

# Cost Stickiness, Ownership Concentration and Enterprise Risk

## —Empirical Evidence from Chinese Listed Manufacturing Companies

Kening Yao

School of Management, Jinan University, Guangzhou, China

Email: yaokening1030@163.com

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### Abstract

This paper examined the impact of cost stickiness on company risk by using the data of listed manufacturing companies of Chinese A-share market from 2008 to 2015. The research shows that the cost stickiness significantly increases the risk level of companies. Ownership concentration, as the core content of corporate governance, would impact the relationship between cost stickiness and company risk level: when the ownership concentration is higher, the impact of cost stickiness on company risk is greater.

### Keywords

Cost Stickiness, Enterprise Risk, Ownership Concentration

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## 1. Introduction

The overall economic growth of China is slowing down. Faced with the circumstance of income growing slowly, to effectively control the cost, maximize the use of resources, reduce risks are the focus of Chinese enterprises. The discovery of cost stickiness is conducive to the exploration of the control behavior of the enterprise cost management, the operating efficiency and management effectiveness of the enterprise from the perspective of cost. On the premise of external economic uncertainty, the enterprise will initiatively adjust and manage the costs and expenses according to the economic environment.

To prevent cutting cost from harming the enterprise core competence, the process of cost adjustment may cause incomplete match between the business activity and resources, producing the phenomenon of sticky cost. Too strong cost stickiness causes the cost level deviating from the optimal allocation of resources, resulting in inefficient utilization of resources and affecting the forma-

tion of core competitiveness [1]. In that agency, problems exist in modern companies; the enterprise managers consciously focus on cost management for a variety of reasons. Planning the resources needed for the producing and operating causes the asymmetry of cost and business activities changes in the process of resource allocation and balance, which would bring huge risks to the enterprises. The concentration degree of ownership is an important part of corporate governance, which reflects the regulatory strength of shareholders to a certain extent. The failure of corporate governance mechanism is the root cause of enterprise risk [2]. The right ownership structure is directly related with the effectiveness of the supervision and motivation, different ownership concentrations mean that the largest shareholder has different control abilities and motivations to manage, supervise and constrain, in turn, affect the cost stickiness, change the risk level of the enterprise [3]. The existing research focuses on the causes of cost stickiness and its effects on performance. There are few studies on the impact and relationship between the cost stickiness and enterprise risk. Based on this, this article using the data of Chinese A-share market from 2008 to 2015, examined the relationship between the cost stickiness and enterprise risk, and further studied the impact of the ownership concentration on the above relationship.

## **2. Background and Hypothesis Development**

### **2.1. Cost Stickiness and Enterprise Risk**

The concept of cost stickiness was put forward by Anderson, Banker and Janakiraman (2003), utilizing the concept of price stickiness in the economic (Hamermesh and Pfann, 1996) (hereinafter referred to as ABJ). Cost Stickiness refers to this phenomenon: the cost increment caused by the increase of business volume is greater than the cost decrement caused by the decrease of business volume. On this basis, the ABJ (2003) researched the American public companies' sales and management fees (SG & A), they found that when the sales grew 1%, SG & A average rose 0.55%, when 1% drop in sales, SG & A only decreased by 0.35% [1].

To some extent, the cost represents the limited economic resources of enterprises. As the competition intensifies, the management of cost management is an important means to improve the management level and the performance of enterprises. In order to maintain a certain advantage in the fierce competition environment, enterprises must improve the utilization efficiency of limited resources.

Anderson, Banker and Janakiraman (2003) found that in the actual operation of the enterprise, the cost increment caused by the increase of business volume is greater than the cost decrement caused by the decrease of business volume, presenting a certain "sticky" characteristics, which is inconsistent with the traditional theory of cost behavior. Both external objective environment and internal management subjective wills would exert influences on cost control and cost management of enterprises. The enterprise's cost stickiness is put forward to help the enterprise's cost management based on objective reality, optimize the

decision-making of enterprise management and realize the maximization of enterprise value.

