Citation:
Studying the Effect of Protective Policies of the Government in the Agriculture Sector of Khuzestan Province by Using of the Policy Analysis Matrix

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ABSTRACT

Khuzestan province due to have the favorable conditions of agriculture such as water, fertile land, human force,... is accounted as one of the most important agriculture pivots of the country in a manner that this province in terms of the area under cultivation and production of agricultural outputs is accounted from the superior provinces of the country. In this study, by using of the policy analysis matrix, the policies of our planners about ten agricultural outputs including wheat and barley produced by irrigation and dry farming, maize produced by irrigation, watermelon, cucumber, potato, onion and tomato produced by irrigation farming in Khuzestan province are analyzed. The results of this research indicate that in the intended agricultural year, the producers of all ten outputs have profited in the current conditions of domestic market, while in the conditions of free commerce and without intervention of government, only watermelon, cucumber, potato, onion and tomato produced by irrigation will profit. Also, both groups of production inputs (domestic and interchangeable inputs) have had the government's subsidy which indicates the government's protection from production inputs. According to the index of nominal protection coefficient on output which is gained from the policy analysis matrix, the government has protected from the sale market of the outputs including wheat and barley produced by irrigation and dry farming and maize produced by irrigation, indirect subsidy has accrued to the producers of these outputs; about other outputs, indirect tax has been imposed on producer. The results of the indexes of domestic sources cost and social net profitability indicate that only the outputs including watermelon, cucumber, potato, onion and tomato produced by irrigation have relative advantage in production and the production of them should be in priority.

Keywords: policy analysis matrix, protective policies of the government, Khuzestan province, Domestic Resources Cost

Introduction

In production of agricultural outputs, in addition to the mutual effects existing between the factors related to the plant, soil and environment, the social-economic factors such as proper liquidity, accessibility and low price of necessary inputs also play an important role. Marketing is accounted as an important sector in production of agricultural outputs. It is necessary to be mentioned that accessibility of farmers to the markets and reasonable prices should be possible easily. Despite of existence of severe erosion in the soil and increase of the problematic soils level (brackish, alkali and acidic soils), the quality and quantity of the prone soil sources for supplying the foodstuffs needed for human and other creatures are important. Anyway, imbalance in distribution of foodstuffs and injustice of it threat the food security in Asia, Africa and Latin
America. Today's world is the economic competition world and any country for retaining its supremacy and independency has to be precise in designing its economic policies. Nowadays, in our country, there are protective policies of government in agriculture sector like other economic sectors of the country that cognition of these policies and their effect on production of agricultural outputs are very important, in a manner that the ability of the country or a region in production of agricultural outputs with low cost of production, profitability and competitiveness with other outputs in the event of elimination of subsidies can be identified.

