Construction of Financial Forecasting Model based on China’s Listed Companies

Meng-Kun Li¹,a, Xiao-Yun Shi¹,b, and Yang Yu¹,c,*

¹ Capital Normal University, No. 56 West Third Ring Road, Haidian District, Beijing, 100048 China.

ᵃlimengkun@aliyun.com,ᵇ1114990532@qq.com,ᶜyuyang@cnu.edu.cn

*Corresponding author

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Abstract. China’s economy has been developing rapidly in recent years. In this background, enterprises are often influenced by various risk factors while seeking rapid growth. This paper sets up index system of financial analysis and constructs a financial forecasting model. Based on financial data of Letv Information Technology (Beijing) Co.Ltd during 2010-2014, the paper uses the constructed model to forecast Letv’s financial states during 2015-2017. The empirical result shows that the constructed model can forecast financial conditions of an enterprise accurately and recognize financial difficulties in advance.

1. Introduction

China achieves a rapid economic development in recent years. In this background, enterprises are often influenced by various risk factors while seeking rapid growth. In particular, the importance of information is beyond all doubt and information is promoted to a more important position in the coming era of big data. China’s listed companies are an important component in the process of informatization. Hence, researches on financial forecasting of listed companies deserve enough attentions. Recently, “thunderstorm” phenomenon occurs frequently in China’s listed companies. According to data, nearly 90 companies have issued announcement of forecasting loss and 68 companies announced a loss of 100 million. Absolutely, “Thunderstorms” which are announced successfully have caused great losses. Therefore, a detailed study on financial forecasting problems in listed companies has important significance to investors, managers, supervisors and other stakeholders.

Constructing an effective financial forecasting model is of important practical significance, which is mainly manifested as following three aspects. Firstly, an effective financial forecasting model can help managers to strengthen management of the company and protect the company from special treatment, suspension or termination. Secondly, an effective financial forecasting model helps investors to make decisions on investment to avoid investment risk to some extent. Thirdly, an effective financial forecasting model helps creditors and other stakeholders to make correct decisions. Fourthly, an effective financial forecasting model helps security supervision department in further development, and support and strengthen supervision of security supervision institutions from the perspective of empirical study.

2. Construction of Financial Forecasting Model

2.1. Forecasting Index System

A set of appropriate forecasting indexes were chosen from profitability, current funds, debt paying ability and overall operation of an enterprises to construct the financial forecasting model.
Table 1. Forecasting index system

| Name                              | Calculation method                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------|
| Profitability                     |                                                                                     |
| Gross Profit Margin               | Gross profit/total sales                                                            |
| EBITDA Margin                     | EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization)/total sales |
| EBIT Margin                       | Earnings before interest and taxes (EBIT)/total sales                                |
| Net Profit Margin                 | Net profit / total sales                                                             |
| Return on Equity                  | Net profit/capital stock                                                             |
| Return on Assets                  | Total profit/total assets                                                            |
| Return on Invested Capital        | Net profit/ (ownership interest + debt)                                              |
| Current funds                     |                                                                                     |
| Current Ratio                     | Current assets/current liabilities                                                   |
| Quick Ratio                       | (cash + receivables)/current liabilities                                            |
| Cash Conversion Cycle             | Receivables conversion period (DSO)+inventory conversion period (DIO)- Deferred payment of accounts payable (DPO) |
|                                 | DSO=receivables/gross sales×365                                                      |
|                                 | DIO=inventory/selling cost×365                                                       |
|                                 | DPO= accounts payable/selling cost×365                                                |
| Debt paying ability               |                                                                                     |
| Total Liabilities to Equity Ratio | Total liabilities / ownership interest                                               |
| Debt to Capital Ratio             | Debt / (debt + ownership interest)                                                   |
| Overall operation                 |                                                                                     |
| F-score model                     | -0.1774+1.1091X₁+0.1074X₂+1.9271X₃+0.030X₄+0.4961X₅                                    |
|                                 | X₁: (closing current assets-closing current liabilities)/closing total assets         |
|                                 | X₂: closing retained earnings/closing total assets                                    |
|                                 | X₃: (net profit+discount)/ average total liabilities                                 |
|                                 | X₄: closing market value of stockholders’ equality/ closing total liabilities         |
|                                 | X₅: (net profit+discount+interest)/ average total assets                              |

2.2. Construction of the Financial Forecasting Model

2.2.1. Regression Analysis

Regression analysis is a statistical technology and it finds a mathematical expression that can describe one group of historical dataset (X, Y) mostly. With considerations to future value of X, this expression can be used to predict future value of Y.

