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EVALUATING THE ROLE OF WHEAT PRODUCTION AND TRADE IN FOOD SECURITY

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ABSTRACT

Food plays a key role in the emergence, survival, and demise of civilizations. Food security is one of the criteria and tools of human development. Access to adequate and healthy food is one of the fundamental pillars of development, public health, and infrastructures of the country's next generation and achieving it is one of the main goals of each country.Food security in one hand has a relationship with production, supply, and distribution and on the other hand it has aclose relationship with the discussion of supplying by households and their composition and diet. Food security is a multi-dimensional and multi-disciplinary issue that can be studied from different aspects in different countries due to economic and social conditions of that society. In this study, the effects of producing and trading this product on the Aggregate Household Food Security Index in rural and urban areas will be discussed due to the importance of wheat in the goods basket of household, providing energy, and food security. For this purpose, the information of rural and urban households and the amount of production and trade of wheat from the years 1362 to 1391 were used. GARCH model was used to check the fluctuations in wheat production and trade. Also, VECM model was used to separate the long-term and short-term effects. The results show that wheat imports in the short-term has not a significant impact on the Aggregate Household Food Security Index in rural and urban areas but, in the long-term, both production and import have a significant impact on the Aggregate Household Food Security Index in rural and urban areas. Also, the production and import of wheat to the country have

fluctuations. Finally, it is suggested to improve the Aggregate Household Food Security Index in the country by implementing the production-oriented policies.

Keywords: Wheat, AHFSI, GARCH, VECM

INTRODUCTION

Food plays a key role in the emergence, survival, and demise of civilizations. Nutritional knowledge has a crucial role in increasing the mental power, coping with diseases, longevity and quality of life in addition to the impact on physical growth and development. In fact, good nutrition ensures the public health and it causes happiness in life, work, activity, creativity, and innovation. Food and nutrition are one of the fundamental aspects of life, health, and also, the welfare of the society. From the perspective of national development, social justice and economic growth, providing sufficient food, health, and nutritional quality and quantity of the food consumption pattern of the population are the main and decisive axis in the context of human orientation motion and malnutrition is an obstructive force which affects the national development process and in other words, food security has a completely direct relation with justice-orientation (United Nations, 2003).

Food security is one of the criteria and tools of human development. Access to adequate and healthy food is one of the fundamental pillars of development, public health, and infrastructures of the country's next generation and achieving it is one of the main goals of each country. In the human-oriented development, food security and nutrition have a main and decisive role and along with the income per capita, equitable distribution of income, employment rate, environmental protection, and human rights in the international communities are recognized as a developmental index. Food security is one of the most fundamental and basic human needs. Considering its importance, this need is realized in each country with the aim of achieving sustainable development based on the centrality of agriculture in the long-term plans. The status of food security in developing countries is faced with difficult issues. Developing countries are unable to produce enough food because of a range of adverse conditions (United Nations, 2003). Food security not only is influenced by production facilities, but also it is influenced by political, economic, social, and cultural community. Food security in one hand has a relationship with production, supply, and distribution and on the other hand it has a close relationship with the discussion of supplying by households and their

composition and diet. Food security is a multi-dimensional and multi-disciplinary issue that can be studied from different aspects in different countries due to economic and social conditions of that society. It is important that in many cases, it has been noted that food is used as a political weapon and this issue should be considered in design of food security strategies at the national level (Shakoori, 1383).

The main way to achieve food security is improving the status of nutrition, providing healthy food and release of hunger and malnutrition at the national level, fundamental planning in the field of food and nutrition. Attention to the different aspects of food and nutrition and determining the status of food intake and nutritional value, usual dietary patterns, and evaluating changes trend, identifying the effective factors on the nutritional vulnerability of the population, applying appropriate policies in different sections related to food demand and consumption patterns are the starting point for the development, analysis and evaluation of food policy at the macro level and this issue must be defined in the framework of a suitable model (Bayres 1982, Johnston and Kelly, 1982).

Theoretical Basis

Food security is one of the important aspects of national security. This means that providing an optimal level of security requires supplying an optimal level of food security. The history of relations between the countries shows that powerful countries in most cases use the food weapon as a political trick to create more pressure on other countries. Food security from a historical perspective refers to global, regional, national, and regional supply. In the final decades of the twentieth century, this historic approach to food security has changed and food security highly means food availability and it is considered at the level of households and individuals.

Food security has different definitions that its historical evaluation reveals the evolutionary trend of the global approach to its importance. In 1975, United Nations has defined food security: "Food security is continuous supply of main food in the global level in order to constantly improve food consumption and counteract the adverse effects of fluctuations of food prices." (Ghasemi, 1994).

Food security in the scientific definitions is a deliberated method to solve the problems of food and nutrition and it is a defined framework for planning and management of development. History of food security discussion backs to for more than fifty years ago and the United Nations Declaration of

Human Rights in 1948. The intellectual origin of food security discussion as one of the most important components of national security refers to the food crisis in the early 1970s in the world (Ghasemi, 1994).

The concept of food security is very broad and it is determined by the interaction of a range of biological, economic, social, agricultural and physical factors. Food security requires an adequate supply of food at a macro level and equitable distribution to achieve all to it and its certain components are food, access to food, and using food. In fact, food security is the cornerstone of a developed country and the main element of mental, physical, and psychological health. Based on the recommendations of the World Food Organization, the need for national food security policies by governments to ensure the safety and quality of food available to citizens through the establishment of national safety measures is emphasized (Fathy, 1382).

