Customer Concentration and Firm Performance are Analyzed from the Perspective of Information Asymmetry

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Abstract. Based on the perspective of information asymmetry, this paper selects the data of Shanghai and Shenzhen A-share listed companies from 2014 to 2023 to explore how customer concentration affects the degree of information asymmetry and thus corporate performance. The research shows that the relationship between customer concentration and firm performance is inverted U-shaped. In addition, from the perspective of property rights, it is found that compared with state-owned enterprises, customer concentration in non-state-owned enterprises has a more significant positive impact on enterprise performance. The research results provide a new supplement for the influence of customer concentration on enterprise performance and its influence mechanism, and provide a new theoretical significance and practical basis for enterprise to manage customer relationship and improve resource utilization.

Keywords: Customer concentration; Information asymmetry; Nature of property right; Inverted U-shaped relation.

1 Introduction

Customers are the demanders and important stakeholders of the company's products, and enterprises need to establish stable cooperative relations with customers to seek greater profits and improve corporate performance. Therefore, it is essential to establish long-term stable customer relations. Theoretical circles have three conclusions on the impact of customer concentration on enterprise performance. The first view is that the two are negatively correlated. Li Shu [1] found that excessive customer concentration would increase operational risk and financial risk, while shareholders and creditors would increase the financing cost of enterprises due to higher risk premium, thus reducing corporate performance. Zhao Shan and Li Guihua (2023) found in their empirical study that customer concentration has a negative effect on firm performance through factors such as inter-firm specific investment and industry competition [2]. Dhaliwal et al. [6] found that the improvement of customer concentration is not conducive to the improvement of enterprise performance. The second view is that the two are positively correlated. Jiang Wei [4] (2021) found that enterprises build coopera-

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tive relationships with major customers through loose accounts receivable policies, which improves corporate performance. Patatoukas[7] (2012) found that high customer concentration will improve asset management efficiency and thus corporate performance. The third view is that the relationship is not just linear. Yu Maojian and Sun Yuanxin (2014) used customer concentration to represent specific investment and found that the relationship between them presents an inverted "U" shape [5]. Irvine[3] (2016) found that as the cooperation between enterprises and customers becomes closer, the relationship between them changes from negative to positive.

Based on the existing conclusions, from the perspective of information asymmetry, this paper analyzes the mechanism by which customer concentration changes the degree of enterprise information asymmetry and then affects enterprise performance. The possible contributions are as follows: First, the change of customer relationship in the transaction process provides new theoretical support for the relationship between customer concentration and enterprise performance. At the same time, this relationship study from a certain Angle indicates the reasons for the divergence of research conclusions on the influence of customer concentration on firm performance. Second, the analysis of the mechanism of customer concentration affecting enterprise performance from the perspective of information asymmetry is helpful for customer relationship management and implementation of strategic decisions.

2 Theoretical Analysis and Research Hypothesis

2.1 The Impact of Customer Concentration on Enterprise Performance

Customers have a significant impact on the company's business activities and strategic decisions. According to the transaction cost theory, the increase of customer concentration leads to the risk of blackmail, while the value creation after the increase of customer concentration is ignored. A moderate concentration of customers can form a unique competitive advantage of an enterprise [2]. In the cooperation, the trust degree, information exchange and cooperation efficiency of both parties are enhanced. Therefore, the customer concentration not only increases the transaction cost, but also promotes the cooperation between enterprises. This shows that the relationship between customer concentration and firm performance is not simple linear, but complex two-way relationship. Therefore, this paper proposes the following hypothesis: H1: There is an inverted U-shaped relationship between customer concentration and firm performance.

