

Empirical Study on the Impact of Environmental Uncertainty on Dynamic Adjustment of Financial Flexibility

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Abstract: From the perspective of environmental uncertainty, this paper further studies whether the dynamic adjustment of the financial flexibility of enterprises will be affected by environmental uncertainty and its changes. Through the research, it is found that there is a reasonable level of target flexibility, and the actual financial flexibility of enterprises will constantly converge to the target. Environmental uncertainty will accelerate the dynamic adjustment of financial flexibility. The change in environmental uncertainty will also accelerate the dynamic adjustment speed of financial flexibility. It can help enterprises correctly understand financial flexibility, and then guide enterprises to make reasonable and effective financial decisions so that the financial decisions of enterprises are more scientific.

Keywords: Environmental uncertainty, Financial flexibility, Dynamic adjustment.

1. Introduction

Along with the globalization of the world economy, especially China's increasingly prominent position in the World Trade Organization and the increasingly important role it is playing, thus making Chinese enterprises intermingle with the economic activities of other economic organizations in the world. Since the reform and opening up, our country has pursued a "going-out" development strategy economically, so that Chinese enterprises not only face their domestic consumption market, And for the whole world market, with enterprises around the world frequent trade and economic exchanges. At the same time, along with the conflicts and frictions which are becoming increasingly fierce in surrounding areas of our country, it has also caused a certain degree of a hindrance to the economic development of the region, which will have an impact on the strategic development and investment choice of Chinese enterprises. Environmental uncertainty has become an important feature in the era of economic globalization, and how enterprises deal with uncertainty has become an important topic in the current era. This paper is written based on this background. Through the analysis and research of relevant theories, it helps enterprises to correctly understand the dynamic adjustment of financial flexibility, so that enterprises can take this as the premise. Make decisions about financial management scientifically.

2. Literature Review

In 2010, Cook and Tang proposed that the adjustment speed of enterprise capital structure would be affected by the macroeconomic environment, and the capital turnover situation of enterprises would have a cross-effect on this impact[1]. Regarding the source of uncertainty, different experts and scholars hold different views. In general, the source of uncertainty is divided into the external and internal environment of the organization. Tung proposed that the source of uncertainty is external to the organization, and Milliken believed that it is a cognition of managers to the external environment, so it is internal[2][3]. In 2011, Byoun

closely linked financial flexibility with environmental uncertainty and proposed that enterprises reserve financial flexibility to cope with environmental uncertainty, while DeAngelo and DeAngelo (2007) divided financial flexibility into cash flexibility, debt flexibility, and equity flexibility and proposed the theory of financial flexibility[4]-[5]. This lays the theoretical foundation for the study of financial flexibility.

The research on environmental uncertainty and dynamic adjustment of financial flexibility mainly focuses on the following three aspects: First, it is about the concept, measurement, and impact of environmental uncertainty. Ducan (1972) comprehensively elaborated on three aspects of corporate decision-making. Environmental uncertainty is caused by the lack of relevant environmental information in decision-making, the inability to make clear decision results, and the inability to accurately predict the environment. In addition, when the external environment is more uncertain, it will have a negative impact on the enterprise, such as suppression of corporate innovation (Y. Ma et al., 2022), prompting the enterprise to increase equity investment and deteriorate the investment structure, thus causing the occurrence of 'funds being diverted out of the real economy' situation (M. Xing et al. 2022)[6][7].

Secondly, the concept of financial flexibility, measurement, and target financial flexibility-related research. Flexibility is the ability and state that enables things to adjust accordingly according to changes in the external environment. Flexibility and rigidity are two completely different concepts, while flexibility and elasticity. The concept is also very different. Firms can change their financial resilience by adjusting their capital structure and financing regime, and this change is usually quantifiable. DeAngelo and DeAngelo (2007) divided financial flexibility into cash flexibility, debt flexibility, and equity flexibility from the perspective of financial flexibility. For domestic-related fields, the study of financial flexibility started relatively late, the development of rapid, and in line with our country on the basis of the actual innovation. In 2011, A.M. Zeng and Y.L. Fu et al published an article on financial research to demonstrate the relationship between enterprise financing behavior, financial crisis impact, and financial

flexibility reserve, they used the multiple regression method for the first time to study the influence of pre-reserved financial flexibility of enterprises on their financing behavior under adverse environment[8]. However, it has not completely solved the problem of how to select appropriate financial policies and reserve financial flexibility appropriately.

