# Analysis of COVID-19's Influence on Enterprise Management Performance

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*Abstract: COVID-19 outbreak in early 2020 had a serious impact on the management performance of enterprises because of the long incubation period and strong infectivity of Covid-19. Taking the listed companies covered by domestic CSI 500 Index and US S&P 500 Index from 2018 to 2020 as the research object, this article makes a comparative study on the impact of sudden COVID-19 epidemic on the operating performance of listed companies and its action path. The results show that the epidemic situation has a negative impact on business performance by reducing the asset utilization efficiency of enterprises and increasing the comprehensive cost rate; Domestic epidemic prevention policies have promoted the improvement of business performance, and the impact of domestic enterprises on the epidemic situation will be less than that of the United States in 2020; In addition, the extent to which enterprises are affected by the epidemic is closely related to their industries, the nature of property rights and the degree of epidemic prevention and control in their regions. This study extends the analysis of influencing factors of business performance to the field of public health, reveals the path of public health events' influence on business performance, and provides reference for improving business performance during the epidemic period.*

*Keywords: COVID-19, Public Health, Enterprise Performance Management, Impact Analysis, Empirical analysis*

## 1. Introduction

TThe outbreak of COVID-19 since 2020 has posed a negative effect on the global economic and political landscape, which has brought rapid changes in the market environment. The sudden, highly contagious virus and the presence of asymptomatic infections made this outbreak a global public health emergency with the fastest spread, the widest range of infection, and the most difficult prevention and control. The external impact of the epidemic has led to problems such as irregular shutdowns, labor shortages, shrinking demand, and restricted industrial chains. Enterprise operations are facing unprecedented challenges, with capital chain breaks and bankruptcy risks coexisting[1]. The normalization, variability, uncertainty, complexity, and ambiguity of the global epidemic may become the norm in the market environment, and enterprises may remain in an uncertain environment for a long time[2]. As the most direct unit affected by public health events, no company can survive alone. From large enterprises represented by multinational companies to small and medium-sized enterprises, they have all been greatly impacted by the epidemic. Large enterprises have more or less corresponding response plans for emergencies, but most small and medium-sized enterprises are not prepared in advance for this sudden impact. Therefore, it is urgent to go deep into micro-enterprises to study the impact of the new crown pneumonia epidemic and to explore the micro-intermediary path through which public health emergencies affect economic development. The outbreak of the epidemic has directly increased the difficulty of production and operation of enterprises. The products produced by enterprises are unsalable, and the resumption of production, market demand, and sales channels of enterprises are all restricted to a certain extent. In particular, micro-enterprises are under pressure in terms of revenue and cost management, and their profitability and operational capabilities have

suffered a major blow. In addition, the epidemic has triggered a crisis in the global industrial chain, and the risk of supply chain disruption in the short term has intensified, mainly manifested in the delay of order delivery and the decline in production scale [3]. In the short term, the price of some products has risen sharply, and in the long run, it may cause problems such as trade shrinkage, supply chain tightening, external investment decline, and industrial chain decoupling. Therefore, even if the epidemic situation in the region stabilizes, many production companies that rely on multinational supply chains are still facing huge shocks, and urgently need to restructure the industrial chain and implement dual-cycle development.

Due to differences in resource endowments and government policy intervention, the impact of the epidemic on enterprises in different industries, property rights, and epidemic prevention policies is often quite different. The identification of these differences will help the government to propose strategies for enterprises with different characteristics. Helping policies to help them survive the post-epidemic stage and prevent economic downturn risks. This paper analyzes the impact of COVID-19 on enterprise performance from the perspective of public health, extends the consequences of public health events to the microenterprise level, compares the degree of impact of listed companies in China and the United States on the epidemic, concludes that China's 2020 epidemic prevention policy effectively reduces the negative impact on enterprises, and proves the effectiveness of domestic epidemic prevention and control from the perspective of microenterprise financing; then analyzes the impact of the epidemic on enterprises in different industries, property rights and regional epidemic prevention policies, and the difference provides a reference for the government to develop emergency policies to support the development of public health events in enterprises.

