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## **Policy analysis the impact of GDP, the ratio of prices and exchange rates in neighboring countries on the development of agricultural exports**

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**Abstract.** Today, due to international changes regarding the sharp decline in oil revenues, the negative impact of diseases such as Corona-virus on many parts of the country and international trade, change in patterns of development of national income is inevitable. In the current situation, changing the main variables of the country's development, the importance of exporting agricultural products to the national economy and the growth and development of the country is undeniable. Despite numerous studies that support the export of non-oil products for the growth of the country's exports, the effect of price ratios, exchange rates and the GDP of neighboring countries on the country's exports have not been studied. In this article, with the approach of econometric approach and using data panel method, the test of export of Iranian agricultural products to neighboring countries has been tested. According to the research findings, the effects of GDP on the export of Iran's agricultural products are positive and significant, and the effects of price-to-price ratios between Iran and neighboring countries, as well as the effects of exchange rate ratios between Iran and neighboring countries on Iran's agricultural exports, are negative and significant. Therefore, the increase in gross domestic product of neighboring countries increases the export of Iranian agricultural products to these countries and by increasing domestic prices compared to the prices of neighboring countries and increasing the domestic exchange rate compared to the exchange rate of neighboring countries reduces Iran's agricultural exports.

**Keywords.** Agricultural exports, GDP, exchange rates, price ratios, data panel model

### **1. Introduction**

The agricultural sector is one of the most important economic sectors. Examining the economies of developed and industrialized countries today, we find that the basis of economic development in most of these countries has been the agricultural sector, and in the shadow of special attention to this sector will be possible to develop other sectors. On the other hand, today, due to changes in global consumption patterns, the collapse of trade and economic borders, as well as the globalization of the economy and the emergence of the word economic solidarity instead of economic domination, in international trade relations, the issue of exports of goods and services It has become very important. Thus, it would be natural for all countries

to strive for a significant share of world trade. Because in the meantime, countries that gain a larger share of world trade can reach a desirable level in terms of economic power.

In general, one of the most important problems of developing countries and the Third World is their monoculture and the dependence of their economy on the export of raw materials, which has created negative consequences for their economic, political, social and even cultural structure. Because the bulk of the foreign exchange earnings of such countries come solely from the export of one or more items of raw materials, therefore, such countries have a very weak and fragile structure in the face of adversity and external pressures. Obviously, in such a situation, any abnormal fluctuations in the price of these goods or the limited goods that constitute the main sources of income of these countries will have far-reaching effects on their entire structure. Therefore, the development of other economic sectors such as agriculture is necessary both to supply food and to expand exports. Due to the strong dependence of the Iranian economy on revenues from the export of raw materials (oil) and in order to reduce dependence, attention to the production and export of non-oil products is one of the important priorities that increase exports accelerate economic growth. In this regard, Iran's agricultural sector, which is one of the comparative advantages of the country in export markets, can lead to a boom in exports and an increase in currency. In particular, Iran's climatic conditions have provided a favorable climate for the diversity and expansion of agricultural crops.

According to the latest statistics in the first 10 months of 2019, the export of agricultural products and food industry is 5692 thousand tons and worth 4673 million dollars. which in terms of weight 4.9 percent and in terms of value 13.2 percent of the total exports of non-oil goods in the country. The value of 10-month exports in 2019 compared to the same period last year has decreased by 14.5 percent and compared to the average of 6 years leading to 2017 has decreased by 8.6 percent. Major export items of agricultural products and food industry include tree fruits worth 1576.2 million dollars with a share of 33.7%, vegetables and weaving products worth 1049 million dollars with a share of 22.4%, milk and its products worth 358/1 million dollars with a share of 7.7 percent, saffron with 230.7 million dollars with a share of about 5 percent and fish and shrimp worth 190.5 million dollars with a share of 4.1 percent of the total export value of agricultural products and food industry. The average price per ton of agricultural exports was 821 dollars, which is 166.6% higher than the average price per ton of non-oil exports (308\$).