A review on the works done

The researches done out of the country

The research about relative advantage of production of coffee in Africa has been done among African countries which export coffee, in 1974 by Pearson, Scott and Meyer, Ronald and it has studied the relative advantage of production of coffee in these countries. The results of this research indicate that the countries of Ethiopia, Uganda and Tanzania have relative advantage in production of coffee, while the country of Ivory Coast doesn’t have relative advantage in production of coffee and this is due to the high cost of domestic factors (Pearson, Scott, 1992). Zhong and Xu have measured the relative advantage of China regions in production of the main cereals including rice, wheat, maize and soybean and they have indicated that in most of the regions in China, production of soybean has relative advantage and also the relative advantages of the main cereals in different regions of China have significant difference with each other. Finally, these two persons expressed implicitly that there is a potential capacity for allocation of sources and increase of production of cereals through reconstruction of cereals sector (Zhong and Xu, 2000). Gonzales, Leonawdo in 1993 with a number of his colleagues studied the relative advantage of five main agricultural outputs of Indonesia including: rice, maize, soybean, sugar and wheat. In this research, three indexes of relative advantage namely Domestic Resources Cost (DRC), Net Social Profitability (NSP) and Effective Protection Rate (EPR) have been used. The results of this research indicate that production of soybean inside the country is costly and abundant protections from this output are done by the government. About the rice input, it should be said that due to the advanced technology about this output, production of this product inside Indonesia country has relative advantage. Also, in comparison between two outputs of rice and maize, it should be said that maize as an output for exports has higher potential than rice (Leonawdo, 1993). In another research, Mohanty and Fang have studied the competitive conditions in production of three outputs of cotton-wool, cane-sugar and earthenut by using of the Policy Analysis Matrix (PAM). The results of this research indicate that cotton-wool isn’t produced efficiently in Maharashtra as the second producer province of India and cane-sugar and earthenut have a higher relative advantage (Mohanty and Fang, 2002). Mann and Khawha in 1999 studied the relative advantage of agricultural outputs of Pakistan by using of the index of Domestic Resources Cost (DRC). The results of this research indicate that cotton-wool is the most profitable international commercial output for Pakistan country and after it, the oily seeds are in the second place. Among all outputs, cane-sugar is the only output which doesn’t have relative advantage and DRC gained for it is larger than the unit. Also, the coefficients gained for DRC indicate that an important factor which is effective in determining DRC, is the distance of
McIntire and Delgado, Christopher in 1985 have studied the relative advantage of agricultural outputs in two countries of Burkina Faso and Nigeria with three indexes of Domestic Resources Cost (DRC), Effective Protection Rate (EPR) and Net Social Profitability (NSP). The results of this research in Burkina Faso indicate that the gained DRC is less than the unit only for the maize output and for other outputs of this country, it is larger than the unit which indicates lack of existence of relative advantage in the main agricultural outputs of this country. While most of the people of this country subsist through farming. Also, the results of this country in Nigeria country indicate that DRC gained for all agricultural outputs of Nigeria country is smaller than one which indicates the existence of relative advantage in production of agricultural outputs in this country (McIntire and Christopher, 1985). Herdt and Lakzin in 1976 studied the relative advantage of production of rice in Philippine country by using of the index of Domestic Resources Cost (DRC). The results of this research indicate that the gained DRC is smaller than the unit which expresses the existence of the relative advantage in production of this output in Philippine country. This research caused to increase the production of rice output in Philippine country quickly (Herdt and Lakzin, 1976).

**The researches done inside the country**

Musanezhad in 1996 used of the index of Domestic Resources Cost (DRC) for deciding in the policy of encouraging the agricultural outputs export. The formula used in the intended research is in the following form:

\[
\text{DRC} = \frac{C - e c_i}{e P_w - e c_i}
\]

C: Production cost, e: Foreign currency rate, c;: The interchangeable inputs cost

Pw: The price on the boundary (Cost Insurance and Freight (CIF) and/or Free On Board (FOB)).

