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Risk Velocity and Financial Markets Performance: Measuring the Early Effect of COVID-19 Pandemic on Major Stock Markets Performance

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Abstract

Capital is coward, money tend to flee the markets during crises periods. In just few days after declaring Coronavirus as a pandemic by the World Health Organization (WHO), major stock markets lost more than 15% of their market capitalization. This study aims to examine the velocity of Coronavirus pandemic effect on major stock markets during the early stages of the pandemic. The study also examines whether or not there was any difference before and after the first confirmed Coronavirus case reported. Using the data on eleven major stock markets, results from this study shows that, out of the eleven markets under study, six markets showed no difference in mean return 30 trading days before and after reporting the first Coronavirus case in these countries. The results also showed that WHO announcement had a more impact on the stock markets performance than the announcements of local health authorities' announcements. One interesting finding in this research is that there was an inverse relation between the distance of the stock market from Wuhan and the financial performance of that market.

Keywords: Coronavirus; COVID-19; Stock market performance; Risk velocity; OLS regression.

1. Introduction

Few days after the announcement of the Coronavirus, risk aversion investors started pulling their money out of the stock markets resulting in more than 15% losses in market capitalization. The Covid-19 pandemic can be classified as a 'black swan' since it was a very unlikely event that has a severe unfavorable economic consequences. Taleb (2005), defined black swan as a random event satisfying the following three properties: large impact, incomputable probabilities, and surprise effect.

With France GDP estimated to contract by 6% for the first quarter in 2020 and the German economy by almost 5%, and that is mostly due to the lockdown in these countries and the operational hold in their economic activities. The economic effect of the Coronavirus has started to take its toll on the economy. Numerus studies were conducted to measures the economic effect of pandemics. Jonung and Roeger (2006), examined the effect pandemic on European countries, and estimated that during the pandemic period the economy would lose around 1.5% of their GDP but these losses would be eliminated by the next years. The structure of the economy also influences the magnitude of the pandemic effect on the economy, where Fernandes (2020) estimated that the average global GDP growth could decline somewhere between 3-5% during pandemic crisis, with service oriented counties such as like Greece, Portugal, and Spain (that are largely reliant on tourism) will be more affected. Bloom et al. (2005) studied the pandemic economical effect on Asian countries and estimated that in such cases the Asian economy would plunge by 6.5% in the long-run. Buetre *et al.* (2006), studied the effect of pandemic on the Australian economy, and estimated that a pandemic outbreak would cause a 6.8% downfall in Australia's GDP and a GDP drop of 3.0% to 6.8% for countries elsewhere. The degree of impact is found to be greater for developing countries than the developed ones. A study by Brainerd and Siegler (2003) on the economic effects of the Spanish flu during the 1918-1919 period on the U.S. economy and found that while the U.S. economy retracted during the pandemic period, the economy grew during the 1920's. Fernandes (2020), suggests that the longer the pandemic lasts, the more economic damage it will cause resulting in a longer recovery period.

Stock markets have always been one step ahead of the economy. Investors use forecasting methods to estimate the future economic condition and construct their market position based on these forecasts. But, the Coronavirus, which can be labeled as "Black Swan", caught the investors by surprise. While markets plunge during epidemic periods, history shows that these losses were erased during the first 6 months after the end of the epidemic as shown in table1. Studying the effect of pandemic on the stock market, Velde (2020) found that the negative impact of the Spanish Flu on U.S. stock markets was fairly modest even over time spans of several months. He contributed the

modest effect to the lack of information availability during that time. Mann (2020), concluded that the interlinkage between global commodity markets, financial markets, public sentiment, and the economy is likely to make situation worse and challenging for policy responses and would result in a faster spread of the destructive of effect of the pandemic. Fernandes (2020), argue that the difficulties in estimating the economic effects of pandemic outbreak are currently being underestimated, due to over-reliance on historical comparisons with SARS, or the Spanish flu.

Table-1. S and P 500 Performance after Epidemics

Epidemic	Month End	6 - Months Change in S&P	12 – Moths Change in S&P
HIV/AIDS	June 1981	-0.3	-16.5
Pneumonic plague	September 1994	8.2	26.3
SARS	April 2003	14.59	20.76
Avian flu	June 2006	11.66	18.36
Dengue Fever	September 2006	6.36	14.29
Swine flu	April 2009	18.72	35.96
Cholera	November 2010	13.95	5.63
MERS	May 2013	10.74	17.96
Ebola	March 2014	5.34	10.44
Measles/Rubeola	December 2014	0.20	-0.73
Zika	January 2016	12.03	17.45
Measles/Rubeola	June 2019	9.82%	N/A

Source: Dow Jones Market Data

2. Methodology

Risk velocity measures the pace in which a certain risk or event causes the devaluation of an asset. It can be calculated as follow;

$$Risk\ Velocity = \frac{\frac{(Index_t - Index_{t-n})}{Index_{t-n}}}{n} \quad (1)$$

Where $Index_{t-n}$ is the index level at the time of event occurrence, $Index_t$ is the time in which the calculation is done, and n is the time difference between the two dates. The study tries to examine if there is any relation between the stock market performance and its distance from Wuhan, that relation can be examined using OLS regression as follows;

$$SMR = \alpha + \beta Dis + \varepsilon \quad (2)$$

Where *SMR* is the market return, *Dis* is the distance in kilometers from Wuhan and ε is the error term.

