Determination of Comparative Advantage on the Main Agricultural Products

Seyyed Ali Zamaninejad[1,*], Abbas Abdeshahi[2]

[1]Department of Agriculture, International Branch of Ferdowsi Uinversity of Mashhad, Mashhad, Iran.
[2]Department of Economics, University of Agriculture and Natural Resources Ramin Khuzestan, Molasany, Iran.

ABSTRACT

Due to the potential climate and its diversity, Kohgilouye and Booyerahmad (K & B) of Iran province could have a production comparative advantage on the agricultural products. Considering that not being conducted any study on the agricultural productions in this province, we're going to try to recognize and analyze the comparative advantage of K & B province in producing some of the main agricultural products such as wheat, grain, paddy, grain corn, bean, tomato and Canola. In this study, the Revealed Comparative Advantage Index (RCA) has been used to determine the comparative advantage of production. Data are formed as time series between the years of 2003 to 2008 and are collected through the Agricultural Administration statistics. Using the RCA index showed that K & B province had production comparative advantage in producing the agricultural products such as wheat, grain and paddy during years of 2003 to 2008, grain corn in 2008, bean during 2004 to 2007 and Canola in 2007; while there was no production comparative advantage for tomato during 2003 to 2008. Therefore, development and well-agriculture of these products would lead to positive results for the local and national economy.
KEY WORDS: Comparative Advantage, Production, Revealed Comparative Advantage.

1. INTRODUCTION

Development of exports and increasing its diversity depend on the production potentiality and competitive power of the produced agricultural products in the global market. The competitive power of agricultural products is influenced by the factors such as their price and quality. One of the indexes used for measurement of the competitive power of products of a country in the global market, is the Comparative Advantage Index. According to this index, if a country or an area has a lot of production factors and is able to produce a production cheaper with less expense comparing with other areas and then can offer to the global market, has had comparative advantage on producing that production; so it's able to maintain its competitive market among the rivals. There's another concept for comparative advantage which compare the production in different areas of a country and measure its situation to other areas. This concept is more physical and prices have no impact on determination (Mohammadi, 2005). Comparative advantage could be examined from different points of view like production, export, offer and demand. On the production, factors like labor frequency, capital and technology determine the comparative advantage. On the export or offer, factors such as reducing the packing costs, transportation, insurance, marketing, advertisement, etc. lead to comparative advantage. Comparative advantage in the production field may be gone because of factors such as imposing transportation costs, insurance, packing and increasing the final price of production. Of course, not every comparative advantage is a permanent and constant privilege and could be transferred from an area to another, from a country to another one or from a product to another one inside the same area during time. This transfer occurs gradually and could be conserved or strengthen by maneuvering the right politics (Haji Rahimi, 1997). Due to the climate diversity and its potentiality, Iran areas have various production facilities and abilities which is significant particularly in the agricultural part. That's why every province is expected to have a relative preference in producing some of the agricultural products. Having a lot of potentialities, specially natural resources and diverse climate, K & B province can play a key role in increasing the production of agricultural products. The climatic situation of this province including temperature, type of soil and weather is so that it's possible to cultivate most of agricultural and garden products. This study tries to recognize the relative preferences of K & B province in producing some of the agricultural products and analyze the relationship between them. This study aims to determine the comparative advantage of the selected agricultural products (wheat, grain, paddy, grain corn, bean, tomato and Canola) during the years 2003 to 2008. Some studies and surveys are conducted on the comparative advantage inside and outside Iran that we're going to indicate. On the inside surveys, Moosa Nejad and Zarghami (1994) studied the comparative advantage of several main products in 1992. In this study they proved that watered and dry farmed wheat, grain corn,

---
*Corresponding Author: Seyyed Ali Zamaninejad, Department of Agriculture, International Branch of Ferdowsi Uinversity of Mashhad, Mashhad, Iran. Email: s.ali.zamaninejad@gmail.com

cotton, union, navy bean and French bean have comparative advantage, but products such as potato, rice, lentil, kidney bean, watered grain, dry farmed grain and sugar beet don't have.

Determining the comparative advantage of Persian rice (case study on Gilan, Mazandaran and Fars provinces), Azizi and Zibaii (2001) came in conclusion that Gilan and Mazandaran provinces have comparative advantage in rice producing comparing to the countries like Syria, Turkmenistan, Thailand, Australia and Kuwait; but comparing to countries such as India, Azerbaijan, Vietnam, Pakistan and Uruguay have no comparative advantage. Fars province only has comparative advantage comparing to Syria, Turkmenistan and Thailand.

