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Studying the Competitiveness and Supporting Potential of Oil Seeds Production in Golestan Province (Case study: Soybean and Sunflower)

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ABSTRACT: The comparative advantage is a term used to represent the potential of a country in producing various products in comparison to global markets. Thus, the method of policy analysis matrix and index of domestic resource cost for calculating relative advantage of soy and sunflower products were used in this study. To study the support policies of the mentioned products the indices policy analysis matrix were also used. The study period was crop year of 2012-2013 and the study area was and cities in Golestan province. In this study, two-stage cluster method was used for the field and questionnaire studies. DRC index was calculated for irrigated soybean, irrigated sunflower and rain fed products was 0.25, 0.02 and 0.89, respectively which shows that the mentioned products had the comparative advantage of production. In addition, the results of calculated support indices indicated that domestic policies tended to support this study.

Keywords: comparative advantage, effective rate of protection, domestic resource cost, oil crop, Golestan

INTRODUCTION

Development and prosperity of rural areas and agriculture needs economic growth of agricultural sector and improvement of the industrial and service sectors. There are several strategies for development of the agricultural sector including increased investment, modifying local markets, agricultural integration in world trade, strengthening the participatory planning and implementation of cropping patterns in different geographical areas (Falahati, 2012). Some important reasons for this could be the role of agriculture sector in the economies of developing countries, the issue of food security, market assistance, raw materials, exchange factors, supporting the agricultural sector, non-commercial farmers, rural poverty, low level and efficiency and productivity and non-optimal allocation of production factors (Boshrabadi, 2004). Therefore, paying attention to this sector and supporting it against international competition in the world of free trade are the country's most important functions of authorities and researchers (Joolaie *et al*, 2011).

Agricultural policy consists of set of rules and regulations related to local agriculture, import and export of agricultural products. Governments through agricultural policy makers follow objectives such as ensuring the provision of specific products on the market, fixed prices, quantity and quality of production, land use and employment.

In recent years, the concept of joining the World Trade Organization had increased the importance of comparative advantage researches, so that these researches can indicate the future prospects and competitiveness of each product after joining the World Trade Organization and even entering into international markets. Several national and international studies have been done in this area. In a study titled evaluating the comparative advantage in production and export of saffron, Karbasi & Rastegarpour (2014) assessed the comparative advantage of saffron production in Torbat-e-Heydarieh. The results showed that Torbat-e-Heydarieh had a comparative advantage in saffron production. Mahmoudi (2014) evaluated and compared the exports competitiveness of raisins, comparative advantage and long-term export in Iran and other countries separately. The results showed that Iran had a comparative advantage in the export of raisins during the period of 1975-2008. Shokat Fadaei & Khaledi (2014) evaluated and compares the comparative advantage in Iran and other main exporters. The results indicated that Italy, Spain, Belgium, Thailand, the United States, Germany, Britain and Iran had no comparative advantage in almost all studied years.

Lakra (2014) in a study determined the comparative advantage in the export of major agricultural products in India.

The results showed that the comparative advantage of main agricultural exports to India had changed during the period after land reform compared to global trade. In addition, Peter Debaz (2014) in his article titled "the global economy: Is the water a source of comparative advantage?" found that water had a comparative advantage and countries with good water sources produce and supply products that need more water, which has a significant impact on the exports. M. Aref Shahinli (2014) calculated the competition and revealed comparative advantage in agriculture sector in Turkey in the global scope. The results indicated that competitive had been stronger and higher with RCA. Hence, the literature suggests that the comparative advantage depends on inventory resources and factors of production, method of production, technology development, human resource skills and efficiency of the inputs (Abedi *et al*, 2011).

