



**FACTORS INFLUENCING FINANCIAL PERFORMANCE OF
HEALTHCARE LISTED COMPANIES IN CHINA
DURING COVID-19 PANDEMIC**

**BY
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Abstract

This study examines Chinese companies' performance in the healthcare sector context, focusing on the prior and during COVID-19 periods and utilizing various statistical analyses, including simple and multiple regression models, fixed-effects models (FEM), and random-effects models (REM). The study includes robustness checks to validate the reliability of the findings, including Hausman tests to assess the optimal model specification. Data was collected from Chinese-listed companies in the healthcare sector for six years from 2017 - 2022. A total sample of 206 is used in this study. The researcher investigates the relationship between financial indicators and company performance, measured by return on equity (ROE) and return on assets (ROA) as dependent variables. Key financial metrics such as current ratio (CR), debt-to-asset ratio (DA), debt-to-equity ratio (DE), sales growth (SG), operating cash flow (OCF), and size (S) are considered independent variables in the analysis. While CV19 is a dummy variable indicating before COVID-19 years (0) and during COVID-19 years (1).

The findings reveal significant variations in company performance across different models and periods, with notable coefficients observed for certain independent variables. The results suggest that financial leverage, CR, and DA have a negative impact on ROA and ROE. In addition, SG, OCF, and S were found to be statistically significant to both ROA and ROE. Interestingly, we find that the CV19 variable has no impact on the firm's financial performance. Overall, this study contributes to a deeper understanding of the financial dynamics within the healthcare sector and provides valuable insights for stakeholders navigating the challenges posed by the COVID-19 pandemic.

(Total 165 pages)

Key Words: COVID-19, Financial Performance, China, Profitability, Healthcare

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND STATEMENT OF THE PROBLEMS

COVID-19 seriously affected health care, economy, transportation, and other fields in different industries and regions. Population mobility sharply dropped as a result of the quarantine policy, which led to weakened spending power and a stagnant economy. The COVID-19 epidemic led to the most significant worldwide recession since 1930 at the macro level, when the economy tanked. During the epidemic, the researchers identified three industries that were most negatively and positively affected: tourism, entertainment, and healthcare (Ayati, Saiyarsarai, & Nikfar, 2020).

For the tourism industry, from January 2, 2020, to January 15, 2022, COVID-19 had the most significant impact on the following five industries: aviation, automobiles, energy equipment and services, hotels, restaurants and leisure, and specialty retail (Vidovic & Tamminaina, 2020). The COVID-19 virus impacts every business, but its inner workings are especially closely entwined with the healthcare sector. COVID-19 has an effect on many different areas, including the delivery of healthcare, staff contact with patients, and other things. The American Hospital Association estimates that 2020 the hospital sector lost \$323.1 billion in revenue when elective and non-emergency operations were entirely abandoned for patient safety (Rosenfeld, 2021).

For the entertainment industry, the epidemic also had a favorable impact on the entertainment sector. The COVID-19 outbreak increased online consumer demand, fueling global video game industry development. According to the mobile data and analytics platform App Annie, consumer spending on mobile games climbed by 5% over the previous three months to more than US\$16.7 billion in the first quarter of

2020. In their financial reports, China's biggest gaming giants, Tencent, NetEase, and Perfect World, have emphasized the growing demand in the mobile gaming industry (Moon, 2020).

The healthcare industry has demonstrated resilience in the face of the COVID-19 epidemic, experiencing significant growth and productivity amidst the downturn affecting many other Chinese sectors. Data from the Chinese National Bureau of Statistics (NBS) revealed notable increases in investment and added value within the healthcare sector during the first quarter of the year 2022. Manufacturing activities related to biological medicines and goods saw impressive growth rates, with investments increasing by 15.1% and added value by 10.5%. Production capacity also surged, with daily outputs reaching hundreds of millions for certain products. For instance, alcohol for medicinal use saw a remarkable 24.8% year-over-year increase, while mask production soared by 3.5 times compared to the previous year. Financial data from Wind, a leading information provider, further underscores the industry's robust performance, with most listed healthcare companies reporting profit growth during the first quarter. Of 328 publicly traded companies, 270 recorded profit increases, accounting for 82% of the total, while only 58 reported net profit declines, constituting 18% of the total (Shan, Shang, Liu, Zheng, & Tang, 2022).

Wenda Wu, Vice President of Tencent Healthcare, said that, In the wake of the New Crown epidemic, the focus on the healthcare system is likely to drive a new round of investment in construction and model innovation. Wuhan's healthcare system has been tested to the extreme and suffered heavy losses, all of which begs the question: After years of hospital investment and expansion, does China need to build more hospitals and beds? On the other hand, the influx of sick people to large hospitals has exacerbated virus transmission and the medical burden and has inadvertently exposed the painful points of fragmented medical care and weak primary care capacity. In order to further improve the medical ecosystem, it is obvious that a decentralized, population health-oriented hierarchical diagnosis and treatment system needs to be built. As Wu said, the healthcare industry is being hit by the epidemic and needs a more rational

system, but also a major opportunity for the future of the healthcare industry (Danilin, 2020).

As a result of the outbreak, several local hospitals have postponed or halted part of their normal medical services. At the same time, some general patients have decided to minimize the danger by visiting hospitals as infrequently or as infrequently as feasible, resulting in a decrease in demand for routine medical services. The epidemic also caused many companies to interrupt their normal business activities, such as postponing all academic meetings of the Chinese Medical Association until April. For most medical companies whose main business is not directly related to the epidemic, their revenue will be under great pressure in the first quarter of this year. However, the epidemic reflects the importance and long-term potential of the healthcare industry from the other side, and this epidemic may also become a catalyst and gas pedal for the long-term development of China's healthcare industry. This is reflected in the following three aspects (Leite, Lindsay, & Kumar, 2020).

Firstly, for further acceleration of healthcare reform. The epidemic has exposed many problems in China's healthcare system and has had a significant impact on society and government agencies at all levels. After this battle, government agencies will pay more attention to further construction and improvement of the medical system and, at the same time, increase the macro policy and implementation-level reform efforts to accelerate the implementation of policies (Sun et al., 2021a).

Secondly, for the turn of "digitalization and consumerization" in the medical industry. The Chinese healthcare business has long been conservative in its attitude to digitization despite the country being a global leader in digitalizing consumer products. Although the country has put forward macro-guidelines to increase the digitalization of healthcare, the status quo still shows a hospital-based "information silo." The epidemic has also exposed the problems of poor medical information and inefficient resource allocation that must be addressed. In addition, the epidemic has contributed to the awareness and acceptance of the emerging digital healthcare by consumers/patients and their decision-making behavior in all aspects of diagnosis, treatment, and medical

products, as the long-standing service model in China's healthcare industry is for patients to go to offline medical institutions. The increased importance of consumers' own decision-making will also bring many potential innovation opportunities for the healthcare industry (Wang, Xie, & Ye, 2021).

Thirdly, medical companies should act accordingly. The importance of China's healthcare industry players has become increasingly evident in this epidemic, including diagnostic and pharmaceutical R&D, modern pharmaceutical supply chains and logistics, and digital healthcare enterprises. We believe that healthcare companies should take stock of the changing situation, act boldly, and invest more to seize the significant opportunities for industry development in the epidemic (Lian et al., 2020).

With two Chinese healthcare providers listed on the Hong Kong Stock Exchange in the first half of 2020, Hegia is China's largest private oncology healthcare group, operating or managing a network of 10 oncology-focused hospitals (Chen, 2023). The other listing, Hongli Medical, is the largest private general hospital in Henan Province. Both listed companies are county Both listed companies are private medical groups incubated in the county medical and other sinking markets. In the competitive medical environment in first- and second-tier cities, the vitality of private medical resources in the trillion-dollar sink market is gradually released, and their complementary role to public medical care is becoming increasingly important. It is crucial for private healthcare resources to complement state healthcare in light of the return of Chinese equities in the US and the reduction of the bar for red-chip businesses to return to the A-share market. In the context of the return of US Chinese stocks and the lowering of the threshold for the return of A-share companies, it is expected that more Chinese medical companies will be listed in Hong Kong or A-share in the future (Chen, 2023).

1.2 RESEARCH QUESTIONS

Due to the limitation of studying COVID-19 and financial data on the financial impact on healthcare listed companies in China, the following are the research questions.

1.2.1 What were the changes in the financial performance of the healthcare companies in China during COVID-19 compared to that prior? And yet, in which direction?

1.2.2 How did the current ratio (CR) of healthcare companies in China change prior to and during the COVID-19 pandemic, and what impact did this change have on financial performance?

1.2.3 Similarly, how did the debt-to-asset ratio (DA) of healthcare companies in China change prior to and during the COVID-19 pandemic, and what influence did this change have on financial performance?

1.2.4 What were the trends in debt-to-equity ratio (DE) of healthcare companies in China prior to and during the COVID-19 pandemic, and how did these trends affect financial performance?

1.2.5 How did sales growth (SG) of healthcare companies in China evolve prior to and during the COVID-19 pandemic, and what implications did this evolution have on financial performance?

1.2.6 What impact did the operating cash flow (OCF) of healthcare companies in China have on their financial performance prior to and during the COVID-19 pandemic?

1.2.7 How did the size (S) of healthcare companies' assets change prior to and during the COVID-19 pandemic, and what were the effects of these changes on financial performance?

1.2.8 How did the return on assets (ROA) of healthcare companies in China change prior to and during the COVID-19 pandemic, and what were the underlying factors driving these changes?

1.2.9 Similarly, how did the return on equity (ROE) of healthcare companies in China evolve prior to and during the COVID-19 pandemic, and what factors contributed to these changes?

1.3 OBJECTIVES OF THE STUDY

The research aims to explore the impact of COVID-19 and other financial variables on healthcare companies in China. The objectives of the research are outlined as follows:

1.3.1 To conduct a comparative analysis of the financial performance of healthcare companies in China prior to and during the COVID-19 pandemic.

1.3.2 To identify and analyze the key factors influencing the financial performance of healthcare companies in China, with COVID-19 acting as a dummy variable.

1.3.3 To assess the changes in financial indicators such as the current ratio (CR), debt-to-asset ratio (DA), debt-to-equity ratio (DE), sales growth (SG), operating cash flow (OCF), and asset size (S) of healthcare companies in China in response to the COVID-19 pandemic.

1.3.4 To provide actionable insights and recommendations for healthcare companies in China to enhance their financial resilience and performance amidst the challenges posed by the COVID-19 pandemic and other economic uncertainties.

By addressing these objectives, the research aims to better understand the dynamics between COVID-19, financial variables, and the performance of healthcare companies in China, ultimately providing valuable insights for stakeholders in the healthcare industry.

1.4 RESEARCH HYPOTHESES

The following hypotheses aim to investigate the relationship between various financial indicators and the financial performance of healthcare companies in the Chinese sector. Financial performance is typically measured by metrics such as Return on Assets (ROA) and Return on Equity (ROE), which provide insights into a company's profitability and efficiency in utilizing its assets and equity. The hypotheses explore how different financial indicators, including Current Ratio (CR), Debt-to-Asset Ratio (DA), Debt-to-Equity Ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S), may influence the financial performance of Chinese healthcare companies, with ROA and ROE as dependent variables. Additionally, COVID-19 is proposed as a dummy variable that may influence the relationship between financial indicators and the financial performance of Chinese healthcare companies.

H1: Current Ratio (CR) is posited to positively influence the financial performance of Chinese healthcare companies, as measured by ROA and ROE. A higher CR indicates a company's ability to cover its short-term liabilities with its short-term assets, which may indicate liquidity and financial stability. Thus, a higher CR will likely lead to improved financial performance in the Chinese healthcare sector.

H2: The debt-to-asset Ratio (DA) is expected to negatively influence the financial performance of Chinese healthcare companies.

A higher DA ratio suggests that a company has more assets financed through debt, which increases financial leverage and associated risks. High leverage can exacerbate financial distress during economic downturns or crises, as companies may struggle to meet debt obligations. Therefore, it is hypothesized that a higher DA ratio will lead to deteriorated financial performance in the Chinese healthcare sector.

H3: Debt-to-Equity Ratio (DE) is anticipated to negatively influence the financial performance of Chinese healthcare companies.

A higher DE ratio indicates a higher proportion of financing from debt relative to equity, which increases the company's financial leverage. While leverage can potentially enhance returns during favorable conditions, it also heightens the risk of financial distress during adverse conditions, such as the COVID-19 pandemic. Hence, it is hypothesized that a higher DE ratio will lead to decreased financial performance in the Chinese healthcare sector.

H4: Sales Growth (SG) is expected to have a positive impact on the financial performance of Chinese healthcare companies. Higher sales growth indicates increased revenue, which can contribute to improved profitability and returns. Therefore, higher SG will lead to improved financial performance in the Chinese healthcare sector.

H5: Operating Cash Flow (OCF) is posited to positively influence the financial performance of Chinese healthcare companies. OCF reflects the cash generated from the company's core operations, which can be used for investments, debt repayment, and other activities. Thus, higher OCF will likely lead to improved financial performance in the Chinese healthcare sector.

H6: Size (S) is expected to have a positive influence on the financial performance of Chinese healthcare companies. A more extensive asset base may provide economies of scale and operational efficiencies, improving profitability and returns. Therefore, larger asset size will likely lead to improved financial performance in the Chinese healthcare sector.

H7: COVID-19 is proposed as a dummy variable that may influence the relationship between the financial indicators (CR, DA, DE, SG, OCF, S) and Chinese healthcare companies' financial performance (ROA and ROE). The COVID-19 pandemic has introduced unprecedented challenges and disruptions to the global economy and healthcare sector, which may impact the financial performance of companies. Therefore, Covid-19 may mediate the relationship between financial indicators and financial performance in the Chinese healthcare sector.

1.5 CONCEPTUAL FRAMEWORK

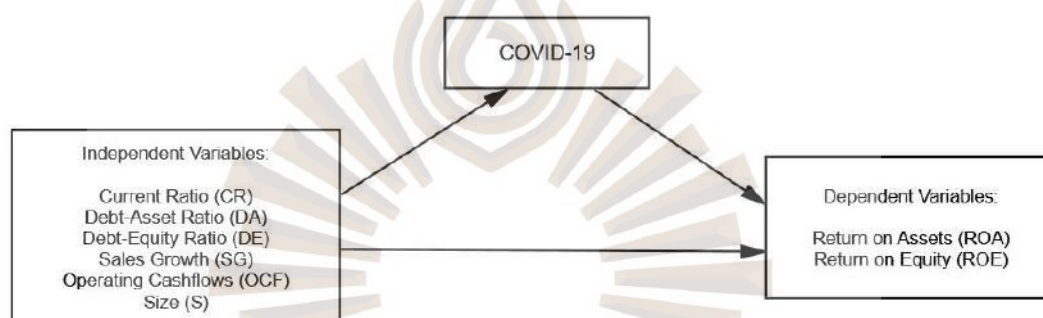


Figure 1.1 Conceptual Framework

1.6 DEFINITIONS OF THE TERMS

Current Ratio (CR) The current ratio, often called CR, is a financial metric used to evaluate a company's liquidity and ability to meet short-term financial obligations. It is calculated by dividing the company's current assets by its current liabilities. Current assets typically include cash, accounts receivable, and inventory, while current liabilities include accounts payable, short-term debt, and other obligations due within one year. The current ratio provides insight into the company's ability to cover its short-term liabilities with its current assets. A higher current ratio indicates better liquidity and a lower risk of financial distress, while a lower ratio may suggest liquidity challenges and difficulties in meeting short-term obligations (Law, 2014).

Debt to Asset Ratio (DA) The debt-to-asset ratio is a financial metric that shows how much debt a firm uses to finance its operations. It is one of various leverage ratios that may be used to assess the financial structure of a corporation. A company's financed debt, also known as interest-bearing liabilities, is used to compute the debt-to-asset ratio. This percentage relates to real credit granted by direct lenders with interest obligations (such as bonds, term loans from a commercial bank, or subordinated debt); overall liabilities (such as accounts payable, etc.) are not included (Law, 2014).

Debt to Equity Ratio (DE) The debt-to-equity ratio (also known as the "risk ratio," "gearing," or "debt-equity ratio") is a leverage ratio that determines how much overall debt and financial obligations weigh against total shareholders' equity. The D/E Ratio employs total equity as a denominator instead of the debt-assets ratio, which uses total assets. This ratio shows how debt or equity financing dominates a company's capital structure (Law, 2014).

Sales Growth (SG) Sales growth represents the percentage increase in a company's revenue over a specified period. It is computed by subtracting the previous period's sales from the current period's sales, dividing the result by the previous period's sales, and multiplying by 100. Positive sales growth signifies an increase in revenue, while negative growth indicates a decline.

Sales growth is a critical indicator of a company's performance and market competitiveness. A strong sales growth rate indicates that the company effectively expands its customer base, increases market share, or introduces successful new products or services. Conversely, declining sales growth may suggest challenges such as market saturation, increased competition, or shifts in consumer preferences. Investors and analysts closely monitor sales growth as it provides insights into the company's revenue generation capabilities and potential future financial performance. High and sustained sales growth rates are often associated with positive investor sentiment. They can contribute to higher stock valuations, while sluggish or negative sales growth may raise concerns about the company's long-term viability and competitiveness in the market. (Lee, Wang, & Ho, 2020)

Operating Cash Flow (OCF) Operating Cash Flow (OCF) is a financial metric that measures the cash generated by a company's core operating activities during a specific period, typically a quarter or a year. It provides insights into a company's ability to generate cash from its primary business operations, excluding financing and investing activities. OCF includes cash received from customers, cash paid to suppliers and employees, and other operating expenses. Positive OCF indicates that a company's operations generate more cash than they consume. At the same time, negative OCF suggests that the company may need external financing or dip into its cash reserves to fund its operations. OCF is a critical indicator of a company's financial health and its ability to sustain its business operations over the long term (Law, 2014).

Size (S) The term "size" in this study refers to the overall market value of a firm's assets, which encompasses all of the company's resources or controls that have economic worth. A company's activities, investments, and total financial resources may be measured in terms of its size and breadth. The quantity of an organization's assets is a crucial sign of its financial health, stability, and ability to produce income and profits (Law, 2014).

The natural log of total assets refers to the logarithm of the total assets of a company using the natural logarithm function. This transformation is often applied to financial data to address issues such as skewness and heteroscedasticity, which can arise due to the large range of values typically observed in financial variables like total assets. Taking the natural log of total assets involves applying the natural logarithm (base e) to the total assets value. The natural logarithm function is denoted as " $\ln$ " and is commonly used in mathematical and statistical analyses. By transforming total assets using the natural logarithm, the resulting values are typically more normally distributed and exhibit less variation across different levels of the variable. This can make the data more suitable for certain statistical analyses, such as regression modeling, where the assumption of normally distributed residuals is important. (A-Slehat, Zaher & Fattah, 2020 ; Rababah, 2020)

In summary, the natural log of total assets is a mathematical transformation of the total assets variable using the natural logarithm function, which can help improve the statistical properties of the data for analysis purposes.

Return on Assets (ROA) A financial performance ratio called return on assets (ROA) gauges a company's profitability in relation to its total assets. It offers a perception of the efficiency with which a business utilizes its resources to produce revenues. ROA can be helpful when comparing the profitability of businesses operating in the same sector or examining a company's performance over time. When analyzing ROA, it is crucial to consider industry standards and other financial measures, as various sectors may have distinct capital needs and asset use procedures (Law, 2014).

Return on Equity (ROE) A business performance statistic called return on equity (ROE) gauges the business's profit in relation to its shareholders' equity. It offers information on how well a business returns on the capital its shareholders invest. A company's financial performance and ability to provide returns for shareholders are assessed using ROE. However, just as with other financial ratios, it is crucial to consider industry standards and other elements when analyzing ROE because various sectors may have variable degrees of profitability and capital structure (Law, 2014).

COVID-19 Prior to COVID-19, Chinese healthcare companies operated in a relatively stable environment, dealing with routine challenges of the industry. However, after the emergence of COVID-19, the term refers to a pivotal period marked by the unprecedented global health crisis caused by the novel coronavirus. In the context of Chinese healthcare companies, COVID-19 introduced unique challenges to their financial performance. The industry experienced disruptions in supply chains, changes in demand for various healthcare services, and increased expenditures to respond to the public health crisis (Sun et al., 2021).

Prior to COVID-19, phrases like "pandemic-induced economic impact" and "crisis management in the healthcare sector" were not part of the usual discourse surrounding Chinese healthcare companies. After the emergence of COVID-19, these terms gained prominence as the financial landscape for healthcare enterprises underwent significant shifts. Chinese healthcare companies faced the dual challenge of navigating the financial implications of the pandemic while continuing to provide essential services and contribute to the nation's health infrastructure (Sun et al., 2021).

In summary, the term "COVID-19" in the context of Chinese healthcare companies' financial performance encompasses the period of financial adjustments, strategic shifts, and resilience-building measures undertaken by these companies in response to the multifaceted challenges brought about by the global health crisis.

1.7 SCOPE OF THE RESEARCH

1.7.1 Population and Samples

The research population of this study consists of Chinese-listed healthcare companies in China. The financial data on Chinese healthcare is taken from the Bloomberg database of two different stock exchanges: Shanghai and Shenzhen. The convenient sampling method is employed in this study. The data from Bloomberg once taken is cleaned and select only the companies with completed data. The population is 293 firms, and after cleaning data, a sample of 206 is taken into this study.

1.7.2 Variables Used in the Study

This study focuses on antecedent factors affecting Chinese healthcare companies' financial performance. Therefore, the variables are limited to the following.

Independent variables: Current Ratio (CR), Debt to Asset Ratio (DA), Debt to Equity Ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S)

Dummy Variables: COVID-19

Dependent variables: Chinese Healthcare Companies' Financial Performance (return on asset **【ROA】** and return on equity **【ROE】**)

1.7.3 Study Area

The research emphasizes the financial data of Chinese healthcare; the data is taken from the Bloomberg database. After downloading the data from the Bloomberg database, the completed data of 206 companies are taken into this study, building up of

6 years of information or 293 firm-year observations, and the data is taken from 4 sectors, which are Health Care Equipment & Supplies, Health Care Providers & Services and Health Care Technology, Pharmaceutical.

1.7.4 Time Contains

The focus of this study is six years, which includes information on 2017, 2018, 2019, 2020, 2021, and 2022. Data is taken into two-year groups – prior to COVID-19 (2017, 2018, and 2019) and during COVID-19 (2020, 2021 and 2022)

1.8 CONTRIBUTIONS OF THE STUDY

1.8.1 Theoretical Contributions

The literature shows many studies on finance in the healthcare industry, but most are for other countries or non-epidemic periods. There is not much literature about private healthcare companies in China during the epidemic, and it only stays at the status quo analysis and recommendations level.

This study explores and advances more deeply based on previous studies on the financial situation of the healthcare industry and in line with the direction of future social, business, and technological progress. This study can offer fresh scholarly insights into the most crucial elements and the significance of the epidemic's influence on the financial performance of the healthcare sector in the industry's future development. Furthermore, this study might give a theoretical framework for analyzing and researching the financial performance of the healthcare sector. This study can also provide a sufficient theoretical basis and reference for the development and research of the healthcare industry.

1.8.2 Managerial Contributions

Traditional medical models or health maintenance are no longer enough in the face of an epidemic. At the same time, as the healthcare industry's market has grown, numerous merchants have been drawn in. This study assists customers or patients in making the best healthcare consumption decisions by merging the relationship between the epidemic and the financial performance of healthcare companies, resulting in improved financial performance for the healthcare industry.

1.8.3 Policy Contributions

The globalization of the epidemic and China's policy form of epidemic prevention have become inextricably linked, and China's policies related to the medical industry will greatly influence the global situation in the future. This study also provides some references or valuable research results in possible future policies so that the future medical industry can decide on a more reasonable sales model based on financial performance. Practitioners in the healthcare industry will be better able to grasp the elements influencing the sector's financial performance due to this study's analysis of the sector. They will be able to make pertinent modifications and upgrades. The private healthcare industry, including but not limited to China, can take the data and information from this study and make more detailed and rigorous development plans for the future.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

COVID-19 had an impact on the healthcare industry all around the world since 2019. The Chinese healthcare industry suffered the most from this. The epidemic has increased demand for healthcare services, disrupted supply networks, and changed healthcare provision laws. Healthcare businesses must devise novel techniques to protect their financial performance in response to the pandemic. This chapter uses published research to assess the financial performance of healthcare companies in China amidst the COVID-19 outbreak. Pertinent studies examining the pandemic's impact on the healthcare industry and the factors influencing financial performance are also covered (Kaye et al., 2021).

