**The effect of economic sanctions on the volume of trade in the agriculture sector of Iran and business partners in the EU**

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**Abstract**

In this research, the effect of economic sanctions on the volume of trade of Iran with 10 main trading partners in EU through 2001 up to 2015 is investigated. In this way, a Modified Gravity Model is used as an empirical international trading model and Panel data are used for investigating the effect of sanctions. Based on models, the effects of sanctions are categorized into two weak and strong levels. First, the gravity model for Iran trading is estimated without tanking the sanctions to account. Then in the second state, the sanctions in two weak and strong forms are mentioned in the model. In the first state, the sign of all of the variables except population is matched with expectations. When the sanction variable is entered in the model the effect of foreign exchange fluctuation variable gets more intense in comparison with the condition that sanction variable is not mentioned. Considering the obtained results, mentioning the sanction in the model has not had a considerable effect on variables in terms of sign and signification but in terms of quantity, it has had a tremendous effect which indicates the role of sanctions especially strongest sanctions. Finally, it can be said that the effect of sanctions on the trade of agriculture sector of Iran with Europe was significant and has led to 7% decrease of trading in weak sanctions and 12% decrease in strong sanctions.

Keywords: sanction, trade, gravity model, EU panel data

**Introduction**

In trading sanctions, the kinds of business relationships get limited or cut. In financial sanction, some pressures and limitations get implied to financial relationships of countries.

Nowadays, considering the globalization of the economy,foreign trading dedicates main part of the economy of any country to itself and it is a tool for obtaining the required products with less cost through welfare purposes of communities. After the Islamic revolution, our country Iran, by attention to political problems with the United State of America, got the goal of several sanctions by the USA, United Nations, and some other countries. Based on this, the issue of sanction turned to an endogenous phenomenon for an economy of Iran which was accompanied with several falls and rises through three past decades and always this question has been raised that: what was the effect of sanctions on different economic parts and how was this effect?

Srinivasan (1967), commercial ban phenomenon is analyzed by market failure and it is concluded that for investigating the act of optimum politic intervention by the time occurrence of commercial destructions using a two commodity model (exportable and importable) of international trade in the frame of a two periods horizon is essential.

Frey (1984) using a simple two-commodity model, investigated the effect of negative sanctions on production–possibility frontier of economy and indifference curve of commodities of sanctified countries and concluded that negative sanctions in the countries with inflexible manufacturing structure lead to more loss of economic welfare.

Gray (1986) in his study for choosing the appropriate and effective method of economic sanctions affecting imports of the target country, distinguished between competitive and none competitive goods.

Hufbauer (1997) in a study investigated the effect of economic sanction of USA on USA trading (based on the gravity model). In this paper, Hufbauer calculated and estimated the amount of missing business or commercial lossesin USA economy because of sanction and shows that between 6 countries being studied Iran is the second country which its sanction has imposed the most loss or missing business on the economy of USA.

**Methodology**

In this research, investigating the effect of USA sanction on bilateral trading of Iran and its business partners in the European Union is considered as the main purpose. Therefore, for expressing circumstance of bilateral trade the gravity model is considered in form of a linear and logarithmic equation which its specification is in the following the form:

*(9)*

In the model TRADE(9) total trade of Iran with business partners, GDP and GDPjtare gross domestic product of Iran and business partners respectively, POPit and POPjt are populations of Iran and business partners respectively,DISTijis distancebetween Iran and capital city of business partner countries, and ER is the variable of foreign exchange. Uijtis error term.

In model 10 the variable of sanction are added in two weak (sanl) and strong (sans) form.

**Estimation of gravity model and analyzing the data**

By attention to existence of time series as a part of Panel data in this research, the first different unit root test is used for testing the stationary of time series, then different cointegration tests are used for investigating the existence of cointegration, theF Limer test is used for distinguishing the type of Panel data and Hausman test is used for choosing the type of the model.

First, it is necessary to stationary of variables be investigated. In this study, the Pesaran, Dickey-Fuller, and Levin, Lin, and Chu tests are used for unit root test.

Based on results the null hypothesis based on the existence of unit root in all of the variables except GDPD is at 5% level is rejected in a way that variables are stationary at level and the variable GPPD is stationary at first difference.

