

# Construction Of Development Index Of Retail In China — Based On The Evidence Of 95 Listed Companies In 2011-2015

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**Keywords:** Development index; Retail; Principal component analysis; Wind database

**Abstract.** This paper uses the panel data of China's Retail Listed Companies in 2011-2015 years, and uses the principal component analysis to build development index of retail in China. The results show that: firstly, the development index of Listed Companies in retail is the trend of decline in the 2011-2014 years, 2015 has increased, the development of the industry index was flat in 2011, steady development in general little change. Secondly, with the increase of Internet penetration and the development of Internet economy, there exists a fierce competition between online retail and retail entities ,and the after has been impacted.

## Introduction

The retail industry refers to the form of industrial and agricultural producers through the sale of products sold directly to the residents living consumption as used or sold to the social group for public consumption goods industry, which is closely related to the lives of the residents. Retail is a bridge between producers and consumers. Since the reform and opening to the outside world, China's retail industry has made gratifying achievements under the impetus of market economy. As of September 2016, the total amount of retail sales of wholesale and retail goods above Designated Size totaled 10 trillion and 178 billion 520 million yuan, representing a year-on-year increase of 7.9%. The development of the retail industry plays an important role in activating the market economy, promoting people's lives, promoting employment and adjusting the industrial structure. At present, there are 96 listed companies, all listed companies in 2015, the income of 1 trillion and 102 billion 787 million yuan, an increase of 4.56%, and how to evaluate the development of retail listed companies has become a question worthy of study.

The index is widely used in the capital market, the Shanghai Composite Index and Shenzhen stock index, some companies have even developed exclusively for the industry index, such as real estate index, consumer confidence index, national prosperity index, the index compiled by the scientific method, to reflect the situation of the economic development but also can predict some economic indicators. Similarly, constructing an index to measure the development power of China's retail listed companies plays an important role in the development of the retail industry. With the development of the index, in the history of mankind, the most influential is the United Nations development programme launched in 1990 from the human development index (HDI), and is widely accepted as a measure of comparison of different countries (regions) and human development level index. Based on the annual data of 95 listed companies in 2011-2015 in 2011, this paper constructs the development index of retail in listed companies, so as to serve the long-term development of retail industry and even non retail industry. Its practical significance has two aspects: one is good for our listed retail enterprises to better understand their own situation and adjust the direction; and the other is conducive to better understand the development trend of China's retail industry.

## Journals Reviewed

The research on the growth of China's retail listed companies mainly focuses on the following aspects: the research on the growth of the company and he evaluation of retail enterprises

Research on company growth. Kosova (2010) from the perspective of enterprise size, through empirical analysis found that retail chain size has a negative impact on its growth. Phillips (2010) from the retail business scale was studied, and selected four indicators (financial leverage, business activities, liquidity and profitability) were analyzed, the results showed that different size of the retail enterprise's growth condition is different, and in the retail business is not with the life cycle of growth is different. A crystal (2013) of 2008-2011 retail listed firm size and growth were analyzed, results showed that the size and growth of the retail enterprises in China is positively related to output, and the investment scale and the growth of negative correlation. Zhou Suwei (2014) believes that the chain retail enterprises should change their management concepts, carry out the whole channel integration and develop strategic alliances, so as to meet the various challenges faced by enterprises and achieve long-term development of enterprises.

Research on Evaluation of retail enterprises. Michael Levy (2000) that the elements of chain retail enterprise competitiveness mainly includes: information management, store location, customer loyalty, low cost, relationship with suppliers and sales channels. David E Baer (2000) pointed out in his work, staff quality, management quality, service quality, marketing level, organization, funds and information management system is mainly composed of chain retail enterprise competitiveness. Fan Xiufeng (2011) uses the DEA efficiency evaluation method to select the total assets, the number of stores, the period expenses, the number of employees, the main business income and net profit of 22 of the index in 2009 Retail listed companies were evaluated for efficiency. It is found that the operating efficiency of retail listed companies is unsatisfactory. In order to further evaluate the company's operating efficiency, the author through the Tobit model on the factors affecting the empirical analysis, the results found were significantly related to retail enterprise management efficiency and the rate of return on net assets, asset liability ratio, equity ratio and other factors. Zou Yang (2013) Through the selection of 11 financial indicators, we construct a factor analysis model and analyze the operating results of 26 Retail Listed Companies in China Factor evaluation, analysis and ranking.

