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Determination of target Exchange rate for the comparative advantage of Iran crops (A Case of Sari Township)

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Abstract

In this paper, the value of exchange rate was calculated in order to determine comparative advantage in crops of Sari Township during 2009-2010. Hence, first, comparative advantage indices are estimated by using a policy analysis matrix. The results showed that just wheat has a DRC index of one in the minimum amount of national currency exchange rate value. This indicated the fact that only wheat, compared to Rice, Soybean, Canola and Barley in this region, can compete with global markets and had a social profitable production system. Therefore, it is recommended that executive policies, which make competitive ability in wheat, should also be applied for other products.

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INTRODUCTION

Agricultural activities Development are considered as basic indices in developing countries such as; Iran. Principle of comparative advantage is one of the important economic criteria for production planning, import and export. This shows that if a country produces a commodity cheaper than the other countries, it will have comparative advantage in producing of that commodity (karbasi & *et al.*, 2005, p. 2). Also, this principle is one of the very profitable criteria for the optimal allocation of resources in countries with open economy and has the important role in international trade. Developing countries are often facing to lack of capital, which is considered as the most important productive resources. Other productive resources may be abundant in this country, but these resources are wasted because of Non-optimal use which results in low productivity. Thus, it is important for these countries to allocate their limited capital, in order to develop and progress, so that first, it causes to use other production factors and increase their productivity; second, productive resources are used in producing the products which have regional and national comparative advantage (Azizi & Yazdani, 2004, p. 2). It is important to survey and pay attention to comparative advantage of agricultural products, in respect to significant share of agricultural sector in non-petroleum export of country. Paying attention to policy of exchange rate valuation is an effective policy on changing process of comparative advantage in different sectors. In policy makers' opinion, exchange rate has a special role because of its affecting feature and of signaling to other variables, however, it is introduced as a macro variable in economics. In this study, the effect of exchange rate changes on comparative advantage in agricultural products of Sari, during 89-1388, is investigated. Sari has 3685 /3 square km so allocates about 15 / 3 percents of the total area of Mazandaran province to itself. This city is located between 35 degrees and 58 minutes to 36 degrees and 50 minutes of north latitude and 52 degrees and 56 minutes and 53 degrees and 59 minutes of East longitude of the prime meridian. Policy analysis matrix and

related indices are one of the widely used methods in the analyzing of policies and determining of comparative advantage of different products. Mounk and Pearson created policy analysis matrix approach for a comprehensive review of policies, in 1989 (Julayi and Jeirani, 2008, p. 5). Up to now, many studies have been done, in the field of comparative advantage. For example, Fang & Beghin (2000) deal to investigate self-sufficiency, comparative advantage and trade in agricultural products in China. They have used policy analysis matrix (PAM) in their analysis. The results show that China has advantage in products labor and no advantage in products with the earth. Hasan & *et al.*, (1999) was analyzed comparative advantage of agricultural products in South Africa. In this study, DRC method is used. McIntire and Delgado (1985) were estimated comparative advantage of crop in Burkina Faso and Nigeria. They used effective protection coefficient, Net Social Profit and Domestic Resource Cost Indices. Results show that, Burkina Faso does not have advantage in producing, but Nigeria has advantage. Masters and Nelson (1995) concluded that the use of SCB indices has better results than DRC index in Kenya. Moses Nejhad (1996) measured the comparative advantage of pistachio production and export by using the DRC index. The results showed that Iran has comparative advantage in this production. Haddad and Rabiei (2007) estimated comparative advantage of agricultural products by using the DRC index, in Iran. The results indicated that potato, onion, corn, wheat, barley, cotton, apple and citrus have comparative advantage, but rice, beans, sugar beets and soybeans have comparative disadvantage. Azizi and Yazdani (2004) showed that pistachio has comparative advantage among the major horticultural products in Iran compared to rival countries such as; USA, China, Turkey and Syria. The results showed that potato, onion, corn, wheat, barley, cotton, apple and citrus have comparative advantage, in Iran. in the present study, it seems necessary to investigate comparative advantage in respect to its importance, lack of a coherent and clear study in Sari as one of the largest producers of grain in

country, the issue of subsidies and also an emphasis on liberalization Prices in this policy as well as the impact of the high exchange rate policy. Needed Information is collected through filling in 591 questionnaires for five products in Sari, includes rice, wheat, barley, soybeans and canola in 2009-2010.