When managers increase or decrease the promised resources, extra adjustment cost will happen, making the cost does not only mechanically changes according to the change of current business volume, but also according to the existing production capacity (such as human resources and material resources, etc.) and the restriction of expected future business volume [4], which result in the inertia of cost change, increasing the risk of the enterprise future earnings. James N. Cannon(2014) found that high adjustment costs makes it hard for the enterprise to timely adjust the constraint cost according to the internal and external environment changes, hard to reconfigure the enterprise resources quantity and structure [5]. Ramji Balakrishnan (2014) found that when the enterprise future product demand and revenue decline, it will cause the enterprise resource waste and the increase of risk level. At the same time, in manufacturing listed companies, with the great capital intensity and the strong specialization of assets, these assets are often the foundation of the enterprise core competitiveness and value creation [6]. It is difficult for these enterprises to change the users and uses of their assets. So cost stickiness will bring resistance to the cost adjustment. When the business volume decline, the idle loss grow lager due to stop production, reducing the efficiency of business activities and increasing the risk level. Banker (2010) found that under the condition of future demand uncertainty, managers are not able to make an accurate judgment for the change of economic business and enterprise development in the future [7].

Optimistic managers expect product demand will grow in the future, they would choose not to adjust the enterprise resources and even increase resources for the future possible good operation situation, which would reduce the efficiency of resource allocation in enterprise and make cost stickiness significantly enhanced and decision making risks increase. Based on this, below hypothesis is proposed:

H1: The high cost stickiness is positively associated with the enterprise risk. The greater the degree of stickiness, the greater the risk of enterprise.

## **2.2. Ownership Concentration, Cost Stickiness and Enterprise Risk**

The shareholding structure has an important influence on the behavior and decision of shareholders and executives, which in turn can affect the degree of supervision and the degree of restraint of shareholders to managers, forming different agency costs and operational performance [8]. Whether the ownership structure appropriate or not influences the severity of the agency problem. Sha Lv & Yujia Zheng (2016) found that the separation of ownership and management caused the occurrence of adverse selection and moral hazard problems, affects the degree of cost stickiness [9]. When large shareholders have a relatively high shareholding ratio and their controlship is inconsistent with their cash flow

right, they have a strong incentive to pursue private interests [10]. The predation hypothesis considers that in the enterprises with high concentration of ownership, the controlling interest of the company is in the hands of minority shareholders, which can control the management decision of the listed company according to the self-will. At this time, minority shareholders have less right to speak, and it is difficult to form effective supervision mechanism, resulting in “trench defense effect”. So, in the enterprise that does not have perfect protection for minority shareholders, in order to maximize their own enterprise resource, the large shareholders will choose a compliant agent. The agent, aiming for promotion and avoiding potential value in the labour market, may simply serve the large shareholders for all kinds of resources adjustment decisions rather than to the company value maximization as the goal [11]. The behavior of management represents the individual will of the largest shareholders, and is directly controlled by the major shareholders. When the compliant agent adjusts the resource allocation structure, he will retain redundant resources and influence the risk tolerance level of the enterprise. He will not change the resource allocation in time when demand declines, making enterprise cost stickiness increased. The largest shareholders and managers conspired to encroach on enterprise resources, greatly increases the risk of the enterprise. When the ownership concentration is too high, the separation of control and cash flow makes the large shareholders take advantage of the “hollowing out” behavior to seek private benefits, rather than the maximum value of the enterprise [12]. By controlling agent, they allocate capital and transfer resources according to personal preferences, producing certain “large shareholder agency problem”. Also, small and medium-sized shareholders tend to be “free rider” and have opportunistic behavior, prompting large shareholders encroach on minority shareholders interests more easily, greatly increasing the enterprise risk. Cespedes (2010) found that the greater the ownership concentration, the greater the financial leverage, and the greater likelihood that the company would be exposed to financial risks. Laeven, Levine, 2009 found that the shareholders with more control in the enterprise is easier to implement personal willingness to risk strategy, resulting in a decline in the resource allocation efficiency of the enterprises, causing the decline in the value of the company, making the enterprise face a higher risk of insolvency [13]. Therefore, this paper proposes the following hypotheses:

H2: Ownership structure has an impact on the positive relationship between cost stickiness and enterprise risk. Compared with the companies with lower ownership concentration, the cost stickiness’s positive effect on the enterprise risk is greater in companies with higher ownership concentration.

### **3. Research Design and Methodology**

#### **3.1. Sample Selection**

This article selects manufacturing companies listed on the Shanghai and Shenzhen A-share stock exchanges as samples. The sample period extends from 2008

through 2015. The ST listed companies are excluded because they do not operate in normal environment. The data which is missing or abnormal is excluded. Finally, these criteria result in a final sample of 9786 firm-year observations. All data in this paper comes from CSMAR database<sup>1</sup>. The software used in this article is Stata 12.0. In order to eliminate the effect of abnormal value on the result, the paper has winsorized with 1% adjustment for all continuous variables respectively.

