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ORIGINAL ARTICLE

AN ANALYSIS OF COMPARATIVE ADVANTAGE OF PISTACHIO PRODUCTION AND EXPORT IN IRAN

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Abstract:

This paper focuses on the comparative advantage in Pistachio production and the export market in Iran. A policy analysis matrix (PAM) framework and revealed comparative advantage (RCA) index are applied to 1998-2011 data to study Iranian government policy regarding Pistachio production and export. In addition, the producer protection indices in the framework of the aforementioned matrix were calculated in order to study input and output protection policy. Results showed that Iran has a comparative advantage both in the production and export of this commodity, but the comparative advantage in pistachio production is diminishing. The RCA index showed that the comparative advantage of pistachio exports from Iran has progressed.

KEYWORDS:

Comparative advantage, Pistachio, Policy analysis matrix, Revealed comparative advantage.

1-INTERODUCTION

In recent years, the global trade growth and development has made governments to seriously think about competition and mostly comparative advantages. comparative advantage is the core of trade and shows the profit resulted from the trade and its path, while a real competition is established far from interference and is based on comparative advantage. comparative advantage indicates which company or product can compete in both domestic and global markets under determined assumptions. Paying attention to comparative advantage is one of the most important parts of economic planning which enjoys a remarkable stability, considered as a base for economic planning for more efficient resource allocation. Comparative advantage is not a permanent advantage as long as it changes from time to time with scientific improvements and providence of boosted technology in different products or different places. Therefore, comparative advantage is affected by factors as resources inventory, production method, and technological changes and so on.

Agricultural sector in Iran has strong advantages in several fields because of climate diversity, existence of rich natural sources, possibility for generative employment with high efficiency, relative advantage in the production and exporting the products. Despite the obvious dominance of oil, agriculture has always been a key economic contributor and employer in Iran.

According to F.A.O. Iran having 257925 hectares of land planted with pistachio and the production of 472097 tons of this fruit is place first in the world in 2011. Considering what we discussed here, conducting studies in the country regarding the comparative advantages of production and export of agricultural products is a necessity.

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2-METHODOLOGY

Source of Data

Data used in this study collected FAO reports, Govt publications of Iran, annual reports of statistical department, and other published reports either from the Govt or from the private agencies for the years 2010-011 . The study is based on secondary data. However efforts being made to collect primary data from the producers, processors, and exporters of selected commodities for the study. The required data is also sourced from Internet. The collected data is analyzed by using the appropriate statistical tools

The PAM is a tool which generates policy indicators for which values can be estimated, notable among which are the nominal protection coefficient, effective protection coefficient, private cost ratio and domestic resource cost ratio. State that the PAM is relevant to three areas of economic analysis:

The impact of policies on the competitiveness of commodity systems;
The impact of investment policy on economic efficiency and comparative advantage;
The effects of agricultural research policy on steering the processes of technological change in desirable.

The PAM is constructed through double entry book– keeping, with the purpose of ensuring complete and consistent coverage of all policy influences on the returns to, and costs of, agricultural production or marketing. Indicators of the economic consequences of policies can be derived from the parameters in the matrix. The main empirical task is to construct accounting matrices of revenues, costs and profits. A PAM is constructed for each commodity system to be analyzed. Thus, the impact of commodity and macroeconomic policies is gauged by comparing results in the presence and the absence of policy.

The PAM consists of revenues, costs and profits, at private and social (often called 'shadow') prices. The top row of the matrix is a budget showing costs of production and marketing at market prices, the only unusual aspect being the division of cost elements into two categories: tradable and non–tradable inputs (usually defined as domestic resources – the immovable domestic resources – the immovable domestic factors of production).

The second row in the matrix shows the same cost elements expressed at social prices, i.e. social opportunity cost. For tradable products, adjusted world prices are normally taken as social prices, applying import or export parity measures as appropriate. The social price of domestic resources is taken as their opportunity cost, in other words the return at the margin in the best available alternative

An important general point about the PAM is that the opportunity costs of domestic resources will be a function of current policy. Thus, strictly, these opportunity costs are only relevant under a particular set of policy constraints, i.e. they are constrained second best equilibrium values. If policy was to change, so would opportunity costs. For this reason, the PAM is not wholly satisfactory in terms of economic theory, being based on a partial equilibrium rather than general equilibrium approach. It is a pragmatic, indicative approach to policy, which recognizes that practitioners of policy analysis will only rarely have the data or the time to construct a fully specified general equilibrium model capable of generating useful estimates of opportunity costs under different policy scenarios.

