

# How can gas companies improve their profitability? ——Based on DuPont analysis method

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**Abstract.** In recent years, due to serious environmental problems—increasing global natural gas demand, notable supply growth, LNG supply capacity expansion, natural gas consumption has increased significantly, and the natural gas industry has entered a booming stage. In this paper, China Resources Gas, a leading company in gas industry, is selected as the research object. We use DuPont analysis to analyze its financial statement from 2014 to 2017 and decompose the company's return on net assets into the multiple of several financial ratios step by step. So the relationship between several major financial ratios can be used to comprehensively analyze the company's profitability. Taking this as an example, the key factors affecting profitability of gas companies are concluded.

## 1 Introduction

In recent years, benefiting from a wide range of demand growth and expansion of LNG supply capacity, natural gas consumption has grown obviously worldwide. Especially, the industrialization process of emerging Asian and African countries, the growth of electricity demand, the continuous coal-to-gas transition China, and the discovery of low-cost gas sources in North America and the Middle East have brought strong support to continuing growth of the natural gas market.

Compared with the developed countries, China's coal consumption stays on a high level, accompanied by a low proportion of natural gas. Using natural gas as a clean energy to replace coal in some consumption areas has become an important means of reducing atmospheric emissions. Several developed countries have already experienced heavy air pollution in their history, proving that it is a practical method for air pollution controlling, to increase the proportion of clean energy usage represented by natural gas and to carry out energy restructuring.

Founded in January 2007, by investing and operating its urban gas business, China Resources Gas Group has become China's largest urban gas operator, closely related to public life. Taking China Resources Gas as an example, this paper analyzes how a fast-growing industry company improves the profitability of gas.

## 2 Materials and Methods

When analyzing the profitability of enterprises, the DuPont analysis method is widely used by scholars because of its comprehensiveness.

Wu Mingtao, Han Dingqi[1] occupied the traditional DuPont analysis method to study the financial data of

Qingdao Haier from 2014 to 2017, and analyzed the company's net sales interest rate by studying the proportion of various cost items in its sales revenue. The author proposed a series of processes to reduce the cost of the enterprise and to speed up the turnover to improve its financial status.

Du Juan[2] uses the traditional DuPont analysis method to study the financial data of Qingdao Haier from 2014 to 2017, and analyzes the company's net sales margin by studying the proportion of various cost items in sales revenue. The author proposes a series of processes to reduce the cost of the enterprise and speed up the turnover of the enterprise to improve the financial status of the enterprise.

Huang Shaoping[3] employed structural analysis and trend analysis to analyze the company's business structure when conducting profitability analysis. At the same time, the author adopted DuPont analysis and serial substitution method for longitudinal analysis, and found that the company's capability for cost control is below the average of companies in the same industry, and that financing structure is unreasonable.

Zeng Fanrong, Wu Beibei[4] built an extended model, introduced the concept of ecological efficiency, and constructed an ecological efficiency multiplier model based on DuPont analysis method, in which the sales profit rate, asset turnover rate, equity multiplier and other factors with ecological efficiency are combined.

Li Xinyu and Cheng Lamei[5] analyzed the financial statements of Changchun High-tech Industry Group Co., Ltd., and extracted the company's balance sheet and income statement information for comprehensive analysis. While Cao Kaichen, Li Xiaoguang, and Mao Sinong[6] applied the DuPont analysis method to profitability analysis, they combined Kunlun Gas's business characteristics, and carried out horizontal and

vertical analysis on the overall. At the same time, DuPont analysis was integrated into overall budget management to enhance the feasibility of the budget.

Based on China Resources Gas's 2014-2017 financial data, this paper uses DuPont Analysis to calculate the company's return on net assets, and then uses serial alternatives to identify the factors that have the greatest influence on the company's profitability. Based on these results, this paper analyzes the problems that companies in gas industry are prone to and how they can improve their profitability.

### 2.1. DuPont analysis

DuPont analysis analyzes a company's profitability using the following formula:

$$\text{Return on Net Assets} = \text{Net Profit margin} \times \text{asset turnover} \times \text{multiplier of equity} \quad (1)$$

**Table I.** Indicators analyzed by DuPont

Indicators	Time period			
	2017	2016	2015	2014
Net profit margin	12.33%	13.48%	11.58%	11.66%
Asset turnover	62.03%	55.06%	55.82%	53.06%
Debt to assets ratio	58.83%	61.37%	62.93%	63.28%
Multiplier of equity	2.43	2.59	2.70	2.72
Profit rate to net worth	7.65%	7.42%	6.47%	6.19%
Return on equity	18.58%	19.22%	17.44%	16.85%

From 2014 to 2017, the return on net assets increased from 16.85% to 18.58% (1.72%). The largest increase was in 2016, at 1.78%. Return on net assets decreased slightly by 0.64% in 2017.

### 2.2. Analysis of serial substitution

Serial substitution is a basic form of factor analysis. It is a technical method to determine the degree of influence by each factor on the difference of analysis index according to the relationship between the analytical index and its influence factors.

