creating a joint regulatory structure in order to

improve financial transactions between their banking systems [Russia sign deal… 2015], bilateral monetary agreement or enhancing barter trade, but the financial and banking sanctions imposed against Iran in the aftermath of the 2011 have noticeably pushed down the trade turnover between these two counties. Another crucial reason would be delineated as trade structure between these two countries. A high number of economic cooperation and trade between these two countries have been made out mostly by state-owned companies such as Zarubezhneft, Tatneft, Stroytansgaz, Russian Railways, Kamaz, National Iranian Oil Company, Islamic Republic of Iran Railways and Government Trading Cooperation on Iran (GTC). Thus, admittedly, the role of SMEs which can express non oil relations in the Iran-Russia bilateral trade is negligible. The third major reason can be declared as the similar comparative advantage of the economic system of Iran and Russia.

According to data from The Islamic Republic of Iran Customs Administration, between 1994 to 2013, Russia's exports into Iran negatively changed in 1998, 2002, 2009, 2011–2013. The primary reasons for this drastic reduction are the onset of various sanctions against Iran and also that there has been no serious attempt by these two countries to solve trade barriers. Conversely, apart from a reduction during the course of 2009, Iran's exports into Russia have undergone positive changes over the period 2003–2013.

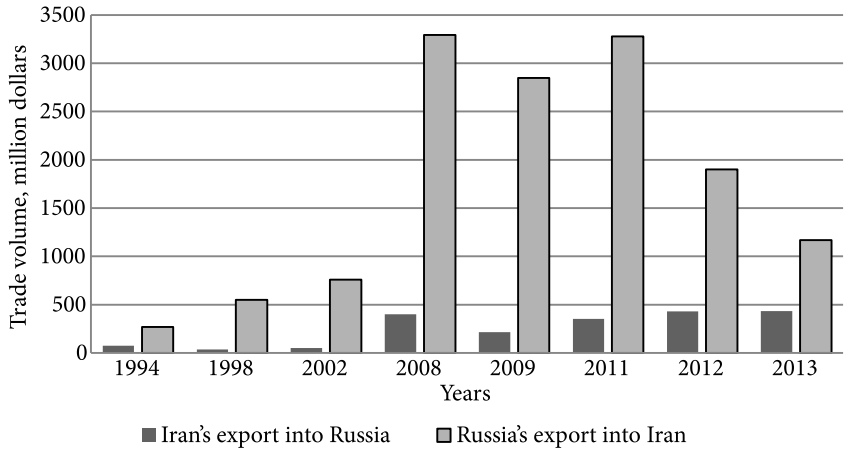

Figure 5. Russia-Iran trade during 1994–2013, million dollars

Source: [The Islamic Republic of Iran…].

Besides the changes of trade deal between these two countries during 1994–2013, review of the share of Iran-Russia trade in their overall trade volume would be useful. As shown in figure 6, over the past 20 years, the share of Iran's imports from Russia as a proportion of Iran's import volume increased from 2.2 % in 1994 to about 6 % in 2007 and then reduced to 2.02 % in 2013, while the share of Russia's exports into Iran based on the total Russia's export volume relatively decreased over the same period from 0.4 % in 1994 to 0.22 % in 2013. Meanwhile, Iran's exports into Russia recorded with 1.54 % share to total Iran's export volume in 1994 and 1.24 % in 2013. Moreover, Russia's imports from

Iran as a share of total Russia's import volume rose up from 0.15 % in 1994 to 0.13 % in 2013.

It should be highlighted that during the 1994–2013 period, Russia's exports to Iran were dominated by iron and steel (43.6 % in 1994 and 31.1 % in 2013), cereals (1.04 % in 1994 and 26 % in 2013), wood and articles of wood, wood charcoal (1.1 % in 1994 and 14.2 % in 2013), electrical, electronic equipment (10.4 % in 1994 and 6.6 % in 2013) and mineral fuels, oils, distillation products (2.5 % in 1994 and 5 % in 2013).

