

Design and Presentation of a Stock Market Volatility Model with Emphasis on the COVID-19 Financial Crisis

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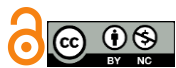
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ABSTRACT

Objective: The present article addresses the design and presentation of a stock market volatility model with an emphasis on the COVID-19 financial crisis.

Methodology: For this purpose, a qualitative method and thematic analysis model were employed.

Findings: In the first stage, familiarization with the data occurred, followed by the creation of initial codes in the second stage. At this stage, 40 initial codes were extracted from texts and articles. The third stage, known as selective coding, aimed to categorize various codes into selective codes and organize all summarized coded data, resulting in six selective codes. In the fourth stage, sub-themes were formed, involving two sub-stages: reviewing and refining, and shaping the sub-themes. The first sub-stage included a review at the level of summarized coded data, and the second sub-stage considered the validity of sub-themes in relation to the data set, resulting in 15 sub-themes. Ultimately, the model's presentation yielded a Holsti coefficient (PAO) or "percentage agreement observed" of 0.830, which is significant. Considering the criticisms of Holsti's method, Scott's Pi was also calculated, yielding a value of 0.73. The fourth measure of qualitative research validity, Cohen's Kappa, was also calculated, resulting in a value of 0.73. Finally, Krippendorff's Alpha was used, with an estimated value of 0.88 in this study.

Conclusion: The study provides a comprehensive model illustrating the significant impact of COVID-19 on stock market volatility, emphasizing the role of macroeconomic variables, monetary and fiscal policies, and investor behavior. The findings highlight the need for effective policy interventions and strategic investment diversification to mitigate market disruptions during global crises.

Keywords: Stock Market Volatility, Financial Crises, COVID-19, Financial Markets, Thematic Analysis

1 Introduction

The coronavirus emerged in Wuhan, China, at the end of December 2019 and was declared a pandemic by the World Health Organization on March 12, 2020. Initially, financial markets did not react significantly due to the limited and incomplete information about the virus. However, as the virus spread to various countries, the ensuing fear among investors led to substantial declines in stock markets, with some indices losing approximately 10% of their value in a single day. This was the most significant daily drop since September 11, 2001, for stock markets. The impact of the coronavirus on the economies of countries, particularly their financial markets, remains highly uncertain due to ambiguous factors such as the spread of the disease, its severity and mortality rate, and its adverse economic effects on various sectors. In this scenario, stock markets are continually updated based on the probabilities of negative impacts on the financial sectors, resulting in abnormal volatility (Behera et al., 2022; Chundakkadan & Nedumpambil, 2022).

Alongside the impacts of the coronavirus on stock markets, many macroeconomic variables experienced significant price shocks. The global oil price dropped from \$53 to below \$20, and the prices of gold, silver, copper, and other commodities also faced severe fluctuations during the initial spread of the coronavirus (Malaiyan et al., 2021). Eventually, after substantial declines, most financial markets and macroeconomic variables stabilized and reached relative equilibrium, reducing the initial excitement in these markets. The negative economic impacts of the coronavirus have manifested as a combination of demand, supply, and uncertainty shocks, primarily due to factory closures, company shutdowns, and travel restrictions, which have harmed the economies of all countries. The detrimental economic effects of these developments are significant due to the disruption of global supply chains, reduced demand for imported goods and services, and a notable decline in international tourism and business travel (Jabeen et al., 2022).

Historically, when a disease emerges, the economic impacts are minimal, and stock markets are moderately affected. For instance, the SARS virus, which occurred in China in 2003, was quickly contained, and the stock market increased by about 20% that year. However, the coronavirus pandemic has appeared very different. The spread of this virus has shown that the global economy is extremely fragile and may lead to economic recessions. No previous disease

has affected stock markets as strongly as the coronavirus pandemic (Sakhaei et al., 2020). The coronavirus wiped out at least five trillion dollars from the value of stock markets in one week, and its rapid spread to other countries led to investor fear. Additionally, the virus caused severe fluctuations in global economic variables such as the prices of oil, gold, silver, copper, and more, ultimately leading to global economic turbulence (Jabeen et al., 2022).