Since exports and development of non-oil exports based on comparative advantage in the current situation is considered as fundamental problems in Iran, hence, according to the Ministry of Agriculture, the export development of oilseeds due to 40% increase in the area of cultivated oilseeds (the area under oilseeds cultivation was 80 thousand ha in 2011 which reached to 121 thousand ha in 2012 due to 40% increase) and also according to the theory of comparative advantage in the form of one of the most important theories of international trade are important. In this way, the cultivation of oilseeds is a necessity in the country. Because of weather conditions, Golestan province is given a special status in the production of agricultural products. In the context of a specific strategy relying on local resources, exports of agricultural products, this province can be considered to meet the currency needs regarding economic and political objectives. Among these products, oilseeds can be named. The top rank of cultivation and production of oilseeds in the country belong to Golestan province (Ministry of Agriculture, 2014). This theory represents that: a country has the ability of produce and export goods, which are obtained with relatively lower costs. Therefore, the aim of this study was to investigate the global market of oilseeds, using the practical methods as well as to assess and analyzes the comparative advantage of Golestan province in exporting agricultural crops (oilseeds) on the world market. For this purpose, this study was to evaluate the effect of support policies on soybean and sunflower. Given the fundamental and important role of soybean and sunflower in the agricultural sector and Iran's economy, evaluation and analysis of changes' trend and the effectiveness of support policies in relation to these products, according to the objectives and performance of economic development programs would provide valuable and useful information in agricultural development for policymakers and planners to achieve the objectives.

MATERIAL AND METHODS

In addition to estimate the relative advantage criteria, policy analysis matrix provides the analysis of adopted policies by the government. Similar to using comparative advantage indices, this method is also based on input-output coefficients of input and commodity prices with the difference that in this method the costs and revenue of market-place is calculated using the market prices and is compared to social costs and income that has been calculated through shadow price and hence the impact of government intervention on the shortcomings in the market for any activity, including the production of oil seeds would be shown (Monke & Pearson, 1989).Policy analysis matrix is basically a technique of double accounting that provides the budgeting information of farm and off-farm activities. This approach is resulted from topics of social cost-benefit analysis and the theory of international trade in the economy. The first row of the matrix contains the values of income (A), the cost of tradable inputs (B), the cost of non-tradable inputs (C) and profit (D), which is calculated per single product and on the basis of market prices. The second row of the matrix contains income (E), costs of tradable inputs (F), the cost of non-tradable inputs (G) and profit (H), which is calculated based on specific values and shadow prices. In other words, the second row presents the first line items calculated on the basis of shadow prices of non-tradable inputs and tradable inputs. The social benefit of each product (H) shows the power of producers' competitiveness in the international arena; domestic producers can compete in the international arena and profit when this amount is positive. Negative value of h indicates a lack of domestic producers' competitiveness in the international arena (Shujiyao, 1997). Third row values obtain from the differences of first and the second rows, which is used in policy analysis. Production factors are divided into two categories of tradable and non-tradable. Tradable inputs are inputs that have international market and are moveable such as pesticides, fertilizers and machinery. Non-tradable inputs are inputs that are not marketable internationally, such as land, water and labor (Karbasi, 2005). In order to calculate the relative advantages, data related to the shadow price of the product, tradable inputs, non-tradable inputs and shadow exchange rate are required to be calculated. Shadow price is the true value of a product or input under competitive conditions without the intervention of any factor or factors outside of market forces (Abedi *et al*, 2011).

Shadow price of tradable inputs

Shadow price of tradable inputs is the CIF price at the border of Iran plus all costs of transportation to the domestic market, and in fact it is a price at which the foreign suppliers deliver the inputs with this price on the domestic market (Nouri, 2002).

Shadow price of machinery

The cost of different machines results from employing a variety of tractors, sprayers, water pumps, combines and vehicles. Among the machines for the studied products, tractors are used more than others. Among used tractors in the province, MF285 model is used more that its price is declared based on the domestic approved price as well as the export price by the development of agricultural machinery service. Based on the equation (1), the shadow price to market price ratio of tractors is calculated, which the shadow price of these inputs can be obtained by multiplying this number to the machinery market cost (Karbasi, 2005).

