



Financial Flexibility and Its Potential Contributing Factors

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Abstract. To make a wise investment decision and take appropriate action during financial crises, it's vital for all industries to have a general idea of the key factors which affect the financial flexibility of firms in different industries. In our study, factor analysis is firstly utilized to reduce dimension. Then, multilinear regression is conducive to studying the influential factors of financial flexibility in the chosen 6 sectors: basic materials, consumer cyclical, energy, industries, technology, and utilities. This method further demonstrates that (1) there is a positive relationship between external financing and financial flexibility, (2) a negative relationship between firms' value and personal tax rate and financial flexibility respectively, and (3) no relationship between leverage and financial flexibility. We also use ANOVA to compare the impact of company size and industries, demonstrating that (1) Free Cash Flow per share, leverage ratio, and external financing, are not the same across categories of size, (2) payout ratio, PE ratio, and tax rate are the same among firms of different sizes, and (3) there is no relationship between the previous factors and industries.

Keywords: financial flexibility, contributing factors, industries.

1 Introduction

It is widely acknowledged that financial issues are a vital part of an enterprise. The rational planning of financial content is conducive to the rational use of enterprise funds, which can ensure that the use of enterprise funds is more efficient. To achieve this goal, the company should take the long view, rationally control financial flexibility, and stabilize the financial situation, rather than rely too much on the capital market and use financing to solve the financial problems, which will only lead to the fracture of the capital chain. Finally, the actual profit of the enterprise is far from meeting the actual demand, or the broken capital chain will even lead to bankruptcy. According to Denis, financial flexibility is the ability to respond to changing financial conditions timely and maximize the value [1]. It is determined by the external financing cost reflected by corporate characteristics such as company size, as well as affected by the company's investment, and liquidity [2]. Meanwhile, financial flexibility is the most important factor in making capital structure decisions [3].

There is a large number of scholars who have explored some perspectives of financial flexibility. Frank and Goyal pointed out that the problem of financial flexibility faced by enterprises is a topic of great research significance [4]. Marchica et. al. studied the interaction between financial flexibility and investment ability by using some leverage and investment models, demonstrating that there is no evidence that can show that the low-leverage strategy is able to make higher financial flexibility [5]. Arslan-Ayaydin et. al. examined the impact of financial flexibility on the investment and performance of East Asian firms over the period 1994–2009 by regressing the MTB ratio against contemporary and lagged sales growth, squared sales growth, and industry dummies. They concluded that the value of financial flexibility is depended on region/country, due to different macroeconomic policies and different economic/legal environments [6]. However, most of them only concentrated on whether financial flexibility could influence companies of a certain country, a certain field, or just generally without further comparison. Additionally, there has been less previous evidence for the influential factors of financial flexibility of different industries. Besides, still little is known about which factors can affect financial flexibility, and whether different industries have different influential factors. Billett & Garfinkel and Gamba & Triantis deemed that the key factors of financial flexibility were capital market conditions and the cost of issuing debt [7, 8]. Kahl et al. explored the influence of the mercantile paper on financial flexibility. They argued that mercantile paper can represent the source of financing, which strengthens financial flexibility [9]. Byoun stated that there is an inverted U relationship between financial leverage and enterprise characteristics. To be more specific, small firms have low retained earnings and operating cash flow, and low financial leverage. Medium growth enterprises have a medium credit level and operating cash flow, and high financial leverage; Large mature enterprises retained earnings and operating cash flow high, and their financial leverage is at the average level [10]. Nonetheless, all of their research did not divide the enterprise into sectors.

In this work, based on traditional regression, used by Arslan-Ayaydin et. al. [4-10], we utilize other ways to analyze whether there are some causes having impacts on financial flexibility and whether different industries have different affecting factors on financial flexibility. By using factor analysis, regression, and ANOVA, we discover that payout ratio, PE ratio, and tax rate are the same among firms of different sizes, while Free Cash Flow per share, leverage ratio, and external financing, are not the same across categories of size. In addition, there is a negative relationship between firms' value and personal tax rate and financial flexibility respectively, and a positive relationship between external financing and financial flexibility. But there is no relationship between leverage and financial flexibility. Our study contributes to all firms in several ways. First, by learning literature, we extract some key factors, and also proposed new factors for our own hypothesis. What is more, this work covers various industries and company scales, which is more comprehensive than previous scholars. In addition, our results are beneficial for exploring payment policies, expansion policies, and financing decision-making in a way. We believe that if people can find out each industry's influential factors of financial flexibility, companies will make decisions more available and effectively.

The essay is organized as follows: chapter 2 introduces the preliminaries of conditions of testing various factors in 6 industries' financial flexibility, and some information about our data; Chapter 3 describes three ways of researching which factors are influential, and the specific research process; Chapter 4 further study the reasons why those factors can influence each industry's financial flexibility; Chapter 5 gives a consequence.

