Original Article

A Comparison of Performance of Iranian Cooperatives in Job Creation

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ABSTRACT

According to the young population and economic conditions prevailing in Iran in recent years, employment has been a major objective of economic policies. One of the most important policies is to promote economic cooperation in the share of micro enterprises on one hand, and with its productive capacity it could increase economic power which helps reduce unemployment by creating jobs in the state on the other hand. Therefore, in this study, with the focus on employment as important activities, the role of the cooperative sector in a changing economic situation has been studied. Also, in order to evaluate their relative performance in achieving this goal the data envelopment analysis (DEA) is used.

Keywords: Corporate, Employment, Data Envelopment Analysis (DEA).

Introduction

Cooperation is considered as one of the efficient levers for economic and social development. It can affect the optimum efficiency of life conditions, jobs and production and also help the income promotion and social conditions. The experience of developed countries demonstrates that cooperatives have been the best organization that have succeeded to gather those talented and motivated assemblies who had been scattered. In recent years, major efforts have been made to improve economic and social conditions of the people of Iran and many models have been proposed for achieving these objectives. . But considering the conditions and possibilities of its economic characteristics and specifications, actually contribution to economic growth and development has not been fully realized. For example, different types of investments in the sector due to ,on the one hand, economic characteristics could limit the capacity of growth and parallel to the concentration of economic interactions, on the other hand, a lack of planning and lack of suitable planning and the development of structural and cultural problems of this investment failed to create a boom in the market mechanism and interaction which is of great importance in reciprocal influence of increasing and accelerating economic factors. Efficiency means the ratio of the products to the consumed materials used to produce them. Economic efficiency is

based on two issues: the first is the appropriate choice of materials to be used and the second is the choice of methods to be followed in order to produce the product. Two main methods of measuring the efficiency are "parametric and nonparametric" ones. In parametric method a production function would be estimated using the econometrical and statistical procedure. The second method does not need the estimation of production function. Data Envelopment Analysis (DEA) is a nonparametric method that compares and evaluates the relative efficiency of units (DMU). It does not need to specify the production function and has no limits on number of inputs and outputs so efficiency is the ratio of outputs to inputs.

Literature Review

The employment offices may cause to decrease the unemployment in economy. Vassiliev et al (2006) carry out Data Envelopment Analysis (DEA) to evaluate the employment offices' performance in Switzerland based on production efficiency measures. They find that there is considerable room for improved efficiency in employment service, which could lead to a lower level of structural unemployment. We also find that differences in the external operating environment have a significant influence upon the efficiency of employment offices. Phillips and Nordlund (2012) investigate the efficiency of the benchmark revisions to the current employment statistics (CES) data. They find evidence of a cyclical and seasonal bias in the annual benchmark revisions to the monthly level of non-farm payroll employment. They propose a change to the methodology that would remove the seasonal bias and ensure that the benchmark process does not artificially influence the estimated

seasonal pattern in the raw data. Cimera, and Rusch (1999) discuss the cost-efficiency of supported employment programs, the benefits and costs of employing 394 individuals, with various disabilities in three types of supported employment models. They found that supported employees with cerebral palsy, deafness, or autism generated the highest benefits from the perspective of taxpayers and society, whereas individuals with mild mental retardation and a secondary disability as well as people with blindness accrued the lowest monetary benefits to society and taxpayers. Individuals with cerebral palsy, deafness, epilepsy, or specific learning disabilities were the most costly populations to serve. Mickiewicz et al (2005) examined the relationship between corporate control structures, sales growth and the determinants of employment change in large Polish firms. Their finding shows that Privatized and de novo firms are the main drivers of employment growth; in the case of de novo firms, it is foreign ownership which underpins the result. Being privatized has a positive impact on employment but this is concentrated within a range of 3–6 years after privatization. There are no systematic differences in employment response to negative sales growth across the ownership categories. Employment in state firms is less responsive to positive sales growth. They infer that the behavior of state firms is affected by both insider rent sharing and binding budget constraints. Pickett et al (1974) comprised a bald presentation of some results of an enquiry into the choice of technology in the sugar and footwear industries in Ethiopia and Ghana, and a bold examination of some implications of these results. They show that the baldness can be justified by the need for brevity and the fact that more complete results, more fully

