



## Analysis of Competition Power of Iranian Almond Export

Azizi Jafar (Corresponding author)

Department of Agricultural Economics, Islamic Azad University Branch of Rasht

PO box 41335-3516, Rasht, Iran

Tel: 98-912-338-5994 E-mail: [Jafar574@yahoo.com](mailto:Jafar574@yahoo.com)

Yazdani Saeed

Department of Agricultural Economics, University of Tehran, Iran

Tel: 98-912-167-4771 E-mail: [Syazdani@ut.ac.ir](mailto:Syazdani@ut.ac.ir)

### Abstract

This study has been done in 2007 year to examine the competition power of Iranian almond in export markets and its relative advantages among the countries that are involved almond production and trade. A time series data for years 1970-2002 were analyzed to reach the study objectives. The RCA and RSCA indices were estimated to measure the competition power of almond in World market. The results indicated that based on introduced criteria, the value of RCA has been dropped from 222.71 in 1970 to 4.10 in 2002. So, this means that the position of Iran in almond export market is decreasing. Negative correlation between RCA of Iran and the USA shows that United State has been able to outshine Iran export market using new technologies. According to the estimated export function, it seems that the variables such as domestic GDP, wholesale price Index and foreign exchange rate have a significant impact on export of almond.

**Keywords:** Almond, Export, Competition, Relative advantage

### 1. Introduction

Almond is a tree from *rosaceae* family and from *prunus* gender that originated from wild species in low slopes of central Asia and eastern south mountains. The cultivation of almond from Greece was spread to Mediterranean shores in specific areas about 450 years ago. Most of botanists believe that the origin of almond is Iran. They also believe that almond was taken from Asia to Europe and from Europe to the North of Africa. It was also taken to California in the middle of the 19th century. The almond tree grows pretty well in Mediterranean climate conditions which have dry and hot summers and mild winters. In all part of Iran except Bushehr, Khuzestan, Hormozgan, Guilan, Mazandaran provinces and some areas in Gorgan and Gonbad almond in being produced. The main production areas are; Chaharmahal Bakhtiyari, Tehran, Qazvin, Semnan, East Azerbaijan, Fars, and Yazd. Almond mostly can be produced in a dry area. The main variety of almond which is being produced in the world are nun Pril, California, Mishen, Noplastantra, Tampson and Pirless. The time of blossom, productivity, sensitivity to plagues and diseases, access to markets and taste are the main factors affecting on variety selection in different part on the country. The main variety of almond which is produced in Iran are; Peste Badam, Moheballi and Mamaei. Almond is a rich nuts in terms of nutrition and its consumption in the world is high. Unshelled almond is consumed in raw as well as used in bakery and sweets industries. The extracted oil of almond is also being used in medical industry. The wood of almond tree crust is used in providing pulp, Neopan, etc (Garden assistance of agricultural ministry, 1381). In overall almond is one of the most important non-oil export products in Iran. The government of Iran also emphasizes on export of non-oil products in the 4th economic development program. Therefore, it is a need to study the trend of export and its structure in comparison to the other exporting countries. We need to find the ways of increasing the share of Iran in world export market. We have to develop a program which can encourage the firms to act more efficient in the world market. This study tries to show the relative advantages of Iranian almond and make some practical suggestions.

#### 1.1 The purposes of the study

The main objectives of this study are;

- 1) to determine the relative advantage and competition power of Iranian almond..

2) to analysis the correlation between the export of Iranian almond and other producing countries in international competition market.

3) to estimate the export function of almond and examine the factors affecting on export.

### 1.2 The hypothesis of the study

1) Iran has relative advantage in almond production comparing to the main producing countries (e.g. the USA, China, and Spain).

2) The competition power of Iranian almond has decreased through the time.

3) Almond wholesale price Index has negative effect, and GNP and Domestic Product (DP) have positive impact on almond export.

### 1.3 A review on previous studies

Pawl, in 1992, has studied those factors affected on almond export as well as factors which cause instability in exports income. He has used a time series data of agricultural export products for years 1970 – 89. The results of this study showed that the estimated parameters of price and the amount of exported products such as coffee, tea, linen and cotton have negative signs. Also calculated correlation of price and the export of sugar and tobacco were positive. So this shows that there is a fluctuation in demand income gained from almond in export market (Pawl, 1992).

