

## Analysis on China air conditioners' overall environment and brand competitiveness in recent years

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**Keywords:** comparative analysis, time series decomposition, sales amount of air conditioner, prediction

**Abstract:** This paper first uses the methods commonly used in traditional financial statement analysis such as comparative analysis and trend analysis to analyze Midea, Gree Haier processes, analyzes and compares various data in its financial statements, calculates various financial indicators of the enterprise, roughly analyzes the profitability and development ability of the enterprise, and judges the current development of each enterprise. Taking Gree enterprise as an example, the time series method is used to analyze the past sales data and predict the sales volume of Gree air conditioner in 2021. Firstly, the seasonal components were determined and separated; Then, we select the cubic curve regression prediction model for the series without seasonal components, and use the model to predict the sales volume; Finally, the final prediction value including seasonal factors is obtained by multiplying the obtained prediction value by the corresponding seasonal index. On this basis, the sales volume of air conditioners in each quarter of 2021 is predicted.

### 1. Introduction

As a traditional industry, China's home appliance industry has developed for a long time and is relatively perfect, which can not be ignored in the economic composition. At present, the country is facing the new situation of supply side reform, and constantly advocates the development of home appliance enterprises in the direction of intelligence. However, with the increasingly strict control of the real estate market by the government and the promotion of energy-saving subsidies for household appliances in previous years, it has caused a large consumption overdraft for the household appliance industry.

In the face of complex and changeable economic environment, Midea and Gree Group need to be firm all the time

Adhere to the innovative development strategy, absorb the development experience at home and abroad, actively expand the market and develop

New fields and new markets. meanwhile. We should also open up an international perspective and gradually reduce our own competitiveness

Financial risk, information risk, etc. Midea and Gree Group can develop to the leading position in the industry level, must have their own unique place, to seize their own advantages and enhance their own competitiveness, keep pace with the times, and rationalize the business war. It is bound to develop better and better. The home appliance industry is facing increasingly fierce competition. With people's higher and higher requirements for the intelligence and refinement of household electrical appliances, the household electrical appliance industry must continue to develop and innovate in the direction of diversification and intelligence, meet the increasing market demand of consumers, and improve consumers' lasting satisfaction. Only with long-term satisfaction can the enterprise's profit be guaranteed and obtain a leading position in the industry.

## 2. Methods

This paper mainly takes time series decomposition model and regression analysis model as the analyzing method. Sales volume forecast refers to the estimation of the sales volume of all products or specific products in a specific time in the future. Purchase can be arranged through sales volume forecast to avoid overstock caused by too much and too early product purchase and effectively control operation cost; It can effectively manage product inventory, set up inventory early warning for products, and make replenishment in advance to avoid hindering sales due to insufficient product supply. Economic prediction is to make a scientific prediction of the future development of the economy under the guidance of certain economic theories, according to the historical and current data of economic development, the conditions of the objective environment and subjective experience and lessons. The traditional economic prediction method is relatively simple, mainly qualitative prediction, mainly based on experience, with low accuracy and lack of quantification. In order to meet the needs of the development of socialized large-scale production, mathematical methods, statistical methods, logical methods and computer technology have been introduced into forecasting, which makes the theory and method of economic forecasting more and more scientific, the system has been gradually improved, and the accuracy has been continuously improved. It has become an independent discipline of Applied Economics. Economic forecast can be divided into quantitative economic forecast and qualitative economic forecast according to attributes. In this paper, time series analysis method is used for quantitative economic forecast. The time series analysis method is to find the quantitative regularity of the appearance with the development of time through the analysis of the time series, and analogy or extension of this quantitative regularity to predict the future development and change of the phenomenon. Time series analysis is a commonly used quantitative analysis method. It infers the future according to the regularity of the prediction object itself changing with time. It has the advantages of simple and rapid information collection. It is very suitable for enterprises in the process of daily production and operation. Among them, the more common and mature prediction methods are moving average method, exponential smoothing method and seasonal variation analysis method [1].

The basic idea and principle of moving average method is: It is a method of smoothing the periodic and irregular changes of time series by moving average of time series according to a certain number of items (interval length), displaying the trend changes like development, and then extrapolating and predicting according to the trend changes. Moving average method is an extrapolation prediction method for the linear long-term trend of time series. The common moving average methods are primary moving average method and secondary moving average method. This paper adopts the one-time moving average method (table1 and2).

