Advances in Economics, Business and Management Research, volume 203
Proceedings of the 2021 3rd International Conference on Economic Management and Cultural Industry (ICEMCI 2021)

The Impact of $1.9 Trillion Covid Relief Bill on the Return by Different Moving Average Strategy

Haoyu Cheng[1, †, *] and Wanqi Zheng[2, †]

[1] *School of Letter & Science, University of California - Davis, Davis, California, 95616, United States*
[2] *School of Finance, Guangdong University of Finance & Economics, Guang Zhou, 510220, China*
[*] *Corresponding author. Email: khcheng@ucdavis.edu*
[†] *These authors contributed equally.*

ABSTRACT
Since the epidemic outbreak and spread of COVID-19 had worsened the public's expectation of the global economy, President Joe Biden tried to stimulate economic development with his $1.9 trillion relief bill. This research studied the performance and following effects of momentum strategies in the mid- and short-term, comparing relative returns of moving average investing strategies. As shown by the empirical results, the medium-term MA strategy performed relatively better compared to the short-term MA strategy subsequent to the relief bill, indicating the momentum effect was more pronounced with the longer-term MA strategy(proof of a more active market, which confirms the effectiveness of President Biden's relief bill). Under the current situation of an active market and epidemic normalization, the investors should elastically adjust the portfolio and strategies, longing for the medium- and long-term momentum investment and releasing those with shorter maturity terms.

Keywords: *Momentum Effect, Moving Average Strategy, President Joe Biden's $1.9 Trillion Relief Bill, Strategies of Investing.*

1. INTRODUCTION

The pandemic of COVID-19 is one of the most severe natural catastrophes in the 21st century. The WHO reported 31.12 million cases and 950,000 deaths in October 2020 [1]. Relatively, the epidemic of COVID-19 had also changed the global economic situation. According to the report from International Monetary Fund (IMF), the global GDP growth have declined by 3.3% since the pandemic, which reached the lowest point from the "Great Recession" of the 1930s [2]. Due to the risk consideration of business debts and changes to risk preference, the World Bank Group [3] predicted that the global economy would face a downward growth low to -8%, based on the future bankruptcy and possible following financial crisis. Continuously, Mike Patton explained the economic situation of the United States. Compared with the evidence given by the World Bank Group, the data provided by Patton is closer to reality [4]. For instance, Patton mentioned that the real GDP growth of the United States was falling by 31.4% in the 2nd quarter of 2020.

Moreover, specifically in the financial market, the stocks are mostly overvalued due to the recession of COVID-19. Moshfique et al. supported this view with their research results on the Dow Jones Industrial Average and FTSE 100 [5]. Their results mentioned that the BBC reported that both indexes have fallen by approximately 23% to 25%. To prevent the further decline of the US economy, President of United States, Joe Biden, signed a $1.9 trillion relief bill with a series of actions to stimulate the national economy. Reminded by Jacob Pramuk, the relief bill included 1) sending direct payments of up to $1,400, with $300 weekly unemployment insurance supplement; 2) expanding the child tax credit to lessen the burden of families; 3) supporting vaccine distribution with funds and techniques required [6]. However, with both pandemic and relief bills, there is uncertainty to the future development of the economy, with more abnormal activities frequently appearing in the market. Thus, how would the market expectations be changed by President Biden's relief plan? Furthermore, how should investors adjust their portfolio, taking advantage of the momentum effect to process their investment?

In recent years, behavioral finance has become a popular topic of economic study, which leads the bachelors to focus on the momentum effects. Jegadeesh and Titman first put forward the concept of the momentum effect, and in 2001, they reopened the further

study to the momentum effect on finance， and theoretically discussed its effectiveness [7, 8]. Hameed and Yuanto also utilized their researches among six stock markets in Asia to prove the serviceability of the momentum effect [9]. Daniel et al. raised the DHS model and summarized that the momentum effect and contrarian effect result from the "over-confidence" and "self-attribution" of investors [10]. However, theoretically, the studies nowadays are mainly focusing on the momentum effects before the pandemic instead of Joe Biden's relief bill. This article pays attention to the medium- and short-term investment strategies to avoid ineligible loss, which individual investors and institutes prefer to rearrange their momentum investing strategies.

