

# Economic Uncertainty, Capital Structure, and Firm Investment

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## ABSTRACT

Our main goal in this article is to find out in the period of great economic uncertainty, will the impact of capital structure on investment be reduced (Ivashina and Scharfstein, 2010). We want to ask how will economic uncertainty affect this positive relationship between capital structure and investment. We use five indicators to reflect the capital structure of enterprises and one indicator of economic uncertainty. Capital structure indicators include long term net asset liability ratio, short term net asset liability ratio, long term asset liability ratio, short term asset liability ratio and asset liability ratio. The economic uncertainty measure we use here is the conditional variance based on graph (1,1) model estimated using quarterly adjusted GDP growth rate. (Hadlock and Pierce, 2010) point out that it is difficult to identify the impact of capital structure on corporate behavior. Therefore, we follow (Wintoki, et al. 2012) using Bartik tool variables to conduct panel two-stage least squares method in the industry. What is more, we use the propensity matching score method (Tian, 2014) to exclude the potential impact of enterprise characteristics. In addition (Heckman, 1979), we also use the Heckman style two-stage least square method to control the potential deviation caused by the listed companies are usually high capital structure companies.

From the past article, we can find that the amount of investment will be affected by many factors. Like the development potential of the industry and also the state of the economy affects investment.

**Keywords:** *Economic uncertainty, capital structure, investment*

## 1. INTRODUCTION

During the financial crisis, people realize that the fluctuation of economic uncertainty can have huge effects on firms, capital structure and investment behavior. Campello et al. (2011) finds evidence showing that the limited external finance caused by financial crisis can exert tremendous effect on firm investment. In this paper, we ask whether the change of economic uncertainty can affect firms' investment through channel of capital structure previous research claims that when economic uncertainty increases, firms are less likely to have access to external finance, meaning that they are more likely to be financial constraint (Campello, Graham, and Harvey, 2010) [1].

Therefore, we aim to test whether the effects of capital structure on investment will be reduced during the time when the economic uncertainty is high (Ivashina and Scharfstein, 2010). They claim when economy is blooming, firms with higher capital structure tend to invest more [2]. (Zingales and Kaplan, 1997) also find that companies with higher capital structure usually invest more because they have more assets and more capital marking experience [3]. Hence here we want to ask how will economic uncertainty affect this positive relationship between capital structure and investment. We use five measures that reflect the firm capital structure and one

measure about economic uncertainty. The capital structure measures are long term net asset liability ratio, short term net asset liability ratio, long term asset liability ratio, short term asset liability ratio and asset liability ratio. The economic uncertainty measure we use here is the conditional variance based on graph (1,1) model estimated using quarterly adjusted GDP growth rate. (Hadlock and Pierce, 2010) point out that the identification in examine the effects of capital structure on firm behaviors is difficult [4]. For instance, the capital structure could be related to many unobserved firm characteristics, which could make the estimation biased. We therefore follow (Wintoki, et al. 2012) to use Bartik instrument variable within industries to do the panel two stage least squares [5]. Further, we follow (Tian, 2014) using propensity matching score to rule out the potential effects caused by firm characteristics [6]. In addition (Heckman, 1979), we also use a Heckman style two stage least squares to control the potential bias caused by the fact that listed firms are usually high capital structure firms [7].

From the past article, we can find that the amount of investment will be affected by many factors. When investors think that this industry has great development potential, that is, they think that this industry is a sunrise industry, such as new energy, they will increase their investment, even if they don't necessarily get a return in the end. On the contrary, when investors think that this industry has no great development potential, that is, they think that this industry is a sunset industry, For example,

when they invest in the steel industry, they will reduce their investment volume because they think that investment in the industry will not pay off in the end. Similarly, the state of the economy affects investment. When novel coronavirus outbreaks, for example, the US stock market began to pick up after many times of fusing. When people get the grant, they will invest in the stock market with an idea that they can make money by buying stocks. Because they can not work, people can place their hopes of making money on the stock vote and hope that the stock will rise, which has led to the growth of investment.

In the past literature, people usually choose two of the three variables such as economic uncertainty, capital structure and firm investment to compare. But in this article, I will compare all three variables and study the relationship between them. This is the main difference between my article and the previous ones.

**2. MODEL**

The summary data for the primary variables used in this study is covered in panel A, panel B reports correlations among the variables, however. Cap1, which is the capital structure, is the short term debt to asset ratio. While Cap2 is the long term to debt ratio. Cap3 is the gross debt to asset ratio. Cap4 is the short term debt to net asset ratio, while Cap5 is the long term debt to net asset ratio. Inva is the investment in current period divided by total asset in the last period. GFin is the KZ index. Invb is the investment in current period divided by net asset in the last period. Invq is the increase in asset in current period divided by net asset in the last tangible period. Wmb is the ratio of market value to booklet value. WLSR is the long term debt to short term debt ratio. Account is the market value of account and stock is the market value of stock. Size is the total value of asset. Ley is the ratio of liquidity to asset. Rov is the return of asset. Mu1 is the conditional variance of GARCH (1, 1) model of GDP growth rate. SOE is a virtual variable, when the enterprise is a state-owned enterprise, the variable is 1, otherwise it is 0.