In order to calculate DRC, he has used of the shade prices. He divided the production inputs into two groups of interchangeable and domestic inputs. In the intended research, for calculation of the shade price of land in agricultural activities, the best alternative, namely the outputs which are directly in competition with intended output, were used and about the shade price of water, the costs of extraction and protection of its delivery system have been used. About work force, the highest wage to the laborers of agriculture sector was used. To estimate the shade rate of foreign currency, the theories of purchase power equality were used. Julaie in 1997 by using of the method of policy analysis matrix studied the relative advantage of citrus fruits in Jahrom Township. In this research, in order to estimate the shade rate of foreign currency, the real foreign currency rate which had been estimated in 1995 by Dr. Musanezhad, was used and adjusted. And, in order to determine the shade price of interchangeable inputs, their CIF price was used. To determine the shade price of produced outputs including orange, tangerine and sweet lemon, their export FOB price was used. A point which is seen in this research than other researches, includes this issue that for determining the shade price of domestic inputs including land, laborer and water, the production function of citrus fruits was estimated and the final value of production for per hectare of land, laborer and water was applied in calculations as the shade prices. The results of the policy analysis matrix indicated that production of citrus fruits in Jahrom Township has relative advantage. In the meantime, the government has protected from the commercial inputs and paid subsidy to them (Julaie, 1997). Mohammadi in 2003 studied the relative advantage of oily seeds including canola, sunflower, sesame and rose-colored in Fars province. In this research,
he has utilized of two kinds of relative advantage index; according to the indexes of first kind which have included the index of domestic resources cost, social net benefit, canola, sunflower and sesame have relative advantage in production. But, according to the indexes of the second kind which have included the indexes of efficiency advantage, scale advantage, only the canola output has relative advantage in production (Mohammadi, 2003). Jafari in 2000 has studied the relative advantage of gardening activities of Hamedan province. In this research, he has used of two indexes of DRC and SCB (Social Cost Benefit). The research results indicate that the indexes of DRC and SCB present different ranking of relative advantage of garden outputs and the index of SCB in total, indicates less relative advantage in comparison with DRC. Comparison of the relative advantage of outputs, under inter-area commercial regimes and exports encouragement expresses this issue that in the conditions of inter-area commercial regime, all outputs have relative advantage that in the conditions of export encouragement, the advantages are reduced and even some products don’t have relative advantage (Jafari, 2000). Sadrolashrafi and Vakilpur in 2000 studied the domestic resources cost and calculated the relative advantage of citrus fruits production in Hormozgan province by using of the input-output tables and meantime calculation of the costs according to the market and shade prices, indicated that Hormozgan province in production of citrus fruits has relative advantage in all three scenarios of foreign currency rate namely free-floating, exports and free market (Sadrolashrafi and Vakilpur, 2000). Niamanesh in 1995 formed the policy analysis matrix for the apple output in western Azerbaijan Province. In this research, two methods were used for calculation of the domestic Resources Cost (DRC). In the first method, he studied all costs of apple production and one-twentieth of the cost of apple garden construction and gained the amount of DRC equal to 0.14. In the second method, with considering all costs and the cost of garden construction, he gained the amount of DRC equal to 0.36 and according to these two methods, he indicated that the western Azerbaijan Province has very high relative advantage in production of apple (Niamanesh, 1995).

Methodology

The method of Policy Analysis Matrix (PAM) is used for more than three decades and for the first time, it was proposed in 1981 by the researchers of Arizona and Stanford University for studying the agricultural policies and then, it was presented in 1991 by Nelson and Panggabean. This method in addition to calculate the relative advantage, evaluates the government's policies about special section or output too. Other researchers such as Shujie Uao by adjustment in the policy analysis matrix have made it more complete that the structure of this matrix is in the following form:

<table>
<thead>
<tr>
<th>Income</th>
<th>Costs</th>
<th>Profit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interchangeable inputs</td>
<td>Domestic inputs</td>
</tr>
<tr>
<td>The market price</td>
<td>$A_i$</td>
<td>$B_{ij}$</td>
</tr>
<tr>
<td>The shade price</td>
<td>$E_i$</td>
<td>$F_{ij}$</td>
</tr>
<tr>
<td>The amount of deviation</td>
<td>$I_i$</td>
<td>$J_{ij}$</td>
</tr>
</tbody>
</table>

This matrix has two profit factorizations and different effects. Profit is extracted from the subtraction of income and cost according to the market and shade prices and the difference effects, the existing situation of income estimators, cost and profit are gained from their non-
disordered amounts (shade). Parameter D is equal to A-(B+C) which expresses the market profit. If D (market profit) is positive, in the conditions of government interference, there will be market profit for producer and the producer with increase of production can increase his profit. But, in the conditions that D is negative, the production will have less efficiency to the normal conditions and in this state, the interference of government will be finished on detriment of producer. Parameter H is equal to E-(F+G) which expresses the shade profit. About the shade profit (H), it can be also said that if the amount of this profit is positive, production of outputs will have relative advantage and the activity in the conditions of free commerce will be profitable for producer; otherwise (H<0), production doesn’t have efficiency and the activity in the state of free commerce will be on detriment of producer. Parameter I indicates the difference between the market income and shade income resulted from production of outputs: I=A-E, therefore, if I>0, the market price of the output will be more than its shade price and in this event, indirect subsidy will be paid to the domestic producers of outputs and if I<0, the market price of the output will be less than its shade price and therefore, the implicit tax has been imposed on domestic producers. If I=0, it will mean that we are in the head to head point and no tax policy (negative and positive) is exerted. Parameter J indicates the difference of the interchangeable inputs costs in production of output according to the market and shade prices:

\[ J = B - F \]

