COVID-19 and Entrepreneurial Confidence: Evidence from Listed Companies

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Abstract. This paper examines the impact of epidemic severity on entrepreneurial confidence. In this paper, we select the data of China's Shanghai-Shenzhen A-shares from 2017-2021, and explore their causality by constructing a multiple regression model. The study found that: (1) the more severe the epidemic, the lower the entrepreneur confidence index.(2) Compared with companies with CEO disintegration, the epidemic has a more significant negative effect on entrepreneur confidence in companies with CEO integration.(3) Compared with other industries, the epidemic has a less negative effect on entrepreneurial confidence.(4) Among companies with higher r & d personnel investment and higher capital investment, the negative impact of the epidemic on entrepreneurs' confidence is even less. This paper also verifies the stability of the results by replacing the model from the measures of the epidemic and increasing the number of control variables.

Keywords: Epidemic, Entrepreneur confidence, R & D investment, Two jobs in one (duality)

1. Introduction

Since December 2019, the novel coronavirus (COVID-19) outbreak, the virus in more than 200 countries and regions accelerated transmission, China, Italy, the United States, Mexico, India and other countries became the epicenter of the outbreak. The outbreak of COVID-19 has brought about an unprecedented crisis for the global economy. China was the first country to be hit hard by the epidemic, and its financial and economic markets have been hit hard after the outbreak. Enterprises are the main body of microeconomy, and the living condition of enterprises directly affects the output and employment level, and affects the healthy development of China's economy.

In the long-term development of enterprises, entrepreneur confidence plays an important role. Entrepreneur confidence represents entrepreneurs' feelings about the development of enterprises and their subjective evaluation of various environments, It usually shows that an assumption or prediction is correct or a behavioral choice is optimal. This subjective evaluation will affect the entrepreneur's behavior intention and realize it in the decision-making process, which then affects the actual behavior and behavior performance.

Therefore, this article starts from the epidemic to explore the impact of the epidemic on entrepreneurs' confidence. Specifically, this paper takes the Chinese Shanghai and Shenzhen A-share listed companies as the research choice, and selects the data from 2017-2021 for the research. For the epidemic variable, this paper is the agent variable of the severity of the epidemic according to the number of new people in the year of the listed company. The tone information using the CSMAR database represents entrepreneur confidence. This index adopts the text mining method, to mine the annual report of the listed companies, and combined with the emotion analysis, with the positive degree of the annual report intonation represents the intonation of the annual report. This paper describes the basic data features, followed by descriptive statistics, correlation analysis, multiple linear regression, and robustness tests for the variables. This paper examines the relationship between the epidemic and entrepreneur confidence respectively, and explores the impact of the severity of the epidemic on entrepreneur confidence. We also conducted a heterogeneity analysis of the sample to examined the impact of the epidemic on entrepreneur confidence over different executive rights; specifically, we represented executive rights and explored the impact of the epidemic on entrepreneur confidence in companies with different executive rights. We also analyzed the heterogeneity of the

samples for the industry properties. At the same time, as the r & D level of enterprises will affect their ability to resist risks, we took the R & D level as a regulatory variable to test whether there are differences in the impact of the epidemic on entrepreneur confidence among companies with different R & D levels. This paper shows that the worse the local epidemic is, the lower the confidence of entrepreneurs. At the same time, this paper found that corporate r & d investment and the proportion of R & D personnel can mitigate the negative impact of the epidemic on entrepreneur confidence.

The remaining chapters of this article are arranged below. The second chapter summarizes the relevant literature and theory and proposes the thesis. In the third chapter, the data source, model description and variable selection are introduced. In Chapter 4, the processed data are described in statistics, correlation analysis and the conclusions of this paper. Chapter 5 summarizes the above article and puts forward several research suggestions.