The standard deviation method is used in some literatures on the calculation of alternative indexes of macroeconomic uncertainty. However, compared with the unconditional variance, the conditional variance is a better index to measure the uncertainty, because it contains the historical information set. In accordance with the method in the existing literature, we use the generalized autoregressive conditional heteroscedasticity model, i.e. GARCH (1,1) to measure the conditional variance of macroeconomic variables. Among them,  $m_1$  is the first order log difference of GDP,  $e_t$  is the error term,  $h_t$  is the conditional variance of the error term estimated by GARCH. The annual conditional variance data is obtained by the average value

$$\frac{I_{i,t}}{A_{i,t-1}} = \alpha_i + \alpha_t + \beta_1 Cap\_Structural_{i,t} + \beta_2 Cap\_Structural_{i,t} * Uncertain_i + \sum_{j=1}^k \gamma_j Control_{j,i,t} + \varepsilon_{i,t}$$

of monthly data or quarterly data( Yoon and Ratti, 2011[8]; Kang et al. , 2012[9]; Bredin & Fountas, 2009[10]).

The result is not affected by the positive effect. When the economic uncertainty increases, the negative effect increases. When the economic uncertainty decreases, the positive effect decreases.

**3. DATA AND IDENTIFICATION STRATEGY**

**3.1. Table 1: Summary Statistics**

This Table 1 gives all our firm level characteristics are collected from Csmar database. All the firm level variable are winsorized at 99%.

The interaction term in equation (1) estimate the marginal impacts of economic uncertainty on the capital structure coefficient just as the slope coefficients without the interaction term. Pooled regressions like equation (1) are standard in investment and corporate finance and literature.

The key issue here is to know that equation (1) does not test whether the investment will change when economic uncertainty changes. Equation (1) controls year fixed effects and firm fixed effects, each vision is belittled by its annual and cross-sectional averages with effect, making the investment and capital structure of orthogonal to economic uncertainty and industrial features. And that is the reason why we do not include the economic uncertainty in the regression. We only include the capital structure and other related firm level characteristics in the regressions. Because we cluster the standard errors on both firm and year level, the average of all the independent variables and dependent variables within a given period compared with other periods do not have effect on our estimation results.

**3.2. Table 2 : Economic Uncertainty, Capital Structure, and Firm Investment: Mean Difference Test**

The Table 2 conducts the results of mean t test of firms in the low capital structure group and firms in the high structure group in company investment mean comparison. Low capital structure group includes firms with capital structure lower than 25 quantile. And high capital structure group includes firms with capital structure higher than 75 quantile.

**Equation (1) Benchmark specification**

**Table 1** Summary statistics

variable	N	mean	sd	min	p50	max
EM1	1.00E+05	0.047	0.046	0	0.033	0.211
EM2	1.00E+05	0.045	0.051	0	0.027	0.252
EM3	9.70E+04	0.028	0.03	0	0.018	0.143
EM4	1.00E+05	0.023	0.028	0	0.016	0.184
EM5	9.60E+04	0.045	0.058	0	0.027	0.435
Wtobinqa	1.20E+05	2.225	1.988	0.215	1.628	11.367
GFin	1.10E+05	0.177	0.137	-0.056	0.173	0.409
Wtobinqb	1.20E+05	2.418	2.225	0.224	1.738	12.765
Wtobinqc	1.20E+05	2.681	1.927	0.907	2.061	11.857
Wtobinqd	1.20E+05	2.908	2.181	0.935	2.201	13.403
Wmb	1.20E+05	0.879	0.818	0.088	0.614	4.648
WLSDebt	9.30E+04	1.818	5.48	0	0.275	42.105
Waccounts	1.10E+05	0.09	0.074	0.001	0.071	0.368
Wstock	1.10E+05	0.167	0.154	0	0.129	0.778
Wsize	1.20E+05	21.767	1.264	19.206	21.605	25.696
Wlev	1.20E+05	0.448	0.217	0.045	0.447	1.013
Wroa	1.20E+05	0.024	0.036	-0.106	0.018	0.148
MU1	1.20E+05	0.835	0.4	0.384	0.65	1.963
soe	1.10E+05	0.465	0.499	0	0	1

**Table 2** Mean difference test

	Low capital structure group	High capital structure group	Mean1	Mean2	MeanDiffer
Asset liability ratio	27229	27229	2.131	2.283	-0.151***
Long term asset liability ratio	27231	27231	2.056	2.573	-0.517***
Long term net asset liability ratio	25568	25568	1.818	2.647	-0.829***
Short term asset liability ratio	26954	26954	2.217	2.308	-0.091***
Short term net asset liability ratio	25303	25304	2.168	2.27	-0.102***

We divide the group into two sub groups according to capital structure of each group. Group 1 means that in this group, the capital structure of the firms is low, which means that the investment of this group of companies is low. And group 2 means that in this group, the capital structure of the firms is high, which means that the investment of this group of companies is high. Mean1 is the average investment of group 1, and mean2 is the average investment of group 2. From the form we can see that the group with high capital structure has high average investment. And the difference of the average of two groups is -0.517, which is negative significant at 99%. Also, the difference is 7% of mean1 and 6% of mean2. And we use other capital structure measures, based on this, we still get consistent results.