Therefore, if J>0, the domestic producers will buy these inputs more expensive than the world prices and in fact, they will pay a kind of indirect tax and if J<0, it will mean that the domestic producers buy the interchangeable inputs lower than the world price and therefore, they receive subsidy. Also, if J=0, there will be (head to head) balance state and the producers are included in no kind of subsidy and/or tax. Parameter K indicates the difference between the domestic inputs costs in production of output according to the market and shade prices:

\[ K = C - G \]

If K>0, it will mean that the implicit and indirect tax has been ordained on domestic inputs. If K<0, it will mean that the indirect subsidy has accrued on domestic inputs. And in the event that K=0, the producers will be included in no kind of subsidy and/or tax. Therefore, with regard to the explanations mentioned formerly, it can be said that the effect of protective and non-protective policies of government in production of different outputs will be in the form of one of the following states:

\[ L = D - H \]

- **L>0:** In this state, for production of output, the market profit will be more than the shade profit; namely, the producer in those conditions that government with its policies interferes in production of outputs, gains more profit than the state of free commerce (or it is incurred by less loss) and therefore, the interference-oriented policies of the government are justifiable and they are on the favor of production of output.
- **L<0:** In this state, the shade profit is more than the market profit; therefore, the interference of government is finished on detriment of producer; because, in the conditions of free commerce (lack of deviations), more profit is accrued on producer.
- **L=0:** It is a head to head point and therefore, interference and/or lack of interference of government has no effect on the situation of producer.
In addition to the above interpretations, other indexes are also resulted from the policy analysis matrix which consist of:

**The index of Domestic Resources Cost (DRC)**
The index of DRC can be gained according to the policy analysis matrix from the following relation:

\[ DRC = \frac{G}{E - F} \]

If DRC<1, it will express that there is relative advantage in production of output.
If DRC>1, it will express that there is not relative advantage in production of output.
If DRC=1, it will indicate that producer is in the head to head point, in this state, production of output inside the country and/or import of it from abroad depends on the decision of planners and policy-makers.

**Nominal Protection Coefficient on Outputs (NPCO)**
NPCO can be gained by using of the policy analysis matrix:

\[ NPCO = \frac{A}{E} \]

NPCO>1 expresses this issue that domestic (market) price has been more than the import or export prices, the output production system has been protected and indirect subsidy accrues to the producer; if NPCO<1, the market price will be less than the world price and in fact, indirect tax is imposed on producer, in the event that NPCO=1, the production system will not have protective policies.

**Nominal Protection Coefficient on Inputs (NPCI)**
The mathematical relation for calculation of NPCI in the frame of matrix PAM is in this form:

\[ NPCI = \frac{B}{F} \]

If NPCI>1, the cost of interchangeable inputs with market price will be more than their cost with shade price. In this state, the producer pays indirect tax and if NPCI<1, it will mean that the indirect subsidy will accrue to the producer in applying commercial inputs. If NPCI=1, it will indicate lack of adopting any kind of protective policy in using of commercial inputs.

**Effective Protection Coefficient (EPC)**
This relation indicates the effects of government interference in the input and output markets simultaneously and in the frame of matrix PAM, it is calculated in the following form:

\[ EPC = \frac{A - B}{E - F} \]

If EPC>1, it will indicate the government's protection from the output production process; if EPC<1, it will indicate lack of government's protection in the output production process and if EPC=1, lack of adopting proper system for output production will be intended.

**Net Social Profitability (NSP)**
The profit resulted from production according to the shade prices by using of criterion NSP indicates that its mathematical relation is in the following form:
NSP = E – F – G
If NSP > 0, there will be relative advantage in production of output; if NSP < 0, it will indicate lack of existence of relative advantage in production of output and in fact, in the recent state, the productive activity will not have social profitability; namely, production and exports aren’t profitable (Pearson and et al, 2003).

