Investigation on Relationship Between Revealed Comparative Advantage of Value-added Agricultural Sector and Economic Development of Khorasan Province of Iran

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Abstract: The purpose of the present paper is to investigate the relationship between the so-called Revealed Comparative Advantage (RCA) of agriculture value added and economic development in Khorasan province and compare it with other provinces of the country. To do so, we have used data published by Iran's statistic center in 2006.We have used RCA to estimate comparative advantage and applied the so-called Morris index to quantify the degree of economic development in all 28 provinces. Results showed that Khorasan province has enjoyed comparative advantage in agriculture during the period under consideration. We have also shown that the index of economic development in agriculture in Khorasan province is estimated to be 0.538 which indicates that Khorasan is a developed province in agriculture and is third among all provinces. Finally we found a positive and significance relation between comparative advantage as well as economic development indexes in agriculture sector.

Key words: Value-Added in Agricultural Sector · Comparative Advantage index · Morris index · Khorasan Province

INTRODUCTION

Planning for economic development in Iran started much earlier than for many other countries. The first plan for economic development of Iran was initiated in 1948. In initial structural plans of Iran industry development received the main focus, while, from the fourth plan the focus has shifted to agricultural development. In spite of the fact that during the fourth plan, national production increased with the average rate of above twelve percent, annual growth rate of agriculture sector was only 9.3 percent. Consequently, the gap between earnings of workers of agriculture and industry sectors increased. After Islamic Revolution of Iran, agricultural development gained the first priority among Iranian leaders. The agricultural sector was the only part that could preserve its dynamicity during the eight-year war and economic embargo [1-5].

Considering the above-mentioned points, the main aim of the present article is to investigate the relationship between revealed comparative advantage of value added and economic development in agriculture sector in provinces of Iran. In order to accomplish the aim, the following research questions will be answered.

- Concerning revealed comparative advantage of value added in agriculture sector, what is the status of Khorasan province in comparison with other provinces of Iran?
- How is the status of economic development of Khorasan province in comparison with other provinces? Can Khorasan province be ranked as a developed province among others regarding measurement indexes of agriculture development?
- What is the relationship between revealed comparative advantage value added in agriculture sector and economic development of the same sector? Is it positive, negative? Is it significant or not?

MATERIALS AND METHODS

The research method of the present article is analytical in nature. It is also library-based. Iran's provinces constitute the statistical population of the study. The necessary data of the study was extracted from statistics and data of regional accounts of Iran's provinces as well as the annual statistics published by Iran's statistic center in 2006.

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In order to investigate the research questions, three models will be used. They will be introduced and analyzed in the following part respectively.

Introducing Revealed Comparative Advantage (RCA) of Agriculture Sector: The follow index will be used to investigate revealed comparative advantage value added of agriculture sector of provinces of Iran [2,3,6-9].

RCA =

$$\text{RCA} = \cfrac{\cfrac{\text{Value added of agriculture sector in the province}}{\text{Gross domestic product of the province}}}{\cfrac{\text{Value added of agriculture sector of the whole country}}{\text{Gross domestic product of the whole country}}}$$

Therefore, using the above-formula, the index of revealed comparative advantage value added of agriculture sector of the provinces can be calculated [5-7].

Introducing Morris Un-weighted Index and Its Application in Determining Agricultural Development: For the first time, this method was utilized in 1990 to rank 130 countries in terms of Human Development Index by UN. The method was called human development index. The stages of the method will be represented below.

First Stage: this stage involves identifying and defining the related index for privation recognition or enjoyment of the provinces in terms of direct or indirect relationship with the business sector. A great amount of attention should be devoted to index identification as well as definition of statistic concepts in this stage. Hereby, in this stage, matrix indexes $IN(n \times m)$ will be formed in which the rows represent provinces and columns represent indexes.

$$IN(n \times m) = \begin{bmatrix} IN_{11}IN_{21}...IN_{1n} \\ IN_{21}IN_{22}...IN_{2n} \\ . \\ . \\ IN_{m1}IN_{m2}...IN_{mn} \end{bmatrix}$$

$IN_{,ij}$ show the value of each individual index ($i = 1,2,3,...,13$) agriculture development index for each individual province ($j=1,2,3,....,28$)

Second Stage: The second stage involves using the calculated matrix indexes of the first stage; minimum Min_j

and maximum Max_j should also be identified. In other words, by identification of Min_j and Max_j of the indexes the scope of the privation of the provinces would be calculated in terms of all indexes.

Third Stage: The third stage concerns defining the amount of privation for each of the provinces with consideration of the chosen indexes of the first stage and of Min_j and Max_j of the indexes of the second stage. Therefore, privation of each province is defined as:

$$I_{ij} = \frac{Max(IN_{ij}) - IN_{ij}}{Max(IN_{ij}) - Min(IN_{ij})}$$

In which I_{ij} is the amount of privation of the i province in terms of j index.