Tractor price (Rials)/(exchange rate * tractor price (dollar))= shadow price to market price ratio …(1)

Shadow price of fertilizer

Chemical fertilizer is completely a tradable commodity. The amount of consumed fertilizer is provided by domestic production and imports. The shadow price of fertilizer is estimated by the following equation:

Total consumption of fertilizers/Σ (price of fertilizer I) (amount of fertilizer I) = shadow price of fertilizer …(2)

In the above equation, the price of fertilizer is based on imported fertilizer currency per kilogram (Karbasi, 2005).

Shadow price of pesticides

The most important pesticides used for crops are herbicides, fungicides and insecticides. To calculate the price of pesticides the following equation is used:

Total use of poison/Σ (price of pesticide I) (amount of pesticide I) = shadow price of pesticide …(3)

Pesticides price is the currency price of imported pesticide per kilogram (Karbasi, 2005).

Revenue in terms of shadow prices

To obtain the shadow per hectare, the dollar value of one kilogram product in the global market is multiplied by the shadow exchange rate to achieve a kilogram export price in Rials. Then, the yield in kilogram is multiplied by the price in Rials to obtain shadow income for the product per hectare (Karbasi, 2005).

Shadow price of domestic resource

Given that the services provided by domestic factors of production such as labor, capital and land do not have a global price and they have domestic markets, thus their social values is obtained by estimating lost revenue due to the non-use of best alternatives (Karbasi, 2005).

Shadow price of labor

In this study, given that the price of labor is determined in the competitive market and the government does not interfere in this market, its shadow price equals to the market price (Mahmoudi, 2014).

Shadow price of land

In this study, since similar to labor price, government does not interfere in the market, the market price can be used to calculate the shadow price of land (Mahmoudi, 2014).

Shadow price of water

In the present study, due to the water shortages in the province, the cost of the most expensive water sourceis considered as a shadow price (Karbasi, 2005).

Shadow exchange rate

The theory of purchasing power parity in both absolute and relative state can be used to calculate the shadow exchange rate. The shadow exchange rate is obtained by the following equation using the absolute purchasing power parity method (Nouri, 2002):

$$E = \frac{P_{IG}}{P_{WG}} \quad \ldots(4)$$

Where is the price of an ounce of gold in the domestic market in Rials and is the price of an ounce of gold on the world market in dollar. Using the relative purchasing power parity exchange rates, shadow exchange rate is obtained by the following equation (Karbasi, 2005).

$$E = \frac{P_I}{P_I^*} \cdot E^* \quad \ldots(5)$$

In equation (5) the domestic price index divided by foreign price index and multiplied by the exchange rate in origin year. Because Iran's and America's consumer goods basket are not the same that distorts the calculation of shadow exchange rates therefore, in this study two other alternatives (a 5% increase and decrease in value of the shadow exchange rates calculation) were also used when the official exchange rate had been used (Rezaie & Tarshizi, 2009). The absolute shadow exchange rate was used in this study.

Introducing support policy analysis indices

Nominal Protection Coefficient on Outputs (NPCO).

The index is achieved from the ratio of market revenue to shadow revenue.

$$NPCO = \frac{A}{E} \quad \ldots(6)$$

If NPCO is greater than one, the market price is more than the shadow price and production system is supported and indirect subsidies is given to producers. If this amount is less than one, an indirect tax is imposed on producers and no support of production systems and market is given (Sagheb, 2005).

Nominal Protection Coefficient on Input (NPCI)

NPCI suggests how to support tradable inputs. If the market price of inputs is less than the shadow price, market inputs would support in favor of consumers' (producers') organizations (Sagheb, 2005).

$$NPCI = \frac{B}{F} \quad \ldots(7)$$

If NPCI is greater than one, the producer pays indirect taxes; and if NPCI is smaller than one, producers are given indirect subsidies for implementation of tradable inputs (Sagheb, 2005).

Effective Protection Coefficient (EPC). This criterion shows the value-added of production in terms of market prices to value-added production in terms of shadow price. In other words, EPC indicates effects of government intervention in the inputs market and products market simultaneously (Sagheb, 2005).

$$EPC = \frac{A-B}{E-F} \quad \ldots(8)$$

EPC greater than one indicates the total effects of government intervention in the product market and input market in favor of producers and EPC less than one indicates the intervention effects to the detriment of producers.