## **2- A review of the studies performed**

Shakeri, A. (2004) in examining the determinants of Iran's non-oil exports, non-oil exports as a function of two price variables, free exchange rate and inflation rate and considered two basic variables of productivity and competitiveness and used ARDL technique to estimate the model. The results of model estimation show that non-oil exports are mainly dependent on the situation of the basic variables of productivity and competitiveness, but exchange rate price variables, although had a positive effect on exports, but this effect was not significant and decisive. The results of this study show that in order to increase exports, efforts should be made to remove barriers to the effective functioning of price factors and to promote non-oil exports with more emphasis on non-oil variables (such as productivity and competitiveness)<sup>1</sup>.

Hooshmand, M., Daneshniya, M., Abdollahi, Z., Eskandaripour, Z. (2011) Using the system of simultaneous equations (2SLS) and time series statistics of the years (1971-2009), the effective and determining factors of Iran's non-oil exports have been studied. The results of this study show that global income and real exchange rates have a positive and significant effect on export demand. Government infrastructure investment also has a positive effect on export supply. On the other hand, it seems that foreign direct investment and domestic demand surplus, although

they did not have a statistically significant effect on export supply, but their coefficients were obtained positively and negatively, respectively<sup>2</sup>.

Asari S.A., Fattahi,A. and Fehrest, M. have studied the factors affecting the demand for Iranian pomegranate exports using parametric models and using panel data during the period 1992-2012 for countries importing pomegranates from Iran. The results showed that price elasticity is a function of pomegranate import demand, -0.6, which shows that with the increase in prices, there is no significant decrease in demand of importing countries and indicates the inelastic demand for pomegranate in the world market. These results are consistent with the calculation of Herfindahl – Hirschman indices and the share of two firms and eight large firms in the structure of the global pomegranate market, which shows the strong market concentration in India and Iran. The results show that the continuation of the current trend may jeopardize Iran's market position and strength. Finding new patterns of trade, marketing and participation in international exhibitions are some of the strategies to maintain and expand the demand for Iranian pomegranate in global markets<sup>3</sup>.

Pishbahar, E., Dashti, Q. and colleagues to study the economic factors affecting the demand for Iranian pistachio exports, the countries that had the largest share of imports from Iranian pistachios during the period 1997-2006 were selected and using data The panel estimated the export demand function of this product. The results showed that factors such as the export price of Iranian pistachios and the shock caused by the presence of aflatoxin toxin in 2004 had a negative and significant effect and the variables of global pistachio prices and real per capita income had a positive and significant effect on Iranian pistachio imports. The exchange rate variable did not show a significant effect. Therefore, paying attention to principled investment in pistachio production and market (such as developing appropriate methods of planting, holding and harvesting and paying attention to aflatoxin toxin) can strengthen the country's export share in the long run<sup>4</sup>.

In this study, the statistical population of the study of agricultural exports to neighboring countries of the Islamic Republic, which share the land and sea borders, including Pakistan, Afghanistan, Turkmenistan, Azerbaijan, Armenia, Turkey, Iraq, Russia, Kazakhstan, Kuwait, Saudi Arabia, Qatar, Bahrain, UAE, Oman. In total, it can be said that of the total exports of agricultural products in the first ten months of 2019, which was equal to 4673 million dollars, 3965 million dollars (about 85% of total exports of agricultural products) to neighboring countries has been done. This indicates the great importance of exporting agricultural products to neighboring countries.

Despite the numerous studies that have been mentioned and the results of research that show the positive impact of export protection policies on export growth, there is still a comprehensive study of agricultural products and their relationship with exchange rates, price ratios and GDP of neighbors Has not taken place. Therefore, this study intends to study the export function of agricultural products to neighboring countries in terms of exchange rate variables, price ratios and GDP of neighbors by estimating the economic model. In addition to the fact that no study has been done so far, other issues such as heavy international sanctions and the Corona (Covid-19) epidemic have led us to pay more attention to regional issues and neighboring countries to expand exports from oil revenues to sustainable revenues. And take advantage like agricultural products.