Today, the issue of food security has taken a new dimension in the world and it has become one of the most important topics in all countries of the world. Since, self-sufficiency is one of the principles of food security, achieving this will be possible by increasing food production. As an important and key agricultural production, wheat has a special place in food consumption of nations in the world. Wheat has a special importance as one of the basic agricultural products and providing this product for societies like Iran where wheat has a special place in nutrition and food security means creating food security and social welfare of middle and poor classes are severely affected by the product. Shortages of this product and subsequently, its price increase causes severe social tensions and large strikes in many countries, including Egypt and El Salvador (Klafrti, 2000). Severe food crisis in 1977 in Egypt which caused by decreasing the main products of the country's consumption pattern faced the food security of this country with challenge until this issue was considered as one of the major events of the twentieth century in this country (Klafrti, 2000). Similar to this crisis has happened in the 1960s and 1970s in South American countries such as Brazil (Silva and Guernsey, 1999). The crisis has caused deep and structural changes in policies related to food security and the country's wheat policies. In Brazil, market liberalization and production support and the expansion of investment in infrastructure were taken into consideration (Silva and Guernsey, 1999) and in Egypt, providing main requirements such as water was important (Klafrti, 2000).

Wheat also plays an important role in the physical and mental health of society by

providing 40 percent of daily energy and 50 percent of protein. Self-sufficiency in wheat production in recent years has become one of the most important economic goals. With the continuous increase in the world population, the need for food is increasing day by day with high speed and based on the current estimations by the year 1044 the population will reach 22 million and the amount of food production in the country should be 40% more than their current production to move consistent with the growing population. The purpose of this study is to evaluate the role of wheat in providing food security and also predicting the amount of production and consumption it in the coming years.

Research Literature

Today, the issue of food security has taken a new dimension in the world and it has been converted into one of the most important topics in all countries of the world. Since, self-sufficiency is one of the principles of food security, achieving this will be possible by increasing food production. As an important and key agricultural production, wheat has a special place in food consumption of nations in the world. Wheat has a special importance as one of the basic agricultural products and providing this product for societies like Iran where wheat has a special place in nutrition and food security means creating food security and social welfare of middle and poor classes are severely affected by the product. Shortages of this product and subsequently, its price increase causes severe social tensions and large strikes in many countries, including Egypt and El Salvador (Klafrti, 2000).

Mehrabi Basharabadi and Mousavi Mohammadi (1388) have evaluated the effect of trade liberalization on food security of rural households with vector error correction procedure using the Aggregate Household Food Security Index and commercial severity index. The results showed that the amount of effect was slight which was negative in short-term and positive in long-term.

Mehrabi Basharabadi and Mousavi Mohammadi (1388) in another study have evaluated the effects of agricultural support policies on the food security of rural households in Iran using Aggregate Household Food Security Index and the general criteria of support and self-regression vector model. They found that the total price that supports of the agricultural sector has a positive effect on the food security of the rural households in the short term, but, this process did not exist in the long-term.

Zarei Bideskanand Mehrabi Basharabadi (2013) have investigated the effect of financial development on food security of

rural households in Iran. The researchers suggest that food security requires an adequate supply of food at macro level and equitable distribution to achieve all to it, and in fact, food security is the cornerstone of a developed country and it is considered as the main element of mental, physical, and psychological health. Financial development or, in fact, development of the financial sector includes markets, institutions, and financial tools. In the present study, the effect of financial development on food security of rural households during the period 1365-1389 was evaluated. For this purpose, initially they used Aggregate Household Food Security Index to calculate the amount of food security in rural families and Financial Development Index to determine the level of financial development in the country and finally, they surveyed the effect of financial development on food security of rural households using Auto Regressive Distributed Lag (ARDL). The results of their study showed that the financial development index which was appeared based on the financial depth creates expectable short-term and long-term effects on the food security of rural households in the country that these effects are positive and significant in the short-time and long-time. Thus, financial development policies which are based on the defined and specific criteria, increase the food security in rural areas.

Zhai (2013) has investigated the food security in China within the framework of structure, system, and resources. Using the system theory method, he has shown that achieving food security in China should be performed based on specific national conditions, optimal allocation of resources, and structural optimization.

Costa et al. (2013) have researched about the agricultural productivity and food insecurity in Brazil. They concluded that there is a significant relationship between the level of education of household head, the presence of the presence of persons in the family, agricultural productivity, and food insecurity. Regmi and Mideh (2013) have evaluated the food security incentives from the demand side in the society. They investigated the consumers' preferences changes in their study. Estimating the price and income elasticity for many countries, they concluded that consumers in poor countries are allocated a large share of their income to buy food. Casey et al (2012) have examined the effective factors on the food security in Kenya. Applying parametric and non-parametric econometric methods, they have concluded that families that have female heads are more vulnerable to food insecurity.

The food security of these households increases by improving work quality, farm size, and land quality.

Bashir et al. (2012) in a study entitled the food security differences of rural households in the state of Punjab in Pakistan, have evaluated the level of food security at the national and household level in the first step, they concluded that The level of food security at the national level is par with the level of food security at the international level but, at the household level, 26 percent of the 1152 surveyed households have not an appropriate food security. In the second step, they evaluated the effective factors on the food security that the monthly income, household assets, household size had a real positive impact on the food security of rural households.

Research Objectives

1. Evaluation of wheat production in the country;
2. Evaluating the trend of wheat trade;
3. Evaluation of wheat prices in the country;
4. Evaluating the presence of fluctuations in wheat production in the country;
5. Calculating the food security index;
6. Evaluation of the impact of wheat production on the food security of the country;
7. Separation of the long-term and short-term effects.

Research Hypotheses

1. Wheat production in the country has fluctuations;
2. Import and export of wheat have fluctuations;
3. Wheat production affects the food security of the country.

Research Method

ARMA and ARIMA model are used which are for evaluating the formation process of time series using time series' past and present breaks and the base is the time series patterns. Box-Jenkins method is used to select the most favorable estimation for ARMA and ARIMA processes. Some of the patterns that are heavily used for modeling the fluctuations are ARCH and GARCH models. In the following, disturbing dissonance variance test is used which is a way to test the effects of ARCH and GARCH. ARCH and GARCH patterns models are used for modeling the fluctuations. Eventually, VAR model is used to evaluate the interaction between time series and their reaction to the evaluation. Using the reaction functions of and variance analysis of the results of the VAR model highly helps

analyzing the relationships between variables. VECM model is also used to study the long-term relationships.