Domestic Resource Cost (DRC). DRC expresses that how much domestic resources based on shadow prices should be consumed to obtain or save a single currency by the non-arrival of goods. In other words, the production of goods within the country is effective or lower cost is imposed by importing goods into the country (Sagheb, 2005).

$$DRC = \frac{G}{E-F} \quad \ldots(9)$$

In this study, to measure the supportive indices, information on the cost of oilseeds production (soybean and sunflower) in Golestan province during crop year of 2012-2013 was used.

RESULTS AND DISCUSSION

1. Shadow price currency

In this study, information on domestic and global price of one ounce of gold and the official exchange rate of the Central Bank of the Islamic Republic of Iran were received.

According to the above information and equation 53(4) shadow exchange rate in 2012 was estimated at 25777/2 Rials.

2. Shadow price of machinery

The market cost for machinery in different stages for one hectare farm in 2012 was 2100 thousand Rials, according to data from the Agriculture Organization of Golestan province. Among used tractors in the province, MF285 model is used more that its price based on the export price declared by the development of agricultural machinery service was 76 million Rials and between22500 to 22800thousand dollars. The export price depends on the destination country as well. The exchange rate of 1226 Tomans, which was declared by agricultural machinery service, the average price in Rials of MF285 tractor is approximately 27 million Tomans. Furthermore, on the basis of equation (1) the ratio of the shadow price to market price for the tractor was 3/6. Shadow price for machinery is 7723800 thousand Rials per ha.

3. Shadow price of labor

The highest wage for agricultural workers in the province is related to the land preparation stage, which is 294/420 thousand Rials per day of work.

4. Shadow price of water

Since the water in Iran has no competitive market and it is not sold in terms of volume, there is no exact price for the unit price of water, which makes it difficult to calculate the shadow price of water. In this study, due to the water shortages in the province, the cost of the most expensive water source, water of semi-deep wells, is considered as a shadow price (Karbasi, 2005).

5. Shadow price of land

To calculate the shadow price of land or opportunity cost, it is best to calculate its rent that in the absence of crop planting by farmers; it would be given to others or conversely, a farmer with a target price can rent it that in most researches about a of harvested product quarter is considered. In this study, since similar to labor price, government does not interfere in the market, the market price can be used to calculate the shadow price of land (Mahmudi, 2013).

6. Shadow price of fertilizer

Chemical fertilizer is completely a tradable commodity. The amount of consumed fertilizer is provided by domestic production and imports. Based on the equation (2) shadow price of fertilizer in the crop year of 2012-2013 for irrigated sun flower, rainfed sunflower and irrigated soybean was 71691/34, 59283/98and 53955/63Rials per ha, respectively.

7. Shadow price of pesticides

The most important pesticides used for crops are herbicides, fungicides and insecticides. Mean shadow price of pesticides for sunflower and soybean was 35493/38Rials per ha in the crop year of 2012-2013.

8. Revenue in terms of shadow prices

The dollar value of one kilogram of soybean and sunflower in the world market was 0/58and 0.97dollars in 2012. Multiplying this amount by shadow exchange rate (25772/72Rials), the price of one kilogram of soybean and sunflower product export was obtained 15028 and 25237Rials, respectively. According to the average yield of soybean and sunflower, 1211/32 and 404/45 kg per ha respectively, shadow income of soybean and sunflower per ha was 34124/821 and 45577/260 thousand Rail in the province, respectively.

Calculating policy analysis matrix

The results of policy analysis matrix for one ha of irrigated soybean in Golestan province in 2012 are presented in Table 1.

Table 1: Policy analysis matrix of irrigated soybean per ha in Golestan province (million rials).