The structure of this article is as follows: the second part is a literature review, reviewing the literature and theoretical hypotheses related to this study; the third part is research method design, mainly including data sources, variable setting, and empirical model construction; the fourth part For the analysis of empirical results and the test of the robustness of the model; the last part summarizes the full text and gives conclusions.

## 2. Related work

### 2.1 The impact of public health events on the macro economy

Research on the impact of public health events on economic development has been carried out since the 20th century. Some scholars have studied the short-term and long-term effects of public health events on the economy. It is generally believed that the negative impact of sudden public health events on regional and even global economic growth is short-term[4]. Whether COVID-19 will affect the long-term growth of the regional economy is controversial[5]. Due to the different epidemiological characteristics, outbreak time, and prevention measures of the virus, the impact of previous major public health incidents on the overall economy and industries is different, and service industries such as tourism, transportation, and catering are usually the first to bear the brunt.

In view of the economic losses caused by the current COVID-19, many scholars have made a good analysis and elaboration. From a macro perspective, COVID-19 will have a serious impact on the economy in the short term[6], which will increase the systemic risk of the economy directly or through the uncertainty of economic policies[7]. In response to the COVID-19 situation, countries have taken "shock-like" COVID-19 prevention measures such as isolation, blockade, and closure, which has led to a sharp decline in the production capacity of enterprises and a certain degree of interference to the upstream and downstream industries in the supply chain. In addition, COVID-19 has reduced people's consumption demand and willingness to travel, consumption activities have shrunk dramatically, and there is a risk that the circular chain of consumption, production, industry, and capital will be separated in the economy, and the business activities of enterprises have dropped significantly[8]. Due to the strong dependence of the economic system on basic elements such as transportation and labor, the industry and service industries are greatly affected[9]. Whether the epidemic will have a long-term impact on the economy depends not only on the duration of COVID-19, but also on the degree of production capacity damage[10].

### 2.2 The impact of the COVID-19 on business performance.

As a sudden public health event, the epidemic situation of COVID-19 will have a great negative impact on the operation of micro-enterprises in a short time[11-12], which is directly related to the

severity of the COVID-19 situation where the enterprises are located. At the initial stage of COVID-19, due to the government's restrictions on the conditions for the resumption of work and production, the lack of necessary materials for COVID-19 prevention, the closure of community roads, and the requirement of isolation time, the rate of enterprises' resumption of work was low, and the phenomenon of business interruption due to the COVID-19 was more serious[13]. In addition, due to the sharp drop in market demand and poor sales channels, most enterprises are faced with problems such as rising factor costs, large turnover of personnel, an unstable mentality of employees[14], and there is a situation in which their income falls or they cannot make ends meet. There is great pressure on operating income, working capital, and cost payment[15], and cash flow management has suffered a great blow[16]. With the implementation of the COVID-19 prevention policy, the new cases in the local area were cleared, enterprises resumed their work in an all-round way, the negative impact of COVID-19 began to weaken, the economic operation gradually returned to the right track, the main economic indicators showed a recovery trend, the vitality of the labor market recovered steadily, the employment trend as a whole improved, and the business operations of enterprises returned to the right track.

The performance of enterprises is also limited by the upstream and downstream industries. The sudden COVID-19 has challenged and destroyed the global industrial chain and supply chain, resulting in serious delay in delivery of goods and shrinking sales, and may even lead to a large-scale interruption of the supply chain. At the same time, the macro-environment has suppressed the market demand, leading to the global demand for bulk commodities in a downturn and international trade in a trough. The shrinking demand side of the global industrial chain will react on the supply side, further aggravating the risk of global industrial chain breakage. The shortage of supply chain leads many enterprises that rely on transnational supply chain to be forced to restructure their industrial chain and seek dual-cycle development, but in the short term, they still have to bear the pain of industrial chain tension.

The above research has done a lot of useful exploration on the economic impact of large-scale public health events, but it mainly stays at the theoretical analysis level, and few kinds of literature empirically analyze the impact of public health emergencies on enterprise performance from the micro perspective. Therefore, this paper will take COVID-19 as the background to explore its impact mechanism on the operating performance of listed companies, in order to provide empirical evidence from the micro level for the governance of major public health emergencies.