described, will shortly be available; the boldness by the desire to focus attention on a number of issues which can stand airing in provocative form. Cahuc, and Postel-Vinay (2002) analyzed the combined impact of those two instruments using a matching model. They found that it may be the willingness of a majority of workers to support the combination of two instruments with opposite effects on job destruction and job creation that increases unemployment and reduces efficiency. Moreover, while inefficient, this combination may be supported by a majority of workers, depending on firm ownership concentration. Laissez faire is the preferred point of a majority of workers when firm ownership is dispersed, whereas a combination of job protection and temporary jobs is preferred by workers when it is concentrated. Vangelista and Savona (2003) investigated the employment impact of innovation in the heterogeneous universe of services, using data provided by the 1993–1995 Italian innovation survey. The empirical evidence presented shows that the "direct" impact of innovation on employment varies greatly according to the type of innovation strategy pursued by firms, across industries and according to the level of qualification of the labor force. High skilled and qualified jobs do replace low skilled jobs. Among small firms and in less than half of the service sectors considered the net effect is positive, particularly in industries which have a strong scientific and technological base. The negative impact of innovation on employment is on the contrary concentrated among large firms, capital intensive industries and in all financial-related sectors (banking, insurance and other financial services). Morton (1998) used industry data to investigate the connection between compensation

volatility and the volatility and growth rate of employment. He observed a significant relationship between employment and `seasonally predictable' compensation volatility, implying that industries in which firms commit themselves to paying regular new year bonuses employ more workers, more stably. He also investigated the relationship between compensation, profits and productivity growth and found a significant role for productivity growth in the determination of profits and for profits in the determination of bonuses. However, it appeared that productivity growth itself is mainly determined by exogenous factors, and is only slightly responsive to the bonus system.

Çetin, and Eğrican (2011) investigated the employment effects of solar energy industry in Turkey. By the findings they suggested that solar energy in Turkey would be the primary source of energy demand and would have a big employment effects on the economics. That can only be achieved with the support of governmental feed-in tariff policies of solar energy and by increasing research-development funds.

Data and Methodology

The present study has measured and compared efficiency of Iranian cooperation Firms according to thirteen fold bracket of cooperation ministry by using a BCC output oriented model of the DEA. The data used encompasses thirty months proceeding September 2007. In each used model, the number of companies, their stock and the number of their staff has been considered as inputs and produced jobs as outputs.

Concepts and Methods

In economic literature, efficiency has different definitions:

Daft (1989): Organizational efficiency is the amount of used sources in producing an output unit. If a firm uses the sources less than others and can produce the same, it is efficient. Nicholson (1972): Efficiency is the optimum specializing of sources. He claims that in a set of activities, those are more efficient that their production does not increase unless the production of other activities decreases. Manouchehr Farhang: Efficiency is the ratio of the product to the used materials. He has considered both technical and economical efficiency the same. Data envelopment analysis began with Edward Rhodes's doctoral dissertation under the observation of Cooper. It evaluated the education development of American students in 1978. He published the results of his research with cooperation of Charnes and Cooper in an article named CCR. CCR changed multiple input and output to single ones and used optimized method in order to adopt the efficiency of one input and one output. In the cases which consist of more than one input x and y, efficiency is the ratio of y/x. now if this unit or organization includes more than one input and output , it is essential to devote more coefficients to inputs and outputs, so efficiency is:

Efficiency= sum of weighted outputs/ sum of weighted inputs

If the aim of efficiency observing is $\underline{n}$ units and each includes $\underline{m}$ inputs and $\underline{s}$ outputs, the efficiency of $\underline{j}$ unit is calculated as below:

$$efficiency\ of\ unit\ \ j = \frac{\sum_{r=1}^{s} u_r\, y_{rj}}{\sum_{i=1}^{m} v_i\, x_{ij}}$$

In the equation above ( )s are scales of inputs and( )s are scales of outputs. The general linear planning model of DEA is like the one below:

$$Max\ Z_k = \frac{\sum_{i=1}^{s} u_r\, y_{rk}}{\sum_{r=1}^{m} v_i x_{ik}}$$

$st:$

$$\frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \le 1 \qquad (j = 0,1,\ldots,n)$$

$$u_r, v_i \ge 0$$

DEA main models are divided into two categories: CCR and BCC. Each of these can be investigated by using two methods, output oriented and input oriented. Each of them can be solved via two methods.

According to the goal's function, it would be obvious that this model is not linear and by solving it the (u_r) and (v_i) will be available in order to calculate the efficiency of the unit. This model has a problem because of its infinite answers. In order to change this model to a linear one we can use simple mathematic methods.

CCR model:

This model was first presented by Charnes, Cooper and Rhodes in 1978 and its name is the combination of the first letters of their name. Imagine that $\underline{n}$ units are available to evaluate that use inputs such as x_{1o}, x_{2o}… x_{mo} in the process of producing y_{1o}, y_{2o}… y_{mo}. Mainly the CCR model changes more than one input and output to only one virtual input and output. And for one special decision unit, the proportion of this amount of output toward the amount of virtual input is the efficiency of the unit.

BCC model

Banker, Charnes and Cooper (1984) expanded the CCR in a way that includes the variable output regarding the scale. Using the assumption of fixed output relative to scale can distort the calculated amounts for technical efficiency (by including scale efficiency). Using variable output relative to scale leads to a precise analysis by calculating technical efficiency on the basis of efficiency amount derived from scale and the efficiency caused by management.