MATERIALS AND METHODS

There are several indices for evaluating comparative advantage that policy analysis matrix approach (PAM) is used to estimate these indices (Kavoosi Kalashami and *et al.*, 2010). General framework of policy analysis matrix is presented in Table 1. There are various indices in each area to determine the comparative advantage which are presented in table 1. Different types of indices used in this study are shown in Table 2.

In order to calculate the comparative advantage

by using these indices, estimating shadow price of applied inputs in production and also shadow prices of exchange rate is necessary. The CIF price and transportation costs are used to calculate Shadow price of tradable input (poison, fertilizer). Also, the opportunity cost method (the value of their best application) was used to calculate the shadow price of domestic inputs (labor, water...). Shadow exchange rate has a special sensitivity in the calculation of comparative advantage and of government support rates. In fact, this rate is based on achieving an acceptable shadow price for products and tradable inputs. Purchasing power parity (PPP) can be used, in both absolute and relative mode, for calculating real exchange rate (Gardner & Rausser, 1998). Real exchange rate (equal rate of Rial against dollar) is obtained from the following equation by using purchasing power parity method, in absolute form (ppp).

Table 1: General framework of policy analysis matrix

	Revenues	Input costs		Profits
		tradable input	domestic factor	
Private	A	B	C	D
Social	E	F	G	H
Effects of Divergences	I	J	K	L

Table 2: Indices of comparative advantage based on a policy analysis matrix

Index	Calculation method	Index Commentary
DRC	$\frac{G}{E-F}$	This ratio compares cost of domestic factors (G) with differences of shadow income and shadow cost of tradable input If DRC<1, there is Advantage in producing and exporting of products If DRC>1, there isn't Advantage in producing and exporting of products
SCB	$\frac{F+G}{E}$	This ratio compares shadow costs of Inputs (F+G) with shadow income (E) If SCB>1, Profitable production and export If 0<SCB<1, Profitable production and export If SCB>1, non-Profitable production and export
NPIC	$\frac{B}{F}$	This ratio compares cost of tradable inputs (B) with cost of their domestic factor If NPIC<1, Market inputs are protect If NPIC>1, Market inputs are not protect
NPC	$\frac{A}{E}$	This ratio compares Private Revenue (A) with Social Revenue (E) If NPC<1, The product market is not protected (producers pay indirect tax) If NPC>1, The product market is protected (Producer receives indirect subsidies)
EPC	$\frac{A-B}{E-F}$	This ratio compares added value in domestic prices (A – B) with added value in shadow prices (E – F). If EPC<1, Total effects of government intervention in inputs and products market is to detriment of producer If EPC>1, Total effects of government intervention in inputs and products market is to favor of producer
NSP	(E-F-G)*Y	This Index show Difference between shadow income (E) and shadow cast of inputs

$$E = \frac{P_{ig}}{P_{dg}} \quad (1)$$

Where P_{ig} and P_{dg} represent an ounce of gold price in the domestic market (in terms of Rials) and global market (in terms of dollar), respectively. By using purchasing power parity method, in absolute form (PPP), real exchange rate (equal rate of Rials against dollar) is obtained from the equation 2.

$$E = \frac{P_i}{P^* i} \times E_o \quad (2)$$

Where P_i , $P^* i$ and E_o represent Domestic consumer price index, Foreign consumer price index and Free exchange rate in the source, respectively (database of central bank of Islamic Republic of Iran, 2009). In this research, since, consumer price index has more accuracy to express the consumer purchasing power and on the other hand, a gold price is not dynamic enough due to the interference policies of government, relative method is used to calculate real exchange rate

RESULTS AND DISCUSSION

The relative purchasing power parity method is used for calculating real exchange rate, in

2008. Considering the exchange rate value in base year 1383 and the amount of retail price indices in the U.S and Iran, in 2008, the value of a real exchange rate is estimated 16428.5 Rial. The shadow price of fertilizer is the CIF price. The value of imported chemical fertilizer in per kilogram was calculated 4681.8 Rial. According to distance of Sari from the border of import chemical fertilizers (1300 km) and price of per kilogram (724.1 Rials) as transportation cost of input, the shadow price of fertilizer is calculated 5405.9 Rials, in Sari. In addition, the average price of import pesticides (herbicide, fungicide, Insecticide, acaricide) is 9.25 dollars per liter, in 2008. In respect to real exchange rate (16428.5 for per unite dollar), value of import pesticides in per liter is calculated 151963.62 Rials. Finally, by adding the transportation cost in per liter, shadow price of pesticides is estimated 152687.72 Rials per liter. The labor cost per hour was estimated 20,000 Rials. Shadow price of machinery has been considered equal to the highest paid price for an hour using machinery, in region. Hence, the products divided into two groups according to planting and harvest date, firstly. Then, the highest cost in per hour of using machinery, in each group, is calculated, and weighted average is used for calculating shadow price, in regard to common steps of each group. Finally, shadow price of machinery of the wheat, barley and canola has been calculated 418,428 Rials and