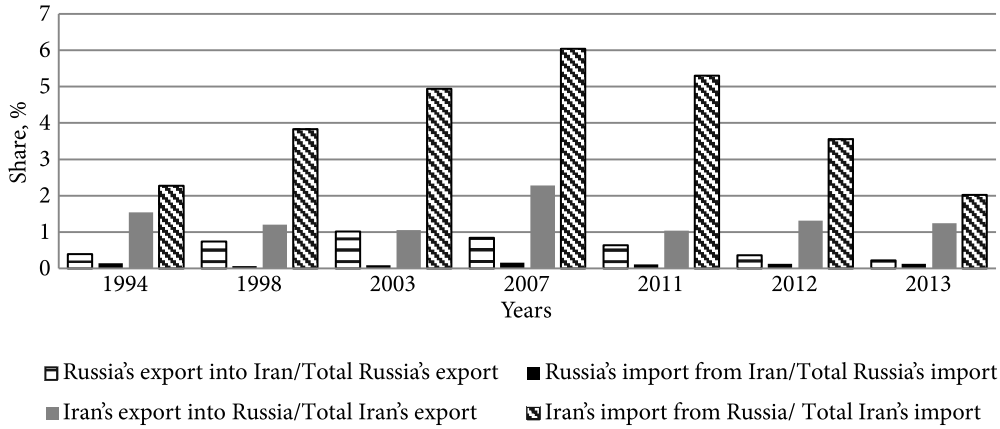

Figure 6. Share of Iran-Russia trade in their total export-import volume during 1994–2013, %

Source: [The Islamic Republic of Iran…; Trademap…].

On the contrary, principle Iranian exports to Russia consist of edible fruit, nuts, peel of citrus fruit, melons (11.25 % in 1994 and 36.9 % in 2013), edible vegetables and certain roots and tubers (0.0 % in 1994 and 26.6 % in 2013), salt, sulfur, earth, stone, lime and cement (0.43 % in 1994 and 11.2 % in 2013), vegetable and fruit (47.66 % in 1994 and 5.3 % in 2013), organic chemicals (0.09 % in 1994 and 4.9 % in 2013) and plastics (0.39 % in 1994 and 3.4 % in 2013).

The important point here is that share of some imported or exported goods in total trade volume of these two countries has varied greatly during 1994–2013. For instance, in terms of exported commodities from Iran to Russia, the volume of edible fruit, nuts, peel of citrus fruit and melons nearly doubled in total Iran's exports to Russia from 11.25 % in 1994 to 17.5 % in 2000 and over 37 % in 2013 or in case of vegetable, fruit, nut and food preparation, its contribution to total Iran's exports into Russia decreased from 47.66 % in 1994 to 36 % in 2000 and to nearly 5.3 % in 2013. In other side, cereals contributed about 26 % of the total Russia's exports into Iran with compared to just 1.04 % in 1994. Moreover, the share of wood and articles of wood in total Russia's exports into Iran sharply jumped up from 1.1 % in 1994 to 14.2 % in 2013. The leading causes of these sharp changes are various economic agreements (especially agricultural agreement in 2009) which have promoted more the trade of some specific goods between these two countries.

The combination of goods in Iran-Russia trade between the years of 1994–2013 is depicted in detail in the table 1.