The third row of the PAM is simple the first row minus the second. It shows the net impact of: market failure; distorting policies; and efficient policies (those which correct market failure). The signs of the revenue and cost terms in the third row indicate whether the net
effects of policy and market imperfections for these categories amount to an implicit subsidy or tax. If for example, I letter were positive, the net effect of policy or market failure is that the market price paid to the system is in excess of the social opportunity cost, i.e. output prices are subsidized. The right–hand entry in the third row, L, summaries the net effect of polices or market failures on the profitability of the system, known as 'net transfers'. If D>H, then the net effect of policy is to subsidize the system. In this case, policy reforms to bring about greater economic efficiency will reduce the gap between D and H, and this will induce adjustments in the commodity system in question, which may involve changes in the proportions in which resources are used and, at least in the short term, some contraction in the scale of operation.

Regarding indicators in the PAM, the basis PAM permits twelve indicators of economic efficiency, six of which are non–ratio indicators and six are ratio–indicators. Ratio measures are more useful for comparison of commodity systems which are dissimilar in the relative proportions in which they use inputs.

Table 1. The Policy Analysis Matrix

Item	Revenues	Cost of Tradable Inputs	Cost of Domestic Factors	Profits
Private Values	A	B	C	D
Social Values	E	F	G	H
Divergences	I	J	K	L

Source: Monke and Pearson, 1989.

Private profits (D) = A-(B+C)
Social profits (H) = E-(F+G)
Output transfers (I) = A-E
Input transfers (J) = BF
Factor transfers (K) = C-G
Net transfers (L) = D-H or I-J-K
NPCO=A/E and NPCI=B/F
EPC= (A-B)/ (E-F)
DRC=G/ (E-F)
SCB= (F+G)/E
PNRL= A-B-C without
Land use cost
SNRL= E-F-G without land use cost,
Profitability coefficient (PC) = (A-B-C)/ (E-F-G) or D/H

Some popular indicators derived from the PAM include

The primary objective of constructing a PAM is to derive a few important policy parameters for policy analysis. Four most commonly used parameters are domestic resource cost (DRC), nominal protection coefficient output (NPCO), nominal protection coefficient input (NPCI) and effective protection coefficient (EPC).

Domestic Resource Cost Ratio (DRC)

DRC is the ratio of domestic factor cost valued at social prices to the value–added created by the same resources at social prices. In Table 1, DRC=G/ (E–F). It is, in fact, a social cost–benefit ratio which helps determine the desirability of certain domestic production system relative to the international market in terms of economic efficiency. The social cost is the opportunity cost of domestic resources involved in the production process. The social benefit is the value–added generated by the resources measured at social prices. If the cost is greater than the benefit (DRC>1), the production of the product is not desirable from the social point of view. On the other hand, if the cost is less than the benefit (DRC<1), the production of that product is socially desirable. If the cost is equal to the benefit (DRC=1), it is just worthwhile to produce the commodity. It also implies that in regard to the commodity in question, the allocation of productive resources have reached of domestic resources would reduce the country's welfare.

Nominal Protection Coefficient Output (NPCO)

NCPO is the ratio of domestic market price of a product to its parity price at the farm–gate. In table 1, NCPO=A/E. If NPCO>1, it indicates that the private price of output is greater than its parity price and hence producers are positively protected for the product. If NPCO<1, it indicates that producers are implicitly taxed on the product. If NCPO=1, it indicates a neutral situation.

Nominal Protection Coefficient Input (NPCI)

NPCI is the ratio of the private to the social values of all the tradable inputs (or input components). In table 1, NPCI=B/F. If NPCI>1, it indicates that producers are taxed when they buy tradable inputs. If NPCI<1, it indicates that they are subsidized. NPCI=1 represents a neutral situation.

Effective Protection Coefficient (EPC)

NPCO and NPCI consider the distortion of government policy in the product and tradable input

markets respectively in isolation. EPC measures the total effects of intervention in both markets. It is defined as the ratio of value–added measured at private prices to that at social prices, or EPC= (A–B)/ (E–F). If EPC>1, it implies that the overall impact of the existing policy results in a net positive incentive to produce the commodity. EPC<1 represents a net disincentive. EPC=1 implies either no intervention or impact of various distortions in both the input and product markets results in a neutral effect on value–added.

The Concept of Revealed Comparative Advantage

Revealed comparative advantage (RCA) indices offer a useful way of analyzing a country's comparative advantage, based on demonstrated (i.e. actual) export performance. This contrasts with other popular measures such as the domestic resource costs coefficients (DRCs) that are considered indicators of potential comparative advantage and often used in ex-ante types of analysis of export possibilities.