Finally, the research focuses on environmental uncertainty and financial flexibility. Studies on the relationship between the two are usually carried out based on the behaviors of listed companies, such as cash dividend distribution (K.L. Deng and M.X. Liu, 2013), mortgage financing (M.X. Liu and X.H. Xiang, 2014), corporate value enhancement (H.X. Tong, 2021; A.Q. Wang and W.P. Tang, 2017; R.H. Yang and Z. Huang, 2016; C. Liu et al., 2016), R&D investment (F. Chen and X.Y. Han, 2018), diversification strategy (Y.M. Fu et al., 2019), etc[9][16]. At the same time, part of the research on the relationship between them takes environmental uncertainty and financial flexibility as moderating variables, so as to study the influence of their joint moderating effect on a series of corporate behaviors such as enterprise innovation (W.H. Wang et al., 2021; X.G. Wang and Y.H. Sheng, 2021; Y.M. Sun and G.T. Zhang, 2020[17][19].

3. Theoretical Analysis and Research Hypothesis

3.1. Environmental uncertainty promotes dynamic adjustment of enterprise financial flexibility

In the rapid development of the Internet era, enterprises are faced with increasing environmental uncertainty, which has an impact on the financial flexibility management of enterprises. In the process of operation and development, enterprises will inevitably face various uncertainties. For this reason, it is particularly important for enterprises to establish financial flexibility suitable for themselves and make timely adjustments according to the changes of environmental uncertainties. For enterprises, in the face of environmental uncertainties, if they want to survive and develop in the fierce competition, It is very necessary to adjust one's financial level at any time according to environmental changes. In general, the dynamic adjustment speed of the financial flexibility of enterprises will increase with the existence of environmental uncertainties. Therefore, the hypothesis proposed in this paper is as follows:

Hypothesis 1: The dynamic adjustment speed of the financial flexibility of enterprises will increase with the increase of environmental uncertainty so that there is a certain positive correlation between them.

3.2. The change of environmental uncertainty promotes the dynamic adjustment of enterprise financial flexibility

According to the main content of hypothesis 1, it can be preliminarily judged that environmental uncertainty has a positive promoting effect on the dynamic adjustment speed of financial flexibility, but this hypothesis only takes the current environmental uncertainty as the starting point, that is, to study the static influence of environmental uncertainty on the dynamic adjustment of enterprise financial flexibility. However, the impact of any event is not limited to the current period, which indicates that we should pay proper attention to

the dynamic impact, and further study the impact of the change of environmental uncertainty on the dynamic adjustment speed of financial flexibility. If the enterprise's financial flexibility dynamic adjustment speed is only affected by the uncertainty of the current period, The guiding function of enterprises is that only the current environmental uncertainties can be taken into account when making relevant decisions. Based on the above analysis, the hypothesis proposed in this paper is as follows:

Hypothesis 2: The speed of dynamic adjustment of enterprise financial flexibility will increase with the increase of the change range of environmental uncertainty so that there is a certain positive correlation between the two.

4. Research Design

4.1. Model Construction

On the basis of the above analysis, hypothesis 1 and hypothesis 2 are tested empirically. In this paper, after referring to the research results of Byoun (2008) and N. Xu(2016)[20], etc., a financial flexible part adjustment model (4-1) is constructed:

$$ff_{i,t} - ff_{i,t-1} = \lambda (ff_{i,t}^* - ff_{i,t-1}) + \varepsilon_{i,t} \quad (1)$$

Among them, i and t represent different enterprises and years respectively, ff represents the financial flexibility of the enterprise, and the regression coefficient λ called financial flexible adjustment speed leads to that goal. $0 < \lambda < 1$, reflects the enterprise's actual financial flexible part of a year only can be adjusted to the target. Next, substitute the target financial flexibility fitting model (2) into the model (1) to obtain the model (3):

$$ff_{i,t}^* = \alpha + \beta_1 \tan g + \beta_2 lsize + \beta_3 profit + \beta_4 growth + \sum year + \sum industry + \varepsilon_{i,t} \quad (2)$$

$$ff_{i,t} = \alpha + (1-\lambda) ff_{i,t-1} + \lambda \beta_1 \tan g + \lambda \beta_2 lsize + \lambda \beta_3 profit + \lambda \beta_4 growth + \sum year + \sum industry + \varepsilon_{i,t} \quad (3)$$