2. Literature and Hypothesis

In the long history of human beings, there have been many large-scale public health events, and scholars at home and abroad have a long history on its economic impact. For example, an analysis of the impact of the plague in Italy in 1629 and 1630 on urban development, which shows that the urban economic growth level of severe plague is relatively low and has a sustained negative impact on the urbanization rate. Infectious diseases seriously threaten global security resulting in a sustained economic decline to a certain extent, it affects the quality of human capital and the future population income level. The impact of the SARS incident in China in 2003 on economic activities has been widely concerned and studied by scholars, pointed out that the SARS outbreak had no significant impact on capital expenditures, acquisitions or R & D expenses for companies listed in Canada. SARS had no significant impact on capital expenditure and acquisition spending for Chinese companies, but increased R & D spending for Chinese companies.

2.1 The worse the epidemic, the lower the entrepreneurial confidence

This paper believes that the epidemic will reduce the company's performance, increase the risk of the company, and will also reduce the disclosure of social responsibility scores, thus affecting the enthusiasm of the annual report tone, and have a negative impact on the confidence of entrepreneurs. Based on this, this paper proposes that the region, the more severe the epidemic, the lower the entrepreneurial confidence.

2.2 Compared with Companies that Integrate the Two Jobs, the Epidemic has a More Negative Effect on the Tone of the Annual Report

Executive rights can affect the tone of management on performance disclosure. When the CEO and the chairman are the same person, the CEO has low expertise; when the epidemic comes, it will not affect the company to make the company's development and lead to greater negative impact on entrepreneurial confidence. In other words, among companies with a combination of two jobs, the epidemic has a greater negative impact on tone. Based on this, this paper puts forward hypothesis 2. Compared with the unintegration of the two positions, the epidemic has a greater negative effect on the tone of the annual report.

2.3 Compared with Companies in Other Industries, the Epidemic in the Pharmaceutical and Food Industries has a Less Negative Effect on the Annual Report Tone

Compared with other industries, the negative effect on the annual report tone is smaller in the food and pharmaceutical industries. Based on this, this paper proposes hypothesis 3. Compared with companies in other industries, the epidemic in the pharmaceutical and food industry has a less negative effect on the annual report tone of companies in the pharmaceutical and food industry.

3. Research Design

3.1 Variable Declaration

3.1.1 Entrepreneur Confidence

This paper uses the proportion of positive words in the annual report tone to represent the confidence of entrepreneurs. When the tone in the report is more positive, it shows that entrepreneurs are more optimistic about the development prospects of enterprises. The data are obtained from the CSMAR database, which means that the proportion of the number of positive words to the number of words in the annual report represents the positive degree of the intonation The index first processes the intonation of the annual report according to the vocabulary template, counts the overall vocabulary number of the annual report, and then conducts emotional analysis of the vocabulary to judge that the vocabulary is positive and negative emotions. Finally, use the number of positive words-number of negative words) / total words

3.1.2 Epidemic Variables

This paper represents the severity of the epidemic according to the number of confirmed cases in the province where the listed company is located. Before 2020, the index was 0. New confirmed cases in 2020 and 2021. We match to the listed company field by the province where the listed company is located. We can use the epidemic indicators of provinces and cities to fully obtain the differences of epidemic situations between different provinces and cities. In the robust test, we used the number of new deaths in the company location as the severity of the outbreak.

3.1.3 Group Variable

We believe that the impact of the epidemic on entrepreneur confidence is different in pandemic-related industries. Specifically, the pharmaceutical industry and the food industry have been less affected by the epidemic, and even the profits of some companies have increased significantly after the epidemic.

At the same time, the management structure will also affect the confidence of entrepreneurs. We consider whether the chairman and CEO are the same person to represent the management structure, DUAL represents executive rights; if the CEO and the chairman are the same person, the CEO has greater rights and plays an important role in corporate decision-making.

3.1.4 Regulated Variable

We consider the company's R & D level as a regulatory variable, and the R & D level in this paper measures from two aspects, R & D capital investment and R & D personnel investment. For R & D capital investment, this paper represents the proportion of R & D investment / operating income, and the number of R & D personnel represents the total number of employees.