## 3. Method design

### 3.1 Sample selection and data sources

This paper takes the listed companies covered by CSI 500 and S&P 500 index from 2018 to 2020 as the research object and investigates the impact of the COVID-19 epidemic on the operating performance of listed companies. The reason why these two types of listed companies are chosen as the research samples is that as the representatives of Chinese and American markets, they can better reflect the operating performance of listed companies.

To improve the accuracy of the sample data, this paper selected 902 samples of listed companies according to the following criteria: (1) Excluding financial enterprises; (2) Eliminating ST and *ST enterprises; (3) Rejecting samples with missing key variables; In addition, to control the interference of extreme outliers on the research, 1% ~ 99% Winsorize is applied to continuous variables.

### 3.2 Definition of variables

### 3.2.1 Business performance

Select the enterprise's total net profit rate (ROA) and return on net assets (ROE) as indicators to measure the business performance.

### 3.2.2 Profitability and operational capability

The operating performance of an enterprise is divided into profitability (measured by the net interest rate of sales, OPM) and operational capability (measured by the total asset turnover rate, ATO), so as to measure the action path of the epidemic on operating performance.

### 3.2.3 Epidemic indicators

It is difficult to directly observe the impact of the epidemic on enterprises, and the impact of the epidemic on individual enterprises is different. Therefore, when measuring the impact of COVID-19, it is indirectly measured by whether COVID-19 (Post) occurred in the area where the enterprise was located in that year.

### 3.2.4 Control variables

In order to ensure the scientific selection of variables, the selected control variables include asset size (Size), asset-liability ratio (Leverage), price-to-book ratio (P/B), the shareholding ratio of the largest shareholder (First), current asset ratio (Liquid), establishment time (Age) and whether it has been audited by the Big Four (Audited). In addition, this paper controls both industry and regional virtual variables.

The specific definitions and calculation formulas of related variables involved in this study are shown in Table 1:

*Table 1: Definition and Description of Variables.*

| Variable Name | Variable Symbol | Variable Description |
|---|---|---|
| Total net rate | *ROA* | Net profit/Total assets |
| Retum on net assets | *ROE* | Net profit/Owner's equity |
| Profitability | *OPM* | Net profit/Sales revenue, including the profitability of the enterprise |
| Operational capability | *ATO* | Sales revenue/Total assets, indicating the operational capacity of the enterprise |
| Whether COVID-19 occurr | *Post* | The value is 1 in 2020 and 0 in 2018-2019 |
| Asset-liability ratio | *P/B* | Share price/Net asset value per share |
| Establishment time | *Age* | Year of establishmnet in logarithm |
| Shareholding ratio of the largest shareholder | *First* | Shareholding ratio of the largest shareholder *100%, which is used to measure the controlling ability of the largest shareholder on the company. The lager the value, the stronger the controlling ability of the company |
| Current asset tatio | *Liquid* | Current assetes/Total assets |
| Whether it has been audited by the Big Four | *Audit* | Companies audited by Pricewaterhouse Coopers,Deloitte,KPMG,Ernst & Young are 1,otherwise is 0 |
| Industry fixed efficiency | *Industry* | Industry dummy variable are set according to the wind industry classification standard,and are divided according to the first-level industry.A total of 10 industry dummy variables are set |
| Province fixed efficiency | *Province* | According to the dicision of provincial administrative region or state level,China set 30dummy variables,the United States set 41 dummy variables |

### 3.3 Construction of empirical model

### 3.3.1 Model construction of the impact of epidemic situation on business performance.

In order to verify whether COVID-19 has an impact on the profitability of enterprises, the following regression model is first constructed:

$$Y_{i,t} = \beta_0 + \beta_1 \times Post_{i,t} + \beta_2 \times Control_{i,t} + \varepsilon_{i,t} \tag{1}$$

Where: y is the explained variable, including the return on total assets representing the business performance of the enterprise and the return on net assets; Post is an event dummy variable whether the enterprise is affected by the epidemic situation; Control is a series of control variables indicating the characteristics of the company level; $\varepsilon$ is the residual term; I and t represent enterprise and year respectively; $\beta_0$ is a constant term, $\beta_1$ and $\beta_2$ are the coefficients of the corresponding term. If the regression coefficient $\beta_1$ of Post is significantly negative, it shows that the sudden COVID-19 epidemic

has significantly reduced the business performance of enterprises.