In order to verify hypothesis 1 and hypothesis 2, this paper introduces environmental uncertainty and changes in environmental uncertainty based on model (3) and obtains model (4) and (5).

$$ff_{i,t} = (1-\lambda_1 + \eta Uc_{i,t}) ff_{i,t-1} + \gamma Uc_{i,t} + \lambda_1 \beta_1 \tan g + \lambda_1 \beta_2 lsize + \lambda_1 \beta_3 profit + \lambda_1 \beta_4 growth + \sum year + \sum industry + \varepsilon_{i,t} \quad (4)$$

$$ff_{i,t} = (1-\lambda_2 + \xi \Delta Uc_{i,t}) ff_{i,t-1} + \omega Uc_{i,t} + \lambda_2 \beta_1 \tan g + \lambda_2 \beta_2 lsize + \lambda_2 \beta_3 profit + \lambda_2 \beta_4 growth + \sum year + \sum industry + \varepsilon_{i,t} \quad (5)$$

4.2. Measurement and description of variables

1. Explained variables

ff represents the financial flexibility of an enterprise, which can be measured by the sum of debt flexibility and cash flexibility. This measurement method is based on the method adopted by A.M. Zeng et al. (2011).

2. Explaining variables

(1) Environmental uncertainty

uc represents the environmental uncertainty of an enterprise. Based on the previous theoretical analysis, this paper adopts the standard deviation of the profit rate of net assets of a company in the recent three years to measure the

environmental uncertainty of an enterprise.

(2) Changes in environmental uncertainty

Δuc represents the change of environmental uncertainty, which is calculated by the difference between current and previous environmental uncertainty in this paper. When Δuc

is greater than zero, it reflects some extent that the environmental uncertainty faced by the enterprise in the current period is larger than that in the previous period. On the contrary, it reflects that the uncertainty of the current period is smaller than that of the previous period.

Table 1. Variable definitions

Variable property	Variable name	Variable symbol	Variable calculation method
Explained variable	Financial flexibility	<i>ff</i>	Cash flexibility + debt flexibility
Explanatory variable	Environmental uncertainty	<i>uc</i>	Standard deviation of the company's net asset profit rate in the last three years
	Environmental uncertainty changes	Δuc	Current environmental uncertainty - Previous environmental uncertainty
	Tangibility of assets	<i>tang</i>	Total fixed assets/assets at year end
	Enterprise scale	<i>lsize</i>	Natural log of total assets at year end
Control variable	profitability	<i>profit</i>	Net profit/main business income
	Enterprise growth	<i>growth</i>	(end of year total assets - beginning of year total assets)/beginning of year total assets
	Year dummy variable	<i>year</i>	--
	Industry dummy variable	<i>industry</i>	--

4.3. Data sources and descriptive statistics of variables

The sample data in this paper is composed of A-share listed companies in Shanghai and Shenzhen. The financial report data and other related information used in this study are all from the RESSET.

After a series of steps, a total of 14,231 sample data from 2,033 listed companies from 2012 to 2018 were obtained in this paper.

As can be seen from Table 2, the standard deviation of financial flexibility (*ff*) is 0.201, indicating that the data fluctuates to a certain extent. The stability of the financial flexibility reserve level of each enterprise is poor. The maximum value of financial flexibility (*ff*) is 0.756, and the minimum value of financial flexibility (*ff*) is -0.167. To some extent, it reflects that there are some differences in the financial flexibility reserves of Chinese enterprises, and there is a serious polarization phenomenon.