Research findings

Investigating the status of wheat production and trade in Iran

Wheat is one of the oldest plants on earth that human have cultivated and used it. Wheat is important because it has been the staple food of most people in the world and it provides a part of food security. In this regard, the wheat self-sufficiency was began in the eighth government and Iran was innocent from wheat imports since 1383 but, this trend was not sustainable and wheat imports were done again. In the following, the amount of wheat imports and production are presented in a chart in order to make the discussion more tangible.

Figure 1 shows the amount of production, consumption, and import of wheat during the period 1339 to 1393. As shown in the figure, wheat consumption had an increasing trend that this trend of wheat consumption is associated with an increase in population. During these years, wheat production has increased, but over the last decade, the increase in production, has been associated with changes that have threatened the stability of the production. It is natural that with the increase in consumption and the lack of response of the internal production, the government is forced to import. To investigate this issue, it is better to investigate self-sufficiency coefficient. Self-sufficiency coefficient is the ratio of domestic production to the consumption of the country.

Figure 2 shows the self-sufficiency coefficient of wheat. The amount of this coefficient changes from zero (lack of self-sufficiency) to one (full self-sufficiency) and more than one which will be exported. As shown in Figure 2, in recent decades that the issue of wheat self-sufficiency was raised, the self-sufficiency coefficient was more than one and the country had wheat exports, but this self-sufficiency was not sustainable and it had declined up to 0.7.The amount of 0.7 states that wheat production will meet only 70 percent of the country's needs.

Figure 3 shows the per capita consumption of wheat. As is known, the amount of wheat per capita has increased over time and it has been fixed in recent decades. Considering that the amount of per capita wheat has increased, it is obvious that the importance of wheat has increased in the households' food basket and it will have a greater role in the food security of Iranian households.

Table 1 shows the Aggregate Household Food Security Index in the rural areas of the country during the period 1362 to 1391. The

general trend of the index has been improved and it has been increased from 85.54 in 1983 to 85.9 in 2012.

Table 1 shows the Aggregate Household Food Security Index in the urban areas. To compare these two indices, their chart is drawn.

Figure 4 shows the Aggregate Household Food Security Index of the rural and urban households in the years 1362 to 1391. According to the charts, it is clear that the Aggregate Security Index had a growing trend and it had an improving trend in recent years. The point that is evident in the chart is the changes of the urban aggregate index toward the rural aggregate index.

Guaranteed price of wheat

The wheat price chart is reported to evaluate the price trend of wheat. According to Figure 5, it is clear that the guaranteed price of wheat has increased, but this trend had a sharp rise in recent years. Increasing wheat prices causes that the food security be affected by the price.

Evaluation of the static variables

According to the available information, the study period is selected from 1362 to 1391. In order to keep the scale of the study variables, the amount of wheat production and import similar to the AHFSI Index and the obtained parameters of the model be not large, logarithm was taken from the variables of wheat imports and production. In the time series studies, the unit root of variables is important. First, the unit root of the objective variables is discussed, which are the amount of the Aggregate Household Food Security Index of the urban and rural households, production and import of wheat.

The results of Table 3 show that the study variables are at the static level and they do not need differencing. In the following, the logarithm of the objective variables is used at their level.

Evaluating the presence of fluctuations in the production and import of wheat

The results of Table 4 show that there are ARCH effects in both series of wheat production and import. Thus, ARCH models are used for fluctuations' modeling.

Table 5 shows the results of GARCH (1,1) model for the logarithm of wheat imports. Using the results of this table, fluctuations of the production's logarithm are calculated. The results in Table 5-4, with one unit increase in the amount of disturbing components with a lag, the amount of wheat imports increases to the extent of 0.57% (because the left side is a logarithmic equation, the interpretation is in the form of unit-percent). Also, the effects of ARCH (1) were not significant, but the existence of this variable improved the significance of the whole model and less AIC

and SC statistics were obtained. The effects of GARCH (1,1) increased 0.49% of the conditional variance of the model.

Table 6 shows results of GARCH (1,1) model for the logarithm of wheat production.According to the results, if the amount of wheat production in the previous period (last year) increases as one unit this increasing leads to increase in wheat production to the extent of 0.62%. In this model, the effects of GARCH (1) are meaningless, but this variable improves the whole model. Also, the effects of ARCH (1) have been significant so that an increase of one unit of these effects led to an increase as 0.89 unit for the conditional variance of the model. A chart is used in order to display fluctuations of these two variables more tangible and a comparison be made between the two fluctuations.

Figure 6 shows the fluctuations of the amount of wheat production along with the fluctuations of the amount of wheat imports during the study period. According to the chart and comparison of fluctuations, it is clear that the fluctuations of imports are more compared to the fluctuations of production. This issue shows the importance of wheat production in the country to control the fluctuations. This means that whatever the country needs to import, it will experience more fluctuations and it should also accept damages.

Long-term and short-grain effects of wheat production and trade on the food security

The estimation results of the short-term and long-term model of urban AHFSI

In this section of the study, the short-term and long-term effects of wheat production and trade on the Aggregate Food Security Index of the urban households are discussed. First, the short-term effects will be discussed.

$AHFSI_{urban}$= 30/37–0/4 D ($AHFSI_{urban}$ (-1)) ***0/78+ D (LIM (-1)) + 7/4 D (LPR (-1))* [1] -0/35ECM+ε_t (1)

Equation (1) shows the short-term and long-term effects of wheat production and import on AHFSI. In this equation, AHFSIurban is the Aggregate Food Security Index of the urban households, D is the differencing operator, LIM (-1) is the logarithm of wheat imports with a lag, LPR (-1) is the logarithm of wheat production with a lag, εt are the disturbing components of the model. ECM is a component of error correction, which shows the long-term adjustment.