Table 3: Comparative advantage indices for products Produced in Sari

product	DRC	SCB	NPIC	NPC	EPC	NSP (million Rials)
Soybean	0.95	0.97	0.46	0.6	0.69	0.51
Rice	0.87	0.9	0.4	0.8	0.95	4.23
Canola	0.84	0.92	0.41	0.75	1.1	1
Wheat	0.7	0.85	0.44	0.66	0.88	2.12
Barley	1.62	1.21	0.34	0.68	1.31	-2

Table 4: Rials Value of exchange rate for determining of index border Of comparative advantage for products in Sari

product	Exchange rate (Rials)	DRC Index	NSP
Soybean	15852	1	-7971.4
Rice	14610	1	-16365.33
Canola	14653	1	-2920.42
Wheat	12982	1	-1258.24
Barley	21523	1	-4724.73

of the rice and soybean has been estimated 410701.5 Rials. For calculating the shadow price of water for irrigation products, expensive cost of extraction method was used. The most expensive cost of extracting was selected for rice and soybean. Rice has expensive cost of water extraction, compared to those other products. The highest irrigation cost for per ton of rice is 1843657.8 Rials and water requirements of rice is 2359.88 cubic meter per ton. So, shadow price of rice is estimated 781.25 Rials. Since, the gasoil import price average had been 0.43 dollars in 2008, therefore import prices of gasoil was considered as shadow price. According to Calculated real exchange rate, this price is 7064.25 Rials in per liter. Rent of per ton - km transporting of product was 385 Rials, at Mazandaran province in 2008. For calculating shadow Price of transportation, subsidies should be removed from gasoil. To this reason, it is regarded that, in average, 0.025 liter gasoil is consuming for per ton-km. Subsidized price of gasoil is 165 Rials per liter; therefore shadow price of transportation (per ton-km) will be 176.6 plus 380.87 Rials (4.125 Rials Fraction is due to gasoil subsidy). In calculating the cost of transportation, the average distance of the province to the border is considered 1300 km. Thus, the cost per ton-km transporting of product was 557.47 Rials in Mazandaran province, in 2008. Results of comparative advantage indices of five products in Sari are reported in Table 3. The DRC index indicates that barley doesn't have advantage. Tradable and untradeable input costs for this product, based on shadow prices, are more than their values based on market prices. Review of EPC index shows that the effects of government intervention on product market in addition to input of soybeans, rice and wheat is detrimental for producers. Effective protection for producing of canola and barley in the Sari is in favor of producers. In other hand, the loss due to product market is lower than benefit of input market, so effective protection is positive in this city.

It is better, in study of Comparative advantage of these products, to estimate amount of exchange rate which leads DRC index to be one in order

to present proper offers. Therefore, this exchange rate was calculated through trial and error methods. The results are presented in Table 4. The results show that wheat has advantage in lowest exchange rate in terms of domestic currency. This indicates that if the real exchange rate decreases to 1300 Rials, only wheat producers can compete in global market and this product will have advantage. The highest exchange rate is 21523 Rials belonged to barley. It means if the value per exchange rate unit is less than this amount, the production has disadvantage and it is not economical to produce.

CONCLUSION

In this study, the effect of exchange rate changes on comparative advantage of farm products was investigated Sari. To this aim, Policy Analysis Matrix (PAM) method was used. The results show that barley has disadvantage in this region and compared to foreign import is not profitable. Therefore, it is recommended to do required research in order to increase profitability and performance, as one of the most important effective factors on the comparative advantage of this product. Study of exchange rate valuation in estimating of comparative advantage showed that wheat in lowest level of the exchange rate has advantage. This result indicates that farmers can compete in global markets at this level of exchange rate. Therefore, the government can provide domestic needs and increase export of these products for global markets by applying the appropriate foreign exchange policies with respect to comparative advantage of all products in the region. Furthermore, applying policies which increasing the competitive ability of wheat in global markets can increase competitive ability of other products in world markets, too.

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