Fourth Stage: While the amount of privation for each province in terms of each index is calculated, the overall privation coefficient of the provinces was not identified, yet. Thus, in this stage the main index of privation for each province in comparison with other provinces will be calculated through combining other introduced indexes. In order to calculate the comparative privation and convenience of the provinces, the sum of indexes amounts of the third stage should be divided to the number of used indexes. The following formula is the result of such process:

$$D_{ij} = \frac{\sum I_{ij}}{n}$$

Fifth Stage: the last stage concerns estimating the index of development of the sectors. In this stage, the index is calculated from the difference of 1 from the mean of D_{ij} privation [1-2,8].

$$(BDI)_i = (I - D_{ij})$$

Model Used to Investigate the Relationship between Economic Development and Revealed Comparative Advantage of agriculture sector in provinces of Iran: To investigate the relationship between indexes of RCA of the activities of the agricultural sector and economic development of the provinces, the following regulation formula is used:

$$Y_i = a + \beta.RCA_i + U_i$$

in which Y_i is the agriculture development of the i province; RCA_i is the index of revealed comparative advantage of value added of agriculture sector in i province. This model is estimated using the procedure of the least squares. In order to determine the level of significance of the above model t-test is used [6,7].

RESULTS AND DISCUSSION

Analysis of the Findings of the Study: The analysis section contains three parts. In the first part, the index of revealed comparative advantage of value added of economic activities of agriculture sector of the provinces of Iran is calculated and the status of Khorasan province in comparison with other provinces will be investigated. In the second part, agriculture development index will be calculated using the model introduced in the pervious section and also the status of Khorasan province will be compared with other provinces concerning agriculture development. In the third part, the relationship between the revealed comparative advantage of value added of agriculture sector and the development of the same sector in different provinces of Iran will be studied.

Calculating Revealed Comparative Advantage of Value Added of Agriculture Sector in Provinces: Considering the agriculture value added share data in gross domestic product of provinces that was published by the statistic center of Iran, also considering the introduced models of revealed comparative advantage, RCA of the provinces was calculated and is presented in Table 1.

Table 1, indicates that the greatest amount of revealed comparative advantage of value added of agriculture sector is related to Golestan province. Considering the fact that revealed comparative advantage of value added of agriculture sector in Golestan province is higher than one, not only does the Golestan province enjoy comparative advantage in terms of agriculture activities, but also it ranks first among other provinces. Table 1 also reveals that Ardebil and Hamedan provinces ranked second and third respectively among other provinces. In contrast, the lowest amount of index that is equal to 0.19 is related to Tehran province. Therefore, Tehran province lacks the necessary comparative advantage regarding activities of value added in the agricultural sector.

Table 1 also indicates that revealed comparative advantage of value added of agriculture activates in Khorasan province is equal to 1. 48 that proves the

Table 1: Revealed Comparative Advantage of Value-Added in Agriculture Sector in Provinces of Iran

Provinces	RCA	SRCA	Rank
East Azerbaijan	1.31	0.14	18
West Azerbaijan	1.95	0.32	11
Ardebil	2.61	0.45	2
Isfahan	0.83	-0.10	25
Ilam	0.93	-0.04	21
Boushehr	0.89	-0.06	24
Tehran	0.19	-0.68	28
Chaharmahal Bakhtiari	2.26	0.39	6
Khorasan	1.48	0.19	15
Khozestan	0.57	-0.27	26
Zanjan	1.96	0.32	10
Semnan	2.11	0.36	7
Sistan Balouchestan	1.44	0.18	16
Fars	1.99	0.33	8
Qazvin	1.63	0.24	13
Qom	0.93	-0.04	22
Kordestan	1.40	0.17	17
Kerman	2.38	0.41	4
Kermanshah	1.66	0.25	12
Kohkilouyeh Boyer Ahmad	0.24	-0.62	27
Golestan	2.64	0.45	1
Guilan	1.49	0.20	14
Lorestan	1.99	0.33	9
Mazandaran	2.34	0.40	5
Markazi	0.93	-0.03	23
Hormozgan	1.30	0.13	19
Hamedan	2.44	0.42	3
Yazd	1.18	0.08	20
Iran	1	0	-

Source: Calculated by Author from Iran's Statistic Center (2006)

amount of symmetric revealed comparative advantage of value added of agriculture activities is also positive. Therefore, since revealed comparative advantage of value added of agriculture activates of Khorasan province is higher than one ($RCA>1$) and consequently, its symmetric comparative advantage is also positive ($SRCA>0$), Khorasan province enjoys comparative advantage in terms of value added of agriculture activities. Also, regarding this score, Khorasan ranked fifteenth among provinces of Iran.