2.2.2. Forecasting of T Account and Sales Percentage

The T account forecasting method starts from the base year of financial statement and determines how each account changes and the corresponding balance through double entry. Although this method is relatively accurate, it is relatively complicated and requires certain transaction forecasting information. This information is unavailable to many analysts out of and even in the company.

Sales percentage forecasting method starts from sales forecasting and then estimates other terms of the income statement according to a hypothesized relationship between sales and the account. Although it can be executed simply, this technology may get a wrong conclusion. It requires crossing examination of reasonability of the conclusion.
3. Empirical Analysis of Financial Forecasting Model

3.1. Case Selection

In this study, Letv Information Technology (Beijing) Co., Ltd (hereinafter referred as Letv) was chosen for deep data analysis. Data of Letv in five successive financial years from 2010 to 2014 were collected from the Tidal Wave network.

The market value of Letv in the beginning of listing was about 3 billion and the stock of Letv was 6.37 yuan on December 23rd, 2014. After four-year development, its stock price increased to the peak 44.72 yuan on May 13th, 2015, and its market value soared up to 152.6 billion. Such rapid sound development brought not only a shining appearance, but also the unknown financial risks. This is one of reasons that it was chosen as the research object in this study. In the beginning of November, 2016, Letv suffered capital chain rupture and it went downhill since then. The market value of Letv shrank to more than 20 billion by the beginning of February, 2018. Such rapid recession after the rapid development is occurred suddenly or is a consequence of some factors. This was discussed in this study. Recently, the network video industry has been booming and enjoyed considerable profits. Under this circumstance, it is easy to be attacked by various financial risks. Letv has strong representativeness in the industry, and analyzing Letv can provide some references to the whole industry. This is the third reason why it is chosen as the research object in this study.

3.2. Forecasting Analysis

3.2.1. Forecasting Results

A financial forecasting model was constructed with financial data of Letv during 2011-2014 and was used to predict financial data of Letv during 2015-2017. Forecasting results are listed in Table 2.

Table 2. Financial data and financial forecasting results of Letv during 2012-2017