Table 1. **Most traded commodities between Iran and Russia during 1994–2013, %**

Most exported commodities from Iran to Russia (% total Iran's export into Russia)							
Goods	**1994**	**2000**	**2002**	**2005**	**2009**	**2012**	**2013**
Edible fruit, nuts, peel of citrus fruit, melons, %	11.25	17.49	33.00	35.63	50.24	43.09	36.99
Edible vegetables and certain roots and tubers, %	0.0	0.03	1.76	4.54	21.17	23.25	26.64
Salt, sulfur, earth, stone, plaster, lime and cement, %	0.43	1.09	0.26	0.21	0.27	6.92	11.28
Vegetable, fruit, nut, food preparation, %	47.66	36.07	20.19	10.92	9.03	3.77	5.35
Organic chemicals, %	0.09	0.12	0.19	5.28	0.57	3.58	4.91
Plastics and articles thereof, %	0.39	0.76	1.04	0.38	1.16	4.01	3.46
Most exported commodities from Russia to Iran (% total Russia's export into Iran)							
Iron and Steel, %	43.6	22.24	51.07	64.19	66.28	45.42	31.14
Cereals, %	1.04	1.63	0.85	1.14	5.16	25.51	26.05
Wood and articles of wood, wood charcoal, %	1.1	1.11	2.98	3.96	5.12	10.95	14.22
Electrical, electronic equipment, %	10.4	8.02	1.57	2.59	1.44	3.37	6.68
Mineral fuels, oils, distillation products, %	2.5	0.66	0.33	9.74	2.86	4.28	5.08
Animal, vegetable fats and oils, cleavage products, %	0.00	0.00	0.00	0.00	0.79	1.53	3.27
Paper and paperboard, articles of pulp, paper and board, %	4.62	4.88	5.46	3.31	2.97	1.93	2.64

Source: [The Islamic Republic…; Trademap…].

2. Literature review of the gravity model of trade

There are a great number of studies that investigated bilateral trade flows through the Gravity model. The first well-known study to explore trade flows goes back to Jan Tinbergen's paper "Shaping the world economy: suggestions for an international economic policy" in 1962 [Kaukin, 2013]. He believed that based on the Newton's gravity rule, the trade between two countries can be a function of their economic sizes and distance between them. The Tinbergen's theoretical foundation of this model was improved by Linnerman [1966], Anderson [1979] and Brocker [1989].

By the time, scholars have developed the empirical econometric approaches of the gravity model by using a number of real and dummy variables in regards to trade flows of various countries. For instance, Byers et al. [2000] applied a parsimonious gravity model for three Baltic countries of Estonia, Latvia and Lithuania after the collapse of the Soviet Union. Their findings stated that the trade flows of these nations were not only reduced, but also shifted to the members of the former Soviet Union. Porojan [2001] tried to find trade flows-spatial effects nexus through the gravity model for the European Union and some of its potential members. In another study, Martinez-Zarzoso [2003] evaluated the effects of preferential agreements on the bilateral trade flows among 47 countries in several economic blocs and areas during 1980–1999. Papazoglou [2007] attempted to explore potential trade flows for Greece to the EU member states by using a gravity model. His finding depicted that accrual exports of Greece fall short of potential ones, while the op-

posite is true for Greek imports. Okubo [2007] investigated the trading system of the Japanese Empire using border effect analysis in the gravity model from the 1910s through the 1930s. His finding showed steadily trading bloc border effects in this period. Xuegang et al. [2008] used the three new explanatory variables GDP, GDP per capita and Shanghai Cooperation Organization (SCO) to construct a gravity model for Xinjiang's bilateral trade. Their result illustrated that all the three variables affect the Xinjiang's bilateral trade. Ekanayake et al. [2010] investigated the trade diversion effects of the regional trade agreements in Asia on intra-regional trade flows by using a gravity model and annual data for 19 Asian countries during 1980–2009. The findings represented the negative sign of ECO and positive signs of ASEAN, BA and SAARC RTAs. Chen and Novy [2011] applied a gravity model to find out the trade integration across manufacturing industries in European Union countries. They concluded that substantial technical barriers to trade in specific industries are the most important trade barriers. Ulengin et al. [2015] developed two gravity models to analyze Turkish textile exports to 18 selected EU countries between 2005–2012. Their result proved the fact that the quota limitations are against Customs Union regulations.