To sum up, in the study of corporate growth, mostly from internal factors and external factors to consider. In the domestic research, most of them are about the growth of small and medium-sized enterprises or high-tech enterprises, and there is little research on the growth of retail enterprises. With the development of big data era, it is a new topic to evaluate the growth of China's Retail Listed Companies by index, and it is also the focus of this study. By reading relevant literature, we establish the index system of the growth of China's retail listed companies, and adopt appropriate methods to build the corresponding index.

## Research Design

**Data Sources.** This paper selectd 95 Retail Listed Companies in 2011 -2015,whose data from the wind database.

**Evaluation Index Selection.** The company's ability to develop is the result of internal and external interaction. The company's internal factors play a vital role in the company's growth ability. Financial indicators can well reflect the company's growth capability. In the construction of the retail development of the listed companies in the evaluation index system, the results from previous studies, mainly adopted such as scale, profitability, ability to obtain cash, operational capacity and solvency, 5 indexes and 10 level two indexes, and the index in detail. After the establishment of the index system, the main component analysis method is used to analyze and finally obtain the development index of Retail Listed companies.

Firstly, the scale of operation and the size of the scale of operation are mainly measured from three aspects of the company's operating income, net profit and total assets. The scale of operation reflects the business face of a company, and the larger the scale of operation, the better the growth of the company to a certain extent, the stronger the competitiveness of the enterprise.

Secondly, the growth ability of a company is also reflected in its profitability. The company is

aimed at maximizing profits, and the company's profitability and growth are positively related, that is, the stronger the profitability of a company, the better the growth of the company. The profitability of the company is mainly reflected from the return on the assets. The rate of return on net assets as a percentage of net profit and average shareholders' equity, is the percentage of the company's after tax profit divided by net assets ratio is the percentage of the company's after tax profit divided by net assets ratio, the index reflects the shareholder equity income level is used to measure the efficiency of the use of company owned capital. The higher the index value, the higher the income of the investment. The index reflects the ability of its own capital to obtain net income

Thirdly, the growth ability of a company is also related to the company's cash capture capabilities. In this paper, the asset liability ratio and the basic earnings per share of two indicators to measure. Among them, the asset liability ratio is the total amount of the total liabilities at the end of the period divided by the total amount of assets, that is, the proportion of total liabilities to total assets. The ratio of assets to liabilities is reflected in how much of the total assets is financed by borrowing. It also measures the extent to which an enterprise protects the interests of its creditors in liquidation.

Forthly, the company's operating capacity is closely related to its growth. This article uses two indicators: gross margin and inventory turnover. Among them, the sales gross margin is gross profit, accounting for the percentage of net sales, often referred to as gross margin. Among them, gross profit is the difference between net sales revenue and product cost. Sales gross margin of main function is: sales gross margin will help to choose the direction of investment; development helps to predict the measure, the growth of enterprises; helps to find out whether the enterprise conceals the sales income or false sales cost; help managers performance evaluation; help to reasonably predict the market competitiveness of enterprises; help to find potential problems.

Finally, debt paying ability is also related to the development of the company. The current ratio is the ratio of current assets to current liabilities. It is used to measure the ability of an enterprise's current assets to change into cash before the maturity of the short-term debt to repay the liabilities. Generally speaking, the higher the ratio is, the stronger the realization ability of the assets of an enterprise is, the stronger the short-term debt paying ability is, and the other is weak. Is generally believed that the liquidity ratio should be more than 2:1, said the current assets is two times the current liabilities, even half of liquidity in the short term can not be realized, also can ensure that all current liabilities repaid. Quick freezing ratio refers to the ratio of quick assets to current liabilities. It is a measure of the liquidity of an enterprise's liquid assets that can be realized immediately and used to repay current liabilities. Generally speaking, the ratio of quick ratio to current ratio should be more than 100%, which is most appropriate at about 1 to 1.5.