Salimi far and Mirzaii Khalil Abadi (2002) have studied the comparative advantage of production and export of pistachio in Iran. The results show that Iran has still comparative advantage over the production and export of pistachio. Studying the comparative advantage in exporting the chicken meat in the Middle East region, Mirzaii et al (2003) came to this conclusion that Iran doesn't have any comparative advantage in exporting the chicken meat. Studying the comparative advantage of oil seeds, Mohammadi (2004) showed that products such as Canola, sun flower and sesame have comparative advantage and Golrang production doesn't have; according to the social sheer benefit index, domestic resources costs, the ratio of cost to the social benefit and utilizing the influential prices of the currency rate. Karbasi et al (2006) have studied the comparative advantage of the most important agricultural products in Kerman during 2006 to 2007 using indexes like Domestic Resourse Cost (DRC), social sheer benefits, economic privilege and privilege scale. Information and statistics needed for this study were collected through Kerman Agricultural Department and Foreign Trade Year book. The results showed that Kerman province has got comparative advantage in producing and exporting watered wheat, grain corn, pea, sugar beet and potato; therefore it's so important to more and more consider and support producing these products. Mehrabi Boshr Abadi (2007) has studied the political influences and comparative advantage of the agricultural products in Kerman. He showed that the most comparative advantage in Kerman in 2005 was related to union and watermelon; and also supporting the product market and influential support to wheat and grain production is beneficial for the producers. On the foreign studies (outside Iran), Jaber and Thomson (1980) have studied the comparative advantage in Senegal. In this study, they used global prices in non-confident circumstances and showed that the comparative advantage pattern is changing due to the non-confident circumstances in operation and prices and risk impact on the comparative advantage as well. Masters and Winter-Nelson (1995) have utilized the DRC index in a survey and came into this conclusion that it's not a suitable index for comparing the social benefit in different activities, because DRC mainly rely on the local and non-tradable resources such as landed properties and labor; so they recommended to use the cost ratio to the social benefit criteria to compare the social benefits. Using the modified political analysis matrix method, Yao (1997) tried to find an answer to this question that: is Thailand benefiting from replacing soya and green pea for rice producing? Two northern areas in Thailand were chosen for this study during the agricultural years of 1992-93. The results said that rice producing in the both areas had a beneficial privilege rather than two rival products (soya and green pea); but because of government subsidization and high prices of soya and green pea, farmers are looking for reduce in rice farming and replacing the rival products instead.

2. MATERIALS AND METHODS

Site characterization: This study was conducted in Kohgiloye and boyer ahmad Province with an area of 16,264 square kilometers (about one percent of the total land area of Iran); this Province is located in southwestern Iran between 31 degrees, 27 minutes and 29 degrees, 56 minutes north latitude and also 51 degrees, 53 minutes and 49 degrees, 53 minutes East longitude.

Methods of measuring the regional comparative advantage: Regional economic researchers use different methods to determine the regional comparative advantages which the most important ones are: Domestic Resources Cost method (DRC), Social Cost Benefit (SCB), Revealed Comparative Advantage method (RCA), Shift Share Model (SSM) and Location Quotient method (LQ). In several studies, RCA index has been used to determine the comparative advantage of particular products or an economic part or determine the global situation of a product and its changes during time. Unido, Aquino, Crafts and Thomas, Van Hulst et al, global Bank, Lin, Brasili et al, Lutz, Lee and Yeats studies are all examples of this type of survey. As far as it's related to the measurement of comparative advantage of the agricultural products in the regional levels, the above methods are functional only providing some modifications. For example the Balassa revealed comparative advantage index is structurally too similar to the location quotient; so we can measure the comparative advantage through this index plus some agricultural economic statistics. Anyway, since the location quotient method and the revealed comparative advantage method are the simplest methods available and could be measured easily, are considered the most in the experimental researches especially in the agricultural and farming area. Moreover, these two methods are commonly used in applied studies

at a global level (Li Yingzhong, 1997). In this study, we used RCA index to determine the comparative advantage of the farming products. The general form of this index is as following:

$$RCA = \left(\frac{X_{ij}}{X_{tj}}\right) \Big/ \left(\frac{X_{iw}}{X_{tw}}\right) \tag{1}$$

In the Eq. (1), X_{ij} is producing the product in the region, X_{tj} is the whole region product of the study, X_{iw} is producing the products in the country and X_{tw} is the whole country product of the study. Regarding the above relation, if the *RCA* index value equals 1, the regional production equals the country production and the regional production can reply the demands well. So the region won't import or export the product. If the index value is bigger than 1, the producers will have surplus to export. But if the index value's less than 1, we'll face the lack of offer, so the product will be imported.

