

Corporate Financial Measures and Covid-19 Pandemic with Evidence from the Growth Enterprise Market of China's Shenzhen Stock Exchange

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Abstract. The Covid-19 pandemic has caused huge losses of lives. Social distancing policies were enacted in an effort to contain the virus. However, they constrained commercial activities, leading to recessions worldwide. Nevertheless, this situation provides an opportunity to investigate how companies' financial measures of liquidity, solvability, activity, and profitability reacted to external risks similar to the pandemic. This paper approaches this issue by collecting data from companies listed on China's Growth Enterprise Market of Shenzhen Stock Exchange. Due to the limited numbers of companies from several industries, only six industries that contain more than 30 companies listed were selected. Several ratios for liquidity, solvability, activity, and profitability were calculated with reported financial data and mapped throughout the studied period. Changes were recorded to determine the sensitivity of these measures. How price changes responded to the increases in the number of covid cases was studied as well. The first finding is that liquidity and solvability ratios were not sensitive to the pandemic for the studied companies. On the contrary, activity and profitability were negatively influenced severely. In addition, prices had a negative relationship with increases in covid cases in general, but the regression result was not statistically significant due to the lack of representations.

Keywords: Covid-19; Financial Performance; Second-board Market; China.

1. Introduction

As the public health emergency worsened by the novel coronavirus at the beginning of 2020, the world economy has suffered from not only the losses caused by the pandemic but also the quarantine measures executed by governments or authorities around the World. Brar, Dosanjh, and Saran stated that the World's major economic growth depends on commerce. The social-distancing policies, however, limited commercial activities [1]. Aiming to mitigate the economic losses, businesses, as well as almost every aspect of society, applied online work to keep the economy moving. However, researchers have identified that jobs that can be performed at home are limited. For example, Dingel and Neiman found that only 37% of jobs in the United States can be performed entirely at home [2]. As a result, online work could not substitute conventional in-person activities, so economic growth was still confined.

Under this recessionary situation, World's authorities reacted by proposing new policies to mitigate the undesirable economic outcomes. One of the most popular toolkits is supporting smaller companies that might be more sensitive to the external environment. IMF's Covid-19 policy tracker has shown that governments focused on helping businesses with tight cash flows through grants, public-guaranteed loans, tax reliefs, and lower interest rates (IMF Blog) [3]. These measures target increasing companies' liquidity and solvency but whether the outcomes can be reflected in commercial activities remains suspected. Besides, these quantitative easing (QE) techniques, especially those executed by the developed economies, have long been condemned for international spillovers that caused inflations in the developing World (Chen et al.) [4]. Some researchers (Shkodina et al.) even declared that QE techniques during the pandemic could enlarge disparities, induce hyperinflation, and even lead to systematic collapse [5]. As a result, it is crucial to investigate how companies' financial measures were affected by the pandemic so that macroeconomic policymakers could develop less controversial yet more effective tools to alleviate the recession.

Corporate managers can also be benefited by developing strategies accordingly to prevent losses from Covid-alike risks that might happen in the future.

In addition, it is essential to analyze how performances differed across industries. If industrial differences are significant, policies might be adjusted to accommodate their unique problems. Similarly, investors can identify which industry to invest in if they have special concerns regarding future risks.

There are profound precedents in researching financial ratios that enlightened this research. For instance, Fajriyanti and Wiyarni studied companies' financial performance during the pandemic with liquidity, solvency, profitability, and activity ratios [6]. Their objects were some particular industries' companies traded on the Indonesia Stock Exchange. Financial measures including quick ratios, debt-to-equity, total assets turnover, and gross profit margins were utilized to determine companies that performed well.

Sari and Yasa studied how financial ratios influenced stock prices of the building construction subsector during the pandemic with empirical evidence from the Indonesia Stock Exchange [7]. The multiple regression analysis of this research found that liquidity, profitability, and solvency ratios had no effects, while the activity ratios had positive relationships with stock prices.

Musa et al.'s research approaches from an interesting perspective, in which whether good corporate governance is capable of mitigating the losses due to Covid-19 is discussed with empirical evidence from Bratislava Stock Exchange [8]. They found that better corporate governance helps to reduce indebtedness during the pandemic, which is shown by the negative association between governance compliance and short-term measures for solvability.

Clark, Mauck, and Pruitt tried to investigate the economic effect of Covid-19 on the hospitality industry, which is considered severely hurt due to the massive social-distancing protocol, with the application of financial ratios [9]. Finding that some companies have stronger balance sheets and income statements, which are categorized by low leverage ratios and high price-to-earnings ratios, this research figured out that hotels performed better than restaurants, while casinos had the worst financial performance,

How the stock market reacted to Covid-19 is also critical. For example, Mazur, Dang, and Vega studied the stock market crash in March 2020 [10]. They found that despite the market plummeting by 26% in four days, healthcare, food, natural gas, and software sectors performed well. Their result provides precious support to the hypothesis developed for this paper.

These outstanding works provide invaluable insight for this research. Financial measures will be chosen accordingly for the following empirical analysis. Also, Industrial disparities will be an exceptionally essential component as several past studies have pointed out some significant differences.

2. Method

2.1 Data Collection

This research is a case study whose objects are public companies trading on the Growth Enterprise Market of the Shenzhen Stock Exchange. Companies included are majorly from technology industries such as Industrials, Information Technology, and Materials, segmented according to the Global Industry Classification Standard (GICS). Scholars have pointed out that smaller businesses are deemed to suffer more from external events such as the pandemic due to their lack of cash and risk-counteracting strategies (Kalogiannidis) [11]. The Growth Enterprise Market companies are used because they are relatively small compared to their counterparts listed on the Main Board Markets. Hence, looking at how these companies responded to the pandemic can be meaningful for the sake of providing recommendations for both smaller company owners and investors interested in these companies.

Stocks listed on the Growth Enterprise Market by the data collection date are extracted from the Choice platform developed and operated by the East Money Information Co., along with their

financial statement information. This research divided all the financial measures into four groups, categorized as the indicators for liquidity, solvability, activity, and profitability of companies, according to Fajriyanti and Wiyarni's previous research [6]. Measures studied are chosen from each of these categories accordingly. The exact financial Measures examined can be seen in Table 1 below.

Table 1. Financial Measures

Category	Ratio
Liquidity	Quick Ratio Current Ratio
Solvability	Debt-to-Equity Ratio
Activity	Fixed Asset Turnover Total-Asset Turnover
Profitability	Return on Equity

In addition to financial data, information related to the number of China's Covid-19 cases was obtained from the official website of World Health Organization.

2.2 Data Cleaning

The raw data received from Choice includes the stock tickers, company names, industries, and financial statement information to calculate the above financial measures by quarters which range from the year 2019 Q4 to the last quarter of the year 2021. The initial dataset has listed 1,161 companies trading on the Growth Enterprise Market. Nevertheless, some companies were not been publicly traded since the beginning analysis cycle, so they were dropped for further research. As a result, only 742 companies are included in this study. Besides, some industries only have a limited number of companies listed among this dataset of 742 companies. Therefore, only those industries with more than 30 companies are included in the industrial-level analysis, which will be discussed later.

