

Did the Market Indices of G7 Countries Recover Evenly from the Start of COVID-19 (January 2020) Through December 2021?

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— Review of —
**Integrative
Business &
Economics**
— Research —

ABSTRACT

Earlier work documented how COVID-19 affected the performance of the stock market indices around the world (Bieszk-Stolorz and Dmytrow, 2021; Lento and Gradojevic, 2021). Research has yet to investigate the longer-term recovery of these market indices. From a buy-and-hold perspective, this paper compares the recovery of indices in G7 countries and Hong Kong from the beginning of the pandemic in January 2020 to June 2021. The empirical results show that the null hypothesis of equal individual monthly returns in the indices of G7 countries and Hong Kong cannot be rejected. However, the null hypothesis of equal buy-and-hold returns in the indices of G7 countries and Hong Kong from January 2020 through June 2021 can be rejected, indicating that the market recovery status among the G7 countries and Hong Kong from the start of COVID-19 in January 2020 through June 2021 has been uneven and unequal.

Keywords: COVID-19, Market Recovery, Stock Index, G7 Countries, Portfolio Management

Received 3 September 2021 | Revised 29 December 2021 | Accepted 2 February 2022.

1. INTRODUCTION

Global financial markets faced an exogenous shock as the pandemic COVID-19 raged in early 2020 (IMF, 2020; Izzeldin *et al.*, 2021). The World Health organization (2020) announced on January 5, 2020, the arrival of a pneumonia of unknown cause - COVID 19. Following the publication of this report, the unprecedented downturn in the global stock markets was observed in 2020 (Baker *et al.*, 2020; Izzeldin *et al.*, 2021). Earlier research works documented the negative effect of COVID-19 on the global stock markets in 2020 (Izzeldin *et al.*, 2021; Olakojo *et al.*, 2021). Bonser-Neal *et al.* (2021) speculated that the prospects for stock returns in 2021 would be highly dependent on the speed of the development and distribution of a COVID-19 vaccine. Bonser-Neal *et al.* (2021) opined that the ability of businesses to continue to adjust to the new ways of doing business would also affect the progress in the recovery of the stock market indices.

However, research has yet to investigate the progress of the recovery in the stock market indices of G7 (group of seven) countries comprising USA, Canada, UK, Germany, France, and Japan from the advent of COVID-19 in January 2020 up until June 30, 2021. The reason that this study focuses on the stock market indices of G7 countries is that the economies of G7 countries account for 32 to 46 percent of the global gross domestic product (France Diplomacy, 2019). The purpose of this research is to investigate if the stock market indices of the G7 countries

and Hong Kong have delivered equal compounded monthly returns from the advent of COVID-19 from January 1, 2020, until June 30, 2021.

The current research differs from the previous work in that it focuses on the buy-and-hold returns on G7 indices and Hang Seng (Hong Kong) Index. In other words, this paper addresses the situation that portfolio managers will buy-and-hold portfolios of indices of G7 countries and Hang Seng index continuously for the entire time period from January 2020 through June 2021. In this long-term buy-and-hold situation, it is hypothesized that the indices of certain G7 countries will outperform the indices from other G7 countries. In the remaining of the paper, we will begin with a brief literature review followed by the details of our proposed buy-and-hold measurement. The financial return data from the indices of G7 countries and Hang Seng index will be analyzed. We will conclude with discussions and managerial implications.

2. LITERATURE REVIEW

In this section, the current literature of the impact of COVID 19 on the performances of financial markets in the world is being reviewed. A summary of the literature is listed in Table 1.