The impacts of the coronavirus outbreak on the performance of stock markets in different countries and the fluctuations in macroeconomic variables have set the stage for further examination. Generally, one of the factors that can affect the stock prices of listed companies is financial crises. Some economic opinions suggest that developing countries' financial markets, like Iran's, will not be affected by financial crises due to their lack of integration or interaction with global financial markets (Jabeen et al., 2022). The critical mistake these analysts make is assuming that the financial market response mechanisms in countries with financial integration and those without, such as Iran, are the same (Behera et al., 2022). In countries like Iran, where financial markets do not interact or integrate with international financial markets, the impact mechanism is different and occurs with a delay of a few months. The prevailing psychological state of the global economy, the reduction in effective demand, and consequently, the decline in the prices of many goods, especially metal and petrochemical products, predominantly produced by companies listed on the stock exchange, convey a significant message to these companies about the expected decline in demand in domestic and foreign markets, reducing their sales and profitability. This factor causes countries like Iran to initially lead the active stock exchanges globally, contrary to central countries facing declines in their financial indices during the first months of the crisis. However, a few months after the onset of the crisis, the stock index in countries like Iran also starts to decline (Ogimi et al., 2020).

The outbreak of the coronavirus has altered many financial and economic equations at various levels, especially in global stock markets. One of the variables potentially affected by this outbreak is the level of investment. In recent years, with the increasing number of companies listed on the stock exchange and the recent events of the past two years, including the entry of COVID-19 into the world, the average value of purchases and the number of shareholders have decreased. Although there were periods when stock sales and offerings were acceptable, they have not yet compensated for the annual sales decline (Curto &

Serrasqueiro, 2022). Therefore, it is unclear how much the financial performance of companies has decreased or increased, or how much their investment levels have changed. Investment and its efficiency have always been a missing link in companies' growth and development paths. Investment involves converting financial assets into one or more types of assets held for a period, requiring the management of investors' wealth. This wealth includes the total current income and the present value of future incomes, where the present value and the concept of compound interest can play a significant role in this process. The level of investment is essential for capital growth and future benefits (Chundakkadan & Nedumparambil, 2022). Effective investment is a critical responsibility of the company's manager, as investment decisions drive future cash flows and the company's final valuation. Effective investment results from creating and securing initial capital or increasing the capital of companies expecting business progress and higher profits. The more capital a company has, the better it can expand activities and achieve higher income and profits. Hence, the efficiency of capital increases, provided various control variables are present, and in some cases, it improves. Theoretically, companies continuously invest in projects with positive net present value until the marginal benefits of these investments equal their marginal costs. In addition to the level of investment, stock returns are concepts that might change during the coronavirus outbreak (Ogimi et al., 2020). Stock returns themselves contain informative content and are used by actual and potential investors in financial analysis and forecasting. Moreover, investors' goal in investing is to maximize their wealth. To achieve this, investors invest in assets with high returns and relatively low risks. If the return on an investment exceeds the expected return, the asset's value is higher, increasing the investor's wealth (Zheng & Zhang, 2021). Considering the increasing trend of investors and financial decision-makers toward cash flow information in recent decades, which indicates the high informative content of this data, researchers use various approaches to evaluate this content, and multiple models are employed to substantiate their claims. One of the most commonly used models is stock return-based models (Malaiyan et al., 2021). Given these discussions, the present article focuses on designing and presenting a stock market volatility model with an emphasis on the COVID-19 financial crisis.

2 Methods and Materials

In this study, the thematic analysis method was used to analyze qualitative data. To present a model for examining the impact of COVID-19 on stock market volatility with an approach to the Iranian stock market (Tehran Stock Exchange), thematic analysis was employed. The process of analyzing qualitative data begins when the researcher identifies and considers meaningful statements and expressions related to the subject. This analysis starts with repeated reviews of the data, followed by coding the meaningful statements related to the research topic. The practical process of data analysis includes four stages: preparation, familiarization, coding, and obtaining main categories.