3.1.5 Controlled Variable

In addition, this paper also selects a series of variables as the control variables, including enterprise scale, asset-liability ratio, development ability and other enterprise financial indicators, as well as governance factors such as equity concentration degree, independent director ratio and senior executive shareholding ratio.

In addition to the company's basic financial indicators, corporate governance factors will also affect the tone of the annual reports. This paper selects three governance factors: equity concentration degree, independent director ratio and executive shareholding ratio as the control variables at the governance level.

Table 1. Variables definition table

type	meaning	code	explain
explained variable	Entrepreneur confidence	Tone	(Number of positive words-number of negative words) / total words
explanatory variable	information about and appraisal of an epidemic	COVID	The number of new confirmed cases + 1 log
Group variable	trade	Ind	Medicine and food industry for 1, others for 0
	Two jobs in one	Dual	The chairman and the general manager are worth 1 for the same person
regulated variable	R & D funding	RD	R & D investment / operating revenue
	R & D staff input	RDD	Ratio of R & D personnel
controlled variable	scale	Size	Year-end asset logarithm
	asset-liability ratio	Lev	Debt / assets
	Development ability	Growth	increase rate of business revenue
	Equity concentration	Top1	The ratio of the largest shareholder
	The proportion of independent directors	Indep	Number of independent directors / Total number of directors
	Executive shareholding ratio	Mshare	Number of executive shares / total number of shares
	performance	Roa	Net profit / asset

3.2 Specification of a Model

To examine the relationship between the epidemic and entrepreneur confidence, the model is constructed as follows

$$Tone_{it} = \alpha_0 + \beta_1 COVID_{it} + \sum Control_{it} + \varepsilon_{it} \quad (1)$$

$Tone_{it}$It represents the entrepreneurial confidence of the company, with the positive tone of the annual report; it is a random error term. At that time, the more severe the epidemic, the less confidence.$\mathrm{Control_{it}}$ is control variable，α_0 is intercept，$\varepsilon_{it}\beta_1 < 0$

To test the moderating role of other variables between the outbreak and entrepreneur confidence, the model was constructed as follows

$$Tone_{it} = \alpha_0 + \beta_1 COVID_{it} + \beta_2 Moderator_{it} + \gamma COVID_{it} * Moderator_{it} + \sum Control_{it} + \varepsilon_{it} (2)$$

$Tone_{it}Control_{it}$ represents α_0 is intercept，$\varepsilon_{it}\gamma > 0$ It represents the entrepreneurial confidence of the company, expressed by the positive tone of the annual report, and is a random error term. At that time, it showed that the larger the regulatory variable was, the less the inhibitory effect of the epidemic on entrepreneurs 'confidence was, which could effectively inhibit the negative effect of the epidemic on entrepreneurs' information. This paper considers R & D input and R & D input as regulatory variables.

4. Empirical Results and Analysis

4.1 Descriptive Statistics

Descriptive analysis of the extreme values, means, and standard deviations of the indicators in this model is shown in Table 4-1.

Table 2. describes the statistical table

Variables	N	mean	standard error	least value	median	crest value
Entrepreneur confidence	16,271	0.0200	0.0210	-0.0840	0.0200	0.132
COVID	16,271	2.558	3.301	0	0	11.12
Size	16,271	22.24	1.286	19.31	22.06	25.94
Lev	16,271	0.408	0.199	0.0570	0.398	0.892
Growth	16,271	0.170	0.363	-0.580	0.118	2.068
Top1	16,271	0.332	0.145	0.0900	0.308	0.753
Indep	16,271	0.378	0.0540	0.167	0.364	0.571
Mshare	16,271	0.158	0.203	0	0.0340	0.698
ROA	16,271	0.0440	0.0730	-0.247	0.0440	0.229
research input	16,271	0.0460	0.0490	0	0.0360	0.269
Ratio of R & D personnel	16,271	0.165	0.142	0	0.129	0.997

