Effects of Supplier Concentration on the Financial Performance of Manufacturing Enterprises from Mediating Effect of Commercial Credit

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Abstract. The research on effects of supplier concentration on financial performance of manufacturing enterprises is conducted from the perspective of mediating effect of commercial credit based on financial data of 1090 listed manufacturing companies. MLRM (multiple linear regression model) plus empirical data and the mediating effect test method are used in the research. The results show that the commercial credit plays a partial mediating role in impact of supplier concentration on enterprises’ financial performance, that the commercial credit as a financing means can improve the financial performance of enterprises to a certain extent, and that supplier concentration exerts a significant positive effect on financial performance. Thus, this research can provide theoretical reference in supply-chain management for enterprises.

1. Introduction

In the daily transactions between enterprises and suppliers, commercial credit plays an important role as a bridge. Commercial credit is regarded as a means of financing for enterprises, and is mainly provided by suppliers. The improvement of supplier concentration means that the relationship between enterprises and suppliers is closer, so it is easier to obtain more commercial credit, and then improve the company's performance[1]. Some scholars believe that from the perspective of enterprise bargaining, the business credit of enterprises may be reduced due to the weak position in the transaction process with suppliers, thus affecting the performance of enterprises. So what role does business credit play in the impact of supplier concentration on financial performance? At present, there is no unified conclusion, which provides an opportunity for this study.

In addition, scholars at home and abroad have studied the impact of supply chain concentration on enterprise performance from multiple perspectives, but there are still some problems. There are still some differences about the research conclusions. It may be due to the following reasons: first, research methods. Some scholars use questionnaires for research, such as Zhao (2011)[2]; others use financial data for analysis, such as Li (2019) [3]. Second, performance measurement. For the measurement of performance, different scholars use different indicators, such as Swink M (2007) [4] use enterprise operation performance; Chen(2014)[5] use ROA. Third, the research direction of supply chain concentration is not unified. For example, Barbara B (2010) [6] divides the research direction into internal concentration and external concentration; Kuang(2018) [7] puts suppliers and customers...
together to set comprehensive indicators to measure the concentration of the whole supply chain. Therefore, there is still room for further research in this field.

This paper has three main contributions: first, using the financial data of listed companies to study the impact of supplier concentration on corporate financial performance; second, to study the impact of commercial credit on corporate financial performance; third, to further study whether commercial credit plays a mediating role in the impact of supplier concentration on financial performance.

2. Literature review and research hypothesis
Kenneth J. (2005) [8] believes that when supplier concentration is high, enterprises can use suppliers' R & D capabilities to improve their own financial performance. Chin S. Ou (2010) [9] found that supplier concentration and customer concentration can not only improve enterprise operation performance, but also improve financial performance and customer satisfaction. Zhao (2015) [10] combined with resource dependence theory and transaction cost theory to study, found that supplier concentration and corporate financial performance is inverted U relationship, financial performance reaches a critical value after higher concentration will have a negative impact on corporate financial performance. Xu (2017) [11] takes manufacturing listed companies as the research object and finds that they all promote the financial performance of enterprises to varying degrees; Yang (2018) [12] studied agricultural listed companies and found that supplier concentration had a significant positive impact on corporate financial performance, while customer concentration had no significant impact on corporate financial performance. Based on the above analysis, hypothesis 1:

H1: supplier concentration is positively correlated with financial performance.

Van Horen N (2010) [13] found that suppliers are willing to provide more business credit to businesses when their sales to businesses exceed 20%. Giannetti M (2011) [14] found that when the amount of procurement from enterprises to suppliers is large, enterprises have stronger premium ability, and then obtain more commercial credit. Hirofumi Uchida (2013) [15] believes that excessive dependence on suppliers will reduce business credit, but from the perspective of long-term cooperation, it is conducive to business credit. Bao(2016) [16] believed that enterprises with high supplier concentration have low degree of information asymmetry, which is conducive to the acquisition of commercial credit. Sun (2017) [17] believed that the higher the supply chain concentration is, the stronger the trust is and the lower the degree of information asymmetry is, which is conducive to providing business credit to enterprises.

On the other hand, commercial credit can significantly improve the business performance and market performance of enterprises. The acquisition of commercial credit by enterprises can be transmitted to creditors as a signal to obtain the trust of creditors, thereby improving enterprise performance[18]. Lu (2011) [19] believe that the commercial credit given by suppliers to enterprises can convey good news to the market and enhance the value of enterprises. Based on this, this paper puts forward the following assumptions:

H2: commercial credit is positively correlated with corporate financial performance;
H3: supply chain concentration affects corporate financial performance through the intermediary effect of commercial credit

3. Research design

3.1. Data
Based on the industry classification of China Securities Regulatory Commission in 2012, this paper takes 2016-2018 listed manufacturing companies as the research object. The specific steps of selecting enterprise samples are as follows: select the enterprises classified as manufacturing industry from CSMAR database; remove the enterprises of ST and * ST categories, which have been losing money continuously, so the data may lead to deviation of research results; remove the enterprises with missing data; remove the enterprises that have been delisted by the end of the study. According to the above
steps, 3270 companies' annual sample data are selected. In this paper, Excel and stata16.0 software are used to process the data.