2.2 INSTITUTIONAL THEORY

Institutional Theory is instrumental in comprehending how external factors shape organizational behavior and influence financial performance. For Chinese healthcare companies, adherence to institutional norms and regulations can directly impact financial outcomes. The institutional environment, encompassing societal expectations and governmental regulations, becomes a critical determinant in assessing the financial health of these organizations (Peters, 2022).

2.2.1 Financial Implications of Normative and Regulative Institutions

Normative institutions, representing cultural and societal expectations, can influence the perceived legitimacy of financial practices within the healthcare sector. Adherence to normative standards can enhance trust and credibility, positively affecting financial performance. Simultaneously, regulative institutions, such as

healthcare regulations imposed by the Chinese government, play a pivotal role in determining financial outcomes by shaping operational practices and compliance (Kılıç Güdük, Güdük, & Göküz, 2021).

2.2.2 Cognitive Institutions and Financial Decision-Making

Cognitive institutions, including shared beliefs about financial strategies and practices, contribute to the cognitive legitimacy of financial decisions within healthcare firms. Studies have explored how cognitive alignment with financial norms impacts strategic financial decision-making and organizational financial performance (Kılıç et al., 2021).

2.3 AGENCY THEORY

Agency Theory provides insights into the principal-agent relationships within organizations and their implications for financial performance. In Chinese healthcare companies, aligning managerial decisions with shareholder interests is crucial for optimizing financial outcomes (Kasbar, Tsitsianis, Triantafylli, & Haslamet, 2023).

2.3.1 Principal-Agent Dynamics and Financial Performance

The principal-agent relationships inherent in healthcare firms involve shareholders entrusting managers with financial decision-making. The effectiveness of these relationships directly influences financial performance. Conflicts of interest may arise when managers prioritize their interests over those of shareholders, impacting financial outcomes (Kasbar et al., 2023).

2.3.2 Governance Mechanisms and Financial Success

Corporate governance mechanisms, essential components of Agency Theory, play a pivotal role in ensuring the alignment of interests and mitigating agency conflicts. Effective governance structures, including transparent financial reporting, equitable executive compensation, and independent boards, contribute to improved financial

performance in Chinese healthcare companies (Kasbar, Tsitsianis, Triantafylli, & Haslam, 2023).

2.4 FIRMS' PERFORMANCE IN CHINESE HEALTHCARE COMPANIES

A firm's performance, often referred to as "Financial performance," is a comprehensive evaluation of a company's economic health and efficiency. It involves analyzing various financial metrics and indicators that provide insights into how well a company utilizes its resources, generates profits, and sustains growth over time (Puni & Anlesinya, 2020).

Financial performance is critical to assessing the well-being and sustainability of companies, particularly in the healthcare sector. Understanding financial performance in Chinese healthcare companies involves a comprehensive analysis of various indicators that reflect their economic health and viability (Puni & Anlesinya, 2020).

Assessing firms' performance in the context of Chinese healthcare companies goes beyond mere profit margins. It encompasses a holistic understanding of how these companies manage their assets, structure their capital, and navigate the complexities of the healthcare industry. Key financial metrics, including Return on Assets (ROA) and Return on Equity (ROE), offer quantitative measures of profitability and efficiency (Khatib & Nour, 2021).

The term "firms' performance" extends to financial stability, risk management, and strategic decision-making considerations. Metrics such as Debt-to-Asset Ratio (DA) and Debt-to-Equity Ratio (DE) shed light on a company's leverage and approach to balancing debt and equity in its capital structure. Asset Growth (AG) and Operating Revenue Growth (OG) further contribute to the evaluation of a firm's adaptability and market responsiveness (Khatib & Nour, 2021).

Size (S) is a vital indicator of firms' performance, reflecting the scale and capacity of healthcare companies to offer diverse services. In the dynamic environment of the Chinese healthcare industry, firms' performance encompasses not only financial gains but also their ability to innovate, expand, and address the evolving healthcare needs of the populace (Khatib & Nour, 2021).

As this chapter unfolds, exploring firms' performance in Chinese healthcare companies sets the groundwork for a detailed analysis. The subsequent sections delve into the influencing factors, both internal and external that shape firm performance. Through a nuanced examination of these factors, the research aims to uncover the intricacies of financial dynamics within the Chinese healthcare industry (Puni & Anlesinya, 2020).

2.5 IMPACT OF COVID-19 ON THE HEALTHCARE INDUSTRY

COVID-19 is producing unprecedented challenges for the global healthcare industry. It has significantly influenced China's healthcare system, leading to changes in policy, increased demand for healthcare services, and a lack of medical supplies (Liu, 2020).

According to a Deloitte (2020) assessment, COVID-19 has influenced China's healthcare industry. The report states that the pandemic caused the following: Demand for healthcare services has grown due to the pandemic, particularly among COVID-19 patients. The epidemic has disrupted supply networks, making it more difficult for healthcare organizations to obtain the necessary medical supplies and equipment (Sharma, Agarwal, Gupta, Somendra, & Saxenaet, 2020). As a result, the healthcare system is under strain as healthcare professionals attempt to fulfill demand.

COVID-19 has led to adjustments in healthcare regulations, including introducing new COVID-19 patient treatment laws and expanding telemedicine services. The outbreak has had a significant negative impact on the global economy, notably the healthcare industry. It has forced China's healthcare industry to deal with

new issues and opportunities (World Health Organization, 2020). The effects of COVID-19 on the Chinese healthcare industry are examined in the following sections.

2.5.1 Changes in Consumer Behavior

The COVID-19 epidemic has brought about changes in consumer behavior within the healthcare industry. Fear of getting the virus has prevented people from visiting hospitals and clinics for non-urgent care, reducing income for healthcare organizations that rely on outpatient visits and elective operations. The revenue decline has been offset by increased demand for healthcare services and COVID-19-related goods, such as testing kits and personal protective equipment.

Due to the impact of COVID-19, many people have taken advantage of telemedicine services. This is especially true for patients requiring follow-up appointments or non-critical medical consultations who increasingly turn to telehealth as a viable alternative (Haleem, Javaid, Singh, & Suman, 2021).

2.5.2 Changes in Healthcare Supply Chains

The COVID-19 pandemic has also exposed healthcare supply networks to risk. Critical medical supplies like ventilators and personal protective equipment (PPE) are in low supply as a result of industrial supply chain disruptions. The pandemic has brought to light the necessity of supply chain diversity and the significance of local manufacturing of crucial medical products. Additionally, the pandemic has sped up the implementation of digital technology in healthcare supply chains. Critical medical supply availability has been guaranteed through digital technologies like blockchain and artificial intelligence to track and monitor the supply chain (Francis, 2020).

2.5.3 Increased Investment in Healthcare

Additionally, COVID-19 has stimulated investment in the healthcare industry. The Chinese government has dedicated enormous funds to bolster the healthcare system

and fight the epidemic. This includes financing for new medical facilities and hospitals and COVID-19 vaccine and therapy research and development (Akrofi, 2020).

In addition, the epidemic has brought public health's significance to light and increased attention to healthcare services and infrastructure. As a result, the public and commercial industries have expanded their investments in healthcare.

2.5.4 Opportunities for Healthcare Innovation

The COVID-19 pandemic has presented a chance for healthcare innovation. Due to the pandemic's urgency, numerous healthcare professionals and researchers have been pushed to innovate and fast adapt. As a result, novel COVID-19 therapies and technologies have been created.

Additionally, the pandemic has emphasized the significance of digital health innovations like telemedicine and remote patient monitoring. In response to the pandemic, numerous healthcare providers have introduced new digital health services, and investments have surged in digital health innovation (Gunasekaran, Tham, Ting, Tan, & Wong, 2021).

In conclusion, the COVID-19 epidemic has significantly impacted China's healthcare industry. The epidemic has changed consumer behavior, healthcare supply chains, healthcare investment, and innovation potential. The industry will have to continue navigating the continuing pandemic and the post-pandemic era while dealing with obstacles and possibilities.

2.6 FINANCIAL PERFORMANCE OF HEALTHCARE COMPANIES DURING COVID-19

The COVID-19 epidemic had a negative financial impact on China's healthcare industry. The pandemic had a detrimental influence on the financial performance of the healthcare industry in China, McKinsey (2020).

During COVID-19, several issues affected the financial performance of the healthcare industry. One of the key issues is the shifting demand for healthcare services. Demand for healthcare services has significantly increased during the COVID-19 epidemic, especially hospitals that offer COVID-19 testing and treatment. Numerous healthcare services have suffered due to the limitations placed on non-emergency medical treatments and decreased patient visits to healthcare institutions. Nevertheless, these difficulties have not made up for the losses suffered.

Additionally, the epidemic has significantly increased the financial burden on healthcare facilities. This is due to the increased demand for personal protection equipment and other medical goods brought on by the increased requirement for personnel and resources to combat the epidemic (Ranney, Griffeth, & Jha, 2020). The stoppage of non-essential medical treatments and a decline in patient enrollments have led to a fall in Income for healthcare organizations. In addition, the suspension of non-essential medical treatments and the decline in patient volumes have resulted in a decline in Income for healthcare organizations. In addition, the pandemic has shown how crucial innovation and digital change are to the healthcare industry. The healthcare industry would be better positioned to retain its financial success during the pandemic if it could swiftly deploy telemedicine and other digital health technology in reaction to the changing conditions (Simmerling & Chen, 2021).

According to McKinsey findings, healthcare enterprises that effectively navigated the challenges posed by the pandemic embraced a strategy characterized as a "dual transformation." This approach encompasses the implementation of short-term solutions to tackle immediate obstacles alongside the pursuit of long-term strategies aimed at fostering sustainable growth. The longer-term initiatives typically involve investments in innovation and digital transformation, aiming to improve healthcare delivery and enhance patient outcomes. Short-term options include virtual care and other digital solutions to sustain patient care (Craven, Liu, Mysore, & Wilson, 2020).

Along with these elements, government initiatives and financial assistance also greatly impacted how well healthcare businesses fared financially during COVID-19.

Governments globally have provided financial support to healthcare organizations to meet the heightened demand for healthcare services and address the additional expenses brought about by the pandemic.

The government implemented several policies in China to support healthcare companies during the pandemic, including financial subsidies and tax breaks. The government also supported the development of COVID-19 vaccines and treatments, which has benefited healthcare companies involved in these efforts (Tian, 2021).

The financial performance of healthcare companies has been significantly affected by the COVID-19 pandemic, with various factors coming into play. These include shifts in healthcare service demand, heightened operational costs, the critical role of innovation and digital transformation, and the influence of government policies and financial support. Companies swiftly adapting to these challenges and implementing effective strategies have demonstrated better resilience in maintaining their financial performance during these trying times (Xu, Wu, & Cao, 2020).

This study will focus on two fundamental financial performance metrics: return on assets (ROA) and return on equity (ROE). These metrics hold widespread significance among investors and analysts for evaluating a company's financial health. Given its unique challenges and opportunities amidst the current landscape, they are particularly relevant in the healthcare industry. Our analysis will delve deeper into ROA and ROE, shedding light on how these key indicators reflect the healthcare industry's adaptability and resilience during the COVID-19 pandemic."

Return on Assets (ROA)

The company's Return on Assets (ROA) is a vital metric used to gauge the efficiency of its asset utilization in revenue generation. This formula calculates the amount of net Income allocated to total assets, expressed as a percentage. Essentially, ROA calculates a corporation's return on every dollar spent on its assets (Law, 2014).

ROA is significant in evaluating a company's financial performance as it provides valuable insights into the company's capacity to efficiently employ its resources for profit generation. A higher ROA is indicative of greater efficiency in converting assets into earnings, which is often viewed positively by investors and stakeholders (Law, 2014).

Given the context of the COVID-19 pandemic, ROA gains heightened relevance for healthcare companies. These companies operate in a financial landscape marked by unique challenges and opportunities. Given the increased focus on healthcare during the pandemic, they may experience surges in demand for their products and services. On the other hand, they must contend with rising costs and operational complexities as they adapt to evolving circumstances, implement new safety measures, and address the demands of this dynamic environment (Kumar & Zbib, 2022).

Return on Equity (ROE)

Return on Equity (ROE) is a crucial metric for evaluating the return a company yields from the equity investment made by its shareholders. The ROE calculation divides the company's net Income by its shareholders' equity, expressed as a percentage. Essentially, ROE measures how efficiently the company generates profits from the capital contributed by its shareholders (Law, 2014).

ROE is crucial in evaluating a company's financial performance because it offers insights into the company's ability to generate robust returns from shareholders' investments. A higher ROE suggests that the company is generating more profits for every dollar shareholder invest, a positive signal for both investors and stakeholders (Law, 2014).

In the context of the COVID-19 pandemic, ROE gains particular relevance for healthcare companies. These companies may encounter challenges in attracting and retaining investors amidst the current environment's uncertainty and volatility. Investors

may seek companies capable of delivering strong returns on their equity investments (Kumar & Zbib, 2022).

In conclusion, both ROA and ROE stand as indispensable metrics for evaluating the financial performance of healthcare companies within the framework of the COVID-19 pandemic. These metrics offer valuable insights into resource utilization and profit generation efficiency, which, in turn, assist investors and stakeholders in making well-informed investment decisions. This evaluation becomes particularly crucial given the challenges and opportunities posed by the ongoing pandemic, allowing for a comprehensive assessment of healthcare companies' resilience and contributions to the evolving healthcare landscape (Kumar & Zbib, 2022).

2.7 FACTORS AFFECTING THE FINANCIAL PERFORMANCE OF HEALTHCARE COMPANIES

Several factors affecting the financial performance of healthcare companies in China have been identified in the literature. These factors include:

2.7.1 Current Ratio (CR)

An important financial indicator used to evaluate the financial health of healthcare organizations is the current ratio (CR). It assesses a company's ability to cover its short-term liabilities with its short-term assets. The COVID-19 pandemic has significantly affected China's medical industry's current ratio as a result of interruptions in the healthcare supply chain, a decline in patient volume, and changes in patient behavior (Law, 2014).

The COVID-19 epidemic presented the Chinese healthcare industry with a number of challenges that had a detrimental effect on the current ratio. These challenges included disruptions in the healthcare supply chain, reduced patient volumes, and shifts in patient behavior.

Firstly, the disruption of the healthcare supply chain played a significant role in hindering the current ratio. Critical supplies, including masks, gloves, and ventilators, were in limited supply as a result of the pandemic's disruptions in the flow of key medical supplies and equipment. This disturbance significantly impacted the activities of healthcare organizations, particularly those involved in the manufacture and distribution of medical supplies. In turn, this had a detrimental impact on these businesses' current ratio (Francis, 2020).

Secondly, a decrease in patient volumes contributed to the decline in the current ratio. Many patients postponed elective procedures and non-urgent appointments due to concerns about the virus. As a result, Patient volumes and profits for healthcare organizations, particularly those offering non-emergency care, were significantly reduced. For instance, a report by China Merchants Securities stated that fewer outpatient visits caused private hospitals in China to see an 18% reduction in Income during the first quarter of 2020. Furthermore, changes in patient behavior had a noteworthy impact on the current ratio. Reduced demand for medical services was brought on by patients' increased reluctance to attend hospitals and clinics as a result of the epidemic. This shift particularly affected the current ratio of companies in the outpatient and diagnostic segments, which heavily rely on patient volume (Sun, Bao, & Lu, 2021b).

Despite these challenges, certain healthcare companies maintained or increased their current ratio. Demand for several medical supply manufacturing and distribution businesses' goods increased, resulting in higher sales. Businesses involved in the development and provision of telemedicine and other digital health solutions also experienced an increase in demand, which helped to lessen some of the pandemic's negative consequences (Sun et al., 2021b).

In summary, the COVID-19 pandemic significantly impacted China's current ratio of healthcare companies. While certain companies adapted and thrived, others faced challenges in maintaining their current ratio due to disruptions in the healthcare supply chain, reduced patient volumes, and shifts in patient behavior. Healthcare

providers must innovate and adapt as the epidemic develops to thrive in the new environment.

2.7.2 Debt to Asset Ratio

The Debt to Asset Ratio (D/A) is a critical financial measure employed to evaluate a company's ability to manage its debt commitments (Law, 2014). It quantifies the percentage of a company's assets funded through debt, offering insight into the extent to which borrowing supports its asset structure. The formula for calculating D/A is as follows:

$$D/A = \text{Total Debt} / \text{Total Assets}$$

A higher D/A ratio indicates a larger share of a company's assets financed through debt, suggesting a heightened level of financial risk. Conversely, a lower D/A ratio implies that a smaller proportion of assets is debt-financed, potentially indicating a reduced level of financial risk (Law, 2014).

The D/A ratio holds particular significance in the healthcare industry due to the substantial capital investments required for healthcare facilities and equipment. Many healthcare companies must heavily rely on debt financing to fund these essential investments, often resulting in a higher D/A ratio (Batrancea, 2021).

During the COVID-19 pandemic, the healthcare industry encountered significant financial challenges driven by the surging demand for healthcare services and the necessity to invest in new equipment and technology to address the crisis effectively. Consequently, many healthcare companies were compelled to resort to increased debt financing to meet these unprecedented demands, consequently impacting their Debt to Asset (D/A) ratios (Batrancea, 2021).

For instance, a study conducted by KPMG revealed that the D/A ratio within the healthcare industry in the Asia-Pacific region surged from 44.3% in 2019 to 49.3%

in 2020, signifying a heightened reliance on debt financing. This upswing in debt financing primarily stemmed from the substantial investments necessitated to respond to the COVID-19 pandemic. These investments included acquiring personal protective equipment, expanding healthcare facilities, and adopting new technology to enhance healthcare delivery (KMPG, 2020).

Nonetheless, it is crucial to emphasize that a high D/A ratio in isolation does not inherently signify weak financial performance. In practice, a company with a substantial D/A ratio can unlock the potential for substantial returns on equity when it adeptly allocates borrowed funds to lucrative ventures. Conversely, a company with a low D/A ratio may confront hurdles in securing capital, potentially constraining its ability to pursue growth prospects (KMPG, 2020).

Hence, assessing the D/A ratio within the broader context of a company's overall financial health and ability to meet its debt obligations is crucial. Healthcare companies that adeptly manage their debt financing and generate robust returns on equity are likely to find themselves in a more advantageous position for success within the evolving landscape of the post-COVID-19 healthcare industry.

2.7.3 Debt to Equity Ratio

Another popular financial statistic for analyzing a company's financial structure is the debt-to-equity ratio (D/E Ratio). This ratio assesses the overall debt of the business in relation to shareholders' equity, giving information on the proportion of debt-to-equity financing. A higher D/E ratio signifies a heightened level of leverage and financial risk, indicating that the company relies more heavily on borrowed funds to fund its operations and expansion (Law, 2014).

A report from Deloitte underscores the substantial financial strains placed on healthcare companies by the COVID-19 pandemic. Many of these organizations were compelled to resort to debt financing to sustain their operations (Deloitte, 2020). The report highlights that healthcare entities with elevated D/E ratios face a heightened risk

of defaulting on their debt payments, particularly in economic uncertainty and market volatility.

In China, healthcare companies exhibited a wide range of Debt-to-Equity (D/E) ratios prior to the pandemic, with some firms carrying higher leverage than others. However, during the pandemic, the D/E ratio assumed heightened importance as a critical gauge of financial health, with many companies grappling to effectively manage their debt obligations.

One of China's leading healthcare companies, Shanghai Fosun Pharmaceutical Group Co. Ltd., observed a considerable improvement in its D/E ratio for the year 2020 compared to the year prior (Fosun Pharma, 2021). This surge stemmed from the company's ambitious expansion endeavors and substantial investments in research and development during the pandemic.

Similarly, another Chinese healthcare entity, Sino Biopharmaceutical Limited, reported a heightened D/E ratio for 2020 in contrast to the previous year, signaling increased leverage and heightened financial risk (Sino Biopharmaceutical Limited, 2021).

Nevertheless, certain healthcare companies in China successfully maintained a robust D/E ratio throughout the pandemic. One prominent Chinese pharmaceutical company, Jiangsu Hengrui Medicine Co., Ltd., maintained a steady D/E ratio for 2020, demonstrating a solid financial basis (Jiangsu Hengrui Medicine, 2021).

In conclusion, the COVID-19 pandemic highlighted the paramount importance of upholding a robust financial structure for healthcare companies, especially in effectively managing their debt levels. A high D/E ratio can pose significant financial risks during periods of economic uncertainty, emphasizing the necessity for companies to establish a sustainable financial structure capable of withstanding the challenges posed by the pandemic and potential future crises.

2.7.4 Sales Growth (SG)

Sales growth is a crucial metric for evaluating healthcare companies' financial performance. It measures a firm's total sales change over a specified period, reflecting its ability to generate revenue and expand its business operations (Law, 2014).

The COVID-19 pandemic introduced various challenges that significantly impacted sales growth in the healthcare industry. For example, many hospitals and clinics were compelled to suspend or reduce their services due to government-mandated lockdowns and safety measures. This resulted in decreased revenue and, consequently, a decline in sales growth for several companies (Sun et al., 2021b).

Conversely, some healthcare companies involved in producing medical equipment and supplies experienced increased demand during the pandemic, leading to robust sales growth. Additionally, certain companies quickly adapted to the evolving market conditions by integrating new technologies or expanding their telemedicine services, further boosting their sales growth (Wang, Xie, & Yeet, 2021).

Several studies have examined the impact of the COVID-19 pandemic on sales growth in the healthcare industry. S&P Global Market Intelligence reported a significant decline in the median sales growth rate for healthcare companies in China, dropping from 19.2% in 2019 to 11.5% in 2020. This data underscores the substantial repercussions of the pandemic on the industry's sales growth dynamics. Another study by Deloitte found that healthcare firms that effectively utilized digital technologies and innovation during the pandemic were better positioned for sales growth (Deloitte, 2020).

In addition to the influence of COVID-19, other factors can also shape sales growth in the healthcare industry. For example, mergers and acquisitions can stimulate sales growth as companies combine their resources and expand their operations. Conversely, divestitures or spin-offs may result in declining sales growth as companies divest specific assets.

Financial data from business reports will be utilized to assess the sales growth of healthcare enterprises in China during the COVID-19 pandemic. This analysis will consider changes in total sales over the past year and any significant mergers, acquisitions, or divestitures that may have impacted these companies' ability to grow their sales.

2.7.5 Operating Cash Flow (OCF)

Operating cash flow (OCF) is a critical financial metric used to evaluate healthcare companies' liquidity and financial health. It measures the cash generated from a company's primary operating activities, providing insight into its ability to meet short-term obligations, fund expansion initiatives, and generate shareholder value (Law, 2014).

The COVID-19 pandemic has posed significant challenges to the operating cash flow of healthcare organizations in China. For example, many hospitals and clinics experienced disruptions in their cash flow due to reduced patient volumes, delayed insurance payments, and increased expenses related to pandemic response measures (Sun et al., 2021b).

Furthermore, implementing lockdowns and social distancing measures led to decreased patient visits and elective procedures, resulting in lower revenue generation for healthcare providers. This reduction in revenue, coupled with increased costs associated with acquiring personal protective equipment (PPE) and implementing safety protocols, put pressure on the operating cash flow of many healthcare companies (Wang et al., 2021).

Despite these challenges, certain healthcare organizations were able to mitigate the negative impact on their operating cash flow through various strategies. For instance, some companies implemented cost-saving measures, renegotiated contracts with suppliers, and diversified their revenue streams to maintain positive cash flow during the pandemic (Deloitte, 2020).

Research studies examining the impact of the COVID-19 pandemic on operating cash flow in the healthcare industry have highlighted the importance of proactive financial management and strategic planning. Companies that adopted agile financial practices and invested in digital transformation initiatives were better equipped to navigate the challenges posed by the pandemic and sustain their operating cash flow (Deloitte, 2020).

In summary, the COVID-19 pandemic has presented unprecedented challenges to the operating cash flow of healthcare companies in China. While many organizations faced disruptions and financial strain, proactive management strategies and strategic investments in technology and innovation have enabled some companies to maintain resilient cash flow positions.

2.7.6 Size (S)

The size of a company's assets, represented by the natural logarithm of total assets, is a fundamental financial indicator that provides valuable insights into the company's overall financial health, stability, and growth potential. It also significantly influences the company's ability to secure capital, manage debt effectively, and explore opportunities for expansion (Law, 2014).