According to the estimated coefficient, the difference of the imports logarithm has a positive effect on the Aggregate Food Security Index of the urban households, but

[1] In this study *, ** and *** are significance level at the 1%, 5% and 10% respectively.

this coefficient is statistically meaningless. On the other hand, the logarithm of the amount of wheat production has significant effects on the Aggregate Food Security Index of the urban households so that if the production of the country increase one unit (production logarithm per tons per hectare), then the amount of the Aggregate Food Security Index of the urban households will be increased to the extent of 7.4%. The point that is clear in this estimation is the lack of the significance of the amount of wheat imports on the food security. The amount of ECM in this study is -0.35. This value indicates that it gets close to the long-term balance as 0.35 unit in each period. In the following, the long-term relationship is expressed.

$AHFSI_{urban}$=1/73+-218/8 LIM* + 13/7 LPR *-0/7 Trend* +ε_t(2)

Equation (2) shows the long-term relationship of the Aggregate Food Security Index of the urban households with the logarithm of the amount of wheat production and import. In this equation, the definitions of variables are such as previous relationship. The point of this equation about the estimated short-term relationship is the significance of imports in long-time, unlike the short-term relationship. This shows that by increasing one unit of the logarithm of the imports in long-term, the amount of Food Security Index will be improved to the extent of 1.73%. The amount of imports in the long-term has a higher coefficient than the short-term. If the logarithm of the production increases one unit, then, the Aggregate Food Security Index of the urban households will be increased to the extent of 13.7%. The impulse response functions are used to investigate the effects of independent variables' shocks on food security index.

Figure 7 shows the impulse response function of urban AHFSI to the amount of wheat production and import.As can be seen in both charts, the imposed shocks on the Aggregate Food Security Index has a negative effect and they are stable over time and in the long-term and they are not adjusted.

The estimation results of short-term and long-term rural AHFSI

In this section of the study, the short-term and long-term effects of wheat production and trade on the Aggregate Food Security Index of the rural households are discussed. First, the short-term effects will be discussed.

$AHFSI_{rural}$= 0/09–0/39** **D ($AHFSI_{rural}$ (-1))**0/29+ **D (LIM (-1))** + 2/36 **D (LPR (-1))** *** * **ECM** ****+ε_t (3)**

Equation (3) shows the effects of short-term production and import of wheat on AHFSI. In

this equation, AHFSIrural is the Aggregate Food Security Index of the rural households, D is the differencing operator, LIM (-1) is the logarithm of wheat imports with a lag, LPR (-1) is the logarithm of wheat production with a lag, εt are the disturbing components of the model. ECM is a component of error correction, which shows the long-term adjustment.

According to the estimated coefficient, the difference of the imports logarithm has a positive effect on the Aggregate Food Security Index of the rural households, but this coefficient is statistically meaningless. On the other hand, the logarithm of the amount of wheat production has significant effects on the Aggregate Food Security Index of the rural households so that if the production of the country increase one unit (production logarithm per tons per hectare), then the amount of the Aggregate Food Security Index of the rural households will be increased to the extent of 2.36%. The point that is clear in this estimation is the lack of the significance of the amount of wheat imports on the food security. The amount of ECM in this study is -0.48. This value indicates that it gets close to the long-term balance as 0.48 unit in each period. In the following, the long-term relationship is expressed.

$$\mathbf{AHFSI_{urban}} = 0/6 + -125/5\ \mathbf{LIM}^{*} + 4/13\ \mathbf{LPR}^{*} - 0/47\ \mathbf{Trend}^{*} + \varepsilon_t \quad \mathbf{(4)}$$

Equation (4) shows the long-term relationship of the Aggregate Food Security Index of the rural households with the logarithm of the amount of wheat production and import. In this equation, the definitions of variables are such as previous relationship. The point of this equation about the estimated short-term relationship is the significance of imports in long-time, unlike the short-term relationship. This shows that by increasing one unit of the logarithm of the imports in long-term, the amount of Food Security Index will be improved to the extent of 0.6%. The amount of imports in the long-term has a higher coefficient than the short-term. If the logarithm of the production increases one unit, then, the Aggregate Food Security Index of the urban households will be increased to the extent of 4.13%. The impulse response functions are used to investigate the effects of independent variables' shocks on food security index.

Figure 8 shows the impulse response function of rural AHFSI to the amount of wheat production and import. As can be seen in both charts, the imposed shocks on the Aggregate Food Security Index has a negative effect and they are stable over time and in the long-term and they are not adjusted.

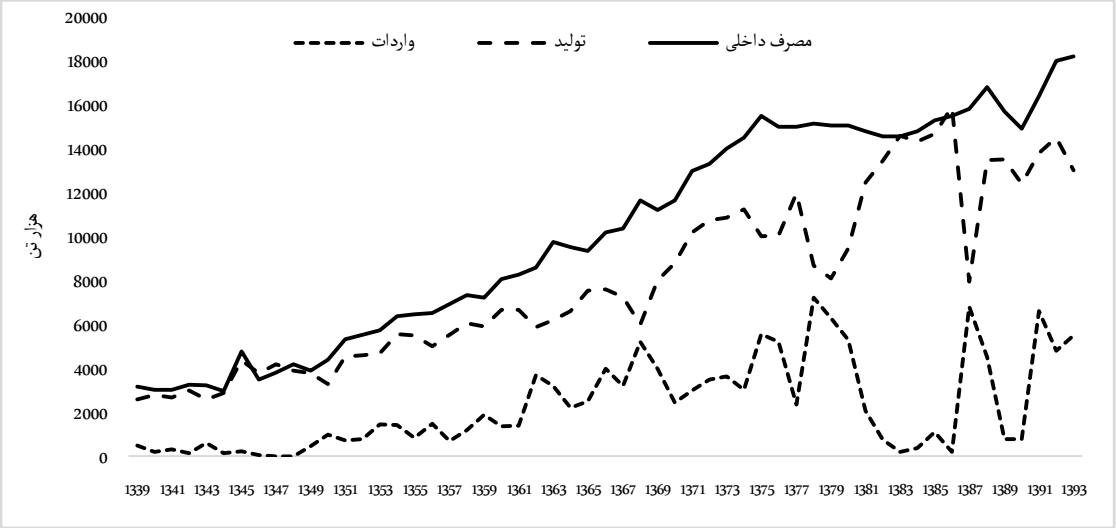

Figure 1: The amount of production, consumption, and import of wheat in the country (Source: www.usda.gov)