**3.3. Figure 1: The Relationship between Capital Structure on Investment on Country**

Figure 1: The first graph shows the relationship between change in structural balance and the percentage of change in pc GDP. And the second graph shows the relationship between change in structural balance and the percentage of

change in unemployment rate. And I get consistent reserve. The horizontal lines in two graphs represent that on the lines the percentage of change in pc GDP and the percentage of change in unemployment rate is zero. The two vertical lines in these two graphs represent that on the lines the change in structural balance is zero. The red line in the first graph represents the regression of changing linear fit on changing structural balance and changing pc GDP. The red line in the second graph represents the regression of changing linear fit on changing structural balance and changing unemployment rate. The blue points in the graphs represent countries' situation. For example, Ireland's pc GDP changes by 0.1 percent. And its structural balance increases by 6 percent. When structural balance increases, enterprise's surplus increases too. That means this is a period of economic recession, change in GDP decreases and the rate of unemployment increases. At this time, enterprises prefer to hold property, waiting for economic upturn. In 2008, the financial crisis occurred, which led to a decline in GDP, while the unemployment rate rose. So many enterprises can't borrow money, so that structural balance decreases. Without enough money, the company will not invest. This is consistent with the description in the figure, which shows that the drawing is correct. Also, in 2019, Sino US trade war happened. This is basically the

same as the situation in the financial crisis. In the first case, the first macroeconomic variable we use here is GDP, and we have the downward relationship between GDP and the structural balance. Then, we use unemployment rate to measure the macro-economy and we have a consistent reserve.

From here we can see that capital structure really impact company investment.

### **3.4. Table 3: Economic Uncertainty, Capital Structure, and Firm Investment: Country Analysis**

This table gives an account of the results of benchmark regressions. Investment is the dependent variable in this table. Make out Table 3 for the definition of variables. All regressions include firm and year fixed effects. R<sup>2</sup> statistics reflect within firm variations. Standard errors are clustered on both firm and year. Robust standard errors are reported in the parentheses. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

Table 3 reports estimates of equation (1) in which the normalize investment is the dependent variable. In the first regression we use debt asset ratio as the measure of capital structure.

In the first case, the capital structure variable is positive significant, the interaction term between capital structure and economic uncertainty is negative significant. The coefficient of capital structure is 5.131, the coefficient of the interaction is -2.915. The regression results shows that being additional on the same level of capital structure when the economic uncertainty increases 1 unit, the effect of capital structure on investment will be reduced by 2.915, compared to which is almost 60% of initial effect of capital structure on investment. The regression 2 to 5 reports the results using different measures of capital structure which are long term net asset liability ratio, short term net asset liability ratio, long term asset liability ratio, short term asset liability ratio and asset liability ratio.

In regression 2 to 5 evaluate the economic significant of the effects driven by economic uncertainty is consistent with what we find in regression 1, on the sensitivity of investment on capital structure.

With all these different measures of capital structure, we have significant positive effects came from capital structure on investment. Meanwhile, the increase of economic uncertainty will reduce the positive effects on investment on capital structure. Therefore, we can conclude that our results here are not robust to the measure of capital structure. And more important, all reductions caused by economic uncertainty count for around 60% of the initial effects on investment on capital structure. Hence, the effects of an increase of economic uncertainty have an impact not only on statistics, but also on investment.

### **3.5. Table 4: Economic Uncertainty, Capital Structure, and Firm Investment PSM Analysis: Propensity Matching Score**

This table gives an account of the results of benchmark regressions. Investment is the dependent variable in this table. Make out Table 4 for the definition of variables. All regressions include firm and year fixed effects. R<sup>2</sup> statistics reflect within firm variations. Standard errors are clustered on both firm and year. Robust standard errors are reported in the parentheses. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%. The sample used here is generated by propensity matching score.

The dependent variable is firm investment. In all five regressions, the coefficient of capital structure and the interaction of capital structure and economic uncertainty are significant. moreover, the coefficient of capital structure are all positive and the interaction term are all negative.

In regression two to five, we use four other capital structure variable, which are long term net asset liability ratio, short term net asset liability ratio, long term asset liability ratio, short term asset liability ratio and asset liability ratio. The results we find in regression two to five are robust and consistent with what we find in regression 1.

The capital variable has a standard deviation of 1.168, therefore, this module claims that 1-SD deviation moves upwards in capital structure leads to an increase of 7.18 in firm investment. The average value of firm investment is tobinQ, hence this represents an increase of 32 percent.