Some earlier studies were applied gravity model in the cases of our study, i. e. Iran and Russia. Kaukin [2013] tested various gravity models to find out the trade pattern in the Russian Federation. His results showed the positive signs of GDP in Russia's regions, GDP in Russia's trade partners and borders, while depicted a negative coefficient for variable distance. Traekorova and Pelevina [2014] applied a gravity model to explore the trade flows between BRICS for the period of 2005–2011. Their findings in the case of Russia represented a positive coefficient of GDP for both import and export. Besides, distance had a negative coefficient in export equation, while had a positive effect on Russia's import during 2005–2010. Taghavi and Hossein Tash [2011] analyzed the international trade patterns of Iran with 12 oil exporting countries by using a gravity model. The results reported that GDP and distance are statistically significant in the case of Iran's export to developed oil exporting countries, while they are not statistically significant in the trade flows of Iran with other oil exporting countries such as Libya and Nigeria. Soori and Tashkini [2012] investigated trade flows between Iran and regional blocs through a gravity model over the period of 1995–2009. The results of this study proved that geographical distance has a negative and significant coefficient. Furthermore, they found that FDI is positively correlated with the trade.

Besides the above empirical researches, a number of scholars have considered oil price and sanctions in the gravity model of international trade:

Mirza and Zitouna [2010] tried to find out the impact of oil prices on the geography of US imports through a gravity model. The results showed that an oil price shock would increase the share of US neighbors by around 0.8 %. Beckmann and Fidrmuc [2012] examined the effects of oil price shock as a dummy variable on the CMEA (Council for Mutual Economic Assistance) trade during 1950–1990 by applying a gravity model. They concluded that the oil price crisis in the 1970s had several repercussions on Eastern Europe.

Van Bergeijk [1992] had an attempt to find out the impact of diplomatic barriers on trade through a cross section gravity model that deals with forty countries in the year 1985. His results depicted that any diplomatic sanctions can affect the export and export flows. Evenett [2002] estimated the impact of economic sanctions of eight industrialized

economies on their imports from South Africa by using a gravity model. His findings showed that sanctions most adversely affected South African exports. Yang et al. [2004] applied an empirical analysis through a gravity model for the period from 1980–1998 to find out the impact of US economic sanctions on USA trade with other countries. The findings depicted that sanctions increased trade between target countries and the EU or Japan. Ziaee Bigdeli et al. [2012] investigated the impact of economic sanctions on the Iran's trade flows with its 30 trade partners during 1972–2006 through a gravity model. Their results showed that the imposition of any economic sanctions against Iran can decrease its trade flows by 0.089 %.

Overall, it can be seen that there has not been a serious attempt to examine the impacts of sanctions and oil price shock on the Iran-Russian bilateral trade. Hence, this paper would provide new and useful results in order to find out how financial sanctions, non financial sanctions and oil price shock can affect the bilateral trade between Iran and Russia.

3. Data description and Methodology

3.1. Dataset description

The variables used in this study contain trade volume (sum of import and export) between Iran and Russia in million U. S. dollars, GDP and GDP per capita in Iran and Russia in current million U. S. dollars, transportation cost between these two countries in U. S. dollars, and three dummy variables non financial sanctions, financial sanctions and oil price shocks. Table 2 reports definitions and units of all the variables. It should be noted that Data on trade volume come from the ITC (International Trade Center) and the Central bank of Iran. Moreover, GDP and GDPPC in Iran and Russia are collected from the World Development Indicators (WDI) online database. Meanwhile, since just two countries (Iran and Russia) are considered in our gravity model, the common variable distance which is a constant number over the time period, should be omitted from the model. Hence, we have used the annual transportation cost (exporting full 40 ft containers from Amirabad port in Iran to Astrakhan port in Russia) data which are collected from the [Amirabad port website].