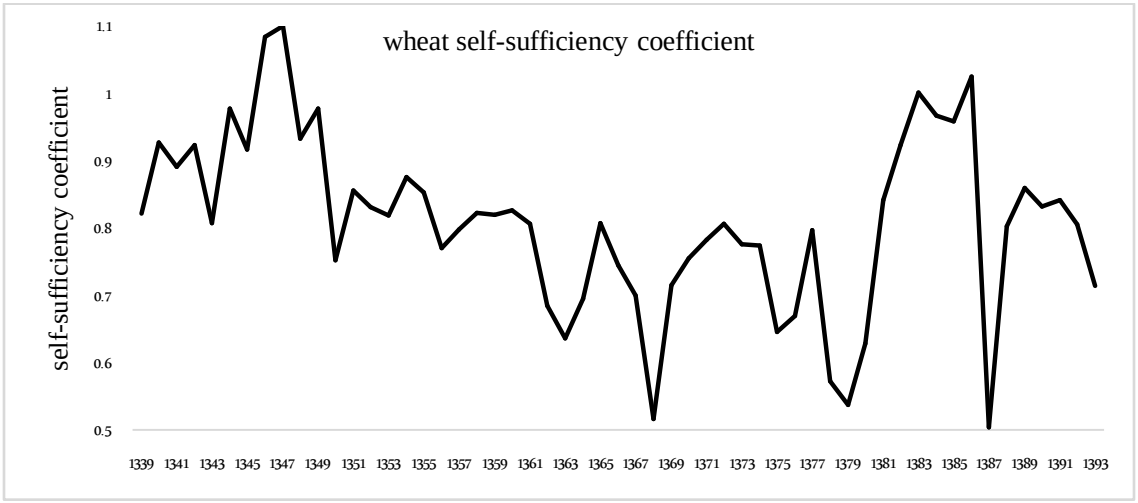

Figure 2: The self-sufficiency coefficient of wheat (Source: research findings)

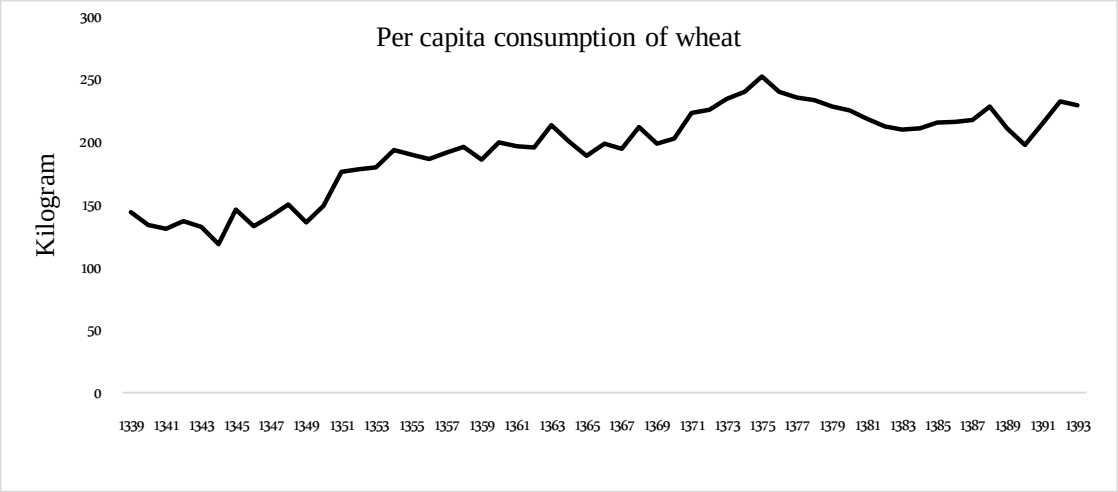

Figure 3: Per capita consumption of wheat (Source: research findings)

Calculation of Food Security Index

Table 1. The amount of Aggregate Household Food Security Index of the rural households

Year	H	G	CV	I	AHSFI Rural
1362	39/1	0/0235	0/34	0/43	85/54
1363	41/3	0/0222	0/34	0/43	84/55
1364	42/6	0/0216	0/34	0/43	84/30
1365	33/5	0/0274	0/34	0/46	86/68
1366	34/2	0/0269	0/34	0/41	87/69
1367	35/1	0/0262	0/34	0/41	87/49
1368	36/4	0/0252	0/34	0/42	86/76
1369	37/4	0/0246	0/34	0/44	85/84
1370	35/2	0/0261	0/34	0/44	86/55
1371	39/4	0/0233	0/34	0/44	85/08
1372	29/6	0/031	0/34	0/43	88/93
1373	30/2	0/0304	0/34	0/43	88/74
1374	27	0/034	0/34	0/42	89/89
1375	28/2	0/0326	0/34	0/43	89/40
1376	29/1	0/0316	0/34	0/40	89/73
1377	20/8	0/0442	0/34	0/42	92/17
1378	25/5	0/036	0/34	0/41	90/68
1379	25/3	0/0363	0/34	0/41	90/85
1380	29/1	0/0316	0/34	0/40	89/71
1381	22/2	0/0414	0/34	0/39	92/14
1382	20/1	0/0457	0/34	0/40	92/67

1383	20/2	0/0455	0/34	0/42	92/28
1384	15/8	0/0582	0/34	0/43	93/82
1385	15/7	0/0585	0/34	0/43	93/77
1386	16/8	0/0498	0/34	0/40	93/79
1387	15/8	0/0511	0/34	0/40	94/29
1388	14/7	0/0524	0/34	0/40	94/69
1389	13/7	0/0537	0/34	0/40	95/09
1390	13	0/055	0/34	0/41	95/49
1391	12/5	0/0536	0/34	0/40	95/89