The indexes resulted from policy analysis matrix
After calculation of the policy analysis matrix for each one of the above agricultural outputs for Khuzestan Province, in order to confirm the results gained from the policy analysis matrixes, other indexes have been extracted from it which have been presented for all outputs in the frame of table 2. One of the most important indexes is the index of Domestic Resources Cost (DRC), this index indicates that in the intended agricultural year in Khuzestan province, some outputs such as watermelon, cucumber, potato, onion and tomato produced by irrigation have relative advantage, the index of Net Social Profitability (NSP) has been also positive about these outputs and it expresses the existence of relative advantage in them. Among these outputs, tomato produced by irrigation has the most relative advantage, watermelon, cucumber, onion and tomato in order have the next ranks. Other outputs including wheat, barley and maize produced by irrigation and wheat and barley produced by dry-farming due to have the index of Domestic Resources Cost (DRC) larger than the unit and negative Net Social Profitability (NSP) don’t have relative advantage and social profitability. To study the situation of government's protection from import inputs, the results of the index of Nominal Protection Coefficient on Inputs (NPCI) can be used. The Nominal Protection Coefficient on Input is less than the unit for all agricultural outputs of Khuzestan Province which indicates payment of indirect subsidy by government to these inputs in order to protect from production of agricultural outputs. The index NPCO indicates the situation of government interference in the output market, unlike the input market, in the intended agricultural year for output market, the protections haven’t been the same. The index results express that the market of outputs like wheat, barley and maize produced by irrigation and wheat and barley produced by dry-farming has been protected and indirect subsidy accrues to the producers of these outputs. But, the market of some outputs like watermelon, cucumber, onion and tomato produced by irrigation hasn’t been protected and indirect tax accrues to the producers of these outputs. The intended index for potato output is about the unit which expresses that the production system hasn’t had the protective policies.

<table>
<thead>
<tr>
<th>The name of the output</th>
<th>DRC</th>
<th>NPCO</th>
<th>NPCI</th>
<th>EPC</th>
<th>NSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat produced by irrigation</td>
<td>1.73</td>
<td>2.23</td>
<td>0.7</td>
<td>2.61</td>
<td>-115611</td>
</tr>
<tr>
<td>Wheat produced by dry-farming</td>
<td>1.68</td>
<td>2.19</td>
<td>0.68</td>
<td>2.55</td>
<td>-42958</td>
</tr>
<tr>
<td>Barley produced by irrigation</td>
<td>2.1</td>
<td>1.9</td>
<td>0.65</td>
<td>2.3</td>
<td>88651</td>
</tr>
<tr>
<td>Barley produced by dry-farming</td>
<td>2.02</td>
<td>1.82</td>
<td>0.69</td>
<td>2.08</td>
<td>-49456</td>
</tr>
<tr>
<td>Maize produced by irrigation</td>
<td>1.16</td>
<td>2.07</td>
<td>0.84</td>
<td>2.53</td>
<td>-40856</td>
</tr>
<tr>
<td>Watermelon produced by irrigation</td>
<td>0.14</td>
<td>0.55</td>
<td>0.75</td>
<td>0.55</td>
<td>2681489</td>
</tr>
<tr>
<td>Cucumber produced by irrigation</td>
<td>0.18</td>
<td>0.27</td>
<td>0.76</td>
<td>0.26</td>
<td>3697302</td>
</tr>
<tr>
<td>Potato produced by irrigation</td>
<td>0.79</td>
<td>1.01</td>
<td>0.85</td>
<td>1.02</td>
<td>306473</td>
</tr>
<tr>
<td>Onion produced by irrigation</td>
<td>0.79</td>
<td>1.01</td>
<td>0.85</td>
<td>1.02</td>
<td>306473</td>
</tr>
<tr>
<td>Tomato produced by irrigation</td>
<td>0.09</td>
<td>0.2</td>
<td>0.84</td>
<td>0.19</td>
<td>9528187</td>
</tr>
</tbody>
</table>

Reference: The research calculations
The Effective Protection Coefficient (EPC) indicates the effects of government interferences in the input and output markets simultaneously. According to the table No. (4-1) in the intended agricultural year, the amounts of mentioned index for the outputs including wheat, barley and maize produced by irrigation and wheat, barley produced by dry-farming are larger than the unit which indicate the government's protection from the production process of these outputs. The amount of this index for the output of potato produced by irrigation is about the unit which indicates lack of adopting proper policy for production of this output. Other outputs including watermelon, cucumber, onion and tomato produced by irrigation have the Effective Protection Coefficient (EPC) smaller than the unit which indicates lack of government's protection in the production process of these outputs and causes the loss of production of these outputs due to the interferences of government.