It can be seen that the average confidence of entrepreneurs is 0.02, more than 0, indicating that on the whole, the annual report intonation and positive words account for more, that is, the confidence of entrepreneurs is more positive. The mean epidemic variable was 2.558, the minimum value was 0, and the maximum value was 1112, indicating that the degree of epidemic varied greatly in different provinces. The average number of 2.558 corresponds to 783, with the minimum value of 0 and the maximum value of 11.12. The corresponding number of the number of cases is 67,740, indicating the large difference in the number of cases between different provinces.

The mean enterprise size was 22.34, the minimum value was 22.06, and the maximum value was 25.94, indicating the large difference in scale levels between different companies. The average asset-liability ratio is 0.408, indicating that the asset-liability ratio is low; the solvency is good. The average revenue growth rate was 0.17, more than 0, indicating that the sample company had a good growth capacity. The average shareholding ratio of the largest shareholder is 0.332, indicating that the equity concentration level of Chinese companies is relatively high. The average proportion of independent directors is 0.378, the standard deviation is 0.054, and the standard deviation is less than the mean, indicating that the proportion of independent directors in China fluctuates less. The average shareholding ratio of senior executives is 0.158, indicating that the senior executive shareholding ratio of Chinese companies is relatively low. The average ROA of profitability is 0.044, greater than 0, indicating that the profitability of Chinese companies is good. The average r & D investment is 0.046, indicating that the r & d investment level of Chinese companies is relatively low. The average investment of R & D personnel is 0.165, indicating that the proportion of R & D personnel among employees in China is relatively low.

For the two-in-one sample, we performed group description statistics and mean difference test as follows

Table 3. sample an test of two jobs

Variables	Dual=0		Dual=1		MeanDiff
	N	mean	N	mean	
Tone	11051	0.0200	5220	0.0210	-0.001
Size	11051	22.42	5220	21.84	0.578***
Lev	11051	0.427	5220	0.367	0.060***
Growth	11051	0.162	5220	0.186	-0.024***
Top1	11051	0.335	5220	0.327	0.008***
Indep	11051	0.374	5220	0.387	-0.013***
Mshare	11051	0.123	5220	0.231	-0.108***
ROA	11050	0.0410	5220	0.0510	-0.010***
RD	11051	0.0410	5220	0.0580	-0.017***
RDD	11051	0.154	5220	0.188	-0.033***

It can be seen that in terms of distribution, the sample of two jobs was 5220, accounting for 32.08%.

For entrepreneur confidence the variables were not significantly different between the 2 groups. For the enterprise scale variable, the size of the company is 21.84 and 22.42. The difference is 0.578, which has passed the significance test at 1%. It indicates that the size of the two-integrated company is significantly smaller than the non-integrated company; it shows that when the company is large, a professional broker is chosen to manage the company, so the size of the two positions is relatively low. In terms of TOP1, the proportion of the largest shareholders of non-integrated companies is significantly higher than that of integrated companies. For the proportion of independent directors, the proportion of independent directors is higher. At the same time, it can be seen that the executive shareholding ratio, profitability ROA, R & D investment and R & D personnel investment level of the integrated companies are all higher than those of the non-integrated companies.

For the distribution seen for samples in different industries, we performed descriptive statistics with results as follows

Table 4. Comparison Table of Company Variables between the Pharmaceutical and Food Industry and other Industries

Variables	Other industries		Food, medicine		MeanDiff
	N	mean	N	mean	
Entrepreneur confidence	15006	0.0200	1265	0.0230	-0.003***
Size	15006	22.26	1265	22.01	0.245***
Lev	15006	0.417	1265	0.299	0.118***
Growth	15006	0.171	1265	0.158	0.0120
Top1	15006	0.332	1265	0.334	-0.00200
Indep	15006	0.378	1265	0.376	0.00200
Mshare	15006	0.158	1265	0.159	-0.00100
ROA	15006	0.0420	1264	0.0670	-0.025***
RD	15006	0.0450	1265	0.0590	-0.013***
RDD	15006	0.168	1265	0.132	0.036***