Table 2. **Definitions of variables**

Variables	Definition	Unit
Trade	Trade volume between Iran and Russia	Million US $
GDP	GDP in Iran and Russia	Current Million US $
GDPPC	GDP per capita in Iran and Russia	Current Million US $
TC	Transportation cost	U. S. Dollars
SANCNF	Dummy variable taking a value of one if there are non financial sanctions against Iran (1994–1996, 2005–2013)	Dummy (0/1)
SANCF	Dummy variable taking a value of one if there are financial sanctions against Iran (2011–2013)	Dummy (0/1)
OILSHOCK	Dummy variable taking a value of one if there are sharp changes in the oil prices (1998, 2003, 2007, 2008, 2009 ,2011)	Dummy (0/1)

3.2. Model specification

In this paper, we follow the gravity model form introduced by Deardorff [1998] and developed by Yang et al. [2004] to find out how oil price shocks, financial sanctions and non-financial sanctions as dummy variables can impact on the bilateral trade between Iran and Russia. Hence, our econometric model takes the following form of time series:

$$\begin{aligned} LnTRADE_t = \beta_0 + \beta_1 LnGDP_t + \beta_2 LnGDPPC_t + \beta_3 LnTC_t + \\ + \beta_4 SANCNF_t + \beta_5 SANCNF_t + \beta_6 OILSHOCK_t + \varepsilon_t . \end{aligned} \quad (1)$$

Where TRADE denotes trade volume between Iran and Russia, GDP is (GDP_{Iran}* GDP_{Russia}) which represents the size of the economy in Iran and Russia. GDPPC indicates (GDP per $capita_{Iran}$* GDP per $capita_{Russia}$) that shows the size of income in Iran and Russia. TC is transportation cost for these two countries. All the rest variables are dummy as non-financial sanctions (SANCNF), financial sanctions against Iran (SANCF) and global oil price shocks (OILSHOCK).

First, we need to find out the order of integration of the variables by applying unit root tests, i. e. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests in this study. The main difference between these two various tests is their facing with the heteroskedasticity and any serial correlation in the error terms. The test regressions for the ADF and PP tests are as follows:

$$ADF\ test: \Delta Y_t = \beta' D_t + \pi Y_{t-1} + \sum_{j=1}^{p} \varphi_j \Delta Y_{t-j} + \varepsilon_t . \quad (2)$$

In the ADF equation, D_t indicates the deterministic term vector. The εt represents the error term which is serially uncorrelated and also consider as hemoskedastic.

$$PP\ test: \Delta Y_t = \beta' D_t + \pi Y_{t-1} + \mu_t . \quad (3)$$

Where μ_t is I (0) and may be heteroskedastic. The PP stationary test ignores the existence of serial correlation and heteroskedasticity in the error terms.

According to the unit root tests, if the variables are integrated of the same order, we would run the Johansen-Juselius cointegration test (two different likelihood ratio tests, i. e. the trace test and maximum eigenvalue test) to obtain the number of co-integrating vectors (Before running this test, we would imply the Lag Length Selection to detect the lag length using three popular criteria as AIC, BIC and HQ).

If the Johansen-Juselius suggests that variables are co-integrated, we will develop an error correction model in VECM structure as follows:

$$\begin{aligned} nLnTrade_t = \alpha_1 + \alpha_1 ECT_{t-1} + \sum_{i=0}^{n} \beta_i nLnTrade_{t-i} + \sum_{i=0}^{n} \delta_i nLnGDP_{t-i} + \\ + \sum_{i=0}^{n} \theta_i nLnGDPPC_{t-i} + \sum_{i=0}^{n} \gamma_i nLnTC_{t-i} + \varphi Dummy + \varepsilon_{1t} . \end{aligned} \quad (4)$$

Where β, δ, θ, γ are the coefficients to be estimated, ECT_{t-1} is the vector error correction term which is obtained by the long run co-integration relationship, φ is the coefficient of dummy variable, Δ is the difference operator, n is the number of lags and ε_{1t} indicates the serially uncorrelated error terms.

4. Empirical results

4.1. Unit root tests

In order to evaluate the stationarity of all series, we performed two unit root tests on all variables at levels and first differences. The tests used are the augmented Dickey-Fuller (ADF) test and Phillips-Perron test. The results are summarized in Table 3 and Table 4. We can conclude all the variables become stationary through doing first difference or in other words, all time series are I(0).

