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Impact of policy of purchasing wheat on welfare of producers and consumers in Iran

Hamidreza Feili[1*], Reihaneh Besharat[1], Mohammadreza Chitsaz[1], Shahrzad Abbasi[3]

[1]*Department of Industrial Engineering, Karaj Branch, Islamic Azad University, Karaj, Iran*
[2]*Department of Industrial Engineering, Karaj Branch, Islamic Azad University, Karaj, Iran*
[3]*M.A. Manufacturing System Engineering, Putra Malaysia University, Serdang, Malaysia*

hrfeili@gmail.com, Reyhanehbesharat@gmail.com, Pedram_cz@yahoo.com, Sh.abbasi80@yahoo.com

Abstract

Wheat is one of the most strategic agricultural products, which has always been a significant issue for the government. The main purpose of this study is to review the policy of purchasing wheat on the welfare of producers and customers in Iran. Due to the significance of wheat in consuming model of Iranian families, this product has been permanently under consideration. The government grants a subsidy to wheat consumption within the framework of inexpensive food policy and implements price setting support policies, a subsidy to products and insurance for wheat production. Furthermore, it is the exclusive buyer and seller of wheat in the country. Considering endurance of performance and ever-increasing expenses for the supporting plans for wheat producers and consumers, our goal in this paper is to evaluate and study the impact of such policies on the welfare of producers and consumers. To gain such objective, a mathematical model has been developed. The fulfilled policies in the period from 2005 to 2016 were the basis of the present study. The results of this study demonstrate that less role of government in the arrangement and context of wheat supply chain and broader support for production may lead to more solidarity of wheat production. Therefore, we should move toward privatization and liberate wheat market. However, this point should be regarded that it is better to conduct market to the more dynamic condition by appropriate policies rather than consuming energy and resources of the government. For instance, the government should forecast price of wheat in the next year by making use of comments and researchers of experienced economists instead of specifying the price of wheat for trades, and announce a price slightly less than this price as a guaranteed price.

Keywords: Wheat, Policy of Purchasing, Welfare, Producers and Consumers of wheat, pricing

1- Introduction

Wheat provides about 20% of calories of people's food in the world and it is considered as the main food of about 35% of the world's population. In Iran, bread is the most significant food of the majority of people and supplies 45% of consuming energy and about 70% of the required protein of people, particularly in the low-income communities.

Wheat is one of the most significant agricultural products and it is a strategic product which requires a great deal of consideration. In accordance with the statistics, control and inspection of the USA on wheat production and agricultural products are stronger than the amount of control and inspection of oil-producing countries on oil production (Ahmadian, 2006) and this issue demonstrates its importance and necessity of considering this product more.

Evaluating agricultural policies is one of the noteworthy subjects in most of the agricultural economy studies (Alston et al., 1994; Hosseini and Springer, 1998; Jinak and Folton, 2000; Alston and James, 2002). Any conscious intervention of the government in agriculture section is called agricultural policy (Soinen et al., 1998). It is accepted in all economic systems that no market mechanism can be successful solely in solving economic problems, particularly allocating optimized resources and fair distribution of incomes (Bulock and Salhuffer, 2003). Hence, the government mediates in various ways in economic affairs to compensate failure or deficiencies of the market. Generally, the objective of policy-making could be regarded as redistribution of social surplus based on the goals of policy-makers (Alstone & Pardi, 1999).

To support agricultural section, there are various tools which have different effects on the agricultural section and other economic parts of a country. Agricultural economists have always tried to evaluate agricultural policies (De Gurter et al., 1993; Cola, 1993; Jung et al., 2003, 1999 and Hosseini & Hassanpour, 2000; Stewart, 2018). While most of the agricultural supporting plans apply more than one policy tool simultaneously, there are few studies in/outside of the country discussing determination of the optimized combination of policy tools at the same time. Most of the studies implemented about supporting policies for special agricultural products in Iran have just discussed the impacts resulting from the omission of one policy, and paid no attention to the determination of the optimized combination of policy instruments and/or specified just the optimized level of one policy tool. Studies of Najafi (1997), Bakhshoudeh (2001) and Hosseini (2005) are included in this group. During the current years, some studies have been performed in which welfare effects of the combination of various policy tools were reviewed and the efficiency and inefficiency of such policies were judged (Gardner, 1992; Mayer, 1993; Muschini and Scuwaki, 1994; Kozicka, 2017). Bulock and Salhuffer (1995) were the first ones who measured social expenses resulting from the combination of supporting tools. Economists generally assess the policies by the social expenses which they may provide. In fact, they compare welfare consequences of policies with the time when there is no interference. Since execution f each particular policy has a different welfare outcome, studying welfare consequences of one policy disregarding distributing effects of other policies obtained in the market of the product can bring about elusive results. So, in this study, the impact of policies of purchasing wheat on the welfare of consumers and producers of wheat has been reviewed simultaneously.

Wheat – as the main food of people in Iran community – has always been under consideration for policy-makers of the agricultural section. Due to the significance of wheat in consumption model of Iranian families and incessant and widespread support of government for this product, most of the cultivating areas of agricultural products in Iran are allocated to wheat.

After Islamic Revolution in Iran, the government has supported producers of agricultural products in order to reach self-sufficiency by granting the subsidy to such products. Since 1977, it was one of the supporting policies of the government to distribute some inputs such as fertilizer, poison, and seeds required for farmers with low prices. Among total subsidies allocated to these inputs, about 80 percent of them were granted to chemical fertilizers (Producers & Consumers Supporting Organization, statistics of different years). Meanwhile, more than 80 percent of insurance premium of wheat were paid by the government (Agricultural Products Insurance Fund, statistics of different years).

Wheat – in the form of bread and its products – is the main food of Iranians. Based on the report of Iran Statistics Center (2003), the average of consumption of wheat in Iran is 4.151 kg per capita. Per capita consumption of wheat is 129 in urban areas and 185 in rural areas. Considering the role of bread in nutrition of most of the people in the country (particularly low-income people), the government has executed the policy of inexpensive food in the form of paying subsidy for flour and bread during the previous years, and considered a significant amount annually as the subsidy for flour and bread in the budget. For instance, in 2003, subsidy for bread amounted to 15802 billion Rials (Producers & Consumers Supporting Organization, statistics of different years).