2.2 Analysis based on the Perspective of Information Asymmetry

The formation of cooperative relationship between enterprises and customers increases the motivation of enterprises to make use of cooperative relationship, including adjusting the degree of information asymmetry to adjust the resource dependence relationship between enterprises and customers, and these changes affect the performance of enterprises. Specifically, when the customer concentration is low, the customer can only use the information disclosed by the enterprise or similar enterprises

to predict the value of the investment enterprise and make investment direction. In order to achieve the purpose of expanding customers and reducing transaction costs, the enterprise will also meet the customer's demand and expectation of information transparency. Therefore, at this stage, improving the customer concentration will narrow the degree of information asymmetry. The reduction of corporate financing pressure is conducive to improving corporate performance. When customer concentration rises beyond a certain stage, enterprises will disclose information to obtain other investors' investment motivation is weakened, so they will choose informal channels to communicate information to customers. In addition, enterprises will manipulate the process of information production and disclosure in order to avoid punishment by regulatory authorities and maintain corporate reputation, thus increasing the degree of information asymmetry and financing costs. Not conducive to the improvement of enterprise performance. In general, before a certain stage, customer concentration can optimize the information disclosure of enterprises, reduce the motivation of enterprises to hide negative information for financing, reduce irrational behavior of customers, and then improve corporate performance by reducing the degree of information asymmetry of enterprises. After a certain stage, big customers will take advantage of their dominant position to demand changes in the disclosure system of enterprises, enhance the degree of information asymmetry of enterprises and then reduce the performance of enterprises. Therefore, the hypothesis is put forward :H2: customer concentration affects enterprise performance by influencing the degree of information asymmetry.

2.3 The Regulating Effect of the Nature of Property Rights

Although there have been studies from the institutional perspective, few studies are based on customer management analysis. Therefore, this paper fills in this theory by analyzing the performance heterogeneity of state-owned and non-state-owned enterprises. The nature of property rights is an important way for customer concentration to affect enterprise performance. Since state-owned enterprises have many advantages, such as preferential access to resources and capital, as well as access to management rights and administrative privileges in certain fields, the government will reduce part of taxes, provide some financial subsidies, or reduce financing interest and other ways to support state-owned enterprises. And then reduce the financing constraints of state-owned enterprises. Secondly, state-owned enterprises are guaranteed by the government, which reduces the cost of debt. In times of financial distress, the government guarantee strengthens the ability of state-owned enterprises to deal with risk uncertainty and releases good reputation information. Therefore, the loss caused by the concentration of customers of state-owned enterprises is lower than that of non-state-owned enterprises. Therefore, hypothesis H3 is proposed: property rights play a moderating role when customer concentration affects the degree of information asymmetry and then affects firm performance.

3 Research Design

3.1 Sample Selection and Data Sources

Based on the perspective of information asymmetry, this paper selects data of Shanghai and Shenzhen A-share listed companies from 2014 to 2023 for research, and excludes relevant data of ST, *ST, PT and enterprises with missing data. After 1% and 99% extreme processing, 20,665 sample data were obtained. All the data are from Guotai 'an database.

3.2 Variable Definition

1. Explained variable enterprise performance: According to the research of Patatoukas (2012) [5], the return on total assets (ROA) and return on equity (ROE) are used to measure enterprise performance.

2. Explanatory variable customer concentration (CC): Referring to existing research [8], it is measured by dividing the sales share of the top five customers by the total sales share of the enterprise.

3. Information asymmetry index of intermediary variables(ASY): Referring to the research of Yu Wei et al. [3], the degree of information asymmetry of enterprise value is measured by the trading data of individual stocks of a company. The liquidity ratio index (LR) and illiquidity ratio index (ILL) were evaluated using the relationship between buy and sell order flow and stock prices. That is, the lighter the adverse selection problem, the greater the stock liquidity and the smaller the corresponding unit volume price change." Liquidity ratio (LR) and illiquidity ratio index (ILL) were measured respectively: $LR_{it} = -\frac{1}{D_{it}}\sum_{k=1}^{D_{it}}\sqrt{\frac{V_{it}(k)}{|r_{it}(k)|}}$, $ILL_{it} = \frac{1}{D_{it}}\sum_{k=1}^{D_{it}}\sqrt{\frac{|r_{it}(k)|}{V_{it}(k)}}$.