This research is based on the trading of S&P 500 and NASDAQ indexes through comparisons between the returns in two discontinuous periods. The empirical results show that the excess return of both indexes in the medium term (10 days and 30 days) has better performance than in the short term (1 day and 5 days). Given that, it could be summarized that the stock market became relatively active, and the bill's monetary policies encouraged investors' passion after the relief bill was implied, representing the effectiveness of the actions in the bill. Meanwhile, investors (individuals and institutes) should hold a higher portion of trading with medium-term strategies to lessen the burden of potential risks.

The remainder of this paper is organized as follows. Section 2 describes the data basis and details of the methodology. Section 3 illustrates the empirical result and explains the result. In Section 4, we present the conclusion of our research.

2. DATA & METHODOLOGY

2.1 Data

To compare the short- and medium-term momentum effects throughout the implementation of President Biden's $1.9 trillion relief plan, we chose to use momentum strategies to trade S&P 500 and NASDAQ indexes and examine their investment returns over two three-month periods from 2020.11.13 to 2021.3.12 and from 2021.4.13 to 2021.7.12. Those data sets are credited to Yahoo Finance & WIND.

2.2 Methodology

2.2.1 Trading strategy

Specifically, we regarded the 1-day moving average (MA) curve and the 5-days MA curve as the indicator of short-term momentum strategy. Moreover, we considered the 10-days MA curve & 30-days MA curve as the indicator of medium-term momentum strategy. The assumptions of buy and sell signals were defined based on these indicators.

A buy signal is triggered at a point in time where the shorter-term MA curve was intersecting and breaking above the longer-term MA curve. Conversely, a sell signal is triggered when the shorter-term MA curve intersected and broke below the longer-term MA curve.

To increase the confidence level of data used in the analysis and validity of resultant conclusions, we decided to employ a non-continuous approach with the large-event condition (President Biden's $1.9 Trillion Relief Bill signed on Mar 12, 2021) to set the trading period of analysis. The two-period was three months before the relief bill was signed (Nov 12, 2020, to Feb 12, 2021) and three months later (Apr 12, 2021, to Jul 12, 2021).

2.2.2 Relative return

We reviewed and validated the trading data sets collected to ensure a meaningful comparison between different momentum strategies. In calculating relative return for a particular strategy, the process described below was followed. First, we calculated returns from individual trades, with cost defined as the share price at a time point when a buy signal is triggered, and gain is the share price at a point in time when a sell signal is flagged. Then, we added up returns from each of the trades to generate the total return of indexes, the numerator in formula (1). Returns from the market portfolios (S&P 500 and Nasdaq indexes) under the buy-and-hold strategy are taken as market gains, shown as the denominator in formula (1). Applying the formula, we derived relative returns for each strategy. This relative-return approach is benchmarked against market gains, making the performance comparison among different momentum-based investing strategies more comparable.

$$\text{Relative return} = \frac{\text{The total return of Index}}{\text{Market gains}} \quad (1)$$

3. EMPIRICAL RESULTS

3.1 Return based on the short-term strategy

Based on these assumptions, we had the trading results as summarized in the tables and figures below:

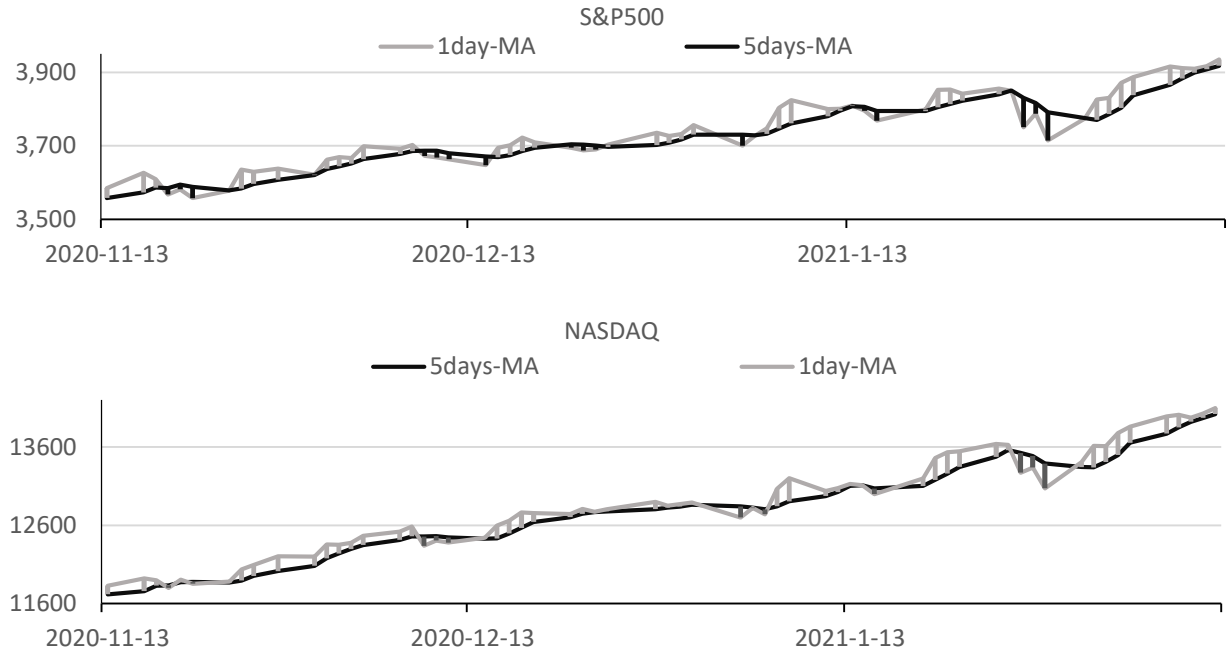

Figure 1. 1-day MA line crossing 5-day MA line over the three months of 2020.11.13-2021.2.12 (Shades of gray is signal of long; Shades of black is signal of short).

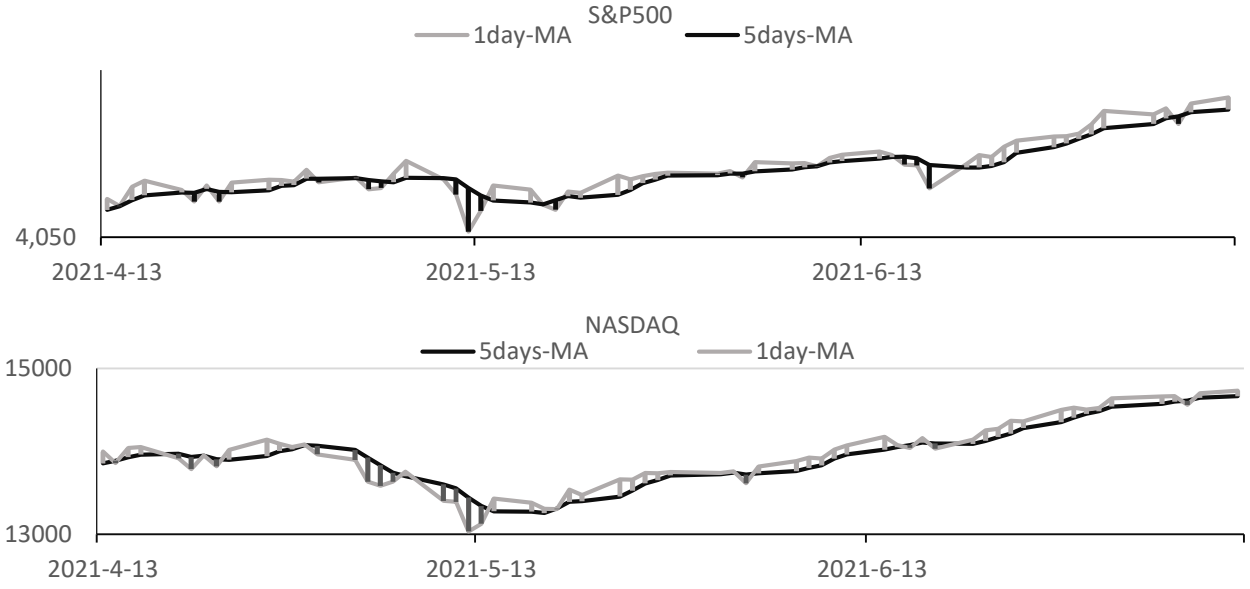

Figure 2. 1-day MA line crossing 5-day MA line over three months from 2021.4.13 to 2021.7.12 (Shades of gray is signal of long; Shades of black is signal of short).