## 3.2. Variable Measurement

### 3.2.1. Measure of Enterprise Risk

The explained variable of this paper is the enterprise risk calculated by the Z-Score model. Altman used 22 financial ratios to set up the five-variables Z-Score model through mathematical statistics screening. Today, most scholars use Altman's financial risk early warning Z-Score to indicate the degree of financial risk of the enterprise. Therefore, this paper adopts Altman's Z-Score model to reflect the enterprise risk. The specific formula is as follows:

$$Z = 1.2 * X_1 + 1.4 * X_2 + 3.3 * X_3 + 0.6 * X_4 + 0.999 * X_5 \quad (1)$$

In formula (1),  $Z$  represents the financial risk warning value;  $X_1$  = operating capital/total assets;  $X_2$  = retained earnings/total assets;  $X_3$  = EBIT/total assets;  $X_4$  = shareholders' equity/total liabilities;  $X_5$  = sales revenue/total assets. When  $Z < 1.8$ , the enterprise is in bankruptcy area; when  $1.8 \leq Z < 2.99$ , the enterprise is in grey area; When  $2.99 < Z$ , the enterprise is in safe area. That means that the smaller the  $Z$  value, the greater the risk level for the enterprise [14].

### 3.2.2. Measure of Cost Stickiness

The ABJ model is the most widely used in the study of cost stickiness. However, ABJ model is only applicable to test the existence of the cost stickiness and study the effects of other factors on cost stickiness. ABJ model cannot be quantized treatment to the stickiness as the explanatory variable, so it is not suitable to discuss the economic consequences of cost stickiness. The Weiss model can directly estimate the stickiness level, which is in line with the requirement of this paper as the explanatory variable and can establish the regression model of its economic consequences on this basis. This method measures the degree of stickiness from the company's point of view, and defines the stickiness level by measuring the difference between marginal cost change during sales rise and marginal cost change when sales decrease. We calculate the sum of the operating cost, sale cost and management cost as the proxy variables of the total cost to measure the rate of cost change. The specific formula is as follows [5]:

<sup>1</sup>CSMAR (China Stock Market & Accounting Research Database) is developed under the support of China Financial Research Center in Hong Kong University, China Accounting and Finance Research Center in Hong Kong Polytechnic University, the Shanghai Stock Exchange, Shenzhen Stock Exchange and other professional research and investment institutions. It is one of the most professional and accurate database in China, built according to standards of the famous international database such as CRSP and COMPUSTAT for the purpose of China stock market and accounting academic research.

$$\text{Sticky}_{i,t} = \log(\Delta\text{COST}/\Delta\text{SALE}_{i,a}) - \log(\Delta\text{COST}/\Delta\text{SALE}_{i,b}) \quad (2)$$

where  $i$  represents the company  $i$ ;  $t$  represents the year  $t$ ;  $a$  represents the latest quarter in which the sample company's business volume declined in four consecutive quarters;  $b$  represents the latest quarter of the sample company's four consecutive quarters of increase in business volume;  $\Delta\text{cost}$  represents the total cost change rate for the quarter;  $\Delta\text{sale}$  represents the rate of change of quarterly operating income. The Sticky value calculated by the model is less than 0, which means that the cost stickiness exists, and the greater the absolute value, the higher is the stickiness.

### 3.2.3. Measure of Ownership Concentration

Ownership concentration is measured by the sum of top 5 shareholders' holdings.

### 3.2.4. Control Variables

There are many factors that can affect cost stickiness. This paper selected the following control variables: Size represents the enterprise scale; Lev is the asset-liability ratio; Profit is for the enterprise's profit ability; Intensity is the capital intensity of the enterprise.

The overviews of all above variable definitions are presented in **Table 1**.

## 3.3. Model Specification

To verify H1 and H2, this article uses the following regression model to carry out OLS regression. Firstly, we use model (3) to verify the cost stickiness's effects on enterprise risk. Then, we use model (4) to test if ownership concentration has an impact on the relationship between cost stickiness and enterprise risk.