Where, Vit(k) represents the trading volume of the k trading day in t year of enterprise i, rit(k) is the stock return rate, Dit is the trading day of the year, and the liquidity is evaluated by the return reversal index. The yield inversion indicator GAMit=|γit|, and the coefficient γit is estimated by the following formula: reit(k)=θit+φitrit(k-1)+γitVit(k-1)sign [reit(k-1)] +εit(k), where reit(k)=rit(k)-rmt(k) is the excess return. Due to the particularity of China's stock market, rmt(k) is a market return calculated by the weight of the circulating market value. If other conditions remain unchanged, the higher the degree of information asymmetry, the lower the stock liquidity, and the higher the LR, ILL and GAM indicators.

Control variables. Based on the existing literature [4], this paper controls other indicators that may affect enterprise performance in the regression analysis. In terms of Year and Ind, year and industry affiliation are represented. See Table 1.

Table 1. Specific variable definitions

Variable Types	Variable name (symbol)	Variable definition
Explained variable	business performance (ROA)/(ROE)	Net profit margin on Total assets = Net profit for the period/total assets at the end of the period
Explanatory variable	customer concentration(CC)	Sales revenue to the top five customers as a percentage of total sales for the year
Intermediate variable	information asymmetry degree (ILL)	stock non-current ratio, the higher the value, the higher the degree of information asymmetry
Control variable	Enterprise Size (Size)	The value of total enterprise assets is the natural logarithm
	Asset-liability ratio (Lev)	Total liabilities/total assets
	Total assets turnover (ATO)	Operating income/Average total assets
	ownership concentration (Top10)	Share of top 10 shareholders
	equity balance degree (Balance)	Shareholding ratio of the second to fifth largest shareholders/shareholding ratio of the first largest shareholder
	Age of listing (Age)	Age of listed company = observation year -IPO year
	Board size (Board)	The number of board members is logarithmic
	Proportion of independent directors (Indep)	The number of independent directors/the number of board of directors in Indep
	Equity nature (SOE)	state-owned enterprises take 1, otherwise 0
	Tobin'Q (TobinQ)	(Equity value + book value of liabilities)/ total assets
Dummy variable	Year(Year)	Dummy variable of year
	Industry (Ind)	Industry dummy variable

3.3 Model Setting

The measurement model constructed in this paper is as follows:

$$ROA_{i,\ t} = a_0 + a_1 CC_{i,\ t} + a2CC^2 + a_3 \sum Controls + \sum Year + \sum Ind + \varepsilon_{i,t} \quad (1)$$

Where, ROAi and t are the return on assets of enterprise i in year t, CC is the customer concentration, and CC^2 is the square term of customer concentration. ∑Contros is the set of control variables, and virtual variables ∑Year and ∑Ind, $\varepsilon_{i,t}$ are random error terms to control the influence of time and industry.

In order to study the relationship between customer concentration and firm performance, information asymmetry degree (ASY) is used as a mediating variable to study the influence of customer concentration on information asymmetry and the mediating effect of information asymmetry when customer concentration affects firm performance. The following model is constructed:

$$ASY_{i,t} = b_0 + b_1 CC_{i,\ t} + b_2 \sum Control_{i,t} + \sum Year + \sum Ind + \varepsilon_{i,t} \quad (2)$$

$$ROA_{i,\ t} = c_0 + c_1 CC_{i,t} + c_2 ASY_{i,t} + c_3 \sum Control_{i,t} + \sum Year + \sum Ind + \varepsilon_{i,t} \quad (3)$$

4 Empirical Results and Analysis

4.1 Descriptive Statistics

The maximum and minimum values of customer concentration (CC) are very different, indicating that enterprises are different, and customers present a diversified basis, with an average value of 33.481 and a standard deviation of 22.638. The difference between the maximum value and the minimum value of enterprise performance (ROA) is 0.815, the difference is large, the standard deviation is 0.074, and the overall difference is small.

4.2 Correlation Analysis

From the correlation coefficient between the variables, it can be seen that the correlation coefficient between the primary term of the explanatory variable and the explained variable is -0.059, and the correlation coefficient is negative, indicating that the customer concentration is negatively correlated with the change of enterprise performance, and it is significant at the level of 10%. At the same time, variance inflation factor test was carried out on the variables, all of which were less than 0.6, indicating that the explanatory variables met the conditions of regression analysis and there was no multicollinearity problem.