One of the simple and efficient methods of qualitative analysis is thematic analysis. In fact, thematic analysis is the first qualitative analysis method researchers should learn. This method provides the essential skills needed for many qualitative analyses. Thematic analysis is a common and shared skill in qualitative analyses; therefore, Boyatzis (1998) does not introduce it as a specific method but rather as a tool suitable for various methods. Ryan and Bernard (2000) also describe coding themes as a prerequisite process for common qualitative analyses rather than a unique method. However, Braun and Clarke (2006) view thematic analysis as a specific method, noting its flexibility as one of its advantages. Thus, thematic analysis is a method for identifying, analyzing, and reporting patterns within qualitative data. This method is a process for analyzing textual data, transforming scattered and diverse data into rich and detailed information. Thematic analysis is not merely a specific qualitative method but a process applicable in most qualitative methods. Generally, thematic analysis is a method for:

- (a) seeing the text;
- (b) interpreting and understanding seemingly unrelated information;
- (c) analyzing qualitative information;
- (d) systematically observing a person, interaction, group, situation, organization, or culture;
- (e) transforming qualitative data into quantitative data.

As mentioned, the thematic analysis method was used in this study to analyze qualitative data, and an example of coding is provided below, with full coding presented in Chapter Four.

Thematic analysis is a method for determining, analyzing, and expressing patterns (themes) within data. This method

organizes data and describes them in detail. Clarke and Brown (2006) proposed six steps for thematic analysis.

In the first stage, familiarization with the data occurs; in this stage, we become deeply familiar with the content of the data.

The second stage involves creating initial codes; codes represent features of the data that the researcher finds interesting. In this stage, 40 initial codes were extracted from texts and articles.

The third stage, known as selective coding, aims to categorize different codes into selective codes and organize all summarized coded data, resulting in six selective codes.

In the fourth stage, sub-themes are formed; this stage includes two sub-stages of reviewing, refining, and shaping the sub-themes. The first sub-stage involves reviewing the level of summarized coded data. In the second sub-stage, the validity of sub-themes in relation to the data set is considered, resulting in 15 sub-themes.

The fifth stage involves defining and naming the main themes; in this stage, the main themes for analysis are defined and reviewed, and the data within them are analyzed. By defining and reviewing, the nature of what a theme discusses is specified, and it is determined which aspect of the data each main theme contains. In this stage, one main theme was obtained from the sub-themes.

In the final stage, the report is prepared; the sixth stage begins when the researcher has a set of completely abstract main themes consistent with the study's contextual structures. This stage includes the final analysis and writing of the report.

The thematic analysis process begins when the analyst considers potential meaningful patterns and topics. This analysis involves continuous back-and-forth movement between the data set and the coded data set, and the analysis of the data generated. Writing the analysis starts from the first stage. Generally, there is no unique way to start a thematic analysis study. The thematic analysis is a recursive process involving back-and-forth movement between the mentioned stages. Additionally, thematic analysis is a process that must be conducted over time, meaning the researcher will collect and analyze data over time. The six stages of thematic analysis proposed by Clarke and Brown (2006) are explained below.

Stage 1. Familiarization with the Data:

To become familiar with the depth and breadth of the data, the researcher must immerse themselves in it to some extent. Immersion typically involves "repeated reading of the data" and active reading (i.e., searching for meanings and

patterns). For data collection in this research, secondary data, known as documents and past records, and interviews were used. These documents and records included all studies on the impact of COVID-19 on the stock market. For this study, articles and research from 2000 to the present were reviewed. To collect and categorize the content of articles produced in the research field, search engines like Google and scientific article databases were used. Various terms like the impact of COVID-19 on the stock market were used for searching research articles. Interview questions were specified as follows:

How has COVID-19 and its spread affected the stock market and its volatility?

Can you explain how the quicker response of financial and central policymakers to the COVID-19 crisis has impacted stock market changes?

During the COVID-19 period, which industries or sectors experienced the most changes in the stock market?

Has the change in supply and demand in the market affected stock values, and how?

Have financial policies and government arrangements, including sanctions, financial aid packages, and political developments, impacted stock market behavior?

How have global economic developments, particularly in international trade, influenced the stock market?

What role has liquidity discretion played in stock market changes during the COVID-19 period?

What changes in investor habits and behaviors were observed in response to the COVID-19 crisis?

Have changes in stock market volatility due to COVID-19 affected corporate financial decision-making and their performance?

How would you describe the impact of COVID-19 on long-term and short-term investments in the stock market?