2.3 Data Analysis

The tool used for data analytics in this research is the R language, with certain auxiliary jobs done with Microsoft Excel. The data analysis part of this research is divided into the following three parts.

The first part is the comparison between the industrial-level financial measures against the increase in the number of Covid-19 cases. Stocks were grouped by their industries, and the quarterly medians of each measurement within each industry were taken as the industrial-level performance. The ratios are the dependent variable in this case and can be mapped against the time progression, which can be viewed as the independent variable, to scrutinize the track as the pandemic progresses. Although the time measurement of this data was collected on a quarterly basis, it is treated in a continuous way to simulate the nature of time. The resulting line patterns are used to evaluate the sensitivity of the measures to the pandemic and determine industrial differences.

Secondly, the overall price changes of the stocks are evaluated against the increase in Covid cases. The average changes in price during each quarter were taken to trace the effect of the pandemic on the stock price. This part of the analysis starts by obtaining the median of each season's price changes within each industry to be applied as the dependent variable. Each quarter's increase in covid cases was divided by 10,000 to determine the covid panic index so that it can be mapped on the same figure with the price changes and be the independent variable of this case. A loess curve is then fitted into this model to determine the relationship.

In addition, individual stocks' performances are measured to determine risk-resistant stocks. Because variance and standard deviation are often utilized as measures for volatility in many former analytical researches (Zhang, Hu, & Ji), each industry's standard deviation of each ratio throughout time was taken in order to find the stocks that performed better than the rest of their counterparts [12]. Individual companies' standard deviation of each ratio over time was computed and compared against

their corresponding industrial level. A company with a lower standard deviation than the industry's median is categorized as risk-resistant.

The following hypothesis are proposed and they shall be tested by the results of the analysis:

Hypothesis 1: Liquidity, solvability, activity, and profitability ratios are all affected negatively due to the pandemic lockdown.

Hypothesis 2: Most of the industries would have worsening performance in the sense of all four dimensions of financial performance. However, Health Care and Communication Service industries might be the exceptions because the demand for their products or services during the pandemic increases. Also, previous researches identified that the health care industry's stocks performed well even during the 2020 March stock crash [10].

3. Results and Discussion

The primary goal of this research is analyzing the influence of the Covid-19 pandemic on some key financial measurements. Because some of the industries in our data set are underrepresented, only six industries that have more than 30 companies are included in this research, which includes: Materials, Industrials, Consumer Discretionary, Health Care, and Information Technology (Industry segmentation according to GICS). Selected ratios are mapped against time progression and compared with the overall track of increasing covid-19 cases which is shown by Figure 1. There are two sharp increases in cases: 1). From December 31, 2019 to March 31, 2020 and 2). From March 31st, 2021 to June 30th, 2021. In this case, the above time ranges will be emphasized in the following discussion. Also, how the price change of stocks is affected by the pandemic will be discussed with regression analysis to evaluate the possible quadratic relationship between stock price variation and the increase in covid cases. Finally, companies that performed better in the sense of less volatile to external influences will be presented as references to investors.

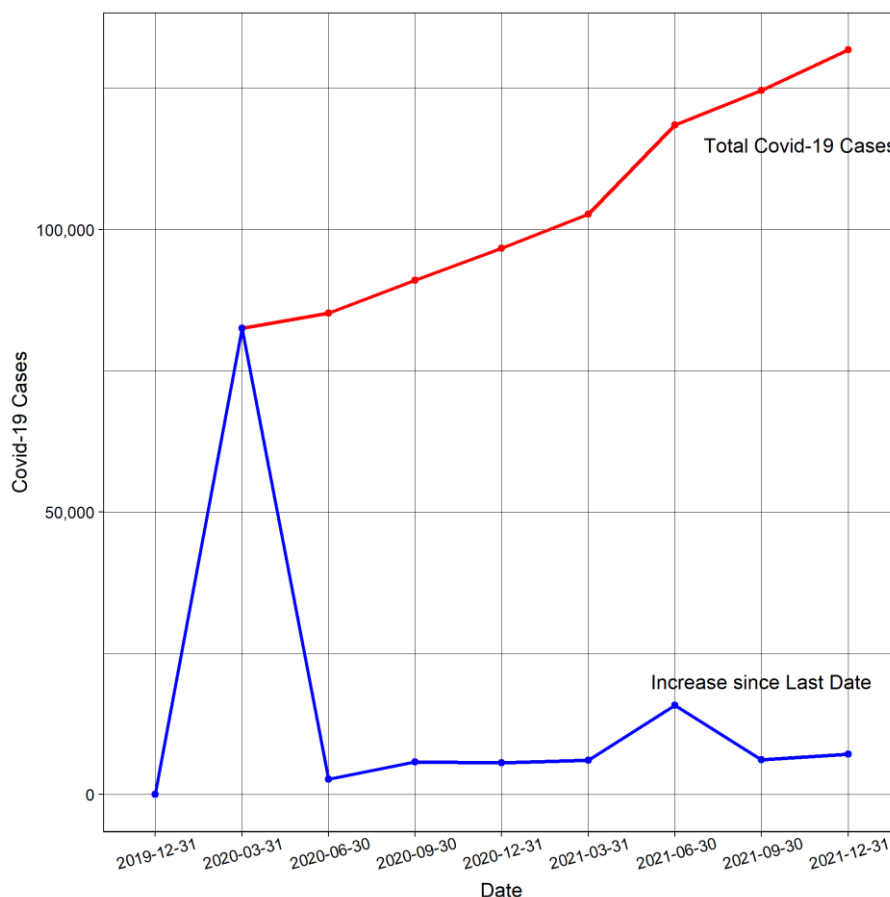


Fig. 1 The Increases in Covid-19 Cases of China

3.1 Financial Measures' Responses to Covid-19 Pandemic

3.1.1 Liquidity Ratios

Quick and current ratios are chosen as the measures for company liquidity in this research as they are common tools to accomplish this task [6]. Figure 2 and 3 below shows the trend of these two measures during our research time frame.