3.2. Definition of main variables

| Type                        | Name   | Definition                                                                 |
|-----------------------------|--------|-----------------------------------------------------------------------------|
| Variable being explained    | EVAr   | EVAr = EVA / total assets                                                  |
| Explanatory variables       | SCIS   | Logarithm of the ratio of mean to variance of the procurement proportion of the top five suppliers |
| Mediator variable           | TC     | Accounts payable + bills payable + advances standardized by total assets   |
| Control variable            | AGE    | Listing time to T year                                                     |
|                             | SIZE   | Logarithm of total assets                                                  |
|                             | GROWTH | Growth ratio of operating revenue                                          |
|                             | SOE    | Dummy variable, state-owned take 1, non-state-owned take 0                 |

3.3. The Model

In order to verify the mediating effect of commercial credit in the impact of supplier concentration on financial performance, the following multiple regression model is established:

\begin{equation}
    EVAr = \alpha_0 + \alpha_1SCIS + \alpha_2LEV + \alpha_3SIZE + \alpha_4AGE + \alpha_5GROWTH + \alpha_6SOE + \Sigma IND, YEAR + \varepsilon \quad (M1)
\end{equation}

\begin{equation}
    TC = \alpha_0 + \alpha_1SCIS + \alpha_2LEV + \alpha_3SIZE + \alpha_4AGE + \alpha_5GROWTH + \alpha_6SOE + \Sigma IND, YEAR + \varepsilon \quad (M2)
\end{equation}

\begin{equation}
    EVAr = \alpha_0 + \alpha_1SCIS + \alpha_2TC + \alpha_3LEV + \alpha_4SIZE + \alpha_5AGE + \alpha_6GROWTH + \alpha_7SOE + \Sigma IND, YEAR + \varepsilon \quad (M3),
\end{equation}

Where, \( \varepsilon \) is the random disturbance term.

4. Empirical analysis

4.1. Descriptive statistics

| VarName | Obs | Mean  | SD   | Min  | Median | Max  |
|---------|-----|-------|------|------|--------|------|
| EVA     | 3270| 0.010 | 0.052| -0.249| 0.005  | 0.398|
| SCIS    | 3270| 0.826 | 0.656| -0.687| 0.797  | 3.571|
| TC      | 3270| 0.224 | 0.139| 0.005 | 0.197  | 0.987|
| SIZE    | 3270| 22.075| 1.068| 17.806| 21.978 | 26.440|
| LEV     | 3270| 0.383 | 0.184| 0.028 | 0.377  | 1.685|
| GROWTH  | 3270| 0.252 | 0.751| -0.971| 0.155  | 23.998|
| AGE     | 3270| 9.223 | 6.040| 0.000 | 7.000  | 26.000|
| SOE     | 3270| 0.210 | 0.407| 0.000 | 0.000  | 1.000|

It can be seen from Table 2 that the maximum value of EVAr is 0.398, and the minimum value is −0.249, indicating that the financial performance level of manufacturing enterprises in China is quite different. The average value of EVAr is 0.010, and the median is 0.005, indicating that the EVA rate of most manufacturing total assets is below the median. The minimum value of SCIS is 0.687, and the maximum value is 3.571, indicating that for different enterprises, the relationship between suppliers is very different. The average value of commercial credit TC is 0.224, the highest enterprise reaches 0.987,
which can predict that most companies pay more attention to commercial credit, but there are still enterprises' commercial credit is only 0.005. The value of firm size SIZE shows that the difference in the size of sample enterprises is not large. The average LEV of financial leverage is 0.383, which basically conforms to 40% - 60% reasonable capital structure. From the growth point of view, the minimum value is -0.971, the maximum value is 23.998, indicating that the growth rate of China’s manufacturing industry is very different. The average age of listed companies AGE is 9.223, with the maximum of 26 years. The largest shareholder in the sample enterprises is 21% of the state-owned enterprises.

4.2. Correlation analysis

|        | EVA   | SCIS   | TC      | SIZE    | LEV     | GROWTH | AGE   | SOE     |
|--------|-------|--------|---------|---------|---------|--------|-------|---------|
| EVA    | 0.004 | 0.024  | 0.022   | 0.075***-0.068*** | 0.346*** | 0.468*** |       |         |
| SCIS   | 0.034** |       |         |         |        |        |       |         |
| TC     | 0.004 | 0.024  | 0.022   | 0.075***-0.068*** | 0.346*** | 0.468*** |       |         |
| SIZE   | 0.221***-0.021 | 0.016 | 0.082*** | 0.076*** |       |        |       |         |
| LEV    | -0.075***-0.068*** | 0.346*** | 0.468*** |         |       |        |       |         |
| GROWTH | 0.128***-0.021 | 0.016 | 0.082*** | 0.076*** |       |        |       |         |
| AGE    | 0.036**-0.089*** | 0.016 | 0.082*** | 0.076*** |       |        |       |         |
| SOE    | 0.038**-0.087*** | 0.023 | 0.294*** | 0.206***-0.023 |       | 0.479*** |       |         |