At the present time, the most important support of government for production of wheat is guaranteed purchasing, subsidies for production inputs and insurance. Purchasing wheat from farmers was implemented under a special system using "system of purchasing agricultural products in cash by agent bank" through 14 Cereal & Trading Services Companies in 31 provinces throughout the country. The present system for purchasing wheat is in such a way that farmers submit products after harvesting to special centers in any city and provinces which are the representatives of Ministry of Commerce and receive their income based on the ratified and guaranteed price of the government.

Governmental support is fulfilled in a way that tariffs of wheat are increased annually in a fixed manner and international changes of wheat have no effect on them. The annual increase in the number of tariffs, disregarding the influence of world prices and qualitative conditions, has led to a great pressure on the government to supply budget for purchasing wheat and essential quality and superficial quality of wheat has also demonstrated no improvement.

Considering the ever-increasing growth of wheat production and consumption, incessant fulfillment of government policies in the market of this product has imposed many expenses on the government. On the other hand, due to the importance of wheat in Iranian household food basket and agricultural economy of the country, supporting producers and consumers of this product seems inevitable. Therefore, studying this issue looks so important. Hence, this study reviewed policies of purchasing wheat during the previous years and discussed its impact on the welfare of producers and consumers; and finally, the strategies are expressed to increase this level of welfare.

2- Review of literature

Wheat is one of the first farming plants which is domesticated and cultivated by a human being. History of domesticating wheat probably returned to 12000 to 18000 years B.C., and it has been commenced with gathering seeds of the wild ancestors of the present wheat.
Herbert Hoover in 1943 said about the significance of bread during the war: "The first word pronounced in the war was the weapon and the last one was bread."

Now in our country, the wheat will be purchased and delivered which have the following specifications:
- Maximum useful downfall 10%
- Maximum non-useful downfall 7%
- Maximum humidity 12%

Maximum humidity in Gilan, Mazandaran and Golestan provinces is determined to be 14% due to special weather. Humidity in some regions in Ardebil and Semnan provinces is more than 12%, and the wheat cultivated in regions with humidity up to 14% will be purchased after verification in the Committee of Purchasing Wheat in Iranian Governmental Trade Company.
- Maximum seeds with sunn 2%
- Maximum seeds with smut and seeds of germinated weeds per 1000 weight
- Maximum barley and rye mixed with wheat, separately or as combination 6%

The wheat with musty and rotten seeds, with fungus, storks and the wheat which has no specifications mentioned in the following table could never be submitted.

Table 1. Standard of wheat specifications

Degree	Min. Volumetric Weight per Kg. in Hectoliter	Maximum Damages Seeds								Max. Impurity Percentage				Max. Percentage of other types of wheat	Max. Percentage of seeds or other grains
Specifications		Total Damages Seeds	Brocken & Wrinkled Seeds	Germinated Seeds	Color-Changed Seeds in Seedling	Heated Seeds	Seeds with Pest (except Sunn)	Rotten Seeds	Seeds with Smut	Total of Impurities	Weed Seeds		Claviceps Purpurea		
											Poisonous	Non-Poisonous			
1st Grade	78	3.5	3	0	5%	0	1%	0	0	1	0	1%	0	10	2
2nd Grade	75	6	5	1	1	2%	2%	2%	5%	2	1	2%	25%	15	4
3rd Grade	73	10	9	2	2	5%	3%	5%	1%	3	2	5%	5%	20	7
4th Grade	71	15	14	2	3	1	5%	1	2%	5	3	1	1%	25	10

All the specifications mentioned for wheat will be called in the table as purity table. In this table, the prices will be varied too based on the specifications of purchased wheat.

Table 2. Purity table in 2010

Useful Non-Useful	0	1	2	3	4	5	6	7	8	9	10
0	3426	3412	3398	3384	3370	3356	3342	3328	3314	3300	3286
1	33	3377	3363	3349	3335	3321	3307	3293	3279	3265	3251
2	3356	3342	3328	3314	3300	3286	3272	3258	3244	3230	3216
3	3321	3307	3293	3279	3265	3251	3237	3223	3209	3195	3181
4	3286	3272	3258	3244	3230	3216	3202	3188	3174	3160	3146
5	3251	3237	3223	3209	3195	3181	3167	3153	3139	3125	3111
6	3216	3202	3188	3174	3160	3146	3132	3118	3104	3090	3076
7	3181	3167	3153	3125	3125	3111	3097	3083	3069	3055	3041

3- Guaranteed purchase of wheat in part & present time

Based on this law, some products with more vital significance (such as wheat, sugar, rice, grains, and oilseeds) in farming part have received more support. Regarding wheat which forms the main food of society, the government takes action to purchase and pays price of wheat to wheat farmers by subsystems of Iran Commercial Governmental Company as grains companies and trade services as well as stewardship of this company including Rural Cooperative Organization which it takes place by mobilizing procurement and credit facilities, supplying maintenance warehouses and expanding governmental salons.

Other products which are under cover of guaranteed purchase law are also supported by governmental purchased considering facilities in Rials and foreign currencies and regarding time conditions in accordance with guaranteed purchase law.

3-1- The laws concerning guaranteed purchase of agricultural fundamental products

In this section, we defined first stabilized and guaranteed price of agricultural products legally based on regulations, their differences were specified, then regulations of guaranteed purchase and its weakness were discussed.

3-2- Stabilized price of fundamental agricultural products

To support producers of fundamental agricultural products and to prevent irregular price increase, the government set rules and regulations to stabilize the price of this major product from 1981 to 1990. The stabilized prices were implemented practically through two ways:
In the first method, the government held the exclusive right to purchase and sell strategic agricultural products such as wheat, prevented private section to enter any transaction with them, and fixed the price low by purchasing strategic agricultural products and selling them to consumers. Since obtaining fixed price policy has led to eliminating farmers' motivation to increase products, hence the government pays the subsidy to decrease expenses of production and consequently to enhance production. In the second method, the government determines sale ratio and stabilizes sale price at a specific level, and on the other hand, pays the difference between the fixed price and price of supplying in the market to producers.