Statistical analysis: Information used in this study was obtained from the department of Agriculture of Iran between 2003 to 2008. (Tables 1 to 6)

Table 1. Production of selected crops in 2003

	Production (tons)	
Product	**Province**	**Country**
Wheat	264437	13439565
Grain	66361	2908074
Paddy	52206	2931138
Grain corn	1291	1653001
Bean	3506	218858
Tomato	10425	4429426
Canola	975	108139
Total	399201	25688201

Table 2. Production of selected crops in 2004

	Production (tons)	
Product	**Province**	**Country**
Wheat	183685	14568480
Grain	54818	2940349
Paddy	47478	2542443
Grain corn	10390	1926078
Bean	3177	225720
Tomato	7051	4022877
Canola	1057	126115
Total	307656	26352062

Table 3. Production of selected crops in 2005

	Production (tons)	
Product	**Province**	**Country**
Wheat	179206	14307970
Grain	42482	2856667
Paddy	36367	2736843
Grain corn	10761	1995253
Bean	2513	216131
Tomato	9826	4781018
Canola	1720	234698
Total	282875	27128580

Table 4. Production of selected crops in 2006

Product	Production (tons)	
	Province	Country
Wheat	175128	14663745
Grain	46884	2956032
Paddy	46715	2612174
Grain corn	13594	2166130
Bean	5060	208286
Tomato	8797	5064571
Canola	2654	315090
Total	298832	27986028

Table 5. Production of selected crops in 2007

Product	Production (tons)	
	Province	Country
Wheat	195368	15886609
Grain	44056	3103981
Paddy	37961	2664237
Grain corn	17475	2361299
Bean	5581	223303
Tomato	11442	5534267
Canola	7490	356890
Total	319373	30130586

Table 6. Production of selected crops in 2008 (Source: Department of Agriculture)

Product	Production (tons)	
	Province	Country
Wheat	45251	7956648
Grain	11873	1547394
Paddy	14631	2183964
Grain corn	15417	1763539
Bean	102	182705
Tomato	18815	4817733
Canola	28	258995
Total	106117	18710978

3. RESULTS AND DISCUSSION

This study showed that K & B province has got a comparative advantage in producing the wheat, grain and paddy during 2003 to 2008. That is, this province had the ability to not only support the need of society, but also export the products. We didn't have comparative advantage on the grain corn during 2003 to 2007 and it was needed to be imported; only in 2008 this product had a comparative advantage. About bean, in 2003 the RCA index equaled the calculated unit which shows it's only enough for the need of society and can't be exported. Also, there was no need to import this product; it had a comparative advantage during 2004 to 2007, but not in 2008. Tomato had no comparative advantage during 2003 to 2008. Canola also had not comparative advantage during 2003 to 2006 and 2008; only in 2007 there was a comparative advantage (Table 7).

Table 7. The comparative advantage of production of selected crops in the province during 2003 to 2008 (Source: Department of Agriculture)

product	82	83	84	85	86	87
Wheat	1.265	1.081	1.201	1.12	1.159	1.002
Grain	1.469	1.603	1.428	1.485	1.33	1.353
Paddy	1.14	1.604	1.28	1.677	1.34	1.181
Grain corn	0.046	0.452	0.52	0.584	0.692	1.542
Bean	1	1.25	1.142	2.285	2.428	0.092
Tomato	0.151	0.144	0.193	0.161	0.191	0.688
Canola	0.5	0.75	0.75	0.727	2.09	0.014

4. CONCLUSION

According to the results, the following are some suggestions which may be useful:
- ✓ Reducing the production costs is a main factor to increase the comparative advantage. As a result, investment on the labor impacts on the increasing of the comparative advantage.
- ✓ On the products that we don't need to import, it's better to work on their quality (appropriate packaging, marketing, etc.) so that we can aim both the local and foreign markets as sell targets.
- ✓ In order to develop cultivating the products which lack the production comparative advantage, These product can increase the yield per unit area; for example it's crucial to increase the knowledge level of the farmers through educate them the technical issues in different stages of sowing, planting and harvesting (considering the appropriate time for sowing, good plough, modify and improving the watering methods, using the chemical poisons and fertilizers, maneuvering proper methods to harvest, etc.).
- ✓ Provide the needs of the province of the products which have not comparative advantage from the provinces which have got the comparative advantage on this product, especially neighboring provinces (in order to reducing spoilage about the high spoilable products and also reducing the transportation costs) and allocate the under-cultivate areas and other production factors to plant and producing the products with high comparative advantage.