Table 2. Descriptive statistics used to estimate target financial flexibility

variables	Sample size	Mean value	Standard deviation	Minimum value	Maximum value
<i>tang</i>	14,231	0.219	0.163	0.00191	0.707
<i>lsize</i>	14,231	22.16	1.194	19.78	25.63
<i>profit</i>	14,229	0.0746	0.146	-0.678	0.513
<i>growth</i>	14,218	0.193	0.392	-0.272	2.629
<i>ff</i>	14,231	0.0932	0.201	-0.167	0.756

By analyzing the data in Table 3, it can be seen that the standard deviation of enterprise environmental uncertainty (*uc*) is 8.679, indicating that the data fluctuates significantly, and the environmental uncertainty faced by enterprises is severely polarized, with the maximum value being 252.3 and the minimum value being 0.0124. To some extent, it reflects

that there are some differences in the environmental uncertainties faced by Chinese enterprises, and the mean of the environmental uncertainties is 4.918, which further reflects the significance of the impact of environmental uncertainties.

Table 3. Descriptive statistics of model variables of financial flexible adjustment speed

variables	Sample size	Mean value	Standard deviation	Minimum value	Maximum value
<i>uc</i>	14,231	4.918	8.679	0.0124	252.3
Δuc	12,198	-0.127	6.977	-192.6	156.6

The standard deviation of environmental uncertainty's change (Δuc) is 6.977, which also reflects the large fluctuation of environmental uncertainty change faced by Chinese enterprises and the serious polarization of environmental uncertainty change situation faced by enterprises. The maximum value is 156.6, the minimum value is -192.6, and the mean value is -0.127, indicating that with the continuous improvement of the Chinese capital market, the environmental uncertainty faced by enterprises has improved, but the timely reserve financial flexibility adopted by enterprises to cope with environmental uncertainty still needs to be strengthened to cope with the changing business environment.

5. Empirical Test of The Influence of Environmental Uncertainty on Dynamic Adjustment of Financial Flexibility

5.1. Analysis of regression results

5.1.1. Regression analysis of influence of environmental uncertainty on dynamic adjustment of enterprise financial flexibility

Table 4. Regression analysis of dynamic adjustment speed of environmental uncertainty and financial flexibility

variables	(1)	(2)	(3)
$ffi_{i,t-1}$	0.722*** (91.99)	0.426*** (50.50)	0.722*** (81.27)
$uc*ffi_{i,t-1}$	-0.003*** (-3.53)	-0.001** (-2.15)	-0.003*** (-3.61)
uc	0.001*** (4.37)	0.001*** (5.69)	0.001*** (4.88)
$tang$	-0.048*** (-7.67)	-0.200*** (-13.62)	-0.048*** (-6.71)
$lsize$	-0.012*** (-11.74)	-0.038*** (-13.06)	-0.012*** (-9.95)
$profit$	0.115*** (12.89)	0.119*** (15.05)	0.115*** (13.10)
$growth$	-0.013*** (-2.82)	0.001 (0.40)	-0.013*** (-2.95)
_cons	0.309*** (13.38)	0.909*** (13.87)	0.291*** (10.58)
year	control	control	control
industry	control	control	control
Sample size	12,198	12,198	12,198
Adj-R ²	0.712	0.284	.
F	737.3	573.9	.
Number of code	2,033	2,033	2,033

Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

In this paper, the Hausmann test and other methods are used to identify the three models, and it is concluded that the fixed effect model is the best choice. Therefore, the output results of the fixed effect model are used as the basis for the corresponding analysis. Table 4 shows that the regression coefficient of $ffi_{i,t-1}$ is 0.426. According to the meaning set by the coefficient in the model, it can be concluded that $0.574+0.001uc$ is the dynamic adjustment speed of the enterprise's financial flexibility. On this basis, the mean value of environmental uncertainty is brought into the results, and the dynamic adjustment speed of financial flexibility is 57.89% after calculation. However, this value was 57.40% before it was brought in, indicating that environmental uncertainty has a positive promoting effect on the dynamic adjustment speed of financial flexibility. The empirical result shows that the dynamic adjustment speed of corporate financial flexibility increases with the increase of environmental uncertainty, and hypothesis 1 is valid.

5.1.2. Regression analysis of the influence of environmental uncertainty changes on the dynamic adjustment of corporate financial flexibility

Table 5 reports the results of multiple regression analysis of the model (5), and verifies hypothesis 2 to test whether the hypothesis is valid. This paper first uses appropriate methods to identify the use of models. After fully comparing the fitting effects of mixed effects, fixed effects, and random effects models, this paper considers the fixed effects model as the best choice, so this paper makes a corresponding analysis on this basis. It can be seen from Table 5-2 that the coefficient of $ffi_{i,t-1}$ is 0.405, and the dynamic adjustment speed of financial flexibility is $0.595+0.007\Delta uc$ according to the setting meaning of the model coefficient, which also indicates that the dynamic adjustment speed of financial flexibility of enterprises increases with the increase of the change range of environmental uncertainty. Hypothesis 2 is validated.