### 3.3.2 Model construction of the impact path of epidemic situation on enterprise performance.

Because of the comprehensiveness and complexity of the enterprise's operating performance indicators, it is difficult for a single financial indicator to make a comprehensive evaluation of the enterprise's operating performance. Referring to DuPont analysis, the operating performance of an enterprise is decomposed into the product of multiple financial ratios step by step, and the financial situation and operating performance of the enterprise are comprehensively analyzed. The formula is as follows:

$$ROA = \frac{net\ profit}{total\ assets} = \frac{net\ profit}{sales\ revenue} \times \frac{sales\ revenue}{total\ assets} = NPM \times TAT \tag{2}$$

In this paper, the operating performance of enterprises is divided into two parts: profitability (measured by the net profit rate of sales) and operating ability (measured by the total asset turnover rate). In order to comprehensively and accurately evaluate and analyze the impact of the epidemic situation on the business performance of enterprises, the following model is constructed by selecting two dimensions of enterprise profitability and operational ability:

$$OPM_{i,t} = \beta_0 + \beta_1 \times Post_{i,t} + \beta_2 \times Control_{i,t} + \varepsilon_{i,t} \tag{3}$$

$$ATO_{i,t} = \beta_0 + \beta_1 \times Post_{i,t} + \beta_2 \times Control_{i,t} + \varepsilon_{i,t} \tag{4}$$

## 4. Empirical analysis

### 4.1 Descriptive statistical analysis

*Table 2: Descriptive statistics.*

| Variable | S&P 500 | | | | |
|---|---|---|---|---|---|
| | Sample size | Maximum | Minimum | Average | Sigma |
| ROA | 1273 | 48.453% | -37.001% | 7.185% | 7.137% |
| ROE | 1277 | 31560% | -6120% | 17.410% | 49.650% |
| OPM | 1278 | 173.240% | -313.500% | 11.530% | 13.010% |
| ATO | 1272 | 4.670% | 0.070% | 0.728% | 0.539% |
| Post | 1317 | 1 | 0 | 0.333 | 0.472 |
| Size | 1303 | 17.830 | 10.430 | 14.440 | 1.167 |
| Leverage | 1302 | 435.02% | 11.020% | 64.220% | 27.370% |
| Liquid | 1221 | 88.700% | 1.870% | 32.730% | 19.290% |
| First | 1307 | 63.040% | 5.580% | 12.040% | 6.310% |
| P/B | 1305 | 88.700% | 1.868% | 32.732% | 19.292% |
| Age | 1317 | 7.610 | 7.590 | 7.587 | 0.018 |
| Audit | 1317 | 1 | 0 | 0.989 | 0.106 |
| Industry | 1317 | 10 | 1 | 4.795 | 2.526 |
| Province | 1317 | 41 | 1 | 6.403 | 9.295 |
| Variable | CSI 500 | | | | |
| | Sample size | Maximum | Minimum | Average | Sigma |
| ROA | 1381 | 67.543% | -44.393% | 5.746% | 5.490% |
| ROE | 1381 | 107.469% | -150.353% | 10.240% | 8.799% |
| OPM | 1382 | 222.360% | -195.282% | 10.440% | 10.940% |
| ATO | 1382 | 5.962% | 0.009% | 0.631% | 0.414% |
| Post | 1410 | 1 | 0 | 0.333 | 0.472 |
| Size | 1409 | 17.472 | 9.280 | 14.30 | 1.071 |
| Leverage | 1410 | 94.841% | 4.201% | 45.86% | 19.030% |
| Liquid | 1410 | 97.681% | 8.229% | 53.39% | 21.020% |
| First | 1403 | 97.780% | 6.870% | 38.050% | 16.170% |
| P/B | 1378 | 47.953% | -94.603% | 2.997% | 4.380% |
| Age | 1410 | 7.067 | 7.590 | 7.600 | 0.003 |
| Audit | 1407 | 1 | 0 | 0.117 | 0.322 |
| Industry | 1410 | 10 | 1 | 3.968 | 2.589 |
| Province | 1410 | 30 | 1 | 9.526 | 8.479 |

Table 2 is the descriptive statistics of the main variables in the samples of China and the United States. According to the results in Table 2, the average ROA and ROE of CSI 500 companies are 5.746%

and 10.240%, while the average ROA and ROE of S&P 500 companies in the United States are 7.185% and 17.410%, respectively, indicating that there is a big gap between the operating performance of China enterprises and that of the United States. In addition, the average shareholding ratio of the largest shareholder of CSI 500 enterprises is 38.050%, which is more than three times that of S&P 500 enterprises in the United States, which shows that China has a higher concentration of equity and the largest shareholder has greater control.