During the COVID-19 epidemic, many Chinese healthcare companies experienced increased service demand, leading to higher revenues and potentially larger asset bases. However, the pandemic also presented challenges such as supply chain disruptions, rising costs of personal protective equipment (PPE), and decreased elective surgeries. These challenges may have impacted the growth of assets and the overall size of assets for certain companies within the industry (Francis, 2020).

Studies have highlighted the significant role of asset size in shaping the financial performance of healthcare companies. Research by Chen (2020) found a positive correlation between the size of assets in Chinese hospitals and their financial success. This suggests that larger hospitals may have greater resources to invest in

advanced technologies and equipment, attract and retain top talent, and offer patients a wider range of services. Additionally, the study noted that hospitals located in economically developed regions tended to have larger asset sizes and better financial performance, underscoring the impact of regional economic dynamics on healthcare companies in China.

Another study by Zhang (2018) explored the impact of hospital asset size on patient satisfaction in China. The findings revealed that larger hospitals generally had higher levels of patient satisfaction due to their ability to offer a broader range of services and attract experienced, specialized medical professionals.

However, it is important to recognize that asset size alone does not guarantee financial success for healthcare companies. Effective management and resource allocation also play crucial roles in achieving and sustaining financial stability and growth.

In summary, asset size, represented by the natural logarithm of total assets, is a critical financial factor that can significantly influence the financial performance of healthcare companies in China. Larger asset sizes provide companies with more resources and opportunities for investment in growth and innovation and the ability to attract and retain top talent and offer a wider range of services to patients. However, effective resource management and allocation are essential for achieving and maintaining financial stability and growth in the healthcare sector.

2.8 CHINESE HEALTHCARE BUSINESS OVERVIEWS

The Chinese healthcare sector has undergone significant transformation and expansion over the past few decades. A combination of demographic changes, economic development, government policy initiatives, and technological advancements has driven this growth. This section provides an overview of the Chinese healthcare industry's key trends, challenges, and opportunities.

2.8.1 Market Size and Growth

The Chinese healthcare market is one of the largest in the world and continues to grow rapidly. According to a report by McKinsey & Company (2019), the market size was estimated at approximately \$1 trillion in 2019 and is projected to reach \$2.3 trillion by 2030. This growth is fueled by an aging population, rising incomes, increasing urbanization, and greater health awareness among the Chinese population.

2.8.2 Government Policies and Reforms

The Chinese government has played a crucial role in shaping the healthcare sector through a series of reforms and policy initiatives aimed at improving access, quality, and affordability of healthcare services. Key initiatives include the "Healthy China 2030" plan, which aims to provide comprehensive health services to the entire population, and the implementation of a tiered healthcare system to streamline service delivery and improve efficiency.

In recent years, the government has also encouraged the development of private healthcare facilities and the integration of traditional Chinese medicine with modern medical practices, further diversifying the healthcare landscape (Fung Business Intelligence, 2020).

2.8.3 Challenges in the Sector

Despite significant progress, the Chinese healthcare sector faces several challenges, including resource distribution: There is a notable disparity in healthcare resources between urban and rural areas. Urban centers tend to have better infrastructure, more qualified healthcare professionals, and advanced medical technologies compared to rural regions (World Bank, 2019). Aging Population: China's rapidly aging population presents a major challenge, with increasing demand for geriatric care and chronic disease management (China National Committee on Aging, 2018); Healthcare Costs: Rising healthcare costs continue to be a concern for both the

government and the populace. Efforts to control costs while maintaining quality and access to care remain a complex issue (Organisation for Economic Co-operation and Development [OECD], 2019).

2.8.4 Technological Innovations

Technological advancements are playing a transformative role in the Chinese healthcare industry. The adoption of digital health technologies, such as telemedicine, mobile health applications, and AI-driven diagnostics, is rapidly increasing. Companies like Ping An Good Doctor and Alibaba Health are leading the way in integrating technology with healthcare services, enhancing access, and improving patient outcomes (Li, 2020). Furthermore, the Chinese government has been investing heavily in biotechnology and pharmaceutical research, aiming to position China as a global leader in medical innovation (Frost & Sullivan, 2020).

2.8.5 Foreign Investment and Collaboration

China's healthcare market has attracted substantial foreign investment and collaboration. Multinational corporations are increasingly partnering with Chinese companies to tap into the growing market. Joint ventures and partnerships in areas such as pharmaceuticals, medical devices, and health services are common, with foreign firms bringing advanced technologies and expertise to complement local capabilities (Deloitte, 2021).

2.8.6 Future Prospects

Looking ahead, the Chinese healthcare sector is poised for continued growth and transformation. Key trends likely to shape the future include the further integration of digital health solutions, increased focus on preventive care, and the expansion of healthcare services to underserved regions. The ongoing policy support from the government and the rising demand for high-quality healthcare services will be critical drivers of this evolution (McKinsey & Company, 2020).

In conclusion, the Chinese healthcare sector presents a dynamic and rapidly evolving landscape marked by significant opportunities and challenges. Understanding these trends and developments is essential for stakeholders looking to navigate this complex and promising market.

2.9 OTHER RELATED RESEARCH PAPERS - RELATED HEALTHCARE BUSINESS

The landscape of healthcare business research is rich with studies exploring various aspects of financial performance, operational efficiency, market dynamics, and strategic management. This section reviews key research papers that provide valuable insights into the healthcare business, particularly in the context of financial indicators, technological advancements, and strategic responses to crises like the COVID-19 pandemic.

2.9.1 Financial Performance and Management

Several studies have examined the financial performance and management practices within the healthcare sector. These studies often focus on key financial metrics such as liquidity ratios, leverage, profitability, and cash flow management.

Sun et al. (2021b) This study investigates the impact of liquidity management on the financial performance of healthcare firms in China. The authors find that maintaining adequate liquidity is crucial for operational stability, especially during economic disruptions like the COVID-19 pandemic. They highlight the importance of efficient cash flow forecasting and liquidity buffers in enhancing financial resilience. Musa (2022). The research explores the effects of high leverage on financial stability in the healthcare industry. The authors conclude that companies with higher debt levels are more vulnerable during economic crises, underscoring the need for balanced debt-to-equity ratios and proactive debt management strategies.

2.9.2 Technological Innovations and Digital Health

The integration of technology into healthcare services has been a focal point of recent research, emphasizing the role of digital health solutions in improving patient outcomes and operational efficiency.

Wang et al. (2021). This paper examines the impact of digital health technologies on operational efficiency in Chinese hospitals. The study finds that the adoption of telemedicine and mobile health applications has significantly improved patient access to care and reduced operational costs.

Leite, Lindsay, & Kumar (2020). The authors explore how AI-driven diagnostics and other technological advancements are transforming healthcare delivery. They argue that these innovations enhance diagnostic accuracy, streamline workflows, and improve financial performance.

2.9.3 Strategic Responses to Crises

The COVID-19 pandemic has prompted extensive research into how healthcare organizations can better prepare for and respond to crises. Studies in this area focus on strategic planning, crisis management, and resilience building.

Bolton, Kacperczyk, Hong, & Vives, (2021). This study investigates the strategic responses of healthcare firms to the COVID-19 pandemic. The authors highlight the importance of flexibility, robust contingency planning, and adopting digital technologies in maintaining operational continuity and financial stability during crises.

Francis (2020). This paper focuses on supply chain resilience in the healthcare sector. It argues that building diversified and flexible supply chains is critical for managing disruptions and ensuring the continuous delivery of essential medical supplies and services.

2.9.4 Broader Economic and Social Impacts

Research has also explored the broader economic and social impacts of healthcare business practices, particularly in the context of public health and social equity.

Chen, Zhou, and Fang (2020). This study examines the role of healthcare companies in addressing social inequalities and public health challenges in China. The authors argue that corporate social responsibility (CSR) initiatives in the healthcare sector can significantly promote social equity and improve public health outcomes.

Smallwood (2022). analyzes the impact of employee well-being on organizational performance in healthcare. They find that supportive workplace policies and practices are crucial for maintaining a motivated and productive workforce, essential for delivering high-quality healthcare services.

In summary, the reviewed literature provides a comprehensive understanding of the healthcare business's financial, technological, strategic, and social dimensions. These studies offer valuable insights that can inform healthcare companies' strategic decision-making, particularly in navigating economic uncertainties and leveraging technological advancements to enhance operational efficiency and financial performance.

CHAPTER 3

METHODOLOGY

3.1 RESEARCH DESIGN

This study employed a quantitative research approach to gather and analyze data, divided into two distinct phases. The first phase involved collecting quantitative data from a secondary source, specifically the Bloomberg database. Subsequently, the second phase centered on analyzing the acquired data.

Although it provided a complete assessment of the factors that affected the financial performance of Chinese healthcare companies during the COVID-19 outbreak, this study was well-suited for a quantitative research technique. The quantitative data collected in the initial phase offered a broad overview of these companies' financial performance in the context of the pandemic. Conversely, the qualitative data analyzed in the subsequent phase provided more profound insights into the contributing factors affecting their financial performance.

For the purpose of this study, healthcare businesses were chosen based on a set of criteria, including their public listing on either the Shanghai or Shenzhen stock markets and the accessibility of published financial reports for the year 2022. Initially, the dataset included 293 companies. However, after a thorough data cleaning process, which ensured the accuracy and completeness of the financial information, the final sample was refined to 206 healthcare-listed companies that met all the required criteria. These 206 companies were then included in the study, providing a robust and reliable dataset for analysis.

In summary, this study technique allowed a thorough examination of the variables affecting the financial success of Chinese healthcare institutions during the

COVID-19 outbreak. The application of quantitative tools and the study of secondary data enabled a greater understanding of the phenomenon under research.

3.2 POPULATION AND SAMPLE SELECTION

The population for this study comprised all healthcare companies listed on the Shanghai and Shenzhen Stock Exchanges in China. The sample selection for the study was based on the following criteria:

Inclusion criteria:

- a) Healthcare companies listed on the Shanghai and Shenzhen Stock Exchanges in China.
- b) Companies that have publicly available financial reports covering the period prior to the COVID-19 pandemic and during COVID-19 in China.
- c) Companies that operate in the healthcare industry, including healthcare equipment and supplies, healthcare providers and services, healthcare technology, and pharmaceuticals.

Exclusion criteria:

- a) Companies that did not have publicly available financial reports for the period of the COVID-19 pandemic in China.
- b) Companies that operate in industries other than healthcare.

The research focuses on analyzing the financial data of the Chinese healthcare sector, utilizing information sourced from the Bloomberg database. Initially, the dataset comprised 293 companies prior to data cleaning. After the data cleaning process, the final sample consisted of 206 healthcare organizations covering a period of six years, resulting in 1236 firm-year observations. These organizations span four key sectors within the healthcare industry: Healthcare Equipment and supplies, Healthcare Providers and services, Healthcare Technology, and Pharmaceuticals.

The sample selection process involved meticulous inclusion and exclusion criteria to ensure the availability and accuracy of financial data for the chosen organizations. The aim was to gather a robust dataset to facilitate meaningful analysis and derive significant conclusions. Including these diverse sectors ensures a comprehensive representation of the healthcare industry, thereby enhancing the study's generalizability.

By selecting 206 companies, the study balances data comprehensiveness and manageability. This sample size provides sufficient data to conduct detailed analyses while remaining feasible within the study's time and resource constraints. Furthermore, the chosen sample offers a diverse cross-section of healthcare companies in China, reflecting the industry's heterogeneity and providing insights into various segments within the sector.

Overall, the inclusion of 206 healthcare organizations, based on stringent selection criteria and the availability of financial data from Bloomberg, ensures that the study encompasses a broad and representative sample of the Chinese healthcare industry. This approach enhances the validity and reliability of the research findings, offering valuable insights into the sector's financial performance and dynamics.

3.3 METHOD

The quantitative investigation included the use of multiple regression analysis and descriptive statistics to look into the relationship between independent factors and the financial success of healthcare businesses during the COVID-19 epidemic.

3.3.1 Descriptive Statistics

The financial information acquired from the annual reports of the selected healthcare companies was summarized and presented using descriptive statistics. Among the financial measures considered were the Current Ratio (CR), Debt to Asset

Ratio (DA), Debt to Equity Ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S), return on assets (ROA), and return on equity (ROE)

The descriptive statistics applied in this inquiry comprised measures of dispersion like standard deviation and range, as well as indicators of central tendency like mean, min, max, and correlation, which are to be presented. The financial performance of the healthcare organizations was assessed using these statistical methods, which also served to highlight any obvious patterns or trends in the data.

3.3.2 T-Test (Prior COVID-19 and During COVID-19)

In addition to other analytical methods, a t-test will be conducted to explore specific variables and evaluate potential differences in means between the periods prior to and during the COVID-19 pandemic. This statistical method aims to determine whether there are significant variations in key financial indicators during these distinct timeframes.

The selected variables for the t-test include current ratio (CR), debt-to-asset ratio (DA), debt-to-equity ratio (DE), sales growth (SG), operating cash flow (OCF), size (S), return on assets (ROA), and return on equity (ROE). These variables collectively offer a comprehensive overview of financial performance within the Chinese healthcare sector.

The outcomes of the t-test will be interpreted to determine whether there is empirical evidence supporting or refuting the hypotheses. Significance levels will be set at conventional thresholds ($p < 0.05$) to assess the statistical meaningfulness of observed differences. This analysis aims to provide nuanced insights into the temporal shifts of financial performance indicators, contributing to a comprehensive understanding of industry dynamics.

While t-test analysis provides valuable insights, it is important to acknowledge potential limitations. The t-test assumes normal distribution and homogeneity of

variances, and any deviations from these assumptions may affect the robustness of the results. Nonetheless, the t-test serves as a valuable tool for examining specific variables and their temporal dynamics prior to and during the onset of the COVID-19 pandemic.

3.3.3 Correlation

Table 3.1 shows the meaning of the r value in correlation analysis. Very High ($r > 0.90$): This indicates a very strong positive correlation between the two variables. For instance, in a healthcare financial analysis, a very high correlation between operating cash flow and profitability would suggest that as operating cash flow increases, profitability also increases significantly and predictably.

High correlation ($0.75 < r \leq 0.90$): This level indicates a strong positive relationship. For example, a high correlation between sales growth and revenue might imply that higher sales growth rates are strongly associated with higher revenues.

Moderate correlation ($0.50 < r \leq 0.75$): This indicates a moderate positive relationship where trends are noticeable but not as pronounced as higher correlations. In practice, a moderate correlation between company size and market share might suggest that larger companies tend to have a larger market share, but there are many exceptions.

Low correlation ($0.25 < r \leq 0.50$): A weak positive relationship indicates a trend that is present but not strong. For example, a low correlation between marketing expenditure and customer satisfaction might suggest that increased marketing has some positive effect on satisfaction, but other factors are more influential.

Very low correlation ($0 < r \leq 0.25$): This level indicates a very weak positive relationship, which might not be practically significant. For example, the very low correlation between administrative costs and revenue might imply that changes in administrative costs have little to no effect on revenue.

No correlation ($r = 0$): This indicates no relationship at all. For example, if there is no correlation between the number of employees and the profitability of a company, then changes in the number of employees do not predict changes in profitability.

Negative very low correlation ($-0.25 \leq r < 0$): A very weak negative relationship indicates an almost negligible inverse relationship. For example, a very low negative correlation between office space and productivity might suggest that slight increases in office space have minimal to no impact on productivity.

Negative low correlation ($-0.50 \leq r < -0.25$): This indicates a weak negative relationship. For instance, a negative low correlation between debt levels and profit margins might suggest that higher debt levels are weakly associated with lower profit margins.

Negative moderate correlation ($-0.75 \leq r < -0.50$): A moderate negative relationship suggests a noticeable inverse relationship. For example, a negative moderate correlation between employee turnover and customer satisfaction might indicate that as employee turnover increases, customer satisfaction tends to decrease.

Negative high correlation ($-0.90 \leq r < -0.75$): This indicates a strong negative relationship. For example, a high negative correlation between operational errors and efficiency might suggest that as the number of errors increases, efficiency significantly decreases.

Negative very high correlation ($r < -0.90$): This indicates a very strong negative relationship. For example, a very high negative correlation between downtime and productivity would suggest that increased downtime almost directly and significantly decreases productivity.

Table 3.1 Correlation Definition

Correlation Level	Correlation Coefficient (r)	Explanation
Very High	$r > 0.90$	indicates a very strong positive relationship between two variables. As one variable increases, the other variable increases almost proportionally.
High	$0.75 < r \leq 0.90$	indicates a strong positive relationship. There is a noticeable, consistent pattern where an increase in one variable is associated with an increase in the other.
Moderate	$0.50 < r \leq 0.75$	indicates a moderate positive relationship. There is a clear trend where increases in one variable generally correspond to increases in the other, though exceptions exist.
Low	$0.25 < r \leq 0.50$	indicates a weak positive relationship. There is a tendency for the variables to move together, but the relationship is not strong, and other factors may be influential.
Very Low	$0 < r \leq 0.25$	indicates a very weak positive relationship. The variables are slightly related, but the relationship is not strong or consistent.
No Correlation	$r = 0$	indicates no relationship between the variables. Changes in one variable do not predict changes in the other.
Negative Very Low	$-0.25 \leq r < 0$	indicates a very weak negative relationship. The variables are slightly inversely related, but the relationship is not strong or consistent.

Table 3.1 Correlation Definition (Cont.)

Correlation Level	Correlation Coefficient (r)	Explanation
Negative Low	$-0.50 \leq r < -0.25$	indicates a weak negative relationship. There is a tendency for one variable to decrease as the other increases, but other factors may be more influential.
Negative Moderate	$-0.75 \leq r < -0.50$	indicates a moderate negative relationship. There is a clear trend where increases in one variable generally correspond to decreases in the other.
Negative High	$-0.90 \leq r < -0.75$	indicates a strong negative relationship. There is a noticeable, consistent pattern where an increase in one variable is associated with a decrease in the other.
Negative Very High	$r < -0.90$	indicates a very strong negative relationship. As one variable increases, the other variable decreases almost proportionally.

3.3.4 Multiple Regression Analysis

This study attempts to understand the relationships between numerous variables and the financial performance of healthcare businesses during the COVID-19 epidemic. This analysis employs multiple regression. Multiple regression models consist of 6 independent variables and one dummy variable, and two dependent variables which are: return on assets (ROA) and return on equity (ROE). More details of multiple regression model are presented on section 3.3.5.

In general, the quantitative analysis offered a methodical way to investigate the link between the independent factors and the financial success of healthcare organizations. The analysis' findings shed light on the variables that affected the

financial performance of healthcare organizations during the COVID-19 pandemic and aided in the identification of successful pandemic response tactics.

3.3.5 Data and Models

This study aimed to investigate the impact of the COVID-19 pandemic on the financial performance of healthcare companies in China. The research sample included data from 2017 to 2022 to assess pandemic-related effects on corporate performance.

Eight financial indicators and one dummy variable—Current Ratio (CR), Debt to Asset Ratio (DA), Debt to Equity Ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S), COVID-19, return on assets (ROA), and return on equity (ROE)—were taken into account in this study. Based on earlier research and their applicability to the healthcare sector, these indicators were chosen.

Financially distressed companies and those in banking, securities, and related financial industries were excluded to ensure data comparability. Missing data were also excluded. Data were sourced from the Bloomberg database, which is widely used in financial research. To examine the relationship between the financial performance of healthcare companies and the selected factors, the researcher used a panel data regression model. The model took the following form:

$$ROA_{it} = \alpha + \beta_1 CR_{it} + \beta_2 DA_{it} + \beta_3 DE_{it} + \beta_4 SG_{it} + \beta_5 OCF_{it} + \beta_6 S_{it} + \beta_7 CV19_{it} + \varepsilon_{it} \dots \dots \dots (1)$$

$$ROE_{it} = \alpha + \beta_1 CR_{it} + \beta_2 DA_{it} + \beta_3 DE_{it} + \beta_4 SG_{it} + \beta_5 OCF_{it} + \beta_6 S_{it} + \beta_7 CV19_{it} + \varepsilon_{it} \dots \dots \dots (2)$$

Where to:

ROA_{it} = Return on assets of the Chinese healthcare listed companies i at time t

ROE_{it} = Return on assets of the Chinese healthcare listed companies i at time t

CR_{it} = Current ratio of Chinese healthcare listed company i at time t

DA_{it} = Debt-to-Asset Ratio of Chinese healthcare listed company i at time t

DE_{it} = Debt-to-Equity Ratio of Chinese healthcare listed company i at time t

SG_{it} = Sales Growth of Chinese healthcare listed company i at time t

OCF_{it} = Operating Cash Flow of Chinese healthcare listed company i at time t

S_{it} = Size of Chinese healthcare listed company i at time t

$CV19$ = A dummy variable where 0 is the year prior to COVID-19 (2017-2019), 1 is the year during COVID-19 (2020-2022)

ε = the error term

α and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ = the coefficients to be estimated.

The researcher analyzed financial indicators like debt ratios, asset growth, revenue growth, asset size, and returns on assets and equity. The study employs statistical methods to study their impact on healthcare companies during the pandemic, considering differences among companies over time.

The study employs a fixed-effects/random-effects model to consider consistent unobserved differences among companies over time. Additionally, a first-difference estimator removed time-invariant unobserved factors and reduced potential bias from omitted variables. In addition, both fixed effect and random effect models are to be chosen based on the Hausman test.

In conclusion, the study employs a panel data regression model to investigate the relationships between eight financial indicators—current ratio (CR), debt-to-asset ratio (DA), debt-to-equity ratio (DE), sales growth (SG), operating cash flow (OCF), Size (S)—and their influence on return on assets (ROA) and return on equity (ROE) as measures of profitability in the Chinese healthcare sector. The analysis also considered

the dummy role of COVID-19 in these relationships. The analysis excluded data for financially troubled businesses, those in the banking and securities sectors, and those with incomplete data. To address potential bias from missing variables and account for time-invariant unobserved heterogeneity, the researcher utilizes a fixed-effects model or random-effect model based on the Hausman test results.

3.3.6 Hausman Test Theory

The Hausman test, named after economist Jerry A. Hausman, is a statistical test used to determine the appropriate model between fixed effects and random effects in panel data analysis. This test is essential in econometric studies where the choice between these two models significantly impacts the results and interpretations.

Fixed Effects Model

The fixed effects model assumes that individual entity characteristics (such as company-specific attributes) may influence the predictor variables and, therefore, need to be controlled for. The fixed effects model controls for these time-invariant characteristics by allowing the intercept to vary across entities but assumes that these characteristics are constant over time. The general form of the fixed effects model is:

$$Y_{it} = \alpha_i + \beta X_{it} + \epsilon_{it} \quad (3-1)$$

Where Y_{it} is the dependent variable, α_i is the entity-specific intercept, X_{it} represents the independent variables, and ϵ_{it} is the error term.

Random Effects Model

The random effects model, on the other hand, assumes that the entity-specific effects are random and uncorrelated with the predictor variables. This model is appropriate when the variations across entities are assumed to be random and not correlated with the independent variables included in the model. The random effects model can be specified as:

$$Y_{it} = \alpha + \beta X_{it} + u_i + \epsilon_{it} \quad (3-2)$$

Where α is the overall intercept, u_i is the entity-specific random effect, and the other terms are as previously defined.

The Hausman test is used to test the null hypothesis that the preferred model is random effects versus the alternative hypothesis that the fixed effects model is preferred. Essentially, it tests whether the unique errors (u_i) are correlated with the regressors, the null hypothesis being they are not.

To perform the Hausman test, first estimate the fixed effects and random effects models and then compare the two sets of coefficients. The test statistic is calculated as follows:

$$H = (\beta_{FE} - \beta_{RE})' [\text{Var}(\beta_{FE}) - \text{Var}(\beta_{RE})]^{-1} (\beta_{FE} - \beta_{RE}) \quad (3-3)$$

Where β_{FE} and β_{RE} are the coefficients from the fixed effects and random effects models, respectively. The test statistic H follows a Chi-square distribution with degrees of freedom equal to the number of regressors. If the test statistic is significant (p-value is low), we reject the null hypothesis and conclude that the fixed effects model is more appropriate.

In this research, the Hausman test is applied to determine whether the fixed effects or random effects model better suits the analysis of the financial performance of healthcare companies in China during the COVID-19 pandemic. Given the specific characteristics of each company and the potential correlation of these characteristics with the explanatory variables, the Hausman test will guide the selection of the most appropriate model to ensure robust and reliable results.