Table 1 Rank list of air conditioner brands in 2021

Brand	Market share	Year-to- year growth	Average(yuan)	Year-to-year growth (yuan)
Midea	38.27%	2.57%	3423	134
Gree	29.92%	-0.74%	4130	212
Haier	13.27%	-0.11%	3928	617
Hicense	6.65%	1.26%	3412	170
Whirlpool	3.11%	-0.73%	2804	77
Changhong	1.41%	0.04%	2748	309
Electrolux	1.15%	-0.07%	1916	326
TCL	1.02%	-0.17%	2488	470
Kelon	0.94%	-0.04%	2693	46

Table 2 Rank list of air conditioner brands in 2020

Midea	36.18%	6.90%	3347	-361
Gree	30.44%	0.75%	3968	-593
Haier	13.18%	2.75%	3438	-551
Hicense	5.59%	-0.72%	3286	-206
Whirlpool	3.60%	-1.90%	2766	-68
Aux	1.94%	-2.07%	2932	-185
Changhon	1.35%	-0.34%	2504	-343
Electrol	1.33%	-1.22%	1567	-234
TCL	1.32%	0.11%	2001	-515
Ke Ion	0.93%	-0.91%	2660	-170

Data source: AUV data

It can be seen that Midea, Gree and Haier have remained stable in the top three in the whole domestic air conditioning market, and the competition situation of oligopoly in the air conditioning industry has already formed. Midea and Gree have won about 70% of the market share, and their sales and market share are relatively stable [2].

Midea, Gree and Haier are not only famous enterprises in China's household appliance industry, but also are as well-known enterprises all over the world. Midea ranks first in the offline market in 2020, with a market share of 36.18%, followed by Gree, Haier and Hisense. In 2021, Midea continued to lead the first place with a share of 38.27%, and the ranking of the top four remained unchanged. The average price remains within 3000 ~ 4000 yuan.

Next I'm about to analyze the three companies detailedly.

Table 3 .Financial indexes of Gree、Midea、Haier from 2017 to 2019

Report Dates	Financial indexes	Gree	Midea	Haier
2017/12/31	Return on equity (%)	34.15	23.44	21.5
	Net Profit Margin on Sales (%)	15.18	7.73	5.68
	Rate of gross profit (%)	32.9	25	31.1
	Operating expense rate (%)	17.6	17.6	25.9
2018/12/31	Return on equity (%)	28.69	24.35	18.88
	Net Profit Margin on Sales (%)	13.31	8.34	5.33
	Rate of gross profit (%)	30.2	27.5	29
	Operating expense rate (%)	15.6	18.2	18.5
2019/12/31	Return on equity (%)	22.42	23.61	17.14
	Net Profit Margin on Sales (%)	12.53	9.08	6.14
	Rate of gross profit (%)	27.6	28.9	29.8
	Operating expense rate (%)	14.9	18.5	25.4

Profitability analysis:

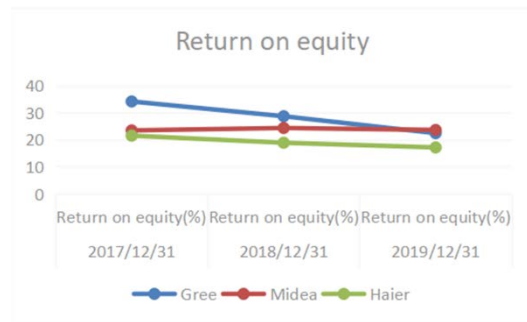


Figure 1 Return on equity of Gree, Midea, and Haier from 2017 to 2019

As can be seen from the above figure, Gree's net asset income in 2017 and 2018 is the highest. In 2019, Midea exceeded Gree and ranked first, while Haier's net assets kept ranking third during these three years. It can be seen that the enterprises' ability of benefit order is Gree, Midea and Haier from strong to weak [3].