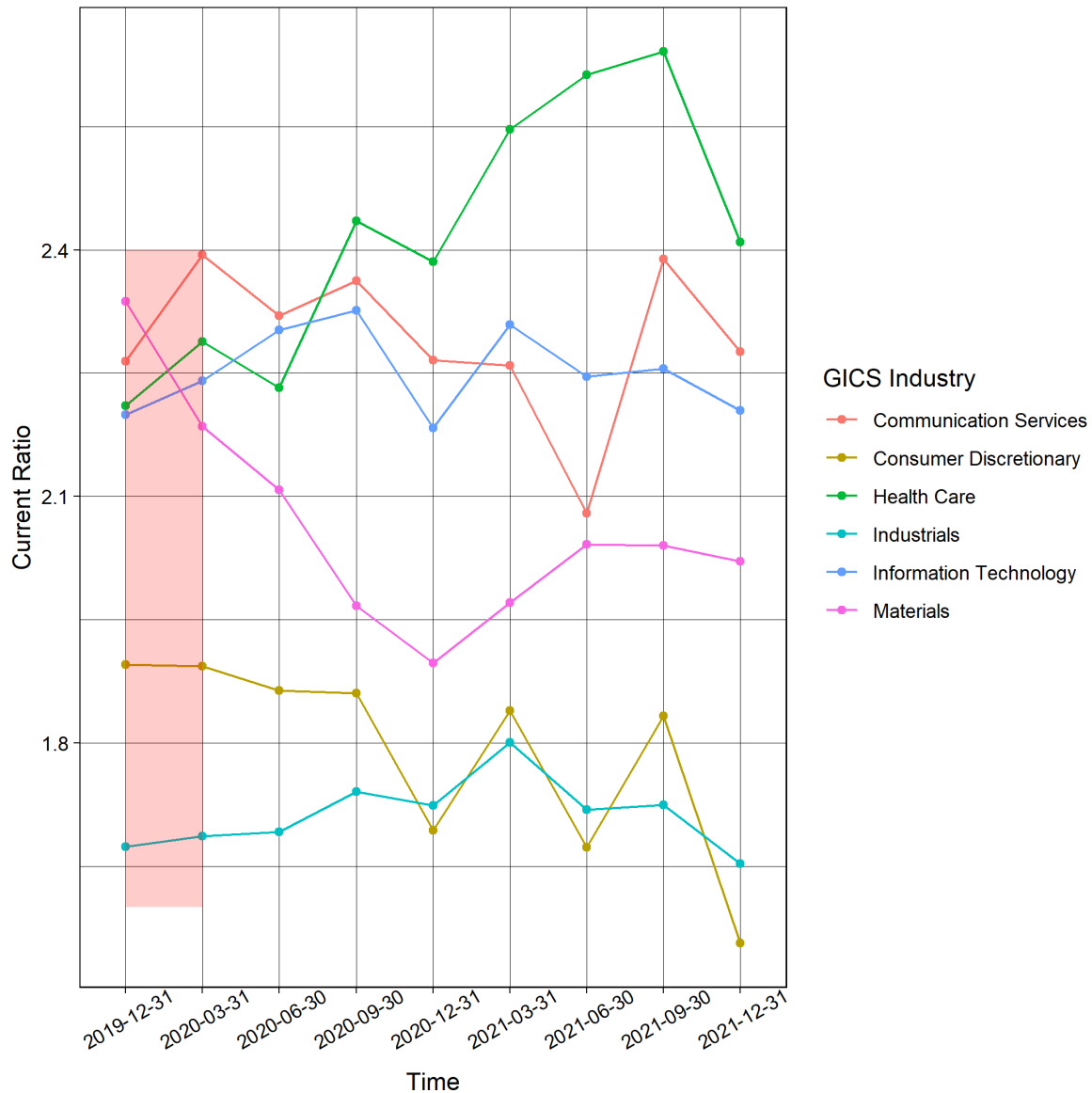


Fig. 2 Current Ratio over Time

Both ratios were surprisingly stable during the first period of escalating covid cases as shown in the shaded area in the figures. There were even three industries that experienced increases in current ratio while only one of them suffered a fall. The result of quick ratio is not as favorable as the former with four industries experienced decreases. Nevertheless, if taking the entire time frame into consideration, the figures show that the differences between the beginning and the ending ratios are relatively small. The current ratio, for example, only observes two industries that have lowered ending ratios while that of the quick ratio is three. As a result, it is reasonable to conclude that liquidity ratios, thus related measures such as current assets and current liabilities, are less sensitive to external events similar to the Covid-19 pandemic.