The interaction term of economic uncertainty and capital structure is -3.691 (the standard error is 1.355), showing that 1-SD deviation in this interaction term leads to an increase in firm interest, therefore, the economic uncertainty can affect the firm investment through the channel of capital structure. All the variable of firm characteristics are added as controlled variable.

### **3.6. Table5: Economic Uncertainty, Capital Structure, and Firm Investment: Further Robustness Check**

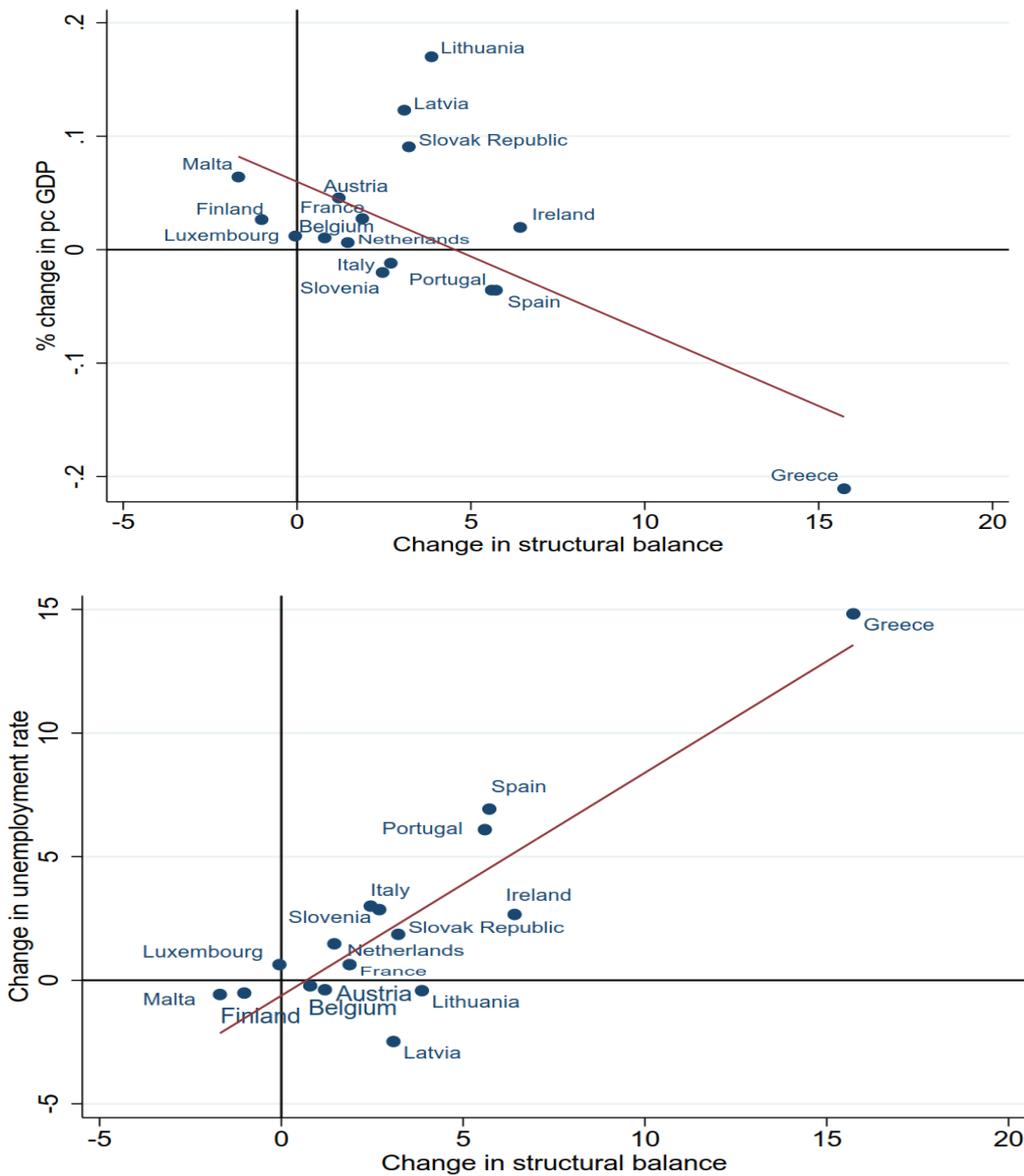
This table gives an account of the results of benchmark regressions. Investment is the dependent variable in this table. Make out Table 5 for the definition of variables. All regressions include firm and year fixed effects. R<sup>2</sup> statistics reflect within firm variations. Standard errors are clustered on both firm and year. Robust standard errors are reported in the parentheses. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

The dependent variable is firm investment. In these five regressions, the capital structure coefficient and the interaction terms between capital structure and economic uncertainty are significant. The capital structure coefficients are all positive, and the interaction terms between capital structure and economic uncertainty.