Naryanan and Redi in 1992 have studied the behavior of net presentation development of exports for some agricultural goods, in India. They have used in their study a times series data for yeas 1360-1376, which had been published by Foods and Agricultural Organization. The obtained results showed that domestic production and wholesale price index have positive and negative effects respectively. Export price, domestic product, foreign exchange rate, and gross national product with positive effect have become significant in orange exports function. There is instability in export income obtained from exporting sweet lemon, orange, and the whole citreous fruits.

Salami and Pishbahar in 2000 year have studied the existence and non existence of relative advantage and their trend changes during 1990-2000 for some groups of garden products in Iran. They used RSCA and RCA measures in their studies. The obtained results indicated that although Iran has relative advantage, based on calculated criteria in the production but general policies of commerce and economical behavior of producers and exporters have been in a manner that they couldn't show a proper respond against export structure changes of countries in the area and world (Salami and Pishbahar, 2000).

Helliner in 1990 has used RCA indicator to show the direction of export trade strategy of some goods in short time. He states that when RCA criteria show relative advantage fluctuations and competition power of export goods, the general trade policies of the country have impact on RCA. He believes that RCA criteria can be used as an export strategy for those goods (Helliner in 1990).

## 2. Method of study

Exporting goods and services have important role in the economics of countries. When trade is flourished, all countries try to make proper policies in order to active the engine of economic growth. So, competition in the field of trade increases, and those countries are successful which have a clear and specific strategy for exporting their products (Pal, 1992). One recognition instrument of exports feedback in different countries, is trade share changes or relative advantage which has become well known during the time, and one criteria which has been presented to measure the export action of countries and different goods, is the criteria of relative advantage which has become well known in RCA that presented for the first time in 1965 by Ballasa.

The RCA emphasizes on the existing structure of exports to study the possibility of joining the developing countries to World Trade Organization (WTO). The RCA Index is defined as follows (Helliner, 1990):

$$RCA = \left[ \frac{\frac{X_{ij}}{X_{j\eta}}}{\frac{X_{iw}}{X_{Tw}}} \right] \quad (1)$$

Where,  $X_{ij}$  is the exports value of  $ith$  goods for  $jth$  country.

$X_{j\eta}$  is the value of total exports of agricultural products of  $jth$  country,

$X_{iw}$  is the exports value of  $ith$  goods in the world

and  $X_{tw}$  is the total exports value of world agricultural products.

When the calculated value of is less than one, it means that country doesn't have the relative advantage in  $ith$  product. In contrast, if it is grater than one, it would have relative advantage. The variation of RCA is a main reason for absence of specific export strategy (Goldin, 1990).

Unsymmetrical indicator of relative advantage, is considered to be a weak point of RCA indicator. To overcome the weakness of RCA indicator, a symmetrical ratio of this indicator is presented by Leamer in 1992.

$$RSCA_{ij} = \frac{RCA_{ij} - 1}{RCA_{ij} + 1} \quad (2)$$

The RSCA indicator varies between  $-1$  to  $+1$ . Regarding to the results of the previous studies, the most important factors which have impact on export are as follows: the price of goods, the wholesale price index, foreign exchange rate, the amount of domestic production, and gross national product of country. In the present study, two linear functions and two forms of linear logarithm functions were estimated to examine the effective factors on export of almond: (Xiaming and et. al. 1997).

$$X_i^s = A PE_i^{a_1} PD_i^{a_2} DP_i^{a_3} GNP_i^{a_4} ER_i^{a_5} \quad (3)$$

Where,  $X_i^s$  is the amount of almond export,

$PE_i$  is almond export price,

$PL$  is wholesale price Index,

$DP_i$  is domestic production of almond,

$GNP_i$  is gross national product and

$ER_i$  is foreign exchange rate, that we will have  $a > 0$ ,  $a < 0$ ,  $a > 0$ ,  $a < 0$  and  $a > 0$ .

The Linear function form also is as follows (DESS, 1991):

$$X_i^s = A + a_1 PE_i + a_2 PD_i + a_3 DP_i + a_4 GNP_i + a_5 ER_i \quad (4)$$

In a linear functional form It is expected that export price has a positive effect on the amount of exports (Gymah, 1991).

For existence or non existence of instability, first of all, a logarithmic function is estimated for income earned from almond export and time as follows:

$$LnE_i = b_0 + b_1 Lnt \quad (5)$$

Where,  $E_i$  is income gained from export of almond and  $t$  is a time trend.