Earlier researchers have used various approaches to study the impact of COVID-19 on stock market performance. The first approach is to measure the impact within a single country (Abu *et al.*, 2021; Adnan and Hasan, 2021; Insaïdoo *et al.* 2021; Nair *et al.* 2021) and they all reported negative market returns and increased volatility due to the pandemic. More specifically, Abu *et al.* (2021) studied the effect of COVID-19 on Nigerian stock market over a six-month period from March 23, 2020 to September 11, 2020. Abu *et al.* (2021) found that COVID-19 had a significant negative effect on the performance of Nigerian stock market. For Bangladesh, Adnan and Hasan (2021) conducted an event study using the first day of the formal announcement of COVID-19 on March 8, 2020. With a window of plus and minus ten-days from the event day, the results of their study reported that the 314 stocks traded in Bangladesh had a significant negative effect from the pandemic. Insaïdoo *et al.* (2021) studied Ghana stock market performance during COVID-19 pandemic. Their study did not find a statistically significant negative relationship between the COVID-19 pandemic and the Ghana stock market returns. However, the results from their research confirmed that the COVID-19 pandemic had led to an increase in the volatility of Ghana stock returns by 8.23%. For India, Nair *et al.* (2021) reported that the impact of COVID-19 on the financial performances of selected stocks traded in the National Stock Exchange of India had been drastic and the performances of these stocks had fluctuated post COVID-19 period.

The second approach is to compare the impact of COVID-19 on stock market performance across countries (Bieszk-Stolorz and Dmytrow, 2021; Izzeldin *et al.*, 2021; Song *et al.*, 2022). In comparing indices across five continents, Bieszk-Stolorz and Dmytrow (2021) found that during the COVID-19 pandemic the highest risks of decline in the stock market indices were in the Americas, Europe, followed by Asia and Australia, and Africa had the lowest risk in the decline of stock market indices. They further reported that half of the stock market indices they studied experienced a 20% drop from the peak achieved prior to the pandemic in fifty-two days. According to their report, the pandemic spread rapidly in all of the continents affecting the social and the economic environment. Izzeldin *et al.* (2021) studied the volatility of the

stock market indices of G7 countries during COVID-19 mainly from January 4 to April 24, 2020. During this period, all market indices were negative except the U.S. based on their daily averages. However, their results showed that the intensity and the timings of the impact varied among the G7 countries, and the volatility is the highest in the U.K. and the U.S. As most researchers view COVID-19 as an exogenous shock, Song *et al.* (2022) argued and found that some markets may have been reacting to COVID-19 as a result of endogenous shock from their inherent internal macro- or market- problems prior to the pandemic. Their study examined 10 indices in 8 countries and found only 3 indices (FTSE, Nikkei, HIS) are truly reacting to COVID-19 as exogenous shock, while the others (S&P500, DJIA, NASDAQ, DAX, CS1300 (China), BSFSN (India), BOVESPA (Brazil)) are the results of endogenous shocks.

Table 1: Literature about Covid 19 and its impact on stock market performance

<i>Authors</i>	<i>Time*</i>	<i>Country, stocks or stock market indices</i>	<i>Other Factors</i>	<i>Results</i>
Abu <i>et al</i> 2021	3/23-9/11	Nigeria		Negative
Adnan & Hasan 2021	3/8 -10 +10	314 stocks traded in Bangladesh		Negative
Bieszk-Stolorz & Dmytrow 2021	t-52	US/Europe/Asia/Africa		Half investigated negative 20%
Chang <i>et al</i> 2021	1/2 – 7/21	21 countries	Government policy	Increased
David & Tenreiro-Mcahado 2021	79 days	10 stock exchanges	COVID-19, MERS, SARS, EBOLA	All events posed positive recovery except COVID-19
Insaidoo <i>et al</i> 2021		Ghana		Volatility increase
Izzeldin <i>et al</i> 2021	1/2 – 4/24	G7 countries		Volatility most in U.S., UK
Lento & Gradojevic 2021	Jan - May	S&P500	Oil gold FX(Euro/\$), VIX bitcoin, TBill	Other markets impact S&P500 recovery
Nair <i>et al</i> 2021		India		Volatility
Naeem <i>et al</i> 2021	2013- 2020	MSCI, DJ Islamic	Gold,oil bitcoin, TBill	Markets connected
Olakojo <i>et al</i> 2021		24 oil producing countries		Negative impact worse on lower income countries
Song <i>et al</i> 2022	February- April	8 countries, 10 indices		FTSE, Nikkei, HSI exogenous