Revealed Comparative Advantage (RCA) is a measure of international trade specialization (Balassa, 1965). It identifies the comparative advantage or disadvantage a country has for a commodity with respect to another country or group of countries. It provides a ranking of commodities by degree of comparative advantage and identifies a binary type demarcation of commodities based on the comparative advantage (Balance et al., 1987). Under the assumption that the commodity pattern of trade reflects the inter-country differences in relative costs as well as non-price factors, the index is assumed to reveal the comparative advantage of the trading countries. The factors that contribute to movements in RCA are economic, structural, world demand and trade specialization. The advantage of using the comparative advantage index is that it considers the intrinsic advantage of a particular export commodity and is consistent with the changes in an economy's relative factor endowment and productivity. The disadvantage, however, is that it cannot distinguish improvements in factor endowments and pursuit of appropriate trade policies by a country (Batra and Khan, 2005). The original index of RCA was first formulated by Balassa (1965) and can be written as per equation (1).

$$RCAij = (Xij/Xik)/(Xnj/Xnk) \quad (1)$$

Where,
Xij = Exports of country i of commodity j
Xik = Exports of country i of a total agricultural commodities k
Xnj = Exports of a world n of commodity j
Xnk = Exports of a world n of a total agricultural commodities k

In the present study, country i refers to Iran, commodity j refers to Pistachio commodities, set of commodities k refers to the total agricultural commodities and n refers to World. When RCA assumed the value greater than unity for a given country in a given commodity, the country is said to have a revealed comparative advantage in that commodity. However, RCA suffers from the problem of asymmetry as pure RCA is basically not comparable on both sides of unity. It the index ranged from zero to one, a country is said not to be specialized in a given sector and if the value of the index ranged from one to infinity, the country is said to be specialized. The index is made symmetric, following the methodology suggested by Dalum et al (1998) and the resultant index is called as Revealed Symmetric Comparative Advantage (RSCA). Mathematically, it can be expressed by the following equation (2).

$$RSCA = (RCA-1)/(RCA+1) \quad (2)$$

This measure ranges between -1 and +1 and is free from the problem of skewness. A commodity is said to have comparative advantage in its exports if the corresponding RSCA value is positive and vice versa. In the present study, the RSCA was used to look into the comparative advantage of the Pistachio.

3-RESULTS AND DISCUSSION

The data used in this study collected FAO reports, Govt publications of Iran, annual reports of statistical department, and other published reports either from the Govt or from the private agencies for the years 2010-011.

Table 2: Results of PAM for Pistachio 2010-11(Value in Rials)

Accounts	Revenue	Tradable Input Cost	Non-tradable Input Costs	Profits
Private Values	141054400	6299064	94969781	397855555
Social Values	241222951	15652482	102170684	123399785
Divergence	-100168551	-9353418	-7200903	-83614230

Source: Derived from survey data, 2010

Table 2 shows an estimated policy analysis matrix for pistachio. The revenue from one hectare of pistachio based on shadow prices is 100168551 Rials more than the revenue for the same amount of pistachio based on market prices. The revenue using the shadow prices is 1.7 times the revenue of pistachio based on market prices. Since K is -7200903 Rials this implies that the market or private prices for no tradable inputs are less than their shadow prices and so the producers receive an indirect subsidy for such inputs. According to Table 2, J is -9353418 Rials; the market costs of tradable inputs to the producer are lower than their shadow or social costs for these inputs.. The producer's profit at market prices, D, is 397855555 Rials, so pistachio production at current market conditions is profitable. Profit at shadow prices (H) are also positive and equal 123399785 Rials, so we can say that pistachio production is profitable at shadow prices too.

The summary results of efficiency indicators derived from the PAM are presented in Table 3 below.

Table 3. Efficiency Indicators of the Pistachio Production System

NPC	NPI	EPC	DRC	PCR
0.58	0.40	0.59	0.45	0.70

NPCO Nominal protection coefficient of tradable outputs
NPI Nominal protection coefficient of tradable inputs
EPC Effective protection coefficient
DRC Domestic resource cost
PCR Private cost ratio

Domestic Resource Cost (DRC)

Table 3 shows the values for the five Comparative Advantage Indices associated with pistachio production. The DRC is 0.45, so at social prices, increased domestic production of pistachio costs 0.45 while generating 1.00 in income from the international market, which implies that Iran has a comparative advantage in pistachio production. The reason may be lower input requirements and hence lower production costs when these practices are followed. This can also be ascribed to the restructuring of farming patterns.

Nominal Protection Coefficient on Tradable Output (NPCO)

An NPC of 0.58 is less than unity and it indicates that the private price of output is less than its parity price. Hence producers are not protected. They are implicitly taxed on the product (pistachio). These results are consistent with the negative divergence on revenues in the PAM.