In Figure 1, based on the fluctuation of 1-day and 5-days MA curves, the intersections were exposed at several dates. For a simple conclusion, there were seven buy signals and seven sell signals appearing on the table of S&P500, mainly concentrating among the dates near Jan 20, 2021. With the date coming closer to the installation of President Joe Biden, the market (represented by S&P 500 index) started to quickly undulate due to the new fiscal policies and relief plans for the post-pandemic era, shown by the massive intersections of 1-day and 5-days moving average curve.

In the three months before the bill was signed, the 1-day and 5-days moving averages of NASDAQ shown a tight correlation. The market suggested several buys and sell signals with the continuing intersection of the short-term moving average curves, with a higher frequency of trading actions.

In Figure 2, the two curves showed the effects on the S&P 500 given by the settlement of the series of emergency policies decided in the relief bill, targeted to the recession resulting from the pandemic. The 1-day moving average had a more significant fluctuation due to the 'wait-and-see' approach of the investors, as they still considered the further steps of the market. However, since the relativity of massive trading actions in the stock and bond market, the 5-days moving average had a similar distribution to the one before the relief bill, which was less fluctuated than the 1-day MA.

Being Similar to the S&P 500, the moving average curves of the NASDAQ index represented that investors' risk preference was rapidly changing in the relatively short term (1 day). The 1-day MA touched its minimum point on May 12, given that the market investors were afraid of the reversal of the pandemic of COVID-19.

Table 1. Comparison of Relative Returns: 1-day MA Line Crossing 5-day MA Line

1days-MA & 5days-MA	2020.11.12-2021.2.12	Transactions	2021.4.13-2021.7.12	Transactions
Relative return of S&P500	102%	7	-17%	11
Relative return of NASDAQ	74%	8	-42%	11

Notes: Transaction cost ignored for all trades and return calculations.

Based on these assumptions, we had the trading results as summarized in the tables and figures below:

3.2 Return based on the mid-term strategy

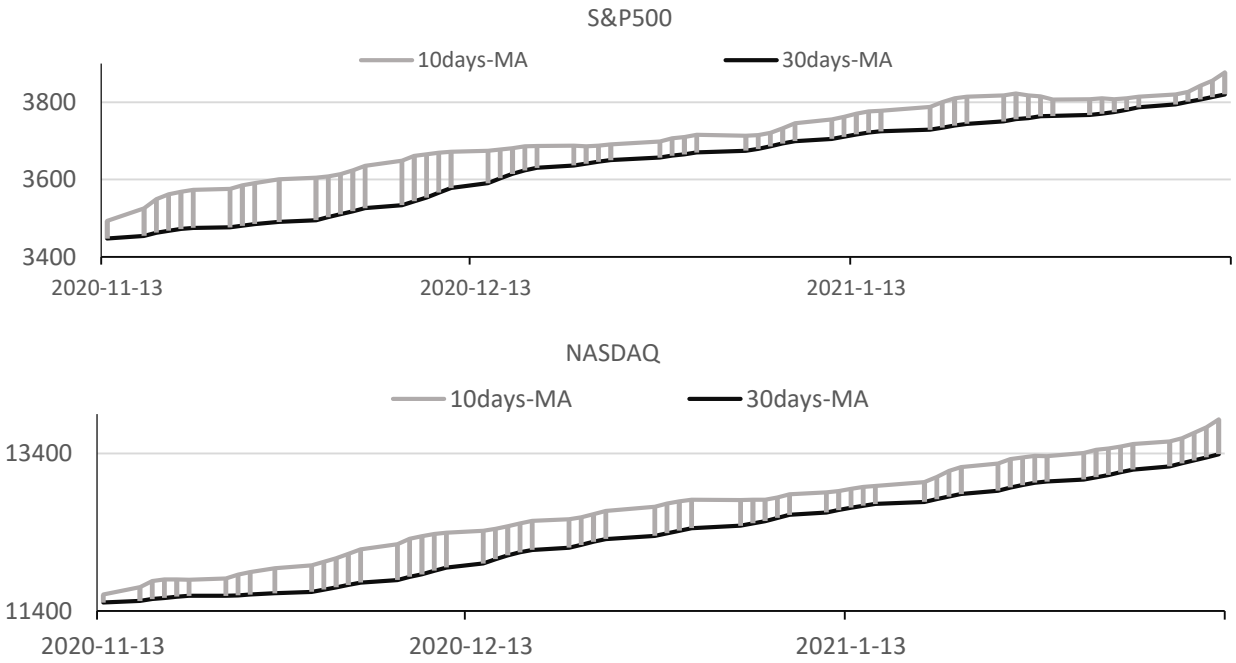

Figure 3. 10-day MA line crossing 30-day MA line during the three months from 2020.11.13 to 2021.2.12 (Shades of gray is signal of long; Shades of black is signal of short).

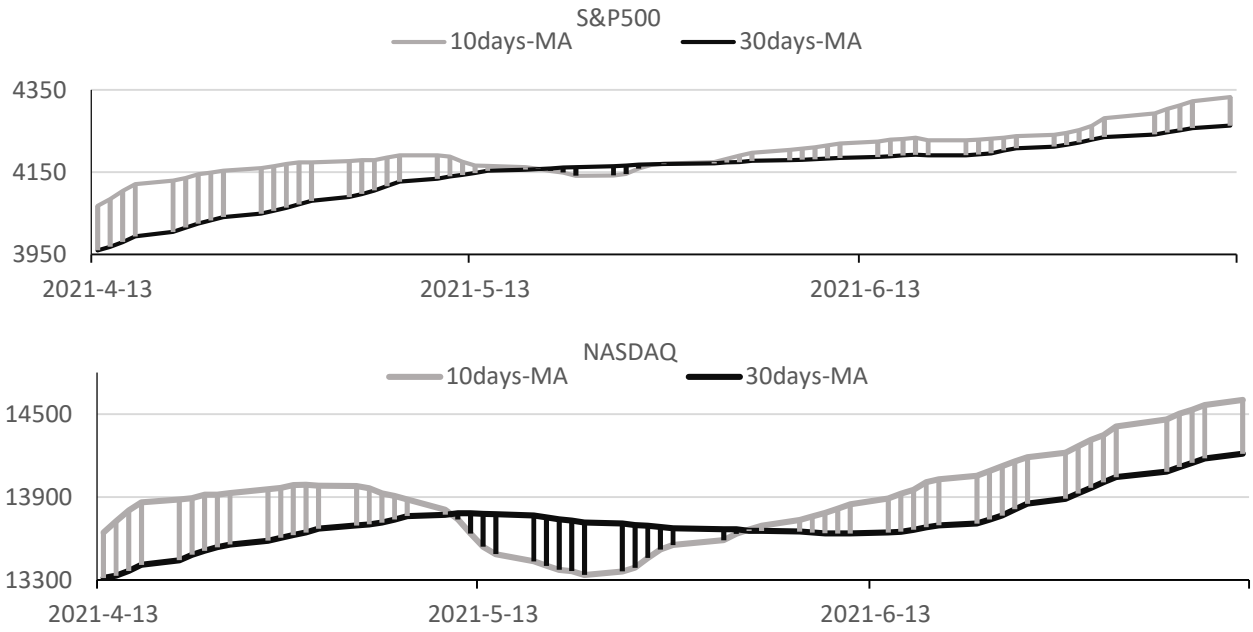

Figure 4. 10-day MA line crossing 30-day MA line over three months from 2021.4.13 to 2021.7.12 (Shades of gray is signal of long; Shades of black is signal of short).

In Figure 3, the 10-days and 30-days moving averages of the S&P 500 index have no intersections throughout three months. Thus, the medium-term momentum effect has no apparent correlation with the trading signals that could help the investors further decide to adjust their investment portfolio.