### **3- Theoretical foundations and research methods**

The growth of the wealth of nations, or in the modern sense of profound economic and social progress, and the expansion of public welfare, although it contains a wide range of factors and components in terms of "causation" and "disability assessment", but in its reference set, one

component can be distinguished and "self-specific" from the others, and that is the theory of comparative advantage. According to the theory of comparative advantage, if a country produces a commodity cheaper than other commodities, that country has a comparative advantage in producing the commodity in question. The same approach can be extended to business. In other words, if the goods are exported at a lower cost compared to other countries, there is an advantage for the exporting country.

The issue of advantage was first raised by Adam Smith in the international trade literature, which actually explains the reason for trade. According to Smith, if one country can produce a product cheaper than another and the other country produces another product cheaper than the first country, each country has an advantage in producing the product they produced cheaper. Therefore, if any country exports the goods in which they have an advantage and imports the goods in which they have no advantage, both countries will benefit from this exchange (Adam Smith principle of absolute advantage). Now, if there is a situation in which one of the parties to the exchange produces both goods in question cheaper, then the principle of absolute advantage is not able to respond, this is where Ricardo explained the reason for the exchange by proposing the theory of comparative advantage. According to the concept of comparative advantage, if a country produces one commodity cheaper than other commodities, it has a comparative advantage in producing such a commodity. In addition, if the country can export the goods at a lower cost than other countries, it will have a comparative advantage in exports compared to other countries.

In classical theory, comparative advantage is usually defined in terms of relative pre-trade prices and operates in perfect competition, but in the real world, the classical theory of comparative advantage is problematic because of the lack of classical assumptions of comparative advantage, including free trade and full competition. Applied studies that measure comparative advantage are mainly based on post-trade information and statistics and determine comparative advantage based on them. In fact, such methods mostly reflect the structure and performance of a country's foreign trade. For the first time, Liesner presented a model called the Revealed Relative Advantage (RCA) and used this index to estimate the export performance of countries and selected goods.

#### **Definition of comparative advantage:**

Comparative advantage is the ability of a country to produce and export goods at a relatively low cost and cheaper price. In the sense that any country that has a comparative advantage in a particular commodity will specialize in the production and export of that commodity, and in return, will import goods in which it has no comparative advantage from other countries to meet the needs of applicants. If we accept this definition of comparative advantage, then the existence of exports can indicate a comparative advantage in export goods and the existence of imports can indicate a lack of comparative advantage in imported goods.

But the nature of international trade statistics is such that it raises issues in the empirical evaluation of comparative advantage in terms of goods. According to this information, most countries become both exporters and importers of a certain group of goods. It therefore discredits import and export measurements as a direct indicator of comparative advantage or disadvantage. In addition, the real flows of international trade are much different and more complex than ideal business conditions (patterns of comparative advantage in a free trade environment).

In recent years, due to changes in exchange rates and changes in labor prices and wages, exports of many products have increased, especially in the agricultural sector. Due to the devaluation of the national currency and the relative stability of domestic wages, especially

in the agricultural sector compared to neighboring countries such as Turkey, Iraq, Russia, Oman, Qatar, UAE, etc., the comparative advantage of agricultural exports has increased significantly and justification Exports of these products have increased.

The type of research method is descriptive-analytical and with the econometric approach and using the data panel method and Eviews software to test and analyze the export function of Iranian agricultural products to neighboring countries. In data panel models, after accepting the width of different origins in the model, two methods of fixed effects model and random effects model are used to estimate the model and Hausman test is used to choose between fixed effects and random effects. The research examines the literature on these approaches.