3-3- Guaranteed price of fundamental agricultural products

Due to failure in executing the policies to fix prices of strategic agricultural products, it ratified the Law to guarantee purchasing agricultural products in November 1989. Based on this law, while the government has guaranteed to purchase strategic agricultural products, it shall inform farmers of the minimum guaranteed price of the products such as wheat, barley, maize, high-quality rice, sugar cane, cotton, oilseeds, tea (green leaves), potato, onion and cereals prior to the farming year (Aug. 22nd of each year) via mass media, and the government shall observe the real expenses of production in each unit of cultivating area to determine minimum guaranteed price.

The difference between guaranteed and fixed prices is that concerning guaranteed prices, the government is not purchaser of major agricultural products and farmers are free to sell their products

with their own desired price, and in case of their failure to sell products and absence of any buyer, farmers can sell their products to the government based on the guaranteed price. To support customers, the government sells the purchased products at a price less than the purchase price.

3-4- Some of the existing weaknesses in guaranteed purchase laws

As mentioned earlier, the objective of guaranteed price policy is to provide balance in producing system and to prevent waste. The most important defect of guaranteed price is that they cannot provide the goals mentioned in Law. This policy may never avoid waste products; since purchasing is just guaranteed by determining the guaranteed price. The other part of ambiguities in this law resulted from this point that guaranteed price policy was not the policy based on a pre-determined planning, but it has been designed based on the fact that if in harvesting season, market price reaches below guaranteed price, the government intervenes in the market for product and purchases the product. Therefore, some problems may be developed after execution of this policy.

The first problem was that the government has no sufficient credit for some products whose prices reach below guaranteed price. The second issue was that the government was not able to cover 17 products mentioned in the first law. In other words, guaranteed prices were announced for these products, but in fact, the market price was higher than guaranteed price. For instance, for the products such as wheat, which was a strategic product, the government had to purchase it from producers; hence, no credit could be remained for purchasing other products. Prices of products like potato, onion or other products may be decreased and reached below guaranteed price, but the government had no credit to purchase these products, or it could purchase these products just at a limited level. Furthermore, for some products such as garden products, the price received by producer was very higher than the announced guaranteed price.

An amendment was added to this Law in 1993. In this amendment, the priority was purchasing strategic products (including wheat, rice, barley, maize, sugar cane, Vash cotton, oily seeds, potato, onion, and cereals). However, in spite of such problem, some other products were added to the list of previous products, hence we observe in practice that guaranteed price policy was just changed to a policy for purchasing wheat, and it has solely satisfied requirement of producing wheat that of course, it received a comprehensive and thorough support.

On September 05, 2004, the note 3 of the Law for guaranteed purchase of agricultural products was amended and 2 other notes were added to it. As declared earlier, amendments of note 3 made the government obliged to supply any probable losses under subject matter of this law from its own resources. In other words, during these years, Rural Cooperative Organization has taken action to purchase products as a steward; and this organization was made to purchase these products with guaranteed prices in some cases and even with a lower price. But in budgeting law, no credit was considered for it. The objective of amending this note was supplying any probable losses and damages under this law by the government from its own resources.

Meanwhile, based on this law, the government is permitted to provide the losses and damages resulting from delays of payments more than one month under this law from its own financial resources, and pay the increased amount to producers in proportionate with the commission of midterm deposits which is determined at the beginning of each year by the Central Bank of the Islamic Republic of Iran on countdown basis plus the original price of purchased products.

On September 06, 2006, two other notes were added to this law. In its 4th note, it is stipulated that in order to prevent any previous transaction and to pay the price of products promptly, the un-forecasted credits concerning annual budgeting law were allocated to farmers one hundred percent. The reason for adding note 4 is that the credits for guaranteed purchases should be promptly submitted to stewards of purchase section in order to be allocated such credits one hundred percent.

Here, sale operation was defined concerning some products such as wheat, since its buyer was government, but some markets should be detected for selling other products. To purchase products, Central Bank was made obliged to send required facilities to agent banks for the steward authority in favor of guaranteed purchasing products on April 04th of each year. This resolution was also ambiguous since the type of inflation rate was not specified in the aforesaid resolution. Finally, through inquiries performed by Planning & Agricultural Economy Research Institute, it was revealed that this inflation rate is based on the received price of the producer. However, considering the

principal mentioned in Supporting Law, an increase of guaranteed price could never be amplified lastingly, because production expenses increase every year and competition is getting harder in the world market. Therefore, regarding the beliefs of the principal of supporting, such support should be comprehensive. This support could never be implemented by guaranteed price policy, but other means shall be used simultaneously beside this tool.

In the literature concerning the guaranteed price policies, four economic criteria could be observed to determine the price as follows:

- The criterion of production expenses
- The criterion equal to border price
- The criterion of trading relation
- Multiple criteria

In the first criterion, the average of total cost of production including the value of consuming inputs, wages, and rentals of the land is calculated and regarded as the minimum price. In the second criteria, the equal amount of border price of products is adjusted with expenses of transportation to farm and it is considered as the minimum price. In the third criterion, the trading relationship is defined as an index from price received (price upon harvesting and/or guaranteed price) by farmers, an index of prices paid by them for production inputs and consuming goods. This criterion is regarded to maintain a proper relationship for the level of prices in the part of agriculture and industry. Calculating trading relation between prices of various products in part of agriculture, particularly the products which are sold under control of the government, with those presented freely, is another criterion for calculation of trading relation. Lastly, the fourth criterion is explained as a set of three above criteria. The different countries in the world apply one or more criteria of the above-mentioned criteria to determine a minimum price for the desired products. Other effective and north worthy elements in determining prices consist of changes in price of inputs, procedure of prices in market, supply and demand of product, relative prices in one group of products, impact of price on structure of expenses in industries, influence on general level of prices and price of product in world markets.

Among the mentioned elements, cost of production is the most tangible and most important element and it has a significant role in all price calculations. The proposed prices in Iran are set up focusing on the first criterion, i.e. the average expenses of production and simultaneous attention to the second and third criteria.