Moreover, compared with Figure 1, a more obvious buy and sell signal is shown on the S&P 500 index (the two intersections). This small shock (occurred between May 18th and 26th) shows the effect of the price plummeting of Bitcoin to the stock market, caused by Elon Musk. According to BBC news [11], Elon Musk declared that Tesla would receive Bitcoin as a payment method of electronic vehicles due to eco-friendly consideration, which continuously caused a boom in the price and demand of Bitcoin (about 6% to the price).

The moving average curves of the NASDAQ index showed a stable, increasing-price trend, and there was no clear signal to sell or buy, based on the economy's recovery throughout the post-pandemic period. The gaps between 10-days and 30-days moving average curves are greater than those of the S&P 500 due to the relatively high wealth of stocks in the NASDAQ index portfolio. Based on a long-term investigation (compared with the 1day and 5days MAs), the stock market is recovering from the recession part of the economic cycle.

In Figure 4, the moving average curves of the NASDAQ index shows a similar distribution to the S&P 500. However, the NASDAQ has a larger response to the price plummeting due to its characteristics. Commonly, the NASDAQ index would contain stocks related to the companies with top market values rather than a pre-decided portfolio of S&P 500, which caused it to have more considerable volatility.

Table 2. Comparison of Relative Returns: 10-day MA Line Crossing 30-day MA Line

10days-MA & 30days-MA	2020.11.12-2021.2.12	Transactions	2021.4.13-2021.6.12	Transactions
Relative return of S&P500	100%	1	64%	2
Relative return of NASDAQ	100%	1	69%	2

Notes: Transaction cost ignored for all trades and return calculations.

3.3 Results & Discussion

An analysis of the trading results shows that, under the short-term momentum strategy, relative returns for trading S&P 500 and NASDAQ indices before the rescue plan were 102% and 74%, respectively; however, relative returns from post-plan trading declined to a net loss of -17% and -42%, respectively. On the other hand, trading under the medium-term momentum strategy yielded relative returns of 100% for both indices for the three months before the plan; after the plan, trades generated relative returns of 64% and 69% for S&P 500 and NASDAQ, respectively. Clearly, the short-term momentum strategy had underperformed the medium-term strategy significantly for trades executed post-plan (2021.4.13 to 2021.7.12). This indicates that the current market after the plan is more active vs. the period before the plan; similarly, the momentum effect is more pronounced post-plan. As a result, short-term strategies are likely to miss part of the price rise due to "signal waiting".

Given that the pandemic of COVID-19 is affecting investors' risk preference and investment expectations, the two indexes, S&P500 and NASDAQ, suggest that the market is facing a significant fluctuation. According to the discussion formed by Dayong Zhang, Min Hu, and Qing Ji [12], the rapid spreading of COVID-19 had increased the risk of having a significant loss in the short term for investors, especially in the stock and consumption market. For instance, the relief bill supported the non-returned workers and small businesses with a tax refund or a relief check to satisfy their basic life needs.

The two time periods are discrete because of the consideration of the continuity of the database. The adjusted closing price is continuous among continuous periods, forcing us to limit the influence of the previous period to the current one. In the research, we chose the two discrete symmetric time series for the big event (the sign of the relief bill by President Joe Biden). The independence of data would help the research to achieve better proof for the momentum effect of the mid-term and short-term moving average, including the following comparisons of effectiveness.

In summary, over the short to medium term, the market has become more active in the period after the stimulus plan of President Biden, given the market weakness of investment. This confirms the effectiveness of the government's anti-infection policy and the following recovery policies to a certain degree. Moreover, according to the data provided, the investors are more interested in the trading strategies with higher trading frequency after the relief bill, which shows investors' positive expectations of the market and the further steps of the economic stimulation. Due to the high risk of investment during the post-pandemic era, the momentum strategy has a relatively high ability to defense the cyclical risk of the stock market because it allows a rapid fluidity of investment (which gives the investors a chance to recover from the loss in the short term).