Next, this article uses the serial substitution method to analyze the degree of influence of net sales interest rate, total asset turnover rate and equity multiplier on the change in return on net assets.

Assuming that the 2014 financial data of China Resources Gas is used as the base period, the 2015 data is the current period.

$$\text{Base period return on net assets} = \text{base period net sales interest rate} \times \text{base period total asset turnover rate} \times \text{base period equity multiplier} \quad (2)$$

$$\text{Base period return on net assets} = 11.66\% \times 53.06\% \times 2.72 = 16.85\%$$

$$\text{Return on actual net assets} = \text{actual net sales interest rate} \times \text{actual total assets turnover rate} \times \text{base period equity multiplier} \quad (3)$$

$$\text{Return on actual net assets} = 11.58\% \times 55.82\% \times 2.70$$

$$= 17.44\%$$

$$\text{Analysis object} = \text{actual return on net assets-base period return on net assets} \quad (4)$$

$$\text{Analysis object} = 17.44\% - 16.85\% = 0.59\%$$

From the calculation above, it can be obtained that the return on net assets of China Resources Gas in 2015 increased by 0.59% compared with that in 2014. The following analyzes the influence degree of each factor index on the change of return on net assets.

The impact of net sales interest rate on return on net assets:

$$(11.58\% - 11.66\%) \times 53.06\% \times 2.72 = -0.11\%$$

It shows that from 2014 to 2015, the net sales margin was reduced from 11.66% to 11.58%, and the impact of this reduction on the return on net assets was -0.11%

The impact of total asset turnover rate on return on net assets:

$$11.58\% \times (55.82\% - 53.06\%) \times 2.72 = 0.87\%$$

It can be found from the result that the total asset turnover rate has increased from 53.06% to 55.82%, and the impact of its increase on the return on net assets is an increase of 0.87%.

The impact of equity multiplier on return on net assets:

$$11.58\% \times 55.82\% \times (2.70 - 2.72) = -0.17\%$$

From the calculation, the equity multiplier is reduced from 2.72 to 2.70, and the impact on the return on net assets is -0.17%

Substituting the financial data of China Resources Gas from 2016 to 2018 into the above formula to calculate the influence of changes in the net sales margin, total asset turnover rate and equity multiplier on the return on net assets for 2016-2015 and 2017-2016, and the results are as follows Table II shows:

**Table II.** The impact of changes in various factors on the rate of return on net assets

Indicators	Time Period		
	2017-2016	2016-2015	2015-2014
Changes in return on equity	-0.64%	1.78%	0.59%
Impact of net sales margin	-1.65%	2.86%	-0.11%
Impact of total asset turnover	2.23%	-0.28%	0.87%
Equity multiplier impact	-1.22%	-0.81%	-0.17%

From the table, it can be seen that the biggest impact on China Resources Gas's return on net assets from 2015-2014 is the turnover rate of total assets(0.87%), the net sales margin in 2016-2015, and the total asset turnover rate(2.23%). The equity multiplier has a negative impact on the return on net assets. Later, this pager will analyze the three influencing factors one by one, and finds the core factors that affect the profitability of China Resources Gas.

#### 2.2.1 Analysis of net sales margin

The following are China Resources Gas's net sales

margin indicators over the past four years:

**table III.** net sales margin

Indicators	Time Period			
	2017	2016	2015	2014
net sales margin	12.33 %	13.48 %	11.58 %	11.66 %
Sales revenue	398.38	329.16	328.34	287.17
Cost of sales	279.22	217.32	228.35	200.03
Sales expenses	37.34	34.13	31.26	27.39
Administrative expenses	25.67	24.64	26.63	23.44
Financing costs	63.05	59.55	48.92	45.14

The following calculation formula is on net sales margin, this paper will analyze the financial index through it:

$$\text{Net sales margin} = \text{net profit} / \text{sales revenue} = (\text{total revenue} - \text{total costs and expenses}) / \text{sales revenue} \quad (5)$$

In the formula, the main factors affecting the net sales margin are the company's sales revenue and various expenses incurred for profit.

As can be seen from the above table, China Resources Gas' sales revenue increased by 38.73% from 2014 to 2017, the cost of sales increased by 39.60%, and the sales expenses from 2.739 billion yuan to 3.734 billion yuan, with an increase of 36.32%. Administrative expenses increased by 9.51%, financing costs by 39.68%, reaching 6.305 billion yuan in 2017, accounting for the largest proportion of period expenses.

### 2.2.2 Analysis of total asset turnover

The total asset turnover rate reflects a company's operating capability, being a result of the company's asset management, and the basis for maximizing the return on net assets. It is based on the relationship between the amount of assets occupied and the amount of work done by using those assets, as an indicator of operational efficiency. The total assets of an enterprise are composed of current assets and non-current assets, both reflecting the profitability of various assets with a big difference. As an example, cash and accounts receivable have almost no income. Therefore, whether the asset structure is reasonable and how the level of operating efficiency is, are core of enterprise asset management, and ultimately affect the company's operating performance. The following is the calculation formula of total asset turnover:

$$\text{Turnover rate of total assets} = \text{sales revenue} / \text{total assets} = \text{sales revenue} / (\text{current assets} + \text{non-current assets}) \quad (6)$$

From the formula, it can be deduced that the total asset turnover rate is influenced by three major factors: corporate sales revenue, current assets and non-current assets.