### 3-1 Fixed effects model

In order to observe how the fixed effects model works, we can use the relation  $y_{it} = \alpha + \beta x_{it} + u_{it}$  and decompose the error component  $u_{it}$  into an individual specific effect, i.e.  $\mu_i$  and the remainder disturbance i.e.  $v_{it}$ , which changes over time and for inputs or objects (ie, to obtain anything in case  $y_{it}$ , not explained).

$$u_{it} = \mu_i + v_{it} \quad (3-1)$$

Therefore, according to the following relation:  $y_{it} = \alpha + \beta x_{it} + \mu_i + v_{it}$  (3-2)

It can be assumed that  $\mu_i$  contains all the variables that cross-sectionally affect  $y_{it}$  but do not change over time; For example, the sector in which the company operates, the gender of the individuals or the country in which the central office of the bank is located, etc. This model can be estimated using virtual variables known as the least squares dummy variables (LSDV) method;  $y_{it} = \beta x_{it} + \mu_1 D1 + \mu_2 D2 + \mu_3 D3 + \dots + \mu_N DN_i + v_{it}$  (3-3)

D1 it is a virtual variable that accepts a value of 1 for all first observations (i.e. the first company) and otherwise a value of zero. Note that the width of the origin ( $\alpha$ ) is to avoid trapping the dummy variable, i.e. when there is a Perfect Multicollinearity between the virtual variables and the width of the origin, removed from the equation. When a fixed effects model is written this way, it is relatively easy to understand how to test whether the panel method is really necessary, and involves applying a constraint that all virtual width variables from the origin have the same parameter (i.e.  $H_0 : \mu_1 = \mu_2 = \dots = \mu_N$ ). If this null hypothesis is not rejected, the data can be merged and OLS can be used. However, if the null hypothesis is rejected, the application of such a constraint that the width of the sources is similar in all cross-sectional units will not be valid and a panel method should be used. Now, according to the model presented in Equation (3-3), it is observed that it has  $N + k$  parameter for estimation, which if  $N$  is large, will be considered as a challenging problem for any regression package. In order to avoid the need to estimate a large number of virtual variable parameters, conversions are made to the data to simplify their nature. This conversion or deformation is known as the internal conversion, which involves the subtraction (fraction) of the average time of each input from the values of the variable<sup>5</sup>.

$\bar{y}_i = \frac{1}{T} \sum_{t=1}^T y_{it}$  Is defined as the mean time of the observations of  $y$  for the cross-sectional unit  $i$ , which is similarly calculated as the mean of all explanatory variables. We can then differentiate the mean time from each variable in order to achieve a regression that includes only the averaging variables. Note that such a regression does not require the width component

of the origin because here it will have a mean of zero based on the structure of the dependent variable. The model for situational variables is as follows:

$$y_{it} - \bar{y}_i = \beta(x_{it} - \bar{x}_i) + u_{it} - \bar{u}_i \quad (3-4)$$

We can write the above relation as follows:  $\ddot{y}_{it} = \beta\ddot{x}_{it} + \ddot{u}_{it}$  (3-5)

The two dots above the variables represent situational values.

Another method that can be used instead of situational values is to perform a cross-sectional regression based on the mean time values of the variables known as the between estimator. Another possibility is that instead of using  $y_{it}$ -levels, use the first-order difference operator in relation  $(y_{it} = \alpha + \beta x_{it} + u_{it})$  to explain the  $y_{it}$ -changes, so that the model becomes unified. Differentiation and internal conversion will provide the same estimates when there are only two time periods and when there are more periods, the choice between the two methods will depend on the assumed features of the error component. Wooldridge has described this in detail (Wooldridge, 2008)<sup>6</sup>.