In regression analysis, we use four other capital structure variables, namely, long-term net asset liability ratio, short-term net asset liability ratio, long-term asset liability ratio, short-term asset liability ratio and asset liability ratio. The results we found in regression 2 to 5 are robust and consistent with those we found in regression 1.

**3.7. Table 6 and 7: Economic Uncertainty, Capital Structure, and Firm Investment: SOE Firms and Non-SOE Firms**

This table gives an account of the results of benchmark regressions. Investment is the dependent variable in this table. Make out Table 6 and 7 for the definition of variables. All regressions include firm and year fixed effects. R<sup>2</sup> statistics reflect within firm variations. Standard errors are clustered on both firm and year. Robust standard errors are reported in the parentheses. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.



**Figure 1** Fiscal tightening and the economy

**Table 3** Economic Uncertainty, Capital Structure and Investment

	(1)	(2)	(3)	(4)	(5)
MB	-0.814*** (0.0533)	-0.812*** (0.0534)	-0.784*** (0.0511)	-0.812*** (0.0541)	-0.801*** (0.0532)
Lsdebt	0.00617*** (0.00170)	0.00795*** (0.00172)	0.00631*** (0.00164)	0.00644*** (0.00176)	0.00672*** (0.00174)
Accounts	0.301 (0.206)	0.165 (0.211)	0.195 (0.203)	0.271 (0.214)	0.231 (0.212)
Stock	-0.187* (0.0960)	-0.0900 (0.0943)	0.0346 (0.0919)	-0.113 (0.0949)	-0.0881 (0.0949)
Size	-0.203*** (0.0257)	-0.216*** (0.0253)	-0.189*** (0.0239)	-0.218*** (0.0267)	-0.205*** (0.0262)
Lev	-0.659*** (0.154)	-0.591*** (0.161)	-0.740*** (0.143)	-0.574*** (0.164)	-0.583*** (0.156)
EM1	5.131*** (1.083)				
EM1MU1	-2.915** (1.257)				
EM2		6.391*** (1.008)			
EM2MU1		-3.592*** (1.124)			
EM3			11.84*** (1.974)		
EM3MU1			-3.710* (2.144)		
EM4				9.366*** (1.855)	
EM4MU1				-7.194*** (2.128)	
EM5					4.359*** (0.844)
EM5MU1					-3.020*** (0.954)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	82285	82295	78477	81574	77783
r2	0.358	0.364	0.377	0.357	0.359

**Table 4** Economic Uncertainty, Capital Structure and Investment-Propensity Score Method

	1	2	3	4	5
	Wtobinqa	Wtobinqa	Wtobinqa	Wtobinqa	Wtobinqa
MB	0.888*** -0.0617	0.862*** -0.0656	0.970*** -0.0661	0.873*** -0.0595	0.825*** -0.0613
Lsdebt	0.0101*** -0.00261	0.00705** -0.00277	0.00163 -0.00222	0.00201 -0.00259	0.00649** -0.00297
Accounts	0.386 -0.259	0.449* -0.27	0.298 -0.301	0.232 -0.245	-0.00934 -0.274
Stock	-0.319*** -0.115	-0.0862 -0.127	-0.182 -0.133	-0.181 -0.136	-0.250* -0.139
Size	-0.243*** -0.0339	-0.203*** -0.0274	-0.233*** -0.0288	-0.199*** -0.0281	-0.231*** -0.0316
Lev	-0.29 -0.21	-1.138*** -0.178	-0.539*** -0.208	-0.803*** -0.171	-0.433* -0.224
Cap1	5.014*** -1.137				
Cap1MU1	-2.693** -1.303				
Cap2		4.849*** -1.012			

	1	2	3	4	5
Cap2MU1		-2.381**			
Cap3		-1.128	12.86***		
Cap3MU1			-2.237		
Cap4			-3.039	7.035***	
Cap4MU1			-2.432	-1.734	
Cap5				-4.110**	3.480***
Cap5MU1				-1.914	-0.811
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	31412	30230	28536	30953	29193

**Table 5** Economic Uncertainty, Capital Structure and Investment-Investment opportunity

	1	2	3	4	5
	Wtobinqb	Wtobinqb	Wtobinqb	Wtobinqb	Wtobinqb
EM1	6.143***				
EM1MU1	-1.168				
MB	-3.951***				
Lsdebt	-1.355				
Accounts	-0.909***	-0.905***	-0.872***	-0.905***	-0.889***
Stock	-0.0595	-0.0594	-0.0568	-0.0603	-0.0591
Size	0.00861***	0.0107***	0.00891***	0.00897***	0.00942***
Lev	-0.002	-0.00202	-0.00194	-0.00205	-0.00203
EM2	0.0268	-0.119	-0.0828	-0.00487	-0.0498
EM2MU1	-0.24	-0.245	-0.236	-0.248	-0.246
EM3	-0.457***	-0.356***	-0.218**	-0.387***	-0.354***
EM3MU1	-0.111	-0.109	-0.106	-0.11	-0.109
EM4	-0.205***	-0.220***	-0.190***	-0.222***	-0.209***
EM4MU1	-0.029	-0.0285	-0.0268	-0.0301	-0.0296
EM5	-0.732***	-0.664***	-0.830***	-0.645***	-0.659***
EM5MU1	-0.176	-0.181	-0.162	-0.185	-0.177
EM2		8.009***			
EM2MU1		-1.138			
EM3		-4.980***	14.11***		
EM3MU1		-1.26	-2.177		
EM4			-5.294**	11.94***	
EM4MU1			-2.365	-2.07	
EM5				-9.779***	5.609***
EM5MU1				-2.367	-0.94
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	82285	82295	78477	81574	77783