Table 5. Regression analysis of the change of environmental uncertainty and the dynamic adjustment speed of financial flexibility

variables	Mixed regression	Fixed effect model	Random effects model
$ffi_{i,t-1}$	0.704*** (96.07)	0.405*** (31.71)	0.704*** (81.39)
$\Delta uc*ffi_{i,t-1}$	-0.002** (-2.49)	-0.007*** (-5.64)	-0.002** (-2.56)
Δuc	0.001*** (3.45)	0.000*** (3.03)	0.001*** (3.75)
_cons	0.319*** (13.65)	0.952*** (9.15)	0.302*** (10.88)
control	Yes	Yes	Yes
year	control	control	control
industry	control	control	control
Sample size	12,198	12,198	12,198
Adj-R ²	0.711	0.408	.
F	730.2	313.3	.
Number of code		2,033	2,033

Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.2. Robustness test

In order to ensure more stable and reliable empirical results, the robustness test of the reduced sample and the financial flexibility threshold test was carried out to verify the robustness of the model.

Table 6. Robustness test results of reduced samples

variable	(1)	(2)	(3)	(4)
s	0.372* **	0.351* **	0.419* **	0.398* **
$ffi_{i,t-1}$	(15.79)	(15.05)	(49.60)	(30.76)
$uc*ffi_{i,t-1}$	- 0.003** (-2.40)		- 0.001** (-2.08)	
uc	0.001* ** (2.60)		0.001* ** (5.62)	
$\Delta uc*ffi_{i,t-1}$		- 0.003** (-2.29)		- 0.008*** (-5.77)
Δuc		0.000* * (2.10)		0.000 (1.49)
_cons	0.787* ** (5.91)	0.842* ** (6.27)	0.826* ** (13.62)	0.862* ** (8.94)
control	Yes	Yes	Yes	Yes
year	control	control	control	control
industry	control	control	control	control
Sample size	6,108	6,108	12,198	12,198
Number of code	1,018	1,018	2,033	2,033
Adj-R ²	0.232	0.231	0.267	0.394
F	59.89	59.51	540.3	285.4

Robust t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

5.2.1. Financial flexibility threshold test

According to the robustness test results in Table 6, there is no significant difference between the robustness test results of the reduced samples and the threshold test results of financial flexibility and the empirical results. Therefore, it can be determined that the hypothesis that environmental uncertainty and its changes have a positive promoting effect

on the dynamic adjustment speed of financial flexibility is valid. That is, the dynamic adjustment speed of financial flexibility will increase with the increase of environmental uncertainty and its range of change.

6. Research Conclusion and Suggestion

6.1. Research Conclusions

Through the study of the above chapters, the research conclusions of this paper are as follows: The enterprise has a reasonable level of target flexibility, and the actual financial flexibility of the enterprise will constantly converge to the target. Environmental uncertainty will accelerate the dynamic adjustment speed of financial flexibility. The change in environmental uncertainty will accelerate the dynamic adjustment speed of financial flexibility.

Through the above research and analysis, the following enlightenment can be provided for the operation and management activities of enterprises: Improve the ability of enterprises to cope with environmental uncertainties. Enterprises are faced with more and more environmental uncertainty factors, and only the competitiveness of enterprises can be improved qualitatively. Only in this way can enterprises maintain their own development and growth in times of economic turbulence. Further, improve enterprises' attention to financial flexibility reserves. Enterprises should pay more attention to financial flexibility reserves. Enterprises should have and maintain the ability to timely mobilize financial resources, and grasp enough financial resources to tide them over when facing risks. Enterprises should further analyze and understand the environmental uncertainty and its changing trend, and rationally allocate financial resources. Enterprises should not focus on the current period in the decision-making process, but should also establish a tracking mechanism for environmental uncertainty changes, so as to achieve comprehensive consideration.

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