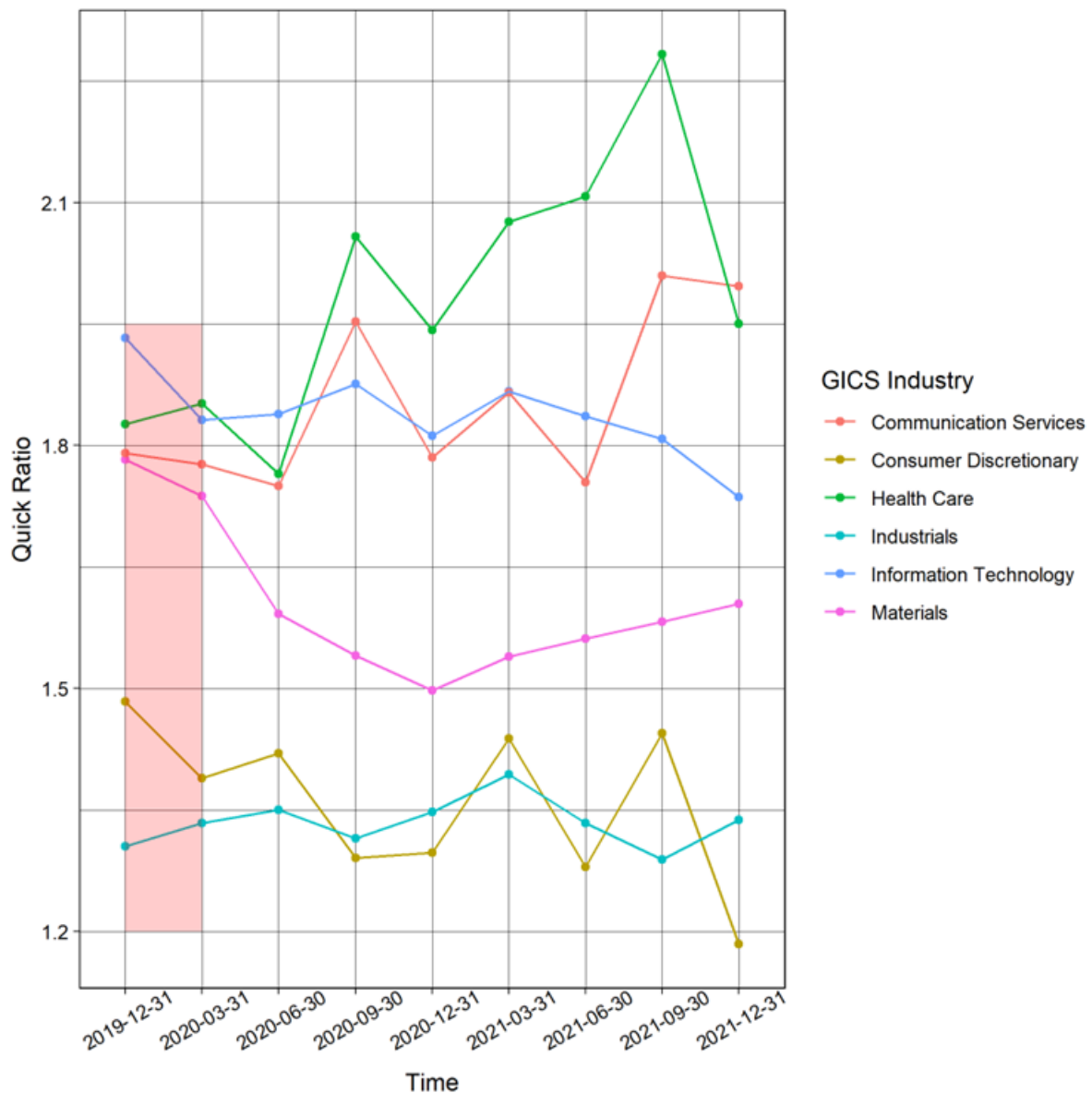


Fig. 3 Quick Ratio over Time

In addition to the general sensitivity of liquidity ratios, these two figures imply industrial insights. On a liquidity perspective, the Health Care and Communication Service industries performed well during the pandemic which resonate with this paper’s second hypothesis. This result might not be astonishing considering that the pandemic caused extra needs for health care services, while the quarantine protocols executed by countries around the world made the use of communication service a necessity. Consumer discretionary, by contrast, performed worse than the rest, represented by continuously decreasing liquidity ratios. Reasons might lie within issues such as the economic recessions that severely harmed purchasing power, thus reducing cash for companies in this industry. Besides, uncertainty for future, such as the possible lock down measures taken by local authorities if covid cases increases, impaired companies’ willingness to stock, so their current assets including inventories were reduced and be reflected by lowering liquidity ratios.

3.1.2 Solvability

This research chooses Debt-to-equity ratio as the measurement for solvability. Figure 4 shows the trends of debt-to-equity ratios during the analyzed time frame.

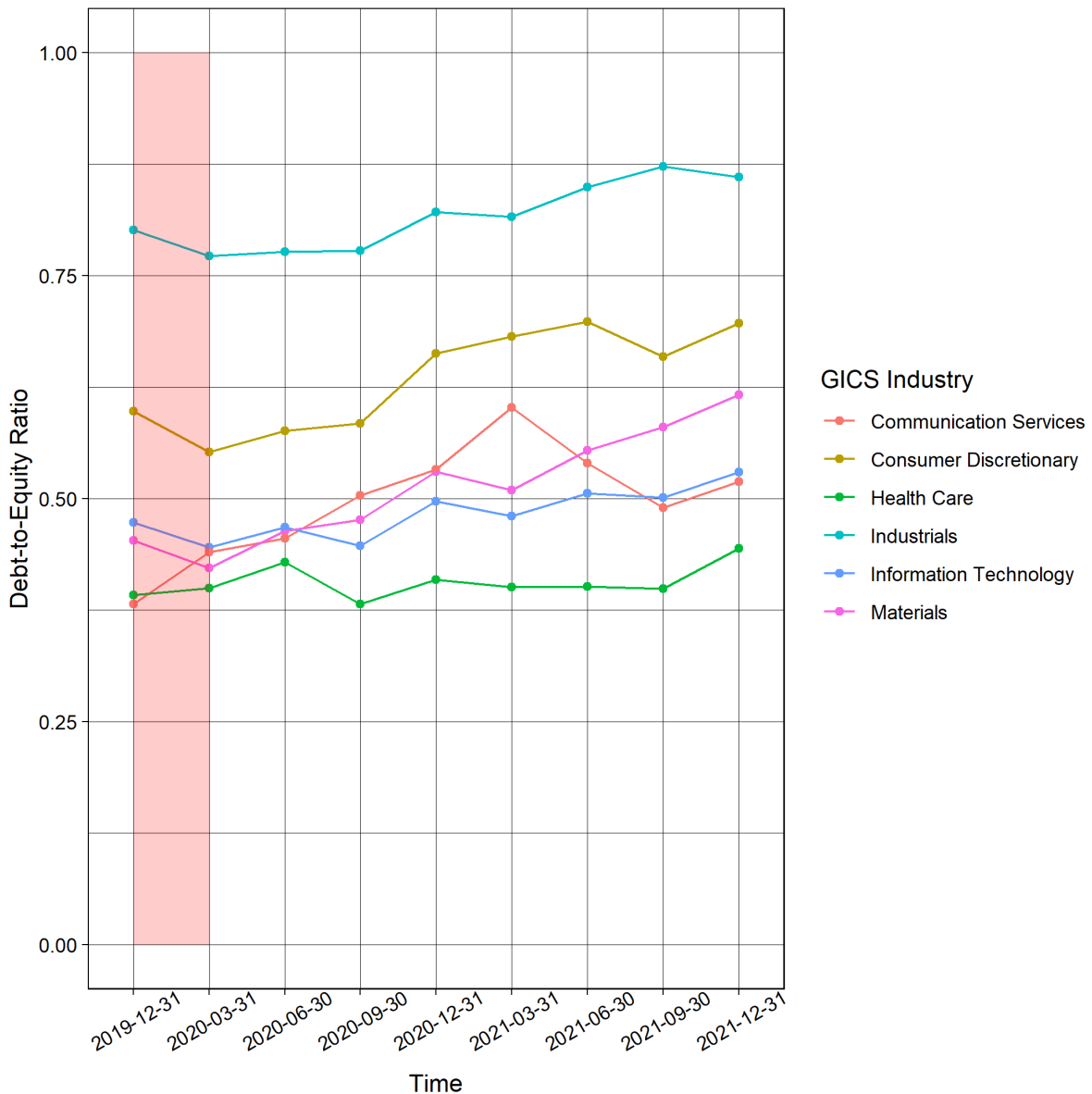


Fig. 4 Debt-to-Equity ratio over time

Debt-to-Equity ratios for all industries were relatively stable within this time range. The general trend is increasing with some exceptions during the first period when the number of covid cases skyrocketed. It can also be derived from the figure that the ending ratios do not have significant differences from the beginning ratios. In this case, it is reasonable to put forward that the debt-to-equity ratios, and solvability ratios as a whole, are not sensitive to the pandemic for the Growth Enterprise Market companies from the six industries studied. This result contradicts the first hypothesis that companies were thought to have problems meeting their financial obligations due to difficulties caused by the Covid-19 pandemic.

3.1.3 Activity

This research applies Fixed-Asset Turnover and Total-Asset Turnover as measurements for companies' activity efficiencies. Studied industries are components of tangible economies, meaning that companies are assumed to have significant assets to support the validity of these ratios, thus validating this analysis. Figure 5 and 6 shows the changes in the above two measures over the research period.