3-5- Methods of determining guaranteed price

Each year in May, the tables of production cost, the income of sub-products, insurance, performance and value of land rentals are sent to all provinces separately for all farming products selected by Ministry of Agricultural Jihad. After sending the tables, Agricultural Jihad Organizations in the provinces shall submit within one month the average of the real expenses of production, income, insurance, rentals and function of farming products for their own province to Planning, Agricultural Economy & Rural Development Research Institute, then Institute shall gather statistics and information and enter information of provinces based on expertized meetings with the deputy of Plant Production Affairs, particularly Cooperative Office of Fundamental Products, Cereals, Grains and Fodder Plants in order to estimate cost price of farming products, hence declare the minimum price. The proposed guaranteed prices are estimated based on the above-mentioned method, and they will be presented to Vice-President in Planning & Strategic Monitoring Dept. after approval of deputies and high authorities of Ministry of Agricultural Jihad.

Vice-President in Planning & Strategic Monitoring Dept. reviews their prices and sends their prices for ratification after studying them to the workgroup in Ministry of Commerce. Finally, the comments of three authorities for guaranteed prices will be presented to the workgroup for ratification of the guaranteed price of wheat by the presence of first vice-president, Minister of Agricultural Jihad, Minister of Commerce and Vice-President in Planning & Strategic Inspection. This workgroup shall announce the ratified prices considering major issues of the economy in the country and amount of credit.

3-6- Guaranteed purchasing process of wheat

Whereas wheat is the main foodstuff in customers' table, and generally each Iranian supplies 1393 kilocalories from total daily 2935 kilocalories through bread, thus wheat is considered as the most fundamental product required by the society and one of the strategic agricultural products of the country, so this product could attract attention of policy-makers and has been supported by the government using the tools such as guaranteed purchase.

Guaranteed purchase of wheat has been commenced since 1989 by approval of the law on the guaranteed purchase of fundamental agricultural products and it is still continuing. Based on the report of Ministry of Commerce, guaranteed purchase of wheat is fulfilled through two direct methods and/or through concluding a contract with the steward, in such a way that wheat purchased by stewards are delivered to salons and warehouses of regional companies gradually, and at last the accounts of stewards are settled down. To purchase directly from farmers, the company shall attend directly to purchase centers, take action to receive wheat and pay the price of wheat in cash through the bank. Method of allocation of purchase centers: Considering quantity of forecasting domestic wheat purchase, regional companies provide purchase centers and conclude contract with steward in order to facilitate receiving wheat from farmers for the geographical regions where are impassable or the areas where are far from salons and warehouses of companies, and allocate a code for each center. Regional companies offer information and install boards in purchase centers to inform farmers of purchase centers.

In 2009, guaranteed purchase rate per each kilogram of ordinary wheat (with 4 percent of suitable downfall and 2 percent of unprofitable downfall) was Rls. 3050, and this amount reached Rls. 3300 in 2010, and it was declared to be Rls. 3600 in 2011. In 2012, this rate was reached Rls. 6800, and this rate was Rls. 12750 in 2015-2016.

3-7- Wheat cash purchase system of Bank Mellat

Based on the agreements between Bank Mellat and Iranian State Trading Company concerning cash purchase of agricultural products and in line with execution of objectives of government and respecting clients, cash purchase plan of some agricultural products such as wheat, rice and sugar cane has been performed by Iranian State Trading Company and affiliated companies since 2006 in cooperation with Bank Mellat through electronic systems.

3-8- Statistical software for calculating wheat guaranteed price

This software is designed to calculate the guaranteed price based on the items of expenses and income of provinces. Inputs of this software are as follows: lateral expenses and incomes, amount of wheat production, area of cultivating land and function of the product in each province. In this software, first blank questionnaires are submitted to centers of different provinces and they are requested to complete them with their information. Then, this information will be certified by experts of Planning Office of the relevant province, and at last will be presented to Planning & Agricultural Economy Development Research Center of Ministry of Agricultural Jihad; which after gathering and analyzing this information, they will be handed over to the esteemed Minister of Agricultural Jihad in the meetings by the presence of vice-minister and Minister of Agricultural Jihad. While submitting a back-up from information to him, the Minister will notify the Presidency of this information.

3-9- Wheat purchase system in other countries

The major wheat producing countries and amount of their products are mentioned in the following table from 2008 to 2011. In accordance with the aforesaid table, it is predicted that totally 676 million tones will be produced in 2011, and European Union, China, India, America, Russia, Canada, and Australia are the seven top producers of the world with production of 142, 113, 81.5, 56.6, 55, 25 and 24 million tons of wheat production, respectively.

Table 3. Top wheat producing countries

	Average 2008-10	2009	2010 estimate	2011 forecast	Change: 2011 over 2010 (%)
EU	141.8	138.5	136.5	142.0	4.0
China (Mainland)	114.2	115.1	115.1	113.0	-1.8
India	80.0	80.7	80.8	81.5	0.9
United States	62.8	60.4	60.1	56.6	-5.8
Russian Federation	55.7	61.7	41.5	55.0	32.5
Canada	26.2	26.8	23.2	25.0	7.8
Australia	23.2	21.9	26.3	24.0	-8.8
Pakistan	22.8	24.0	23.3	24.0	3.0
Ukraine	20.7	20.8	17.2	21.0	22.1
Turkey	19.3	20.6	19.5	19.8	1.5
Kazakhstan	14.3	17.0	10.0	15.6	56.2
Iran Islamic Rep. of	12.4	13.0	14.5	13.2	-9.0
Argentina	10.4	8.8	14.0	13.5	-3.6
Egypt	8.3	8.5	8.5	8.6	0.9
Uzbekistan	6.5	6.6	6.7	6.6	-1.5
World	**674.4**	**684.5**	**653.7**	**676.0**	**3.4**

[1] Countries ranked according to average production 2008-10.

3-10- Wheat industry of USA

Cereals trade system in the USA is totally based on the free economy, and farmers and businessmen in this country can be engaged in wheat trading freely. America produced 62.8 million tones' wheat in 2008 and 56.6 million tons in 2011.

In three consecutive years, i.e. 2009, 2010 and 2011, America has gained the third rank in producing wheat, and the first place of exporting wheat to the world which demonstrates high importance and efficiency of the ruling system on the management of wheat industry in this country.