REFERENCES

Aquino, A. (1981), Change over time in the patterns of comparative advantage in manufactured goods: an empirical analysis for the period 1972-1974, European Economic Review, Vol. 15, 41-62.

Azizi, jafar and mansour zibayi (2001), determine the comparative advantage of rice in Iran (A Case Study of the provinces of Gilan, Mazandaran and Fars), Journal of Agricultural Economics and Development, No. 33, p. 71-96

Balassa, Bella (1988), Export and growth: The lessons of east Asian development, Economic Development and Cultural Change, 36 (3).

Brasili A P. Epofani and R. Helg (2000), On the dynamics of trade patterns. CESPRI, Working Paper, No. 115, Italy.

Crafts, N. F. R. & M. Thomas (1986), Comparative advantage in UK manufactured trade, 1910-1935, Economic Journal, Vol. 96, 629-945.

Haji-Rahimi, M. (1997), comparative advantage and economic incentives in the Fars province agricultural, M.Sc. Thesis, Shiraz University.

Jaber,C.L. and R.L. Thomson (1980), Agriculture comparative advantage nadir international price uncertainty: the case of Senegal, American Journal of Agricultural Economic, 62(2): 188-198.

Karbasi, alireza. Sakineh shamsedini and fatemeh rastegaripour (2006), determine the comparative advantage of major agricultural crops in Kerman province. Journal of Agricultural Economics and Development, in the seventeenth year, Vol. 65, Spring 2009.

Lee, J. (1995), Comparative advantage in manufacturing as American determinant of industrialization: the Korean case, World Development, Vol. 23, 1195-1214.

Li Yingzhong (1997), Zhongguo Nongye Quhuaxue [China Agricultural Zoning].

Lin, K.T. (1997), Analysis of north Korea's foreign trade by revealed comparative advantage, Journal of Econometric Development, Vol. 22, 97-117.

Lutz, J. (1987), Shifting comparative advantage, the NIC'ws and the developing countries, The International Trade Journal, Vol. 1, 339-358.

Masters, W. A. and A.Winter-Nelson (1995), Measuring the comparative advantage of agriculture activities: domestic resources and social cost benefit ratio, American Journal of Agriculture Economics,77:243-250.

Mehrabi Boshrabadi, Hossein (2007), examining policy effects and comparative advantage of agricultural crops in the Kerman province, Journal of Agricultural Economic, No. 3 (Volume I), p. 389- 401

Mirzayi, Farhad. Saeed yazdani, Ali akbar Ghareh daghi and Mohammad ghorbani (2003), examining Comparative advantage of Iran's export of meat products in the Middle East. Proceedings of the Fourth Biennial Conference of Agricultural Economics in Iran - Karaj.

Mohammadi, Dadgar (2005), examining comparative advantage, agricultural crops and garden Fars Province, Articles Collections of the Fifth International Conference on Agriculture, 2005 – Zahedan.

Mohammadi, Dadgar (2004), determine the comparative advantage of oil seeds, and examining production problems in Fars province, Journal of Agricultural Economics and Development, No. 47, p. 125-151

Moosa nejad, mohammad gholi and mehdi zarghami (1994), measurement of comparative advantage and effectiveness of government interventions on the main products of agricultural, Agricultural research and education organization, the final report research project.

Salimi far and sadighe mirzayi khalil abadi (2002), comparative advantage in production and export of Iranian pistachios, JournalAgricultural Economics and Development, No. 38, p.7- 28 Statistics and Information the Department of Agriculture between 2003 to 2008

Unido (1986), International comparative advantage in manufacturing: changing profiles of resource and trade, Unido Publication, Sales No. E86LIB9, Vienna, United Nations, Industrial Development Organization.

Van Hulst, N.R. Nulder and L.L.G. Soete (1991), Exports technology in manufacturing industry, Weltwirtschaftliches Archive, Vol. 127, 265-280.

World Bank (1994), China: Foreign trade reform; country study series, Washington D.C. World Bank.

Yao, S. (1997), Comparative advantage and crop diversification: A policy analysis matrix for Thai agriculture, Journal of Agricultural Economics Department, World Bank, Washington, D.C.

Yeats, A. (1992), What do alternative measures of comparative advantage reveal about developing countries, exports, The Indian Economic Review, Vol. 27.