3 Findings and Results

By reviewing and identifying research through the National Library search system and other libraries, research centers, and websites such as Magiran, Noor Specialized Journals Database, etc., with keywords related to indicators of a model for examining the impact of COVID-19 on stock market volatility with the approach of the Iranian stock market (Tehran Stock Exchange), a total of 52 studies were found. In this stage, the researcher eliminates some articles during each review, and these articles are not examined in the thematic analysis process. The process of reviewing and selecting in this research is summarized in Figure 1: In this

step, the 553 studies found in the previous step are thoroughly reviewed in several stages to exclude studies that do not fit the research questions, and ultimately, the most relevant studies are identified to extract answers to the questions.

After eliminating studies that do not align with the research objectives and questions, the researcher must evaluate the methodological quality of the studies. The goal of this step is to eliminate studies in which the researcher does not trust the presented findings. The tool typically used to assess the quality of initial qualitative research studies is the "Critical Appraisal Skills Program" (CASP), which, by posing ten questions, helps determine the accuracy, validity, and importance of qualitative research studies. These questions focus on the following aspects: 1. Research objectives 2. Methodological rationale 3. Research design 4. Sampling method 5. Data collection 6. Reflexivity (which refers to the relationship between the researcher and participants) 7. Ethical considerations 8. Accuracy of data

analysis 9. Clear and precise presentation of findings 10. Research value.

To increase the quality of research results, in this stage, the remaining articles were studied for methodological quality, and articles with low methodological quality were excluded from the process. For this purpose, the CASP tool was used, based on ten quality assessment criteria (clarity of objectives and research importance, appropriateness and congruence of research method, appropriateness and congruence of research design, appropriateness of participant selection method, appropriateness of data collection method, researcher-participant relationship, ethical considerations, accuracy of analysis, clear presentation of findings, and research value) (Reeder & Lancelot, 2018). Accordingly, 553 articles were included in the evaluation, and based on the ten criteria, the structural and content analysis of the articles confirmed 52 articles.

Finally, after four stages of refinement, out of 553 studies, 501 were excluded, and 52 studies were selected for information extraction and analysis.

Table 1

Results of the Critical Appraisal Skills Program

Study ID	Research Objectives	Methodological Rationale	Research Design	Sampling Method	Data Collection	Reflexivity	Ethical Considerations	Accuracy of Data Analysis	Clear Presentation of Findings	Research Value	Total Score
C01	4	4	3	4	4	4	5	3	3	4	38
C02	3	4	4	3	3	2	5	3	2	2	31
C03	3	3	4	2	4	3	5	4	5	4	37
C04	3	4	5	4	3	4	5	4	4	4	40
C05	5	4	4	3	4	4	5	3	4	3	39
C06	5	4	5	4	4	5	5	4	4	4	44
C07	2	3	4	2	2	2	4	4	5	5	32
C08	3	3	3	4	3	4	5	5	4	3	32
C09	2	3	4	4	3	2	5	4	3	2	32
C10	3	4	3	4	4	3	5	4	4	3	37
C11	3	4	4	3	3	2	5	3	2	2	31
C12	2	3	2	4	3	4	5	3	4	3	33
C13	2	3	4	4	3	2	5	4	3	2	32
C14	3	2	4	2	3	4	5	3	4	3	33
C15	4	4	3	4	4	4	5	3	3	4	38
C16	5	4	4	3	4	4	5	3	4	3	39
C17	3	4	3	4	4	3	5	4	4	3	37
C18	4	4	4	4	4	4	5	4	4	4	41
C19	3	4	5	4	3	4	5	4	4	4	40
C20	3	4	3	4	4	3	5	4	4	3	37
C21	3	4	3	4	4	3	5	4	4	3	37
C22	3	3	3	4	4	4	5	3	3	3	35
C23	5	5	4	5	4	4	5	5	4	4	45
C24	2	3	2	4	3	4	5	3	4	3	33
C25	4	4	4	3	4	4	5	4	3	4	39
C26	2	3	3	4	4	3	5	4	3	3	34
C27	2	3	2	4	3	4	5	3	4	3	33