To provide and maintain interests of farmers, some associations have been established. Local farmers hold farmers association with each other that US Farmers Association is the most important one. From gathering these associations and also in collaboration with the cooperation of research centers and institutes, US Wheat Association has emerged which shows the structure of the wheat industry in America.
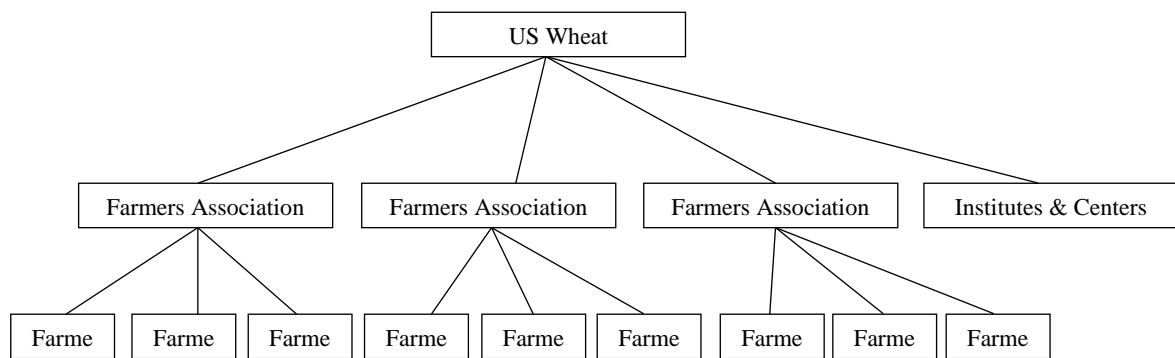
Fig 1. Structure of U.S. wheat industry

3-11- Price determining system and method of purchasing wheat from farmers in United States of America

As it was said before, the rules governing free economy is implemented in transacting wheat in America which means that prices of products are determined by supply and demand as well as conditions in the market, and no organization is responsible for specifying the prices.

Wheat is divided into six different types including:
- Durum Wheat
- Hard Red Spring Wheat
- Hard Red Winter Wheat
- Soft Red Winter Wheat
- Soft White Wheat
- Hard White Wheat

To determine the price of wheat submitted by farmers, type of wheat shall be specified first, then by applying some indexes, quality of products will be assessed. After specifying the type of wheat, its price will be determined by stock markets such as Kansas City Stock (KCB) and Chicago Stock Market (CBOT).

Upon harvesting products by a farmer, he can sell it or store it in his private warehouse. Based on the discretion of Famer, he may attend salons or warehouses of grains and/or their representatives and sell his products. Should any farmer avoid selling his products, he can store them from paying a sum in grains warehouses.

During the process of trading wheat in America, transporting wheat to factories of flour or export terminals and transferring wheat from a place to another are fulfilled by merchants of wheat who may never see wheat. Tenders, bids and other common occasions specify chains of supplying wheat in America. The elements such as volume, quality, time of sending, the method of delivery and payment are some of the important factors in wheat commerce in America. Among the policies which support agriculture and executed by the government are tax exemptions, allocating some tariffs and some similar cases.

3-12- Method of purchasing wheat from farmers in Canada

Farmers deliver their wheat to warehouses and salons of grains after harvesting. At this stage, quality of wheat and its type are determined and farmer delivers his wheat and simultaneously receives its price partially. Delivering wheat and amount of received money upon the stage of delivery shall be implemented based on the contracts concluded beforehand by and between farmer and Canada Wheat Organization. The part of the money which farmer receives at the first stage will decrease the capital risk of a farmer since this sum is guaranteed by the Canadian government. In accordance with the contract of a farmer, he will receive the balance at two stages. A farmer may receive all his debt after termination of the farming year.

Canada Wheat Organization has five major types of contract based on the method and time of payment to farmers which their frameworks are based on the aforesaid principles.

3-13- Method of purchasing wheat from farmers in Australia

Some of the important factors effective in determining a price of wheat are as follows: world supply and demand, quality of a product, type of wheat and its place of storage. So the great companies transport their wheat to the locations where more facilities are available for selling and delivering wheat to clients and to increase general expenses.

Wheat purchasers in Australia, particularly domestic customers of wheat, have different ways to supply their required wheat, and this right of selection is provided by a non-governmental business. For instance, a miller can select one of the following ways to provide his required wheat:
- He can purchase directly from farmers and they should be paid mostly in cash.
- He can buy from domestic merchants or businessmen.
- He can purchase from great companies such as CBH Ltd. to satisfy a lot of his requirements.

Payment method to farmers shall be based on the contracts concluded by and between seller and buyer. Till then the structure of wheat production was reviewed in 3 top exporting countries of this product. Here forth, two wheat importing countries will be studies, i.e. Egypt and Indonesia.

3-14- Method of purchasing wheat from farmers in Egypt

Egypt also tries to avoid wheat governmental industry and to delegate the affairs to the private sector. However, to gain this goal, more amendments should be implemented in this section. Concerning the method of payment to farmers, this point should be mentioned that just 8 percent of farmers are able to work on credit-basis, and about other 92 percent receive their money in cash upon selling products. Type of wheat, its quality and world price are also the important factors in assessing the value of wheat in Egypt. Some of the privileges of amending the plan in Egypt are more dynamism of wheat industry and moving toward wheat production with higher quality and top grade. Alwang et al.(2018) have a good research on food security benefits associated with raised-bed wheat production in Egypt.