|                        | Profit-ability | Current funds | Debt paying ability | Overall operation |
|------------------------|----------------|---------------|---------------------|-------------------|
|                        | 2012A  | 2013A  | 2014A  | 2015F  | 2016F  | 2017F  | 2012A  | 2013A  | 2014A  | 2015F  | 2016F  | 2017F  | 2012A  | 2013A  | 2014A  | 2015F  | 2016F  | 2017F  |
| Gross profit margin    | 37.5%  | 28.2%  | 13.7%  | 2.8%   | -8.9%  | -20.7% | 0.8    | 0.8    | 0.8    | 0.7    | 0.7    | 0.6    | -81.7  | -51.7  | 1.7     | -21.2  | -8.5   | 4.1     |
| EBITDA margin          | 16.9%  | 10.0%  | 0.7%   | -6.0%  | -13.7% | -21.3% | 127.8% | 141.4% | 164.7% | 217.3% | 255.6% | 293.9% | 56.1%  | 58.6%  | 62.2%   | 82.6%  | 95.1%  | 107.6%  |
| margin                 | 53.7%  | 36.5%  | 16.5%  | 15.8%  | 6.8%   | -2.1%  | 0.8    | 0.8    | 0.8    | 0.7    | 0.7    | 0.6    | -81.7  | -51.7  | 1.7     | -21.2  | -8.5   | 4.1     |
| Net Profit Margin      | 16.6%  | 10.8%  | 5.3%   | -1.0%  | -6.9%  | -12.8% | 127.8% | 141.4% | 164.7% | 217.3% | 255.6% | 293.9% | 56.1%  | 58.6%  | 62.2%   | 82.6%  | 95.1%  | 107.6%  |
| Return on Equity       | 46.5%  | 31.9%  | 43.3%  | 25.9%  | 17.7%  | 9.6%   | 0.8    | 0.8    | 0.8    | 0.7    | 0.7    | 0.6    | -81.7  | -51.7  | 1.7     | -21.2  | -8.5   | 4.1     |
| Return on Assets       | 6.7%   | 5.1%   | 4.1%   | 3.7%   | 2.9%   | 2.2%   | 0.8    | 0.8    | 0.8    | 0.7    | 0.7    | 0.6    | -81.7  | -51.7  | 1.7     | -21.2  | -8.5   | 4.1     |
| Return on Invested Capital | 6.7%   | 5.1%   | 4.1%   | 3.7%   | 2.9%   | 2.2%   | 0.8    | 0.8    | 0.8    | 0.7    | 0.7    | 0.6    | -81.7  | -51.7  | 1.7     | -21.2  | -8.5   | 4.1     |
| Current ratio          | 0.8    | 0.8    | 0.8    | 0.7    | 0.7    | 0.6    | 0.8    | 0.8    | 0.8    | 0.7    | 0.7    | 0.6    | -81.7  | -51.7  | 1.7     | -21.2  | -8.5   | 4.1     |
| Quick Ratio            | 0.8    | 0.8    | 0.8    | 0.7    | 0.6    | 0.5    | 0.8    | 0.8    | 0.8    | 0.7    | 0.6    | 0.5    | -81.7  | -51.7  | 1.7     | -21.2  | -8.5   | 4.1     |
| Cash conversion cycle  | 84.5   | 100.7  | 75.0   | 92.6   | 96.6   | 100.7  | 8.4    | 18.69  | 27.18  | 28.184 | 28.79  | 29.396 | 174.7  | 171.1  | 100.5   | 142.0  | 134.0  | 126.0   |
| DSO (days)             | 8.4    | 18.69  | 27.18  | 28.184 | 28.79  | 29.396 | 84.5   | 100.7  | 75.0   | 92.6   | 96.6   | 100.7  | 8.4    | 18.69  | 27.18  | 28.184 | 28.79  | 29.396 |
| DIO (days)             | 174.7  | 171.1  | 100.5  | 142.0  | 134.0  | 126.0  | 174.7  | 171.1  | 100.5  | 142.0  | 134.0  | 126.0  | 174.7  | 171.1  | 100.5   | 142.0  | 134.0  | 126.0   |
| DPO (days)             | -81.7  | -51.7  | 1.7    | -21.2  | -8.5   | 4.1    | -81.7  | -51.7  | 1.7    | -21.2  | -8.5   | 4.1    | -81.7  | -51.7  | 1.7     | -21.2  | -8.5   | 4.1     |
| Total Liabilities to Equity Ratio | 127.8% | 141.4% | 164.7% | 217.3% | 255.6% | 293.9% | 56.1%  | 58.6%  | 62.2%  | 82.6%  | 95.1%  | 107.6% | 127.8% | 141.4% | 164.7%  | 217.3% | 255.6% | 293.9%  |
| Debt to Capital Ratio  | 56.1%  | 58.6%  | 62.2%  | 82.6%  | 95.1%  | 107.6% | 0.347  | 0.362  | 0.011  | -0.111 | -0.3676| -0.964 | 0.347  | 0.362  | 0.011   | -0.111 | -0.3676| -0.964  |

(Data base source: http://webapi.cninfo.com.cn/#/dataBrowse)
3.2.2. Results Analysis

a. Gross Margin

The gross margin of Letv kept decreasing continuously after 2010 and it was expected to decrease to lower than 0% after 2015. There’s no accepted norm that how much gross profit is good. However, a company shall have enough gross profits to support operation and financing cost -- enterprise with a negative gross profit is obviously inadequate to support operation and financing cost.

b. EBITDA Margin and EBIT Margin

EBITDA margin and EBIT margin were kept decreasing continuously, indicating that the input and output efficiency of Letv were decreasing gradually. Revenues of managers of the company from operation of enterprises were decreasing accordingly.

c. Net Profit Margin

Net profit margin of Letv during 2010-2014 dropped quickly and it was expected to keep decreasing during 2015-2017, and would become negative since 2015. This reflected that the profit of Letv for selling 1 yuan of products was inadequate to gain costs.

d. Return on Equity

Return on equity of Letv during 2010-2013 declined sharply. Although it is increased to some extent in 2014, it was expected to continue to decrease during 2015-2017. In other words, the return on equity of Letv would continue to decrease and the profits were not enough to compensate for risks undertaken by shareholders.