For doing the cointegration test the Dickey-Fuller statistic is used, based on this the combined ADF statistic of variables are significant at 5% level, therefore, the null hypothesis of the test based on no cointegration between variables is rejected and variables are cointegrated in long run.

F Limer test: this test is used for choosing between using panel or pooled data since the value of calculated F is more than the F of the table the null hypothesis is rejected and groups effects are accepted and different intercepts most are mentioned in estimation.

**Hausman test**

The value of the calculated statistic in this test is significantly more than the value of statistic in the table, therefore, the null hypothesis is rejected and is not acceptable and it means that the fixed effects model is appropriate.

The results of estimation of gravity model without considering the sanction variable with fixed effects:

As it is expected trading motivation gets decreased by increase of the size of market and improvement of the level of economic actions inside the country. This theory can explain the inverse relationship of mutual trading circumstances with the amount of population. The population can be consumption of size of the country too, in a way that it can be claimed that by an increase of population the frugality caused by scale increase which this issue can have an indeterminate sign in export and based on the resulted sign B is shown. However the distance variable between the countries has the expected value and sign, it is not significant. Trading volume variable with lag has a significant effect on the amount of trading between countries, also foreign exchange fluctuation is matched with expectation and it has a significant and negative effect on the volume of trading. The results of GDP are matching with expectations.

**Table 6) Results of estimating the gravity model without considering the sanction variable (2001-2016)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Coefficient | | Statistic | | Probability level |
| C | 34.56 | | 0.98 | | 0.74 |
| lnDISTANC | -2.3 | | -1.67 | | -0.65 |
| lnTRADE(-1) | 0.065 | | 5.76 | | 0.044 |
| lnGDP | 1.39 | | 2.89 | | 0.0035 |
| lnGDP | 0.73 | | 4.92 | | 0.046 |
| lnPOPI | -1.27 | | -4.56 | | -0.04 |
| lnPOPJ | -0.53 | | -3.12 | | -0.032 |
| LNRE | -0.82 | | -5.67 | | -0.0012 |
| SANL | - | | - | | - |
| SANS | - | | - | | - |
|  | | D.W=2.18 | | R2= 0.86 | |

**The results of estimation of gravity model considering sanction variable**

The effect of foreign exchange fluctuation relating to the condition that the sanction variable was not considered is more intense as it is clear from the results despite considering the sanction variable in model other variables have not had considerable change in terms of sign and significance but in terms of quality they have had considerable change which shows the effect of sanctions and especially strong sanctions. The R2 = 0.91 being high indicates that the model has a strong specification. Finally, it can be said that the effect of sanction variable on agricultural trading of Iran with Europe countries is significant and it has led to 7% decrease in weak sanctions and 12% decrease in strong sanctions.

**Table 7) Results of estimation of gravity model considering sanction variable (2001-2015)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Coefficients | | Statistic | | Probability level |
| C | 19.16 | | 1.28 | | 1.2 |
| lnDISTANC | -4.1 | | -1.08 | | -0.84 |
| lnTRADE(-1) | 0.016 | | 2.66 | | 0.0302 |
| lnGDPI | 1.07 | | 3.19 | | 0.005 |
| lnGDPJ | 0.003 | | 4.65 | | 0.041 |
| ln POPI | -1.21 | | -4.16 | | -0.022 |
| lnPOPJ | -0.22 | | -2.87 | | -0.021 |
| LNRE | -0.96 | | -2.67 | | -0.001 |
| SANL | -0.075 | | -6.55 | | -0.021 |
| SANS | 0.122 | | 4.1 | | 0.05 |
|  | | D.W=2.54 | | R2 = 0.91 | |

**Suggestions**

The most important policy suggestions of the present research are as follows:

Since trading contracts lead to laying down some special rules which obeying them is mandatory by all of the members and sanctifying the country which is member of such institution is impossible and completely ineffective, increase of commercial cooperation of Iranand creating new trading contracts with other countries especially economically powerful countries can lead to resolving the problems and promote and expand of cooperation also forming mutual dependence in relationships of Iran with other countries.

By attention to the negative effect of foreign exchange fluctuation of exporter country on agriculture trading, it is suggested that domestic monetary policies and other dependent policies be planned in a way that contributes to decreasing of the exchange rate and through this stability in Iran's agricultural trade.

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