**Table IV.** Asset structure analysis data

Indicators	Time Period			
	2017	2016	2015	2014

Turnover rate of total assets	0.62	0.55	0.56	0.53
Sales revenue	398.38	329.16	328.34	287.17
Current assets	213.72	201.61	204.05	193.39
Non-current assets	428.48	396.25	384.2	347.78
Total assets	642.2	597.86	588.24	541.17
Proportion of current assets	33.3%	33.72%	34.69%	35.7%
Liquid assets turnover rate	1.86	1.61	1.61	1.48

From the above table, the total asset turnover rate of China Resources Gas shows an increasing trend, from 0.53 to 0.62, an increase of 0.08, by 16.9%. It can be concluded that the overall operating capacity of the company has improved.

The speed of total asset turnover is also related to the proportion of current assets in total assets and the turnover rate of current assets.

$$\text{Turnover rate of total assets} = \text{Turnover rate of current assets} \times \text{Proportion of current assets in total assets} \quad (7)$$

From the above table and formula, the proportion of current assets in total assets has decreased year by year, from 35.7% to 33.3%. However, the turnover rate of current assets increased from 1.48 to 1.86. This increase compensated the negative impact brought about by the decrease in the proportion of current assets, making the overall asset turnover rate increase.

The specific project data of China Resources Gas' current assets and non-current assets from 2014 to 2017 are shown in Table V (unit: 100 million yuan).

**Table V.** Specific project data of current assets and non-current assets

Indicators	Time Period			
	2017	2016	2015	2014
Fixed assets	286.54	241.01	227.57	215.38
Long-term investment	131.13	109.56	120.07	116.02
Intangible assets	19.36	18.8	19.75	20.79
Other non-current assets	42.24	46.48	47.82	41.53
Cash and cash equivalents	103.68	55.47	108.02	97.73
Receivables and prepayments	43.34	44.54	40.16	39.55
Inventory	5.95	4.13	5.71	6.4
Other current assets	74.76	95.56	49.63	60.9

In 2016, China Resources Gas's cash and cash equivalents decreased from 108.02 to 55.47. By 2017, it returned to the level of around 10 billion.

### 2.2.3 Equity multiplier analysis

Earnings are a very important business performance of a

company, but the liabilities also need to be paid attention to. Indebtedness is the pressure that a company needs to face in the future, and it will have an important impact on the company's cash flow and even the survival. The equity multiplier is a very good indicator of corporate debt repayment pressure, and its calculation is related to the debt-to-asset ratio.

**Table VI . Equity Multiplier**

Indicators	Time Period			
	2014	2015	2016	2017
Equity Multiplier	2.72	2.7	2.59	2.43

From the above chart, it is clear that the equity multiplier of the company was decreasing year by year, meaning that the company's ability to bear debts became higher and the company's leverage effect has decreased.

The above analysis is a horizontal financial analysis of China Resources Gas. It compares the company's financial indicators with previous years, and analysis the factors that affect the company's profitability in combination with the company's operating conditions. The next will summarize the research results.

### 3 Results & Discussion

After the overall analysis, it can be concluded that gas industry companies are prone to following potential problems:

#### 3.1. Unreasonable asset structure.

The largest proportion of current assets in a corporation is cash and cash equivalents. The holding of current assets cannot bring a relatively high return on capital to that enterprise. Though holding large amounts of cash may guarantee corporate cash liquidity and short-term debt solvency, such assets have almost no return. Companies need to adjust the amount of cash and cash equivalents held in order to make their operations more efficient.

#### 3.2. Poor cost control.

The increase in sales expenses is roughly proportional to the increase of sales revenue, causing rapid increase in financing costs, which means a poor cost control capability.

### 4 Conclusions

According to the analysis, gas companies may improve their profitability in the following ways:

#### 4.1. Optimize asset structure

Asset structure refers to the proportion of various assets in an enterprise's investment, mainly to the proportion of fixed investment and liquid capital investment. From the

perspective of profitability, a small net working capital means that most of the company's capital is applied to fixed assets with higher profitability, thereby improving the company's overall profitability. However, from the perspective of risk, the less a company's working capital is, the less sufficient funds the company can hold to withstand the pressure of current liabilities, and the greater the risk of being unable to repay at maturity. An effective and reasonable asset structure greatly improves a company's operating efficiency.

#### 4.2. Strengthen cost control

It is not only the sales revenue of the company that has an important impact on the net profit margin of the company, but also the sales cost and various period expenses. If a company's operating costs are less than those of its competitors, then this low-cost advantage will be turned into high-yield, helping the owner to enhance its competitive advantage. Therefore, a company should strengthen the control of operating costs, especially financing costs.

### Acknowledgments

First of all, I want to thank my school and teachers for cultivating my scientific research and academic ability. Secondly, I would like to thank the reviewers of this conference for their pertinent comments on this paper.

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