4- Research methodology

Considering the aforesaid implemented discussions and a schematic image of wheat purchase process in Iran in order to determine an optimized combination of policy tools, first diagram and mathematical model of supporting policy tools of government should be determined, and the impact of these policies on the welfare of producers and consumers will be measured. The policy tools which are evaluated in this study was guaranteed price for producer and paying a subsidy to an applicant of wheat. These means are the most important policy tools which the government applies in the wheat market. Figure 3 demonstrates the welfare consequences resulting from applying policy tools of subsidy to wheat consumers and guaranteed price.
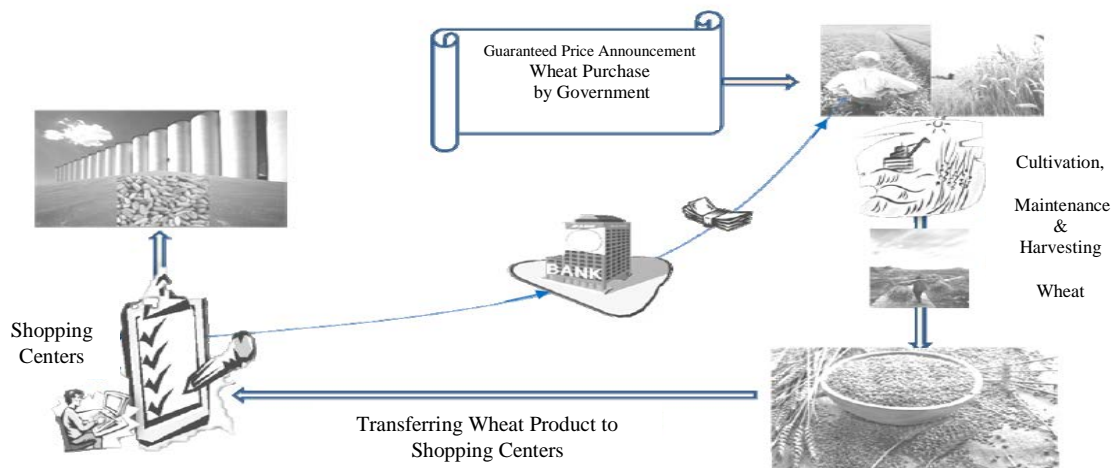

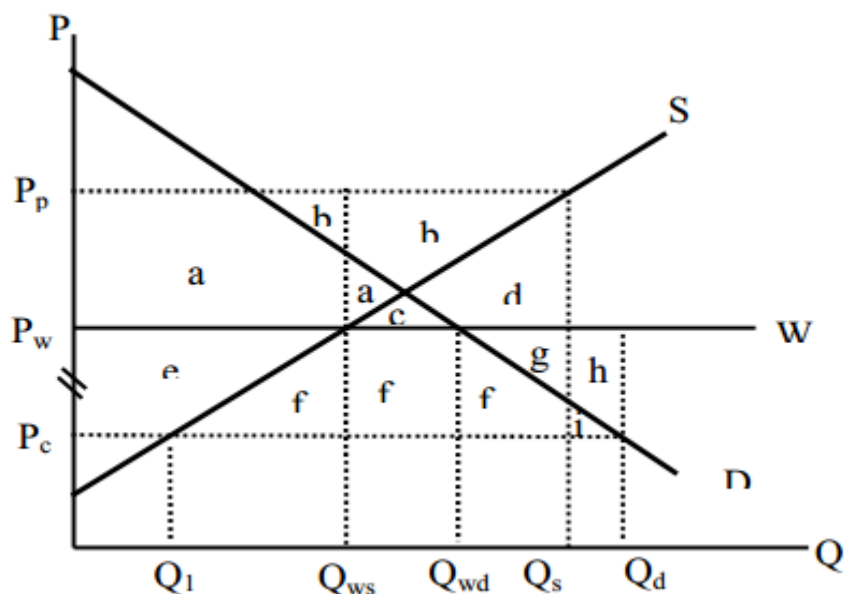**Fig 2.** Schematic figure of purchasing wheat during a year

Fig 3. Welfare outcomes of government policies in purchasing wheat

In figure 3, D, and S, respectively, are functions of wheat domestic supply and demand. In case the government avoids any intervention, assuming that there is free commerce and regarding Iran as a small importer, W is the curve of Iran's demand from world market at the level of world prices (p_w).

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In world prices and without the intervention of the government in production and consumption of wheat, amount of wheat supply is Q_{ws} and amount of wheat demand are Q_{wd}. Hence, amount of $(Q_{wd} - Q_{ws})$ of wheat is imported to the country. However, the government interferes in the wheat market with a different tool. One of the means for the interference of the government in wheat market is the policy of subsidy to consumers of this product. Regarding the price of subsidy of P_C for consumers, the quantity of domestic production of wheat is Q_1 and amount of demand is Q_d, so $Q_d - Q_1$ amount of wheat is getting imported. But, during the previous years and in line with self-sufficiency policy, the government determines the policy of guaranteed price in such a way that wheat importing reaches its minimum amount and/or no import could be observed. Therefore, the government specifies the guaranteed price of wheat higher than world price and at the level of P_p. At this level of prices, production amount is Q_s. Considering the price of P_p for producers of wheat and price of P_C for consumers of this product, amount of wheat import will be equal to $(Q_d - Q_s)$.

Adopting decisions about prices for wheat producers and consumers, in proportionate with the state of no interference, i.e. free business, may result in an increase in the welfare of producers with the amount of a + b and an enhancement in the welfare of consumers with the amount of e + f + i.
By adopting these policies, expenses of government will be an amount equal to a + b + c + d + e + f + g + h + i , and by applying these policies, a dead loss of h + g + d + c may be imposed to society.

To calculate the area under curves of supply and demand, and to estimate welfare influence of government's policies, it seems required selecting a functional figure for functions of supply and demand. By making use of the model proposed by Gardner (1983) and whereas in this study estimated attractions of supply and demand of previous years have been used, we should select a functional figure along which curves of supply and demand have fixed price attractions. Hence, the reason for supply and demand functions is considered in a form which could be demonstrated as follows:

$$Q_d^1 = aP_c^{\hbar}$$
$$Q_s^1 = bP_p^{\varepsilon} \tag{1}$$

In the above functions of Q_s and Q_d are respectively quantities of supply and demand of wheat, $\hbar$ and ε are respectively attractions of wheat supply and demand, P_p and P_C are respectively prices paid by the consumer and received by the producer, and a and b are coefficients of transferring curves of supply and demand. Regarding functions of wheat supply and demand, changes in welfare of producers and consumers due to adopting the policies of purchasing for producers and subsidy price for consumers are calculated as follows:

$$\Delta CS = \int_{p_c}^{p_w} a p_c^n \, dp_c = \frac{Q_d(p_w^{\hbar+1} - p_c^{\hbar+1})}{p_c^{\hbar}(\hbar+1)} \tag{2}$$