Equation (3-5) can be estimated normally using OLS on a consolidated sample of situational data, which requires knowledge of the number of degrees of freedom of this regression. Although only  $k$  degrees of freedom from the observed NT will be used to estimate the relationship,  $N$  degrees of greater freedoms are used to create situational variables (That is, we lose one degree of freedom for each of the  $N$  explanatory variables we need to estimate the mean). Therefore, the number of degrees of freedom that should be used in estimating the standard errors based on a nonlinear method and the time of hypothesis tests is equal to  $NT - N - K$ . Each software package automatically calculates this degree of freedom to estimate such models.

Regression for time-averaged variables will provide the same parameters and standard error as in the case of direct use of least squares dummy variables regression, but without the need to estimate many parameters. However, one of the main disadvantages of this process is that we lose the ability to determine the effects of all variables that are affected by the  $y_{it}$  effect and do not change over time.

### 3-2 Random Effects Model

Another alternative to the fixed effects model is the random effects model, which in many cases is known as the error components, as with the fixed effects method, the random effects approach presents different width components from the source for each input, and that this width of the origin is constant over time. It is also assumed that the relationships between the explanatory and descriptive variables are cross-sectional and temporarily the same.

But the difference is that based on the random effects model, it is assumed that the width of the origins for each cross-sectional unit is due to a width of the common origin,  $\alpha$  (which is constant for all cross-sectional units over the same time) plus a random variable.  $\varepsilon_i$  which changes cross-sectionally but is constant over time.  $\varepsilon_i$  is the random deviation of each component of the width from the origin of the inputs to the width of the general origin, i.e.  $\alpha$ . The random effects model can be written as follows:

$$y_{it} = \alpha + \beta x_{it} + \omega_{it}, \quad \omega_{it} = \varepsilon_i + v_{it} \quad (3-6)$$

As before,  $x_{it}$  is a vector  $k \times 1$  of the explanatory variables, but unlike the fixed effects model, there is no virtual variable to achieve heterogeneity (changes) in the cross-sectional dimension, instead it has an  $\varepsilon_i$  component. Note that this framework requires the assumption

that the component of the new cross-sectional error,  $\varepsilon_i$ , has a mean of zero, independent of the error component of single  $v_{it}$  observations, it has a constant variance of  $\sigma_\varepsilon^2$  and is independent of explanatory variables ( $x_{it}$ ).

The parameters  $\alpha$  and  $\beta$  are consistent but inefficiently using OLS, it can be estimated that the usual formula will be modified due to the cross-sectional correlations between the error components for a given cross-section at different points in time and instead of OLS, a generalized least squares procedure, or GLS, is used. The conversion made in this GLS procedure is the subtraction of a weighted average of  $y_{it}$  over time (i.e., part of the mean instead of the total mean, as was the case for estimating fixed effects). The definition of quasi-averaged data is defined as  $y_{it}^* = y_{it} - \theta \bar{y}_i$  and  $x_{it}^* = x_{it} - \theta \bar{x}_i$  that and  $y_{it}$  are the mean of  $\bar{x}_i$  and  $\bar{y}_i$   $x_{it}$  observations over time, respectively.  $\theta$  will be a function of variance as part of the error of ( $\sigma_v^2$ ) observations and variance as part of the specific error - the existence of ( $\sigma_\varepsilon^2$ )

$$\theta = 1 - \frac{\sigma_v}{\sqrt{T\sigma_\varepsilon^2 + \sigma_v^2}} \quad (3-7)$$

This conversion explicitly requires ensuring that there is no cross-sectional correlation between the error components that must be performed by standard software packages. The fixed effects model with random effects is not conceptually more difficult to accept temporal changes than cross-sectional changes. In the case of time changes, a specific component of the time period error is:  $y_{it} = \alpha + \beta x_{it} + \omega_{it}$ ,  $\omega_{it} = \varepsilon_t + v_{it}$  (3-8)

The effect of a two-way model can be expected to change the width of the origins at both cross-sectional and temporal levels, which is usually used to distinguish random and fixed effects from Hausman statistics (Hausman-1979)<sup>7</sup>.