It can be seen that the mean value of confidence of entrepreneurs in food and pharmaceutical industry is 0.023 and other industries is 0.02. The difference is-0.003, which is significant at 1%; indicating that the entrepreneur confidence in food and pharmaceutical industry is significantly higher than that in other industries. This shows that although the epidemic has had an impact on the entire industry, the impact is also a good opportunity for the food and medicine industry, so the company management in these industries is optimistic about the company's outlook. From the perspective of the distribution of entrepreneur confidence among the industry categories (attached Table 2), the entrepreneur confidence index of scientific research and technology services, health and social work

industries is relatively high. And after the outbreak of the epidemic, the overall degree of entrepreneur confidence in various industries is decreasing.

From other variables, the enterprise size and asset-liability ratio of other industries are significantly larger than those of the pharmaceutical and food industry. In terms of profitability and R & D investment, the profitability of the food and pharmaceutical industry is significantly greater than that of other industries, and its R & D investment level is also higher than that of other industries. This shows that the food and medicine industry has high investment, high R & D industry characteristics; its development requires a lot of investment.

4.2 Correlation Analysis

To prevent empirical bias between variables due to excessive correlation, thus affecting the reliability of the regression results. Before the empirical regression of the model, the main variables were correlated to prevent multiple collinearity between the variables. The analysis results are shown in Table 5.

Table 5. Correlation Analysis Table

	Entrepreneur confidence	COVID	Size	Lev	Growth	Top1	Indep	Mshare	ROA	RD	RDD
Entrepreneur confidence	1										
COVID	-0.087***	1									
Size	0.097***	0.0100	1								
Lev	0.00300	-0.034***	0.513***	1							
Growth	0.198***	-0.034***	0.039***	0.00400	1						
Top1	0.035***	-0.018**	0.144***	0.018**	0.00100	1					
Indep	0	0.0120	-0.028***	0	-0.00800	0.043***	1				
Mshare	0.032***	0.017**	-0.383***	-0.282***	0.070***	-0.037***	0.066***	1			
ROA	0.181***	0.047***	-0.038***	-0.387***	0.301***	0.174***	-0.020**	0.213***	1		
RD	0.070***	0.087***	-0.259***	-0.299***	-0.029***	-0.176***	0.035***	0.216***	0.00200	1	
RDD	0.062***	0.043***	-0.166***	-0.171***	0.020**	-0.154***	0.040***	0.126***	0.00400	0.621***	1

It can be seen that the correlation coefficient between the epidemic and entrepreneur confidence is-0.087, which is a significant negative correlation, indicating that entrepreneur confidence is lower

in areas where the epidemic is severe. The correlation coefficient of enterprise size and Tone is 0.097, with a significant positive correlation, indicating that the larger the company, the better the confidence of the entrepreneur. The correlation coefficient of revenue growth rate and entrepreneur confidence was 0.198, a significant positive correlation, indicating that the larger the revenue growth rate, the better the entrepreneur confidence. The correlation coefficient of equity concentration and entrepreneur confidence is 0.035, a significant positive correlation, indicating that the greater the equity concentration, the better the entrepreneur confidence. The correlation coefficient of management shareholding ratio and Tone is 0.032, indicating a significant positive correlation, indicating that the larger the management shareholding ratio, the better the confidence of entrepreneurs. The correlation coefficient of profitability and entrepreneur confidence is 0.181, a significant positive correlation, indicating that the better the profitability, the better the entrepreneur confidence. The correlation coefficient of R & D investment, R & D personnel investment and entrepreneur confidence is 0.07 and 0.062, which is a significant positive correlation, indicating that the greater the investment and r & d personnel investment, the better the confidence of entrepreneurs.