Where P_C has subsidized the price of consumers and p_w is world price of wheat. Hence, any changes in welfare of wheat producers could be defined as follows:

$$\Delta PS = \int_{p_w}^{p_p} b p_p^{\varepsilon} \, dp_p = \frac{Q_s(p_p^{\varepsilon+1} - p_{pw}^{\varepsilon+1})}{p_p^{\varepsilon}(\varepsilon+1)} \tag{3}$$

Where, P_p is the price of purchasing wheat. The government's expenses for simultaneous execution of governmental policies in which inexpensive food for consumers and guaranteed price for producers are provided could be defined as follows:

$$\Delta TC = (p_p - p_w)Q_s + (p_w - p_p)Q_d \tag{4}$$

Where ΔTC is changing in governmental expenses resulting from execution of guaranteed price policy of wheat. To transfer income from taxpayers to wheat producers and consumers, the government should afford the expenses. If the average of social expenses for transferring income is shown with δ, then changes in the surplus amount of taxpayers could be obtained from the following relation:

$$\Delta TS = (1 + \delta)\Delta TC \tag{5}$$

In this relation, ΔTS shows changes in welfare of taxpayer.

The losses resulting from guaranteed price policies and subsidy to consumers is that part of taxpayers' welfare which is taken from them, but it never increases the welfare of producers and consumers of wheat. This loss is calculated with the following relation:

$$\Delta Lossf = |\Delta TS| - (\Delta PS + \Delta CS) \tag{6}$$

One of the objectives of this study was to evaluate current policies of the government. Calculating index of average transfer efficiency (ATE) is one of the procedures for assessing efficiencies of the policies.

This index demonstrated relativity of increase in the level of welfare of producers and consumers to decrease in the level of welfare of taxpayers, and this relation could be obtained as follows:

$$ATE = \frac{\Delta CS + \Delta PS}{|\Delta TS|} \tag{7}$$

Another index which is used for evaluation of government policies is a harmonic average of policy efficiency, and it can be taken with the following relation:

$$PATE = \frac{\theta_1 (\Delta CS) + \theta_2 (\Delta PS)}{|\Delta TS|} \tag{8}$$

The numerical amount of index for a harmonic average of policy efficiency of transfer depends on the proportionate amount of political weight of social groups and it may be more than 1. If this index is more than 1, the selected policies, in proportionate with free trade, could provide more social welfare.

In execution of the stipulated policies, the income gathered by the government from taxpayers transfers to consumers and producers within the policy of inexpensive food and guaranteed price. Thus, by making use of the above relations, the impacts of welfare and efficiency of current policies of the government are reviewed in the wheat market.

To determine the optimized combination of policy tools in the wheat market, minimizing social loss function is used. In this procedure, changes in social loss function are minimized. Considering three social groups of producers, consumers, and taxpayers, and regarding welfare weights of θ1 and θ2 for consumers and producers of wheat under various scenarios, the function of social net loss for wheat could be obtained with the following relation:

$$\Delta Lossf = \Delta TS - \theta_1 \Delta CS + \theta_2 \Delta PS \tag{9}$$

Where *Lossf* is loss level, ΔPS, ΔCS, and ΔTS, respectively change in a surplus of consumers, producers, and taxpayers. Alterations in a surplus of consumers are calculated with the following relation due to the execution of inexpensive food policy in proportionate to the conditions of avoiding intervention and free trading:

$$\Delta CS = (P_W - P_C)Q_{Wd} + \int_{Q_{wd}}^{Q_d} D(Q_d)dQ_d - P_C(Q_d - Q_{Wd}) \qquad (10)$$

In the above relation, $P_C = D(Q_d)$ is a function of inverse demand of wheat. Q_d is the amount of demand after receiving inexpensive food policy, Q_{wd} is the amount of demand in world price P_C and P_W and subsidy price for consumers.

Changes in producer surplus are calculated with the following relation due to the execution of guaranteed price policy:

$$\Delta PS = (P_P - P_W)Q_{WS} + P_P(Q_S - Q_{WS}) - \int_{Q_{ws}}^{Q_S} S(Q_S)dQ_S \qquad (11)$$

In this relation, P_p shows the guaranteed price of wheat, Q_S is the amount of wheat production with a guaranteed price, and Q_{ws} is the amount of wheat production in world price. $S(Q_s)$ also is a function of the inverse supply of wheat.

Total expenses of government for the simultaneous execution of subsidy policy tools and guaranteed price of wheat is demonstrated in relation (5). By replacing previous relations in the above relation, loss function could be written again as follows:

$$\Delta Lossf = \left[(b(P_p^{\varepsilon+1} - P_w^1.P_p^\varepsilon - \frac{1}{\varepsilon+1}(P_p^{\varepsilon+1} - P_w^{\varepsilon+1}))) + a(P_c^\hbar.P_w^1 - P_c^{\hbar+1} - \frac{1}{\hbar+1}(P_w^{\hbar+1} - P_c^{\hbar+1}) \right] \qquad (12)$$

Now, mathematical model together with the existing limitations has been offered which limitations are expressed as follows:

$$\boldsymbol{Min}\ \Delta Lossf = \left[(b(P_p^{\varepsilon+1} - P_w^1.P_p^\varepsilon - \frac{1}{\varepsilon+1}(P_p^{\varepsilon+1} - P_w^{\varepsilon+1}))) + a(P_c^\hbar.P_w^1 - P_c^{\hbar+1} - \frac{1}{\hbar+1}(P_w^{\hbar+1} - P_c^{\hbar+1}) \right]$$

Subject to:

$$\frac{b(P_p^{\varepsilon+1} - P_w^{\varepsilon+1})}{\varepsilon+1} \geq 0$$

$$\frac{a(P_w^{\hbar+1} - P_c^{\hbar+1})}{\hbar+1} \geq 0$$

$$aP_c^\hbar \geq 10000000 ; \qquad\qquad\qquad\qquad\qquad (13)$$
$$aP_p^\varepsilon \geq 13500000$$

The objective function has been reviewed as above. Three constraints have been considered for this model; which the first and second constraints provide this condition that welfare of producers and consumers shall be non-negative versus free trade that the selected policy for guaranteed purchase of wheat has priority versus free trade, and the third and fourth constraints also are about production and demand of wheat in the current year considering the prediction of Ministry of Agricultural Jihad, which production of wheat is estimated to be more than 13.5 million tones and domestic demand is about 10 million tones'.