*2020 otherwise stated

The third approach is about other financial products interacting with stock market indices in their response to COVID-19. Lento & Gradojevic (2021) studied the price spillover effects

around the COVID-19 pandemic market meltdown between the S&P 500 Index, COMEX (gold), NYMEX, FX (Euro-Dollar), Bitcoin, TBill, Crude (Oil), and CBOE VIX. Within the window from January to May 2020, they studied three time periods: before crash, during crash, and market recovery. They found that before the crash, movements in the prices of S&P 500 Index caused price movements in other markets, however, during the pandemic, they found bi-directional causalities. At the recovery phase, the movement in prices of S&P 500 Index was more likely to be caused by the movements in the prices of VIX, FX, Gold, Bitcoin, Oil, and TBill. In a similar study, Naeem *et al.* (2021) tracked and compared two stock indices - MSCI World Index, Dow Jones World Islamic Index, and four non-stock financial products - Barclays Bloomberg Global Treasury Index, Oil future, Gold future, and Bitcoin during the time period May 1, 2013 to July 31, 2020. Their study found that COVID-19 strengthened the return connectedness among the various markets, and showed that cryptocurrency, bond, and gold are the hedges against the shock from COVID-19 to the stock markets. Tangent to this approach, Olakojo *et al.* (2021) compared twenty-four oil producing countries and the immediate impact of COVID-19 on the stock markets of these countries in North America, South America, Europe, Asia, Oceania, and Africa. These authors showed negative asymmetry in stock market cycles of more than half of these countries, and concluded that negative impact of COVID-19 on stock market indices would linger on for longer time in lower-income oil-producing countries.

The fourth approach toward studying COVID-19 impact on stock market performance is from the perspective of effective government policies worldwide during this period. Chang *et al.* (2021) analyzed panel data of 21 countries from January 2, 2020 to July 21, 2020 and found that the overall government response, containment and health, and stringency indices had significant positive effects on stock market returns during COVID-19. Essentially, their results suggested that the government policy of shutting down workplaces, canceling public events, restricting public gatherings and international travel, provide income support, and implementing fiscal measures could increase stock market returns.

The last approach in prior research used is to compare other exogenous shock pandemic events to COVID-19 recovery. Inacio, and Tenreiro-Mcahado (2021) researched about shocks caused by different pandemics and their impact on stock exchange indices. In their study, they used a vector-error correction model to evaluate the different pandemics of COVID-19, EBOLA, MERS, and SARS and stock market indices performance that include DJIA, S&P 500, EuroStoxx, DAX, CAC, Nikkei, HIS, Kospi, S&P ASX, Nifty and Ibov. David *et al.* (2021) reported that the stock market indices investigated showed a fast recovery within a period of seventy-nine days from the downturn, except for in the case of COVID-19.

It is evident from the above literature review that prior research has elucidated on how the pandemic COVID-19 affected the returns of the world's financial markets in the short run. However, there is a lack of significant information on the statistical analysis of the monthly returns and long-term compounded buy-and-hold returns of the indices of G7 countries and Hong Kong. The current research work will focus on overcoming these gaps in research knowledge.

We propose that there are situations where portfolio managers will buy-and-hold-based portfolios of indices of G7 countries and Hong Kong. In such case, we argue that based on Merton's (1987) investor recognition hypothesis, G7 indices will continue to engage with

investors by attracting media attention and analyst reporting. In this long-term buy-and-hold situation, we propose that certain G7 indices will over-perform indices from other G7 countries. More formally, we hypothesize:

H1. Ceteris Paribus, the Buy-And-Hold Returns of G7 Indices and Hong Kong Index will differ.

3. METHOD

Nandy and Sussan (2019) used the concept of the monthly buy-and-hold returns to evaluate and compare the buy-and-hold returns US pharmaceutical companies and American Depository Receipts (ADRs) of foreign pharmaceutical companies over a period of seventeen years. In the current research work, the compounded monthly buy-and-hold returns of the indices of G7 countries and Hong Kong are evaluated from the start of the COVID 19 pandemic in January 2020 to the end of June 2021.