**Table 6** Economic uncertainty, capital structure, and firm investment: SOE firms

	(1)	(2)	(3)	(4)	(5)
MB	-0.00883*** (0.000705)	-0.00882*** (0.000705)	-0.00749*** (0.000559)	-0.00873*** (0.000707)	-0.00889*** (0.000718)
Lsdebt	0.000126*** (0.0000380)	0.000146*** (0.0000382)	0.000107*** (0.0000303)	0.000123*** (0.0000382)	0.000133*** (0.0000400)
Accounts	0.0208*** (0.00433)	0.0183*** (0.00434)	0.0148*** (0.00335)	0.0192*** (0.00438)	0.0187*** (0.00445)
Stock	0.00682*** (0.00179)	0.00762*** (0.00176)	0.00200 (0.00134)	0.00782*** (0.00178)	0.00778*** (0.00181)
Size	0.00731*** (0.000479)	0.00720*** (0.000473)	0.00470*** (0.000370)	0.00713*** (0.000472)	0.00719*** (0.000480)
Lev	-0.0529*** (0.00270)	-0.0524*** (0.00271)	-0.0321*** (0.00194)	-0.0518*** (0.00269)	-0.0515*** (0.00276)
EM1	0.0186*** (0.00696)				
EM2		0.0412*** (0.00808)			
EM3			0.0226* (0.0125)		
EM4				0.0630*** (0.0126)	
EM5					0.0276*** (0.00688)
Constant	-0.108*** (0.00983)	-0.107*** (0.00982)	-0.0601*** (0.00785)	-0.106*** (0.00978)	-0.107*** (0.00992)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observation	82285	82295	78477	81574	77783
r2	0.163	0.165	0.165	0.163	0.162

**Table 7** Economic uncertainty, capital structure, and firm investment: Non-SOE firms

	(1)	(2)	(3)	(4)	(5)
Wroa	5.044*** (1.517)	4.493*** (1.548)	5.137*** (1.419)	4.499*** (1.595)	4.182*** (1.550)
WroaMU1	-0.621 (1.794)	-0.189 (1.858)	-0.694 (1.716)	-0.000305 (1.918)	0.315 (1.880)
MB	-0.774*** (0.0508)	-0.774*** (0.0509)	-0.744*** (0.0488)	-0.772*** (0.0512)	-0.760*** (0.0503)
Lsdebt	0.00558*** (0.00170)	0.00735*** (0.00172)	0.00575*** (0.00164)	0.00588*** (0.00177)	0.00614*** (0.00174)
Accounts	0.199 (0.205)	0.0858 (0.208)	0.0956 (0.201)	0.186 (0.211)	0.152 (0.209)
Stock	-0.215** (0.0950)	-0.122 (0.0933)	0.00216 (0.0905)	-0.148 (0.0937)	-0.124 (0.0937)
Size	-0.238*** (0.0246)	-0.249*** (0.0244)	-0.224*** (0.0229)	-0.252*** (0.0256)	-0.239*** (0.0251)
Lev	-0.411*** (0.151)	-0.356** (0.158)	-0.493*** (0.141)	-0.335** (0.161)	-0.347** (0.154)
EM1	5.302*** (0.860)				
EM1MU1	-3.198*** (1.021)				
EM2		6.565*** (0.780)			
EM2MU1		-4.001*** (0.860)			
EM3			12.36*** (1.617)		
EM3MU1			-4.302**		

	(1)	(2)	(3)	(4)	(5)
			(1.737)		
EM4				9.761*** (1.498)	
EM4MU1				-8.002*** (1.742)	
EM5					4.629*** (0.665)
EM5MU1					-3.489*** (0.761)
Constant	7.807*** (0.524)	8.005*** (0.521)	7.358*** (0.486)	8.110*** (0.544)	7.806*** (0.533)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observation	82285	82295	78477	81574	77783
r2	0.366	0.371	0.385	0.365	0.367

When the capital structure is significantly positive, companies are more likely to hold assets. Which means that capital structure has impact on company investment. Although this will have an impact on the future, over time, the impact will be smaller and smaller, which shows that our results are very stable.

At the same time, we also use other models to test whether our results are correct. The results are basically the same, which shows that our conclusions are correct and very stable.