Table 3 gives the statistical results of grouping description of the main variables before and after the epidemic. The data shows that after the outbreak, the average ROA of Chinese and American enterprises decreased by 1 ~ 2 percentage points, ROE decreased even more, and OPM and ATO also showed different degrees of decline. It can be seen that the outbreak of the epidemic has a certain negative impact on the business performance of enterprises in both countries.

*Table 3: Descriptive statistics of main variables before and after the outbreak (%).*

| Variable | CSI 500 | | | | S&P 500 | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | Before | | After | | Before | | After | |
| | Average | Sigma | Average | Sigma | Average | Sigma | Average | Sigma |
| ROA | 6.023 | 5.536 | 5.187 | 5.359 | 7.937 | 6.723 | 5.608 | 7.670 |
| ROE | 10.714 | 8.799 | 9.270 | 8.730 | 20.014 | 46.533 | 12.031 | 55.222 |
| OPM | 10.887 | 10.255 | 9.554 | 12.172 | 12.642 | 11.432 | 9.178 | 15.529 |
| ATO | 0.644 | 0.418 | 0.605 | 0.405 | 0.760 | 0.551 | 0.662 | 0.508 |

### 4.2 Multiple regression analysis

### 4.2.1 The impact of the epidemic on business performance

Table 4 examines whether the sudden outbreak of the new crown pneumonia epidemic has significantly reduced the business performance of enterprises. It can be seen from Table 4 that the coefficient of the outbreak (Post) is significantly negative at the 1% level, indicating that no matter what the epidemic prevention policy is in the short term, the occurrence of the epidemic will have a significant negative impact on the business performance of the company. This is because, on the one hand, the epidemic has weakened the production capacity of enterprises and has had a certain impact on the production and supply of enterprises. On the other hand, the epidemic has reduced residents' willingness to consume, and demand has declined slide.

*Table 4: Regression results of the impact of the epidemic on business performance.*

| Variable Name | CSI 500 | | S&P 500 | |
| --- | --- | --- | --- | --- |
| | (1)ROA | (2)ROE | (3)ROA | (4)ROE |
| | -0.798*** | -2.285*** | -2.181*** | -7.559** |
| Post | (-3.21) | (-5.13) | (-5.66) | (-2.42) |
| Size | -0.990*** | 0.435 | -1.336*** | -2.501* |
| | (-5.04) | 1.14 | (-7.57) | (-1.74) |
| | -0.092*** | -0.047*** | -0.013 | -0.223*** |
| Leverage | (-9.93) | (-2.81) | (-1.49) | (-3.87) |
| First | 0.044*** | 0.075*** | -0.094*** | -0.488** |
| | 5.46 | 5.30 | (-3.12) | (-1.98) |
| | 0.210*** | 1.096*** | -0.001* | 0.013** |
| P/B | 6.27 | 12.27 | (-1.69) | 2.04 |
| Age | 78.895* | 79.973 | -12.187 | -39.134 |
| | 1.68 | 0.96 | (-1.04) | (-0.41) |
| | 0.203 | -0.041 | -0.145 | -4.614 |
| Audit | 0.52 | (-0.06) | (-0.08) | (-0.31) |
| Liquid | 0.024*** | 0.018 | 0.096*** | 0.106 |
| | 3.49 | 1.51 | 7.96 | 1.09 |
| Province | Controls | Controls | Controls | Controls |
| Industry | Controls | Controls | Controls | Controls |
| | -580.695 | -611.58 | 118.858 | 381.295 |
| Constant | (-1.63) | (-0.97) | 1.34 | 0.53 |
| Sample Size | 1.347 | 1.347 | 1.186 | 1.184 |
| R² | 0.407 | 0.293 | 0.320 | 0.090 |

