Management Science Letters 4 (2014) 1229–1232

Contents lists available at GrowingScience

Management Science Letters

homepage: www.GrowingScience.com/msl

Measuring the performance of accepted investment companies in Tehran's stock exchange, by value efficiency analysis

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C H R O N I C L E

Article history:
Received December 28, 2013
Received in revised format April 15 2014
Accepted April 18 2014
Available online
April 30 2014

Keywords:
Value efficiency analysis
Data Envelopment Analysis
Investment companies
VEA

A B S T R A C T

Measuring the relative performance of firms plays an important role for investment decisions. This research presents a systematic method to evaluate the performance of accepted investment companies listed on Tehran Stock Exchange. The analysis is based on a set of criteria that are determined by experts and the values of criteria's are extracted from the actual data reported to stock exchange. The efficiency measurement carried out by value efficiency analysis, which is an extension of data Envelopment Analysis. Finally, according to the model's results, the efficient investment companies are introduced and they are ranked based on the defined criteria. The preliminary results indicate that both methods are capable of providing appropriate rankings for different financial firms.

1. Introduction

Increasing growth of investment and trend towards investment in stocks, and the comparative atmosphere with the increase of companies' activities in financial issues, has led the researcher's attention toward the performance measurement. It is also necessary to provide a systematic and scientific approach to analyze companies' performance, especially investment companies because of professional management with its variety of portfolio (Korhonen, 2002; Khedmatgozar et al., 2013; Eskelinen et al., 2014; Haji Bozorgi, 1996). There are different methods for evaluating the performance, which helps achieve desirable objectives (Najafi, 2005; Daneshvar, 2006). Data Envelopment Analysis (DEA) is a method for measuring efficacy and is used for measuring the efficiency of decision making units. However, in DEA model, there is no superiority between inputs and outputs (Korhonen & Syrjänen, 2005). Value efficiency analysis (VEA) is the developed technique of DEA for explaining the process of VEA. Charnes et al. (1978) are believed to be the first

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doi: 10.5267/j.msl.2014.5.001

who introduced DEA to evaluate program Follow-through U.S. education. The idea of DEA is the assessment of efficiency of a unit by considering input weight to output's weight (On inputs haft) and the comparison of this with other similar units (Banker et al., 1984). Units with relative high efficiency, efficient units, are compared with the others units, which are in lower level and they are called ineffective. The inefficiency assessment is derived from radial image in efficient units on efficient border (which is obtained from efficient units). In terms of different applications of DEA method, it was extended to hospital environments (Bedard, 1985; Nunamaker, 1983; Serman, 1981, 1984), post offices (Deprins & colleagues, 1984), etc. Evaluative efficiency analysis was introduced by Halme et al. (1999), which interfered decisive preferential information into the DEA model. At first, the decision maker selects Most Preferred Solution (MPS), which is on efficient frontier (Assuming pseudo-concave utility function of the VEA) (Halme & Korhonen, 2000). Then, since the production of decision making Utility function is not explicated, it is estimated by tangent cones. Eventually, each unit is ranked according to the distance from the origin to the tangent cone. The distance is an optimistic estimate of the true value of efficiency score (Buyukbasaran, 2005). The method was developed in two styles: First, when additional information are not provided by the decision maker, the model builds a range for valued efficiency score and second through interactive method, which obtains each unit's efficiency score. Korhonen et al. (2002) presented some practical aspects, examples and VEA developments. However, three muster's thesis have been devoted on theoretical issues and extension of DEA due to addition of decision maker information to the model, as value efficiency (Ahmadi Amoli, 2005; Amjadi Moheb, 2002; Faghidloo, 2002).

2. Performance Evaluation

In order to perform the performance evaluation of VEA technique, criteria are important for evaluating the results. We first explain how to determine the criteria and their value. Then, the application of VEA is presented, and finally, the results of solving by VEA technique are shown.

2.1. Criteria determination and initialization

Criteria must be defined for an ideal investment company. They should be concise and at the same time, all aspects of the company should be included for evaluation. Most importantly, these criteria should take steps to achieve the objectives of the investment companies. In order to determine and evaluate the criteria, it is effective to know that investment companies are required to report activities, such as portfolio statement, financial reports, board reports, and audit reports for each course to provide access to data. In this paper, after extensive investigation and research about investment companies and use of different thesis and sites associated with investment companies, criteria were selected and collected. The criteria for evaluating the performance of investment companies were selected by using the results of the questionnaire, data collection, and weighting of each option by expert of Stock Exchange Organizations, Tehran Stock Exchange Company, investment companies, investment funds, and brokers. Among the obtained criteria of the questionnaire, efficiency measures, the percentage of revenue on total assets, equities, and gross realized MPS which is desirable to increase, are called output, and risk (standard deviation of latest price), which is desirable to reduce, is called input data. The value of each criterion is among the information that the listed companies on the Stock Exchange must report regularly to the organization. By using the software Rahavard Novin, available in the library of Stock Exchange Organization, the data of 33 investment companies over the period 1998-2012 were retrieved, which includes balance sheet, portfolio statement, and financial ratios.