The monthly returns of each index are calculated by obtaining the prices on the first and the last-trading days of each month starting from January 2020 through the end of June 2021, from the financial website yahoo.com/finance. Let

R_{at} : Monthly return for market index “a” from G7 countries and Hong Kong during the month t, such as, t = January 2020, February 2020, March 2020, ... , June 2021

$$R_{at} = (\text{Value}_{\text{last}} - \text{Value}_{\text{first}}) / \text{Value}_{\text{first}}$$

where: $\text{Value}_{\text{first}}$ = value of index “a” on the first trading day of the month t

and $\text{Value}_{\text{last}}$ = value of index “a” on the last trading day of the month t

BHTRa: Buy-and-hold total return of index “a” for the entire time period, January 2020-June 2021

$$\text{BHTRa} = (1 + R_{a, \text{January 2020}})(1 + R_{a, \text{February 2020}})(1 + R_{a, \text{March 2020}}) \dots (1 + R_{a, \text{June 2021}})$$

Parametric hypothesis tests usually assume normal distributions and i.i.d. (independent and identically distributed random variables) of financial returns (Sharifzadeh and Hojat, 2012; Nandy, 2014). Harwell (1988) demonstrated that using non-parametric hypothesis tests would reduce the chances of Type I error, especially when sample sizes were small. In this paper, we choose to use Kruskal-Wallis non-parametric hypothesis test, thereby assuming that the monthly returns and long-term buy-and-hold returns of the indices of G7 countries and Hang Seng index are independent of each other. A 5% level of significance (risk of type I error) will be used to conduct the hypothesis test.

The test statistic used for Kruskal-Wallis test is designated by H, where,

$$H = [12/n(n+1)] [\sum (R_1)^2 / n_1 + \sum (R_2)^2 / n_2 + \dots + \sum (R_k)^2 / n_k] - [3(n+1)], \text{ with } k-1 \text{ degrees of freedom } k = \text{number of populations (} k=8 \text{ in this work.)}$$

$\sum R_k$ = sum of the ranks of the k-th G7 index,

n_k = size of each index data = 18 months

and $n = n_1 + n_2 + \dots + n_k = 144$

The distribution of the sample H statistic is very close to that of the chi-square distribution with $k-1$ degrees of freedom when every sample includes at least five observations. This situation is true in this analysis. The p-value of H is calculated using the chi-square distribution with $k-1$ degrees of freedom.

4. RESULTS

Table 2 shows the descriptive statistics from the monthly returns of the different indices. In this table DJIA indicates Dow Jones Industrial Average index, TSE – Toronto Stock Exchange index, FTSE = Financial Times London Stock Exchange index, DAX – represents German Stock Exchange index, CAC - Paris stock exchange index, Milan – Milan stock exchange index, Nikkei 0 Tokyo Stock Exchange index, and Hang Seng – Hong Kong Stock exchange index. The last three rows of this table show the average, the standard deviation, and the median values of the compounded month-to-month buy-and-hold returns. From Table 2 it is observed that the average monthly returns of DJIA, TSE, DAX, Milan and Nikkei are higher than the average monthly returns of FTSE, CAC, and Hang Seng index. The standard deviations of the monthly returns are quite variable in nature. However, the median values of the returns are similar. The median values are used for the non-parametric hypothesis test to determine the equality of the median values of the monthly returns.

Table 3 shows the compounded monthly returns and the buy-and-hold average returns of the indices from January 2020 through June 2021. The last three rows of this table show the average, the standard deviation, and the median values of the compounded month-to-month buy-and-hold returns. The average values of the compounded month-to-month buy-and-hold returns of the indices –DJIA, TSE, DAX and Nikkei are greater than 1- indicating that in the long run a portfolio manager invested in these indices would have gained amounts more than the initial investment amounts. The average values of the compounded month-to-month buy-and-hold returns of the indices - FTSE, CAC, Milan ad Hang Seng indices are less than 1 - indicating that in the long run a portfolio manager invested in these indices would have lost amounts more than the initial investment amounts. In this table compounded monthly returns for certain indices which are greater than 1 are shown in bold letters. The standard deviations of the compounded monthly returns are quite variable in nature. The median values are used for the non-parametric hypothesis test to determine equality of the median values of the compounded monthly returns.