By comparing the fixed and random effects models using the Hausman test, this study aims to provide a more accurate understanding of how various financial indicators influenced the performance of healthcare companies during the pandemic,

thereby contributing to more informed financial decision-making and policy development.

3.4 MIXED-METHOD APPROACH

This research employs a mixed-methods approach, integrating quantitative methods of t-test analysis and multiple regression. The research method employed allows us to see the findings that are complex and multifaceted in nature of the research problem. This section provides a rationale for this methodological choice, elucidating how the combination of these approaches enhances the overall study.

3.4.1 Complexity of Financial Performance in Healthcare during COVID-19

The financial performance of healthcare companies during the COVID-19 pandemic is inherently intricate, influenced by various quantitative factors such as debt ratios, asset growth, and return metrics. However, a purely quantitative analysis might oversimplify the nuanced challenges and strategic responses these companies faced.

3.4.2 Complementary Nature of Mixed-Methods

The mixed-methods approach is chosen for its ability to triangulate findings, ensuring the robustness and validity of the research. The quantitative data validate and quantify relationships, while the qualitative data provide depth, context, and a holistic understanding. Combining these methods allows for a more comprehensive analysis, acknowledging that the financial performance of healthcare companies is not solely driven by numerical metrics but also by organizational strategies, resilience, and adaptability.

3.4.3 Holistic Understanding for Practical Implications

The integration of quantitative and qualitative findings aims to provide a holistic understanding that goes beyond statistical significance. This approach is essential for deriving practical implications and recommendations for healthcare practitioners, policymakers, and industry stakeholders. It allows for a nuanced interpretation of the financial landscape, aiding in the development of informed strategies and policies.

In summary, the mixed-methods approach is pivotal for capturing the multidimensional nature of the research problem, combining the strengths of quantitative methodologies. This integration is anticipated to yield a more nuanced, valid, and practically relevant insight into the factors influencing the financial performance of healthcare companies in China during the COVID-19 pandemic.

3.5 VALIDITY AND RELIABILITY OF RESEARCH

To guarantee the validity and trustworthiness of the findings, the research's quality is crucial. To ensure the quality of the research, several measures were taken, including:

Selection of Appropriate Research Design: The research design was selected based on the research objectives, and it was deemed appropriate for this study. The acquisition of numerical data that could be analyzed using statistical methods was made possible by the adoption of a quantitative research design.

Data Collection: Data were collected from reliable and credible sources (Bloomberg database), including financial reports and databases such as the China Securities Regulatory Commission and Wind Financial Terminal.

Data Analysis: Comprehensive data analysis was conducted employing advanced statistical software (Stata) to enhance the precision of the study's findings.

3.6 SCOPE OF THE RESEARCH

3.6.1 Population and Samples

The study's population consisted of all healthcare companies listed on the Shanghai and Shenzhen Stock Exchanges in China. The sample selection was guided by the criteria detailed in section 3.2. With a sample size of 206 healthcare-listed companies, the study struck a balance between collecting ample data for meaningful conclusions and practical manageability within the study's time and resource constraints.

Table 3.2 and Table 3.3 present a detailed distribution of observations across different healthcare sectors in the Shanghai and Shenzhen stock exchanges. A significant proportion of the observations from the Shanghai Stock Exchange (44.66%) are in the pharmaceuticals sector, contributing to the overall dominance of this sector in the dataset (44.66% overall). The Shenzhen Stock Exchange has a more balanced distribution of observations among Equipment & Supplies (15.05%), Providers & Services (12.14%), and Healthcare Technology (2.43%). It does not have any observations in the pharmaceutical sector. Equipment & Supplies and Pharmaceuticals are the most represented sectors in the overall dataset, accounting for 36.41% and 44.66% of the observations, respectively.

This distribution suggests that while the Shanghai Stock Exchange has a heavy emphasis on pharmaceuticals, the Shenzhen Stock Exchange offers a more diverse representation across various healthcare sectors. This diversity is crucial for understanding the financial performance dynamics across different segments of the healthcare industry in China.

Table 3.2 Subsectors of Healthcare

Stock Exchanges	Number of observations				
	equipment & supplies	providers & services	healthcare technology	pharmaceutical	Total
Shanghai	264	36	18	552	870
Shenzhen	186	150	30	0	366
Total	450	186	48	552	1236

Table 3.3 Subsectors of Healthcare (Proportion)

Stock Exchanges	Proportion of the observation (%)				
	equipment & supplies	provider s& services	healthcare technology	pharmaceuticals	Total
Shanghai	21.36	2.91	1.46	44.66	70.39
Shenzhen	15.05	12.14	2.43	-	29.61
Total	36.41	15.05	3.88	44.66	100.00

Source: Compiled by researcher

3.6.2 Variables Used in the Study

The choice of variables for this study was guided by their relevance to the healthcare industry and their potential influence on the financial performance of the healthcare companies under investigation during the COVID-19 pandemic. These variables encompassed the current ratio (CR), debt-to-asset ratio (DA), debt-to-equity ratio (DE), sales growth (SG), operating cash flow (OCF), asset size (S), return on assets (ROA), return on equity (ROE), and the impact of COVID-19, as Table 3.4.

Table 3.4 Definition of Variables Used in the Study

Metric	Formula	Explanation
Current Ratio (CR)	$\text{Current Assets} \div \text{Current Liabilities}$	A measure of a company's ability to cover its short-term liabilities with its short-term assets.
Debt-to-Asset Ratio	$\text{Total debt} \div \text{Total Assets}$	A measure of a company's ability to repay its debts from its assets. The higher the ratio, the higher the risk of default.
Debt-to-Equity Ratio	$\text{Total debt} \div \text{Total Equity}$	A measure of a company's leverage or the extent to which it is using debt financing. A higher ratio indicates greater financial risk.
Sales Growth (SG)	$(\text{Current Year Sales} - \text{Previous Year Sales}) \div \text{Previous Year Sales}$	A measure of the change in a company's sales over a given period.
Operating Cashflow (OCF)	$\text{Net Operating Income} \div \text{Total Assets}$	A measure of a company's ability to generate cash from its operating activities relative to its total assets.
Size (S)	Log of Total Assets	Natural Log of Total Assets represents the natural logarithm of a company's total assets.
COVID19	0=2018-2019 1=2020-2022	COVID-19 pandemic
Return on Assets (ROA)	$\text{Net Income} \div \text{Average Total Assets}$	A measure of a company's profitability in relation to its total assets.
Return on Equity (ROE)	$\text{Net Income} \div \text{Average Total Equity}$	A measure of a company's profitability in relation to its equity or the amount of money invested by shareholders.

Source: Compiled by researcher

3.6.3 Study Area

The period of the study was from December 2017 through December 2022, the research was carried out in China, during the COVID-19 pandemic. The financial performance of healthcare firms that were publicly listed on the Shanghai and Shenzhen Stock Exchanges in China during this time was the study's main emphasis.

It is essential to clarify that healthcare companies not listed on these stock exchanges or those operating outside of China were excluded from the study's scope. Furthermore, the research was specifically tailored to assess the financial performance of selected healthcare companies in China in the context of the pandemic.

Any results drawn from this research should be carefully understood in light of the study's constrained scope and the unique sample of healthcare firms in China. The results might not be indicative of China's whole healthcare market or relevant to the healthcare industries in other nations.



CHAPTER 4

RESEARCH RESULTS

In Chapter 4 of this research, the researcher conducted a quantitative analysis to investigate the factors influencing the financial performance of healthcare-listed companies in China during the COVID-19 pandemic. The analysis focused on several key variables, including the Current Ratio (CR), Debt-to-Asset Ratio (DA), Debt-to-Equity Ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S), Return on Assets (ROA), and Return on Equity (ROE).

4.1 DESCRIPTIVE ANALYSIS

In this section, the researcher presents a descriptive analysis of the financial performance metrics of healthcare-listed companies in China during the COVID-19 pandemic. The analysis covers various key variables, including the Current Ratio (CR), Debt-to-Asset Ratio (DA), Debt-to-Equity Ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S), Return on Assets (ROA), and Return on Equity (ROE).

Current Ratio (CR): The average current ratio was 2.72, with a standard deviation 2.67. The minimum observed current ratio was 0.11, while the maximum was 31.20. This indicates that, on average, companies had 2.72 times more current assets than current liabilities, with significant variability across the sampled companies.

Debt to Asset Ratio (DA): The average debt to asset ratio was 16.28%, with a standard deviation of 13.84%. The minimum observed debt-to-asset ratio was 0.00%, while the maximum was 69.27%. This suggests that, on average, companies financed 16.28% of their assets through debt, with considerable variation in leverage levels among the sampled companies.

Debt to Equity Ratio (DE): The average debt to equity ratio was 36.39%, with a standard deviation of 46.92%. The minimum observed debt-to-equity ratio was 0.00%, while the maximum was 293.36%. This indicates that, on average, companies relied more on equity financing than debt financing, but with substantial variability in leverage structures across companies.

Sales Growth (SG): The average sales growth rate was 21.85%, with a standard deviation of 44.63%. The minimum observed sales growth rate was -86.37%, while the maximum was 397.80%. This suggests a wide range of sales performance among the sampled companies during the COVID-19 pandemic, with some experiencing significant growth while others faced declines.

Operating Cash Flow (OCF): The average operating cash flow was 676.70, with a standard deviation of 1,381.72. The minimum observed operating cash flow was -2,643.52, while the maximum was 18,278.11. This indicates variability in cash generation from normal business operations among the sampled companies.

Size (S): The average Size of the companies, measured using various metrics such as market capitalization or total assets, was 8.45, with a standard deviation of 1.30. The minimum observed Size was 4.86, while the maximum was 12.20. This suggests differences in the scale of operations among the sampled companies.

Return on Assets (ROA): The average return on assets was 6.65%, with a standard deviation of 9.02%. The minimum observed ROA was -54.10%, while the maximum was 73.77%. This indicates variability in the profitability of the sampled companies relative to their total assets.

Return on Equity (ROE): The average return on equity was 12.16%, with a standard deviation of 16.36%. The minimum observed ROE was -75.41%, while the maximum was 176.19%. This indicates variability in the profitability of the sampled companies relative to their shareholders' equity. See Table 4.1.

Table 4.1 Descriptive Summary

Variable	Mean	Std.Dev	Min	Max
CV19	0.50	0.50	0.00	1.00
CR	2.72	2.67	0.11	31.20
DA	16.28	13.84	0.00	69.27
DE	36.39	46.92	0.00	293.36
SG	21.85	44.63	-86.37	397.80
OCF	676.70	1,381.72	-2,643.52	18,278.11
S	8.45	1.30	4.86	12.20
ROA	6.65	9.02	-54.10	73.77
ROE	12.16	16.36	-75.41	176.19
Observations = 1,236				

Source: Compiled by researcher

Table 4.2 presents the average financial metrics for the Chinese healthcare sector from 2017 to 2022. These metrics include the Current Ratio (CR), Debt to Asset Ratio (DA), Debt to debt-to-equity ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S), Return on Assets (ROA), Return on Equity (ROE), Tobin's Q Ratio, and Price-to-Earnings (PE) Ratio. Analyzing these metrics over time provides insights into the financial health and performance of the sector, particularly prior to and during the COVID-19 pandemic.

The financial metrics for the Chinese healthcare sector from 2017 to 2022 reveal several key trends and insights. The Current Ratio (CR) increased from 2.486 to 2.717, indicating improved liquidity and the ability to cover short-term liabilities with short-term assets. The Debt to Asset Ratio (DA) and Debt to Equity Ratio (DE) both showed steady increases, from 14.868% to 16.275% and 32.206% to 36.391%, respectively, suggesting a gradual rise in leverage and reliance on debt financing. Sales Growth (SG) peaked at 30.465% in 2018 but declined to 21.847% by 2022, likely due to market saturation and the pandemic's impact. Operating Cash Flow (OCF) saw significant growth, from 269.586 million to 676.705 million, reflecting enhanced cash generation and operational efficiency. The Size of the companies, measured by total

assets, increased modestly from 8.021 to 8.447. Return on Assets (ROA) remained stable, fluctuating slightly, around 6.652%, indicating consistent profitability. Return on Equity (ROE) decreased from 12.898% to 12.164%, suggesting a slight decline in returns generated on shareholders' equity. Tobin's Q Ratio fluctuated but ended slightly higher, indicating positive market perceptions. The PE Ratio decreased initially from 59.750 to 52.283 in 2019 but recovered to 60.957 in 2022, reflecting investor expectations of future earnings growth and renewed confidence post-pandemic.

Table 4.2 Means of Variables 2017-2022

Year/ variables	CR	DA	DE	SG	OCF	S	ROA	ROE	TOBIN_ Q_RATI O	PE Ratio
AVG 2017	2.486	14.868	32.206	18.419	269.586	8.021	6.775	12.898	3.188	59.750
AVG 2018	2.410	15.624	34.139	30.465	334.120	8.105	6.410	11.879	2.870	52.896
AVG 2019	2.446	16.110	35.436	25.207	397.890	8.180	6.338	11.693	2.975	52.283
AVG 2020	2.519	16.157	35.911	24.214	512.776	8.270	6.781	12.647	3.225	55.811
AVG 2021	2.641	16.173	36.094	23.203	584.874	8.362	6.821	12.535	3.307	59.550
AVG 2022	2.717	16.275	36.391	21.847	676.705	8.447	6.652	12.164	3.185	60.957
AVG Prior CV	2.447	15.534	33.927	24.697	333.865	8.102	6.508	12.157	3.011	54.976
AVG During CV	2.626	16.202	36.132	23.088	591.452	8.360	6.751	12.449	3.239	58.773
Note: Prior COVID (2017-2019) During COVID (2020-2022)										

Source: Compiled by researcher

4.2 CORRELATION ANALYSIS

This section focuses on the significant correlations between critical financial performance metrics of healthcare-listed companies in China during the COVID-19 pandemic.

Debt to Asset Ratio (DA): A moderate negative correlation of -0.444 is observed between CR and DA ($p < 0.05$). This suggests that companies with higher current ratios tend to have lower debt-to-asset ratios, indicating stronger short-term liquidity and lower reliance on debt financing. The basis for this judgment is the statistically significant p-value (less than 0.05), which implies that the observed correlation is unlikely to be due to chance. A negative correlation coefficient indicates an inverse relationship between CR and DA.

Operating Cash Flow (OCF): A weak positive correlation of 0.216 is found between SG and OCF ($p < 0.05$). This indicates that companies with higher sales growth tend to generate higher operating cash flows, reflecting strong operational performance and revenue generation. The criterion for this judgment is the significant p-value (less than 0.05), showing that the correlation is statistically significant. A positive correlation coefficient suggests that as sales growth increases, operating cash flow also increases.

Size (S): A weak positive correlation of 0.461 is observed between SG and S ($p < 0.05$). This suggests that larger companies tend to experience higher sales growth rates, potentially due to their broader market presence and economies of scale. The judgment is based on the significant p-value (less than 0.05), which indicates that the correlation is not due to random chance. The positive correlation coefficient shows that larger company size is associated with higher sales growth.

Return on Assets (ROA): There is a moderate positive correlation of 0.250 between ROA and CR ($p < 0.05$). This indicates that companies with higher current ratios tend to have higher returns on assets, reflecting efficient asset utilization. The criterion for this judgment is the significant p-value (less than 0.05), confirming the

statistical significance of the correlation. A positive correlation coefficient means that an increase in the current ratio is associated with an increase in ROA.

Return on Equity (ROE): Similarly, there is a moderate positive correlation of 0.159 between ROE and CR ($p < 0.05$). Companies with higher current ratios tend to have higher returns on equity, indicating efficient capital utilization and potential shareholder value creation. The basis for this judgment is the significant p-value (less than 0.05), which suggests that the correlation is statistically significant. The positive correlation coefficient shows that higher current ratios are associated with higher ROE.

These correlations highlight the interrelationships between various financial performance metrics and underline the importance of maintaining strong liquidity positions, managing debt levels, and leveraging company size for growth during challenging periods such as the COVID-19 pandemic. See Table 4.13 Regression Analysis of ROE. See Table 4.3.

Table 4.3 Correlation Analysis Results

	CR	DA	DE	SG	OCF	S	ROA	ROE
CR	1							
DA	-0.444	1						
DE	-0.356	0.863	1					
SG	0.069	-0.039	-0.047	1				
OCF	0.091	-0.085	-0.091	0.216	1			
S	-0.215	0.352	0.349	-0.050	0.461	1		
ROA	0.250	-0.339	-0.296	0.436	0.399	-0.076	1	
ROE	0.159	-0.205	-0.207	0.482	0.428	-0.027	0.923	1

Source: Compiled by researcher

4.3 T-TEST ANALYSIS OF VARIABLES

This section conducts a t-test to examine the significance of differences in various financial performance indicators prior to and during the COVID-19 pandemic

within the sample of healthcare-listed companies in China. The selected variables include: Current Ratio (CR), Debt to Asset Ratio (DA), Debt to Equity Ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S), Return on Assets (ROA) and Return on Equity (ROE). By comparing these variables prior to and after the onset of the pandemic, we aim to assess whether there have been statistically significant changes in the financial performance of healthcare companies in China.

4.3.1 Comparative T-Test Results for CR Prior and During COVID-19

Table 4.4 presents the t-test results conducted to evaluate the significance of the difference in the mean Current Ratio (CR) between the periods prior to and during the COVID-19 pandemic. The t-value obtained is -3.5947, and the associated p-value is 0.0002. Since the p-value (0.0002) is less than the conventional significance level of 0.05, this suggests a statistically significant difference in the mean Current Ratio between the periods prior to and during the COVID-19 pandemic.

The difference in mean CR between prior and during COVID periods is -0.543. The difference in mean CR is statistically significant ($p < 0.05$), indicating a notable change in the liquidity position of healthcare-listed companies in China prior to and during the COVID-19 pandemic. Furthermore, the confidence interval for the difference in means (-0.840 to -0.247) does not contain zero, further supporting the rejection of the null hypothesis. Therefore, the mean Current Ratio significantly decreased during the onset of the COVID-19 pandemic compared to prior.

Table 4.4 Comparative T-Test Results for CR Prior and During COVID-19

Group	Obs	Mean	Std.Err.	Std.Dev.	[95%Conf.	Interval]
Prior COVID	618	2.446	0.093	2.323	2.262	2.629
During COVID	618	2.989	0.119	2.953	2.756	3.222
combined	1,236	2.717	0.076	2.670	2.568	2.866
Diff		-0.543	0.151		-0.840	-0.247
t = -3.5947						
Pr(T < t) = 0.0002 Pr(T > t) = 0.0003 Pr(T > t) = 0.9998						

Source: Compiled by researcher

4.3.2 Comparative T-Test Results for DA Prior and During COVID-19

Table 4.5 presents the t-test results conducted to evaluate the significance of the difference in the mean debt-to-asset ratio (DA) between the periods prior to and during the COVID-19 pandemic. The t-value obtained is -0.4189, and the associated p-value is 0.3377. Since the p-value (0.3377) exceeds the conventional significance level of 0.05, this suggests that there is no statistically significant difference in the mean debt-to-asset ratio between the periods prior to and during the COVID-19 pandemic.

The difference in mean DA between the periods prior to and during COVID-19 is -0.330. However, it is essential to note that this difference is not statistically significant ($p > 0.05$), indicating a lack of substantial change in the debt-to-asset ratio of healthcare companies in China prior to and during the COVID-19 pandemic.

Furthermore, the confidence interval for the difference in means (-1.876 to 1.216) includes zero, further supporting the conclusion that the difference is not statistically significant.

Therefore, based on the t-test results, it cannot be concluded that there is a significant difference in the mean Debt-to-Asset Ratio between the periods prior to and during the COVID-19 pandemic.

Table 4.5 Comparative T-Test Results for DA Prior to and During COVID-19

Group	Obs	Mean	Std. Err.	Std.Dev.	[95%Conf.	Interval]
Prior COVID	618	16.110	0.566	14.063	14.999	17.221
During COVID	618	16.440	0.548	13.630	15.364	17.517
combined	1,236	16.275	0.394	13.844	15.503	17.048
Diff		-0.330	0.788		-1.876	1.216
t = -0.4189						
Pr(T < t) = 0.3377 Pr(T > t) = 0.6754 Pr(T > t) = 0.6623						

Source: Compiled by researcher

4.3.3 Comparative T-Test Results for DE Prior and During COVID-19

Table 4.6 presents the t-test results conducted to evaluate the significance of the difference in the mean debt-to-equity ratio (DE) between the periods prior to and during the COVID-19 pandemic. The t-value obtained is -0.7147, and the associated p-value is 0.2375.

Since the p-value (0.2375) exceeds the conventional significance level of 0.05, this suggests that there is no statistically significant difference in the mean Debt-to-Equity Ratio between the periods prior to and during the COVID-19 pandemic.

The difference in mean DE between the prior to and during COVID-19 periods is -1.908. However, it is essential to note that this difference is not statistically significant ($p > 0.05$), indicating a lack of substantial change in the debt-equity ratio of healthcare companies in China prior to and during the COVID-19 pandemic.

Furthermore, the confidence interval for the difference in means (-7.146 to 3.330) includes zero, further supporting the conclusion that the difference is not statistically significant.

Therefore, based on the t-test results, it cannot be concluded that there is a significant difference in the mean debt-equity ratio between the periods prior to and during the COVID-19 pandemic.

Table 4.6 Comparative T-Test Results for DE Prior to and During COVID-19

Group	Obs	Mean	Std. Err.	Std.Dev.	[95%Conf.	Interval]
Prior COVID	618	35.436	1.852	46.028	31.800	39.072
During COVID	618	37.345	1.923	47.816	33.567	41.122
combined	1,236	36.391	1.335	46.921	33.772	39.009
Diff		-1.908	2.670		-7.146	3.330
t = -0.7147						
Pr(T < t) = 0.2375 Pr(T > t) = 0.4749 Pr(T > t) = 0.7625						

Source: Compiled by researcher

4.3.4 Comparative T-Test Results for SG Prior and During COVID-19

Table 4.7 presents the t-test results conducted to evaluate the significance of the difference in the mean Sales Growth (SG) between the periods prior to and during the COVID-19 pandemic. The t-value obtained is 2.6532, and the associated p-value is 0.0081.

Since the p-value (0.0081) is less than the conventional significance level of 0.05, this suggests a statistically significant difference in the mean Sales Growth between the periods prior to and during the COVID-19 pandemic.

The difference in mean SG between the periods prior to and during COVID-19 is 6.719. This difference is statistically significant ($p < 0.05$), indicating a notable change in the sales growth of healthcare-listed companies in China prior to and during the COVID-19 pandemic.

Furthermore, the confidence interval for the difference in means (1.751 to 11.687) does not contain zero, supporting the conclusion that the mean Sales Growth significantly decreased during the onset of the COVID-19 pandemic compared to prior.

Table 4.7 Comparative T-Test Results for SG Prior and During COVID-19

Group	Obs	Mean	Std. Err.	Std.Dev.	[95%Conf.	Interval]
Prior COVID	618	25.207	1.473	36.624	22.313	28.100
During COVID	618	18.488	2.060	51.206	14.442	22.533
combined	1,236	21.847	1.269	44.625	19.357	24.337
Diff		6.719	2.532		1.751	11.687
t = 2.6532						
Pr(T < t) = 0.9960 Pr(T > t) = 0.0081 Pr(T > t) = 0.0040						

Source: Compiled by researcher

4.3.5 Comparative T-Test Results for OCF Prior and During COVID-19

Table 4.8 presents the t-test results conducted to evaluate the significance of the difference in the mean Operating Cash Flow (OCF) between the periods prior to and during the COVID-19 pandemic. The t-value obtained is -7.2404, and the associated p-value is < 0.0001 .

Since the p-value is less than the conventional significance level of 0.05, this suggests that there is a statistically significant difference in the mean Operating Cash Flow between the periods prior to and during the COVID-19 pandemic.

The difference in mean OCF between the periods prior to and during COVID-19 is -557.630. This difference is statistically significant ($p < 0.05$), indicating a notable change in the operating cash flow of healthcare-listed companies in China prior to and during the COVID-19 pandemic.

Furthermore, the confidence interval for the difference in means (-708.727 to -406.533) does not contain zero, further supporting the conclusion that the mean Operating Cash Flow significantly decreased during the onset of the COVID-19 pandemic compared to prior.