### 3-3 Introduction of research model

Today, due to changes in global consumption patterns, the collapse of trade and economic borders, as well as the globalization of the economy and the emergence of the word economic solidarity instead of economic domination, in international trade relations, the issue of export of goods and services is very important. Has been. Thus, it would be natural for all countries to strive for a significant share of world trade, because in the meantime, countries that gain a larger share of world trade can position themselves in terms of economic power. Reach the desired level. Meanwhile, if the Iranian agricultural sector aims to expand production relations, the focus should be on the export of these products, which is further estimated by the export function of the agricultural sector for neighboring countries.

In order to test the research hypotheses and achieve the research objectives based on the model of Yan and Lee<sup>8</sup> (2017) article, the estimation model and the results are reviewed:

$$LX = \alpha + \beta_1 LYW + \beta_2 LPPR + \beta_3 LEER$$

LX = logarithm of Iran's agricultural exports to neighboring countries

LYW = Logarithm of GDP of neighboring countries

LPPR = logarithm of the price ratio of Iran to neighboring countries

IEER = logarithm of exchange rate ratio between Iran and neighboring countries

#### 4- Research findings

##### 4-1 Unit root tests in panel data

To determine the reliability of 15 model variables, unit root tests are used in panel data. Reliability of variables means that the mean and variance of variables are constant over time and the covariance of variables between different years. Various tests are performed for unit root or reliability in panel data. Levin, Lin & Chu (2002), Harris & Tzavalis (1999), Breitung (2000) and Breitung & Das (2005) and Im Pesaran and Shin (2003) and Choi (2001) have the null hypothesis that all panels have roots Are units, while the Hadri Lagrangian coefficient test (2000) has the null hypothesis that all panels are stable, the opposite hypothesis is that some panels have a single root<sup>9</sup>.

Each test makes different assumptions depending on the number of panels in the data set and the number of time periods in each panel (data set with a large number of panels and a small number of time periods, data set with a small number of panels, but with large time periods, and datasets with a large number of panels and time periods). Most tests assume that the panel data set is balanced, but the Im Pesaran and Shin test and the extended Dickey-Fuller test - the Fisher type - are also used for unbalanced panels. Due to the imbalance of the panels and the fact that the number of panels is high, while the number of time periods is constant, so in this study Levin, Lin & Chu test was used. The test results related to the reliability of the research variables are presented below<sup>10</sup>.

Table1. summarizes the results of the Levin Lin Cho unit root test

Variable	Amount of statistics at the level	Prob on the level	The amount of statistics in the first order difference	Prob in the first order difference	Result	
LX	Logarithm of Iran's exports to neighboring countries	1.69	4%	.....	.....	Stable at variable level
LYW	Logarithm of GDP of neighboring countries	2.05	2%	.....	.....	Stable at variable level
LPPR	Logarithm of price ratio	11.54	0	.....	.....	Stable at variable level
IEER	Logarithm of exchange rate ratio between Iran and neighboring countries	10.97	0	.....	.....	Stable at variable level

Source: Research Findings

According to the above results, the variables used in this study were all unstable at the level and stable in the first-order difference. Therefore, estimates can be made with confidence and without fear of false regression.

##### 4-2 Selecting the appropriate model for the regression model - F test

When using panel data, the homogeneity or heterogeneity of the test sections must first be determined. If the sections are homogeneous, aggregated least squares regression is used.

Otherwise the method of fixed effects or random effects is known, should be used, to show heterogeneity in individual effects, across the origin of the units.

Fixed effects tests can be performed for both cross-section and time. To perform the fixed effects test, we must first estimate the cross-sectional and temporal fixed effects model and then apply this test.

The results of this test are shown in Table2. The following hypotheses are defined for testing to select a model with a width from a fixed source or a width from a variable source:

- ✓ Hypothesis H0: The width of the model origins does not differ from sample to sample (the width of the source is constant).
- ✓ Hypothesis H1: The width of the model origins varies from sample to sample (width varies from source).