Table 1 evaluation index system of the development of Retail in China

First level index	Second level index	variable	Calculation formula
Management scale	business income	$X_1$	directly from the database
	net profit	$X_2$	directly from the database
	total assets	$X_3$	directly from the database
Profitability	return on equity	$X_4$	directly from the database
	asset liability ratio	$X_5$	Total assets/liabilities
cash acquisition capability	basic earnings per share	$X_6$	Weighted average attributable to the parent company's net profit / schedule of outstanding common stock
operating capacity	gross profit margin	$X_7$	directly from the database
	inventory turnover	$X_8$	directly from the database
debt paying ability	current ratio	$X_9$	directly from the database
	quick ratio	$X_{10}$	directly from the database

Data source: Wind database.

## Data Sources and Research Methods.

Data from the wind database in 2011 -2015 retail enterprises in China in annual data of listed companies, the main method of taking the method of component analysis.

## Retail Business Development Index

**Applicability Test** Model data is suitable for principal component analysis and should be checked by KMO. The KMO test was performed on the original data using Python software, test results show that the KMO statistic is greater than 0.6, indicating that there is a significant difference between the matrix and unit correlation coefficient matrix, according to the empirical results of KMO statistics, the sample data are suitable for principal component analysis.

**Principal Component Analysis** There are two ways to determine the number of components: one is to extract all the components whose eigenvalues are greater than 1 as principal components; and the other is based on the accumulated data The percentage value of the contribution rate to be determined. For example, the cumulative contribution rate reached more than 80%, which means the first M component (new variables) above the information contained in the total information of the original variable contains 80% variables, the rest of the M-1 variance is very small, that may not be considered, then take the first M component as the main component. From table 2, it can be concluded that the first 5 principal component eigenvalues are greater than 1, and the cumulative contribution rate of the total variance is 87.89%, so 5 principal components are extracted.

Table 2 principal component eigenvalue and variance contribution rate

Component	initial eigenvalue			extract sum of squares load		
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)
1	3.11	31.01%	31.01	3.11	31.01%	31.01
2	2.46	24.54	55.55	2.46	24.54	55.55
3	1.38	13.77	69.32	1.38	13.77	69.32
4	1.00	9.94	79.26	1.00	9.94	79.26
5	0.86	8.63	87.89	0.86	8.63	87.89
6	0.57	5.73	93.63			
7	0.31	3.12	96.74			
8	0.20	2.01	98.75			
9	0.06	0.66	99.41			
10	0.07	0.59	100.00			

**Principal Component Score Matrix.** Using the Python software, we can get the principal component scoring matrix, as shown in table 3. The principal component score matrix is the coefficient matrix of each principal component's linear expression about the original financial index. It defines the formulas for each principal component. Through principal component score coefficient matrix, 5 principal component score functions can be calculated. Take  $F_1$  for example:

$$f_1 = -0.38X_1 - 0.39X_2 - 0.26X_3 - 0.03X_4 + 0.04X_5 - 0.13X_6 - 0.27X_7 - 0.15X_8 + 0.40X_9 - 0.60X_{10}$$

Similarly, the expression of  $f_2$ - $f_5$  can be obtained.

Table 3 principal component score coefficient matrix

Second level index	variable	$f_1$	$f_2$	$f_3$	$f_4$	$f_5$
business income	$X_1$	-0.38	-0.39	-0.26	-0.03	0.04
net profit	$X_2$	-3.30	-0.44	0.06	-0.05	0.15
total assets	$X_3$	-0.37	-0.37	-0.32	-0.06	0.15
return on equity	$X_4$	0.45	-0.29	-0.11	-0.04	0.05
asset liability ratio	$X_5$	-0.14	-0.28	0.59	0.04	-0.09
basic earnings per share	$X_6$	0.27	-0.04	0.10	-0.12	0.92
gross profit margin	$X_7$	-0.03	-0.21	0.65	0.08	-0.02
inventory turnover	$X_8$	0.09	-0.06	0.06	-0.97	-0.19
current ratio	$X_9$	0.40	-0.38	-0.11	0.18	-0.17
quick ratio	$X_{10}$	0.41	-0.39	-0.11	0.07	-0.20