Source: Research Findings

Table 2: The amount of Aggregate Household Food Security Index of the urban households

Year	H	G	CV	I	AHSFI Urban
1362	37/2	0/0259	0/3	0/43	85/65
1363	39/4	0/0244	0/3	0/43	85/13
1364	40/1	0/024	0/3	0/42	84/91
1365	31	0/031	0/3	0/43	88/15
1366	31/4	0/0306	0/3	0/44	87/74
1367	32/2	0/0299	0/3	0/42	87/95
1368	33/5	0/0287	0/3	0/42	87/46
1369	34/1	0/0282	0/3	0/69	79/52
1370	32/3	0/0298	0/3	0/75	87/96
1371	23/9	0/0402	0/3	0/77	84/01
1372	13/7	0/0702	0/3	0/77	90/74
1373	22/3	0/0431	0/3	0/76	85/16
1374	19/1	0/0504	0/3	0/76	87/27
1375	23/4	0/0411	0/3	0/76	84/51
1376	24/3	0/0396	0/3	0/42	90/69
1377	15/9	0/0605	0/3	0/41	93/76
1378	16/8	0/0571	0/3	0/41	93/46
1379	23/3	0/0413	0/3	0/41	91/22
1380	27/1	0/0355	0/3	0/42	92/19
1381	20/2	0/0476	0/3	0/42	92/31
1382	18/4	0/0523	0/3	0/42	93/96
1383	19/9	0/0483	0/3	0/42	94/01
1384	15/7	0/0611	0/3	0/4	95/13
1385	15/6	0/0617	0/3	0/4	95/07

1386	16/7	0/0623	0/3	0/4	95/13
1387	15/67	0/0629	0/3	0/42	95/07
1388	14/46	0/0635	0/3	0/4	95/82
1389	13/6	0/0641	0/3	0/40	95/68
1390	13	0/0647	0/3	0/43	95/37
1391	12/9	0/0659	0/3	0/41	95/23

Source: Research Findings

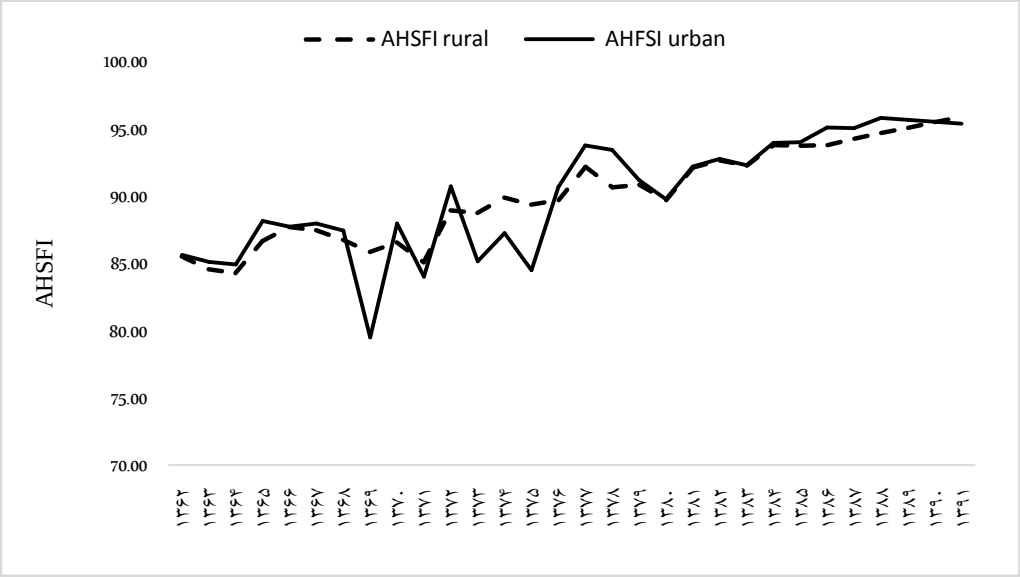

Figure 4: The amount of the Aggregate Household Food Security Index of the urban and rural households

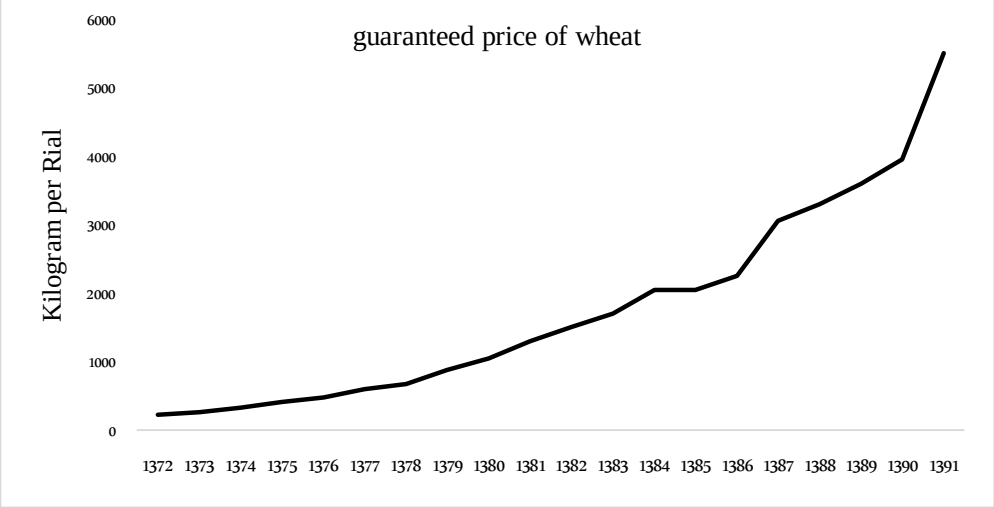

Figure 5: Guaranteed price for wheat (Source: Statistical Center of Iran)