4. CONCLUSIONS

By comparing relative return performance of S&P 500 and Nasdaq indexes under short- and medium-term moving-average strategies that were executed in different periods in the US stock market, we examined the effectiveness of the momentum investing strategies as well as changes in market sentiment and expectation both before and after the implementation of the $1.9 trillion relief bill ("the rescue plan"). Based on the analysis above, investment returns using short-term and medium-term momentum strategies are meaningfully different before and after the rescue plan. This indicates that the plan has a significant impact on the momentum strategies. The momentum effect can account for the inertia in the market. The medium-term MA investing strategy is more effective and performs better after the plan. From a behavioral finance perspective, it is believed that the market is overheated. This also shows that the plan has significantly influenced investors' expectations, reflecting the effectiveness of the policy. The plan has been implemented for six months, and it is active as of this writing.

This paper focused our analysis on three months before and after the plan's implementation, rather than a more extended period to track the evolving market conditions and their impact on momentum strategies. Additionally, we can expand our research to further study investment returns under the long-term momentum strategies and reversion strategies and explore the long-term impact of the plan on market momentum. We can further expand our research horizon to include previous rounds of QE that the Fed implemented during the global financial crisis.

AUTHORS' CONTRIBUTIONS

Wanqi Zheng was responsible for preparing the draft and organizing data. Haoyu Cheng integrated the data and analyzed it based on the draft. And, Yan Xin took charge of checking and summarizing.

REFERENCES

[1] World Health Organization. Novel Coronavirus (2019-nCOV) situation report, 2020. https://www.who.int/publications/m/item/weekly-epidemiological-update---29-december-2020

[2] International Monetary Fund. World Economic Outlook: The Great Lockdown, April 2020. https://www.imf.org/en/Publications/WEO/Issues/2020/04/14/World-Economic-Outlook-April-2020-

The-Great-Lockdown-49306

[3] World Bank Group. The global economic outlook during the COVID-19 Pandemic: A Changed World. Global Economic Prospects, 2020. https://www.worldbank.org/en/news/feature/2020/06/08/the-global-economic-outlook-during-the-covid-19-pandemic-a-changed-world

[4] Mike P. The Impact of Covid-19 On U.S. economy and financial markets. Forbes, October 2020. https://www.forbes.com/sites/mikepatton/2020/10/12/the-impact-of-covid-19-on-us-economy-and-financial-markets/?sh=6fffdfe92d20

[5] Uddin, M., Chowdhury, A., Anderson, K., Chaudhuri, K. The effect of pandemic COVID – 19 on global stock market volatility: Can economic strength help to manage the uncertainty? Journal of Business Research, 2021, Vol. 128, pp.31-44. DOI: https://doi.org/10.1016/j.jbusres.2021.01.061

[6] Jacob P. Biden signs $1.9 trillion Covid relief bill, clearing way for stimulus checks, vaccine aid. CNBC Politics. 2021. https://www.cnbc.com/2021/03/11/biden-1point9-trillion-covid-relief-package-thursday-afternoon.html

[7] Jegadeesh, N. and Titman, S. Returns to buying winners and selling losers: Implications for stock market efficiency. The Journal of Finance, 1993, vol. 48, pp. 65-91. DOI: https://doi.org/10.1111/j.1540-6261.1993.tb04702.x

[8] Jegadeesh, N. and Titman, S. Profitability of momentum strategies: An evaluation of alternative explanations. The Journal of Finance, 2001, vol. 56, pp. 699-720. DOI: https://doi.org/10.1111/0022-1082.00342

[9] Hameed, A. and Kusnadi, Y. Momentum strategies: Evidence from pacific basin stock markets. Journal of Financial Research. 2002. vol. 25, pp. 383-397. DOI: https://doi.org/10.1111/1475-6803.00025

[10] Daniel, K., Hirshleifer, D. and Subrahmanyam, A. Investor psychology and security market under- and overreactions. The Journal of Finance, vol. 53, pp. 1839-1885. DOI: https://doi.org/10.1111/0022-1082.00077

[11] Zhang, D., Hu, M. and Ji, Q. Financial markets under the global pandemic of COVID-19. Financial Research Letters, 2020, vol. 36: 101528. DOI: https://doi.org/10.1016/J.FRL.2020.101528

[12] British Broadcast Company. Bitcoin climbs as Elon Musk says Tesla 'likely' to accept it again. BBC Business News, Jul 21, 2021. https://www.bbc.com/news/business-57924354