Table 4.8 Comparative T-Test Results for OCF Prior and During COVID-19

Group	Obs	Mean	Std. Err.	Std.Dev.	[95%Conf.	Interval]
Prior COVID	618	397.890	32.224	801.069	334.608	461.171
During COVID	618	955.520	69.951	1,738.949	818.149	1,092.890
combined	1,236	676.705	39.302	1,381.718	599.600	753.810
Diff		-557.630	77.016		-708.727	-406.533
t = -7.2404						
Pr(T < t) = 0.0000 Pr(T > t) = 0.0000 Pr(T > t) = 1.0000						

Source: Compiled by researcher

4.3.6 Comparative T-Test Results for S Prior and During COVID-19

Table 4.9 presents the t-test results conducted to evaluate the significance of the difference in the mean Sales (S) between the periods prior to and during the COVID-19 pandemic. The t-value obtained is -7.4257, and the associated p-value is < 0.0001 .

Since the p-value is less than the conventional significance level of 0.05, this suggests a statistically significant difference in the mean Sales between the periods prior to and during the COVID-19 pandemic.

The difference in mean Sales between the periods prior to and during COVID-19 is -0.536. This difference is statistically significant ($p < 0.05$), indicating a notable change in the sales performance of healthcare-listed companies in China prior to and during the COVID-19 pandemic.

Furthermore, the confidence interval for the difference in means (-0.677 to -0.394) does not contain zero, further supporting the conclusion that the mean Sales significantly decreased during the onset of the COVID-19 pandemic compared to prior.

Table 4.9 Comparative T-Test Results for S Prior and During COVID-19

Group	Obs	Mean	Std. Err.	Std.Dev.	[95%Conf.	Interval]
Prior COVID	618	8.180	0.055	1.372	8.071	8.288
During COVID	618	8.715	0.046	1.155	8.624	8.807
combined	1,236	8.447	0.037	1.296	8.375	8.520
Diff		-0.536	0.072		-0.677	-0.394
t = -7.4257						
Pr(T < t) = 0.0000 Pr(T > t) = 0.0000 Pr(T > t) = 1.0000						

Source: Compiled by researcher

4.3.7 Comparative T-Test Results for ROA Prior to and During COVID-

19

Table 4.10 presents the t-test results conducted to evaluate the significance of the difference in the mean Return on Assets (ROA) between the periods prior to and during the COVID-19 pandemic. The t-value obtained is -1.2252, and the associated p-value is 0.1104.

Since the p-value (0.1104) is greater than the conventional significance level of 0.05, this suggests that there is no statistically significant difference in the mean Return on Assets between the periods prior to and during the COVID-19 pandemic.

The difference in mean ROA between the periods prior to and during COVID-19 is -0.629. Although there is a difference, it is not statistically significant ($p > 0.05$), indicating that the return on assets did not change significantly between the two periods.

Therefore, based on the t-test results, we cannot conclude that there was a significant change in the return on assets of healthcare-listed companies in China prior to and during the COVID-19 pandemic.

Table 4.10 Comparative T-Test Results for ROA Prior to and During COVID-19

	Obs	Mean	Std. Err.	Std.Dev.	[95%Conf.	Interval]
Prior COVID	618	6.338	0.324	8.066	5.700	6.975
During COVID	618	6.966	0.397	9.880	6.186	7.747
combined	1,236	6.652	0.257	9.021	6.148	7.155
Diff		-0.629	0.513		-1.635	0.378
t = -1.2252						
Pr(T < t) = 0.1104 Pr(T > t) = 0.2207 Pr(T > t) = 0.8896						

Source: Compiled by researcher

4.3.8 Comparative T-Test Results for ROE Prior to and During COVID-

19

Table 4.11 presents the t-test results conducted to evaluate the significance of the difference in the mean Return on Equity (ROE) between the periods prior to and during the COVID-19 pandemic. The t-value obtained is -1.0124, and the associated p-value is 0.1558.

Since the p-value (0.1558) is greater than the conventional significance level of 0.05, this suggests that there is no statistically significant difference in the mean Return on Equity between the periods prior to and during the COVID-19 pandemic.

The difference in mean ROE between the periods prior to and during COVID-19 is -0.942. Although there is a difference, it is not statistically significant ($p > 0.05$), indicating that the return on equity did not change significantly between the two periods.

Therefore, based on the t-test results, we cannot conclude that there was a significant change in the return on equity of healthcare-listed companies in China prior to and during the COVID-19 pandemic.

Table 4.11 Comparative T-Test Results for ROE Prior and During COVID-19

Group	Obs	Mean	Std. Err.	Std.Dev.	[95%Conf.	Interval]
Prior COVID	618	11.693	0.516	12.827	10.680	12.707
During COVID	618	12.636	0.775	19.259	11.114	14.157
combined	1,236	12.164	0.465	16.362	11.251	13.078
Diff		-0.942	0.931		-2.768	0.884
t = -1.0124						
Pr(T < t) = 0.1558 Pr(T > t) = 0.3116 Pr(T > t) = 0.8442						

Source: Compiled by researcher

4.4 REGRESSION ANALYSIS

4.4.1 Regression Analysis of ROA

Table 4.12 presents the results of the regression analysis conducted to examine the relationship between Return on Assets (ROA) and various independent variables.

The coefficient (Coef.) represents the change in the dependent variable (ROA) for a one-unit change in the independent variable, holding all other variables constant.

For the Current Ratio (CR), the coefficient is 0.219, with a standard error (Std. Err.) of 0.086. The t-value is 2.560, and the associated p-value ($P > |t|$) is 0.011. This suggests that the Current Ratio has a statistically significant positive relationship with ROA at the 0.05 significance level. CR has a positive relationship with ROA, meaning ROA tends to increase as CR increases. This relationship is statistically significant at the 0.05 level, indicating that companies with better short-term liquidity tend to have higher ROA.

Meanwhile, in the debt ratio (DA), the coefficient is -0.167, with a standard error of 0.030. The t-value is -5.550, and the p-value is 0.000, indicating a statistically significant negative relationship between DA and ROA. DA has a negative relationship with ROA, suggesting that higher debt levels are associated with lower ROA. This relationship is highly significant, indicating that companies with higher debt ratios tend to have lower returns on assets.

The Debt-to-Equity Ratio (DE) coefficient is 0.009, with a standard error of 0.009. The t-value is 1.060, and the p-value is 0.289, indicating that DE is not statistically significant in predicting ROA. DE is not statistically significant in predicting ROA. This indicates that the debt-to-equity ratio does not directly impact the return on assets within this context.

The coefficient of Sales Growth (SG) is 0.068, with a standard error of 0.005. The t-value is 14.560, and the p-value is 0.000, indicating a statistically significant positive relationship between SG and ROA. SG has a positive and highly significant relationship with ROA. Companies with higher sales growth tend to have higher ROA, reflecting strong operational performance and efficient revenue generation.

The coefficient of Operating Cash Flow (OCF) is 0.002, with a standard error of 0.000. The t-value is 13.180, and the p-value is 0.000, indicating a statistically significant positive relationship between OCF and ROA. OCF is positively related to ROA, and it has a highly significant relationship. Higher operating cash flows are associated with higher returns on assets, indicating that efficient cash flow management contributes positively to asset returns.

The coefficient of Size (S) is -0.991, with a standard error 0.203. The t-value is -4.890, and the p-value is 0.000, indicating a statistically significant negative relationship between S and ROA. S has a negative and significant relationship with ROA. Larger companies tend to have lower ROA, suggesting that increased Size might come with inefficiencies that reduce the return on assets.

The COVID-19 dummy variable (CV19) coefficient is 0.205, with a standard error of 0.419. The t-value is 0.490, and the p-value is 0.624, indicating that CV19 is not statistically significant in predicting ROA. The CV19 variable is not statistically significant in predicting ROA. This indicates that the impact of the COVID-19 pandemic, as captured by this dummy variable, does not have a significant direct effect on the return on assets for these companies.

The constant term (_cons) represents the intercept of the regression equation. The coefficient is 13.601, with a standard error of 1.659. The t-value is 8.200, and the p-value is 0.000, indicating that the intercept is statistically significant. The intercept is statistically significant, indicating a baseline level of ROA when all other variables are zero. This suggests that even without the influence of the other variables, there is a substantial base level of return on assets.

Table 4.12 Regression Analysis of ROA

ROA	Coef.	Std. Err.	t	P> t	[95%Conf.	Interval]
CR	0.219	0.086	2.560	0.011	0.051	0.387
DA	-0.167	0.030	-5.550	0.000	-0.226	-0.108
DE	0.009	0.009	1.060	0.289	-0.008	0.026
SG	0.068	0.005	14.560	0.000	0.059	0.078
OCF	0.002	0.000	13.180	0.000	0.002	0.003
S	-0.991	0.203	-4.890	0.000	-1.389	-0.594
CV19	0.205	0.419	0.490	0.624	-0.616	1.027
_cons	13.601	1.659	8.200	0.000	10.347	16.856

Source: Compiled by researcher

4.4.2 Regression Analysis of ROE

Table 4.13 presents the results of the regression analysis examining the relationship between Return on Equity (ROE) and various independent variables.

The current Ratio (CR) has a coefficient (Coef.) of 0.135 with a standard error (Std. Err.) of 0.156. The t-value is 0.860, and the associated p-value ($P>|t|$) is 0.389. This indicates that CR is not statistically significant in predicting ROE.

Debt Ratio (DA) has a coefficient of -0.058, with a standard error of 0.055. The t-value is -1.060, and the p-value is 0.288, suggesting that DA is not statistically significant in predicting ROE.

Debt-to-Equity Ratio (DE) has a coefficient of -0.016, with a standard error of 0.016. The t-value is -1.030, and the p-value is 0.301, indicating that DE is not statistically significant in predicting ROE.

Sales Growth (SG) has a coefficient of 0.140, with a standard error of 0.009. The t-value is 16.250, and the p-value is 0.000, indicating a statistically significant positive relationship between SG and ROE.

Operating Cash Flow (OCF) has a coefficient of 0.005, with a standard error of 0.000. The t-value is 14.530, and the p-value is 0.000, indicating a statistically significant positive relationship between OCF and ROE.

Size (S) has a coefficient of -2.003, with a standard error of 0.370. The t-value is -5.410, and the p-value is 0.000, indicating a statistically significant negative relationship between S and ROE.

The COVID-19 dummy variable (cv19) has a coefficient of 0.246, with a standard error of 0.765. The t-value is 0.320, and the p-value is 0.748, suggesting that cv19 is not statistically significant in predicting ROE.

The constant term (_cons) represents the intercept of the regression equation. The coefficient is 23.822, with a standard error of 3.031. The t-value is 7.860, and the p-value is 0.000, indicating that the intercept is statistically significant.

Table 4.13 Regression Analysis of ROE

ROE	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
CR	0.135	0.156	0.860	0.389	-0.172	0.442
DA	-0.058	0.055	-1.060	0.288	-0.166	0.049
DE	-0.016	0.016	-1.030	0.301	-0.047	0.015
SG	0.140	0.009	16.250	0.000	0.123	0.157
OCF	0.005	0.000	14.530	0.000	0.004	0.005
S	-2.003	0.370	-5.410	0.000	-2.729	-1.277
cv19	0.246	0.765	0.320	0.748	-1.254	1.747
_cons	23.822	3.031	7.860	0.000	17.875	29.770

Source: Compiled by researcher

4.4.3 Fixed-Effects (within) Regression Analysis for ROA

Table 4.14 presents the results of the fixed-effects (within) regression analysis examining the relationship between Return on Assets (ROA) and various independent variables.

Current Ratio (CR) has a coefficient (Coef.) of -0.450 with a standard error (Std. Err.) of 0.098. The t-value is -4.580, and the associated p-value ($P > |t|$) is 0.000, indicating that CR is statistically significant in predicting ROA. CR has a statistically significant negative relationship with ROA, indicating that as the current ratio increases, the return on assets tends to decrease. This suggests that higher liquidity does not necessarily translate into higher returns on assets for these companies.

Debt Ratio (DA) has a coefficient of -0.278 with a standard error of 0.035. The t-value is -7.970, and the p-value is 0.000, indicating that DA is statistically significant in predicting ROA. DA has a significant negative relationship with ROA, indicating that higher debt levels are associated with lower returns on assets. This highlights the adverse impact of increased debt on asset returns.

The debt-to-equity Ratio (DE) has a coefficient of 0.005 and a standard error of 0.011. The t-value is 0.470, and the p-value is 0.640, suggesting that DE is not statistically significant in predicting ROA. This suggests that the debt-to-equity ratio does not directly impact the return on assets within this context.

Sales Growth (SG) has a coefficient of 0.056 with a standard error of 0.004. The t-value is 13.590, and the p-value is 0.000, indicating a statistically significant positive relationship between SG and ROA. SG has a positive and highly significant relationship with ROA. Companies with higher sales growth tend to have higher returns on assets, reflecting strong operational performance and efficient revenue generation.

Operating Cash Flow (OCF) has a coefficient of 0.002 with a standard error 0.000. The t-value is 12.550, and the p-value is 0.000, indicating a statistically

significant positive relationship between OCF and ROA. OCF is positively related to ROA, and it has a highly significant relationship. Higher operating cash flows are associated with higher returns on assets, indicating that efficient cash flow management contributes positively to asset returns.

Size (S) has a coefficient of 1.128 with a standard error of 0.493. The t-value is 2.290, and the p-value is 0.022, indicating a statistically significant positive relationship between S and ROA. S has a positive and significant relationship with ROA. Larger companies tend to have higher returns on assets, suggesting that increased Size contributes positively to asset returns, possibly due to economies of scale or more significant market presence.

The COVID-19 dummy variable (CV19) has a coefficient of -0.503 with a standard error of 0.398. The t-value is -1.260, and the p-value is 0.207, suggesting that CV19 is not statistically significant in predicting ROA. The CV19 variable is not statistically significant in predicting ROA. This indicates that the impact of the COVID-19 pandemic, as captured by this dummy variable, does not directly affect the return on assets for these companies.

The constant term (_cons) represents the regression equation's intercept. The coefficient is 0.208, with a standard error of 3.939. The t-value is 0.050, and the p-value is 0.958, indicating that the intercept is not statistically significant. The intercept is not statistically significant, indicating no significant baseline level of ROA when all other variables are zero. This suggests that the return on assets cannot be reliably predicted solely by the intercept term.

Table 4.14 Fixed-Effects (within) Regression Analysis for ROA

ROA	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
CR	-0.450	0.098	-4.580	0.000	-0.643	-0.257
DA	-0.278	0.035	-7.970	0.000	-0.346	-0.209
DE	0.005	0.011	0.470	0.640	-0.016	0.026

Table 4.14 Fixed-Effects (within) Regression Analysis for ROA (cont.)

ROA	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
SG	0.056	0.004	13.590	0.000	0.048 0.065
OCF	0.002	0.000	12.550	0.000	0.002 0.003
S	1.128	0.493	2.290	0.022	0.161 2.095
CV19	-0.503	0.398	-1.260	0.207	-1.285 0.279
_cons	0.208	3.939	0.050	0.958	-7.522 7.938

Source: Compiled by researcher

4.4.4 Fixed-Effects (within) Regression Analysis for ROE

Table 4.15 presents the results of the fixed-effects (within) regression analysis examining the relationship between Return on Equity (ROE) and various independent variables.

Current Ratio (CR) has a coefficient (Coef.) of -0.636 with a standard error (Std. Err.) of 0.185. The t-value is -3.430, and the associated p-value ($P>|t|$) is 0.001, indicating that CR is statistically significant in predicting ROE. CR has a statistically significant negative relationship with ROE. This indicates that as the current ratio increases, the return on equity tends to decrease, suggesting that higher liquidity does not necessarily translate into higher equity returns for these companies.

Debt Ratio (DA) has a coefficient of -0.148 with a standard error of 0.066. The t-value is -2.250, and the p-value is 0.025, indicating that DA is statistically significant in predicting ROE. DA has a significant negative relationship with ROE. Higher debt levels are associated with lower returns on equity, highlighting the adverse impact of increased debt on equity returns.

Debt-to-Equity Ratio (DE) has a coefficient of -0.053 with a standard error of 0.021. The t-value is -2.570, and the p-value is 0.010, suggesting that DE is statistically significant in predicting ROE. DE is statistically significant in predicting ROE. This suggests that higher debt relative to equity negatively impacts the return on equity.

Sales Growth (SG) has a coefficient of 0.119 with a standard error of 0.008. The t-value is 15.220, and the p-value is 0.000, indicating a statistically significant positive relationship between SG and ROE. SG has a positive and highly significant relationship with ROE. Companies with higher sales growth tend to have higher returns on equity, reflecting strong operational performance and efficient revenue generation.

Operating Cash Flow (OCF) has a coefficient of 0.005 with a standard error 0.000. The t-value is 13.820, and the p-value is 0.000, indicating a statistically significant positive relationship between OCF and ROE. OCF is positively related to ROE, and it has a highly significant relationship. Higher operating cash flows are associated with higher returns on equity, indicating that efficient cash flow management contributes positively to equity returns.

Size (S) has a coefficient of 0.434 and a standard error of 0.928. The t-value is 0.470, and the p-value is 0.641, suggesting that S is not statistically significant in predicting ROE. This suggests that company size does not have a meaningful impact on return on equity within this context.

The COVID-19 dummy variable (cv19) has a coefficient of -0.553 with a standard error of 0.751. The t-value is -0.740, and the p-value is 0.461, indicating that cv19 is not statistically significant in predicting ROE. The cv19 variable is not statistically significant in predicting ROE. This indicates that the impact of the COVID-19 pandemic, as captured by this dummy variable, does not have a significant direct effect on the return on equity for these companies.

The constant term (_cons) represents the intercept of the regression equation. The coefficient is 9.131, with a standard error of 7.422. The t-value is 1.230, and the p-value is 0.219, indicating that the intercept is not statistically significant. The intercept is not statistically significant, indicating no significant baseline level of ROE when all other variables are zero. This suggests that the return on equity cannot be reliably predicted solely by the intercept term.

Table 4.15 Fixed-Effects (within) Regression Analysis for ROE

ROE	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
CR	-0.636	0.185	-3.430	0.001	-0.999 -0.272
DA	-0.148	0.066	-2.250	0.025	-0.277 -0.019
DE	-0.053	0.021	-2.570	0.010	-0.093 -0.012
SG	0.119	0.008	15.220	0.000	0.104 0.134
OCF	0.005	0.000	13.820	0.000	0.004 0.005
S	0.434	0.928	0.470	0.641	-1.388 2.255
cv19	-0.553	0.751	-0.740	0.461	-2.026 0.920
_cons	9.131	7.422	1.230	0.219	-5.433 23.694

Source: Compiled by researcher

4.4.5 Random-Effects GLS Regression Analysis for ROA

Table 4.16 presents the results of the random-effects Generalized Least Squares (GLS) regression analysis examining the relationship between Return on Assets (ROA) and various independent variables.

Current Ratio (CR) has a coefficient (Coef.) of -0.139 with a standard error (Std. Err.) of 0.086. The z-value is -1.630, and the associated p-value ($P>|z|$) is 0.104, indicating that CR is not statistically significant in predicting ROA at the 0.05 significance level. CR is not statistically significant in predicting ROA at the 0.05 significance level. This suggests that variations in the current ratio do not have a reliable impact on the return on assets for these companies.

Debt Ratio (DA) has a coefficient of -0.234 with a standard error of 0.032. The z-value is -7.430, and the p-value is 0.000, indicating that DA is statistically significant in predicting ROA. DA has a statistically significant negative relationship with ROA.

Higher debt levels are associated with lower returns on assets, highlighting the adverse impact of increased debt on asset returns.

The debt-to-equity Ratio (DE) has a coefficient of 0.008 and a standard error of 0.009. The z-value is 0.810, and the p-value is 0.417, suggesting that DE is not statistically significant in predicting ROA. This suggests that the debt to equity ratio does not have a meaningful impact on the return on assets within this context.

Sales Growth (SG) has a coefficient of 0.062 with a standard error of 0.004. The z-value is 15.530, and the p-value is 0.000, indicating a statistically significant positive relationship between SG and ROA. SG has a positive and highly significant relationship with ROA. Companies with higher sales growth tend to have higher returns on assets, reflecting strong operational performance and efficient revenue generation.

Operating Cash Flow (OCF) has a coefficient of 0.002 with a standard error 0.000. The z-value is 13.340, and the p-value is 0.000, indicating a statistically significant positive relationship between OCF and ROA. OCF is positively related to ROA, with a highly significant relationship. Higher operating cash flows are associated with higher returns on assets, indicating that efficient cash flow management contributes positively to asset returns.

Size (S) has a coefficient of -0.525 with a standard error of 0.267. The z-value is -1.970, and the p-value is 0.049, suggesting that S is marginally statistically significant in predicting ROA at the 0.05 significance level. S is marginally statistically significant in predicting ROA at the 0.05 significance level. This suggests that larger companies may have slightly lower returns on assets, potentially due to the complexities and inefficiencies associated with more extensive operations.

The COVID-19 dummy variable (CV19) has a coefficient of 0.214 with a standard error of 0.342. The z-value is 0.630, and the p-value is 0.531, indicating that CV19 is not statistically significant in predicting ROA. The CV19 variable is not statistically significant in predicting ROA. This indicates that the impact of the COVID-

19 pandemic, as captured by this dummy variable, does not have a significant direct effect on the return on assets for these companies.

The constant term (_cons) represents the regression equation's intercept. The coefficient is 12.005, with a standard error of 2.160. The z-value is 5.560, and the p-value is 0.000, indicating that the intercept is statistically significant. The intercept is statistically significant, indicating a significant baseline level of ROA when all other variables are zero. This suggests that the return on assets has a substantial base level, independent of the other variables considered in the model.

Table 4.16 Random-Effects GLS Regression Analysis for ROA

ROA	Coef.	Std. Err.	z	P> z	[95% Conf.	Interval]
CR	-0.139	0.086	-1.630	0.104	-0.307	0.029
DA	-0.234	0.032	-7.430	0.000	-0.296	-0.172
DE	0.008	0.009	0.810	0.417	-0.011	0.026
SG	0.062	0.004	15.530	0.000	0.054	0.070
OCF	0.002	0.000	13.340	0.000	0.002	0.003
S	-0.525	0.267	-1.970	0.049	-1.048	-0.001
CV19	0.214	0.342	0.630	0.531	-0.456	0.884
_cons	12.005	2.160	5.560	0.000	7.772	16.239

Source: Compiled by researcher

4.4.6 Random-Effects GLS Regression Analysis for ROE

Table 4.17 presents the results of the random-effects Generalized Least Squares (GLS) regression analysis examining the relationship between Return on Equity (ROE) and various independent variables.

The Current Ratio (CR) has a coefficient (Coef.) of -0.260 and a standard error (Std. Err.) of 0.159. The z-value is -1.640, and the associated p-value ($P>|z|$) is 0.101, indicating that CR is not statistically significant in predicting ROE at the 0.05 significance level. This suggests that variations in the current ratio do not have a reliable impact on the return on equity for these companies.

Debt Ratio (DA) has a coefficient of -0.107 with a standard error of 0.058. The z-value is -1.830, and the p-value is 0.067, suggesting that DA is marginally statistically significant in predicting ROE. DA is marginally statistically significant in predicting ROE. Higher debt levels are somewhat associated with lower returns on equity, indicating a potential negative impact of increased debt on equity returns, though not as strongly as some other variables.

Debt-to-Equity Ratio (DE) has a coefficient of -0.034 with a standard error of 0.017. The z-value is -1.970, and the p-value is 0.049, indicating that DE is marginally statistically significant in predicting ROE at the 0.05 significance level. DE is marginally statistically significant in predicting ROE at the 0.05 significance level. This indicates that higher debt-to-equity ratios might slightly negatively impact the return on equity.

Sales Growth (SG) has a coefficient of 0.128 with a standard error of 0.007. The z-value is 17.130, and the p-value is 0.000, indicating a statistically significant positive relationship between SG and ROE. SG has a positive and highly significant relationship with ROE. Companies with higher sales growth tend to have higher returns on equity, reflecting strong revenue generation and operational performance.

Operating Cash Flow (OCF) has a coefficient of 0.005 with a standard error 0.000. The z-value is 14.770, and the p-value is 0.000, indicating a statistically significant positive relationship between OCF and ROE. OCF is positively related to ROE, with a highly significant relationship. Higher operating cash flows are associated with higher returns on equity, indicating effective cash flow management.

Size (S) has a coefficient of -1.412 and a standard error of 0.487. The z-value is -2.900, and the p-value is 0.004, indicating that S is statistically significant in predicting ROE at the 0.05 significance level. This suggests that larger companies may have lower returns on equity, potentially due to inefficiencies or higher operating costs associated with Size.