By minimizing the objective function and considering the mentioned constraints, a combination of policies is selected with the least losses which could provide the possible welfare of suppliers and consumers.

5- Data analysis

The base year for calculating this study is 2005-06, the first year of the fourth 5-year plan. The guaranteed price in this year was Rls. 1870 and guaranteed price of purchasing wheat reached Rls. 12750 in 2015; and cost price of one kilogram of flour has been Rls. 2500 for the government. The government provides bakeries with the produced flour against Rls. 127 out of which Rls. 75 was the cost of flour; Rls. 52 was expenses of packing and transporting to bakeries. To produce each kilogram

of flour, Rls. 8 has been paid for milling in average. Furthermore, the coefficient of transforming wheat to flour has been 85/0. In other words, to produce one kilogram of flour, 15.1 kg wheat is required. Considering the presented information, if the government submits wheat to consumers instead of flour, its subsidized price will be Rls. 58 per kilo.

In previous studies, various estimations have been gained about the attraction of wheat supply and demand in Iran. In many studies, functions of wheat supply and demand have been estimated exponentially, and just in few cases, linear functions were estimated. Due to applying various methods of estimation and different periods, the estimated supply and demand attractions demonstrated a great difference. Price attraction of wheat demand in previous studies was about 03.0 to 81.0 (Malekzadeh et al., 1987; Faghihi, 1990; Piraei, 1995; Rahimi and Kalantari, 1996; Esfandiari, 1996; Khosravinejad, 1997). Price attraction of wheat supply was between 05.0 and 1.1 (Nouri Naeini & Pedram, 1993; Pahlevani, 1994; Piraei, 1994; Rahimi & Kalantari, 1996). Whereas the most amount of demand for wheat is related to flour, this study has used estimated attractions for flour which equals to -03.0. The average of wheat supply attraction in previous studies was evaluated to be 40.0 which will be used in this study.

While there is no estimation about the losses resulting from disorders in the taxable markets, we have tried in this study to reach estimation about these expenses regarding the researches fulfilled in other countries. Previous studies demonstrate that the final excessive load of taxation in some developed countries varies from 7 to 65 percent. Browning (1987) calculated "average of welfare expenses resulting from taxation clause 1 7/15 (AWC) percent" and final welfare expenses about 32 to 47 percent. Fairbairn (1995) obtained final welfare expenses for some developing countries more than 25 percent. If the average of the amounts of this parameter in previous studies is considered 35 percent, the average of welfare expenses resulting from taxation is about 35 percent of final welfare expenses. In this study, two quantities of 25 and 35 percent are considered for final welfare expenses. Hence, the average welfare expenses resulting from taxation will be equal to 10 and 15 percent.

To calculate welfare levels of producers, consumers, and taxpayers, Excel was used and software of Lingo was used to minimize the expanded mathematical model.

5-1- Results and discussion

To review the results, first, it is required to evaluate the influence of current policies of the government in this market. In 2015, the price for consumers was Rls. 9500, the price for producers was Rls. 12750 and world price with the free rate in 2015 was Rls. 9366. In this regard, by making use of the defined relations in the previous part, changes in welfare of producers, consumers, and taxpayers as well as a social loss resulting from the current policy and average of transfer efficiency have been calculated. The following table demonstrates the obtained results.

Table 4. Changes in welfare of target groups under current policies of market in wheat in proportionate to free trade (billion Rials)

Extra Load of Transferring Income	$\delta = 0$	$\delta = 0.0.95$	$\delta = 0.175$
Changes in Welfare of Producers	-801.8	-801.8	-801.8
Changes in Welfare of Consumers	-8255.9	-8255.9	-8255.9
Expenses of Government	-10107	-10107	-10107
Welfare of Taxpayers	10107	11067.2	11875.7
Social Losses	1049.4	2009.5	2818.1

Considering table 1, as the result of applying the current policy versus free trading and non-avoidance of the government, level of consumers' welfare will be decreased by an amount about 8.25 thousand billion Rials. Level of producers' welfare will be decreased up to about 0.8 thousand billion Rials due to implementing the guaranteed price policy. The government has to pay 10 thousand billion Rials for execution of these policies. Assuming that this excessive load for transferring income equals to 0, 095.0 and 175.0, the welfare of taxpayers is approximately 1, 11 and 11.8 thousand billion Rials, respectively; hence, social loss resulting from execution of these policies is about 1, 2 and 2.8 thousand billion Rials.

6- Conclusion

By reviewing the present system in other countries throughout the world, we can observe explicitly that less role of government in structure and body of wheat supply chain and more expanded support of production will result in more solidarity in the production of wheat. In fact, cost price could be decreased with tax exemption and supporting producers, and prepare farmers for competition with foreign producers. On the other side, by holding training courses concerning modern agriculture and providing proper seeds, quality of products could be augmented. Privatization of wheat market has a number of privileges which we mentioned some:

- Increasing powers and authority of decision-making for farmers;
- Job creation;
- Emergence of cooperatives among farmers and their unity to provide more interest;
- To increase productivity and quality, cooperative companies will enhance their knowledge and use resources properly and correctly;
- Annual persistence of cultivating wheat by farmers who are member of these cooperatives, thus production process will be stabilized;
- Dynamism in free market;
- Increase in competition and improve quality.

Therefore, we should take steps toward privatization and liberate wheat market. However, we should pay attention to this point that it is preferred to conduct market to dynamism through setting appropriate policies instead of spending governmental energy and resources. For example, instead of specifying the price of wheat by the government, it is better to predict the price of wheat for the next year by comments and researchers of experienced economists and to announce a price less than this number as a guaranteed price.

By adopting such policy, both risks of farmers will be less for production and they do their best to sell their product in the free market with a price higher than the price of government. Benefitting the means such as taxation support and low-interest loans, the government can support production and keep the price of wheat low and make it competitive, then try to keep the price of bread stabilized.

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