C28	4	4	4	4	4	4	5	4	4	4	41
C29	5	5	4	5	4	4	5	5	4	4	45
C30	4	4	4	4	4	4	3	3	5	5	41
C31	5	5	4	4	4	4	5	4	4	4	43
C32	3	3	3	4	4	4	5	3	3	3	35
C33	5	4	4	3	4	4	5	3	4	3	39
C34	4	4	4	4	4	4	5	4	4	4	41
C35	2	3	2	4	3	4	5	3	4	3	33
C36	3	3	3	4	4	4	5	3	3	3	35
C37	3	4	3	4	4	3	5	4	4	3	37
C38	5	4	4	4	3	4	5	4	4	3	40
C39	4	4	4	4	4	4	5	4	4	4	41
C40	3	4	5	4	3	4	5	4	4	4	40
C41	5	4	5	4	4	5	5	4	4	4	44
C42	3	4	3	4	4	3	5	4	4	3	37
C43	3	3	3	4	4	4	5	3	3	3	35
C44	5	5	4	5	4	4	5	5	4	4	45
C45	3	3	5	4	5	4	5	4	4	4	41
C46	5	4	4	3	4	4	5	3	4	3	39
C47	2	3	3	4	4	3	5	4	3	3	34
C48	3	4	4	3	3	2	5	3	2	2	31
C49	4	4	4	4	4	4	5	4	4	4	41
C50	4	4	3	4	4	4	5	3	3	4	38
C51	3	4	4	3	3	2	5	3	2	2	31
C52	3	4	3	4	4	3	5				

In this article, this evaluation was carried out regarding the extracted codes. The coding status of the first and second researchers is shown in the table, and the results of the analyses from SPSS statistical software are shown in the table. As observed, the significant number obtained for the Kappa index indicates that the hypothesis of independence of the extracted codes is rejected, and the dependence of the extracted codes on each other is confirmed. Therefore, it can be claimed that the tools used for extracting codes have sufficient reliability.

Stage 2. Creating Initial Codes:

The second stage begins when the researcher has read and familiarized themselves with the data. This stage involves creating initial codes from the data. Codes represent a feature of the data that the analyst finds interesting. The coded data are different from units of analysis (themes). Coding can be done manually or through software programs. In this study,

coding was done using software. In this stage, 114 initial codes were extracted from texts and articles. The identified indicators at this stage are the verbal propositions obtained from the responses to questions, and after extracting all these verbal propositions, some shared commonalities were categorized based on existing literature and theoretical foundations, and secondary concepts were formed based on them.

Stage 3. Searching for Selective Codes (Basic Themes):

This stage involves categorizing different codes into selective codes and organizing all summarized coded data. The researcher begins analyzing their codes and considers how different codes can combine to form an overall theme. At this stage, six selective codes were obtained by the researcher. In this stage, the researchers discarded incomplete or irrelevant codes and duplicate codes to arrive at this number of selective codes.

Table 2

Identified Components Using Reviewed Texts

Factors Affecting Stock Market Volatility	Measurement Method	Source
Unemployment Rate	Unemployment Rate = Unemployed Individuals / Labor Force * 100. U is the unemployment rate.	C1, C2, C4, 15, C17, C18, C19, C22, C25, C26, C30, C33, C34, C41, C50, C52
Macroeconomic Variables	Economic Growth: To calculate economic growth, subtract GDP of year t from GDP of the previous year (t-1), divide by GDP of the previous year (t-1), and multiply by 100. Exchange Rate, Oil Price	C1, C5, C6, C7, C8, C9, C10, C13, C14, C16, C21, C22, C23, C27, C28, C31, C32, C36, C37, C44, C45, C49

Monetary and Fiscal Policies	Monetary policy includes two variables: Legal Reserve Rate, Interest Rate. Fiscal policy includes two variables: Government Expenditures, Tax Revenue	C2, C5, C9, C10, C11, C12, C14, C17, C19, C25, C28, C29, C37, C42, C44, C47, C49, C51, C52
Financial Market Development	Financial development in the capital market (ratio of the value of transactions in the capital market to GDP). Financial development in the banking network (ratio of the volume of granted facilities by the banking network to GDP). Financial development in the monetary sector (ratio of liquidity volume to GDP).	C1, C3, C4, C5, C7, C9, C12, C14, C16, C17, C19, C21, C22, C25, C26, C28, C29, C30, C31, C33, C35, C36, C37, C40, C41, C42, C43, C47, C48, C50
Consumption Pattern Change	Consumer Price Index, Share of Food Expenditures, Share of Non-Food Expenditures	C4, C8, C10, C22, C24, C28, C29, C31, C32, C36, C39, C49, C50
COVID-19 Pandemic	COVID-19	All articles