**Table 1.** Variable definition.

Variable	Symbol	Definition
Dependent variable		
Enterprise risk	$Z$	Calculated according to Z-score model: $Z = 1.2 * X_1 + 1.4 * X_2 + 3.3 * X_3 + 0.6 * X_4 + 0.999 * X_5$
Explanatory variables		
Cost stickiness	Sticky	Calculated according to Weiss model: $\text{Sticky}_{i,t} = \log(\Delta\text{COST}/\Delta\text{SALE}_{i,a}) - \log(\Delta\text{COST}/\Delta\text{SALE}_{i,b})$
Ownership concentration	CR5	The sum of top 5 shareholders' holdings
Control variables		
The enterprise scale	Size	The natural logarithm of the total asset
Asset-liability ratio	Lev	Total debt/total asset
Profitability	Profit	The gross margins
Capital intensity	Intensity	Total assets/operating income

$$Z = \beta_0 + \beta_1 * \text{Sticky} + \beta_2 * \text{Size} + \beta_3 * \text{Lev} + \beta_4 * \text{Profit} + \beta_5 * \text{Intensity} + \varepsilon \quad (3)$$

$$Z = \beta_0 + \beta_1 * \text{Sticky} + \beta_2 * \text{CR5} + \beta_3 * \text{CR5} * \text{Sticky} + \beta_4 * \text{Size} + \beta_5 * \text{Lev} + \beta_6 * \text{Profit} + \beta_7 * \text{Intensity} + \varepsilon \quad (4)$$

where  $Z$  represents the enterprise risk, Sticky represents the cost stickiness, CR5 represents the ownership concentration. Based on the early research, we choose the following control variables: Size is for the enterprise scale, Lev is asset-liability ratio, Profit is for the enterprise's profitability, intensity is the capital intensity of the enterprise.

## 4. Results

### 4.1. Descriptive Statistics

**Table 2** presents descriptive statistics of the main variables. From the point of cost stickiness, the mean value of cost stickiness is 0.043, the maximum value is 0.629, the minimum value is 0.359, that indicates cost stickiness vary greatly. The difference is consistent with present China's industry development situation, provides this paper a good opportunity to study.

From the point of ownership concentration, the sum total top five shareholders' shareholding average 51.3%, which indicate the overall enterprise ownership concentration is relatively high. Ownership concentration is between 18.6% and 86.4%. The difference between the minimum and the maximum value is very big, which means the sample companies are strongly representative. It can be seen from the profitability of the enterprise that the maximum value can be as high as 0.784. The minimum value is  $-0.017$ , indicating that there are different performance situations among enterprises.

From the perspective of enterprise risk, the maximum value of risk is 15.528, and the minimum value is  $-0.875$ , indicating that the sample data span is large and representative, and the sample selection is proper.

### 4.2. Correlation Analysis

**Table 3** is the result of Pearson correlation analysis of the main variables in this paper. The data in **Table 3** shows that the degrees of cost stickiness (Sticky) are

**Table 2.** Descriptive statistics of major variables.

Variable	Observation	Mean	Std.	Min.	Median	Max.
Z	9864	3.452	2.448	-0.875	2.844	15.528
Sticky	9864	0.043	0.137	-0.359	0.021	0.629
CR5	9864	0.513	0.155	0.186	0.542	0.864
Lev	9864	0.414	0.216	0.044	0.403	0.988
Profit	9864	0.263	0.163	-0.017	0.231	0.784
Intensity	9864	2.031	1.312	0.403	1.696	8.204
Size	9864	21.780	1.245	18.879	21.824	27.216

**Table 3.** Pearson correlation matrix.

Variable	Z	Sticky	Size	Lev	Profit	Intensity
Z	1					
Sticky	0.046**	1				
Size	-0.354***	-0.186	1			
Lev	0.251	-0.073***	0.406***	1		
Profit	0.293***	-0.055*	-0.215***	-0.417**	1	
Intensity	0.075***	0.231***	-0.212***	-0.132	0.308***	1

\*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

significantly positive correlation with the level of enterprise risk (Z) at the 5% statistical level, which is consistent with the H1 in this paper. At the same time, correlation coefficient between variables in the model is less than 0.5, and there is no strong correlation between variables.

### 4.3. Multivariate Regression Results

Columns (1) in **Table 4** are the regression test result of cost stickiness and enterprise risk. This paper uses model (3) to examine the correlation between the cost stickiness and the enterprise risk. From the results we can see, in the case of having controlled other variables, the cost stickiness (Sticky) and enterprise risk (Z) has a significant positive correlation (coefficient is 0.173,  $t = 2.16$ ) at the 5% statistical level, which means the enterprise risk level increased with the increase of the cost stickiness.

The regression results of other control variables shows that when the enterprise size is larger, the information asymmetry level is relatively lower, the business level is relatively more mature, and the enterprise has stronger resistance to risk. In the case of high asset-liability ratio, the enterprise mainly uses the creditor's funds to conduct the operation and management activities, the excessive interest will make the risk level of the higher. At the same time, as the profitability of enterprises increases, the risk level also increases. Enterprises with greater capital intensity have relatively lower risk level, and the above test results support the H1 proposed in this paper.