2.2. Application of VEA Model

VEA model is a linear programming model in which the input vector is shown with X and the output is shown with Y, which, in other words, is the vector of measure value, and it is known to us. Z and λ are unknown whose numbers are the same with DMUs, and in order to solve the model, the same

number of DMUs should be solved by linear programming and Z and λ depend on the best preferred solution (Marshall & Shortle, 2005). MPS must be on the efficient frontier (The resulting solution of DEA models). In this study, because of importance of input, DMU's performance with the least amount of inputs are selected as the best preferred answer for implementation in value efficiency analysis in this model. The only difference between VEA and DEA models is positive Z and removing the non-negative of λ that the MPS point is a convex combination of those units. In fact, the VEA releases the strictly positive variables which make MPS as follows,

$$\max Z_A = \theta + \varepsilon\left(1^T S^+ + 1^T S^-\right) \tag{1}$$

subject to

$$Y\lambda - \theta y_A - S^+ = 0 \tag{2}$$

$$1^T \lambda + Z = 1 \tag{3}$$

$$Z \geq 0 \quad \text{if} \quad Z^* = 0 \tag{4}$$

$$\lambda, S^+, S^-, Z \geq 0 \quad S^-\left(\text{input slack}\right), S^+\left(\text{output slack}\right), \varepsilon > 0 \tag{5}$$

Value efficiency rating is between zero and one, that is, if the answer is one, the investment company performance is based on defined criteria. Whatever the number is closer to one, the better performance is indicated. Rating VEA is the most preferred combination of input and output, which is determined by decision- maker. In other words, VEA point identifies how inefficient units improve their performance to achieve the MPS. Table 1 shows details of our findings on the results of DEA versus VEA.

Table 1
The results of the model

Investment company	DEA	VEA	Investment company	DEA	VEA
1.Aatieh Damavand	1.0000	1.0000	18.Rena	0.9677	0.9677
2.Azarbayjan	0.8222	0.3011	19.Bulding	0.4423	0.4365
3.Etebare Iran	0.8846	0.8739	20.Samangostare Isfahan	0.6951	0.6951
4.Alborz	1.0000	0.3930	21.Saypa	1.0000	0.9140
5.Omid	0.8298	0.8298	22.Sepah	1.0000	1.0000
6.Iran khodro	0.7682	0.7682	23.insurance industry	1.0000	1.0000
7.Bazneshastegi	0.7747	0.7034	24-Mining and Industry	1.0000	1.0000
8.Melli Bank	1.0000	1.0000	25.Qadir	1.0000	0.6868
9.Bahman	0.5400	0.4106	26.Kaar Afarin	0.9388	0.9388
10.Bou Ali	0.7568	0.6575	27.Behshahr group	0.6435	0.6370
11.Pars toushe	0.4000	0.3670	28.Maskan	1.0000	0.1690
12.Petrilium	0.9229	0.5037	29- Mining and Metals	0.7135	0.6367
13.Pardis	0.6140	0.2912	30.Mellat	1.0000	1.0000
14.Tous Gostar	0.9700	0.7232	31.Melli	1.0000	0.8081
15.Industrial	0.8778	0.8543	32.Oil	0.7436	0.7436
16.national	0.8600	0.8600	33.Power	1.0000	1.0000
17.Tooka Foolad	1.0000	0.2440			

4. Conclusion

At first, a DEA model solved with Matlab software, which yields 13 efficient companies. The results derived from DEA model show the firms, which were on efficiency border and they have been chosen as the best preferable firms to use in value efficiency model. Table 2 shows details of value efficiency scores for efficient units associated with DEA model. The results of our survey have indicated that both DEA and VEA methods are capable of measuring the relative efficiencies of financial firms. This could help financial investment firms to have a better understanding on how to manage funds in future. As a future study, we recommend researchers to consider these models with uncertainty, which could give more realistic results.

Table 2
Efficient investment companies

Input	DEA Score	Value efficiency score	Investment company
11	1.0000	0.9140	4.Alborz
7	1.0000	1.0000	5.Omid
4	1.0000	1.0000	6.Iran Khodro
8	1.0000	1.0000	7.Bazneshastegi
18	1.0000	0.6868	8.Melli Bank
100	1.0000	0.1690	11.Pars Tousheh
3	1.0000	1.0000	13.Pardis
10	1.0000	0.8081	14.Tous Gostar
0	1.0000	1.0000	16.National Development
54	1.0000	0.2440	17.Tooka Foolad
6	1.0000	1.0000	18.Rena
31	1.0000	0.3930	21.Saipa
13	1.0000	1.0000	25.Qadir

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