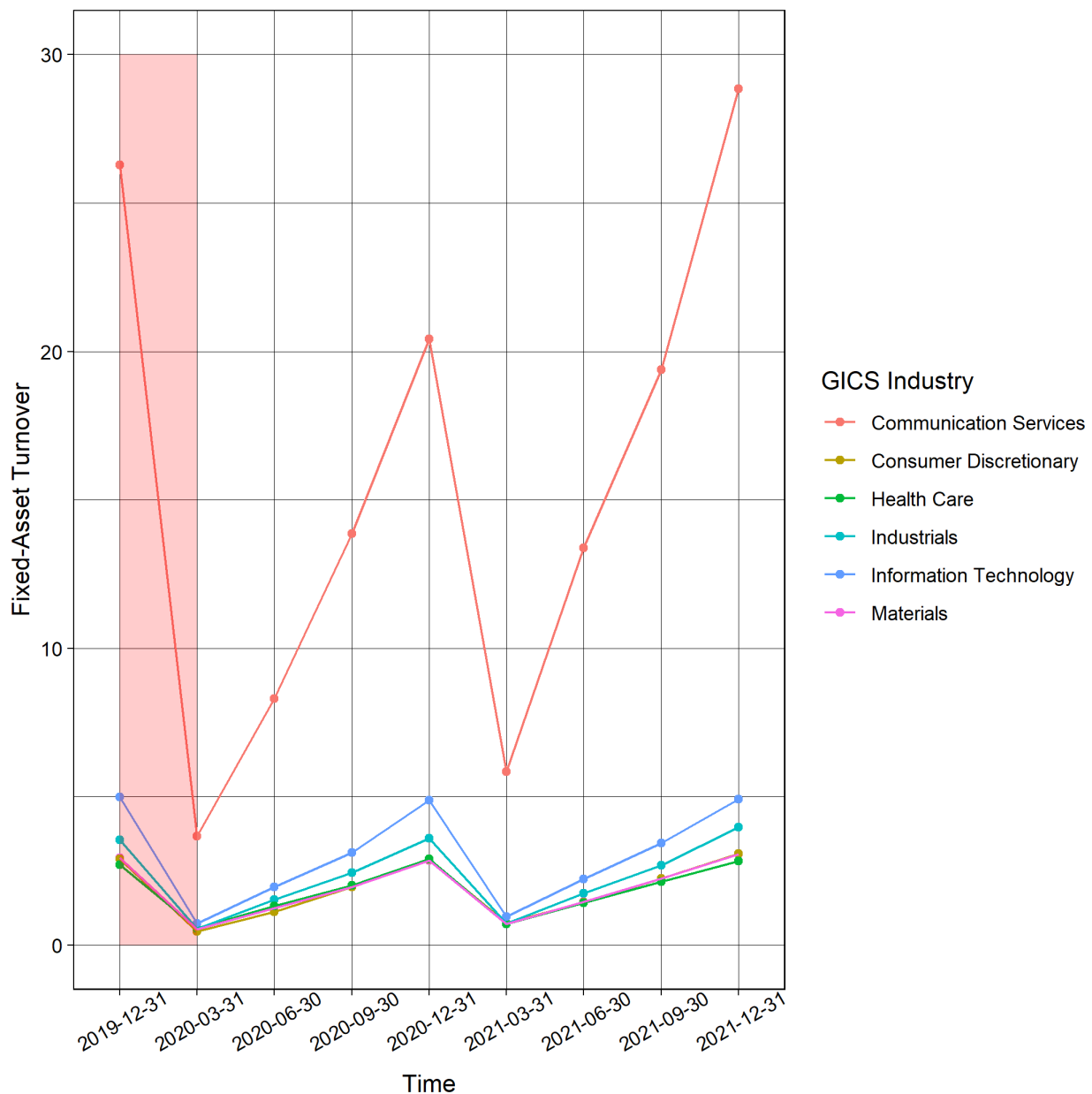


Fig. 5 Fixed-Asset Turnover over time

The most straightforward sensation perceived from the above two figures is that the changes in activity measurements are more radical than the ratios discussed in the former sections. All the industries included experienced a large plummet in activity ratios when the pandemic started. Nevertheless, these ratios bounced back quickly when the situation smoothed, forming the V-shape trajectories. After reaching another peak in the last season of the year 2020, ratios fell again and developed into a similar shape.

In the case of activity ratios, the first hypothesis is confirmed, which indicates that activity measures were negatively influenced by the pandemic and responding lockdown measures. However, this analysis did not validate the second hypothesis because health care and communication service industries were experiencing plummeting activity ratios the same way as others. This result might be counter-intuitive to the public, especially for the healthcare industry, considering the intuition that the pandemic could boost medical activities.

