Research on financing efficiency evaluation of advanced equipment manufacturing enterprise based on network DEA

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Keywords: Financing Efficiency, Network DEA, Advanced Equipment Manufacturing Enterprise

Abstract: This paper uses the network DEA method to measure the financing efficiency of 42 advanced equipment manufacturing enterprises from 2015 to 2020, and divides the financing efficiency into two stages: fund raising and fund allocation. Finally, it is believed that the overall financing efficiency of advanced equipment manufacturing enterprises and the efficiency of the capital allocation stage are low. In this regard, advanced equipment manufacturing enterprises can focus on the stage of weak efficiency, improve the level of operation and management etc.

1. Introduction

Advanced equipment manufacturing is one of my country's strategic emerging industries. It is located at the core of the industrial chain and has the characteristics of high added value and strong industry-driving capabilities. Funds are the blood of enterprise development. For high-end equipment manufacturing enterprises, funds are the basic guarantee for ensuring investment in technology research and development and realizing technological innovation. Financing is the main way for enterprises to obtain funds. How to achieve efficient financing is of great significance to advanced equipment manufacturing enterprises.

Reviewing previous studies, [1] pointed out that enterprises should integrate funds effectively and use them rationally, and should not waste them.[2]proposed that financing efficiency includes financing efficiency and allocation efficiency.[3]believe that the overall level of business performance of advanced equipment manufacturing enterprises in my country is relatively good, and the operating efficiency value of some enterprises is relatively low.[4] use the Super-SBM and Malmquist models , and shows the financing efficiency of my country's advanced equipment industry is in an inefficient state, and the financing efficiency exhibits volatility characteristics.

In order to solve the problem that traditional DEA failed to open the "black box",[5]proposed a network DEA model, which can analyze the efficiency of the whole system and each sub-stage. Based on the superiority of the network DEA model, this paper uses the two-stage network DEA model to measure the financing efficiency of advanced equipment manufacturing enterprises, and divides the financing efficiency into two stages: fund raising and fund allocation.

2. Selection of Indicators and Data Sources

This paper refers to the existing research of [4]etc., and finally selects the indicators as shown in Table 1:

Table 1. Selected Indicators of Financing Efficiency

Fund raising stage investment			Intermediate indicator		Fund allocation stage output		
Total operating cost	Equity ratio	Total assets	Amount of debt financing,	Amount of equity financing	Operating income	Net profit	Intangible assets

  DOI: 10.25236/icited.2022.038

The Tobit indicators are: economic development, financial industry development, corporate profitability, development capacity, operational capacity, financing structure, corporate size.

The data in this paper comes from www.cninfo.com.cn and the statistical results of the National Bureau of Statistics.

3. Evaluation of Financing Efficiency of Advanced Equipment Manufacturing Enterprises

3.1. Comprehensive Efficiency Analysis

Using the MAXDEA software, the efficiency value and sub-stage efficiency values of 42 advanced equipment manufacturing enterprises from 2015 to 2020 are calculated as shown in Table 2.

Table 2 The efficiency value of financing efficiency

DMU	Overall	Stage 1	Stage 2	DMU	Overall	Stage 1	Stage 2
002151	0.38	0.47	0.82	000008	0.40	0.97	0.41
300036	0.45	0.59	0.77	600458	0.56	0.86	0.64
002253	0.45	0.49	0.93	600990	0.41	0.84	0.49
600268	0.36	0.92	0.39	002405	0.50	0.72	0.69
002465	0.40	0.74	0.55	300001	0.30	0.95	0.31
300065	0.44	0.54	0.85	000400	0.46	0.63	0.73
300084	0.19	0.68	0.29	601890	0.29	0.70	0.41
002023	0.32	0.88	0.38	300131	0.81	0.92	0.86
600583	0.52	0.88	0.58	600320	0.34	0.87	0.39
002158	0.49	0.61	0.82	300101	0.45	0.91	0.50
600893	0.40	0.59	0.70	300097	0.31	0.59	0.59
600391	0.24	0.86	0.29	601186	0.90	0.90	1.00
000738	0.40	0.61	0.66	600118	0.48	0.64	0.76
600879	0.35	0.76	0.46	601766	0.74	1.00	0.74
600316	0.21	0.64	0.33	601989	0.29	1.00	0.29
300024	0.37	0.66	0.58	601808	0.24	0.74	0.32
002031	0.21	0.97	0.23	002179	0.60	0.64	0.94
300053	0.45	0.62	0.74	000768	0.40	0.75	0.54
002520	0.26	0.69	0.38	000039	0.46	0.71	0.64
002073	0.26	0.66	0.39	600522	0.67	0.68	0.98
601369	0.21	0.87	0.24	600038	0.36	0.77	0.47

In Table 2, it can be seen that the efficiency values of the top ten enterprises are 0.90, 0.81, 0.74, 0.67, 0.60, 0.56, 0.52, 0.50, 0.49 and 0.48 respectively. The efficiency values of the five least efficient firms are 0.2418, 0.2148, 0.2130, 0.2105 and 0.1947, respectively. Among them, 601,186 and 300,131 achieved a financing efficiency value of 1 for two or more consecutive years, showing good performance. In general, the financing efficiency of advanced equipment manufacturing enterprises is low, mostly between 0.1-0.6.