Nominal Protection Coefficient on Tradable Inputs (NPI)

An NPI of 0.40 is less than unity and it indicates that producers are taxed when they buy tradable inputs, hence again producers are not protected. These results are consistent with the positive divergence on tradable input costs in the PAM.

Effective Protection Coefficient (EPC)

An EPC of 0.59 is less than unity. It implies that under the existing market conditions, there is a net disincentive to produce the commodity in question (pistachio). This coefficient combines the effects of both the input and output markets.

Compare the results of the above three factors indicate that they have similar Comparative advantage based on yield, crop and input prices in 2010-11 has been calculated. Note that the change in yield, product selling prices and input costs per year Comparative advantage index may also be calculated differently. Had higher yield and the selling price of a product by improving quality and reducing the use of modern methods of marketing and Production costs and optimizing the use of production inputs and technology advantage can be Products increased.

Private Cost Ratio (PCR)

A PCR of 0.70 is less than unity. It implies that smallholder pistachio production under the liberalized market economy realizes profits, which are in excess of normal returns to domestic resources. This is consistent with the positive profits observed under private values in the PAM results. However, this PCR value does not imply that smallholders exploit the maximum potential benefits (profits) of the production system. As PCR approaches unity, then it becomes just worthwhile to produce pistachio, and the allocation of productive resources reaches an optimal point in the sense that further reallocation would reduce the welfare of the smallholder farmer.

Tables.4 show the calculated comparative advantage upon the base of RCA and RSCA indexes for selected products in the time interval between 1998 -2011. Considering pistachio product, RSCA indexes Iran were placed in the interval +1 and -1. Therefore, it can be said that Iran have got a comparative advantage in the field of pistachio but since Iran pistachio's RCA has been much greater than Turkey, so, Iran pistachio has got a greater comparative advantage compared to Turkey pistachio. Iran pistachio RCA mean is equal to 253.6 which, compared to the pistachio RCA mean of countries under investigation, shows Iran pistachio higher comparative advantage than these countries. The amount of Iran pistachio RCA has shown an incremental trend from year 1998 to 2003, but then it has decreased during 2006-2010 the reason of which can be the reduction in yield. In the pistachio production and export sectors there are problems which have had negative effects on yield and on Iran's share of the world market. whereas, it has been ascendant in America and Syria case .The mean RSCA calculated for America and Syria shows the lack of comparative advantage in these countries during some years , whereas, in the Iran case, it has been equal to 0.996 and hence, indicating high comparative advantage.

Table 4: Result of the comparative advantage of Pistachio crop in Iran on RCA and RSCA index against competitor countries.

Year	RCA				RSCA			
	Iran	USA	Turkey	Syria	Iran	USA	Turkey	Syria
1998	254.4	0.30	38.45	0.96	0.997	-1.0	0.93	-1.0
1999	255.4	0.43	26.65	0.96	0.998	-1.0	0.93	-1.0
2000	256.7	0.45	33.5	0.98	0.997	-1.0	0.94	-0.82
2001	257.5	0.43	12.6	1.6	0.998	-0.96	0.94	0.30
2002	258.5	0.46	1.56	1.9	0.997	-0.95	0.92	0.90
2003	390.3	0.50	0.78	6.9	0.999	-0.93	0.94	0.89
2004	274.6	0.53	0.45	8.9	0.997	-0.55	0.85	0.74
2005	274.6	0.56	1.4	10.8	0.997	-0.45	0.83	0.87
2006	253.3	0.62	0.77	11.8	0.995	0.34	0.74	0.65
2007	249.9	0.56	0.65	11.8	0.994	-.047	0.73	0.84
2008	225.8	0.56	0.34	12.8	0.994	-0.32	0.35	0.94
2009	190	0.78	1.4	17.86	0.993	-0.13	-0.23	0.84
2010	187.8	0.75	0.91	22.8	0.992	-0.12	0.12	0.83
2011	221.8	0.87	0.95	25.9	0.997	-0.09	0.47	0.93

4-CONCLUSSION AND SUGGESTION

This study indicated that Iran has consistently had a comparative advantage both in pistachio production and exports. But the findings showed that the comparative advantage was reduced during 2006-2010 the reason of which can be the reduction in yield. In the pistachio production and export sectors there are problems which have had negative effects on yield and on Iran's share of the world market. The policy implication from this is that in order to increase yield and productivity through the reduction of production costs. The policy implication of increased exports is that the recognition of penetrable and final consumption markets seems necessary. The expansion of advertising activities to introduce Iranian pistachio throughout the world, investment in the packing and grading industry, and gaining accurate and complete information from world markets are other ways of increasing exports. The consequent benefit of the above policy implications could be a reduction in the vulnerability of pistachio exports.

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