Lower-triangular cells report Pearson's correlation coefficients

*** p<0.01, ** p<0.05, * p<0.1

It can be seen from table 3 that the correlation coefficient between sics and EVA is 0.034, which is significant at the level of 5%, indicating that supplier concentration has a positive impact on enterprise financial performance. The correlation coefficients of TC, EVA and SCIs are 0.004 and 0.024 respectively, which are not significant. The relationship needs further empirical analysis. The correlation coefficient between LEV and EVA is negative, which is in line with the research conclusion of many mathematicians. There is a significant positive correlation between enterprise size and EVA, which indicates that the larger the enterprise is, the easier it is to use its own resources to improve its financial performance. The correlation coefficient between growth and EVA is 0.128, which is significant at the level of 1%. The higher the growth ratio of operating revenue, the better the financial performance of enterprises, which is in line with the actual situation of enterprises. In general, the correlation coefficients between the variables are not more than 0.5, indicating that there is no multicollinearity problem in the model.

4.3. Regression analysis

| Name  | M1-EVAr | M2-TC       | M3-EVAr       |
|-------|---------|-------------|---------------|
| TC    | 0.055*** (7.612) |             |               |
| SCIS  | 0.003** (2.359) | 0.007** (2.320) | 0.003** (2.067) |
| SIZE  | 0.014*** (13.048) | -0.017*** (-5.800) | 0.015*** (13.703) |
| LEV   | -0.051*** (-8.169) | 0.285*** (15.791) | -0.067*** (-10.278) |
| GROWTH | 0.008*** (2.308) | 0.000 (0.029) | 0.008*** (2.321) |
| AGE   | -0.000** (-2.084) | -0.003*** (-5.428) | -0.000 (-1.328) |
The results of regression model 1 in table 4 show that supplier concentration is significantly positively correlated with EVA at the level of 5%, which indicates that supplier concentration can effectively promote the improvement of financial performance, and thus hypothesis 1 is established. The results of regression model 3 show that there is a significant positive correlation between commercial credit and EVA at the level of 1%, indicating that the improvement of commercial credit is beneficial to the level of financial performance of enterprises. This paper adopts Wen’s mediation effect analysis method, namely (1) the coefficient of SC to EVA is significant; (2) The coefficient of SC to TC in Model 2 is significant and the coefficient of TC in Model 3 is significant; The simultaneous establishment of Condition 1 and Condition 2 indicates that the partial mediating effect is significant. The regression results of table 4 show that the coefficient of SC to EVA is significant at the level of 5%, indicating that SC can have a positive impact on EVA, so condition 1 is established. According to Model 2, the coefficient of SC to TC is also significant at the level of 5%, and the coefficient of TC to EVA in Model 3 is 0.055, which is significant at the level of 1%, so Condition 2 holds. Condition 1 and condition 2 are established at the same time, and the partial mediating effect is significant, that is, supplier concentration affects corporate financial performance through commercial credit, hypothesis 3 is established.

5. Conclusion

Based on the data of listed companies' manufacturing industry from 2016 to 2018, this paper studies the impact of commercial credit on enterprise financial performance, and then studies the intermediary effect of commercial credit in the impact of supplier concentration on enterprise financial performance. The results show that: (1) Supplier concentration has a significant positive impact on the financial performance of enterprises. Enterprises can improve their financial performance by improving supplier concentration, and enhance their friendly cooperative relationship with suppliers by purchasing concentration and increasing the purchase amount, so as to obtain a certain amount of purchase discount; at the same time, the improvement of supplier concentration can greatly reduce the cost of enterprises Transaction costs can optimize their own inventory management, and then improve financial performance; (2) As a means of financing for enterprises, commercial credit will be used to obtain commercial credit from supply chain members to alleviate financing difficulties when enterprises face bank loan difficulties, so that enterprises have more idle capital to invest in daily business and R&D activities, and then improve the competitiveness of enterprises Financial performance; (3) With the improvement of supplier concentration, the relationship between enterprises and suppliers is closer. From the perspective of suppliers, maintaining good cooperation with enterprises makes suppliers willing to provide more commercial credit to increase the attraction to enterprises and improve the purchasing volume of enterprises; from the perspective of enterprises, it is easier for enterprises to obtain the deferred payment provided by suppliers to help enterprises slow down Therefore, the improvement of financial performance comes partly from the direct effect of supplier concentration and partly from the intermediary effect of commercial credit. this paper, The research enriches the research on the influence of supply chain management on financial performance, further strengthens the understanding of commercial credit in supply chain management, and provides reference for enterprises to optimize financial performance and supply chain management. There are still some shortcomings in this paper.
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