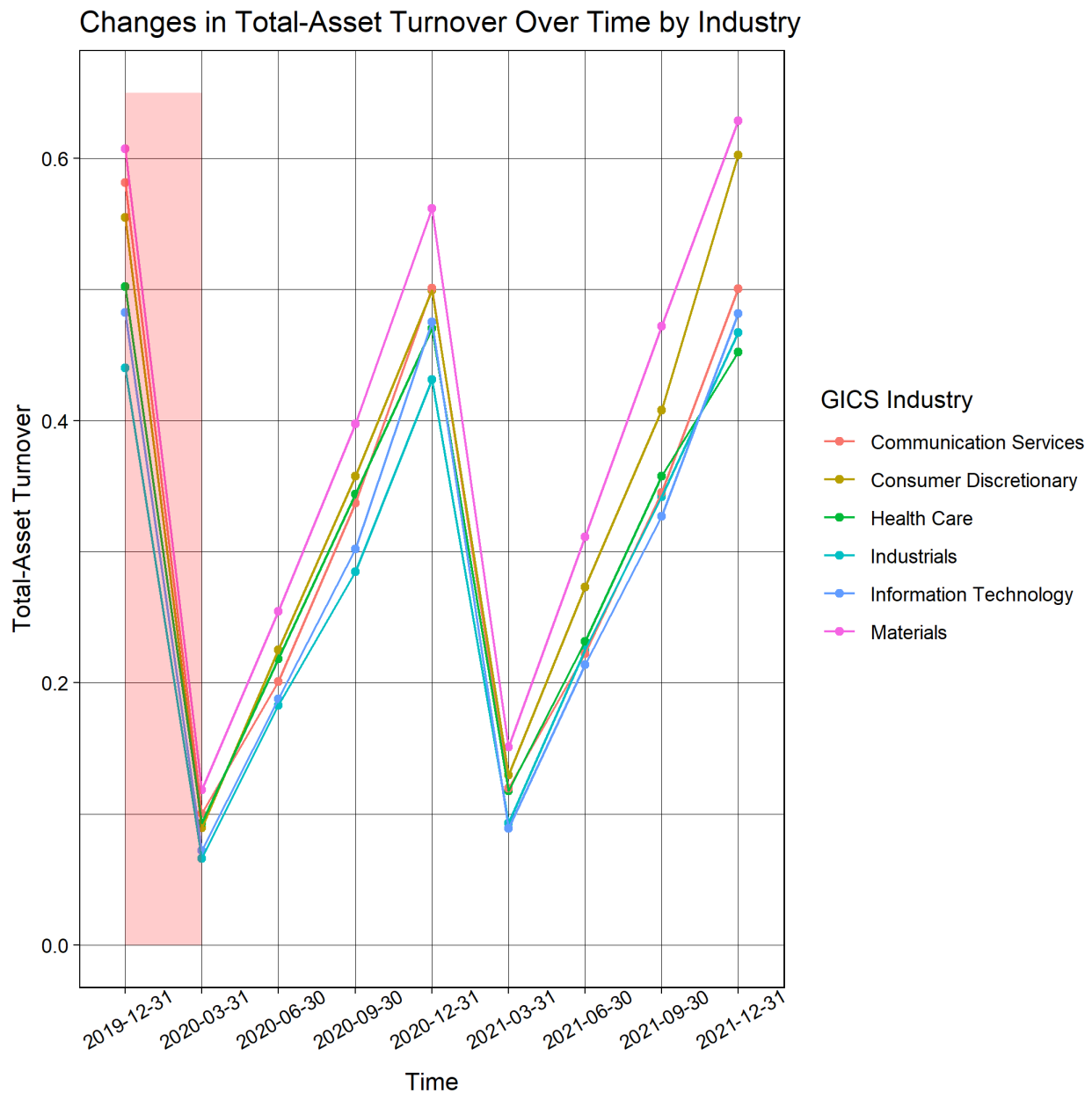


Fig. 6 Total-Asset Turnover over Time

3.1.4 Profitability

This research utilizes the Return-on-Equity ratio (ROE) to measure companies' profitability during the studied time frame. This measure can gauge a corporation's ability to generate profits with the equities they hold. Figure 7 below shows each industry's ROE changes over the period.

The general shape of ROE is similar to that of the activity measurements. All the industries observed a plummet in their profitability during the first quarter of 2020 when Covid-19 cases skyrocketed in China while bouncing back rapidly afterward. The second plummet happened during the first quarter of 2021 in the same way as the activity ratios but returned to the former high later in the year.

Similar results can be obtained from evaluating the profitability ratio. That is, all industries were negatively affected by the pandemic in the sense of profitability, as indicated by the first hypothesis. Nevertheless, the health care and communication service industries were not better off than the others as stated in the second hypothesis.

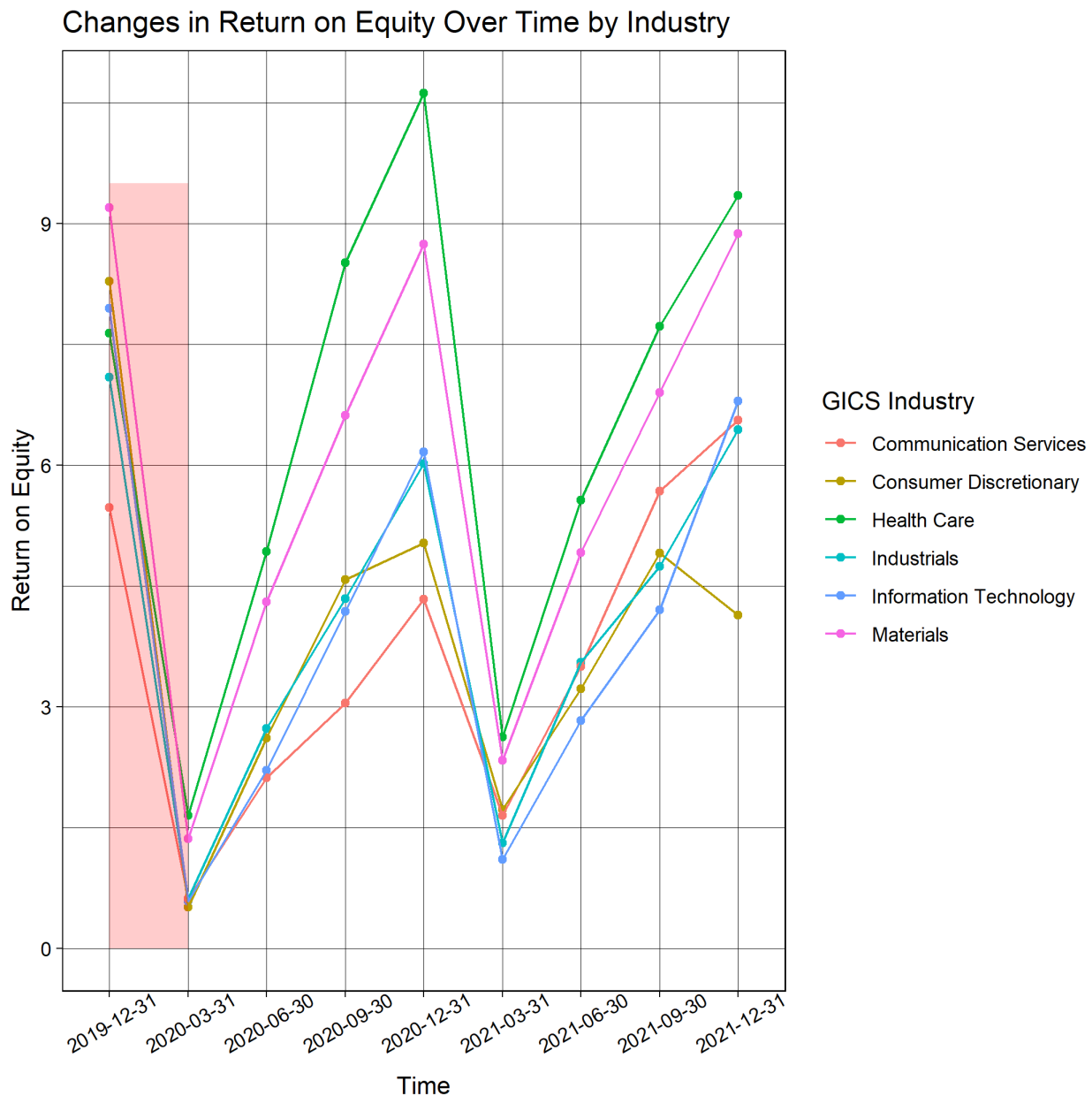


Fig. 7 Return-on-Equity Overtime

3.2 Price Changes

As the Covid Panic Indicator is calculated by the number of increases in covid cases divided by 10,000, Figure 8 maps it with the median price changes of each industry.

As shown in figure 8, when China experienced the most several increases in covid cases, the stock prices of all studied industries decreased to a different extent. Following the price adjustments caused by the pandemic, some industries, such as the health care and communication service, regained their positions in the following quarter. In contrast, other industries, including industrials and customer discretionary, kept performing weakly. This phenomenon supports the second hypothesis that the health care and communication service industries were injured less than the others.