After selecting the width from the source of the variable, a choice must be made between fixed effects or random effects. For this purpose, the Hausman test is used. The results of the Hausman test are given in the table below. The hypotheses of the Hausman test are as follows:

- ✓ Hypothesis H0: The effects are not consistently distributed between firms.
- ✓ Hypothesis H1: The effects are fixedly distributed between firms (in other words, the effects are randomly distributed).

Table2. Appropriate model of regression model (main hypothesis one)

Test	The dependent variable	Amount of statistics	P-value	Result of the estimated model type
Chu F test	Logarithm of Iran's exports of agricultural products to neighboring countries	48.69	0	Panel data regression
Hausman test	Logarithm of Iran's exports of agricultural products to neighboring countries	1.78	61%	Random effects panel data regression

Source: Research Findings

Considering that the amount of F test statistic is 48.69 and its P-value is equal to zero percent (less than 5%), so in choosing between widths from different or fixed sources (choosing between least squares or data regression Panel data) Panel data regression is selected.

Also in Hausman test, considering that the research statistic is equal to 1.78 and the P-value of the test is equal to 61%, so it can be said that in the regression of panel data, a choice between fixed effects and random effects, fixed effects are selected and the model is estimated as fixed effects.

### 4-3 Results and analysis

The results of the model estimate for the purpose of the research, which is the function of exporting agricultural products to neighboring countries, are as follows:

Table3. Estimate the demand function of agricultural exports to neighboring countries

$LX = \alpha + \beta_1LYW + \beta_2LPPR + \beta_3LEER$				
Variable	A symbol	Coefficient	P-value	Result
Width of origin	C	1.03	83 %	meaningless
Logarithm of GDP of neighboring countries	LYW	0.76	0	Positive and significant effect
Logarithm of price ratio	LPPR	0.47	0	Negative and significant effect

Logarithm of exchange rate ratio between Iran and neighboring countries	IEER	± 0.15	2 %	Negative and significant effect
The coefficient of determination	R2	20	.....	.....

Source: Research Findings

In analyzing the results of the model, it can be said that:

- ± The findings of the study show that the logarithm of GDP of neighboring countries has a positive and significant effect on the expansion of agricultural exports to neighboring countries, so that with a ten percent increase in GDP of neighboring countries, increases by 7.6 percent in exports of agricultural products The Islamic Republic of Iran goes to neighboring countries. This is also in line with economic theories, according to economic theories, one of the important factors of export is the amount of income and production of other countries or the country to which exports are made.
- ± The logarithm of the price ratio between Iran and neighboring countries has a negative impact on the export of Iranian agricultural products to neighboring countries. The amount of this effect is equal to 0.47 and it indicates that with a ten percent increase in the price ratio, it will reduce the export revenue of agricultural products by 4.7 percent. In this analysis, it can be said that if there is a ten percent increase in the price of Iranian products or if the price of products in neighboring countries decreases by ten percent, it will reduce the export of Iranian agricultural products to neighboring countries.
- ± If the exchange rate ratio between Iran and neighboring countries increases, it will reduce the export income of agricultural products. Considering that the exchange rate ratio considered from the equality of the free exchange rate to the dollar has been obtained on the exchange rate of neighboring countries in dollars, and this ratio also has a significant and negative effect, because in the long run with the exchange rate increase (Compared to other currencies) Exports are expected to increase, so we can analyze the cause based on the J curve.