Table 3. **ADF Unit root test results**

Variable	ADF statistic	1 % Critical value	5 % Critical value	10 % Critical value	H0	Stationary
LnTRADE	–2.04	–3.95	–3.08	–2.68	Accept	No
D(LnTRADE)	–5.85	–3.92	–3.06	–2.67	Reject	Yes
LnGDP	–0.34	–3.85	–3.04	–2.66	Accept	No
D(LnGDP)	–2.73	–3.83	–3.02	–2.65	Reject	Yes (at 10 %)
LnGDPPC	0.21	–3.83	–3.02	–2.65	Reject	No
D(LnGDPPC)	–2.86	–3.85	–3.04	–2.66	Reject	Yes (at 10 %)
LnTC	–3.02	–3.83	–3.02	–2.65	Reject	No (at 1 %)
D(LnTC)	–6.16	–3.85	–3.04	–2.66	Reject	Yes

Note: ADF refers to Augmented Dicky Fuller, D refers to first differences.

Table 4. **PP Unit root test results**

Variable	PP statistic	1 % Critical value	5 % Critical value	10 % Critical value	H0	Stationary
LnTRADE	–3.02	–3.83	–3.02	–2.65	Accept	No
D(LnTRADE)	–8.75	–3.85	–3.04	–2.66	Reject	Yes
LnGDP	–0.17	–3.83	–3.02	–2.65	Accept	No
D(LnGDP)	–2.73	–3.85	–3.04	–2.66	Reject	Yes (at 10 %)
LnGDPPC	–0.11	–3.83	–3.02	–2.65	Accept	No
D(LnGDPPC)	–2.75	–3.85	–3.04	–2.66	Reject	Yes (at 10 %)
$LnTC_{IR}$	–3.02	–3.83	–3.02	–2.65	Reject	No (at 1 %)
$D(LnTC_{IR})$	–8.75	–3.85	–3.04	–2.66	Reject	Yes

Note: PP refers to Phillips-Perron, D refers to first differences.

4.2. Johansen Co-integration test

As we have found out from the unit root tests, all our series are I(1), hence, it is possible now to check the presence of a long run cointegrating relation among the endogenous variables. But, before proceeding the cointegration test, we should find the convenient and optimal lag length. In this present research, we choose optimal lag numbers using

the Akaike Information Criteria (AIC), Hannan-Quinn Criterion (HQC) and Schwarz information criterion, which suggest one lag. This lag number is used for the cointegration test and also the remaining research analysis.

The following table reports Johansen co-integration test results. It can be seen that both the Trace and Maximum Eigenvalue test suggest the existence of the cointegration relationship among research variables at the 0.05 level.

Table 5. **Johanson co-integration test**

No. of cointegrations	Trace test			
	Eigen value	Trace statictic	Critical value	Prob.**
None*	0.84	55.31	40.17	0.0008
At most 1	0.51	21.64	24.27	0.1032
At most 2	0.32	8.44	12.32	0.2045
At most 3	0.07	0.07	4.12	0.2819
No. of cointegrations	Maximum Eigenvalue test			
	Eigen value	Max-Eigen statistic	Critical value	Prob.**
None*	0.84	33.66	24.15	0.0019
At most 1	0.51	13.20	17.79	0.2147
At most 2	0.32	7.06	11.22	0.2439
At most 3	0.07	1.37	4.12	0.2819

* Shows rejection of the hypothesis at the 5% level.
** Mackinnon-Haug-Michelis (1999) p-values.

4.3. VEC model estimation

By the means of Eviews 7.0 software, the annual data for 1994–2013 in the gravity model presented in the form of the VECM in Equation (4), were analyzed and the results are shown in Table 6. It should be noted that all the three dummy variables have been added to the model as exogenous variables. Meanwhile, since our purpose is to find out the impact of various sanctions (financial and non-financial ones) and oil price shock on the bilateral trade of Iran and Russia, we just focus on the results for these three dummy variables.