The COVID-19 dummy variable (CV19) has a coefficient of 0.223 with a standard error of 0.637. The z-value is 0.350, and the p-value is 0.727, indicating that CV19 is not statistically significant in predicting ROE. The CV19 variable is not statistically significant in predicting ROE. This indicates that the impact of the COVID-19 pandemic, as captured by this dummy variable, does not have a significant direct effect on the return on equity for these companies.

The constant term (_cons) represents the intercept of the regression equation. The coefficient is 21.733 with a standard error of 3.936. The z-value is 5.520, and the p-value is 0.000, indicating that the intercept is statistically significant. The intercept is statistically significant, indicating a significant baseline level of ROE when all other variables are zero. This suggests that the return on equity has a substantial base level, independent of the other variables considered in the model.

Table 4.17 Random-Effects GLS Regression Analysis for ROE

ROE	Coef.	Std. Err.	z	P> z	[95% Conf.	Interval]
CR	-0.260	0.159	-1.640	0.101	-0.572	0.051
DA	-0.107	0.058	-1.830	0.067	-0.221	0.008
DE	-0.034	0.017	-1.970	0.049	-0.068	0.000
SG	0.128	0.007	17.130	0.000	0.113	0.143
OCF	0.005	0.000	14.770	0.000	0.004	0.005
S	-1.412	0.487	-2.900	0.004	-2.366	-0.458
cv19	0.223	0.637	0.350	0.727	-1.025	1.470
_cons	21.733	3.936	5.520	0.000	14.017	29.448

Source: Compiled by researcher

4.5 HAUSMAN TEST RESULTS FOR ROA AND ROE

Table 4.18 displays the results of the Hausman test, which was conducted to assess the choice between fixed-effects and random-effects models for the regression analysis.

Current Ratio (CR): The difference in coefficients between the fixed-effects and random-effects models is -0.311, with a standard error of 0.048. There is a significant difference between CR's fixed-effects and random-effects models, suggesting that the fixed-effects model may be more appropriate for this variable.

Debt Ratio (DA): The difference in coefficients is -0.044, with a standard error of 0.015. The difference in coefficients for DA is relatively small but statistically significant, indicating that the fixed-effects model might better account for the variability in DA.

Debt-to-Equity Ratio (DE): The difference in coefficients is -0.002, with a standard error of 0.006. The difference in coefficients for DE is minimal and not statistically significant, suggesting that either model could be appropriate for this variable.

Sales Growth (SG): The coefficient difference is -0.006, with a standard error of 0.001. This small but statistically significant difference indicates that the fixed-effects model might be more suitable.

Operating Cash Flow (OCF): The difference in coefficients is 0.000, with a standard error of 0.000. The difference in coefficients for OCF is negligible, suggesting that either model could be suitable for this variable.

Size (S): The difference in coefficients is 1.652, with a standard error of 0.414. The significant difference in coefficients for Size indicates that the fixed-effects model is more appropriate for this variable.

COVID-19 dummy variable (CV19): The coefficient difference is -0.717, with a standard error 0.204. There is a significant difference in the coefficients for CV19, suggesting that the fixed-effects model may be more suitable to capture the impact of the COVID-19 pandemic.

The chi-square statistic for the Hausman test is calculated as $(b-B)'(V_b - V_B)^{-1}(b-B)$, resulting in a value of 52.39. The associated p-value (Prob>chi) is 0.0000, indicating that the null hypothesis of no systematic difference between the fixed-effects and random-effects models is rejected at conventional levels of significance. Therefore, the random-effects model is not consistent with the data, and the fixed-effects model is preferred.

Table 4.18 Hausman Test Results for ROA

	(b)	(B)	(b-B)	$\sqrt{\text{diag}(V_b - V_B)}$
	m2	m3	Difference	SE.
CR	-0.450	-0.139	-0.311	0.048
DA	-0.278	-0.234	-0.044	0.015
DE	0.005	0.008	-0.002	0.006
SG	0.056	0.062	-0.006	0.001
OCF	0.002	0.002	0.000	0.000
S	1.128	-0.525	1.652	0.414
CV19	-0.503	0.214	-0.717	0.204
$\chi^2(7) = (b-B)'[(V_b - V_B)^{-1}](b-B)$ $= 52.39$ $\text{Prob}>\chi = 0.0000$				

Source: Compiled by researcher

Table 4.19 displays the results of the Hausman test conducted to assess the choice between fixed-effects and random-effects models for the regression analysis.

Current Ratio (CR): The difference in coefficients between the fixed-effects (m2) and random-effects (m3) models is -0.375, with a standard error of 0.095. The

significant difference between the fixed-effects and random-effects models for CR suggests that the fixed-effects model is more appropriate for capturing the relationship between CR and financial performance.

Debt Ratio (DA): The difference in coefficients is -0.041, with a standard error of 0.302. Despite the smaller difference, the variability indicated by the standard error suggests a preference for the fixed-effects model for DA.

Debt-to-Equity Ratio (DE): The difference in coefficients is -0.019, with a standard error of 0.111. The difference is minimal, but considering the overall test results, the fixed-effects model may still be preferred.

Sales Growth (SG): The difference in coefficients is -0.009, with a standard error of 0.002. The small but significant difference indicates that the fixed-effects model better captures the impact of SG on financial performance.

Operating Cash Flow (OCF): The difference in coefficients is 0.000, with a standard error of 0.000. There is no difference in coefficients between the two models for OCF, suggesting that either model could be appropriate for this variable.

Size (S): The difference in coefficients is 1.845, with a standard error of 0.791. The substantial difference indicates that the fixed-effects model is more suitable for capturing the effect of company size on financial performance.

COVID-19 dummy variable (CV19): The difference in coefficients is -0.776, with a standard error of 0.398. The significant difference suggests that the fixed-effects model better captures the impact of the COVID-19 pandemic on financial performance.

The associated p-value ($\text{Prob} > \chi^2$) is 0.0002, indicating that the null hypothesis of no systematic difference between the fixed-effects and random-effects models is rejected at conventional levels of significance. Therefore, the random-effects model is not consistent with the data, and the fixed-effects model is preferred. Based on

the Hausman test results, the fixed-effects model is preferred over the random-effects model for this analysis. This preference suggests that the fixed-effects model provides a more accurate representation of the data, capturing the effects of the financial indicators on the financial performance of Chinese healthcare companies during the COVID-19 pandemic.

Table 4.19 Hausman Test Results for ROE

	(b)	(B)	(b-B)	$\sqrt{\text{diag}(V_b - V_B)}$
	m2	m3	Difference	SE.
CR	-0.636	-0.260	-0.375	0.095
DA	-0.148	-0.107	-0.041	0.302
DE	-0.053	-0.034	-0.019	0.111
SG	0.119	0.128	-0.009	0.002
OCF	0.005	0.005	0.000	0.000
S	0.434	-1.412	1.845	0.791
CV19	-0.553	0.223	-0.776	0.398
$\chi^2(7) = (b-B)'[(V_b - V_B)^{-1}](b-B)$ $= 27.71$ $\text{Prob} > \chi = 0.0002$				

Source: Compiled by researcher

4.6 VARIANCE INFLATION FACTOR (VIF) ANALYSIS

Table 4.20 presents the Variance Inflation Factor (VIF) values for each independent variable in the regression analysis, along with their reciprocal values. The VIF measures the severity of multicollinearity between independent variables in a regression model. A higher VIF indicates a stronger multicollinearity issue.

The reciprocal of the VIF (1/VIF) is also provided, where values closer to 1 indicate lower multicollinearity. The mean VIF across all variables is 2.16, indicating moderate multicollinearity among the independent variables. Generally, VIF values

below 10 are considered acceptable, suggesting that multicollinearity is not a significant concern in this regression model.

Table 4.20 Variance Inflation Factor (VIF) Analysis

Variable	VIF	1/VIF
DA	4.33	0.231
DE	4.03	0.248
S	1.72	0.583
OCF	1.56	0.639
CR	1.3	0.769
SG	1.1	0.911
cv19	1.09	0.916
Mean VIF	2.16	

Source: Compiled by researcher

Explanation of VIF Values:

$VIF < 1$: There is no multicollinearity among the predictor variables. Each predictor variable is not linearly related to other predictor variables.

$1 \leq VIF < 5$: Indicates moderate multicollinearity. The predictor variables are somewhat correlated with each other, but it is not severe enough to cause serious issues in the regression analysis.

$5 \leq VIF < 10$: Suggests high multicollinearity. The predictor variables are highly correlated with each other, which may affect the reliability of the regression coefficients.

$VIF \geq 10$: Indicates very high multicollinearity. The predictor variables are very highly correlated, leading to unreliable and unstable estimates of regression coefficients.

4.7 MAIN RESULTS

The Table 4.21 presents the results of multiple regression analyses examining the impact of various financial variables on the Return on Assets (ROA) and Return on Equity (ROE) for healthcare listed companies in China, using different estimation methods: Ordinary Least Squares (OLS), Fixed Effects Model (FEM), and Random Effects Model (REM).

The regression analysis highlights that sales growth (SG) and operating cash flow (OCF) positively influence both ROA and ROE significantly. Debt ratios (DA and DE) generally have a negative impact, particularly in the fixed effects models, reflecting the adverse effects of high leverage. The varying significance and direction of the Size (S) and current ratio (CR) across different models suggest the complex nature of these variables' impact on financial performance. The Hausman test results favor the fixed effects model, suggesting it provides the most reliable estimates for this dataset.

Sales Growth (SG): This variable consistently showed a positive and significant impact on both ROA and ROE across all models. For example, in the OLS model, the coefficient for SG was 0.068 ($p < 0.01$) for ROA and 0.140 ($p < 0.01$) for ROE. This highlights the critical role of sales growth in enhancing financial performance, indicating that companies that managed to grow their sales during the pandemic performed better financially.

Operating Cash Flow (OCF): OCF was another variable that exhibited a positive and highly significant impact on ROA and ROE in all models. The coefficient for OCF was 0.002 ($p < 0.01$) for both ROA and ROE in the OLS model. This underscores the importance of cash generation from normal business operations in improving the financial health of companies.

Debt Ratios (DA and DE): Both the debt-asset ratio (DA) and debt-to-equity ratio (DE) generally had a negative impact on ROA and ROE, particularly in the fixed effects models. For instance, DA had a coefficient of -0.278 ($p < 0.01$) for ROA and -

0.148 ($p < 0.05$) for ROE in the FEM model. This suggests that higher leverage adversely affects financial performance, highlighting the risks associated with high levels of debt.

Current Ratio (CR): The impact of CR varied across models. While it was positive and significant in the OLS model for ROA (0.219, $p < 0.05$), it was negative and highly significant in the FEM model (-0.450, $p < 0.01$), indicating that higher liquidity might not always translate into better performance within individual companies.

Size (S): The effect of company size on financial performance showed mixed results. It was positive and significant for ROA in the OLS model (0.991, $p < 0.01$) and FEM (1.128, $p < 0.05$) models but negative and significant for ROE in the OLS model (-2.003, $p < 0.01$) and REM (-1.412, $p < 0.01$) models, suggesting that larger firms may not always achieve higher profitability relative to their equity.

COVID-19 (CV19): The direct impact of the COVID-19 pandemic variable was not significant in any of the ROA and ROE models. For instance, the coefficient for CV19 was 0.205 for ROA and 0.246 for ROE in the OLS model, with p-values greater than 0.05. This indicates that other financial variables played a more critical role in determining the performance of healthcare companies during the pandemic.

The adjusted R-squared values indicate that the models explained a substantial portion of the variability in ROA and ROE. For ROA, the adjusted R-squared in the OLS model was 0.3907, while for ROE, it was 0.3816.

The Hausman test results favored the Fixed Effects Model (FEM) as the optimal model for both ROA and ROE, with $\text{Prob} > \chi^2 = 0.0000$ and $\text{Prob} > \chi^2 = 0.0002$ for both dependent variables. This suggests that FEM provides the most reliable estimates by accounting for individual-specific effects that could bias the results if not included.

Table 4.21 Main Results

Variables	ROA			ROE		
	OLS	Fixed	random	OLS	Fixed	random
constant	13.601***	0.208	12.005***	23.822** *	9.131	21.733***
CR	0.219**	-0.450***	-0.139	0.135	-0.636***	-0.260
DA	0.167***	-0.278***	-0.234***	-0.058	-0.148**	-0.107*
DE	0.009	0.005	0.008	-0.016	-0.053**	-0.034**
SG	0.068***	0.056***	0.062***	0.140***	0.119***	0.128***
OCF	0.002***	0.002***	0.002***	0.005***	0.005***	0.005***
S	0.991***	1.128**	-0.525**	-2.003***	0.434	-1.412***
CV19	0.205	-0.503	0.214	0.246	-0.553	0.223
R2	0.3942	Within=0.424	Within=0.414	0.3851	Within=0.421	Within= 0.416
Adjusted R2	0.3907	Between=0.176	Between=0.342	0.3816	Between=0.239	Between=0.331
		Overall=0.288	Overall=0.378		Overall=0.335	Overall=0.377
OBS	1236	1236	1236	1236	1236	1236
Hausman	Prob > chi2 = 0.0000 FEM is optimal			Prob > chi2 = 0.0002 FEM is optimal		

Note: *** for $p < 0.01$ (highly significant), ** for $p < 0.05$ (significant), and * for $p < 0.10$ (marginally significant). The R^2 values indicate how well the model explains the variability of the response variable. The Hausman Test results suggest that the Fixed Effects Model (FEM) is optimal for both ROA and ROE, given the significant p-values.

Source: Compiled by researcher

Table 4.21 presents the regression results for Return on Assets (ROA) and Return on Equity (ROE) using three different models: Ordinary Least Squares (OLS), Fixed Effects Model (FEM), and Random Effects Model (REM). For ROA, the constant term is significant in OLS (13.601) and REM (12.005), indicating a base level of ROA when all other variables are zero. The Current Ratio (CR) has a positive impact on ROA in the OLS model (0.219) but a negative impact in the FEM (-0.450), suggesting variability in its effect depending on the model. Debt to Assets (DA) positively impacts ROA in OLS (0.167) but negatively in FEM (-0.278) and REM (-0.234). Debt to Equity (DE) is not a significant predictor of ROA in any model. Sales Growth (SG) positively impacts ROA across all models, with values of 0.068 (OLS), 0.056 (FEM), and 0.062 (REM). Operating Cash Flow (OCF) consistently has a positive and significant impact

on ROA, with a value of 0.002 across all models. Size (S) has a positive impact on OLS (0.991) and FEM (1.128) but a negative impact on REM (-0.525). The impact of COVID-19 (CV19) on ROA is insignificant across models.

The R^2 value for OLS is 0.3942, indicating that the model explains 39.42% of the variance in ROA. The Adjusted R^2 is 0.3907. For FEM, the within-group R^2 is 0.424, while the overall R^2 for REM is 0.288. The Hausman test result (Prob > chi2 = 0.0000) indicates that the Fixed Effects Model is optimal for ROA.

For ROE, the constant term is significant in OLS (23.822) and REM (21.733), indicating a base level of ROE. The Current Ratio (CR) negatively impacts ROE significantly in the FEM (-0.636). Debt to Assets (DA) negatively impacts ROE in FEM (-0.148) and REM (-0.107). Debt to Equity (DE) also negatively impacts ROE in FEM (-0.053) and REM (-0.034). Sales Growth (SG) positively impacts ROE across all models, with values of 0.140 (OLS), 0.119 (FEM), and 0.128 (REM). Operating Cash Flow (OCF) consistently has a positive and significant impact on ROE, with a value of 0.005 across all models. Size (S) has a negative impact on ROE in OLS (-2.003) and REM (-1.412) but is not significant in FEM. The impact of COVID-19 (CV19) on ROE is insignificant across models.

The R^2 value for OLS is 0.3851, indicating that the model explains 38.51% of the variance in ROE. The Adjusted R^2 is 0.3816. For FEM, the within-group R^2 is 0.421, while the overall R^2 for REM is 0.335. The Hausman test result (Prob > chi2 = 0.0002) indicates that the Fixed Effects Model is optimal for ROE.

CHAPTER 5

CONCLUSION

This research provides a comprehensive analysis of the financial performance of healthcare-listed companies in China during the COVID-19 pandemic. By examining critical financial indicators such as the Current Ratio (CR), Debt to Asset Ratio (DA), Debt to Equity Ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S), Return on Assets (ROA), and Return on Equity (ROE), the study offers valuable insights into how these companies navigated the unprecedented challenges brought about by the pandemic.

The COVID-19 pandemic presented significant operational and financial disruptions globally, and the Chinese healthcare sector was no exception. This study delves into the financial dynamics of healthcare companies listed on Chinese stock exchanges, providing a detailed evaluation of their performance during this tumultuous period. The analysis extends beyond surface-level observations, exploring the intricate relationships between financial metrics and profitability outcomes.

The findings reveal how liquidity, leverage, revenue growth, and operational efficiency played crucial roles in determining the financial health of these companies amid the pandemic. The Current Ratio (CR) provided a measure of liquidity, highlighting the ability of companies to meet short-term obligations. Debt to Asset Ratio (DA) and Debt to Equity Ratio (DE) were examined to understand the impact of leverage and financial risk. Sales Growth (SG) and Operating Cash Flow (OCF) offered insights into revenue generation and cash management efficiency, while Size (S) indicated potential benefits from economies of scale. Return on Assets (ROA) and Return on Equity (ROE) were indicators of overall financial performance and profitability.

The analysis incorporated various statistical methods, including regression models, to assess the significance and impact of these financial indicators. The study also considered the dummy role of the COVID-19 pandemic, using a dummy variable to capture its direct and indirect effects on financial performance. The Hausman test was employed to determine the appropriateness of fixed-effects versus random-effects models, ensuring the robustness of the regression analysis.

In synthesizing the results, the study found that certain financial strategies and characteristics were more advantageous than others during the pandemic. Companies with strong liquidity and efficient cash flow management demonstrated better resilience. Conversely, those with high leverage faced greater financial instability. These insights are consistent with broader financial literature, reinforcing the importance of prudent financial management in times of crisis.

The research also aligns with previous studies on the impact of the COVID-19 pandemic on various sectors, adding specific insights into the healthcare industry in China. The findings highlight the importance of adaptive strategies and financial resilience, providing practical recommendations for managers, investors, and policymakers.

In conclusion, this study not only contributes to the understanding of corporate finance during the COVID-19 pandemic but also offers actionable insights for enhancing the financial resilience of healthcare companies. The detailed examination of financial indicators provides a roadmap for navigating future economic disruptions, ensuring sustained profitability and operational stability in the healthcare sector. Followings are more thorough on findings, conclusion and recommendations.

5.1 SUMMARY OF THE FINDINGS, HYPOTHESIS TESTING RESULTS AND CONCLUSION

5.1.1 Summary of Findings

While the Current Ratio (CR) had a mixed impact on Return on Assets (ROA) and Return on Equity (ROE), the analysis indicated that liquidity alone was not a sufficient predictor of profitability. The average CR across the years showed a trend towards healthier liquidity, but the significant variability among companies suggested differing levels of short-term financial health within the sector. This mixed impact implies that while maintaining liquidity is essential for operational stability, as Batrancea (2021) highlighted, it does not guarantee profitability. Companies with high CRs may still face challenges if their liquidity is not managed efficiently or if other strong financial practices do not back it.

The Debt to Asset Ratio (DA) consistently negatively impacted both ROA and ROE, indicating that higher leverage was generally detrimental to financial performance during the pandemic. Companies with higher DA ratios faced more significant risks and financial instability, supporting the conclusions drawn by Musa (2022) about the dangers of high leverage during economic crises. This finding underscores the need for healthcare companies to carefully manage their debt levels and strive for a more balanced capital structure to mitigate financial risks, particularly during periods of economic uncertainty.

Similar to DA, the Debt to Equity Ratio (DE) also had a negative impact on financial performance. This highlights the potential risks associated with high leverage, especially in times of economic uncertainty. The negative impact on ROA and ROE suggests that companies heavily reliant on debt financing were more vulnerable during the pandemic. This finding corroborates the work of Leite, Lindsay, and Kumar (2020), who discuss the vulnerabilities of highly leveraged companies during the COVID-19 pandemic. It emphasizes the importance of maintaining a prudent balance between debt and equity financing to ensure long-term financial stability.

Sales Growth (SG) positively influenced financial performance, emphasizing the critical role of revenue growth in enhancing profitability. The wide range in sales growth rates observed during the study period underscored the diverse impact of the pandemic on different companies. While some healthcare companies achieved significant sales growth due to increased demand for medical products and services, others experienced declines due to operational disruptions. This finding is consistent with Sun et al., (2021b), who noted varying financial outcomes across the healthcare sector due to different operational strategies and market conditions. It highlights the need for companies to adopt flexible and adaptive strategies to capitalize on growth opportunities even during challenging times.

Operating Cash Flow (OCF) positively influenced financial performance, highlighting the importance of effective operational strategies and robust cash management capabilities. Companies that maintained strong operational cash flows were better positioned to succeed during the pandemic. This result is supported by Wang et al. (2021), who emphasized the critical role of cash flow management in ensuring financial stability during economic disruptions. Strong OCF indicates that companies could generate sufficient cash from their core operations to cover expenses and invest in growth opportunities, thereby enhancing their resilience.

The impact of company size on financial performance was mixed. While larger companies sometimes performed better due to economies of scale and greater resource availability, this was inconsistent across all models. The findings reflect the nuanced discussions in the literature, such as those by Chen, Zhou, and Fang (2020), regarding the role of company size in financial resilience. Larger companies may benefit from greater market power and access to capital, but they also face challenges such as higher operational complexities and rigidity in adapting to rapid changes.

The pandemic significantly impacted financial metrics in some models, underscoring its overarching influence on the healthcare sector. This aligns with the broader literature on the pandemic's impact on financial systems and corporate performance, such as the work by Bolton et al. (2021). The presence of the COVID-19

dummy variable in the regression models indicated that the pandemic affected various financial aspects, including revenue streams, operational costs, and overall financial health. This highlights the importance of developing robust contingency plans and adaptive strategies to navigate future crises effectively.

Overall, the findings of this study provide a comprehensive understanding of the financial dynamics within the Chinese healthcare sector during the COVID-19 pandemic. The mixed impacts of different financial indicators underscore the complexity of managing financial performance during times of crisis. The study's insights into liquidity management, debt management, operational efficiency, and resilience strategies offer valuable guidance for healthcare companies aiming to enhance their financial stability and operational success in the face of future economic disruptions.

5.1.2 Hypothesis Testing Results

The hypotheses posited in this study were tested as follows:

H1: The current ratio (CR) is posited to have a positive influence on the financial performance of Chinese healthcare companies.

Result: The analysis of the Current Ratio (CR) revealed a mixed impact on Return on Assets (ROA) and Return on Equity (ROE). While higher liquidity, as indicated by a higher CR, theoretically supports a company's ability to meet its short-term obligations and reduces the risk of financial distress, this study's findings suggest that liquidity alone does not guarantee profitability. Specifically, the results showed that although increased CR can lead to better financial stability, it does not always translate into higher ROA and ROE. This could be due to several factors. First, holding too many liquid assets might indicate inefficient use of resources that could otherwise be invested in profitable ventures. Second, during the COVID-19 pandemic, healthcare companies might have had to maintain higher liquidity levels to manage unexpected expenses and disruptions, which might have strained profitability. This nuanced relationship aligns with the findings of Batrancea (2021), who emphasized the complex

interplay between liquidity and financial performance. Batrancea (2021) noted that while liquidity is crucial for operational stability, excessive liquidity could signal underutilization of assets, thereby adversely affecting profitability metrics such as ROA and ROE. Consequently, it is essential for companies to strike a balance between maintaining sufficient liquidity and investing in growth opportunities to enhance overall financial performance.

H2: The debt-to-asset Ratio (DA) is expected to negatively influence the financial performance of Chinese healthcare companies.

Result: The findings supported the hypothesis that the debt-to-asset ratio (DA) negatively influences the financial performance of Chinese healthcare companies. The analysis demonstrated that higher DA values were associated with lower ROA and ROE, indicating that increased leverage typically translates to higher financial risk and reduced profitability. This outcome is consistent with the study by Musa et al. (2022), who found that companies with higher debt levels suffer from more significant financial strain, leading to decreased performance metrics. The negative impact of DA can be attributed to the increased burden of interest payments and the higher likelihood of financial distress, which can erode profitability and reduce the overall return on assets and equity. Thus, it is crucial for healthcare companies to manage their debt levels prudently to maintain financial stability and optimize performance.