$b_0$  and  $b_1$  are parameters. Then the level of instability and fluctuation in almond export income could be calculated using the following formula (Arnade and Vsavada, 1995)

$$I^* = \sum \frac{(LnE_i^N - LnE_i^o)^2}{n} \quad (6)$$

Where,  $I$  show the amount of instability,  $LnE_i^N$  is the natural logarithm of export income,  $LnE_i^o$  is the amount of export income obtained from export function.

The larger value of  $I$ , the higher will be the amount of instability in export income (Gelezakose, 1972).

Required information and data for this study were collected in the form of time series data, from Ministry of Commerce, F.A.O statistical lists, Customs Office, International Bank, Agricultural Ministry and other related organizations.

### 3. Results and Discussions

#### 3.1 Calculating RCA and RSCA criteria for main exporting countries of almond in the world

According to F.A.O information in 2002, the total area almond production in the world were 1,731,890 hectares. The main three almond producing countries are; Spain, the USA, and Tunes respectively. Iran is placed in the fifth position in terms of production. The volume of almond production in main countries is; USA 444 thousands, Spain 315 thousands and Iran 100 thousands ton. The value of exported almond in the world has an annual increase of 8.5 percent during 1970- 2002. The volume of almond exported by Iran is low comparing to the whole world. The share of Iran from shelled almond exports was about 1.7 percent in 2002. On the other hand, a few number of world countries import almond from Iran in recent years. Even though there is an increasing tern in almond export but still its main buyers of Iranian almond are limited to three Asian countries such as United Arab Emirates, Ukraine and Pakistan.

There are some actions taken by Iranian agricultural ministry in order to extend the cultivated area of almond in the fourth 5 year Economics and Social Development Program, but it should be noted that any development program has to be done based on relative advantage principle. In order to increase the almond exports there is a need for provision of a precise export strategy and proper direction for exports of this important product. To examine the strengths of countries in world trade market the RCA and RSCA indices were computed during years 1970-2002 for almond of famous countries such as: Iran, USA, China and Spain. The results are reported in table 1. As the data in table 1 show the RCA criteria for Iran, USA, Spain are equal to 222.71, 1.22 and 6.8, respectively. Also, RSCA criteria for these countries are equal to 0.99, 1, 0.74, respectively. According to these results we can say that there are relative advantages of almond exports in 1970, for all these three countries (i.e. Iran, USA, and Spain), it is clear that Iran's relative advantage indicator is higher than other countries. The trend of RCA of Iran during 1970-2002 show that Iran's position in almond exports market is dropping and there is no strategy to support Iran's position in world market. The RSCA criteria trend also confirms this result. The estimated RSCA index for Iran show that Iran position in world market has been declined from 0.99 percent in 1970 to 0.60in 2002. The USA's RCA was facing with a fluctuation at the beginning of study period but later it shows an increasing trend so that it has increased from 0.73 in 1981 to 5.70 in 2002. This indicate that The USA has got a specific export strategy enabling the USA to increase her market share in world market and also improve its efficiency to gain relative advantages in almond export. The USA's RCA at the beginning of the study period has been facing with a significant fluctuation and its negative value shows there is not a relative advantage but from 1982 it has taken an ascending process that shows its relative advantage. Spain's RCA and RSCA criteria for almond show that this country, like Iran, does not have a clear export strategy in almond market. Spain also like Iran didn't have a relative advantage in almond export market in 1991, 2000, 1996 and 2001. Based on these criteria, the amount of relative advantage for Spain is lower than Iran's relative advantage, so that the value of Iran's relative advantage descending was higher rate comparing to Spain ones. The average value of RCA for Iran was 90.51 for the USA was 2.61 and for Spain was 5.17. So, the first and second theories of this study confirm that relative advantage of Iran almond exports, in comparison with other competitors is higher but this advantage is descending. Based on RSCA and RCA criteria, Chinas almond doesn't have a relative advantage and it isn't disputable. The result also indicate that RSCA and RCA criteria for Iran show a relative advantage of almond in export market and this relative advantage has a descending process. For the USA and Spain, in some years, it shows that there aren't relative advantages, but about USA this relative advantage has an ascending trend.

#### 3.2 Correlation of RCA criteria among almond exporting countries

Iran, USA, China and Spain are the largest exporting countries in the world, so that they have about 73 percent of whole market in the world. The USA share of almond and shelled almond is about 63 and 70 percent of world market respectively, so that it has enough power to determine the world price of almond. Based on obtained results from the following table (Table 2), the correlation coefficient of Iran's RCA with America RCA is significant. In other words, USA almond is considered to be a big competitor for Iran almond in world markets, and this correlation is equal to -0.689. So, considering the position of USA in world market and its negative correlation with Iran's export advantage, a precise export program is required to increase the volume of Iran's export. According to the data reported in table 2 there is a positive relationship between Iran and Spain RCA and it is significant in 5 percent level.