Table 3: The results of the Dickey - Fuller test for the studied variables

Variable	No trend \ trend	The value of the calculated t-statistics	The t-statistic at 5%	Result
Aggregate Household Food Security Index of the rural households	trend	-4/36	-3/61	Static
Aggregate Household Food Security Index of the urban households	trend	-3/63	-3/58	Static
Logarithm of wheat imports	No trend	-3/17	-2/97	Static
Logarithm of wheat production	trend	-3/78	-3/57	Static

Source: Research Findings

Table 4: The results of ARCH effects test

Variable	F-value	Significant level	Observation value in R^2	Significant level
Logarithm of wheat imports	3/6	0/03	8/63	0/03
Logarithm of wheat production	3/62	0/06	3/42	0/06

Source: Research Findings

Table 5. The results of GARCH (1,1) model (dependent variable: Logarithm of wheat imports)

Variable	Coefficient	z-value	Significant level
Average equation			
Intercept	8/05	53/1	0/00
Disturbing components with a lag (MA (1))	0/57	3/25	0/00
Variance equation			
Intercept	-0/01	-0/92	0/35
ARCH(1)	-0/27	-0/83	0/4
GARCH(1)	0/49	12/23	0/00
	,SC=2/08	,AIC=1/48	R^2=0/49

Source: Research Findings

Table 5: The results of GARCH (1,1) model (dependent variable: Logarithm of wheat production)

variable	Coefficient	z-value	Significant level
Average equation			
Intercept	9/27	205/7	0/00
Disturbing components with a lag (AR (1))	0/62	18/04	0/00
Variance equation			
Intercept	0/009	2/27	0/02
ARCH(1)	0/89	2/70	0/00
GARCH(1)	-0/13	-0/76	0/44
	,SC=-0/34	,AIC=-0/57	R^2=0/54

Source: Research Findings

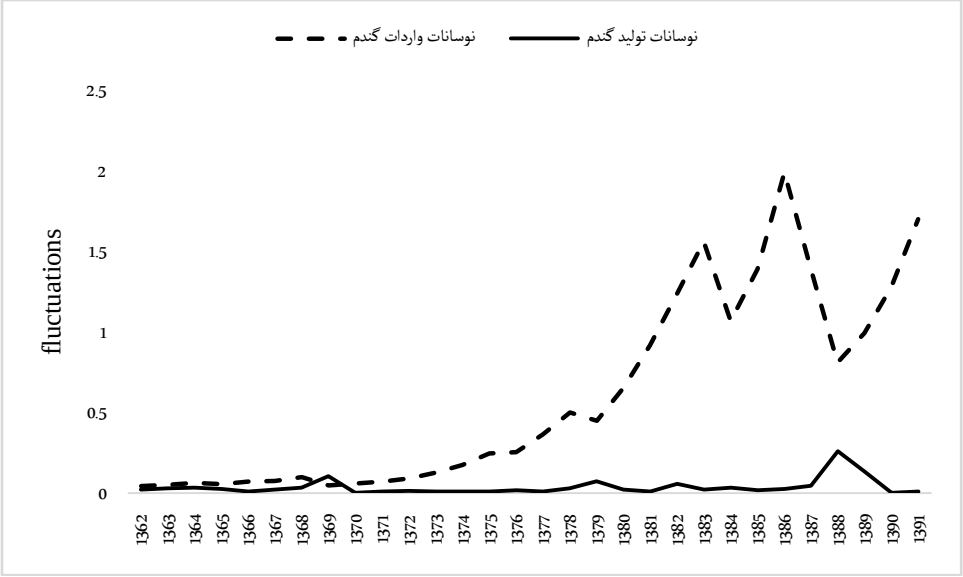

Figure 6. Fluctuations of the amount of wheat production and import of (Source: research findings)

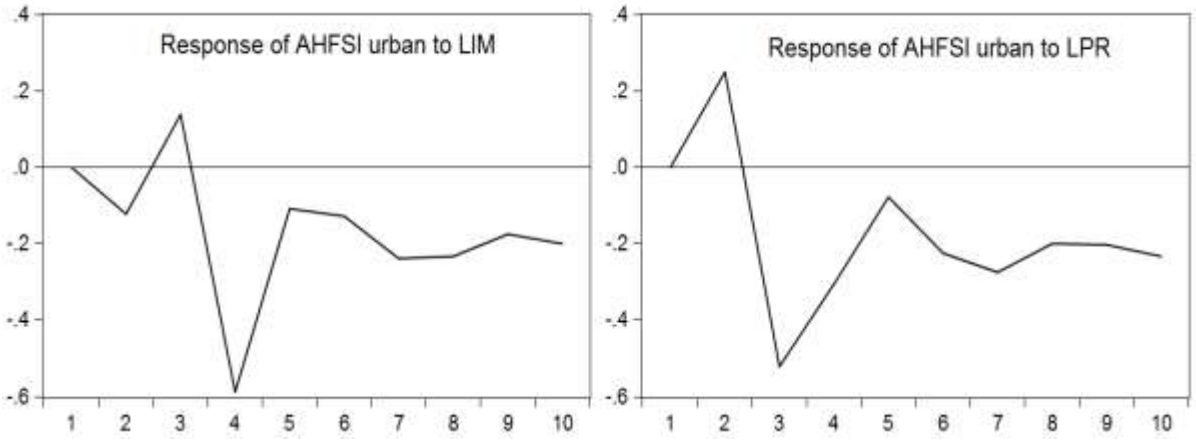

Figure 7: Impulse response function of urban AHFSI to the amount of wheat production and import