Suggestions

- Development and expansion of the area under cultivation for the outputs which have relative advantage of production and exports should be in priority.
- Reduction of the cultivation model of outputs out of competition range (DRC>1) and at least, increase of performance and reduction of the cost of domestic and outsider inputs of these outputs in order to improve the index DRC should be in the agenda.
- Since, generally the outputs produced by dry-farming with high DRCs don’t have relative advantage, the importance of investment in the resources with stability of water and development of the model of cultivation by irrigation is manifested more than before.
- Since, the amounts gained from the index NPCI indicates the government's protection from the import inputs market, it should be attempted that the range of this protection with the aim of non-oil exports to be expanded purposefully.
- With regard to the main share of the cost of domestic non-interchangeable resources in total production costs, especially the cost of work force, land and water, it should be attempted that in policy-making, increase of utilization of these inputs in order to reduce and improve the index DRC to be in the priority.
- The marketing issues of outputs with relative advantage should be considered diligently by governmental and non-governmental related organizations.

References

Eslami, S, 2003, studying the manner of improvement of subsidies in the country, ministry of economy and asset affairs, mutual assistance of economic affairs.
Jafari, A, 2000, studying the relative advantage of gardening activities (domestic resources cost and ratio of cost-social benefit), the articles set of third conference of agricultural economy, Ferdousi University, Mashhad.
Julaie, R, 1997, studying the relative advantage of citrus fruits production in Fars Province (Jahrom Township), MSc thesis, Tarbiat Modarres University, Faculty of Agriculture.
Dehghani, A, 2003, studying the relative advantages of selected agricultural products, the institute of researches of planning and agricultural economy, management of process affairs and investigative findings.
Roohbakhsh Amoli Moghadam, H, 1998, studying the relative advantage of machinery carpet exports in Khorasan Province, MSc thesis, Ferdousi University, Mashhad, Faculty of economic sciences.
Razmi, MN, 2005, studying the protective and commercial policies of government in agricultural products of Fars Province by using of the policy analysis matrix, MSc thesis, Shahid Chamran University, Ahvaz.
The statistical yearbook of Iran's customs duties.
Sadrolashrafi, M; Vakilpur, M, 2000, studying the domestic resources cost and calculating the relative advantage of citrus fruits production in Hormozgan Province, the articles set of third conference of agricultural economy, Ferdousi University, Mashhad.

Gholi Baglu, M, 2005, studying the protective policies of government in relative advantages, case study: the agriculture and gardening sector of Qazvin Province, journal of agricultural economy and development, No.50, pages: 50-80.

The outputs sale price and agricultural services cost in rustic regions of the country, Iran's statistics center.

Mohammadi, D, 2003, determining the relative advantage of oily seeds and studying their production problems in Fars Province, journal of agricultural economy and development, No.47, pages: 125-151.

Musanezhad, M, 1994, measurement of relative advantage and the effect of governmental interferences on the main agricultural outputs in agricultural year of 1992, the institute of economic researches, Tarbiat Modarres University.

Musanezhad, M, 1996, relative advantage of agricultural outputs and the export encouragement policy, Iran's agriculture seminar and world market, ministry of agriculture, the center of studies of planning and agricultural economy.

Noorbakhsh, M, 1996, studying the relative advantage of Mazandaran Province in exporting the agricultural outputs to the middle Asian countries, MSc thesis, faculty of economic sciences, Tehran University.

Niamanesh, H, 1995, studying the relative advantage of Western Azerbaijan Province in apple production, MSc thesis, Tarbiat Modarres University, faculty of agriculture.

Ministry of Agriculture Jihad, general ministration of statistics and information, information bank of the production cost of agricultural outputs

Ministry of Agriculture Jihad, journal of agricultural statistics-letter, different years, general ministration of statistics and information.

The exports development center, information bank of exports goods, commercial ministry.


Comparative Advantage in Pakistan’s agriculture: The concept and The policies Pakistan development review, 1994, Vol.33.No.4.903-917


Pearson, s.Gotsch, C.Bahri, S.May 2003," Applications of the Policy Analysis Matrix in Indonesian Agriculture".


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