To further explore the relationship between the Covid case increase and stock price changes, the price changes were mapped against the covid panic indicators to examine if it is possible to predict one by the other. A loess curve was fitted in the plot, as shown in figure 9.

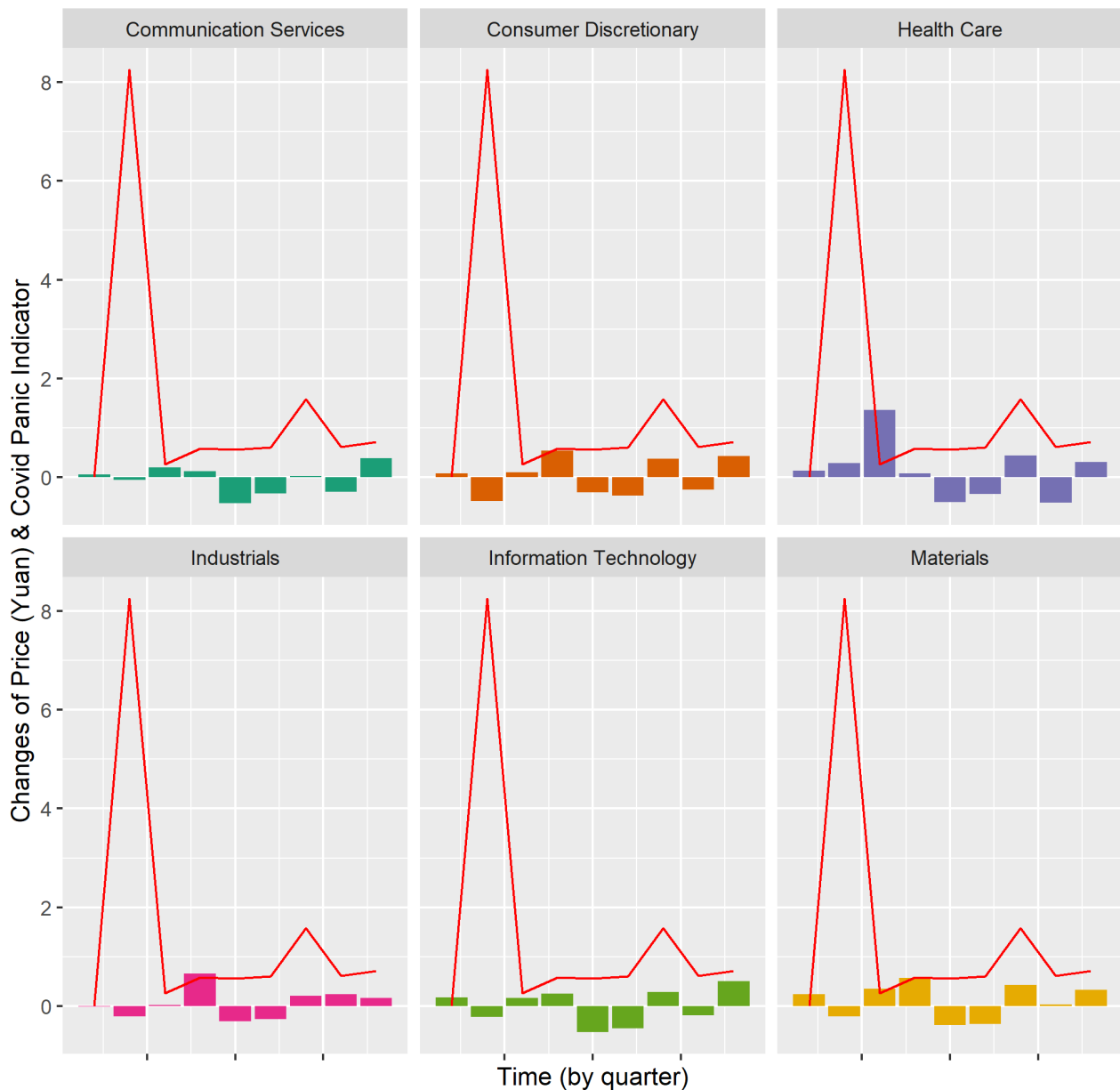


Fig. 8 Changes in Prices versus Covid Panic Indicator

This figure indicates that covid has deep influence on the prices of stocks in all industries except for the Industrial companies, which can be derived from their price increases immediately after the initial increase in covid cases. On the other hand, industrial companies maintained relatively stable prices during the studied period.

Also, prices changed more radically when the covid panic indicator was in between 0 and 2. When the indicator went beyond 4, the changes in price tended to smoothen and bounced back to a level that is close to 0.

Furthermore, because of the parabolic shapes of the curves, a quadratic model was fitted in to evaluate if price changes can be predicted for individual industry. The coefficients show that there are negative relationships between stock price changes and increases in covid cases for all six industries. Nonetheless, p values are high, which shows that, due to the lack of data, all the models were statistically insignificant under the assumption that alpha equals to 0.05, as shown in Table 2.

