IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

THE IMPACT OF SUPPLY CHAIN UPSTREAM AND DOWNSTREAM CONCENTRATION ON FIRM FINANCIAL PERFORMANCE IN THE CONTEXT OF COVID-19 – EVIDENCE FROM CHINESE MANUFACTURING COMPANIES

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Abstract : Under the impact of COVID-19, it increases the risk of supply chain's disruption of Chinese manufacturing enterprises, and it also increases the risk of bankruptcy. Supply chain management is an important element of business management. As we know, China is a large manufacturing country. In order to study the impact of supplier concentration and customer concentration to corporate financial performance, this paper selects 2,015 companies from Chinese manufacturing enterprises. The sample time span from 2019 to 2021 and an observed sample size of 33,654 in this study. In this paper, regression analysis of the sample data by Stata software concludes that supplier concentration and customer concentration have a positive effect on the financial performance of the enterprise in the context of COVID-19. Higher supplier concentration and higher customer concentration can help enterprises improve risk resistance, and it is beneficial to help companies improve financial performance.

Keywords - Supplier concentration, customer concentration, financial performance, supply chain management

I. INTRODUCTION

With the development of the market, the competition between enterprises has become the competition between supply chains (Zhao, Chen, and Ai 2021). The management of upstream concentration and downstream concentration in the supply chain has become an important issue in supply chain management (Liu and Gao 2022). COVID-19 has sent shockwaves through the global economy, which has increased the risk of corporate insolvency, and it has created unprecedented challenges for supply chain management around the world (Sombultawee et al. 2022). COVID-19 puts pressure on a corporate supply chain, which increases operational and financial risk (Ivanov 2020, Cheng et al. 2022). Strengthening cooperation between upstream and downstream supply chains, it can enhance resource sharing and mutual collaboration between supply chains, which is conducive to resisting the impact of unexpected risks such as COVID-19 on enterprises. At the same time, it can help improve corporate operational efficiency and financial performance (Gu et al. 2022). Therefore, it is necessary to study the impact of supplier concentration and customer concentration on the financial performance of enterprises, which is conducive to improving the financial performance of enterprises and can help enterprises control supply chain risks, increase the risk resistance and help enterprises develop sustainably.

Uncertainty in the business environment, along with rapid shifts in customer demand, as well as material flow restrictions and logistics and transportation constraints all pose significant challenges to a corporate supply chain, which seriously affects corporate operational and financial performance (Chen et al. 2021). The manufacturing sector was the most severely affected during COVID-19, with massive production shutdowns, logistics disruptions and disruptions in demand due to order cancellations around the world. China is a major manufacturing country and an important link in the global supply chain. China's manufacturing purchasing managers' index (PMI) dropped to 35.7%. When the PMI index is below 50%, it indicates that the manufacturing economy is in the doldrums, so the Chinese manufacturing industry is severely affected. Risk of supply chain disruption in China rises to the level of global supply chains (Cai and Luo 2020). Therefore, when faced with the risk of supply chain disruption, a higher concentration of suppliers, and a higher concentration of customers can expose the company to higher financial risk. Because there are no alternative suppliers to maintain corporate production and operations (Yang and Guo 2022, Pan et al. 2020). But also, because the enterprise has a high degree of supply chain concentration, to ensure the timely feedback from suppliers and customers, which is conducive to the enterprise to turn risks into opportunities.

Therefore, it is important and very necessary to study the impact of supplier concentration and customer concentration on the corporate financial performance when the risk of supply chain disruption increases. Therefore, the research objectives of this paper are the following two:

1. To study and identify during COVID-19, how supplier concentration has affected the financial performance of Chinese manufacturing enterprises.

2. To study and identify during COVID-19, how customer concentration has affected the financial performance of Chinese manufacturing enterprises.

Since no scholars have studied how supplier concentration and customer concentration affect the financial performance of Chinese manufacturing enterprises in the context of COVID-19, this research gap can be filled by this paper. Moreover, by selecting Chinese manufacturing enterprises as the research sample, the conclusions drawn in this paper are more general and representative, which can help enterprise managers to improve and optimize the management scheme in the management of supply chain concentration, improve the risk resistance of enterprise supply chain, and increase the financial performance of enterprises.