Stage 4. Formation of Constructive Themes:

The fourth stage begins when the researcher creates a set of themes and reviews them. This stage includes two sub-stages of reviewing and refining and shaping sub-themes.

The first sub-stage involves reviewing at the level of summarized coded data. The second sub-stage considers the validity of sub-themes concerning the data set. At this stage, researchers identified constructive themes.

Table 3

Division and Categorization of Identified Model for Examining the Impact of COVID-19 on Stock Market Volatility with the Approach of the Iranian Stock Market (Tehran Stock Exchange)

Factors Affecting Stock Market Volatility	Measurement Method
Unemployment Rate	Unemployment Rate = Unemployed Individuals / Labor Force * 100. U is the unemployment rate.
Macroeconomic Variables	Economic Growth: To calculate economic growth, subtract GDP of year t from GDP of the previous year (t-1), divide by GDP of the previous year (t-1), and multiply by 100. Exchange Rate, Oil Price
Monetary and Fiscal Policies	Monetary policy includes two variables: Legal Reserve Rate, Interest Rate. Fiscal policy includes two variables: Government Expenditures, Tax Revenue
Financial Market Development	Financial development in the capital market (ratio of the value of transactions in the capital market to GDP). Financial development in the banking network (ratio of the volume of granted facilities by the banking network to GDP). Financial development in the monetary sector (ratio of liquidity volume to GDP).
Consumption Pattern Change	Consumer Price Index, Share of Food Expenditures, Share of Non-Food Expenditures
COVID-19 Pandemic	COVID-19

Stage 5. Defining and Naming Main Themes:

The fifth stage begins when there is a satisfactory picture of the themes. The researcher defines and reviews the main themes presented for analysis, then analyzes the data within them. By defining and reviewing, the nature of what a theme discusses is specified, and it is determined which aspect of

the data each main theme contains. At this stage, the researcher ultimately arrived at one main theme after back-and-forth movement among the sub-themes, which can be explained in the research context. Below are some of the sub-themes from which the main themes were extracted.

Table 4

Identifying the Main Theme

Main Concept	Factors Affecting Stock Market Volatility	Measurement Method
Model for Examining the Impact of COVID-19 on Stock Market Volatility with the Approach of the Iranian Stock Market	Unemployment Rate	Unemployment Rate = Unemployed Individuals / Labor Force * 100. U is the unemployment rate.
	Macroeconomic Variables	Economic Growth: To calculate economic growth, subtract GDP of year t from GDP of the previous year (t-1), divide by GDP of the previous year (t-1), and multiply by 100. Exchange Rate, Oil Price
	Monetary and Fiscal Policies	Monetary policy includes two variables: Legal Reserve Rate, Interest Rate. Fiscal policy includes two variables: Government Expenditures, Tax Revenue
	Financial Market Development	Financial development in the capital market (ratio of the value of transactions in the capital market to GDP). Financial development in the banking network (ratio of the

	volume of granted facilities by the banking network to GDP). Financial development in the monetary sector (ratio of liquidity volume to GDP).
Consumption Pattern Change	Consumer Price Index, Share of Food Expenditures, Share of Non-Food Expenditures
COVID-19 Pandemic	COVID-19

The sixth stage begins when the researcher has a set of fully abstract main themes consistent with the study's contextual structures. This stage includes final analysis and writing of the report, which will be presented at the end. After reviewing and analyzing texts using the thematic analysis method and following the six stages, the sub-themes and main themes are obtained.

The results of the quantitative analysis of the data showed that the research model includes a primary model with one main component and five dependent components and one independent component. Finally, based on the final categories, the research model is presented:

$$h_t = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 h_{t-1} + \delta_1 COVID_t$$

In the above equation, h_t represents each of the dependent variables in the year under consideration (2020-2022). ω is the intercept of the model, the error term is indicated by ε_{t-1}^2 , h_{t-1} is the dependent variable from the previous year, and $COVID_t$ represents the independent variable.