Concerning the revealed comparative advantage of value added of agriculture sector of other provinces of Iran, Ttable. 1 indicates that except central provinces, such as Markazi, Ilam, Qom, Boshehr, Isfahan, Khozestan, Kohqiloyeh and Boyerahmad and Tehran that their index of revealed comparative advantage of value added agriculture activities are less than one (RCA< 1) and consequently, symmetric revealed comparative advantage

Table 2. Economic Development in Agriculture Sector in Provinces of Iran

Provinces	Degree of Economic Development (Morris)	Rank
East Azerbaijan	0.415	17
West Azerbaijan	0.475	13
Ardebil	0.509	8
Isfahan	0.615	1
Ilam	0.290	24
Boushehr	0.208	26
Chaharmahal Bakhtiari	0.466	11
Khorasan	0.538	3
Khozestan	0.411	18
Zanjan	0.391	19
Semnan	0.519	6
Sistan Balouchestan	0.270	25
Fars	0.529	5
Qazvin	0.584	2
Qom	0.369	20
Kordestan	0.307	23
Kerman	0.363	21
Kermanshah	0.357	22
Kohkilouyeh Boyer Ahmad	0.461	12
Golestan	0.516	7
Guilan	0.443	14
Lorestan	0.480	10
Mazandaran	0.505	9
Markazi	0.430	15
Hormozgan	0.144	27
Hamedan	0.536	4
Yazd	0.418	16

Source: Calculated by Author from Iran's Statistic Center (2006)

Table 3: Relative Level of Economic Development in Agriculture by Morris Index in Provinces of Iran

Degree of Development	No.of Province	Province Name and Normalized Score	Level of Development
Low than 29.9	1	Hormozgan (23.4)	Underdeveloped
30 to 39.9	1	Boushehr (33.8)	Underdeveloped
40 to 49.9	3	Sistan Balouchestan (43.9); Ilam (47.2); Kordestan (47.2)	Underdeveloped
50 to 59.9	2	Kermanshah (58.1); Kerman (59)	Relatively Underdeveloped
60 to 69.9	6	Qom (60); Zanjan (63.6); Khozestan (66.8); East Azerbaijan (67.5); Yazd (68); Markazi (69.9)	Relatively Underdeveloped
70 to 79.9	5	Guilan (72.1) West Azerbaijan(74.3) Kohkilouyeh (75) Chaharmahal (75.8) Lorestan (78.1)	Relatively Developed
80 to 89.9	7	Mazandaran (82.2) Ardebil (82.8) Golestan (83.9) Semnan (84.4) Fars (86.1) Hamedan (87.2) Khorasan (87.5)	Developed
90 to 99.9	1	Qazvin (95)	Developed
100	1	Isfahan (100)	Developed

Source: Calculated by Author from Table 2

of value added is negative (SRCA<0), other provinces enjoy comparative advantage in terms of agriculture activities,. Therefore, to pave the way for the above-mentioned provinces to achieve the necessary comparative advantage in agriculture activities it is necessary to modify value added of the agricultural sector in the provinces that lack comparative advantage. This aim will be achieved through regular and systematic planning.

Considering the thirteen number of agriculture development data of provinces of the country that was published by the statistic center of Iran, also considering the introduced models of economic development, economic development of the provinces of the country was calculated and is presented in Tables 2 and 3.

Table 2 indicates that the greatest amount of economic development of agriculture sector is equal to 0.615.

For Isfahan province. In contrast, the lowest amount of index that is equal to 0.144 is related to Hormozgan province.

Table 2 also shows that the index of economic development in agriculture in khorasan province is estimated to be 0.538 which indicates that Khorasan is a developed province in agriculture and is third among all provinces

Table3 indicates that only nine provinces of the country are developed, five provinces are relatively developed, eight provinces are relatively underdeveloped and five provinces are underdeveloped. In other hand 33.3 percentages of provinces of the country are developed in agriculture sector.

Finally, regarding to the third model, we found a positive and significance relation between comparative advantage as well as economic development indexes in agriculture sector.

$$Y = 0/335 + 0/058 \, RCA$$
$$(2/8) \quad (5/91)$$

$$F = 13/19 \qquad \bar{R}^2 = 0/82 \qquad R^2 = 0/86$$

Where; Y is the proposed development index in agriculture, F- statistics shows the significance result at a 5 percent level, R^2 is goodness of fit measure indicates a high percentage of variations in dependent variable explained by the model and $\bar{R}^2$ is the adjusted R^2. Figures in parenthesis are the t-statistics.

CONCLUSION

The purpose of the present paper has been to investigate the relationship between Revealed Comparative Advantage (RCA) of agriculture value added and economic development in Khorasan and compare it with other provinces of Iran. The data published by Iran's Statistic Center in 2006 used to estimate RCA and the so-called Morris index to quantify the degree of economic development in all 28 provinces.

Results show that Khorasan province has enjoyed comparative advantage in agriculture during the period under consideration. We have also shown that the index of economic development in agriculture in Khorasan province is estimated to be 0.538 which indicates that Khorasan is a developed province in agriculture and ranked third among all provinces of Iran. Finally we found a positive and significance relation between comparative advantage as well as economic development indexes in agriculture sector. Policies initiated by policy makers to improve RCA and or economic development index are suggested for the country as a whole.

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