e. Return on Assets

Return on assets of Letv was basically decreasing, indicating the continuous reduction of net profits per unit of assets. Profitability of total assets was decreasing, indicating that Letv shall pay attention to increase of revenues and decrease of expenditures.

f. Return on Invested Capital

Return on invested capital of Letv decreased generally after 2011 and it was expected to decrease to some extent during 2015-2017. Return on invested capital is an index to evaluate historical performance of a company or other departments. Reduction of return on invested capital reveals the declined using effect of invested capital.

g. Current Ratio

The current ratio of Letv was decreasing continuously, indicating that the conversion ability of current assets of the company into cash for paying debts before due of the short-term debt decreased. Moreover, the current ratio<1:1 reflects that the current assets were inadequate to pay current liabilities of the company.

h. Quick Ratio

Quick ratio of Letv was kept decreasing basically. According to traditional experiences, it is normal to keep quick ratio at 1:1. However, the quick ratio of Letv was lower than 1:1 for a long period. If no adjustment was made after 2015, the quick ratio would continue to decline. This reflects that the company mainly depends on inventory selling to pay current liabilities and it cannot pay bills quickly.

i. Cash Conversion Cycle

It is expected that DSO, DIO and DPO of Letv would increase to a small extent. The increased DSO revealed decrease of abundance of working capital and the enterprise was struggling with cost rise and passive operation due to loans, thus weakening the industrial competitiveness. The increased DIO demonstrates the increase of inventory, weakening liquidity, decelerated conversion of inventory into cash or decreased quick ratio of the receivables. Generally speaking, DPO shall be as long as possible
and the increased DPO implies the increased payment to suppliers to compensate for operation cost. Hence, the company may be less likely to apply short-term loans from the bank.

The variation period of cash conversion cycle is shown in Fig.1. Although DSO, DIO and DPO were expected to develop toward a benign direction during 2015-2017, the improvements were very small and DSO was decreased too much during 2011-2014. It was expected that cash conversion cycle of Letv would continue to prolong and working cash conversion rate decreased during 2015-2016. These indexes were improved slightly in 2017, but improvement was hardly effective.

![Figure 1. Variation trend of Cash conversion cycle of Letv](image1)

### j. Total Liabilities to Equity Ratio

In Fig.2, the total liabilities to equity ratio of Letv increased significantly on the whole, indicating that shareholders would face with increasing risks in future. It was expected that the total liabilities to equity ratio of Letv continued to rise in 2015 and exceeded 2:1, which is beyond the general acceptable range.

![Figure 2. Variation trend of total liabilities to equity ratio of Letv](image2)

### k. Debt to Capital Ratio

In Fig.3, debt to capital ratio of Letv continued to increase and it was expected to keep this variation trend during 2015-2017. In 2014, the debt to capital ratio of Letv exceeded 60% and it was expected to exceed 80% in 2015 and approach to 100%. This reflected that capitals of Letv mainly come from debts and the huge interest would restrict the quantity of available cash significantly, thus decreasing profits of the company.

It was expected that the debt paying ability of Letv was weak during 2015-2017 and managers shall control debts of the company, or it will further trigger capital chain rupture.
Overall Operation

It can be seen from Fig.4 that Letv was expected to have high financial risk during 2015-2017.

Based on above forecasting results, the financial condition of Letv is not optimistic since its listing. From the low risk and uncertain financial condition in the beginning of listing to the forecasted high financial risk, the financial risk of Letv was increasing gradually. In particular, Letv faced serious financial troubles after 2015, indicating the potential financial crisis implied in the prosperity of Letv. If such potential financial crisis could be discovered early and relevant measures or improvement were adopted or made in time to control it before intensification, Letv may come up with another end rather than suspension. Based on comparison on actual stock price trend of Letv, the constructed model could forecast financial crisis of enterprise and disclose the financial risk of Letv.

4. Summary

China’s stock market still has a problem of information asymmetry. Therefore, how to use open market data accurately and effectively to construct a feasible financial forecasting model applicable to China’s listed companies is viewed a problem with strong guidance significance and practical significance.

In this study, financial data of Letv in five successive years from 2010 to 2014 were chosen. The financial situation of Letv from 2015-2017 was forecasted through regression analysis, T account forecasting and sales percentage forecasting. According to contrast verification, the constructed
model could forecast financial conditions of an enterprise accurately and it can recognize financial difficulties of an enterprise in advance.

5. References

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