#### 3.3 Estimation of almond export function and determining their stability

In order to recognize effective factors on exports of almond, and to examine each factor, almond exports function was estimated. A time series data have been used to estimate the function of exports. Indoor to examine the stationary of time series variables, the unite root and co-integration of variations were used. When time series data are used, their stationary states have to be considered. It means that, two variables may have linear relationship with each other in a short time, but, in long time, there won't be a significant relationship between them. In this case, they are called

divergent. In some studies, with this theory that average and variance of a variable aren't changed during the time, time series variables have been used, while they may be unstable and their average and variance change during the time. If these unstable variations was presented in a model, and considered as stable ones, then the model will face with a problem and their coefficients will be different from the real ones. In order to test the stationary the following hypothesis was used;

The existence of unit root is  $H_0: \beta=0$

Nonexistence of unit root is  $H_1: \beta \neq 0$

If  $\beta$  is significant, the hypothesis of  $H_0$  will be rejected and variable is stationary. As mentioned earlier an ADF test was applied to test the Unit root. The results are presented in the table3. As it is shown in the table, variations have been studied both in the form of logarithm and first difference level. The Unit Root test shows that the variables are stationary and hypothesis was rejected. In table 3, the results show that because some variations are not stable, so, the first difference level for unit root test has been used. Because in differential conditions, ADF values are bigger than critical values, the stability of variations is confirmed. Different tests have been used to test the stable relation between variables. The results confirm the convergence. In the present study a Philips prone method has been also used. In this method a time series was regressed on other assuming with and without progress. Those functions which are convergent can't be far from each other in long time, so, their long term relation will be significant. The obtained results of Philips prone test are presented in the table 4. Regarding to the results reported in table 4 two statistics of *TAU* and *RHO* show almost similar results. These two statistics confirm the convergence of model in 3 levels: zero average, simple average and process. In other words, those data that are used in the present study are in the direction of doing convergent analysis and their results are supposed to be trusted. The functions of almond export in Iran two forms of linear Logarithm model and linear. The obtained results of final calculation, after removing multi co linearity, are presented in table 5. The export functions were estimated using SPSS software. The results show that in linear logarithm model, parameters of variables such as internal production, and indicator of wholesale price index have significant impact on export (Table5). This model shows that 1 percent increase in almond internal production will increase 8.1 percent of its export presentation. Also, 1 percent increase in almond wholesale price will reduce its export to 5.59 percent. So, the third hypothesis of this study is confirmed. The value of R squares is 0.64 that shows the variables in the model describe 64 percent of change in dependent variable (export). In linear model, variables such as; foreign- exchange rate and the indicator of wholesale price were significant. The calculated coefficient for foreign exchange rate indicates that if we have one unit increase in foreign exchange rate, then the amount of almond export presentation will increase about 145.53 units. Also, one unit increase in indicator of almond internal wholesale price will reduce 3.13 units of almond exports. The R square of linear model was 0.66 indicating that 66 percent of changes in dependent variable were explained by independent variable.

Due to the multi-co linearity problem only the export price was entered in the model.

In order to test the co integration the export function was estimated on time variable as follows;

$$\begin{aligned} \text{LnE} &= 5.5 + 3.21 \text{ Lnt} \\ \text{se (1/91) ** (1/75) ***} \\ R^2 &= 89.1 \end{aligned}$$

The value of income variance is equal to 37.2 that show the whole value of almond export has high fluctuations and it is increasing where as export volume is reducing. So, considering these effective factors on export which have been studied in our model. There is a must to improve those effective variables and try to have an efficient program to improve the export of almond.