**3.8. Table 8: Economic Uncertainty, Capital Structure, and Firm Investment: Non Soe Firms**

This table gives an account of the results of benchmark regressions. Investment is the dependent variable in this table. Make out Table 8 for the definition of variables. All regressions include firm and year fixed effects. R<sup>2</sup> statistics reflect within firm variations. Standard errors are clustered on both firm and year. Robust standard errors are reported in the parentheses. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

In the first regression we use debt asset ratio as the measure of capital structure. In the first case, the capital structure variable is positive significant, the interaction term between capital structure and economic uncertainty is negative significant. The coefficient of capital structure is 5.131, the coefficient of the interaction is -2.915. The regression results shows that being additional on the same level of capital structure when the economic uncertainty increases 1 unit, the effect of capital structure on investment will be reduced by 2.915, compared to which is almost 60% of initial effect of capital structure on investment.

In regression 2 to 5, we use four other capital structure variable like long term net asset liability ratio, short term net asset liability ratio, long term asset liability ratio, short

term asset liability ratio and asset liability ratio. And we find that the results we find in regression 2 to 5 are robust and consistent with what we find in regression 1.

**3.9. Table 9-10: Financial Constraints Mechanism Test**

*3.9.1. Economic uncertainty, capital structure, and firm investment: the fact of capital structure on financial constraint*

This table gives an account of the results of benchmark regressions. Investment is the dependent variable in this table. Make out Table 9 for the definition of variables. All regressions include firm and year fixed effects. R<sup>2</sup> statistics reflect within firm variations. Standard errors are clustered on both firm and year. Robust standard errors are reported in the parentheses. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

*3.9.2. Economic uncertainty, capital structure, and firm investment: the channel effect of capital structure through financial constraint*

This table gives an account of the results of benchmark regressions. Investment is the dependent variable in this table. Make out Table 10 for the definition of variables. All regressions include firm and year fixed effects. R<sup>2</sup> statistics reflect within firm variations. Standard errors are clustered on both firm and year. Robust standard errors are reported in the parentheses. \*Significant at 10%; \*\*significant at 5%; \*\*\*significant at 1%.

**Table 8** Economic uncertainty, capital structure and investment-controlling selection bias

	(1)	(2)	(3)	(4)	(5)
	Wtobinqa	Wtobinqa	Wtobinqa	Wtobinqa	Wtobinqa
EM1	5.450*** (1.109)				
EM1MU1	-3.568*** (1.257)				
MB	-1.195*** (0.0866)	-1.173*** (0.0860)	-1.138*** (0.0823)	-1.188*** (0.0866)	-1.169*** (0.0853)
Lsdebt	0.0111*** (0.00344)	0.0133*** (0.00341)	0.0118*** (0.00339)	0.0112*** (0.00343)	0.0114*** (0.00339)
Accounts	0.0359 (0.299)	0.000224 (0.292)	-0.0966 (0.286)	0.0267 (0.303)	0.0880 (0.302)
Stock	-0.106 (0.143)	0.0139 (0.141)	0.150 (0.140)	-0.0133 (0.143)	0.0227 (0.144)
Size	-0.282*** (0.0376)	-0.301*** (0.0368)	-0.261*** (0.0358)	-0.299*** (0.0382)	-0.288*** (0.0381)
Lev	-0.195 (0.209)	-0.142 (0.208)	-0.407** (0.199)	-0.123 (0.211)	-0.161 (0.213)
EM1	5.450*** (1.109)				
EM1MU1	-3.568*** (1.257)				
EM2		8.335*** (1.124)			
EM2MU1		-5.101*** (1.292)			
EM3			16.18*** (2.190)		
EM3MU1			-5.856** (2.415)		
EM4				10.73*** (2.042)	
EM4MU1				-8.795*** (2.306)	
EM5					4.947*** (0.971)
EM5MU1					-3.664*** (1.084)
_cons	9.147*** (0.792)	9.443*** (0.778)	8.532*** (0.755)	9.496*** (0.806)	9.237*** (0.801)
Year fixed effects					
N	40179	40186	38088	40120	38011
r2	0.350	0.361	0.380	0.351	0.353
Standard errors in parentheses					
= " * p<0.1	** p<0.05	*** p<0.01"			