2 Research Design

2.1 Data

Our original data, which include an indicator of financial flexibility, represented by free cash flow per share, and some factors, like tax rate, external financing, leverage, payout ratio, et al., are collected from the financial data of 200+ stocks in 2018 on the website Kaggle ("200+ Financial Indicators of US Stocks") [11]. We integrated these data, deleted the invalid data or extremum, extract several critical variables, and get the seven factors. The selection of these seven factors is according to the previous passage on financial flexibility, which shows that personal tax rate, leverage, level of the firm, and external financing is contributing factors to financial flexibility. The other two factors, PE ratio, and payout ratio are the factors we proposed which will probably affect the value of the financial flexibility. To be clear, among our data, the tax rate is figured out by using the formula:

$$\text{Tax rate} = \text{Income tax expense} / (\text{EBIT} - \text{Interest}) \quad (1)$$

While external financing is derived from the formula:

$$\text{External financing} = \text{Net income} - \text{Capex} - \text{Working Capital} \quad (2)$$

Other factors, free cash flow per share, debt and equity ratio, PE ratio, payout ratio, and market capital, are all extracted directly from the financial data.

2.2 Definition of big and small firms

In our research, we classified the firms into three categories, small cap represented by 0, mid cap represented by 1, and large cap represented by 2. This classification is reference to the article 'What is Market Cap? Defined and Explained' by Jason Hall [12]. The breakdown of the market cap range is demonstrated as table 1:

Table 1. The breakdown of the market cap range

type of stock	Market capitalization range
Large cap	\$10 billion to \$200 billion
Mid cap	\$2 billion to \$10 billion
Small cap	\$300 million to \$2 billion

2.3 Classification of industries

In terms of sectors, we classified all stocks into six industries, which are basic materials of 89 samples, consumer cyclical of 162 samples, energy of 67 samples, industrials of 176 samples, technology of 87 samples, and utilities of 70 samples. This classification is very crucial for our following contrast analysis since we need to compare how different the results would be among various industries.

3 Experiments

The goal of our research is to analyze how different factors can affect a firm's financial flexibility and how the result varies from different sectors and companies of different sizes so that companies can get some reference when they need to restructure their financing during financial changes. We first conducted a regression analysis to figure out the relationship between variables and our dependent. However, to get a better idea of it, we also did factor analysis for the dimension reduction, and then conducted the regression analysis again using the four new factors. Finally, we used contrast and ANOVA analysis for the comparison of different industries and firms of different sizes.

3.1 Factor analysis

For the dimension reduction, we did the factor analysis. We also took the KMO and Bartlett's test to figure out whether it's appropriate to do factor analysis for the data. From table 2, we can see that KMO is 0.516 which is greater than 0.5, which means that the factors are appropriate for factor analysis. Besides, for Bartlett's test of sphericity, significance is .000, which is smaller than 0.05, means that we can reject the null hypothesis and the six factors are well related, so it's appropriate for factor analysis.

Table 2. KMO and Bartlett's Test

Kaiser-Mayer-Olkin Measure of Sampling Adequacy.		.516
Bartlett's Test of Sphericity	Approx. Chi-Square	690.035
	df	15
	Sig.	.000

The criteria we chose for extraction are that eigenvalues are greater than 0.995, and four new factors are generated by factor analysis. According to the total variance, the cumulative% of the four factors is 81.823%, which means that they are explanatory. The first factor is a combination of a 0.933 PE ratio and 0.922 payout ratio, the second factor is 0.948 external financing, the third factor is 0.922 tax rate, and the last factor is debt and equity ratio. As regards financial literacy, the first factor stands for the company's value while the fourth factor stands for the leverage of the firm. After we get the four new factors, it's much easier to analyze the relationship between the factors and financial flexibility.

3.2 Regression analysis

There are two parts of our regression analysis, the first is the one between the six factors and our dependent FCF per share and the second one is the analysis between the four new factors generated by the dimension reduction and our dependent FCF per share.