Table 6. **VECM estimation results for dummy variables**

	Short run		
Variables	OILSHOCK	SANCF	SANCNF
Coefficients	–0.23	–0.49	–0.35
t-statistic	–2.48	–5.22	–4.91
P-value	0.03	0.00	0.00

In regard to our findings in Table 7, we accept the null hypotheses of H_I, H_{II}, H_{III}. The results of accept/reject of the research hypotheses are shown in Table 7.

Table 7. **Hypotheses of the research**

Hypotheses			Variable	Predicted sign	Estimated sign	Result
H_I	*H0*	There is a negative relationship between non financial sanctions and Iran-Russia trade	SANCNF	Negative	Negative	Accept H0
	H1	There is not a negative relationship between non financial sanctions and Iran-Russia trade				
H_{II}	H0	There is a negative relationship between financial sanctions and Iran-Russia trade	SANCF	Negative	Negative	Accept H0
	H1	There is not a negative relationship between financial sanctions and Iran-Russia trade				
H_{III}	*H0*	There is a negative relationship between oil price shocks and Iran-Russia trade	OILSHOCK	Negative	Negative	Accept H0
	H1	There is not a negative relationship between oil price shocks and Iran-Russia trade				

Conclusions

In this research, we examined effects of the sanctions imposed against Iran (financial and non financial sanctions) and also the oil price shocks on Iran-Russia trade through the gravity model by using the VECM approach for 1994–2013. According to the results, the coefficient of the financial sanctions was estimated — negative, which means imposing any financial sanctions against Iran has a profound negative effect on the trade between these two countries. In addition, the effect of non-financial sanctions on the bilateral trade of Iran-Russia statistically was significant and negative, as well. The influence of the oil price shock on the Iran-Russia trade is also negative, so any sharp changes in this variable will decrease the trade volume between these two countries.

According to the research findings we can conclude that:

1. Due to the negative coefficient of non financial sanctions in our research, it seems plausible that there is a higher potential and a huge impetus of Iran-Russia economic integrity when there are not any non-financial sanctions against Iran.

2. According to the high oil dependency of the Russian and Iranian government budget, oil price shock hugely influences the revenues in their budget. With regard to oil price drop, their revenue may be felt and this precarious situation may hit the bilateral trade between Iran and Russia. In case of a sharp increase of the oil prices, the revenues of these two countries would be risen up, but they had not used these sudden high revenues to improve the trade volume. The negative coefficient of the oil price shock in our findings proves this fact. Hence totally an oil price shock, whether an increase or decrease, influences adversely on the bilateral trade of these two exporting oil countries.

3. The financial sanctions against Iran play a primary role in the bilateral trade of Iran and Russia. According to our findings, it has a remarkable negative coefficient, which stands for the harsh and vigorous influence of this variable on the trade mass of these two

countries. Nevertheless, despite Iran and Russia have attempted to solve this problem and paved way through some solutions such as creating a joint regulatory structure in order to improve financial transactions between their banking systems, bilateral monetary agreement or enhancing barter trade during global sanctions, but up to now, it has not come in their real trade process.

4. Financial sanctions have the most negative effects on Iran-Russia trade. Excluding from SWIFT system, problems with issuing and payments of Letter of Credit, sanctions on the Iranian banks and the Central bank of Iran have dramatically harmed the amount of bilateral trade between Iran-Russia in the recent years [Ivanov, 2014]. However, as we mentioned before, the future lifting financial sanctions according to the Joint Comprehensive Plan of Action (JCPOA) would have a profound positive impact on the Iran-Russia trade turnover.

To sum up the paper, it can be noted that obviously there are many other factors such as geopolitical concerns, Iran's situation towards joining WTO, tariffs and pricing, visa procedures and transports which have significant impact on the Iran-Russia trade. The author suggests future researches with a larger data about these factors giving a better result and fewer errors. However, from the point of our view, this research, proves a useful and interesting findings, which can help economists and policy makers to achieve a better view of Iran-Russia bilateral trade.

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