The BCC output oriented model is shown as below:

$$Min\, Z_k = \sum_{i=1}^{m} v_i\, x_{ik} + w$$

$$S.t:$$

$$\sum_{r=1}^{s} u_r\, y_{r0} = 1$$

$$\sum_{r=1}^{s} u_r\, y_{rj} - \sum_{i=1}^{m} v_i\, x_{ij} + w \leq 0$$

$$u_r, v_i \geq 0$$

$$w\ free\ in\ sign$$

In BCC model _w_ demonstrates the output toward scale for each unit.

When _w_<0, there is decreasing return to scale.
When _w_=0, there is fixed return to scale.
When _w_>0, there is increasing return **to scale.**

Anderson-Peterson's Model

In performing data's envelopment analysis, if we decide to rank the observed units, we will face difficulty, when ranking the efficient units. Because the efficiency score of all units is equal and impossible to be differentiated. In 1993 Anderson and Peterson offered a method which solved the problem. In such a way, that after the performance of BCC, CCR models, these

two models can be used again for efficient units. This time the limitation which is related to the unit itself will be eliminated. By doing so the amount of goal's function which demonstrates the efficiency, could be greater than one, so they can be compared. This model is shown as below:

$$Max\, Z_k = \sum_{r=1}^{s} u_r\, y_{rk}$$

$$s.t:$$

$$\sum_{r=1}^{s} u_r\, y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \leq 0 \quad j = 1,2,...,n \quad, j \neq k$$

$$\sum_{i=1}^{n} v_i\, x_{ij} = 1$$

$$u_r, v_i, \geq 0$$

The Model

Output-oriented BCC model was used in this study to evaluate the cooperative companies in different orientations. Capital variables, the number of members and the number of firms in each activity were considered as input and variables such as the number of employees were chosen as output.

As seen in Table 1, agriculture, industrial, manufacturing supply, transportation, credit, multiple services and meeting the needs of service providers, making the use of their resources at hand, compared with other activities managed to perform better at creating jobs. Whereas, the mining and housing cooperatives had the weakest performance considering this type of activity and the main objective of this company it seems quite reasonable. Among efficient activities, multi-functional activities have never been used as a model for other activities. Agricultural activities and meeting the needs of service providers were used once as a model for construction activities and the needs of consumers respectively. The construction activities was used as a model for both

credit unions and consumer needs. If we ignore the number of firms and the number of input variables be reduce from three to two, the results will only vary slightly as shown in Table 2.

Table 1. Results of the model input and output shaft

Row	Activity	Technical efficiency	Scale efficiency	Reference units	Optimum employment	The actual amount of employment	Deviation of employment
1	Agriculture	1	0.852	1	326273	326273	-
2	Construction	0.867	0.892	1,3,6,10	309715	268565	41150
3	Industrial	1	1	3	292866	292866	-
4	Mineral	0.005	0.197	6	347626	1881	345745
5	Carpet	0.157	0.226	6	347626	54510	293116
6	Requiovidres manufacturers to pre	1	0.757	6	347626	347626	-
7	Services	0.516	0.241	6	347626	179526	168100
8	Transport	1	0.892	8	38740	38740	-
9	Housing	0.015	0.632	6	346726	5384	342242
10	Credit	1	1	10	270897	270897	-
11	Consumer needs	0.433	0.856	10,3,10	82713	35841	46872
12	Multipurpose	1	1	12	251721	251721	-
13	Provide the required service classes	1	0.462	13	4686	4686	-

Source: Computing research

The only difference in performance is the increase of the efficiency of the construction activities and consumer needs to 200/0, 048/0 respectively, which, as the result, have changed optimized employment and their reference units. These results suggest that variable of the number of firms in each activity has no impact on the efficiency border. Hence, it would be better to remove the variable from the model. The low efficiency of mining and housing cooperatives reflects the capital nature of this industry. It may also be due to the uncertain status of workers in this sector which is in turn as the result of issues with insurance and social security services. The type and use of labor in the two sectors are often seasonal work contracts, informal and short-term. The carpet performance rated 11 in rank of active employment should be sought in the way and the reason of formation of cooperatives. Take a look at the general condition of the Iranian carpet industry in recent years you can see that despite the fact that lots of the problems exist in the manufacturing sector which are due to mismanagement of the industry at macro-level, a significant share of additional value belongs to distribution sector.