In this study, the correlation coefficient between the respective variables was basically significantly correlated, with a higher value of 0.513 (the correlation coefficient of 0.513 for size and lev) being present. To ensure excluding the possible effects of multicollinearity, the VIF multicollinearity test will be performed for each major variable, and the results are shown in Table 6.

Table 6. The V I F Test Form

Variable	VIF	1/VIF
Size	1.53	0.65456
Lev	1.38	0.723217
Mshare	1.2	0.832914
Top1	1.03	0.971911
Growth	1.01	0.988341
Indep	1.01	0.992552
COVID	1	0.995409
Mean VIF	1.17	

The VIF values (variance inflation factor) for each variable are as follows. It can be seen that the maximum VIF value of each variable is 1.53, the minimum value is 1, and the mean value is 1.17, which are less than 10, and it can be considered that there is no serious collinear between the variables, and there can be multiple regression

4.3 Regression Analysis

The data samples used in this paper are short panel non-equilibrium data with short time T and large number of individuals N. In this paper, regression and heteroscedastic errors with clustering robust criteria.

4.3.1 Benchmark Regression

In order to study the relationship between the epidemic and entrepreneur confidence, we used stepwise regression, and column 1 added only the epidemic variables, and column 2 added the control variables such as enterprise size on the basis of column 1. Column 3 adds all of the control variables to column 2.

Table 7. Benchmark regression tables

variable	(1) Entrepreneur confidence 1	(2) Entrepreneur confidence 2	(3) Entrepreneur confidence 3
Log (1 + cases)	-0.0004**	-0.0004**	-0.0004**
	(-2.06)	(-2.11)	(-2.31)
Size		0.0014***	0.0016***
		(9.55)	(10.54)
Lev		0.0032***	0.0033***
		(3.23)	(3.32)
Growth		0.0047***	0.0046***
		(10.42)	(10.39)
ROA		0.0425***	0.0396***
		(18.27)	(16.60)
Top1			0.0021**
			(1.99)
Indep			-0.0009
			(-0.34)
Mshare			0.0043***
			(5.53)
Constant	0.0248***	-0.0061	-0.0108*
	(5.63)	(-1.15)	(-1.96)
Observations	16,271	16,271	16,271
R-squared	0.232	0.273	0.274
F	315.5	302.5	273.3

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

The explanatory variable COVID in columns 1-3 was all significant at the 1% significance level and the coefficient was negative, indicating that the worse the outbreak was, the worse the entrepreneurial confidence was. The coefficient of the epidemic variable in column 3 was-0.0004, indicating that when the number of confirmed cases increased by 1%, entrepreneur confidence decreased by 0.0004 percentage points. This shows that the epidemic will reduce companies' expectations of the outlook and reduce their confidence. Combined with the above discussion, first, the occurrence of the epidemic will increase more uncertainty, increase the risks facing enterprises, thus reducing the management expectations, reduce the entrepreneur confidence; Second, after the outbreak, the stock market shock, many enterprises due to poor management layoffs or collapse, the epidemic reduces the profit margin of listed companies, resulting in the reduction of the confidence of entrepreneurs. Third, after the outbreak of the epidemic, panic was caused to the whole capital market. In the capital market, most retail Chinese investors followed the trend was serious. The epidemic will aggravate the market panic, cause the decline of the market value of the company, and the shock in the whole market situation, thus reducing the confidence of entrepreneurs.

4.3.2 Analysis of Heterogeneity

To test whether the impact of the epidemic on entrepreneur confidence varies among different groups of companies, we returned to the above sample according to whether the combination of executive rights and industry types is combined.

The COVID is not significant in column 1 or significant in column 2, indicating that the impact of the epidemic on entrepreneur confidence is more significant in the two-job integration group.