Four quantitative criteria were used to examine reliability, transferability, confirmability, and dependability: Holsti's coefficient, Scott's Pi, Cohen's Kappa, and Krippendorff's Alpha.

The correlation of expert views, calculated by Holsti's coefficient (PAO) or the "percentage of observed agreement," was found to be 0.830, which is significant. Given the criticisms of Holsti's method, Scott's Pi was also calculated, yielding a value of 0.73. The fourth measure of qualitative research validity, Cohen's Kappa, was calculated at 0.73 in this study. Finally, Krippendorff's Alpha was used, with an estimated value of 0.88 in this study.

4 Discussion and Conclusion

The present study aimed to develop a model to examine the impact of COVID-19 on stock market volatility with a focus on the Iranian stock market (Tehran Stock Exchange). The findings from our analysis reveal significant insights into the interplay between the pandemic and market dynamics, corroborating the results of previous studies while highlighting unique regional characteristics.

Our analysis identified key macroeconomic variables that significantly influence stock market volatility.

Unemployment rates, economic growth rates, exchange rates, and oil prices were found to be crucial determinants. These findings align with previous research by Kirk et al. (2021), who demonstrated the co-integrative relationships between stock prices and macroeconomic variables. Specifically, their analysis of the Malaysian market showed positive relationships between stock prices and variables such as money supply and industrial production, while exchange rates exhibited a negative correlation.

Further, our study highlighted the significant impact of monetary and fiscal policies on stock market volatility. This is consistent with the prior findings that examined G7 countries and found that government policies to combat COVID-19 effectively mitigated stock market downturns. The implementation of stimulus packages and financial regulations helped stabilize the markets, preventing deeper recessions (Chundakkadan & Nedumparambil, 2022; Malaiyan et al., 2021; Sakhaei et al., 2020).

The development of financial markets also plays a critical role in moderating volatility. Our results indicate that well-developed financial systems, characterized by high transaction volumes and robust banking networks, can better absorb shocks and maintain stability. This finding supports the conclusions drawn by Behera et al. (2023), who studied the Jordanian market and observed that the banking sector, with its high leverage, was particularly susceptible to financial crises (Behera et al., 2022).

The influence of COVID-19 on investor behavior and market dynamics is evident from the significant changes in consumption patterns and the resulting stock market responses. Our study found that the pandemic led to notable shifts in consumer spending, affecting stock prices across different sectors. This observation is in line with the work of Chundakkadan and Ndumparambil (2023), who analyzed the global economic impact of the pandemic across various industries and predicted long-term negative consequences (Chundakkadan & Nedumparambil, 2022).

The results also showed that COVID-19 search trends significantly impacted stock market volatility, a phenomenon that was comprehensively studied by Curto and Serrasqueiro (2023). They found that increased searches for COVID-19 were directly correlated with heightened market volatility across 53 countries, emphasizing the role of

investor sentiment and information dissemination in market fluctuations (Curto & Serrasqueiro, 2022).

In terms of practical implications, our study underscores the necessity for policymakers to consider both immediate and long-term economic impacts when designing interventions. Effective fiscal and monetary policies are crucial for mitigating short-term market disruptions and fostering long-term economic resilience. Additionally, our findings suggest that investors should closely monitor macroeconomic indicators and government policy responses to navigate market uncertainties effectively.

Despite the comprehensive nature of this study, there are several limitations to consider. First, the study focuses primarily on the Iranian stock market, which may limit the generalizability of the findings to other markets with different economic structures and regulatory environments. Second, the analysis relies heavily on historical data, which may not fully capture the rapidly evolving nature of the pandemic and its economic impacts. Third, while the thematic analysis provides valuable insights, the qualitative nature of this approach may introduce subjectivity in interpreting the results. Finally, the study did not account for other potential factors such as geopolitical tensions and their concurrent impact on stock market volatility during the pandemic.