For the first part, we selected six factors as our independents and FCF per share as the dependent. The confidential interval is set at a 95% level and the method we use for selecting independents is stepwise. Two variables are entered, which are external financing and market cap, while the other four variables are removed since they don't meet the F value standard. We also get two models as follows:

Table 3. Model summary^c

Model	R	R Square	Adjusted R Square	Stand Error of the estimate	Durbin-Watson
1	.847a	.718	.718	775.5577	
2	.848b	.719	.718	775.3344	2.005

a. Predictors: (Constant), external financing

b. Predictors: (Constant), external financing, Market Cap

c. Dependent Variable: FreeCashFlowPerShare

Table 4. Coefficients^a

Model		Coefficients Std. Error	t	Sig	Tolerance	VIF
1	Constant	30.430	-.415	.678		
	Ex Fin	.000	40.677	.000	1.000	1.000
2	Constant	34.342	.176	.860		
	Ex Fin	.000	40.70	.000	.998	1.002
	MarCap	.000	-1.17	.241	.998	1.002

a. Dependent Variable: Free Cash Flow Per Share

As we can see from the table 3, the dependent is FCF per share, in the first model there's only one factor, external financing, while model 2 has two factors, external financing, and market cap. The R Square of both is over 0.7, which means they are both effective models. Besides, the tolerance of both is over 0.5 and VIF is smaller than 10, which means there's no co-linearity in both models. However, from table 4, we can find that the significance of Market Cap is .241, which is very high. It shows that although the market Cap is entered by stepwise, it has very little contribution to the model. On the other hand, the factor of external financing is greatly related to the dependent FCF per share and is an appropriate indicator for the prediction of FCF per share. This result, however, contradicts the previous research by Andrea Gamba and Alexander Triantis (2005) [8], in which they said external financing, leverage, level of the firm, and personal tax rate determined the value of financial flexibility.

Since there are many variables listed and only a few entered, we used the factor analysis for the dimension reduction and get the four new factors. We also used the four factors for a new regression analysis. Three factors, the company's value, external financing, and tax rate are entered by the method stepwise this time, while the factor

leverage ratio is excluded. R squares of the three factors are all greater than 0.6, which means that they can explain the relationship well.

Table 5. Coefficients^a

Model		Unstandardized B	t	Sig.	Tolerance	VIF
1	Constant	62.721	1.819	.069		
	Factor2	1160.776	33.646	.000	1.000	1.000
	Factor1	-75.876	-2.199	.028	1.000	1.000
	Factor3	-70.315	-2.038	.042	1.000	1.000

a. Dependent Variable: FreeCashFlowPerShare

We also got a model from regression analysis. From table 5, we can know that all the three factors have a good interpretation for the relationship since the significance is very small, smaller than .05. What's more, the test for co-linearity illustrates that there's no co-linearity because the tolerance is greater than 0.5 and VIF is far smaller than 10. In terms of the relationship between variables and dependents, it clearly indicates that factor 2, external financing, is positively related to the FCF per share while factor 1, firm's value, and factor 3, personal tax rate, are negatively related to FCF per share. However, the dependent, FCF per share, has nothing to do with the leverage ratio, which contradicts to some of the previous research.

3.3 ANOVA analysis

In order to find out how different the results can be among firms of each size and different industries, we did the ANOVA analysis. From the descriptive result, we can know that financial flexibility represented by free cash flow per share is quite different between big companies and small ones. As for big companies, their financial flexibility is much stronger than the one of small companies. The mean of free cash flow per share of big firms is 189.289, the mean of the medium firms is 2.886, and the mean of small firms is 2.202. However, the medium doesn't vary a lot, the small firm is 1.716, the mid firm is 2.411, and the big firm is 3.277. This is due to some of the extreme FCF per share in big firms leading to a high mean number. Although there's not a big difference of medium among those companies, in general, big firms still have higher financial flexibility compared with medium firms and small firms. For the other five factors, there's not a big difference between big companies and small companies.

According to Tests of normality, the five variables' significance of both Shapiro-Wilk and Kolmogorov-Smirnov is .000, which is smaller than 0.05, which means that the data is not normally distributed, and we need to do the nonparametric tests of independent samples.

Table 6. Hypothesis test summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of freeCash-FlowPerShare is the same across categories of size.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
2	The distribution of payout Ratio is the same across categories of size	Independent-Samples Kruskal-Wallis Test	.135	Retain the null hypothesis
3	The distribution of debt Equity Ratio is the same across categories of size.	Independent-Samples Kruskal-Wallis Test	.002	Reject the null hypothesis.
4	The distribution of PE ratio is the same across categories of size.	Independent-Samples Kruskal-Wallis Test	.325	Retain the null hypothesis.
5	The distribution of external financing is the same across categories of size.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
6	The distribution of tax rate is the same across categories of size.	Independent-Samples Kruskal-Wallis Test	.244	Retain the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

From table 6, it shows that the significance of all three factors is smaller than 0.05, so we should reject the null hypothesis. This means that Free Cash Flow per share, leverage ratio, and external financing, are not the same across categories of size. However, the significance of the other three factors is greater than 0.05, which means that the null hypothesis should be retained. Therefore, the payout ratio, PE ratio, and tax rate are the same among firms of different sizes.

In terms of firms of different sectors. We first did the test of normality, and the result reveals that the significance of both Kolmogorov-Smirnov and Shapiro-Wilk is .000, which means that the data are not normally distributed, so the nonparametric tests of independent samples are needed.