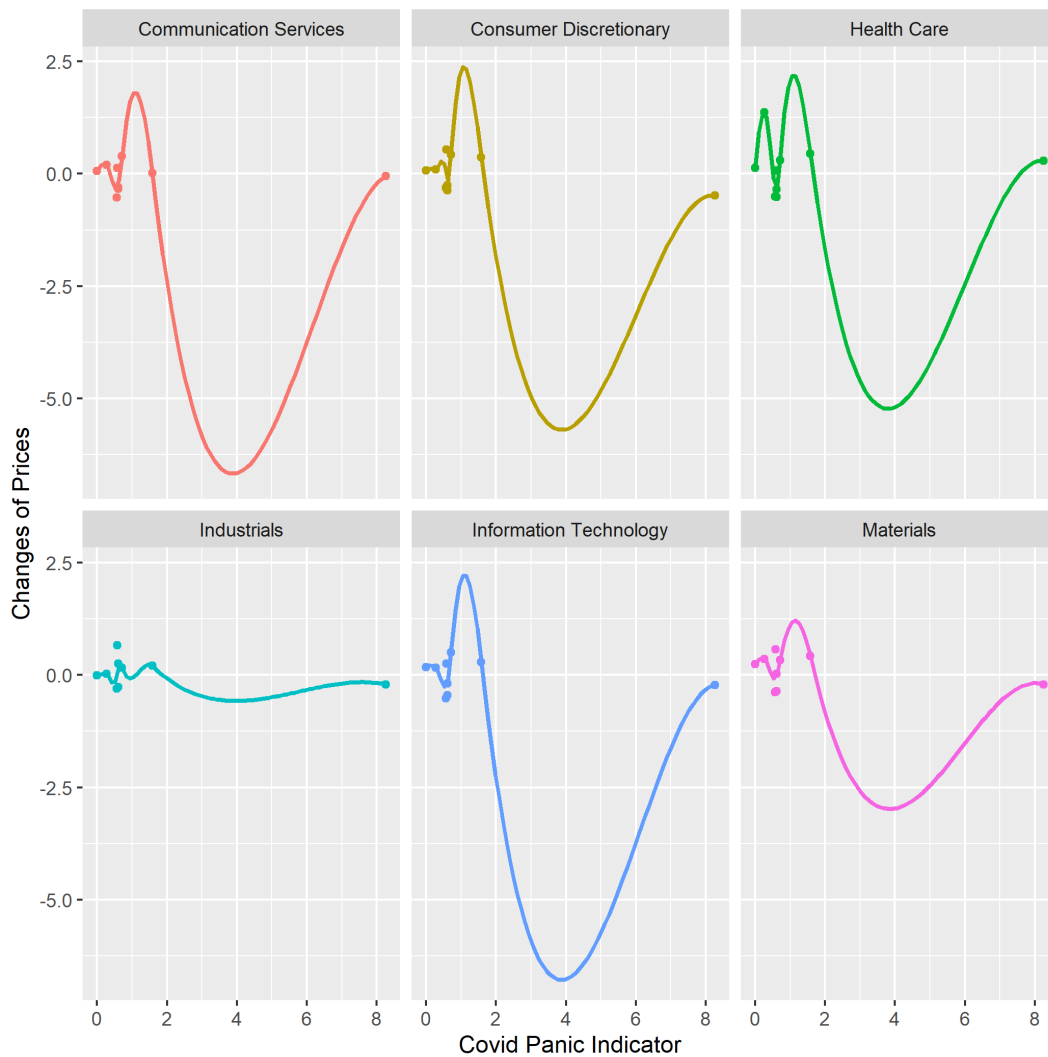


Fig. 9 Changes of Prices by Covid Panic Indicator

Table 2. Quadratic Models

Industry	Coefficient	P-value
Communication Service	-0.0001	0.98
Consumer Discretionary	-0.009	0.51
Health Care	-0.007	0.79
Industrials	-0.005	0.62
Information Technology	-0.03	0.09
Materials	-0.002	0.88

3.3 Risk-Resistant Companies

At the end of the analysis, some companies categorized as more resistant to risks than their counterparts in the same industry were found by comparing their standard deviations of each ratio over time with that of their corresponding industrial standard deviation. If the company’s standard deviation is lower, it is categorized as risk-resistant in terms of that specific financial measure. If a company is labeled as risk-resistant in all four dimensions, it would be selected to be presented in the table below as a reference for investors.

The majority of risk-resistant companies are from the Health Care industry, which is consistent with our hypothesis that this industry performed better than the rest. However, it was unexpected that there were some material and customer discretionary companies that performed well during the pandemic.

Table 3. Risk-resistant Companies

Name	Ticker	Industry
Aba Chemicals Corporation	300261.SZ	Materials
Anhui Anli Material Technology Co., Ltd.	300218.SZ	Materials
Keshun Waterproof Technologies Co.,Ltd.	300737.SZ	Materials
Ningbo Henghe Precision Industry Co.,Ltd.	300539.SZ	Materials
Shantou Wanshun New Material Group Co., Ltd.	300057.SZ	Materials
Canature Health Technology Group Co.,Ltd	300272.SZ	Consumer Discretionary
Guangdong Jinma Entertainment Corporation Limited	300756.SZ	Consumer Discretionary
Anhui Shanhe Pharmaceutical Excipients Co.,Ltd.	300452.SZ	Health Care
Dian Diagnostics Group Co.,Ltd.	300244.SZ	Health Care
Guangdong Transtek Medical Electronics Co.,Ltd	300562.SZ	Health Care
Guangdong Vtr Bio-Tech Co.,Ltd.	300381.SZ	Health Care
Guanhao Biotech Co., Ltd	300238.SZ	Health Care
Hebei Changshan Biochemical Pharmaceutical Co., Ltd.	300255.SZ	Health Care
Honz Pharmaceutical Co., Ltd.	300086.SZ	Health Care
Jiangxi Sanxin Medtec Co.,Ltd.	300453.SZ	Health Care
Shandong Sito Bio-technology Co., Ltd.	300583.SZ	Health Care
Zhejiang Canaan Technology Limited.	300412.SZ	Health Care

4. Conclusion

This research finds that different financial performance indicators were affected by the coronavirus pandemic and quarantine measures to various extents. Firstly, liquidity and solvability ratios were influenced in less extreme ways, shown by small slopes of the line graphs. This result indicates that companies traded on the Growth Enterprise Market of Shenzhen Stock Exchange did not have severe short-term indebtedness issues even though the pandemic slowed down the macroeconomy. Explanations might include that these companies were in their growth or mature stage, so they were rich in cash flow that could be used to fulfill their financial obligations. Also, PwC's IPO Watch Report (2019) displayed that China Exchanges observed the highest amount of funds raised by IPO in 2019, reaching 77.9 billion dollars. This massive amount of cash flowed into companies and helped to defend potential indebtedness.

On the contrary, activity and profitability ratios were deeply affected by the pandemic. These ratios for all studied industries plummeted after the quarantine measures took place. This result is constant with the hypothesis since social distancing prevents commercial events from happening, thus reducing companies' activities and eventually lowering profits. However, the health care and communication service did not perform better than the rest in terms of activity and profitability ratios. Multiple reasons can be used to explain this phenomenon. The public observed that hospitals and pharmaceutical companies were busy dealing with the pandemic but ignored that many subsectors of the health care industries were temporarily shut down. For example, dental clinics were determined to be high-risk locations for the coronavirus to transmit between people, so they did not resume business until the end of the second quarter of 2020. Even multiple-purpose medical centers had to reduce the number of patients seen each day in departments unrelated to covid so more medical workers could be relocated to other departments that required acute assistance. As a result, the general activity of the industry was slowed down despite the busyness of hospitals.

Besides, this research found that prices of stocks tended to decrease as the number of covid cases increased. This result is consistent with the hypothesis. Even though the pandemic severely harmed the macroeconomy, some companies still performed better than the rest, with the majority in the health care industry, as shown in Table 3.

This research studied how corporate financial measures reacted to the covid-19 pandemic with observations from the Growth Enterprise Market of Shenzhen Stock Exchange of China. The result

might be beneficial to the investigation of small-scale companies' ability to deal with external risks comparable to the Covid-19 pandemic. Policymakers could learn from this research as well. According to the results, smaller companies have problems maintaining their commercial activities and profitability. In this case, policies should focus on boosting activities such as building online business platforms that help to do business even during the social distancing, and measures considering cash flows should not be the primary instruments that were abused.

Lastly, this research used quarterly measures to perform the analysis. Because of the lack of data points, the regression analysis for the relationship between price changes and covid increase did not return statistically significant results. In this case, future research should collect data from shorter periods of time, such as weekly or daily price changes, to further investigate this issue.

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