II. LITERATURE REVIEW

2.1 Supplier concentration and financial performance

Supplier concentration is a measure of a corporate purchases from its top five suppliers as a percentage of total annual purchases (Gu et al. 2022). It reflects the concentration of corporate suppliers (Liu and Gao 2022). According to previous scholars' studies, there are two broad categories of conclusions regarding the impact of supplier concentration on corporate financial performance. The first group of scholars believes that supplier concentration has a positive effect on the financial performance of enterprises. Because as the concentration of enterprise suppliers increases, the higher the degree of information sharing between enterprises and suppliers, which helps to reduce the losses caused by information asymmetry (Patatoukas 2012). More focused supplier relationships can help enterprises reduce uncertainty in the procurement process, which helps enterprises reduce procurement costs and improve capital utilization (Ahmad et al. 2019, Budiman and Rau 2021).

However, another group of views suggests that supplier concentration has a negative impact on the financial performance of a enterprise. This is because as supplier concentration increases, companies become more dependent on their suppliers, which can reduce their bargaining power. Moreover, as the corporate reliance on suppliers increases, if the company cannot quickly obtain more material supplies from other suppliers when there is a supply shortage, it will increase the risk of supply chain disruptions and increase the cost of cooperation with new suppliers (Cheng et al. 2022). At the same time, as the concentration of suppliers increases, banks will perceive an increased risk to the business and therefore increase the interest rate on the loan as well as the number of restrictive terms (Campello and Gao 2017). Not only that, but bond investors are also translating supplier concentration risk into higher risk premiums (Sun and Li 2018). As a result, as supplier concentration increases, enterprises have higher financing costs and increased financial risk.

However, this paper argues that in the context of COVID-19, there is an increased risk to the supply chain. If companies are quick to respond to market changes, it helps enterprises turn risks into opportunities and improve corporate financial performance. Because of the increased concentration of suppliers, companies can quickly get feedback from suppliers and adjust corporate strategies in a timely manner, which is conducive to avoiding confusion in purchasing, production, and sales plans, improving asset utilization, and improving corporate financial performance. Therefore, based on the above view, this paper proposes the following research hypotheses:

H1: Supplier concentration and corporate financial performance have a positive correlation.

2.2 Customer concentration and financial performance

Customer concentration is a measure of a corporate top five customers sales as a percentage of total annual sales (Gu et al. 2022). According to previous scholars' studies on the impact of customer concentration on corporate financial performance, the results can be broadly classified into two categories. The first type of view is that customer concentration has a positive effect on a corporate financial performance. This is because as customer concentration increases, stable customers can generate stable cash flows for the enterprises. And a high customer concentration facilitates enterprises to focus on managing key customers, it facilitates companies to generate more revenue from a smaller percentage of the customer base (Patatoukas 2012). In addition, a stable customer relationship can also help enterprises get timely customer feedback, which helps enterprises optimize corporate purchasing plans and bring lower inventory holding costs (Ak and Patatoukas 2016, Kwak and Kim 2020). As customer concentration increases, the diversity of customer needs decreases, which helps companies reduce procurement costs and operating expenses, thus increasing asset utilization and improving financial performance (Patatoukas 2012, Kwak and Kim 2020).

Another type of argument is that as customer concentration increases, a corporate financial performance decrease. This is because as customer concentration increases, a corporate bargaining power in the sales process is weakened. Customers may encroach on the corporate profits by reducing prices, resulting in lower profits (Huang, Song, and Hu 2021). As customer concentration increases, enterprises will provide more commercial credit to maintain the stability of customer relationships, and excessive commercial discounts will reduce the profitability of the enterprises (Ertekin, Shulman, and Chen 2019, Sinha and Sarmah 2010). And increase the cash flow pressure of the enterprise, thus increasing the financial risk of the enterprise (Shi and Qin 2018).