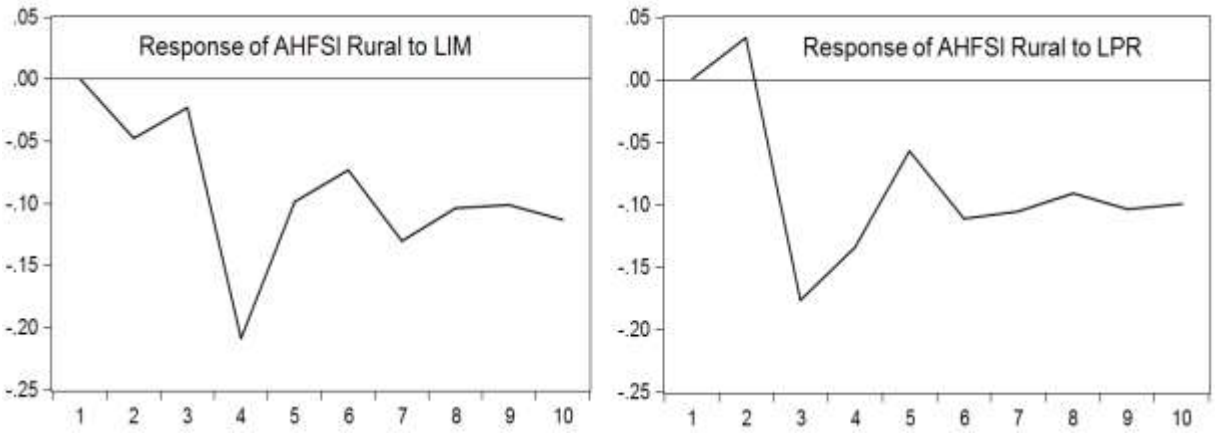

Figure 8: Impulse response function of rural AHFSI to the amount of wheat production and import

CONCLUSION

This study was done with the aim of investigating the effects of wheat production and trade on food security. ARCH and VECM regression models were used to achieve the objectives of the study. According to the obtained results, it was found that Iran had fluctuations in wheat production in recent years and according to the development plan to achieve self-sufficiency and based on the wheat production chart, producing this product has not been stable. It is worth noting, consolidation of production and stability of wheat is the key element of self-sufficiency. In the case of wheat exports, it was found that Iran is not considered as one of the wheat exporters and the greatest exports of the country was 0.7 million tons.

There has been an increase in the field of wheat imports in recent years due to population growth and increasing per capita consumption of wheat. Since, import is the function of the amount of wheat production in the country, thus, the amount of imports was not a certain and fixed value and it had fluctuations. All of these issues, such as fluctuations in production and import of wheat, caused a shock in the food security of the country. According to results, creating shock in the production and import of wheat causes creating a stable and negative shock in the mentioned indices. It has also become apparent in the self-sufficiency coefficient of wheat. According to the chart of this coefficient, it can be seen that this coefficient had a lot of changes over the past years.

Another issue that can be seen in the study is the discussion of fluctuations in the amount of wheat imports to the fluctuation of the amount of wheat production. Wheat imports fluctuations are far more than wheat production fluctuations and this fluctuation gap has been greater in recent years. Imports policy does not need fundamental and infrastructure decisions and it can be changed easily. But, the policy of increasing wheat production is a long-term process and requires specific and fundamental infrastructures. It seems, governments mostly have used this leverage due to facilitating imports policy compared to the policy of increasing production.

The point that is emphasized in this study is differences between wheat production and trade effects on the Aggregate Household Food Security Index of the urban and rural households. In the estimated coefficients, rural households show fewer effects of the amount of wheat production and trade and their shocks to the Aggregate Household Food Security Index of the urban households. This shows that the dependence of urban households to the wheat production and trade

is more than rural households. The reason of this issue can be the type of employment in rural and urban households. Most villages in the country are engaged in agriculture and this issue leads to less reaction of these households to wheat production and trade.

Another point that was found in the results of this study is the large changes of the Aggregate Household Food Security Index of the urban households to the Aggregate Household Food Security Index of the rural households. This issue indicates that generally, rural households are more stable in the Aggregate Food Security Index than urban households. The reason for this issue can be the dependence of households on food and their occupation. Naturally, the dependence of rural households to the food that is obtained from the market is less than urban households because a part of the food needs of rural households is met by themselves.

Finally, another issue that is evident in the results is the small short-term coefficients compared to the estimated long-term coefficients. This issue shows that the production and import of wheat show their effects on the Aggregate Food Security Index in long-term. In other words, it is possible that an imposed policy about wheat imports does not show a significant effect on the Aggregate Food Security Index in short-term, but its effect may appear in long-term. Therefore, this issue must be considered in applying the policy of food security.

Recommendations

According to the results of the study and the performed analyzes, the following recommendations are applied to improve the country's wheat production:

1. Given that wheat production in the country has fluctuations and fluctuations cause an uncertain space among farmers, it seems that the government's policy should be in line with stabilizing the production of wheat and after stabilizing the production of wheat, the policies for increasing production should be applied. Certainly, additional studies are needed to investigate how to achieve this goal but, if some successes can be achieved in this field; according to the study, these successes in long-term will have a significant and positive effect on the Aggregate Household Food Security Index of the urban and rural households.
2. The government's attention for the wheat imports policy should be on both the long-term and short-term perspectives. As the results showed, the amount of imports in short-term

had not a significant effect on the Aggregate Food Security Index, but it showed a significant effect in long-term. Therefore, the short-term and long-term effects must be addressed in the policy reviews.

3. According to the results of the study, wheat production coefficient was greater than wheat imports coefficient. This issue suggests this fact that the country's food security goals can be achieved faster according to the production of wheat. Also, the employment policy in the country has increased and the amount of exited foreign exchange from the country will be reduced.
4. Attention to food security is one of the issues which was highly regarded in the international organizations and various policies are applied in the world. Thus, governments must consider a special place for this important social issue in their policy plans because a healthy society can be achieved by food security and the country's development prospects can be achieved with a healthy society. It is hoped that Iran's nation remains leading in the field of rejecting the global arrogance and makes the pure Islamic state practical in the world in the light of the guidelines of the Supreme Leader and implementation of his resistance economic policies in light of the appropriate measures to avoid the edge of the three branches of power.

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