Specifically, although Gree's return on net assets was higher in 2019 than that in 2017, it decreased by 34.35%, but its overall level was still the first, and Midea ranked second. Meanwhile, Haier kept in the third place, with a slight decline. (figure2)



Figure 2 Net profit margin on sales of Gree, Midea, and Haier from 2017 to 2019

In order to know more clearly the specific factors affecting roe. Through DuPont decomposition, it is found that the decline of Gree is due to the decline of net sales interest rate, Haier's decline is due to the decline of current ratio and quick ratio, which leads to The decrease of equity multiplier is due to the difference between current ratio and quick ratio on the solvency side The analysis has been done, so let's analyze it from the perspective of net sales interest rate. From the above figure, on the whole, Gree's net profit margin on sales shows a slow decline But it was higher than Haier and Midea for three consecutive years, mainly due to Gree's target market position is at the medium and high-end level, and the product pricing is high In recent years, the profit income is higher. The net profit margin of sales is mainly affected by two factors: gross profit margin Interest rate and operating expense rate [4]. The following is a specific analysis of these two indicators (figure3 and 4)



Figure 3 Operating expense rate of Gree, Midea, and Haier from 2017 to 2019

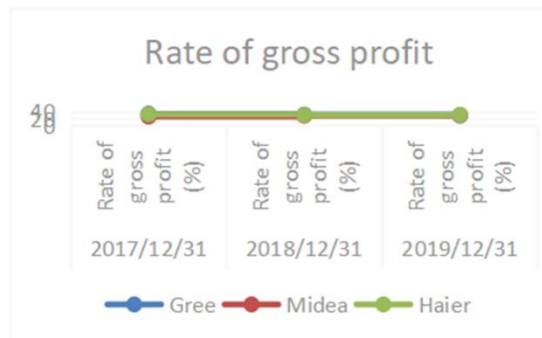


Figure 4 Gross profit rate of Gree, Midea, and Haier from 2017 to 2019

From the gross profit margin line chart, Gree's average level from 2017 to 2019 is 30.23%, Haier's average is 29.97%, while Midea's average is 27.13%. Through the analysis, it can be found out the reason why Gree's gross profit margin is the highest. That is because Compared to Midea and Haier, Gree's air conditioning price is the highest [5]. The gross profit margin of the product is relatively lower. Specifically, the gross profit margin of Gree has decreased from 32.9% to 27.60% in recent three years. The main reason is that they has adopted the sales rebate policy to encourage dealers to pick up and return goods through various channels, which results in the decline of operating profit; Midea's gross profit margin is from 25% in 2017 to 28.90% in 2019, mainly due to their upgrading of product consumption promotion [9]. As for operating expense rate, Haier's operating expense rate is much higher than that of Gree and Midea, which also causes Haier's high gross profit margin but low net sales profit margin, so Haier should focus on the future business development to control the manufacturing costs and period expenses. In contrast, Gree has high gross profit. At the same time, it also achieved high net profit, which shows its strong cost management ability.

With the decline of China's macroeconomic growth rate and the gradual saturation of the market, household appliance enterprises. The competition between industries is becoming more and more intense [10]. How can we survive and survive in a highly competitive environment Development has become a common challenge for home appliance enterprises. Gree Electric and Midea Group. The leading enterprises in China's household electrical appliance industry are gradually moving in business strategy and development mode to different roads [6]. In short, Gree Electric puts more emphasis on the main business of refrigeration appliances. The development of business is slightly conservative and steady; Midea Group has opened up a diversified development path. On the road of development, it seems more radical to expand its business territory through continuous mergers and acquisitions. At home and abroad, with the advent of the era of artificial intelligence and industry 4.0, both are seeking the development of new technologies Change, strive to remain invincible in the fierce competition, and their differences in development models also gradually reflected in their respective financial indicators [11].

Then I'm to take Gree for example from the above three enterprises to show historical sales analysis and future sales forecast(table4)

Table 4 Sales volume of Gree air conditioner from 2017~2018

2017/1th	3500.7
2017/2nd	7944.6
2017/3rd	11401.1
2017/4th	14056.9
2018/1 th	3883.9
2018/2nd	8640
2018/3rd	12326.8
2018/4th	15574.4

2019/1th	3664.2
2019/2nd	8657.2
2019/3rd	12079.8
2019/4th	14856.1
2020/1th	3826.2
2020/2nd	8373.1
2020/3rd	12083.8
2020/4th	15994.4

Data source: National Statistical Bureau of China: Gree air conditioner sales data from 2017 to 2020