**Table 9** Financial constraints mechanism test

	(1)	(2)	(3)	(4)	(5)
MB	-0.0286*** (0.00204)	-0.0285*** (0.00203)	-0.0286*** (0.00206)	-0.0281*** (0.00210)	-0.0282*** (0.00211)
Lsdebt	0.000295 (0.000189)	0.000392** (0.000189)	0.000321* (0.000191)	0.000338* (0.000194)	0.000426** (0.000197)
Accounts	0.0908*** (0.0175)	0.0768*** (0.0176)	0.0901*** (0.0177)	0.0803*** (0.0180)	0.0765*** (0.0179)
Stock	0.0626*** (0.00830)	0.0651*** (0.00822)	0.0646*** (0.00827)	0.0646*** (0.00826)	0.0638*** (0.00831)
Size	0.0364*** (0.00152)	0.0360*** (0.00153)	0.0364*** (0.00155)	0.0359*** (0.00154)	0.0362*** (0.00155)
Lev	-0.332*** (0.00902)	-0.330*** (0.00901)	-0.332*** (0.00944)	-0.330*** (0.00897)	-0.333*** (0.00929)
EM1	0.0637*** (0.0215)				
EM2		0.195*** (0.0235)			
EM3			0.0252 (0.0474)		
EM4				0.273*** (0.0479)	
EM5					0.159*** (0.0221)
Constant	-0.464*** (0.0320)	-0.460*** (0.0323)	-0.462*** (0.0330)	-0.455*** (0.0325)	-0.461*** (0.0329)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Observation	82196	82206	78397	81485	77703
r2	0.294	0.299	0.298	0.296	0.301

**Table 10** Financial constraints mechanism test

	(1)	(2)	(3)	(4)	(5)
GFin	1.270*** (0.352)	1.098*** (0.367)	1.236*** (0.332)	1.120*** (0.377)	0.969*** (0.363)
GFinMU1	-1.168*** (0.303)	-1.075*** (0.332)	-1.132*** (0.296)	-1.021*** (0.340)	-0.887*** (0.338)
MB	-0.803*** (0.0515)	-0.804*** (0.0518)	-0.773*** (0.0497)	-0.802*** (0.0523)	-0.793*** (0.0515)
Lsdebt	0.00577*** (0.00171)	0.00741*** (0.00172)	0.00578*** (0.00164)	0.00600*** (0.00177)	0.00630*** (0.00174)
Accounts	0.250 (0.202)	0.0891 (0.207)	0.127 (0.199)	0.196 (0.209)	0.165 (0.208)
Stock	-0.189** (0.0946)	-0.0860 (0.0929)	0.0371 (0.0901)	-0.109 (0.0932)	-0.0845 (0.0932)
Size	-0.218*** (0.0230)	-0.228*** (0.0226)	-0.205*** (0.0212)	-0.232*** (0.0237)	-0.218*** (0.0229)
Lev	-0.546*** (0.147)	-0.506*** (0.154)	-0.626*** (0.137)	-0.465*** (0.156)	-0.488*** (0.149)
EM1	3.428*** (0.917)				
EM1MU1	-1.043 (1.053)				
EM2		4.781*** (0.777)			
EM2MU1		-1.732** (0.862)			
EM3			9.340*** (1.697)		

EM3MU1			-0.895 (1.849)		
EM4				6.470*** (1.457)	
EM4MU1				-3.792** (1.587)	
EM5					3.181*** (0.666)
EM5MU1					-1.649** (0.739)
Constant	7.498*** (0.504)	7.675*** (0.498)	7.056*** (0.463)	7.806*** (0.520)	7.479*** (0.503)
Year fixed effects					
Observation	82196	82206	78397	81485	77703
r2	0.361	0.367	0.381	0.360	0.361

When the economic cycle is in the upward phase, the positive channel may have an impact, but when the economy is in the downward phase, it does not necessarily have an impact.

There are two reasons. The first is that it will be difficult for the company to borrow money, so the liquidity of capital is limited, and the company will reduce investment. The second is that when the economy is in a downturn, the number of good investment projects in the market will decrease, so companies are more willing to hold property rather than investment because they are afraid of losing money.

#### 4. CONCLUDING REMARKS

The results show that the impact of economic uncertainty on the sensitivity of investment to capital structure is not only statistically significant, but also economically significant. In this article, we explain the relationship between our findings and previous corporate finance studies. We now look at the role of economic uncertainty in the investment decision-making process of enterprises.

According to our benchmark analysis, we find that capital structure can have a positive significant effect on firm investment. However, when economic uncertainty increases, the positive relationship will be weakened. And further we use different capital structure measures to redo the benchmark regression using asset debt ratio, we can still have similar results, meaning that our results are consistent and robust to different measures of capital structure.

Further, we do a series of endogenous test on our empirical setting. Firstly, we use propensity matching score to rule out the potential effects caused by firm characteristic on firm investment. In addition, we also use Heckman two stage least squares to control the potential bias driven by the effects that firms with higher capital structure are on the cards to be listed firms.

Besides, for the sake of coping with the endogeneity caused by capital structure because of the omitted variable bias, we use panels two stage least squares with a Bartick IV across industries. And we still have a similar result as we have in the benchmark regressions. Therefore, it is safe to say the empirical finding in this paper will not be affected by these endogenous problems.

Further, we examine the heterogeneity of our empirical findings. Firstly, we find that the non SOE firms their sensitivity of investment on capital structure is more likely to be affected by fluctuation of economic uncertainty. However, the investment behavior of SOE firms is not that sensitive to economic uncertainty compared with non SOE firms. And finally, we also split our example into manufacturing firms and non-manufacturing firms. And results exhibit that the non-manufacturing firms to be affected by the change in economic uncertainty.

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