#### 4. Conclusion

Almond is a garden product which is considered as a non-oil export product in Iran. The export of Almond has a significant fluctuation in recent years. This study has been done in 2007 year to examine the competition power of Iranian almond in export markets and its relative advantages among the countries that are involved almond production and trade. The required information for the present study was time series information of production and exports (during 1970-2002). The required indices for measurement of export competition power have been RCA and RSCA criteria. The results are reported in table 1. As the data in table 11 show the RCA criteria for Iran, USA, Spain are equal to 222.71, 1.22 and 6.8, respectively. Also, RSCA criteria for these countries are equal to 0.99, 1, 0.74, respectively. So, this point shows that the position of Iran in almond export market is fading. Negative correlation between RCA of Iran and the USA one shows that the USA has been able to outshine Iran export market using new technologies. Regarding to the result of estimated export function the value of income variance is equal to 37.2 that show the whole value of almond export has high fluctuations and it is increasing where as export volume is reducing. The results also indicate

that there is a grate need for a suitable strategy for Iranian almond export market. Government should makes a number of measures to support the exporters and remove their weakness.

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Table 1. The amounts of RCA and RSCA criteria for main exporting countries of almond in the world

| year     | RCA         |            |              |              |  | RSCA        |            |              |              |
|----------|-------------|------------|--------------|--------------|--|-------------|------------|--------------|--------------|
|          | <i>Iran</i> | <i>USA</i> | <i>Spain</i> | <i>China</i> |  | <i>Iran</i> | <i>USA</i> | <i>Spain</i> | <i>China</i> |
| 1970     | 222.71      | 1.22       | 6.8          | 0            |  | 0.9911      | 0.988      | 0.7435       | -1           |
| 1971     | 251.41      | 0.63       | 7.11         | 0            |  | 0.9921      | -0.2272    | 0.7534       | -1           |
| 1972     | 195.35      | 1.07       | 6.49         | 0            |  | 0.9898      | 0.0329     | 0.7329       | -1           |
| 1973     | 154.9       | 0.43       | 5.44         | 0            |  | 0.9872      | -0.3982    | 0.6896       | -1           |
| 1974     | 278.4       | 1.12       | 5.28         | 0            |  | 0.9928      | 0.0578     | 0.6810       | -1           |
| 1975     | 164.73      | 1.29       | 8.68         | 0            |  | 0.9879      | 0.1268     | 0.7934       | -1           |
| 1976     | 92.24       | 0.34       | 8.57         | 0            |  | 0.9786      | -0.4885    | 0.7910       | -1           |
| 1977     | 95.14       | 0.61       | 6.28         | 0            |  | 0.9792      | -0.2444    | 0.7251       | -1           |
| 1978     | 51.98       | 0.67       | 5.62         | 0            |  | 0.9622      | -0.1984    | 0.6979       | -1           |
| 1979     | 57.19       | 0.75       | 7.8          | 0            |  | 0.9656      | -0.1417    | 0.7726       | -1           |
| 1980     | 199.79      | 0.87       | 13.21        | 0            |  | 0.99        | -0.069     | 0.8593       | -1           |
| 1981     | 130.58      | 0.73       | 36.45        | 0            |  | 0.9848      | -0.1558    | 0.9466       | -1           |
| 1982     | 171.75      | 2.53       | 7.27         | 0            |  | 0.9848      | 0.4329     | 0.7582       | -1           |
| 1983     | 208.84      | 2.34       | 6.12         | 0            |  | 0.9908      | 0.4013     | 0.7193       | -1           |
| 1984     | 158.95      | 0.52       | 1.78         | 0            |  | 0.9875      | -0.3126    | 0.2812       | -1           |
| 1985     | 25.16       | 2.16       | 3.83         | 0            |  | 0.9235      | 0.3666     | 0.5855       | -1           |
| 1986     | 34.48       | 2          | 3.54         | 0            |  | 0.9436      | 0.3364     | 0.5596       | -1           |
| 1987     | 34.84       | 2.72       | 3.39         | 0            |  | 0.9442      | 0.462      | 0.5442       | -1           |
| 1988     | 9.97        | 4.23       | 2.15         | 0            |  | 0.8176      | 0.6175     | 0.3653       | -1           |
| 1989     | 12.57       | 4          | 2.56         | 0.05         |  | 0.8526      | 0.6002     | 0.4378       | -0.9073      |
| 1990     | 25.58       | 3.65       | 3.47         | 0            |  | 0.9248      | 0.5696     | 0.5527       | -1           |
| 1991     | 70.8        | 3.33       | 0.95         | 0            |  | 0.9721      | 0.5383     | -0.0261      | -1           |
| 1992     | 38.87       | 3.64       | 1.24         | 0            |  | 0.9498      | 0.569      | 0.1079       | -1           |
| 1993     | 40.22       | 2.45       | 1.55         | 0            |  | 0.9515      | 0.4205     | 0.2153       | -1           |
| 1994     | 31.42       | 4          | 1.15         | 0            |  | 0.9383      | 0.6005     | 0.06886      | -1           |
| 1995     | 35.63       | 4          | 1.4          | 0.02         |  | 0.9454      | 0.6029     | 0.1668       | -0.9606      |
| 1996     | 72.1        | 4.57       | 0.93         | 0            |  | 0.9726      | 0.6408     | -0.034       | -1           |
| 1997     | 3.95        | 5.7        | 1.69         | 0            |  | 0.5956      | 0.7014     | 0.2566       | -1           |
| 1998     | 5.74        | 5.34       | 1.73         | 0            |  | 0.7032      | 0.6843     | 0.2673       | -1           |
| 1999     | 13.62       | 5.47       | 1.23         | 0            |  | 0.8632      | 0.6906     | 0.1034       | -1           |
| 2000     | 3.31        | 5.32       | 0.97         | 0            |  | 0.5361      | 0.6838     | -0.016       | -1           |
| 2001     | 4.11        | 5.69       | 0.82         | 0.03         |  | 0.6083      | 0.7011     | -0.098       | -1           |
| 2002     | 4.10        | 5.67       | 0.80         | 0.03         |  | 0.608       | 0.700      | -0.097       | -1           |
| Average  | 90.51       | 2.61       | 5.17         | 0            |  | 0.91        | 0.27       | 0.47         | -0.99        |
| Variance | 6972.23     | 3.29       | 41.86        | 0            |  | 0.02        | 0.15       | 0.1          | 0            |