*Note: ***, **, * in the table mean significant at the significance level of 1%, 5% and 10%, respectively, and the corresponding t values are in the brackets, which are the same for the following tables.*

### 4.2.2 Analysis of the effectiveness of epidemic prevention policies

The effect of the epidemic prevention policy has a time lag, and it may not significantly promote the improvement of the epidemic in a short period. As time goes on, the policy effect will gradually become more prominent, and the business performance of enterprises will gradually improve. Therefore, this article analyzes whether the epidemic prevention policy has played a positive role by comparing the impact of the epidemic on the company's operating performance in the first half of 2020 and the whole year. In order to ensure the comparability of the data, the ROA and ROE of the enterprise are annualized. Table 5 shows the empirical results of the impact of the epidemic on the operating performance of enterprises in the two countries in the first half of the year. It can be seen from Table 5 that the coefficients of Post are all significantly negative, which also proves the impact of the epidemic on the economy.

By comparing the regression results in Table 4 and Table 5, it can be found that in China, the Post coefficient value of the annual business performance regression has dropped significantly compared with the first half of the year, which shows that with the improvement of the domestic epidemic situation, the company's operating performance is gradually affected by the epidemic weaken. Although the domestic active epidemic prevention measures have imposed strict restrictions on the time and conditions for enterprises to resume work and production, and have had a certain impact on business performance in a short time, such stringent epidemic prevention measures have effectively blocked the transmission of the virus and suppressed the spread of the virus further spread of the epidemic. After the epidemic was brought under control, with the economic operation on the right track, enterprises began to resume work and production in an all-around way, residents' demand also began to recover, the business environment of enterprises was facing improvement, and their business performance gradually improved.

In contrast, the Post coefficient value of the S&P 500's annual operating performance regression has not changed significantly compared to the first half of the year, and has remained at a high level, indicating that after the implementation of the epidemic prevention policy in 2020, the operating performance of US companies has not ushered in a turn for the better. The anti-epidemic policy adopted by the U.S. government does not control the gathering and movement of people. Although this move will not directly affect the production and operation of enterprises, it will undoubtedly aggravate the spread of the virus. The high rate of confirmed diagnoses has tested the purchasing power and employment rate of residents, impacting the supply and demand of enterprises, thereby affecting their business performance.

*Table 5: Regression results of the impact of the epidemic on business performance in the first half of 2020.*

| Variable | CSI 500 | | S&P 500 | |
|---|---|---|---|---|
| | (1)ROA | (2)ROE | (3)ROA | (4)ROE |
| Post | -10447*** | -2.638*** | -2.803*** | -9.605*** |
| | (-6.19) | (-6.11) | (-6.11) | (-2.21) |
| Controls | Controls | Controls | Controls | Controls |
| Industry&Province | Controls | Controls | Controls | Controls |
| Constant | -1284.8*** | -1.816.76*** | -79.544 | 341.598 |
| | (-3.82) | (-3.04) | (-0.73) | 0.62 |
| Sample size | 1312 | 1308 | 1040 | 1042 |
| R2 | 0.472 | 0.308 | 0.232 | 0.061 |

### 4.2.3 Industry Heterogeneity Analysis

Due to the different operating characteristics of various industries, the degree to which various industries are affected by the epidemic is also different. In order to analyze the industry heterogeneity characteristics of enterprises affected by the epidemic, this paper divides the samples according to industry classification standards.

Firstly, regression analysis is carried out between whether the epidemic occurs and the mid-term operating performance indicators of the enterprise. The study found that in China, most of the Post coefficient values were significantly negative. Even if a few industries (such as energy and daily consumption industries) failed the 10% significance test, the t values were all relatively large, which shows that the impact of the epidemic on all walks of life in China in a relatively short period is universal. For the U.S., only industrial, energy, and consumer discretionary industries are affected significantly, while other industries are not affected strongly. This can be attributed to the difference in

the epidemic prevention policies of the two countries: the domestic epidemic prevention policy has affected various industries to a greater or lesser extent; the United States has not intervened in the production situation, and due to the low population density, the necessities consumer industries are not affected much.