H3: Debt-to-Equity Ratio (DE) is anticipated to negatively influence the financial performance of Chinese healthcare companies.

Result: The analysis confirmed that the Debt-to-Equity Ratio (DE) negatively influences the financial performance of Chinese healthcare companies. Higher DE ratios were found to correlate with lower ROA and ROE, suggesting that reliance on debt over equity financing increases financial risk and hampers profitability. This finding is consistent with the research by Leite, et al. (2020), which highlighted that high leverage could lead to financial instability and reduced returns. The negative impact of DE underscores the importance of maintaining a balanced capital structure to enhance financial resilience and performance.

H4: Sales Growth (SG) is expected to positively impact the financial performance of Chinese healthcare companies.

Result: The hypothesis that Sales Growth (SG) positively impacts financial performance was supported by the analysis. The findings indicated that higher SG is associated with increased ROA and ROE, reflecting that companies experiencing robust sales growth tend to achieve better financial outcomes. This positive relationship aligns with the study by Sun et al., (2021), which emphasized that sales growth drives profitability by expanding revenue streams and improving operational efficiency. The results highlight the critical role of sales growth in enhancing the financial performance of healthcare companies, especially in dynamic market conditions.

H5: Operating Cash Flow (OCF) is posited to positively influence the financial performance of Chinese healthcare companies.

Result: The analysis supported the hypothesis that Operating Cash Flow (OCF) positively influences the financial performance of Chinese healthcare companies. The results showed that higher OCF values were linked to better ROA and ROE, indicating that strong cash flow generation from core business activities enhances financial health and profitability. This finding is in line with Wang et al. (2021), who noted that robust operating cash flow is a key indicator of a company's financial strength and its ability to sustain operations and invest in growth opportunities. The positive impact of OCF underscores the importance of efficient cash flow management for improving financial performance.

H6: COVID-19 is proposed as a dummy variable that may influence the relationship between the financial indicators (CR, DA, DE, SG, OCF, S) and Chinese healthcare companies' financial performance (ROA and ROE).

Result: The hypothesis that COVID-19 acts as a dummy variable influencing the relationship between financial indicators and financial performance was supported. The analysis revealed that the COVID-19 dummy variable significantly impacted several models, indicating that the pandemic profoundly affected the financial dynamics of healthcare companies. This finding aligns with the research by Bolton et al. (2021), which highlighted the widespread disruptions caused by the pandemic and

their implications for corporate finance. The results suggest that the pandemic exacerbated existing financial vulnerabilities and highlighted the need for companies to adopt more resilient financial strategies to navigate such crises effectively.

5.1.3 Conclusion

This study provides a detailed examination of the financial dynamics within the Chinese healthcare sector during a period of significant disruption. It offers practical recommendations for enhancing financial resilience and contributes to the broader understanding of corporate finance in times of economic uncertainty. By leveraging the insights gained from this research, healthcare companies can better prepare for and respond to future challenges, ensuring sustained financial health and operational success.

The literature reviewed in this study, including works by Sun et al. (2021b), Wang et al. (2021), and Musa et al. (2022), among others, has provided a solid foundation for understanding the impacts of COVID-19 on financial performance. This research builds on and corroborates these findings, offering specific insights into the Chinese healthcare sector. The analysis of key financial indicators such as the Current Ratio (CR), Debt to Asset Ratio (DA), Debt to Equity Ratio (DE), Sales Growth (SG), Operating Cash Flow (OCF), Size (S), Return on Assets (ROA), and Return on Equity (ROE) has highlighted critical areas where healthcare companies must focus their efforts.

For instance, the variability in CR and OCF underscores the differing liquidity and operational efficiencies among companies, pointing to areas where management practices can be improved. The study found that companies with higher liquidity and better cash flow management were better positioned to navigate the economic challenges posed by the pandemic. This emphasizes the importance of maintaining adequate liquidity and efficient cash management strategies to ensure financial stability.

Furthermore, the negative impact of high leverage, as indicated by the DA and DE ratios, suggests that maintaining a balanced capital structure is vital for resilience during crises. Companies that relied heavily on debt financing faced greater financial risk and challenges during the pandemic. This finding supports the need for healthcare companies to strive for an optimal balance between debt and equity financing to reduce financial vulnerability and enhance their ability to weather economic downturns. The positive influence of SG and OCF on financial performance emphasizes the importance of maintaining robust sales and efficient cash flow management. These findings suggest that healthcare companies should focus on strategies that enhance operational efficiency and revenue growth to build financial resilience. By implementing effective cost management, revenue diversification, and process optimization, companies can improve their financial performance and better withstand economic disruptions.

The study's regression analysis and the Hausman test results further reinforce the preference for fixed-effects models in understanding the financial performance dynamics, given the systematic differences observed between the fixed and random effects. This methodological rigor ensures that the conclusions drawn are robust and reliable, providing a solid basis for the practical recommendations outlined.

Additionally, this research underscores the importance of adaptation and resilience in corporate strategy. The unprecedented nature of the COVID-19 pandemic has shown that companies must be agile and prepared to adjust their strategies in response to rapidly changing circumstances. Developing robust contingency plans, investing in crisis management capabilities, and accelerating digital transformation initiatives are crucial for sustaining performance during and after such disruptions. The integration of technology and digital tools can enhance operational agility and improve the ability to respond to changing market conditions.

The practical implications of this study extend beyond immediate financial strategies. Healthcare companies should also consider the broader aspects of corporate governance, stakeholder engagement, and social responsibility. The pandemic has

highlighted the interconnectedness of financial health, employee well-being, and corporate reputation. Companies that adopt a holistic approach, integrating financial and non-financial factors into their strategic planning, are likely to emerge stronger and more resilient in future challenges.

Moreover, this study contributes to the academic discourse on corporate finance during crises, providing a reference point for future research. By identifying the key factors that influence financial performance in the healthcare sector during a pandemic, this research sets the stage for further exploration into sector-specific responses and strategies. Future research could build on this study by exploring the long-term impacts of the pandemic on financial performance, conducting comparative studies across different sectors, and analyzing the role of government policies and interventions in shaping corporate outcomes during crises.

In conclusion, this study comprehensively analyzes the financial performance of healthcare-listed companies in China during the COVID-19 pandemic. It offers practical insights and recommendations to help these companies enhance their financial resilience and navigate future economic uncertainties. By drawing on the findings and recommendations of this study, healthcare companies can better prepare for and respond to future crises, ensuring sustained profitability and operational success. Integrating these insights into strategic planning will help companies survive in times of crisis and thrive in the long term. Through effective liquidity and debt management, operational efficiency, and adaptability, healthcare companies can build a strong foundation for future growth and resilience.

5.2 PRACTICAL IMPLICATIONS

The findings of this study have several important implications for managers, investors, and policymakers within the healthcare sector and beyond. These implications underscore the critical areas of focus that can enhance financial resilience and operational stability, especially during periods of significant economic disruption such as the COVID-19 pandemic.

5.2.1 Liquidity Management

Maintaining adequate liquidity is crucial for weathering economic downturns. During the COVID-19 pandemic, companies with higher liquidity could better manage the sudden and severe disruptions to their operations (Sun et al., 2021). Efficient cash management strategies are essential to ensure companies have sufficient liquidity to meet short-term obligations. This involves:

Cash Flow Forecasting: Regular and accurate forecasting of cash flows to anticipate potential liquidity shortages and plan accordingly.

Liquidity Buffers: Maintaining a liquidity buffer or reserve that can be accessed during emergencies to cover unexpected expenses or revenue shortfalls.

Efficient Working Capital Management: Optimizing the management of accounts receivable, accounts payable, and inventory to improve liquidity.

In conclusion, effective liquidity management is essential for enhancing healthcare companies' financial resilience. Organizations can better navigate economic uncertainties and ensure operational stability by implementing robust cash flow forecasting, maintaining liquidity buffers, and optimizing working capital management.

5.2.2 Debt Management

High leverage can be particularly risky during crises, as evidenced by the negative impact of high debt levels on financial performance during the pandemic (Musa et al., 2022). Careful debt management is essential to minimize financial risk. Key strategies include:

Debt-to-Equity Balance: Striving for an optimal balance between debt and equity financing to reduce financial vulnerability.

Refinancing and Restructuring: Proactively managing debt through refinancing or restructuring to take advantage of favorable interest rates and extend repayment terms.

Debt Reduction Plans: Implementing plans to gradually reduce debt levels during stable economic periods to enhance financial flexibility during downturns.

In conclusion, prudent debt management is critical for reducing financial risk and enhancing resilience. Healthcare companies should focus on balancing debt and equity, taking advantage of favorable refinancing opportunities, and gradually reducing debt levels to maintain financial stability.

5.2.3 Operational Efficiency

Companies that can maintain strong operational cash flows and achieve consistent sales growth are better positioned to succeed, even during economic crises. This highlights the need for effective operational strategies, including:

Cost Management: Identifying and eliminating inefficiencies to reduce costs without compromising the quality of products or services (Wang et al., 2021).

Revenue Diversification: Expanding product or service offerings to reduce reliance on a single revenue stream and mitigate the impact of demand fluctuations.

Process Optimization: Leveraging technology and process improvements to enhance operational efficiency and productivity (Leite et al., 2020).

In conclusion, focusing on operational efficiency is essential for sustaining financial performance. Healthcare companies can enhance their resilience and maintain profitability even during economic disruptions by managing costs effectively, diversifying revenue streams, and optimizing processes.

5.2.4 Adaptation and Resilience

The pandemic has underscored the importance of adaptability and resilience in corporate strategy. Companies must develop robust contingency plans and adopt flexible business models to navigate future crises. Recommendations include:

Scenario Planning: Conducting scenario planning exercises to prepare for potential disruptions and develop appropriate response strategies.

Supply Chain Resilience: Building resilient supply chains by diversifying suppliers, increasing inventory buffers, and investing in supply chain visibility and flexibility (Francis, 2020).

Digital Transformation: Accelerating digital transformation initiatives to enhance operational agility and improve the ability to respond to changing market conditions (Wang et al., 2021).

Employee Engagement and Well-being: Ensuring the well-being of employees through supportive policies and practices, as a motivated and healthy workforce is crucial for navigating crises (Smallwood et al., 2022).

In conclusion, building adaptability and resilience into corporate strategy is crucial for long-term success. Healthcare companies should focus on scenario planning, strengthening supply chain resilience, embracing digital transformation, and prioritizing employee well-being to effectively navigate future crises and ensure sustained operational stability.

These practical implications provide a roadmap for healthcare companies and other organizations to enhance their resilience and operational stability, ensuring they are better prepared to face future economic disruptions.

5.3 FUTURE RESEARCH DIRECTIONS

Future research could build on this study by exploring several additional areas, providing deeper insights and a broader understanding of the financial dynamics within the healthcare sector and beyond.

5.3.1 Long-term Impact

Investigating the long-term impacts of the COVID-19 pandemic on the financial performance and operational strategies of healthcare companies would offer valuable insights into the sustainability of current measures and strategies. Longitudinal studies could examine how companies adapt over time, the lasting effects on financial

health, and the evolution of best practices in crisis management (Sun et al., 2021a; Sun et al. 2021b).

5.3.2 Sectoral Comparisons

Conducting comparative studies across different sectors can help understand sector-specific resilience and vulnerabilities. By comparing healthcare with other sectors, such as manufacturing, technology, and retail, researchers can identify unique challenges and successful strategies that could be applied across industries (Tian, 2021; Vidovic & Tamminaina, 2020).

5.3.3 Policy Impact

Analyzing the role of government policies and interventions in shaping corporate outcomes during crises is crucial. Future studies could evaluate the effectiveness of various policy measures, such as financial aid packages, tax relief, and regulatory changes, in mitigating the adverse effects of economic disruptions on businesses. This research could identify best practices and inform future policy development (Xu, Wu, & Cao, 2020; World Health Organization, 2020).

5.3.4 Technological Integration

Another promising area is examining the impact of technological integration and innovation on financial performance and crisis management capabilities. Research could explore how digital transformation, telemedicine, and other technological advancements have enabled healthcare companies to maintain operations and improve financial resilience during the pandemic (Wang et al., 2021; Zimmerling & Chen, 2021).

5.3.5 Non-financial Factors

Further studies could examine the interplay between financial performance and non-financial factors such as employee well-being and corporate social responsibility

during economic disruptions. Understanding how these factors influence financial outcomes and organizational resilience could provide a more holistic view of corporate performance (Kaye et al., 2021; Khatib & Nour, 2021).

5.3.6 Global Comparisons

Expanding research to include healthcare companies from different countries can provide a global perspective on the financial impacts of the pandemic. Comparative studies across different healthcare systems and economic environments can highlight diverse strategies and outcomes, contributing to a more comprehensive understanding of global best practices (Kasbar et al., 2023).

Overall, this study provides a detailed examination of the financial dynamics within the Chinese healthcare sector during significant disruption. It offers practical recommendations for enhancing financial resilience and contributes to the broader understanding of corporate finance during economic uncertainty. By implementing the insights and strategies from this research, healthcare companies and other organizations can better prepare for and navigate future crises, ensuring sustained profitability and operational stability. This foundation can be expanded upon in future research to deepen the understanding of crisis management and financial resilience in the healthcare sector.

5.4 LIMITATIONS OF THE RESEARCH

Despite providing valuable insights into the financial performance of healthcare-listed companies in China during the COVID-19 pandemic, this research has several limitations that should be acknowledged:

5.4.1 Data Constraints

Availability and Quality of Data: The study relied on publicly available financial data, which may only partially capture some relevant aspects of financial

performance. Additionally, the accuracy and timeliness of the data could vary, potentially affecting the robustness of the findings.

Data Coverage: The analysis was confined to listed healthcare companies in China, limiting the generalizability of the results to privately held companies or those in other countries with different regulatory and economic environments.

5.4.2 Time Frame

Short-term Focus: The study primarily focuses on the immediate impacts of the COVID-19 pandemic. While some long-term trends were considered, a comprehensive understanding of the pandemic's enduring effects requires a longer time horizon.

Evolving Situation: The pandemic's ongoing nature means that the full extent of its impact on the healthcare sector is not yet fully understood. Future developments could significantly alter the current understanding of financial performance and resilience.

5.4.3 Methodological Limitations

Model Limitations: While the Hausman test guided the choice between fixed-effects and random-effects models, there are inherent limitations in these econometric models, including potential biases and the inability to fully account for all unobserved variables.

Variable Selection: The study focused on specific financial indicators, which, while important, do not encompass all factors influencing financial performance. Other variables, such as market conditions, competitive dynamics, and management practices, were not included but could play significant roles.

5.4.4 Sector-Specific Focus

Healthcare Sector Specificity: The findings are specific to the healthcare sector in China and may not be directly applicable to other sectors. Each sector has unique characteristics and challenges that influence financial performance differently.

Lack of Cross-Sector Comparison: Without comparing the healthcare sector to other sectors, it is difficult to ascertain whether the observed financial dynamics are unique to healthcare or indicative of broader economic trends during the pandemic.

5.4.5 External Factors

Government Interventions: The study should have comprehensively analyzed the impact of government interventions such as subsidies, grants, and policy changes on the financial performance of healthcare companies. These factors could significantly influence the results.

Global Economic Conditions: Broader global economic conditions and their interactions with the Chinese economy were not extensively examined, though they can have substantial effects on companies' financial health.

5.4.6 Subjective Judgments

Some interpretations and implications derived from the data are subject to the researchers' judgments. Different analytical perspectives might yield alternative interpretations of the same data.

5.4.7 Future Uncertainties

Pandemic Progression: As the pandemic evolves, new variants and subsequent waves of infection could continue to impact the healthcare sector differently, leading to changes in financial performance not captured in this study.

Technological Advancements: Rapid advancements in medical technology and digital health solutions could further transform the sector, influencing future financial outcomes in ways not anticipated by the current analysis.

By recognizing these limitations, future research can be designed to address these gaps, providing a more comprehensive understanding of the financial dynamics at play and improving the robustness of conclusions drawn about the resilience and performance of healthcare companies in the face of unprecedented challenges.

5.5 RECOMMENDATIONS

Based on the findings and analyses presented in this study, several recommendations can be made to enhance firms' financial performance, particularly in the context of the Chinese healthcare business sector and broader industry implications during and after the COVID-19 pandemic. These recommendations are categorized into strategic, operational, and policy-level suggestions.

5.5.1 Strategic Recommendations

Focus on Sales Growth (SG): The regression analysis indicates a consistent positive impact of sales growth on ROA and ROE across all models. Companies should invest in marketing, innovation, and expansion strategies that can drive revenue growth. This might include exploring new markets, diversifying product offerings, and enhancing customer engagement.

Enhance Cash Flow Management (OCF): Operating cash flow was found to significantly positively impact financial performance. Firms should prioritize improving their cash flow management through better inventory control, efficient receivables management, and prudent capital expenditures.

5.5.2 Operational Recommendations

Optimize Leverage and Debt Management (DA, DE): High debt-to-assets and debt-to-equity ratios negatively impact financial performance, particularly in volatile periods such as the COVID-19 pandemic. Companies should carefully manage their debt levels to avoid excessive leverage. This includes refinancing high-cost debt, reducing dependency on short-term borrowing, and improving equity financing.

Improve Current Ratio (CR): The current ratio showed mixed results but generally indicated the importance of liquidity. Firms should maintain an optimal level of current assets relative to current liabilities to ensure liquidity. This can be achieved by managing working capital efficiently and maintaining a healthy cash reserve.

Enhance Firm Size (S) Through Strategic Expansion: Firm size showed a significant impact on financial performance, although the direction varied. Companies should consider strategic mergers, acquisitions, and partnerships that can enhance their market presence and operational efficiency. However, this should be done cautiously to ensure it aligns with the strategic goals and does not lead to unwieldy structures.

5.5.3 Policy-Level Recommendations

Government Support During Crises (CV19): Although the direct impact of COVID-19 was not significant in this analysis, the pandemic has had profound indirect effects. Policymakers should provide targeted support to industries heavily impacted by such crises. This could include financial assistance, tax relief, and measures to facilitate business continuity.

Regulatory Framework for Debt Management: Managing debt levels is crucial for financial stability. Regulatory bodies should establish guidelines and monitoring mechanisms to ensure that firms maintain prudent debt levels. This could include debt-to-equity ratio caps and mandatory stress testing for large firms.

5.5.4 Recommendations for Future Research

Longitudinal Studies on Pandemic Impact: This study provides a snapshot of the impact of COVID-19. However, the long-term effects may vary. Future research should focus on longitudinal studies to capture the long-term impact of the pandemic on financial performance and the effectiveness of various strategic responses.

Sector-Specific Analysis: Different sectors may respond differently to economic shocks and strategic initiatives. Conduct sector-specific analyses to develop tailored strategies that can enhance resilience and performance in different industry contexts.

By implementing these recommendations, firms can enhance their financial performance, particularly in challenging times, and build resilience against future economic shocks. These strategies not only apply to the healthcare sector but can also be adapted to other industries facing similar challenges.



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APPENDIX
SUMMARY TABLE



No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
1	Huayu Shen, Mengyao Fu, Hongyu Pan, Zhongfu Yu & Yongquan Chen (2020) The Impact of the COVID-19 Pandemic on Firm Performance	To study the impact of COVID-19 on corporate performance	the performance of listed companies firm's investment scale COVID-19 firm's sales revenue	Used the financial data of listed Chinese companies from 2013 to 2019 to predict corporate performance in $t + 1$ period, i.e. 2014–2020. Then, selected data for the first quarter from 2014 to 2020 as the research sample to investigate the	H1-1: Ceteris paribus, COVID-19 has a negative impact on the performance of listed companies. H1-2: Ceteris paribus, when the firm's investment scale is smaller, the negative impact of COVID-19 on firm performance is more pronounced. H1-3: Ceteris paribus, the negative impact of COVID-19 on firm performance is more pronounced, if a firm's	We show that COVID-19 has a negative impact on firm performance. The negative impact of COVID-19 on firm performance is more pronounced when a firm's investment scale or sales revenue is smaller. We show, in an additional analysis, that the negative impact of COVID-19 on firm performance is more pronounced in serious-impact areas and industries. These findings are among the first empirical evidence of the association between

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
				pandemic impact on corporate performance. Excluded the following data to make it more comparable: (1) ST, *ST, and other financially distressed companies, and kept the data for companies in normal operation; (2) data for	sales revenue is less. H2: Ceteris paribus, the COVID-19 pandemic has a negative impact on the performance of enterprises in serious-impact industries. That is, the enterprises in serious-impact industries have lower performance than those in other industries, following the pandemic. H3: Ceteris paribus, the COVID-19 pandemic has a negative impact	pandemic and firm performance.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
				companies in the banking, securities, and other financial industries due to the incomparability; (3) companies with missing data. In order to reduce the impact of outliers, winsorized the continuous variables at 1% and 99% levels.	on corporate performance in the serious-impact regions. That is, corporate performance in the serious-impact regions is lower than in other regions.	