Source: investigation findings

Table 2. Correlation of RCA amount of almond exporting countries in the world.

|       | Iran               | USA               | China             | Spain |
|-------|--------------------|-------------------|-------------------|-------|
| Iran  | 1                  |                   |                   |       |
| USA   | -0.689<br>(0.0001) | 1                 |                   |       |
| China | -0.276<br>(0.126)  | 0.320<br>(0.074)  | 1                 |       |
| Spain | 0.389<br>(0.028)   | -0.512<br>(0.003) | -0.158<br>(0.387) | 1     |

Numbers inside parenthesis show significant possible surface.

Surface: investigation calculations.

Table 3. The obtained results of unit root test using ADF test

| variation | ADF   | Critical amount | significant surface |
|-----------|-------|-----------------|---------------------|
| D(InX)    | -4.16 | -2.10           | 1%                  |
| D(InPD)   | -2.1  | -2.05           | 10%                 |
| D(InPE)   | -3.07 | -2.14           | 5%                  |
| InGNP     | -5.71 | -2.32           | 1%                  |
| D(InER)   | -7.31 | -4.55           | 1%                  |
| LnDP      | -4.33 | -3.49           | 10%                 |

Source: findings of investigation

Table 4. Unit root test based on A.F.P

| Conditions of Coefficient | The number of Pause | Rho   | Probable surface Of Rho | TAU   | Probable surface Of Rho |
|---------------------------|---------------------|-------|-------------------------|-------|-------------------------|
| Zero average              | 1                   | -2.74 | 0.504                   | -2.33 | 0.927                   |
| Simple average            | 1                   | -3.55 | 1.89                    | -2.46 | 0.382                   |
| Trend                     | 1                   | -6.74 | 1.61                    | -2.12 | 0.194                   |

Source: findings of investigation

Table 5. Calculation of presentation functions of IRAN almond exports

| Coefficients              | Linear model |                        | Linear- logarithmic model |                        |
|---------------------------|--------------|------------------------|---------------------------|------------------------|
|                           | T statistics | Amount of coefficients | T statistics              | Amount of coefficients |
| Constant                  | -7217.648    | -2.494                 | -22194.9                  | -3.48                  |
| export price              | 0.221        | -0.167                 | 0.036                     | -0.795                 |
| Wholesale price indicator | -3.13        | -2.161                 | -5.56                     | -1.301                 |
| Domestic production       | 0.143        | -0.115                 | 8.10189                   | 3.645                  |
| Gross National Product    | -0.043       | 0.053                  | -0.059                    | -0.198                 |
| Foreign exchange rate     | 145.53       | 2.026                  | 0.86                      | 0.45                   |
| R                         | 0.662        |                        | 0.64                      |                        |
| R                         | 0.604        |                        | 0.59                      |                        |
| F                         | 7.762        |                        | 10.627                    |                        |
| D.W                       | 1.65         |                        | 1.62                      |                        |

Source: findings of investigation