Table 2: Monthly Returns of Indices from G7 countries and HSI (Hong Kong)

Months	DJIA	TSE	FTSE	DAX	CAC	MILAN	NIKKEI	HSI
Jan 20	-0.101	-0.061	-0.027	-0.084	-0.085	-0.054	-0.089	-0.007
Feb 20	-0.131	-0.177	-0.200	-0.166	-0.172	-0.224	-0.105	-0.097
Mar 20	0.111	0.105	0.040	0.093	0.042	0.038	0.067	0.044
April 20	0.043	0.028	0.030	0.067	0.027	0.029	0.083	-0.068
May 20	0.017	0.021	0.013	0.062	0.051	0.065	0.015	0.064
June 20	-0.015	0.042	-0.044	0.000	-0.031	-0.015	-0.026	0.007
July 20	0.118	0.021	0.011	0.051	0.034	0.028	0.066	0.024
Aug 20	-0.023	-0.024	-0.016	-0.014	-0.029	-0.032	0.002	-0.068
Sept 20	-0.046	-0.034	-0.048	-0.094	-0.044	-0.056	-0.009	0.028

Oct 20	0.120	0.103	0.123	0.152	0.201	0.230	0.015	0.093
Nov 20	0.031	0.014	0.031	0.030	0.066	0.008	0.038	0.034
Dec 20	-0.020	-0.006	-0.008	-0.021	-0.027	-0.030	0.008	0.039
Jan 21	0.032	0.042	0.012	0.026	0.056	0.059	0.047	0.025
Feb 21	0.066	0.035	0.036	0.089	0.064	0.079	0.007	-0.021
Mar 21	0.027	0.022	0.038	0.008	0.033	-0.021	-0.013	0.012
Apr 21	0.019	0.021	0.008	0.019	0.028	0.043	0.002	0.015
May 21	-0.001	0.024	0.002	0.007	0.009	-0.003	-0.002	-0.011
June 21	0.013	0.013	-0.001	0.001	0.016	0.010	0.052	-0.099
Average Monthly Return	0.014	0.011	0.000	0.013	0.009	0.012	0.011	0.001
Std. Dev.	0.066	0.060	0.061	0.072	0.073	0.085	0.059	0.052
Median*	0.021	0.015	0.009	0.018	0.022	0.009	0.016	0.014

*Median values are used for non-parametric hypothesis test.

Table 3: Buy-and-Hold Returns of Indices from G7 countries and Hong Kong

Months	DJIA	TSE	FTSE	DAX	CAC	MILAN	NIKKEI	HSI
Jan 20	0.899	0.939	0.973	0.916	0.915	0.946	0.911	0.993
Feb 20	0.776	0.773	0.778	0.765	0.757	0.734	0.815	0.897
Mar 20	0.862	0.853	0.810	0.817	0.787	0.761	0.870	0.937
April 20	0.898	0.877	0.834	0.893	0.809	0.783	0.943	0.873
May 20	0.914	0.896	0.847	0.948	0.850	0.834	0.960	0.928
June 20	0.904	0.934	0.809	0.949	0.824	0.822	0.936	0.935
July 20	1.006	0.954	0.819	0.997	0.852	0.845	0.997	0.957
Aug 20	0.983	0.931	0.805	0.983	0.827	0.818	0.999	0.892
Sept 20	0.938	0.900	0.766	0.890	0.791	0.772	0.990	0.916
Oct 20	1.051	0.993	0.866	1.024	0.950	0.949	1,139	1.001
Nov 20	1.083	1.007	0.887	1.050	0.956	0.957	1.183	1.035
Dec 20	1.198	1.079	0.910	1.147	1.033	0.995	1.321	1.083
Jan 21	1.095	1.041	0.890	1.062	0.982	0.983	1.248	1.101
Feb 21	1.167	1.080	0.921	1.156	1.045	1.061	1.357	1.079
Mar 21	1.199	1.103	0.957	1.166	1.080	1.039	1.242	1.092
Apr 21	1.222	1.126	0.964	1.188	1.110	1.083	1.244	1.101
May 21	1.221	1.228	0.966	1.196	1.121	1.080	1.241	1.096
June 21	1.236	1.512	0.965	1.197	1.139	1.091	1.176	0.987
Average Monthly Buy-and- Hold Return	1.035	1.013	0.876	1.021	0.935	0.920	1.082	0.995
Std. Dev.	0.143	0.163	0.069	0.130	0.125	0.121	0.156	0.080
Median*	1.028	0.973	0.873	1.011	0.932	0.948	1.069	0.990

*Median values are used for non-parametric hypothesis test.