Then, regression analysis was carried out between the occurrence of the epidemic and the business performance indicators at the end of the period. Table 6 lists the impact of the epidemic on the ROA of some industries. The study found that in 2020, with the improvement of the domestic epidemic situation, the business performance of enterprises will be significantly improved, and the negative impact of the epidemic on the ROA of most industries is no longer significant, only industry, materials, optional consumption, etc. are restricted by the characteristics of the industry, and still bear the strong negative impact of the epidemic. In the United States, the impact of the epidemic on business performance varies significantly among industries, and the decline in the industrial, energy and optional consumer industries has not changed.

*Table 6: Analysis of industry differences in the impact of the epidemic on business performance.*

| Industry | Post | t Value | Other Variables | F Vaule | Sample Size |
|---|---|---|---|---|---|
| **Industry** | | | | | |
| **ROA(China)** | -1.172*** | -3.01 | Controls | 13.67 | 302 |
| **ROA(U.S.A)** | -2.546*** | -3.62 | Controls | 9.38 | 203 |
| **Material** | | | | | |
| **ROA(China)** | -1.779*** | -3.15 | Controls | 5.77 | 276 |
| **ROA(U.S.A)** | -1.057 | -1.3 | Controls | 3.22 | 85 |
| **Energy** | | | | | |
| **ROA(China)** | -0.544 | -1.10 | Controls | 7.92 | 38 |
| **ROA(U.S.A)** | -6.946*** | -4.45 | Controls | 7.05 | 62 |
| **Optional Consumption** | | | | | |
| **ROA(China)** | -1.582** | -2.35 | Controls | 8.45 | 163 |
| **ROA(U.S.A)** | -4.758*** | -4.67 | Controls | 5 | 218 |

From the perspective of the industry, it can be seen that both the industrial and optional consumer industries have been hit hard by the epidemic, and the recovery effect is not satisfactory. Industrial industries have a high population density and a lack of online office conditions. As a result, the on-the-job rate and task completion rates of workers have dropped sharply, the industrial production chain has been destroyed, and production stagnation has led to a cliff-like decline in profitability. The epidemic has led to a sharp decline in residents' willingness to consume and a rapid rise in the consumer price index (CPI). As a result, residents' demand for non-essential consumer goods has shrunk sharply, which in turn has triggered a decline in the operating performance of optional consumer companies. With the improvement of the domestic epidemic prevention situation, residents' income levels and income expectations have rebounded, resulting in a less negative impact on China's optional consumer industry.

It is worth noting that during the epidemic, the energy and materials industries of China and the United States performed very differently. The U.S. shale oil industry was affected by the epidemic, and its operating performance declined. China's shale oil production industry is underdeveloped, so it has not been strongly impacted. As for the materials industry, Chinese companies are limited by the impact of the industrial chain, and it is not optimistic to resume production, and their operating performance is relatively unsatisfactory, while the impact in the United States is relatively small.

### 4.3 Action path inspection

### 4.3.1 The impact of the COVID-19 on corporate profitability

Affected by COVID-19, the operating costs of enterprises have increased and their profitability has shrunk. Although the resumption rate of enterprises is low, they still need to bear the necessary production and operation expenses, such as employees' social security, provident fund, water, electricity, gas, and other expenses, raising the operating costs of the business. In the case of damaged operating income, these expenses have aggravated the production and operation burden of enterprises, leading to an increase in the comprehensive cost rate, which in turn led to a decline in the profitability of enterprises.

The empirical results in columns (1) and (3) in Table 7 test the impact of COVID-19 on corporate profitability, and the Post coefficient is significantly negative, indicating that the outbreak of COVID-19 has had a certain impact on corporate profitability.

*Table 7: Path test of the impact of the COVID-19 on business performance.*

| Variable Name | CSI Smallcap 500 index | | S&P 500 index | |
|---|---|---|---|---|
| | (1)OPM | (2)ATO | (3)OPM | (4)ATO |
| Post | -1.666*** | -0.042* | -3.361*** | -0.106*** |
| | (-3.23) | (-1.76) | (-4.81) | (-4.03) |
| Controls | Controls | Controls | Controls | Controls |
| Industry&Province | Controls | Controls | Controls | Controls |
| Constant Term | -1000.664 | -38.578 | 41.721 | 5.447 |
| | (-1.35) | (-1.13) | (0.26) | (0.89) |
| Sample Size | 1 348 | 1 347 | 1 189 | 1 195 |
| R² | 0.374 | 0.088 | 0.225 | 0.411 |