However, in the context of COVID-19, when enterprises face greater supply chain risks, higher customer concentration can help enterprises understand customer needs in a timely manner and facilitate the stabilization of customer relationships and the development of new customers. Moreover, higher customer concentration can help enterprises get timely customer feedback, which is conducive to timely adjustment of production and procurement plans and helps enterprises gain more revenue. Therefore, a high customer concentration can better help enterprises cope with unexpected risks and help them reduce the losses caused by unexpected risks. Therefore, based on the above view, a hypothesis is proposed in this paper.

H2: Customer concentration and corporate financial performance have a positive correlation.

III. RESEARCH METHODOLOGY

3.1 Research design

In this paper, through an empirical research method, the collected data were subjected to regression analysis by Stata software. Equation 1 and Equation 2 are the regression models set in this paper.

$$Y1 = a1 \times x + a2 \times c1 + a3 \times c2 \qquad (1)$$
$$Y2 = b1 \times z + b2 \times c1 + b3 \times c2 \qquad (2)$$

Where Equation 1 is designed to calculate the effect of supplier concentration on a corporate financial performance. Equation 2 is designed to calculate the effect of customer concentration on the corporate financial performance.

The explained variables in this paper are Y1 and Y2. Y1 and Y2 denotes the corporate financial performance, this paper used the return on equity (ROE) metric for measurement. The explanatory variables in this paper are x and z. X denotes the supplier concentration of the manufacturing enterprise, supplier concentration is a measure of a corporation purchases from its top five suppliers as a percentage of total annual purchases. Z denotes the customer concentration of the manufacturing enterprise, customer concentration is a measure of a company's top five customers' sales as a percentage of total annual sales. The control variables in this paper are c1 and c2. C1 indicates the size of the enterprise, this paper uses the natural logarithm of the total assets of the sample enterprises at the end of the year to measure, c2 indicates the age of the enterprises, the natural logarithm of the difference between the reporting year of the annual report and the corporate year of incorporation add one is measured.

3.2 Sample selecting ·

In this paper, all manufacturing enterprises on the Shenzhen Stock Exchange in China are selected through the CSMAR database. The sample time span is 2019-2021. Excluding Special Treatment (ST) companies with financial or other abnormalities, and excluding some companies with incomplete data. The final sample of companies included in the study was 2,015, with a final sample size of 33,654 observations. This paper collects the top five customer sales share, top five supplier purchase amount share, ROE, accounts receivable turnover, accounts payable turnover, company age, and total assets for the period 2019-2021 through the CSMAR database.

IV. RESEARCH RESULTS \

4.1 Model estimation

First of all, this paper detects whether a fixed effects model or a random effects model is applied in this paper by Hausman command. The test results are shown in Table 1. Because Prob > F is less than 0.05 in the test results, so this study selects fixed effect model.

Table 1. Hausman test results of fixed model and random effect model selection

Equation 1 Hausman test result				Equation 2 Hausman test result			
Test	Coef	Std. Err.	P	Test	Coef	Std. Err.	P
Summary	0.211	0.062	0.001	Summary	0.128	0.065	0.048
	Prob > F = 0.0000				Prob > F = 0.0000		

4.2 The impact of supplier concentration on corporate financial performance

In this paper, the results of regression analysis through fixed effects model, the effect of supplier concentration on the financial performance of companies are shown in Table 2. Supplier concentration has a significant positive effect on firm financial performance after controlling corporate asset size and corporate age. This implies that as supplier concentration increases, it will have a positive impact on the financial performance of the enterprise with an impact value of 0.211. Therefore, hypothesis 1 of this paper is tested.

Table 2 Regression results of the relationship between supplier concentration and corporate financial performance

VARIABLES	ROE
x	0.211***
	(0.0618)
c1	0.0387***
	(0.00761)
c2	-0.142***
	(0.0351)
Constant	-0.443***
	(0.155)
Observations	4,809
Number of code	2,015
R-squared	0.015

Standard errors in parentheses

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

According to the regression results, it can be concluded that supplier concentration positively affects the corporate financial performance even when the risk of the corporate supply chain increases. This is because as the concentration of suppliers increases, the complexity of the supply chain decreases. This helps to reduce the maintenance and procurement costs of the supply chain and improve the financial performance of the company(Choi and Krause 2006). And as the concentration of suppliers increases, the more effective feedback companies can get from suppliers, which helps reduce uncertainty in the procurement process (Patatoukas 2012). Especially when the risk of supply chain increases, effective feedback and communication between enterprises and suppliers can help enterprises to continuously reduce the risk of procurement process. By continuously optimizing the procurement plan and improving the efficiency of inventory management, this helps to reduce the cost of the enterprise (Ahmad et al. 2019, Budiman and Rau 2021). Therefore, increasing supplier concentration is conducive to improving a company's ability to cope with risk and improving its financial position.