Columns (2) in **Table 4** are the regression test result of ownership concentration, cost stickiness and enterprise risk. This paper uses model (4) to test the correlation among the three. As can be seen from the results, the interaction of ownership concentration and cost stickiness ( $CR5 * Sticky$ ) has a significant positive effect on enterprise risk (Z) at 1% statistical level (the coefficient is 0.021,  $t = 3.56$ ). It means that the high ownership concentration of enterprises, controlling shareholders can make the enterprise the management decisions according to their will. At this point it is difficult for small and medium shareholders to form effective supervision mechanism, it cannot achieve the optimal resource allocation, the positive influence that cost stickiness have on the enterprise risk is greater. In order to control the cost stickiness level and reduce the



**Table 4.** Multivariate regression results.

	(1)	(2)
	Z	Z
Sticky	0.173** (2.16)	0.792*** (-2.75)
CR5		1.328*** (7.55)
CR5 * Sticky		0.021*** (3.56)
Size	-0.187 (-7.20)	0.179 (-6.81)
Lev	7.024*** (57.10)	6.624*** (55.12)
Profit	1.240*** (5.88)	0.897*** (4.30)
Intensity	-0.195** (-7.23)	-0.114*** (-5.54)
_cons	9.891*** (17.26)	9.117*** (16.21)
N	9864	9864
Adj. R <sup>2</sup>	0.204	0.213

t statistics in parentheses. \*p < 0.05, \*\*p < 0.01, \*\*\*p < 0.001.

risk of the enterprise, the enterprise needs to maintain the right degree of ownership concentration, so that the enterprise can form a certain monitoring mechanism. The above test results support the H2 proposed in this paper.

## 5. Conclusions

Based on the data of Chinese manufacturing listed companies in A-share market from 2008-2015, this paper studied the cost stickiness's influence on the enterprise risk. And this paper also considered the ownership concentration, discussed its effect on the relationship between enterprise risk and cost stickiness. The research shows that: 1) There is a significant positive correlation between the cost stickiness and the enterprise risk, which indicates that the increase of the stickiness increases the risk level. Therefore, in the practice of cost management, enterprises should correctly understand the stickiness of cost, control the degree of stickiness in the process of cost change, and reduce the risk of enterprises. 2) Further study found that ownership concentration had a significant positive effect on the relationship between cost stickiness and the enterprise risk. In the enterprise with high ownership concentration, super large shareholders under the control of self-interest behavior will lead business decision-making to

deviate from the optimal resources configuration, increase the cost stickiness level, and make enterprises face a higher risk.

Enterprises need to overcome the problem of agency to some extent, in order to control the benefit expropriation behavior of large shareholders, the enterprise needs to maintain proper ownership concentration, reduce the risk of the enterprise, improve the management efficiency of enterprises. In China, state-owned enterprises (SOEs) are the main economic forces, and the widespread problem in state-owned enterprises is the state being the single-large shareholder, the distribution of ownership is too concentrated on the state. The mixed ownership reform of SOEs should be further accelerated. They should adopt measures such as bringing in overseas strategic investment, redesigning the capital mix and optimizing the ownership concentration in SOEs. Meanwhile, in the process of improving the shareholding structure, the interests of minority shareholders should be taken into account and the protection mechanism of minority shareholders should be strengthened.

This paper studies the influence mechanism of different ownership concentrations on the relationship between cost stickiness and enterprise risk, makes up the blank in the research of the relevant economic consequences to enterprise risk, and improves the development of the existing research on cost stickiness and the study of enterprise risk management. This paper may be a reference for later scholars' research about the cost stickiness and enterprise risk. At the same time, this paper can also help enterprises take more effective measures in practice to control cost stickiness level in the case of the macroeconomic uncertainty and the management to make more accurate decisions. For the enterprise, this paper can offer references to develop a reasonable measure to reduce the decision-making risk and to promote the competitiveness in the market.

In addition to the above contributions, this paper also has the following limitations. This paper only studied the sample of 2008 to 2015 about companies in China A-share stock market, did not extend to the latest year and other stock markets, which will limit the application scope of our conclusions. Besides, this paper only studies the influence of the ownership concentration variable, the influence of the ownership balance degree or other external corporate governance variables on the relation between cost stickiness and enterprise risk can be studied for further research.

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