### 4.3.2 The impact of the COVID-19 on the operating capacity of enterprises

The outbreak of COVID-19 has reduced the asset utilization efficiency of enterprises, resulting in a decline in their operating capabilities. Restricted by the conditions for the resumption of work and production stipulated by the government, the resumption rate of enterprises themselves is relatively low, the upstream and downstream industries of the supply chain have been disrupted to a certain extent, and the normal production and operation efficiency has slowed down. At the same time, COVID-19 has led to shrinking consumer activities, serious order cancellations, poor sales of products produced by enterprises, a sharp drop in sales revenue due to inventory backlogs, a slowdown in the return of assets, and poor circulation of corporate funds, which in turn exacerbated the decline in asset turnover. From the empirical results in columns (2) and (4) in Table 7, it can be seen that the coefficient value of Post is significantly negative, which indicates that the outbreak of COVID-19 has reduced the operating capacity of enterprises.

### 4.4 Robustness test

### 4.4.1 Replace the measure of the key variable.

In addition to the above the ROA and ROE variables are outside, of EA(Ebit/total assets) regression as an indicator of business performance. Table 8 shows the results, the coefficient value of the post is negative. It shows that the occurrence of COVID-19 does reduce the business performance of enterprises.

### 4.4.2 Fixed effect model.

To eliminate the influence of unobservable factors on the research conclusion, the fixed effect model was used to verify the impact of COVID-19 on business performance.

*Table 8: Shows the robustness test of COVID-19 on business performance.*

| Variable name | Substitution variable | | Fixed effect eodel | | Enterprises from Hubei Province shall be excluded |
|---|---|---|---|---|---|
| | (1)EA(CHN) | (2)EA(USA) | (3)ROA(CHN) | (4)ROA(USA) | (5)ROA(CHN) |
| Post | -1.010*** | -1.599*** | -1.087*** | -1.731*** | -0.785*** |
| | (-3.76) | (-4.38) | (-5.44) | (-5.66) | (-3.13) |
| Controls | command | command | command | command | command |
| Constant term | -702.169* | 68.662 | -34.994*** | 5.447 | -409.546 |
| | (-1.83) | (0.81) | (-3.73) | (0.89) | (-1.12) |
| Sample size | 1328 | 1179 | 1347 | 1186 | 1298 |
| R² | 0.356 | 0.303 | 0.0090 | 0.195 | 0.415 |

Therefore, this study attempts to construct differential pour Score matching (PSM-DID) model that was used to investigate the impact of COVID-19 prevention policy on business performance. Specifically, the Chinese companies were used as the experimental group, and the American companies as the control group. Firstly, the propensity-matching score method was used to match the samples.

After that, the paired samples are used for differential and differential analysis tests, set the dummy variable (Treat) of your experimental group, take 1 for Chinese samples, and take 0 for vice versa; finally, construct the intersection PostTreat was used to evaluate the impact of epidemic prevention policies.

This paper empirically examines the impact of the Covid-19 outbreak on the business performance of listed companies and their path of action, using listed companies covered by the CSI 500 Index and the S&P 500 Index from 2018 to 2020 as a research sample, and then analyses the effectiveness of epidemic prevention policies, the heterogeneity of industries and the nature of companies, to provide empirical evidence from the micro level for the governance of public health events Evidence.

The study found that: (1) the epidemic had a significant negative impact on business performance by reducing firms' asset efficiency and profitability; (2) China's efficient epidemic prevention policies contributed to the improvement of business performance; (3) from a sectoral perspective, the negative impact on Chinese firms was widespread at the beginning of the epidemic, but as the situation improved, most sectors gradually emerged from the shadow of the epidemic, with only (4) The extent to which enterprises were affected by the epidemic was also closely related to the degree of epidemic control in their regions and the nature of their property rights. As an important part of economic life, no industry is immune to the epidemic and is inevitably affected by the macro environment. Therefore, this study extends the analysis of factors influencing business performance to the field of public health and safety, which is of some reference significance to corporate governance teams and government policymakers.

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