Income	Production costs		Interest	
	Tradable	Non-tradable		
2/9	2/2	6/7	20/2	Market prices
3/4	7/8	6/7	1/9	Shadowprice
-4/9	-5/6	-24560	0/73	Difference

Results of Table 1 shows that the deviation rate of production costs, which indicates the amount of indirect incoming from government, is 6/5 million Rial per ha and the negative shows that farmers benefited indirect subsidies granted by the government to compensate production costs in 2012. Increased support made by the government to compensate the cost of production had resulted in increased income of market. Effects of imposed polices on income explain that producers did not benefit from government support policies and paid 4/9 million Rials indirect taxes per ha. In parallel with this increase in the amount of income as well as support from the government, market profits had positive growth. Market profits of 20/2 million per ha suggests that government interventions in the production process had positive and constructive role and producers benefited the supportive government policies. Positive social benefit also emphasizes this issue that producers can compete in the international market and have a comparative advantage in the production. The net effect of the policy for one hectare of irrigated soybean in Golestan province in 2012 was positive, which shows that producers had gained more market benefit than social benefit for the production of a single product; it means that government intervention is justified and farmers had profited from policies imposed by the government in the production process and they had better conditions than that when they used inputs and capital on the open market for production. In addition, results of policy analysis matrix for irrigated sunflower per ha in 2012 is presented in Table 2.

Table 2: Policy analysis matrix for irrigated sunflower per ha in Golestan province (million rials).

Income	Production costs		Interest	
	Tradable	Non-tradable		
2/19	2/1	1/08	18/6	Market prices
4/5	7/8	1/08	36/6	Shadow price
-2/3	-5/6	0	-17/9	Difference

The results of cost differences between domestic inputs per market and shadow prices to produce one unit sunflower showed that farmers did not receive any subsidies from the government and did not pay any taxes in 2012 for the production of irrigated sunflower. However, the total cost of production one unit product indicated that producers received indirect subsidies equal to 5/6million Rials per hectare from the government and with the support by the government, they bought tradable inputs at prices cheaper than the global prices. On the other hand, by increasing the yield rate of 48/2% and raising the guaranteed price by the government, a significant increase in shadow revenue of irrigated sunflower production have been obtained. With regard to effects of imposed polices by the government on income, profit deviation results suggest that government supports and intervention in the process of irrigated sunflower production in 2012 was not economically justified was and had been detriment to farmers and producer could make more profit in the free market. In addition, Table 3 shows the policy analysis matrix calculations for one hectare of rainfed sunflower in crop year of 2012-2013.

Table 3: Policy analysis matrix for one hectare of rainfeds unflower in Golestan province (million rials).

Income	Production costs		Interest	
	Tradable	Non-tradable		
3/3	2/05	2/5	-1/2	Market prices
10/2	7/3	2/5	0/31	Shadowprice
-6/8	-5/2	0	-1/56	Difference

Producers did not receive any governmental facilities nor paid the tax for domestic inputs during the studied crop year. But producers received 5/2 million Rialin direct subsidies per ha to compensate the cost of production and had benefited from government support. In the first row of the matrix PAM and according to the calculated market profit that represents obtained profits in the domestic market and under the government control, it is clear that producers had very low yields even in normal circumstances and government intervention in production made the conditions worse and caused more loss. Social benefit in 2012-2013 revealed that the manufacturing system was efficient and continuing its activities would contribute positively to the national income and has competitiveness potential in the international arena. The effect of applying the policy on the producers' income, which was obtained from market income subtracting shadow income, showed that supportive policies and interventions by the government did not help the manufacturing sector and farmers had witnessed the negative impact of supportive policies by paying 8/6 million Rials per ha. In general, by studying the net effect of the policy on production process of rainfed sunflower in 2012 we can conclude that producers were more competitive in the free market and the support and interventions made in the production process by the government caused losses.

According to Table 4 which shows the results of supportive polices for the two chosen oilseeds products in Golestan, i.e. sunflower and soybean, the policies imposed by the government on the process of growing the two crops in 2012-2013 have been compares, reviewed and analyzed.

Table 4: Results of supportive indices of oilseeds (sunflower and soybeans).