3. Data and Empirical Results

The results of this research is based on the stock market indices of eleven markets that included the Chinese Shanghai SE, Japan Nikkei 225, United States S&P 500, United Kingdom FTSE 100, France CAC, Germany DAX, Canada Toronto SE, India Bombay SE, South Korea KOSPI Composite Index, Europe Euronext 100, and Hong Kong Hang Seng Index. The data for the research were downloaded from Yahoo finance.

The Chinese government first declared, officially, the first confirmed Coronavirus case on December 1st, 2019 and then the rest of the world followed. This unknown disease resulted in a chaos all around the world causing a lockout in many countries such as Italy, Spain, Iran, and many others. Table 2, illustrates the time table of the first confirmed Coronavirus cases in the countries under study.

Table-2. Dates of First Confirmed Coronavirus Case Reported

Country	Date
Wuhan - China	Dec 1st 2019
Japan	Jan 16th 2020
S. Korea	Jan 20th 2020
Hong Kong	Jan 23rd 2020
Europe	Jan 24th 2020
Britain	Jan 31st 2020
France	Jan 24th 2020
Germany	Jan 27th 2020
United States	Jan 20th 2020
Canada	Jan 25th 2020
India	Jan 30th 2020

Conducting the t-test for equal means in market return for 30 trading days before and after the first confirmed coronavirus case in the country. Results illustrated in table 3, shows that there was no difference in mean returns in 6 of the 11 markets under study. These results would indicate that the governments of China, U.K., U.S., Germany, Canada, and South Korea intervened in their stock markets to stabilize the markets and prevent them from collapsing and to give some confidence to the investors in these markets. It can also be concluded from the t-test results the intensity of the intervention, where China was the most aggressive country in their intervention followed by the United Kingdom and then came the United States, Germany, Canada, and South Korea to a less extend.

Table-3. T-test for Equal Means Results

Market	t-Stat
Shanghai SE	3.0834***
Nikkei 225	1.3989
S&P 500	1.8898*
FTSE 100	2.2990**
CAC	1.4142
DAX	1.8174*
Toronto SE	1.8855*
Bombay SE	1.3829
KOSPI Composite Index	1.9135*
Euronext 100	1.4128
Hang Seng Index	1.4739

***, **,* indicates the confidence level at 99%, 95%, and 90% respectively.

Traders in any market tend to take advantage of any news that comes, especially bad news. The same strategy was implemented when the first confirmed Coronavirus was reported in these countries. In the first 7 trading days after the announcement, traders started selling their stocks and from the results presented in table 4, it can be seen that out of the 11 markets under study 6 of them showed negative returns while out of the 5 markets that showed positive returns 4 of them was shown from the t-test results that the governments intervened in these markets from the first week of the announcement. During the first 7 trading days after the announcement, South Korean market showed the highest losses followed by Euronext 100. During the second 7 days, from 7 to 14 trading days, traders started to cover their short positions resulting in market recovery. Out of the 11 markets under study only Nikkei 225 and Bombay SE showed a decline in the returns while the remaining 9 markets showed recovery where the French CAC index showed the highest increase by 4.52%. The period between 14 and 30 trading days showed a sharp decline in all stock markets, except for the Shanghai SE, where the FTSE 100 showed the highest decline of 30.33%. The return of the markets showed a hump shape, as illustrated in figure 1, indicating that traders have realized the severity and uncertainty regarding the Coronavirus pandemic.

Table-4. Post Coronavirus Announcement Market Return

Market	7 Trading Days	14 Trading Dates	30 Trading Days
Shanghai SE	1.44%	4.91%	8.34%
Nikkei 225	-2.90%	-3.00%	-11.22%
S&P 500	-1.43%	0.21%	-9.56%
FTSE 100	2.21%	2.35%	-28.12%
CAC	-3.18%	1.34%	-11.01%
DAX	0.58%	4.09%	-12.59%
Toronto SE	0.40%	2.17%	-16.79%
Bombay SE	0.56%	-0.05%	-16.65%
KOSPI Composite Index	-5.07%	-2.72%	-10.98%
Euronext 100	-3.00%	1.49%	-10.71%
Hang Seng Index	-4.16%	-0.48%	-10.41%
Average	-1.32%	0.94%	-11.79%

Velocity is basically the speed in which the market value of an asset changes as a result of a certain event. Results in table 5, shows that in the first 7 trading days after the announcement of the first confirmed Coronavirus in these countries, South Korean stock market showed the fastest decline among the markets under study indicating the sensitivity of the market toward the event. During the 14 days trading period, Shanghai SE showed the fastest pace in market prices which was fueled by the government intervention followed by the German DAX index. The FTSE 100 had the fastest declining pace among the markets under study after 30 days of trading from the announcement of their first confirmed Coronavirus case. The FTSE 100 declined by -0.937% per day followed by Toronto SE.