4.3 The impact of customer concentration on corporate financial performance

In this paper, the results of regression analysis through fixed effects model, the effect of customer concentration on the corporate financial performance are shown in Table 3. After controlling for the variables of corporate asset size and corporate age, there is a significant positive effect of customer concentration on corporate financial performance. Therefore, as customer concentration increases, it will have a positive impact on the financial performance of the enterprise with an impact value of 0.128. This is consistent with hypothesis 2 of this paper, so hypothesis 2 of this paper is verified.

Table 3 Regression results of the relationship between customer concentration and corporate financial performance

VARIABLES	ROE
z	0.128**
	(0.0646)
C1	0.0389***
	(0.00762)
C2	-0.144***
	(0.0352)
Constant	-0.429***
	(0.155)
Observations	4,809
Number of code	2,015
R-squared	0.012

Standard errors in parentheses

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

Based on the results of the above regression analysis, it can be concluded that customer concentration has a positive impact on the corporate financial performance. Because as customer concentration increases, it helps enterprises reduce customer acquisition costs and contact costs, which helps promote efficient cooperation between companies and customers (Palmatier 2008, Irvine, Park, and Yildizhan 2016). And as the concentration of customers increases, the diversity of customer needs decreases, which facilitates the development of scale production and achieves improved financial performance (Patatoukas 2012, Kwak and Kim 2020). Not only that, a high concentration of customers helps to share information between companies and customers. Especially in the context of COVID-19, the risk of enterprise supply chain increases, timely and effective customer feedback can help enterprises adjust procurement and production plans in time and help enterprises achieve efficient inventory management (Kwak and Kim 2020). This also facilitates enterprises to generate more revenue from a smaller customer base. Therefore, as customer concentration increases, enterprises have less diversity in customer demand, which helps them improve asset efficiency, as well as improve their financial performance.

V. CONCLUSION

In this paper, the data of Chinese manufacturing companies from 2019-2021 are regressed by Stata software. The two conclusions can be drawn as follows:

First, supplier concentration has a positive impact on the financial performance of a enterprise. With the increase of supplier concentration, the accuracy and timeliness of information sharing between enterprises and suppliers are effectively improved. This can help enterprises better cope with unexpected risks when the risks in corporate supply chain increase. Effective and timely information feedback can help enterprises adjust production and procurement plans at this time, helping enterprises reduce the losses caused by unexpected risks, and helping enterprises turn risks into opportunities.

Second, customer concentration also positively affects corporate financial performance. Higher customer concentration facilitates timely understanding of customer needs and feedback, which improves efficient cooperation between enterprises and customers. It can help improve corporate asset utilization and financial performance. In particular, when the risk of supply chain emergencies increases for enterprises, timely understanding of customer demand facilitates timely adjustment of production and procurement plans. This can help enterprises reduce inventory management costs and help improve financial performance while stabilizing customer relationships.

Therefore, Chinese manufacturing companies should improve supplier concentration and customer concentration. A concentrated customer base helps reduce the diversity of customer needs and can reduce the input of redundant production factors. Taking customer demand as the starting point, enterprises can effectively adjust production and sales plans through a bottom-up approach to achieve production and sales balance, which can help enterprises reduce procurement costs and inventory management costs. It also can help enterprises achieve zero inventory management, pursue lean production, and thus improve corporate financial performance.

According to the limitations of this paper, the findings can be made more generalizable in the future by extending the sample time span. And by comparing the effects of customer concentration and supplier concentration on corporate financial performance under different supply chain disruption risk scenarios.

VI. ACKNOWLEDGMENT

I would like to thank Dr. Chonlavit Sutunyarak for his advice and help with my article. His advice helped me to finish this article better.

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