The J-curve is analyzed in such a way that although it is said that if the Marshall-Lerner condition is met, an increase in the exchange rate will improve the balance of payments, but empirical evidence suggests that this effect is negative for several months, after which the positive effects begin. According to the J curve, with the increase of the exchange rate, initially the net export becomes negative, but after a while, it becomes positive and its positive effect increases. This is because export and import elasticities are small at first, so the Marshall-Lerner condition is not valid in the short run, but in the long run, according to the Loshatile principle<sup>1</sup>, these tensions become larger and the condition is met, and the positive effect of the exchange rate increase begins. The reason for the small tensions in the beginning is that consumers need time to recognize the change in the international situation. Manufacturers of export goods also need time to expand capacity, procure new equipment and raw materials<sup>11</sup>.

- ± Regarding the research findings, the coefficient obtained is equal to -1.15 and indicates that with a ten percent increase in the exchange rate ratio between Iran and neighboring countries, it reduces exports by 1.5 percent. In this regard, it can be said that since the exchange rate increases, the price of raw materials, etc. increases, as a result, producers and exporters will need time to adjust prices. It can also be said that producers and Domestic exporters have a lack of liquidity, so with the increase in the exchange rate, they do not have

<sup>1</sup> This principle implies that in the long run, compared to the short run, tensions are greater and greater because there is enough time to adjust and remove constraints.

the opportunity and time to supply materials and increase exports, and based on the J curve, in the short term, will reduce the volume of exports.

**According to the analysis of the results regarding the research hypotheses, we have:**

- GDP of neighboring countries affect the export of Iranian agricultural products to these countries.

According to the research findings, the effects of GDP of neighboring countries on the export of Iranian agricultural products are positive and significant, and therefore the first hypothesis of the research cannot be rejected.

- The price ratio between Iran and neighboring countries affects the export of Iranian agricultural products to these countries.

According to the research findings, the effects of price ratio between Iran and neighboring countries on the export of Iranian agricultural products are negative and significant, and therefore the second hypothesis of the research cannot be rejected.

- The exchange rate ratio between Iran and neighboring countries affects the export of Iranian agricultural products to these countries.

According to the research findings, the effects of the exchange rate ratio between Iran and neighboring countries on the export of Iranian agricultural products are negative and significant, and therefore the third hypothesis of the research cannot be rejected.

## **5- Suggestions**

### **5-1 Policy Suggestions**

- According to the estimation of the demand function of agricultural exports and that the growth and increase in GDP of neighboring countries has a positive effect on exports of agricultural products of the Islamic Republic of Iran. Therefore, it is suggested that policies be implemented to help the economic development and stability of neighboring countries, which will economically lead to the development of Iran's exports (especially exports of agricultural products) to these countries.

- Increasing the prices of domestic goods compared to the prices of goods in neighboring countries has reduced the export of agricultural products, so it is suggested that in order to maintain exports and competitiveness in the agricultural sector at the international level, domestic policies to design and implement more stable prices.

- Since the increase in the exchange rate (relative to the exchange rate of neighboring countries) has reduced the export of agricultural products, so this common view in the country that the increase in the exchange rate increases the export of agricultural products is not correct, at least in the short term. An increase in the exchange rate causes prices to rise, at least in the short term, and creates problems for the export of agricultural products (comparing exports in terms of value is a clear indication of the fact that politicians are often content with weight comparisons in this situation). In general, regarding the impact of exchange rates and price ratios, we can say that according to international sanctions, we can succeed in developing stable exports of agricultural products if we also have stable domestic policies.

### **5-2 Suggestions for future studies**

- Considering that there are different regional advantages in Iran for agriculture, animal husbandry and fisheries. Therefore, studies on the development of economic relations of different provinces should be conducted separately and the effects of these provinces should be created as a comprehensive plan for the development of production relations in the agricultural sector for the provinces.

- In addition to this study, another study is needed to increase the comparative advantage in the production of products that have a competitive advantage, so that by studying the export products of Iran and neighboring countries to move towards specialization and advantage in agricultural products.

- In addition to this study, it is suggested that another study be conducted to investigate the limitations and problems in the agricultural sector of Iran with a regional approach (ie, according to each region separately).

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