Table 2. The results of model input and output shaft

Row	Activity	Technical efficiency	Scale efficiency	Reference units	Optimum employment	The actual amount of employment	Deviation of employment
1	Agriculture	1	0.852	1	326273	326273	-
2	Construction	0.865	0.894	10,1,3	310477	268565	41150
3	Industrial	1	1	3	292866	292866	-
4	Mineral	0.005	0.148	6	347626	1881	345745
5	Carpet	0.157	0.072	6	347626	54510	293116
6	Requires manufacturers to provide	1	0.751	6	347626	347626	-
7	Services	0.516	0.221	6	347626	179526	168100
8	Transport	1	0.892	8	38740	38740	-
9	Housing	0.015	0.457	6	346726	5384	342242
10	Credit	1	1	10	270897	270897	-
11	Consumer needs	0.385	0.963	8,3,10	93051	35841	46872
12	Multipurpose	1	1	12	251721	251721	-
13	Provide the required service classes	1	0.462	13	4686	4686	-

Source: Computing research

The most active micro manufactures have established cooperatives and the main focus of producers is this activity. Carpet and downstream services and related issues such as marketing and sales were ignored by cooperatives. As the result, the cooperatives have been formed with large number of members and high capital investment to the extent that they are placed at first and second among the member cooperatives respectively. Since the meeting the needs of consumers deals with final manufactured goods it requires high capital to carry out its activities, as the goal of establishment of cooperatives is to eliminate middlemen and reduce the consumer's cost it make use of the minimal work force. Its employment performance has been rated 10. Service

cooperatives, contrary to what was expected, given the nature of their job, performed weakly in creating jobs, compared to other activities and success. The reason is that these companies have a large number of members with high capital (maximum investment). Despite above-average employment relative to cooperative sector employment, as for other functional activities did not performed well enough. Constructive activities are a type of investment activities. Considering specific expertise in the industry, the number of the small companies that are established in accordance with specific projects is high in Iran. So the lack of using economies of scale and the existence of small companies are some of the factors which caused the relative inefficiency associated

with these activities. Between the variables, the number of capital and changing capital can be economically more important. Thus, in Table 3, the employment generated per unit of capital was employed in the various activities and the results have shown the optimal value. According to Table 3, the two values are equal for functional activities, but for non-functional they are different. The remarkable point is that the optimum ratio of employment to working capital for multiple units is different and this difference is due to lack of consideration of the number of members. In fact, the two functional activities A and B if they have an equal employment rate and the capital of A is greater than that of B, B has more active members than A. Regardless of the number of members on the basis of Table 3 we can conclude that among the activities of the multifunctional performance, credit, and transportation had the highest ratio. As expected, non-functional activities have and the lowest ratio.

Table 3. The employment of capital

Row	Activity	Technical efficiency	Employment of capital	Optimization of working capital
1	Agriculture	1	28.11	28.11
2	Construction	0.865	24.33	28.06
3	Industrial	1	15.45	15.45
4	Mineral	0.005	0.05	9.39
5	Carpet	0.157	1.56	9.95
6	Requires manufacturers to provide	1	50.96	50.96
7	Services	0.516	3.89	7.54
8	Transport	1	112.01	112.01
9	Housing	0.015	0.38	24.63
10	Credit	1	126.04	126.04
11	Consumer needs	0.385	23.58	54.41
12	Multipurpose	1	260.85	260.85
13	Provide the required service classes	1	75.99	75.99
		Source: Calculations researcher		

According to the results of the output-oriented BCC models and Anderson – Peterson, ratings below can be applied to activities:

Table 4. Full rank models using BCC and A & P

activity	Technical efficiency	Rank	Activity	Technical efficiency	Rank
Agriculture	1	1	Construction	0.867	8
Requires manufacturers to provide	1	2	Services	0.516	9
Industrial	1	3	Consumer needs	0.433	10
Transport	1	4	Carpet	0.157	11
Credit	1	5	Housing	0.015	12
Multipurpose	1	6	Mineral	0.005	13
Provide the required service classes	1	7			
		Source: Calculations researcher			

As Table 3 illustrates among the various activities, mining operations bear the minimum capital and multifunctional activities had the highest ratio of employment to capital. The least effective sector in creating jobs was mining and the most efficient (best performance) was farming.

Conclusion

In the present study, the efficiency of the cooperative sector of Iran in creating jobs and employment was investigated using data envelopment analysis method. According to the data, the variable capital and the number of members were considered as the input and the output was the variable number of employees. The results showed that the model used is not sensitive to the number of firms in each activity, and its deletion from the model did not affect the results of the model so it was not used. The results showed that agricultural, industrial activities, manufacturing supply, transportation, credit, multifunctional activities and meeting the needs of service providers had better performance and efficiency than other cooperative activities, and the mining and housing cooperatives had the weakest performance. On the whole, in the absence of adequate support and proper planning on the part of cooperatives, they failed to perform well in attracting investment, creating jobs, innovation and entrepreneurship compared to other economic sectors. Actually, they possess the lowest share of GDP as compared to Iran's public and private sectors.

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