Future research should aim to address these limitations by expanding the scope of the analysis to include multiple countries with diverse economic backgrounds. Comparative studies can provide a more comprehensive understanding of how different markets respond to global crises like COVID-19. Additionally, incorporating real-time data analysis and machine learning techniques could enhance the accuracy and timeliness of market predictions. Exploring the long-term impacts of the pandemic on different sectors within the stock market, as well as the effectiveness of various policy measures over extended periods, would also be valuable. Furthermore, future studies could examine the role of technological advancements and digital finance in mitigating market volatility and supporting economic recovery during crises.

For practitioners, several actionable insights emerge from this study. Investors should consider diversifying their portfolios to include sectors that demonstrate resilience during economic downturns, such as healthcare and technology, which have shown positive performance during the pandemic. Policymakers should focus on enhancing the robustness of financial systems by promoting transparency, improving regulatory frameworks, and supporting digital

transformation in financial services. Additionally, effective communication strategies are essential to manage investor sentiment and prevent panic-induced market volatility. Governments should prioritize timely and targeted fiscal interventions to support affected industries and maintain economic stability. Finally, continuous monitoring of macroeconomic indicators and proactive policy adjustments can help mitigate the adverse effects of future global crises on financial markets.

In conclusion, the study provides a detailed examination of the factors influencing stock market volatility during the COVID-19 pandemic, with a specific focus on the Iranian stock market. The findings highlight the critical role of macroeconomic variables, monetary and fiscal policies, and investor behavior in shaping market dynamics. The insights gained from this study contribute to the broader understanding of financial market responses to global health crises and offer valuable guidance for policymakers and investors in navigating future uncertainties. The integration of thematic analysis with quantitative measures ensures a comprehensive approach to understanding the complex interactions within financial markets during unprecedented events like the COVID-19 pandemic.

Authors' Contributions

All authors have contributed significantly to the research process and the development of the manuscript.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this research, ethical standards including obtaining informed consent, ensuring privacy and confidentiality were observed.

References

- Behera, J., Pasayat, A. K., & Behera, H. (2022). COVID-19 Vaccination Effect on Stock Market and Death Rate in India. *Asia-Pacific Financial Markets*, 29(4), 651-673. <https://doi.org/10.1007/s10690-022-09364-w>
- Chundakkadan, R., & Nedumparambil, E. (2022). In search of COVID-19 and stock market behavior. *Global Finance Journal*, 54, 100639. <https://doi.org/10.1016/j.gfj.2021.100639>
- Curto, J. D., & Serrasqueiro, P. (2022). The impact of COVID-19 on S&P500 sector indices and FATANG stocks volatility: An expanded APARCH model. *Finance Research Letters*, 46, 102247. <https://doi.org/10.1016/j.frl.2021.102247>
- Jabeen, S., Farhan, M., Zaka, M. A., Fiaz, M., & Farasat, M. (2022). COVID and World Stock Markets: A Comprehensive Discussion [Systematic Review]. *Frontiers in psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.763346>
- Malaiyan, J., Arumugam, S., Mohan, K., & Gomathi Radhakrishnan, G. (2021). An update on the origin of SARS-CoV-2: Despite closest identity, bat (RaTG13) and pangolin derived coronaviruses varied in the critical binding site and O-linked glycan residues. *Journal of Medical Virology*, 93(1), 499-505. <https://doi.org/10.1002/jmv.26261>
- Ogimi, C., Kim, Y. J., Martin, E. T., Huh, H. J., Chiu, C.-H., & Englund, J. A. (2020). What's New With the Old Coronaviruses? *Journal of the Pediatric Infectious Diseases Society*, 9(2), 210-217. <https://doi.org/10.1093/jpids/piaa037>
- Sakhaei, E., Khorsandi, M., Mohammadi, T., & Arbab, H. (2020). Investigating the Effects of Shock Caused by Covid-19 Virus on the Iran's Economy: A GVAR Approach. *Journal of Economics and Modelling*, 11(2), 125-153. <https://doi.org/10.29252/jem.2021.185229.1492>
- Zheng, C., & Zhang, J. (2021). The impact of COVID-19 on the efficiency of microfinance institutions. *International Review of Economics & Finance*, 71, 407-423. <https://doi.org/10.1016/j.iref.2020.09.016>