4.3 Multiple Regression

In this paper, stata16.0 software is used for regression analysis according to the constructed model. After passing F-test and Hausmann test, fixed effect regression model was adopted. The results are shown in Table 2. The goodness of fit of the model is above 18%, and the explanatory variable has a strong interpretation of the explained variable. Wherein, model (1) is the influence of control variables on firm performance (ROA) when no explanatory variables are added. Model (2) analyzes the influence of the first term of customer concentration on business performance (ROA), which is significant at the 1% level. However, only analyzing the first term of customer concentration cannot accurately judge the causal relationship between ROA and business performance. In order to further study whether there is a nonlinear relationship between the two, the quadratic term of customer concentration (CC2) is added to obtain Model (3). The quadratic regression coefficients are significantly negative at the 1% level, and the regression coefficients of the primary explanatory variables are significantly positive at the 1% level, indicating that there is an inverted U-shaped relationship between customer concentration and firm performance. Hypothesis 1 is proved, according to which an inverted U-shaped relationship exists between customer concentration and firm performance.Due to space limitations, all regression tables show only the main variables.

Table 2. Regression tables

	(1)ROA	(2)ROA	(3)ROA
CC		0.000***	0.000***
CC^2			-0.000***
Controls	yes	yes	yes
Industry&Year	yes	yes	yes
N	20665	20665	20665
R^2	0.186	0.187	0.187
F	428.442	388.671	353.346

***p<0.01","**p<0.05","*p<0.10，the same below

4.4 Intermediate Effect Test

To verify the mediating effect of the degree of information asymmetry, the following equation is constructed:

$$Y = s_0 + sX + e_1 \tag{4}$$

$$M = t_0 + tX + e_2 \tag{5}$$

$$Y = s'_0 + s'X + aM + e_3 \tag{6}$$

Table 3 is the regression table of intermediary effect. The test model (1) knows that s is significant, the model (2) knows that t is significant, and the model (3) knows that s' and a are significant, and the coefficient symbols of t*a and s' are the same, indicating that the degree of information asymmetry exerts an intermediary effect on the influence of customer concentration on enterprise performance, and only a partial intermediary effect is played, that is, in addition to the intermediary effect of information asymmetry, Customer concentration also affects firm performance through other intermediaries.

Table 3. Regression table of mediating effect

	(1)ROA	(2)ASY	(3)ROA
CC	0.000***	-0.001***	0.000***
ASY			-0.019***
Controls	yes	yes	yes
Industry&Year	yes	yes	yes
N	20665	20665	20665
R^2	0.198	0.443	0.205
F	109.553	352.595	111.310

4.5 Heterogeneity Analysis

Research shows that compared with state-owned enterprises, non-state-owned enterprises will suffer more serious performance losses due to their resource dependence on large customers.

5 Conclusions

The empirical results of this paper show that the increase of customer concentration can promote the improvement of enterprise performance in a certain stage, but it will have a inhibitory effect on enterprise performance after a certain degree. It is found that customer concentration plays a part of the mediating role in the influence of information asymmetry on firm performance. According to the research results, the following suggestions are given for enterprises to formulate scientific and reasonable business strategies; First of all, enterprises should strengthen customer relationship management and decide which customer relationship to choose according to the industry and market environment. If there is information imbalance and competition deformity in the industry, enterprises should avoid the existence of major customers and implement diversified customers to prevent the risk of rip-off. Secondly, if the concentration of customers exceeds a certain stage, enterprises will privately exchange information with major customers, which is not conducive to the principle of market information fairness. Therefore, the regulatory department should pay attention to the information disclosure system of enterprises with high concentration of customers. Finally, state-owned enterprises should make full use of the advantages of customer concentration to establish a sustainable and stable economic dependence relationship with customers. Non-state-owned enterprises should broaden their sales methods and implement diversified customers to mitigate the adverse consequences caused by bargaining power.

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