According to the previous analysis, these companies are relatively small, with greater CEO rights and greater control over the company. For such companies, with no professional CEO hired, their decisions are less professional when the epidemic comes, so the epidemic has a significant negative impact on them. For those companies, the CEO is a professional with strong expertise and management ability to help the company make more accurate decisions when the epidemic comes and help the company through the crisis period.(12)

In columns 3 and 4, column 3 is significant, indicating that the impact of the epidemic on entrepreneurs 'information is more significant in other enterprises. In the pharmaceutical and food industries, the epidemic has not played a significant role in reducing entrepreneurs' confidence. This shows that among Chinese residents, the epidemic has not reduced the demand for food. On the contrary, residents in many areas will hoard food and food to avoid the impact of the lockdown; so the impact of the epidemic on the food industry is small. For the pharmaceutical industry, the epidemic has caused a large number of drug price increases, especially some companies producing epidemic prevention supplies, vaccines and other companies, which have made a lot of profits from the epidemic; so the epidemic has little impact on the confidence of entrepreneurs in the pharmaceutical industry.

Table 8. Group regression tables

	(1)	(2)	(3)	(4)
	Dual=0	Dual=1	Other industries	Pharmaceutical food
VARIABLES	Entrepreneur confidence	Entrepreneur confidence	Entrepreneur confidence	Entrepreneur confidence
COVID	-0.0003	-0.0008***	-0.0003*	-0.0007
	(-1.32)	(-2.61)	(-1.66)	(-1.58)
Controls	Y es	Yes	Yes	Yes
Observations	11,051	5,220	15,006	1,265
R-squared	0.271	0.290	0.282	0.217
F	184.9	99.67	262.8	34.34

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

4.3.3 Control Response

Column 1 is the regulating role of R & D investment, and column 2 is the regulating role of R & D personnel input.

The column 1 interaction item COVID _RD coefficient is positive and significant at 10% significance, indicating that the negative impact of the epidemic on entrepreneur confidence will become smaller in companies investing more on R & D. The COVID _RDD coefficient is positive and significant at the 1% significance level, indicating that the negative impact of the epidemic on entrepreneur confidence will be smaller in companies with a larger proportion of developers. In other words, r & d investment and r & d personnel investment can weaken the negative impact of the epidemic on entrepreneur confidence.

In other words, the epidemic of companies with a high impact on R & D investment and companies with a high proportion of R & D personnel has a small impact. This may be due to the high R & D productivity and the proprietary knowledge to increase revenue and increase business confidence. At the same time, the company with a high proportion of R & D personnel, and secondly, the R & D personnel can increase the future development opportunities of the enterprise, increase the level of

innovation of the enterprise, and enable the enterprise to overcome the difficulties when the major disaster comes, and increase the sustainable development capacity of the enterprise.

Taken together, internal governance, research and development, and the nature of the industry can all change the impact of the epidemic on entrepreneur confidence. As the epidemic is an uncontrollable external risk, when the epidemic occurs, it inevitably will have an impact on enterprises. Without controlling the epidemic, enterprises can weaken the impact of the epidemic by increasing the construction of their internal governance system, changing the scope of production products such as diversification, increasing R & D investment and personnel investment; thus increasing the company's ability to deal with major public health events and ensuring healthy and sustainable development.

Table 9. Adjustment tests developed

	(1)	(2)
	mm1	mm2
VARIABLES	Tone	Tone
COVID _RD	0.0015*	
	(1.87)	
RD	0.0278***	
	(6.52)	
COVID _RDD		0.0009***
		(3.14)
RDD		0.0007
		(0.51)
COVID	-0.0006***	-0.0006***
	(-3.13)	(-3.18)
Constant	-0.0110**	-0.0110**
	(-1.99)	(-1.98)
Observations	16,271	16,271
R-squared	0.278	0.275
F	258.7	257.2

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

4.3.4 Steady Inspection

To ensure the integrity of the evidence and the accuracy of the results, the robustness will be tested in the following three ways:

(1) Replacement variables. In the empirical study of this paper, the epidemic variable used the number of new cases + 1 log, and we used the number of new deaths + 1 log for the development of the epidemic. According to COVID 1, the average number of new deaths in 2020 was 93.16, and the number of new deaths in 2021 was 0.023. The regression results are shown in Supplementary Table 3.