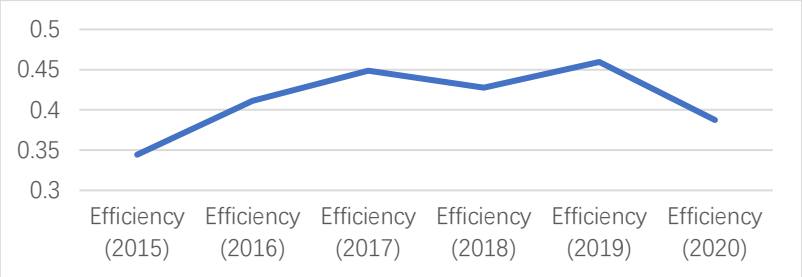

Figure 1 2015-2020 Average Annual Comprehensive Financing Efficiency Trend

From Figure 1, we can see the average change trend of the financing efficiency of 42 advanced

equipment manufacturing enterprises has risen and fallen, but the overall trend of the average financing efficiency has increased. In general, the financing efficiency of advanced equipment manufacturing enterprises fluctuates greatly and is not stable enough.

3.2. Sub-stage Efficiency Analysis

According to Table 2, there are 8 enterprises with a fund raising efficiency of 1 for two years or more, namely 601989, 601766, 000008, 002031, 300131, 300101, 601186 and 002023, indicating that they have strong fund-raising capabilities. There are 6 enterprises with a capital allocation efficiency of 1 for two years or more, namely 601186, 600522, 002179, 002253, 300131 and 300065. The capital allocation efficiency of 601186 has been 1 for six consecutive years, which shows that 601186 has strong capital allocation ability. In general, relatively speaking, the efficiency of fund raising is more effective than the efficiency of capital allocation.

3.3. Comparative Analysis

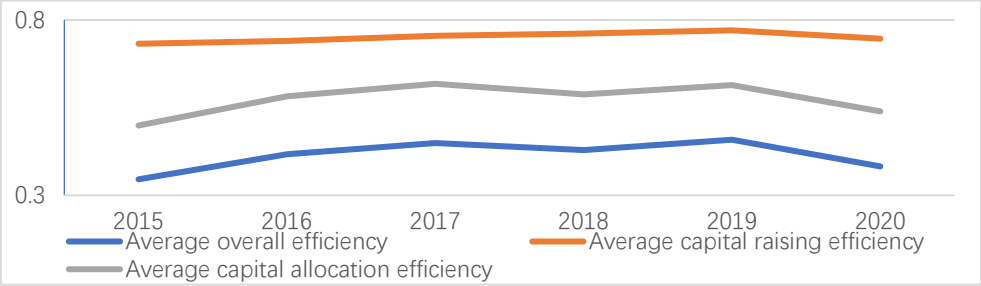

Figure 2 Comparison of changing trends

It can be seen from Figure 2 that the trends of comprehensive financing efficiency and capital allocation efficiency are consistent, which shows that comprehensive financing efficiency is greatly affected by capital allocation efficiency. The efficiency of fund raising is relatively the highest, and the efficiency of fund allocation is relatively low, generally below 0.6.

4. Analysis of Factors Affecting Financing Efficiency

Using stata16.0, this paper conducts panel data regression analysis on the factors affecting the financing efficiency of 42 high-end equipment manufacturing enterprises from 2015 to 2020.

After analyzing the regression results, the following conclusions can be drawn: The GDP growth rate, the added value of the financial industry, the profit margin of main business, the total asset turnover rate and the scale of enterprises are positively correlated with the financing efficiency of high-end equipment manufacturing enterprises. The growth rate of operating income and the asset-liability ratio are negatively correlated with the financing efficiency of high-end equipment manufacturing enterprises.

5. Conclusions

The average financing efficiency of advanced equipment manufacturing enterprises is not stable enough, and the overall financing efficiency of enterprises is low. The capital allocation efficiency is obviously lower than the capital raising efficiency. The change trend of the two-stage efficiency shows that the overall financing efficiency is mainly lowered by the capital allocation efficiency.

The external environment, operating capacity, financing structure have an important impact on the financing efficiency of advanced equipment manufacturing enterprises.

According to the above: Firstly, advanced equipment manufacturing enterprises should focus on the efficiency of capital allocation. The low efficiency of capital allocation may be caused by the failure of enterprises to make full use of financing funds, the existence of redundant financing funds, and the lack of scientific and reasonable capital allocation. It should also take different measures according to its own specific conditions to improve the polarization of the two-stage efficiency.

Secondly, Advanced equipment manufacturing enterprises should focus on improving their own management level and the efficiency of capital use, and reducing redundant funds and idle funds. Advanced equipment manufacturing enterprises can strengthen the management of inventory and cash assets, such as scientifically planning the optimal inventory holdings, optimal cash holdings, etc., try their best to avoid idleness and waste of assets, and improve asset utilization efficiency.

Finally, Advanced equipment manufacturing enterprises should pay more attention to the corporate financing structure, and can optimize the financing structure by expanding financing channels and diversifying financing methods. Enterprises can adjust financing decisions according to their business strategies and choose appropriate financial leverage to improve financing efficiency.

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