### 3. Modeling STEPS

1. Calculate the seasonal index: Seasonal index refers to the ratio of a quarter's data to the annual average data, The degree of seasonal variation is determined according to the deviation between each seasonal index and its average [1]. In this paper, we take the moving average trend elimination method to calculate the seasonal index. Firstly, four items of moving average are carried out on the sales data, and then two items of moving average are carried out on the obtained results to obtain the centralized moving average; Then calculate the seasonal ratio, that is, the ratio of the actual observation value of the sequence to the corresponding centralized moving value; Finally, calculate the seasonal index and divide the average value of each seasonal ratio calculated above by their total average value. The final calculated seasonal index of air conditioning sales is shown in the figure.

2. Separation of seasonal components: By dividing the actual observed value of sales volume by the corresponding seasonal index, the series after separating the seasonal components can be obtained. It reflects the change form of time series after excluding the influence of seasonal factors. In order to better judge the change form of the sequence after separating the seasonal components, the time series diagram is made.

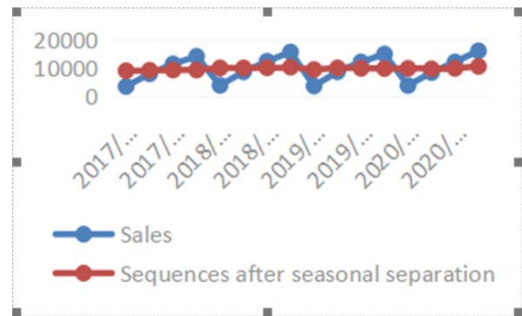


Figure 5 Air conditioning sales and sequences after seasonal separation

It can be seen from the figure that the air conditioning sales volume after excluding seasonal components has a cubic curve trend. Therefore, the cubic curve equation is used to predict the air conditioning sales volume of each quarter. According to the sequence of separating seasonal factors, the curve equation obtained by SPSS software is:

$$\hat{Y} = 8167.747 + 259.92t - 13.452t^2 + 0.259t^3$$

(t as the time number)

From the results of SPSS, the judgment coefficient of the model is, indicating that the accuracy of the equation is 75.1%; The value of F is, so the significance test is passed. It can be seen that the third-order curve equation is feasible and accurate. According to the obtained estimation equation [2], the simulated historical sales value of each quarter from 2017 to 2020 can be obtained.

By multiplying the regression prediction value with its corresponding seasonal index, the final predicted value of air conditioning sales is very close to the actual value. In order to more intuitively

compare the difference between the final predicted value and the actual observed value, the broken line diagram is made. It can be seen from the figure that the simulated sales value is very consistent with the actual sales value, so the air conditioning sales volume predicted by this model in the next year has great reference value.

By substituting  $t = 25, 26, 27, 28$  into the cubic term curve estimation equation, the predicted values are 10091.05, 10131.57, 10179.37, 10235.98 ten thousand units respectively (the sequence after separating the seasonal components), and then divided by the seasonal index, the final predicted value of air conditioning sales volume containing seasonal factors in 2021 is 3925.42, 8773.94, 12490, 15548, 46 ten thousand units.

#### 4. Conclusion

After the rapid development of China's household electrical appliance industry, consumer demand is gradually saturated, changing from incremental market to stock market, and "low growth" will become the norm. The analysis found that 2018 was the highest point of the scale of the home appliance market. From 2019, the performance growth of the home appliance industry was at a low point. The decline was more obvious affected by the epidemic in 2020 and rebounded in 2021, but it was still in a downward trend as a whole. With the rapid development of the Internet, the demand for home appliances has become saturated. Low performance and single category household appliances can no longer meet the daily needs of consumers. Only by timely adjusting the target strategy and actively promoting product diversification and intelligent transformation can they become unique in the fierce market competition.

It can be seen that Gree has the smallest space for sustainable development, and the results of comprehensive analysis are also in line with this fact. The first position was replaced by beauty. We need to broaden the market scope and innovate products in order to maintain progress and provide profit margin in the new intelligent era. In addition, Gree has always advocated air conditioning as the main industry and Midea takes all home appliances. Haier covers large kitchen and bathroom appliances and pays attention to the overseas market, which is also one of the most significant reasons for Gree's gradual backwardness and declining profitability.

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