**Construction of Principal Component Model.** According to the contribution rate of principal component factors, the principal component model of retail listed companies can be obtained:

$$f = \frac{0.3101 * f_1 + 0.2454 * f_2 + 0.1377 * f_3 + 0.0994 * f_4 + 0.0863 * f_5}{0.8789}$$

The data of 95 retail listed companies from 2010 to 2015 were standardized and substituted into the above model, and the principal component f value of each company was obtained.

**Construction of Development Index.** In case the principal component f value is negative, in order to facilitate the understanding and comparison, the following formula is used to adjust the f value of each company (in which e is the natural logarithm), and the development index DEV of each company is obtained. There are three reasons: one is the exponential function as a monotonically increasing function, the transformation does not affect the relative size of the f value is two; the variation after all is positive, enhances the numerical comparability and understandability; three is the F value through the standard in the process of calculation, the value is too small, the f value is multiplied by 100, equivalent to the F value after the decimal point information more clearly reflected, increase the index of readability and comparability.

$$DEV = e^f \times 100$$

Each of the listed companies, the bigger the DEV value and the relative development level on behalf of the company in the industry is high; DEV value increases, the average value of DEV on behalf of the company, as a measure of retail industry development level. For the convenience of understanding and comparison, taking 2010 as the base period, after 2010 of each year and the value of value of retail DEV compared to get the final result, namely: retail industry development index = DEV<sub>n</sub>/DEV<sub>2010</sub>.

**Development index Analysis.** According to the above calculation methods, the industry DEV and development index of retail listed companies are calculated respectively, and the results are shown in table 4.

Table 4 2010-2015 retail development index of listed companies

year	industry Dev	industry development index
2011	117.42	1.00
2012	116.66	0.99
2013	114.88	0.98
2014	116.05	0.99
2015	117.72	1.00

From table 4, we can know that the development index of listed companies in the retail industry is the trend of decline in the 2011-2014 years, 2015 has increased, the development of the industry index was flat in 2011, steady development of overall change is not big. The reason has the following two points: one is that with the increase of Internet penetration and the Internet economy, retail impact. The other is the total retail sales can not fully represent the level of development. A company's level of development, in addition to the total retail sales, it also related to the company's management level, corporate culture and many other aspects.

## Research Conclusions and Implications

**Research Conclusion.** With the increasing popularity of the Internet, the Internet economy continues to develop. When online retail and physical retail are in fierce competition, physical retail has been affected. Total retail sales can not fully represent the level of development. A company's level of development, in addition to the total retail sales, is related to the company's management level, corporate culture and many other aspects. In this paper, when setting up the index system, taking into account the availability of data is easy or not, just a simple list of financial data, this is just a part of the internal indicators, no external indicators involved, is a limitation of this paper.

**Deficiencies and Future Research Directions.** Firstly, the index system designed in this paper

only involves the financial indicators of 95 retail listed companies, but there is no external indicators, which is a limitation of this paper. Later you can consider adding external indicators. At the same time, the retail listed company data availability, in time and money allowed, can consider non retail listed companies data into account, one can make the listed company and the non-listed company were compared, two can better reflect the retail industry overall development situation.

Secondly, with the development of Internet economy, online retail sales is very high, but the main line of retail listed companies is not much, the representative is not very strong, which affects the representativeness of the sample to a certain extent.

Thirdly, although the design of index system mainly reflects the company's financial data, the company is not only the internal indicators of financial data. there are some soft power does not reflect, such as human resources management, innovation, growth capacity and so on, these are the future research areas in need of improvement.

Finally, this paper does not consider the characteristics of the retail industry in the design of indicators, the financial indicators established can be used in any industry, and this is also a shortcoming of this paper. In future work, we can consider the characteristics of the retail industry itself into the index system, and other industries can even build the index to compare the overall trend, reflecting the development of the retail industry better and the running situation of the whole market economy status .

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