Table 7. Hypothesis test summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of freeCash-FlowPerShare is the same across categories of Sector.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
2	The distribution of Market Cap is the same across categories of Sector	Independent-Samples Kruskal-Wallis Test	.004	Reject the null hypothesis.
3	The distribution of payout Ratio is the same across categories of Sector.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
4	The distribution of Debt Equity Ratio is the same across categories of Sector.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.

5	The distribution of PE ratio is the same across categories of Sector.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
6	The distribution of external financing is the same across categories of Sector.	Independent-Samples Kruskal-Wallis Test	.000	Reject the null hypothesis.
7	The distribution of tax rate is the same across categories of Sector.	Independent-Samples Kruskal-Wallis Test	.020	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .050.

From table 7, we can see that all significance is less than .05, which means that we need to reject the null hypothesis. This indicates that the seven factors, Free Cash Flow per share, Market Cap, payout Ratio, Equity Ratio, PE ratio, external financing, and tax rate, are not the same across categories. There's a great difference among different sectors.

4 Results and Reasons

From the above-mentioned data, it is obvious that financial flexibility is determined by lots of factors, and it varies among different industries and firms of different sizes. The six main results that we get by regression and ANOVA analysis are as follows:

- External financing is positively related to financial flexibility.
- Financial flexibility has nothing to do with the firm's leverage.
- The firm's value and personal tax rate are negatively related to financial flexibility respectively.
- Free cash flow per share, leverage ratio, and external financing are not the same across categories of size.
- The payout ratio, PE ratio, and the tax rate are the same among firms of different sizes.
- Free cash flow per share, market cap, payout ratio, equity ratio, PE ratio, external financing, and tax rate, are not the same across categories.

In terms of why a firm's value is negatively related to financial flexibility, according to the research by Matthew and Jon, firms with greater financial flexibility are valued more highly by the market. However, if the firm's value is too high, chances are that the firm is overvalued, which may lead to a restructuring of the firm's financing and a much lower financial flexibility. When it comes to external financing, however, it's positively related to financial flexibility. External financing is net cash from debt and equity and increases with the size of the shortfall. Firms will issue more stocks and repurchase them, leading the equity to decrease [13]. Financial flexibility, represented by free cash flow per share, will decrease with the increasing number of shares. As for personal tax rate, according to the formula:

$$FCF = EBIT(1-t) + Depreciation - Capex - net\ NWC \quad (3)$$

The increase in tax rate will cause a smaller FCF. As free cash flow drops, free cash flow per share will also drop, which means that financial flexibility will be much lower than before. Therefore, the tax rate is negatively related to financial flexibility. One of the results that we get is that leverage has nothing to do with financial flexibility which contradicts the previous research. From ANOVA analysis, we also get the result that financial flexibility, represented by free cash flow per share, is different among firms of different sizes. This is because firms of different sizes usually have different debt capabilities, which will lead to various financial flexibility. Besides, the tax rate is the same no matter what size the firms are while external financing is different regarding the size of the firms, which means that for companies of different sizes, the tax rate is not the key contributing factor to financial flexibility and external financing is the key factor. This also coheres with the result of regression analysis. When it comes to whether contributing factors will have different effects on financial flexibility based on various industries, the result doesn't have an obvious indicator for it because all the factors are different among different sectors.

5 Conclusion

In conclusion, the aim of this research is to investigate the possible influential factors of financial flexibility in different sectors. The analysis in this paper first revealed that external financing is positively related to financial flexibility. What is more, leverage has nothing to do with financial flexibility. Additionally, a firm's value and personal tax rate are negatively related to financial flexibility separately. Besides, Free Cash Flow per share, external financing, Market Cap, payout Ratio, Equity Ratio, PE ratio, and leverage ratio are not the same across categories of size, while payout ratio, PE ratio, and tax rate are the same among firms of different sizes. From the above-mentioned analysis based on current data, companies are able to refer to our research results to make more efficient plans to improve financial flexibility, and ultimately earn more profits. Among all the factors we studied, external financing is the most essential contributing factor to financial flexibility compared with the other six factors. Therefore, when restructuring a firm's financing, it's important to put more emphasis on external financing. Besides, the tax rate is also another factor that may affect financial flexibility. However, financial flexibility is not the same among firms of different sizes and different sectors, so companies should make targeted decisions depending on the size of their companies and what industries they belong to. Admittedly, this study was limited by the absence of all sectors. We only selected six main industries which are representative. If people study further and separate all industries more specifically in future research, each sector's influential factors on financial flexibility might be more accurate and special.

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Linglin Jiang and Yingxue Wang contributed equally to this work and should be considered co-first authors.

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