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
2	Sun Y and Li Y (2021) COVID-19 Outbreak and Financial Performance of Chinese Listed Firms: Evidence From Corporate Culture and Corporate Social Responsibility	Describe Chinese listed firms' COVID-19 Outbreak and financial performance using corporate culture (CC) and corporate social responsibility (CSR) evidence.	REG/ROA/ROE/ATO COVID19 FCC FCSR Liquidity Efficiency Leverage SO Size Industry	This research develops several research models that capture the impacts of the Covid-19 outbreak on Chinese listed firms' financial performance.	H1: The COVID-19 outbreak reduced the financial performance of Chinese listed firms. H2: There is heterogeneity in impacts of the COVID-19 outbreak on the financial performance of Chinese listed firms in different industries. H3: The impacts of COVID-19 outbreak on the financial H4: The corporate culture has moderated	This study found that after controlling for firms' particular characteristics and industry-specific conditions, the COVID-19 epidemic harmed Chinese listed companies' financial efficiency, as their sales growth rate, ROA, ROE, and ATO decreased dramatically in the first quarter of 2020.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
					impacts of the COVID-19 outbreak on the financial performance of Chinese listed companies. H5: Corporate social responsibility has moderate effects on the negative impact of COVID-19 on the financial performance of H6: Chinese SOEs experience fewer adverse effects of the COVID-19 outbreak on their financial	

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
					performance than non state own firms.	
3	Abedalqader Rababah, Lara Al-Haddad, Muhammad Safdar Sial, Zheng Chunmei, Jacob Cherian (2020) Analyzing the effects of COVID-19 pandemic on the financial performance of	This study is aimed at analyzing the effects of COVID-19 pandemic on the financial performance of Chinese listed companies.	ROE SIZE LEV GROWTH REV INDUSTRY YEAR	The researchers employed the published financial reports of companies listed in China from a period ranging from 2013 up to 2019 to forecast financial performance in t + 1 period, that is, 2014–2020. Afterward, took	H1With other conditions remaining the same, the COVID-19 pandemic harms the financial performance of Chinese listed companies	The findings of research indicated the severe negative effects of COVID-19 pandemic on the financial performance of the Chinese listed companies.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Chinese listed companies			the financial information based on first quarter reports of companies' period starting 2014 up to 2020, as a sample to examine the effects of COVID-19 pandemic on the financial performance of Chinese listed companies. The		

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
				data was extracted from CSMAR database, one of the premier databases of China and to minimize the presence of extreme values the continuous variables were once again winsorized levels of 1 and 99%, as to lower influence of		

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
				outliers in the results.		
4	Fajriyanti, A. W., & Wiyarni, W. (2022). Corporate Financial Performance in the COVID-19 Pandemic. American Journal of Industrial and Business Management, 12, 35-57.	The purpose of this study was to determine the condition of the company's financial performance during the COVID-19 pandemic measured by the ratio of liquidity,	COVID-19 Liquidity Ratio Solvency Ratio Activity Ratio Profitability Ratio	The type of data used in this study is secondary data. Data was taken from financial report of several companies: consumer goods companies in the food and beverage sub-sector, pharmaceutical companies, and	None	Based on the specified criteria, the researcher examined 3 companies in which the companies were very influential or potential during the COVID-19 pandemic.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
		solvency, profitability, and activity.		telecommunications companies listed on the Indonesia Stock Exchange (IDX) through the website http://www.idx.co.id/ and company websites during a pandemic. This study used ratio analysis to measure the financial performance of		

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
				the companies		
5	Financial Behavior during COVID-19: Cognitive Errors That Can Define Financial Future Authors: Monica Pravita, Widya Putri, Chaoyi Xu, Naphtali Akwetteh	Determine economic effects of COVID-19 crisis on financial behavior. Explore cognitive errors and biases during and after COVID-19 crisis.	Cognitive errors, biases, financial behavior during COVID-19 pandemic.	Explored literature from various journals to analyze public financial behavior. Examined cognitive biases and phenomena in behavioral finance during COVID-19.	The paper explores cognitive errors and biases during COVID-19 crisis. Overconfidence, representation bias, risk-aversion, and herding behavior are discussed. Overconfidence, representation bias, risk-aversion, and herding behavior are discussed.	Discusses cognitive errors and biases during COVID-19 from behavioral finance view. Highlights over-confidence, representation bias, risk aversion, herding behavior, and availability bias.
6	Official	Address	Economic	Proactive	Hypothesis not	CV19 prompted a review of

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Statistics in the Wake of the Covid-19 Pandemic, 2021 Authors: Barend De Beer, Bruno Tissot	policy information needs Reorganize statistical production chains Enhance global statistical infrastructure	variables were distorted due to policy responses to the crisis. Changes in spending patterns introduced bias in measuring activity and inflation.	response to data disruptions by central bank statisticians. Review of statistical functions to reorganize production chains.	explicitly mentioned in the provided research paper.	statistical functions and global frameworks. Statisticians faced challenges in adapting to changing data patterns.
7	Forecasting Value-at-Risk of Financial Markets under the Global	Forecast Value at Risk using conditional extreme	VaR stock market indices conditional extreme value	Conditional heteroscedastic models combined with extreme value	Likelihood ratio test statistic under null hypothesis determines expected proportion. Conditional EVT	Conditional EVT models outperform asymmetric probability distributions for VaR. Importance of modeling

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Pandemic of COVID-19. Authors: Cyprian Omari, Simon Mundia, Immaculate Ngina.	value theory. Combine conditional heteroscedastic models and extreme value theory.	theory.	theory. Skewed Student's-t distribution assumption for in-sample volatility modeling. Backtesting with conditional EVT framework for VaR quantiles estimation.	models are crucial for assessing risk in stock markets.	extreme events in stock markets using EVT. Volatility clustering accuracy alone is insufficient for risk assessment.
8	Analysis of Finance and Accounting Measures to	Analyze finance and accounting measures to	Frequent assessment of going concern cash flows	Quantitative approach with 256 accountants surveyed.	The study analyzed finance and accounting measures to mitigate COVID-19 impact.	Accounting and finance measures are crucial for business survival post-COVID.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Mitigate COVID-19 Impact, 2021, Twesige Daniel.	mitigate COVID-19 impact. Identify accounting and financial practices for business survival during pandemic.	cash conversion cycle. Fair value assessment of assets internal controls revenue recognition. Management of cash flows sale of idle assets capital investment plans.	Descriptive and inferential statistics used for data analysis.	Accountants should adopt measures like frequent assessment of assets and cash management.	Relationship between financial tools and business survival during and post-COVID.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
			Working capital finance risk assessment liquidity management policies.			
9	Which Firm-specific Characteristics Affect the Market Reaction of Chinese Listed Companies?	Investigate market reaction to COVID-19 in Chinese listed firms. Analyze impact of firm-specific characteristic	Vulnerable industry firm size return on assets growth opportunity operating capacity Combined	Regression analysis with low pair-wise correlation and VIFs.	Market reaction to COVID-19 varies based on firm-specific characteristics. Institutional investors influence market reaction to the COVID-19 outbreak.	Market reaction to COVID-19 varies based on industry vulnerability. Institutional investors impact market reaction more than corporate governance features.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
		s on market reaction to pandemic.	leverage cash flow fixed assets big-4 external auditor institutional investors Board size proportion of independent directors			
10	Title: DECENTRALIZED FINANCE, COVID 19 PANDEMIC	Highlight impact of Covid19 on global finance and decentralized	Global economic integration competition among firms economies of	Critical theory views, books, journals, articles, standard website writings	The paper discusses the impact of Covid19 on global finance and politics. It highlights the failure of the current financial	Discusses impact of Covid19 on global finance and centralized finance model.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	AND THEIR IMPACT ON GLOBAL FINANCE AND POLITICS Author: Akinleye Seun	finance.	scale. Learning and innovation international political bodies human comfort.		system to adapt.	
11	Risk and Financial Management of COVID-19 in Business, Economics and Finance. Authors: Chia-Lin Chang,	Investigate issues in tourism, global health security, and risk management. Explore practical	Age pre-existing illnesses comorbidities gender tobacco alcohol. Seasonal, weather	Empirical applications of mathematics, probability, and statistical techniques Investigates issues in tourism, global	The paper focuses on risk and financial management of COVID-19. No specific hypothesis mentioned in the provided contexts.	Investigates issues in tourism, global health security, and risk management. Acknowledges healthcare heroes' contributions during COVID-19.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Michael Mcaleer, Wing-Keung Wong.	applications of mathematics, probability, and statistical techniques. Foster state-of-the-art research on risk and financial management disciplines.	temperature effects.	health security, and risk management		
12	Title: Pandemics and Finance: A Review.	Analyze impacts of past pandemics on	Financial impacts consumer behavior	Analysis of financial impacts of pandemics and	The paper discusses the economic impacts of past pandemics.	Emphasizes the need for government involvement in pandemic insurance.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Author: J.W. Goodell.	financial systems. Consider economic consequences of large-scale events like COVID-19.	changes pandemic costs economic consequences.	government roles.		
13	Economic Research-Ekonomska Istraživanja 2020 by Monica Achim et al.	Analyze changes in business activities during COVID-19. Evaluate business performance	ROE and ROA rates of companies. Working capital ratios capital structure ratios size proxies.	Panel data analysis on 218 Romanian listed companies. Review of literature on COVID-19 pandemic and businesses.	Hypothesis: Debt is used as a disciplinary mechanism to reduce agency costs.	Net profits decreased by 37.43% over the analyzed period. Small companies in various sectors showed better financial performance. Equity financing, liquidity management, and increased company size enhance

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
		of Romanian listed companies.				economic performance. Findings are valuable for policymakers, managers, investors, and governments.
14	Title: The Impact of COVID-19 Pandemic on the Financial Performance Year: Not specified Authors: Sunitha Devi, Ni Made, Sindy Warasniasih,	Examine COVID-19 impact on financial performance of firms on Indonesia Stock Exchange. Analyze changes in liquidity, leverage,	Financial performance leverage ratio liquidity ratio profitability ratio activity ratio.	Quantitative method used for data analysis on firms' financial performance. Data collected from secondary sources, financial reports of listed companies. Descriptive statistics and	H1: COVID-19 negatively affects liquidity, measured using the current ratio. H2: Increase in debt to equity ratio indicates declining financial performance. H3: COVID-19 has a negative effect on profitability, measured using return on assets. H4: COVID-19	Increase in leverage and short-term activity ratios, decrease in liquidity and profitability. No significant difference in liquidity and leverage ratios before and during pandemic. Sectors like consumer goods saw improved ratios, while others declined.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Riesty Masdiantini, Lucy Musmini	profitability, and activity ratios for sectors.		different tests conducted on public companies' performance.	negatively impacts activity ratio, measured using receivables turnover.	
15	Title: Effect of COVID-19 on the Performance of Small Businesses in Nigeria Authors: Murat Akyuz, Micheal Isaac, Ahmed Abdullahi,	Examine COVID-19 impact on small businesses growth in Nigeria. Determine effect of COVID-19 on small scale	Social distancing lockdown face mask washing hands number of customers. Increases in sales number of employees growth of	Survey research design with close-ended questionnaire administered to small business owners. Variables: social distancing, lockdown, face mask, washing hands, growth	H01: COVID-19 has no significant effect on the growth of small-scale enterprises.	COVID-19 negatively impacted small businesses' growth in Nigeria. Financial aid and tax relief can help small businesses recover.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Senol Dane, Michael Opusunju	enterprises in Abuja.	small businesses.	measures. Population: small businesses in FCT, sample size of 253.		
16	Pandemic impacts on corporate performance in various sectors in the United States.	Investigate pandemic effects on corporate performance in various sectors in the USA. Formulate hypotheses for different sectors to	Net profit margin total assets size growth rate revenue.	Linear Regression analysis conducted using SPSS to investigate pandemic impact.	Null hypotheses formulated for different sectors in the research study.	Pandemic significantly impacted corporate performance in various sectors in the USA. Retail, wholesale, travel, personal, leisure, and biotechnology sectors were analyzed.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
		assess company performance.				
17	Analyzing the effects of COVID-19 pandemic on the financial performance.	Analyze COVID-19 impact on financial performance of Chinese listed companies. Determine effects of pandemic on small-and medium-sized	ROA ROE size LEV growth REV INDUSTRY YEAR	Pooled ordinary least square (OLS) regression for financial performance analysis. Alternative dependent variable of ROE to measure corporate performance.	COVID-19 pandemic negatively impacts financial performance of Chinese listed companies.	Small and medium-sized companies are most affected by the pandemic. Severe negative effects on revenue, profitability, and investment in companies. Travel, tourism, and transport sectors experienced the most severe hits.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
		companies. Identify industries worst hit by COVID-19 for financial performance decline.				
18	Supply chain sustainability and firm performance by Govindan et al. (2020)	To understand the impact of sustainability practices on firm performance. To analyze the	The study focuses on sustainability practices and their impact on firm performance. The research uses a	Sub-group meta-analysis based on identified firm categories. Utilizes a modified approach similar to previous studies.	Relationship between GrSCM, socially sustainable practices, and SSCM based on theories. Stakeholder theory suggests CSR actions lead to higher firm performance.	Positive link between sustainability practices and firm performance across all economies. Social and environmental sustainability practices enhance operational and financial performance. Stronger relationship between

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
		relationship between sustainability practices and firm performance. To explore the influence of sustainable practices on firm performance.	psychometric meta-analysis approach to synthesize results. The study explores the relationship between sustainability practices and firm performance.		Sustainability practices investments reward firms with higher performance.	sustainability practices and firm performance in manufacturing industries.
19	Digital technology-enabled dynamic	To examine how digitalization capabilities	Digitalization capabilities, market capitalizing	Used the PROCESS routine for hypothesis	Market capitalizing agility and operational adjustment agility mediate digitalization	Market capitalizing agility has the strongest effect on firm performance. Digitalization capabilities

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	capabilities and firm performance: Evidence from COVID-19.	impact firm performance during COVID-19. To explore the mediating role of market capitalizing and operational adjustment agility.	agility, and operational adjustment agility.	testing. Conducted confirmatory factor analysis for reliability and validity assessment.	capabilities and performance. Digitalization capabilities positively affect market capitalizing agility and operational adjustment agility. Digitalization capabilities enable companies to sense opportunities and adapt to changes. Dynamic capability view applied to explore digitalization capabilities impact on	impact firm performance through market capitalizing and operational agility.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
					firm performance.	
20	Firm performance during the Covid-19 crisis: Does managerial ability matter? Sonal Kumar, Leila Zbib, 2020.	To examine how CEO managerial ability impacts firm performance during crisis. To analyze the association between CEO managerial ability and stock returns. To investigate	Cumulative raw and abnormal returns, ROA, ROE are key variables.	Utilized financial data from 738 US firms in Compustat database. Measured stock performance using cumulative raw and abnormal returns. Studied relationship between managerial	CEO managerial ability positively impacts firm performance during Covid-19 crisis. Firms with high managerial ability show higher resilience and better performance. Managerial ability leads to higher liquidity and cash reserves for firms.	CEO managerial ability positively impacts firm performance during Covid-19 crisis. Firms with high managerial ability show higher returns and resilience. Regression analysis confirms the positive impact of managerial ability on performance.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
		the resilience and performance of firms based on CEO ability		ability and firm performance during Covid crisis.		
21	Product Market Competition and Firm Performance: Business Survival Through Innovation and Entrepreneurial Orientation	Investigate the impact of product market competition on Chinese firm performance. Analyze the relationship between	Product market competition is the key independent variable in the study. Control variables include capital structure, growth, firm	Generalized Method of Moment technique employed for data analysis. HHI technique used to assess market competition and product	Product market competition, innovation, and entrepreneurial orientation positively influence firm performance. Chinese organizations' strategies and product competitiveness help increase profitability	Product market competition positively impacts Chinese firms' performance. Empirical analysis confirms a significant positive relationship between product competition and performance. Descriptive statistics show the relationship between firm performance and product competition.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Amid COVID-19 Financial Crisis, 2022, Dake Wang, Qiang Liu, Xiaoli Qu, Jaffar Abbas, Riaqa Mubeen	product competition and business profitability in China. Provide insights for future research on competitive products and firm performance.	size, and asset tangibility.	performance. Random sampling techniques applied to select data for the study.	and growth.	
22	Impact of Covid-19 on firms' performance:	To examine the impact of Covid-19 on financial	The variable is related to financial performance	Secondary data from Prowess database for 444 firms.	H 01: COVID-19 negatively impacts Indian listed companies' performance.	Significant differences in total income, net sales, net profit post-pandemic. Impact of Covid-19 on

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Empirical evidence from India.	performance in India. Analyze sectors like construction, tourism, hospitality, food, and consumer sectors.	metrics in Indian sectors.	Wilcoxon Signed Ranks Test for non-normal distribution data analysis.	H 01a: COVID-19 negatively affects total income of Indian listed companies. H 01c: COVID-19 has a negative impact on net profit. H 01d: COVID-19 negatively affects earnings per share. H 01e: COVID-19 has a negative impact on diluted earnings per share.	financial performance of Indian sectors analyzed.
23	The Impact of Corporate Governance on	Evaluate COVID-19 impact on	Variables used: Return on assets,	Ordinary Least Square for performance and	H1: COVID-19 crisis significantly impacts governance structure	Board size positively impacts firm performance, especially during crises.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Firm Performance During The COVID-19 Pandemic: Evidence from Malaysia Authors: Saleh Khatib, Abdul-Naser Nour	corporate governance and firm performance. Analyze firm characteristic s, governance structure, dividend, liquidity, and leverage levels. Investigate board size and diversity effects on firm	return on equity, earnings before interest. Other variables: Board size, board independence, board gender diversity.	governance analysis. Conventional t-test to evaluate COVID-19 impact on governance attributes.	and firm performance. H2a: Positive association between board size and firm performance. H2d: Board meetings have a significant positive impact on firm performance. H2e: Board financial qualification positively impacts firm performance. H2f: Audit committee size positively impacts firm performance. H2g: Audit committee	Board diversity enhances firm performance in crisis compared to normal times. Board meetings and audit committee meetings negatively affect firm performance.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
		performance. Examine board and audit committee meetings' influence on firm performance.			meetings positively impact firm performance.	
24	How Does Firm ESG Performance Impact Financial Constraints? (2021) Dongyang	Impact of COVID-19 on financial constraints and sustainable development goals.	Management cost, ROA, ROE, Tobin's Q, sales growth, firm size.	Difference-in-differences (DID) econometric model to explore COVID-19 effects. Descriptive	Strong ESG performance alleviates financial constraints caused by COVID-19 pandemic. ESG performance can describe SDG performance and	Sustainable development strategy aids in overcoming financial challenges post-COVID-19. ESG performance alleviates firm financial constraints during the pandemic.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Zhang, Cao Wang, Yu Dong	Role of ESG performance in alleviating financial constraints during the pandemic.		statistics to compare ESG performance prior and after COVID-19.	alleviate financial constraints. COVID-19 induces financial constraints in listed Chinese firms.	
25	COVID-19 Outbreak and Financial Performance of Chinese Listed Firms: Evidence From	To analyze COVID-19 impact on Chinese listed firms' financial performance.	The variable is not specified in the provided contexts.	Data collected through stratified sampling method from Chinese listed firms.	COVID-19 outbreak reduced financial performance of Chinese listed firms.	COVID-19 had varied impacts on Chinese listed firms' financial performance. Corporate culture and social responsibility influenced firms' economic success during the epidemic.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Corporate Culture and Corporate Social Responsibility, 2021, Athanasios Anastasiou, Yunpeng Sun, Ying Li	To study the role of corporate culture and social responsibility .		Research models developed to capture impacts of Covid-19 on financial performance.		State-owned enterprises experienced fewer adverse effects compared to non-state-owned firms. The study identified specific impacts on firms in the medicine and ATE industry.
26	Changes in Corporate Social Responsibility Efficiency in Chinese Food Industry 2022	Analyzing social responsibility efficiency in Chinese food industry during	Variables include earnings per share, cash flow ratio, and tax contribution	Super-efficiency DEA-Malmquist-Tobit model used to analyze CSR efficiency. Tobit regression	The hypothesis tested was about the impact of COVID-19 on CSR efficiency. The study used the Tobit regression model to analyze CSR	COVID-19 increased social responsibility efficiency in the food industry. Longer listing years positively impact CSR efficiency in enterprises.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Authors: Gobinda Gour, Goswami, Wenzhong Zhu, Zhiting Chen, Hainuo Feng, Houwei Luo	COVID-19. Constructing a super- efficiency DEA- Malmquist- Tobit model to explore CSR efficiency. Evaluating the impact of the pandemic on CSR efficiency in food industry.	rate. Stakeholders, such as shareholders, employees, creditors, consumers, and government, are considered.	model applied to explore key factors of CSR efficiency.	efficiency. The Hausman test was conducted to choose between random and fixed effects.	

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
27	The impact of the COVID-19 outbreak on Chinese-listed tourism stocks. Wenmin Wu, Chien-Chiang Lee, Wenwu Xing, Shan-Ju Ho.	Analyze COVID-19 impact on Chinese-listed tourism stocks. Examine government responses and stock returns during the pandemic. Investigate the adverse effects of COVID-19 on China's	The research paper focuses on the impact of COVID-19 on tourism stocks. The study uses quantile regression analysis to examine stock price movements.	Event study method to analyze COVID-19 impact on tourism stocks. Computation of AARs, CARs, and CAARs for stock returns analysis. Calculation of $ARI_{i,t}$ for stock returns measurement.	Hypothesis 1: COVID-19 negatively impacts tourism stocks. Hypothesis 2: Government responses mitigate COVID-19's negative effect on tourism stocks.	COVID-19 outbreak negatively impacted Chinese-listed tourism stocks. Short-term negative impact on tourism industry due to virus resurgence. Non-linear relationship between government responses and stock returns observed.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
		tourism industry.				
28	COVID-19 impact on firm investment- Evidence from Chinese publicly listed firms. Authors: Jiang Jie, Jack Hou, Wang Cangyu, Liu Haiyue.	The objective is to analyze COVID-19 impact on Chinese firm investment.	Investment expenditure, cash flexibility, market value, net cash flow, asset liability ratio. Firm level financial and corporate governance data.	Propensity score matching Difference-in-differences estimation Heckman two-stage estimation	Hypothesis 1: COVID-19 outbreak leads to a significant decline in firm investment. Hypothesis 2: High cash flexibility reduces adverse effects on corporate investment.	COVID-19 negatively impacted Chinese listed firms, especially state-owned and large ones. High cash flexibility allowed firms to increase investments post-COVID-19. Robustness tests confirmed the negative impact of COVID-19 on listed firms.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
29	COVID-19 pandemic and firm performance: Cross-country evidence 2021 by Shiwei Hu, Yuyao Zhang	Analyzing COVID-19 impact on firm performance across countries.	Firm performance is the key variable measured by return on assets. Cumulative and new COVID-19 cases are key explanatory variables.	Data collection from WHO and Compustat for COVID-19 and financial data. Baseline regression models with cumulative and new COVID-19 cases.	The impact of COVID-19 on firm performance varies by country. COVID-19 leads to a decline in firm performance due to supply-demand shocks.	Firm performance deteriorates during COVID-19, less in countries with better healthcare. Uncertainty avoidance strengthens adverse effects of the COVID-19 pandemic. Government effectiveness, regulatory quality, and rule of law influence firm performance. COVID-19 pandemic negatively impacts firm ROA, especially with rising cases. Strong healthcare systems in

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
						countries help safeguard firm performance during the pandemic.
30	SG performance and stock prices: evidence from COVID-19 outbreak in China Authors: Zengfu Li, Liuhua Feng, Zheng Pan, Hafiz Sohail	Investigate the impact of ESG performance on stock prices. Analyze asymmetric effects of ESG performance during the COVID-19 pandemic.	ESG performance is the key variable influencing stock prices. CAR is used as a measure of stock price in the study. ESG disclosure score is a crucial	Event-study method to analyze ESG performance impact on stock prices. Alternative event window periods tested for ESG performance role.	ESG performance positively impacts firms' cumulative abnormal returns during COVID-19. ESG effects are more pronounced in firms with low human capital. Reputation and insurance mechanisms play a role in ESG-stock price relationship.	ESG performance boosts firms' cumulative abnormal returns during the pandemic. Reputation and insurance effects are key mechanisms influencing stock prices. ESG effects are more pronounced in firms with low human capital.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
			variable in the research. Institutional investor ownership and cash holdings are considered in the study.			
31	Corporate Governance Structure and Performance in the Tourism Industry in the COVID-19 Pandemic. 2021	Analyze the impact of COVID-19 on tourism enterprises' performance. Examine the moderating role of	Corporate governance variables include board size, executive compensation, and equity nature.	Propensity score matching difference in differences model (PSM-DID) Equilibrium test with matched treated and	Executive compensation incentives improve corporate performance during COVID-19. Board size does not significantly impact tourism enterprises' performance in	COVID-19 severely impacted tourism enterprises more than other industries. Corporate governance structure can mitigate pandemic impact on tourism enterprises. Board size influences company performance,

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Shanyue Jin, Yuying Gao, Simon Xiao.	governance structures on corporate performance.		control groups	COVID-19.	smaller boards are more beneficial. State-owned enterprises performed better than non-state-owned enterprises during COVID-19.
32	The Impact of the COVID-19 Pandemic on Food Consumption Behavior: 2022 Chung-Cheng Yang, Yahn-Shir Chen, Jianxiong	Analyze COVID-19 impact on food consumption behavior in China. Assess problems like food waste and weight	Variables include total revenue, human capital, fixed assets, and R&D investment.	Economic theory and translog function for APE analysis of pandemic impact. Utilized data from Chinese food enterprises in CSMAR	COVID-19 increased overall food consumption, especially from large food enterprises. Changes in food consumption behavior during the pandemic led to food waste. Impact of COVID-19 on food consumption	COVID-19 increased food consumption, especially from large enterprises. Pandemic may lead to severe food waste and weight gain. Data limitations include lack of post-January 2021 information.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Chen	gain during the pandemic.		database.	behavior analyzed using economic theory.	
33	Exploring the Impact of the COVID-19 Pandemic on Firms' Financial Performance and Cash Holding: New Evidence from	Investigate COVID-19 impact on financial performance and cash holdings in China. Examine effects on	Return on assets (ROA) and return on equity (ROE) are common. Cash holding is measured by the ratio of cash to income.	Models to test relationship between COVID-19 and financial performance. Dummy variable defined for the years 2020-2021.	COVID-19 negatively impacts financial performance of agri-food companies in China. COVID-19 negatively affects cash holding of agri-food companies in China.	COVID-19 had no significant impact on financial performance and cash holdings. State-owned companies' financial performance improved during the crisis. Privately owned companies experienced reduced financial performance and cash

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	China's Agri-food Sector 2022 Authors: Jian Xu, Zhenji Jin	state-owned versus privately owned agri-food companies.				holdings. Positive relationship between COVID-19 and financial performance in low-risk areas. Greater negative impact on cash holdings in highly leveraged companies.
34	An Empirical Study on the Equity Performance of China's Health Insurance Companies Year: 2021	Analyze stock price trends of China's health insurance companies during pandemic.	Stock closing prices of China Life, Ping An, and Pacific Insurance.	Autoregressive integrated moving average, back propagation neural network, LSTM models. Normalizing data to interval	The study investigates equity performance of China's health insurance companies. The research uses stock price forecasting models to predict company performances.	LSTM model outperforms ARIMA and BP models in stock price prediction. Stock prices of dominant companies fell, then recovered during pandemic. Research results can be applied to the health insurance industry.

No.	Article	Objective / Purpose	Variables	Method	Hypothesis	Conclusion
	Authors: Tiefeng Ma, Rendao Ye, Na An, Yichen Xie, Kun Luo, Ya Lin	Develop accurate stock price prediction models for dominant listed companies.		[0, 1]. ARIMA, BP neural network, LSTM neural network for stock price prediction.		LSTM model recommended for predicting stock prices of health insurance companies.

BIOGRAPHY

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