Table-5. Risk Velocity Results

Market	7 Trading Days	14 Trading Dates	30 Trading Days
Shanghai SE	0.206%	0.351%	0.278%
Nikkei 225	-0.415%	-0.214%	-0.374%
S&P 500	-0.204%	0.015%	-0.319%
FTSE 100	0.315%	0.168%	-0.937%
CAC	-0.455%	0.095%	-0.367%
DAX	0.083%	0.292%	-0.420%
Toronto SE	0.057%	0.155%	-0.560%
Bombay SE	0.080%	-0.003%	-0.555%
KOSPI Composite Index	-0.724%	-0.194%	-0.366%
Euronext 100	-0.429%	0.106%	-0.357%
Hang Seng Index	-0.594%	-0.034%	-0.347%
Average	-0.19%	0.07%	-0.39%

The status and the severity of Covid-19 was still unclear to the stock market traders, it was not until March 11th 2020 that the World Health Organization (WHO) declared COVID-19 as a pandemic. With a clear picture of the danger of Coronavirus globally, markets started falling in a faster pace as seen in table 6. While, on an average, markets under study lost -1.32% in the first 7 trading days after the announcement of the first Coronavirus case in these countries, the same markets lost -15.51% of their value in the first 7 trading days after WHO announcement. The same thing applies to the 14 days trading period, where the average return was 0.94% after the first confirmed case, that return went down to -7.44% after the WHO announcement. This would indicate that the effect of the WHO is much greater than the effect of country government agencies such as heath ministries. In terms of velocity, it can be seen that the effect on the 7 trading days was much more greater after the WHO announcement where the pace of the decline was -0.19%, that rate reached -2.22%. In the 14 days trading days period, the pace was -0.53% after the WHO announcement compared to -0.39% for the government agencies. In the 7 trading days after WHO announcement, all 11 markets under study showed a decline in returns where the South Korean market was the most effected market losing -.23.61% of its value in just 7 days with a declining pace of -3.37% per day. In the 14 days trading period, Bombay SE was the most effecting losing -20.33% of its market capitalization resulting in a velocity of -1.45% per day.

Table-6. WHO Announcement Effect on Stock Markets

	7 Trading Days		14 Trading Days	
Market	**Return**	**Risk Velocity**	**Return**	**Risk Velocity**
Shanghai SE	-8.97%	-1.28%	-7.46%	-0.53%
Nikkei 225	-14.75%	-2.11%	-1.71%	-0.13%
S&P 500	-12.11%	-1.73%	-4.19%	-0.30%
FTSE 100	-12.34%	-1.76%	-5.32%	-0.38%
CAC	-16.37%	-2.34%	-5.03%	-0.36%
DAX	-17.51%	-2.50%	-5.97%	-0.43%
Toronto SE	-14.71%	-2.10%	-8.63%	-0.62%
Bombay SE	-20.76%	-2.97%	-20.33%	-1.45%
KOSPI Composite Index	-23.61%	-3.37%	-10.02%	-0.72%
Euronext 100	-15.53%	-2.22%	-5.05%	-0.36%
Hang Seng Index	-13.96%	-1.99%	-8.15%	-0.58%
Average	-15.51%	-2.22%	-7.44%	-0.53%

Distancing from the pandemic starting point might lead to less effect, but with the world becoming one small village that might not be true. In order the validate such an assumption, OLS regression was used where the change in market returns is set as the dependent variable and the distance from Wuhan, in kilometers, is set as the independent variable. Results shown in table 7, shows that the distance from Wuhan explains only 28.57% of the changes in the stock market returns at a confidence level of 90%. The results also show that there is an inverse relation between the stock market returns and the distance from Wuhan. This would suggest that the negative effect of the Coronavirus on stock markets can be linked to the distance from the pandemic starting point.

Table-7. OLS Regression Results

R Square	**0.2857**		
Significance *F*	0.0729		
	Coefficient	t-stat	P-Value
Intercept	0.241	1.339	0.210
Distance	-0.0424	-2.004	0.0729

4. Conclusion

Coronavirus pandemic is an event that took the financial markets and the whole world by surprise, the pandemic can only be compared to the Spanish flu during the June 1918 to May 1919 period. The Coronavirus pandemic can be labeled as a "Black Swan" since it meets all its categories. Results obtained from this research indicates that 6 governments intervened in their stock markets to reduce the effect of the pandemic on the stock market. In terms of market velocity, results showed that the pace of declining returns was fasted after the WHO announcement that declared Covid-19 as a pandemic.

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Figure-1. The Stock Markets Return after First Confirmed Case