Supporting product			**Supporting input**			**Effective protection**			**Year**	**Products**
NPCO	**NPR**	**Results**	**NPCI**	**NPIR**	**Results**	**EPC**	**EPR**	**Results**		
0/48	-0/52	Tax	0/27	73%	subsidies	0/52	-0/48	Tax	91	**Irrigated sunflower**
0/33	0/67-	Tax	0/28	72%	subsidies	0/46	-0/54	Tax	91	**Rainfed sunflower**
0/85	-0/15	Tax	0/28	72%	subsidies	1/02	0/02	Subsidy	91	**Irrigated soybeans**

Based on the results, the rate of government support for irrigated sunflower and product market in 2012 is equivalent to 0/48; this means that if a farmer earns 100 Rials in free markets, he would have revenue of 48 Rials with the support of government and the rest of it is cut by the government as a tax deduction.

Effective protection index for irrigated sunflower in Golestan province indicates the lack of government support in production of this product. In other words, a tax that the government has imposed indirectly on irrigated sunflower is more than the subsidies paid to purchase production inputs. This means that for every 100 Rials of added-value in free trade, the added-value was 52 Rials in 2012 in terms of government intervention and domestic markets.

The tax on rainfed sunflower is so high that makes received subsidies ineffective to purchase inputs and all that support demonstrates the lack of government support for the product. The main reason to apply these policies is the significant decline in the performance of this product.

According to Table 4, the government took 28Rials from producers for a cost of 100Rialsof buying tradable inputs from global markets to cultivate one hectare of irrigated soybeans and the remaining costs were compensated by subsidies. The lowest support rate in2012 was related to irrigated soybeans, equivalent to0/02. This means that for every 100 Rials of added value on the open market, an added value of 102 Rials was obtained in the domestic market. Table 5 shows the information on profitability and comparative advantage of two important oilseeds products (sunflower and soybeans) in Golestan province.

Table 5: Results of comparative advantage and profitability indices for oilseeds.

Domestic Resource Cost			**Market profitability**			**Social profitability**			**Products**
DRC	**Comparative advantage**	**rank**	**Rials/ha**	**Profit/loss**	**Rank**	**Rials/ha**	**rank**	**Profit/loss**	
0/02	OK	1	18688822	interest	2	36634592	1	interest	Irrigated sunflower
0/89	OK	3	-1253640	loss	3	314997	3	interest	Rainfed sunflower
0/25	OK	2	20225858	interest	1	19487660	2	interest	Irrigated soybeans

In the crop year of 2012-2013 in Golestan province, irrigated sunflower and irrigated soybean were placed in the first and second ranks respectively, in terms of having a comparative advantage according to the DRC index. Generally, the indices of relative advantage indicate that irrigated and rainfed sunflower and irrigated soybean had a comparative advantage in Golestan province.

CONCLUSION AND SUGGESTIONS

In general, according to the supportive coefficients in Golestan province in 2012-2013, it can be said that government supports for inputs involved in the production of sunflower and soybeans and their product market had an important role; in other words, the government interfered in the production and the effects of this intervention on these inputs market showed receiving indirect subsidies from producers. Among the studied products, irrigated Sunflower was placed in the first place in the ranking of comparative advantage in 2012.

Based on the results it can be suggested that given that the province ranks first in the production of oil seeds among other producing provinces, thus it has a comparative advantage in the production of soybean and sunflower and to maintain this advantage, it had increased the revenue per unit area using high yielding varieties adapted to local culture, while reducing the cost of domestic factors, which helped the sustainability of this advantage in the fertile northern provinces. Policies should be such that to move towards more self-sufficiency in the production of crude oil from cultivated oilseeds in the country. Considering the role of government in the process of production that had led to the high imposition of implicit subsidies on production, it is necessary to support the possible projects of production of other oilseeds in Golestan province. Therefore, further researches are suggested in order to develop a comprehensive program of oil seeds cultivation and in addition to considering the results of the comparative advantages and effects of the policy, attention should also be paid on other items such as technical culture information, supply sources of production, employment and profitability.

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