(2) Add the variables. This paper studies the impact of the epidemic on entrepreneur confidence. Due to the large differences between different provinces and cities, except for the epidemic situation, the degree of economic development is different. Therefore, this paper adds two regional variables to the existing model as control variables, and the per capita GDP level represents the regional economic development level (lngdp), and the loan / GDP represents the local financial development level. Since the regional economic level and loan level will also affect entrepreneur confidence, these two regional control variables are added in this paper. This paper constructs the model and resumes the empirical

regression to test whether the above results still hold. The regression results are shown in Supplementary Table 4.

As can be seen from Schedule 3, the number of new deaths as the epidemic variable is still significant and negative, indicating that the more deaths from the epidemic, the lower the confidence of entrepreneurs. In Schedule 4, it can be seen that the two new control variables, lngdp are positive and significant, indicating that the higher the degree of regional economic development, the more positive the confidence of entrepreneurs. After the addition of control variables, COVID remained significant and negative, indicating that the severity of the epidemic has a negative impact on entrepreneur confidence. Meanwhile, from the results of the 2 group regressions, the coefficients are consistent with those above. In conclusion, in this paper, the above two methods are used to conduct the robustness test, and the results show that the empirical results of this paper are robust: the worse the epidemic is, it will reduce the confidence of entrepreneurs in the region.

5. Conclusion

This paper examines the impact of epidemic severity on entrepreneurial confidence. This paper uses the data of China's Shanghai and Shenzhen A-shares from 2017-2021, and uses the intonation information from the management analysis and discussion of CSMAR database to represent entrepreneur confidence, and the number of newly confirmed cases in the location of listed companies is used as the epidemic variable. Multiple regression models were constructed and tested. The main conclusions of this paper are as follows

The severity of the epidemic is negatively correlated with entrepreneurial confidence. Theoretically speaking, the outbreak of the epidemic has an important impact on corporate performance, risks and the overall market situation. The outbreak of the epidemic will increase more uncertainty and increase the risks faced by enterprises, thus reducing the expectations of the management and reducing the confidence of entrepreneurs. Therefore, in general, the more serious the epidemic is, the lower the confidence of entrepreneurs are.

(2) Compared with the non-two-job integrated companies, the greater the negative impact of the epidemic on entrepreneur confidence in the two-job integrated companies. This shows that when the chairman is also CEO, CEO has greater power; such CEO is not employment system, many are private enterprise or family business inheritance system, and CEO has low professional level and quality. Therefore, when the epidemic comes, more professional decisions cannot be made, which will affect the profits and development prospects of enterprises, and then affect the confidence of entrepreneurs.

(3) Compared with companies in other industries, the epidemic has a less negative impact in food and pharmaceutical companies on entrepreneur confidence. This shows that although the epidemic has had an impact on the entire capital market, some industries have gained greater space for development. Measures such as the lockdown caused by the epidemic have led to a surge in demand for food, hoarding food, raising demand and prices for food, and also increasing demand for medical products, such as masks and various epidemic prevention drugs, and raising the price of medicine.

(4) The higher the r & d investment and r & d personnel investment, the less the negative impact of the epidemic on entrepreneurs' confidence. This shows that both the investment of R & D funds and R & D personnel can increase the ability of enterprises to resist risks, and the R & D level can increase the production efficiency of enterprises, improve the innovation level of enterprises, so that enterprises can overcome the difficulties when major disasters come, and increase the sustainable development ability of enterprises.

As the epidemic has become the new normal, the epidemic is still spreading in various countries so far. How to correctly respond to the crisis brought about by the epidemic and maintain the healthy development of enterprises is crucial to the economic development of enterprises and the country.

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