Table 4 shows the results of the Kruskal Wallis non-parametric hypothesis testing of the medians of the monthly returns of the index of G7 countries and Hang Seng index. In essence, the results suggest that the null hypothesis that the median monthly returns of the indices of G7 countries and Hang Seng index are the same cannot be rejected at 5% level of significance.

Table 4: Results of Kruskal Wallis Test on Mean Monthly Returns of G7 Index and Hang Seng Index

Market Index	N	Mean Rank
DJIA	18	76
TSE	18	77
FTSE	18	67
DAX	18	77
CAC	18	74
MILAN	18	71
NIKKEI	18	71
HSI	18	68
Total	144	

Chi-Square	1.0978
df	7
p-value	0.993

Table 5 shows the results of the Kruskal Wallis non-parametric hypothesis testing of the medians of the buy-and-hold returns of the index of G7 countries and Hang Seng index. In essence, the results indicate the rejection of the null hypothesis that the median buy-and-hold returns of the indices of G7 countries and Hang Seng index are equal at 5% level of significance, supporting H_1 .

Table 5: Results of Kruskal Wallis Test on the Buy-and-Hold Returns of G7 Indices and Hang Seng Index

Market Index	N	Mean Rank
DJIA	18	86
TSE	18	77
FTSE	18	39
DAX	18	85
CAC	18	59
MILAN	18	54
NIKKEI	18	98
HANG SENG	18	80
Total	144	

Chi-Square	28.546
df	7
p-value	0.0002

5. DISCUSSION

The non-parametric comparisons of the buy-and-hold returns of G7 indices and Hang Seng index revealed that there are differences in the compounded returns among these indices. Specifically, the average of the eighteen-month buy-and-hold returns of DJIA, TSE, DAX, Nikkei are greater than 1, and higher than those of FTSE, CAC and Hang Seng index. This suggests that the market recovery among G7 countries have been uneven in the post pandemic period. The compounded monthly returns of FTSE are less than 1 for the entire period from January 2020 through the end of June 2021 - indicating that a portfolio manager who would have remained invested in FTSE index for the entire period would have lost a portion of the original investment.

Prior research had only tracked the progress of the recovery in the financial markets of developed economies for a much shorter period in the post-pandemic era (Davida *et al.*, 2021). The results from the current research clearly indicate that portfolio managers who would have remained invested in the market indices of DJIA, TSE, DAX, and Nikkei from the beginning of January 2020 through the end of June 2021, would have made money more than the original invested amounts. Thus, a judicious selection of investment in the financial indices of certain G7 countries during the COVID -19 pandemic would have proved fortuitous for the financial managers.

6. CONCLUSIONS

In this research, the financial returns of the indices of G7 countries and Hong Kong for a period of eighteen months from January 2020 through the end of June 2021 have been evaluated. A nonparametric test has been conducted to compare their risk-adjusted buy-and hold returns. The results of this hypothesis test indicate that the null hypothesis of the equality of the median compounded buy-and-hold returns are the same can be rejected. There are some limitations of this study as we attempted to investigate a longer period of 18 months rather than the average 3-month timeframe in previous research work. Future research should consider a range of timeframe such as 24 months, 36 months to add more nuanced time dimension to the performance of ADRs. An extended-term perspective has been introduced in this research by using buy-and-hold returns for the financial indices of G7 countries and Hong Kong. Future research should consider evaluating buy-and-hold returns for indices from other developed and developing economies such as, Sydney Index, NASDAQ index, Shanghai index and Mumbai Nifty 50 index.

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