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Analyzing Stock Market Signals for H1N1 and COVID-19: The BRIC Case

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Abstract

In this study, stock performance of the BRIC countries is examined and compared with regards to the announcement of the H1N1 and COVID-19 pandemics. With the use of the event study methodology, we have found evidence that the reactions of these stock markets when faced with these pandemics are diverse, even though they belong to the same group. Apparently, the assimilation of previous experiences improves the actions of the financial market, by reducing the duration and magnitude of the drop in returns when faced with these events, and promoting the semi-strong form of the Efficient Market Hypothesis (EMH).

JEL codes: G14, G15

Keywords: COVID-19, H1N1, BRIC, event study, pandemic.

I. Introduction

Over the last 100 years, only five pandemics have occurred (Madhav et al., 2017), and the interest in analyzing their consequences has resurfaced with the appearance of COVID-19 (Verma and Gustafsson, 2020), especially, due to its proximity to the H1N1 pandemic. Liu et al. (2020) pointed out that the economic losses associated with the spread of COVID-19 would cause stock markets to become riskier, highly volatile and unpredictable. The relationship between the rapid spread of contagious diseases and the financial response has been analyzed as they arise. Ichev and Marinč (2018) found a negative correlation between the occurrence of the Ebola virus and the performance of companies close to the affected countries. Chen et al. (2007) evidenced an economic weakening in tourism in Taiwan after the emergence of the SARS virus in 2003, in which stock market falls of around 30% in the hotel industry in the first month after the outbreak are noted. Zhang et al. (2020) y Akhtaruzzaman et al. (2021) showed that the global stock market responds with an increase in financial risk in response to the spread of COVID-19, while Lyócsa et al. (2020) pointed out that investors' fear of the coronavirus is the cause that led to a loss of value in the financial market.

Stock market behavior in the face of the pandemic phenomenon should be aligned with the Efficient Markets Hypothesis (Fama, 1960), especially if we consider that investors will include all the information available when making a decision, so that the price of the assets may adequately reflect the intrinsic risk and, in turn, any possibility of producing abnormal returns is removed. This type of response is more likely to be observed when events occur with notorious frequency, assuming its incorporation as a characteristic part of asset valuation, which would best fit the semi-strong form of the Efficient Markets Hypothesis (EMH). However, if the events occur with low frequency, it is likely that the assumption of rationality in the investor decision-making process would be questionable, since, if the information available is limited, so is the assimilation of experience, by reducing the possibility that the actions will be effective.

When investors make decisions in a short-term financial scenario, they become susceptible to several anomalies that undermine profit maximization (Chaudhary, 2013). Anxiety has a deterrent impact on investor sentiment to take risks, which fosters a pessimistic vision towards future returns and stock market performance (Baker and Wurgler, 2007; Cen et al., 2013). Under these considerations, it is reasonable to assume that the announcement of a pandemic would trigger an impulsive response in investors, leading to decision making processes that are not consistent with previous experiences, which in this case is a previous pandemic, and that threaten compliance with the semi-strong form of the EMH. For this reason, we believe that abnormal returns between pandemics will not show any similar response in the group of emerging countries deemed to be BRIC¹, since they were unexpected, so it was not possible to extrapolate the experience.

In our study, we will assess the impact of pandemic announcements made by the World Health Organization (WHO), for both H1N1 (June 11, 2009) and COVID-19 (March 11, 2020), on the daily returns of the stock market indexes for the BRIC. We will test compliance with the semi-strong form of the EMH and we will measure the impact of unpredictable events that occurred in a group of countries that reported a low level of infected and deceased people around the period of the event, which will allow us to identify if the effect on the markets was mainly due to investors' emotions arising from the uncertainty caused by the announcement. Finally, considering the stock market behavior after the announcement of the H1N1 pandemic as a precedent, investors should have gained experience and showed a better performance after the event for COVID-19 (11 years later), suggesting that the semi-strong form of the EMH is fulfilled.

¹BRIC, is an acronym which refers to the countries of Brazil, Russia, India and China deemed to be developing countries on their way to becoming developed countries.

II. Empirical strategy

The BRIC stock market data from 2005 to 2020 were collected from a public source². The price indexes used were: BOVESPA for Brazil; MOEX for Russia; NSEI for India; and SZSE for China. To address the effect of the WHO pandemic announcements, we will use the event study method with dummy variables (Binder, 1985; Karafiath, 1988; Malatesta, 1986), as represented in the equation (1).

$$R_t = \alpha + \beta_1 \cdot R_{t-1} + \beta_2 \cdot M_t + \sum_{\tau \in S} \theta_\tau \cdot E_{\tau,t} + \varepsilon_t \quad (1)$$

Where R_t represents the daily return of the stock market of each country belonging to BRIC on the day t measured in percentage points; R_{t-1} is the first lagged stock return, which is variable that allows the momentum effect to be controlled³. M_t is the daily market return represented by *S&P500*; and $E_{\tau,t}$ is a binary variable that takes the value 1 for each day of the event within the size window $S = 3, 5, 9, 11, 21$. In each component of the window, the subindex $\tau = 0$ represents the day the pandemic was announced. The estimation window for normal returns considers a total of 90 days, from lag 11 to lag 101 of the event date. The parameter θ_τ identifies the abnormal return occurring on the day $\tau \in S$, which is the coefficient of our interest, so that the accumulated sum $\sum_{\tau \in S}$ represents the CAR *Cumulative Abnormal* for the different analysis windows S .

III. Results

The estimates of the model described in equation (1) for the H1N1 pandemic announcement are summarized in the table 1. In the case of Brazil, all CARs were negative and significant at 1%, except for $CAR(-2, 2) = 2,1\%$ which was at 5% (Brazil column, Table 1), then returns are accumulated up to the 21-day window with negative accumulation up to $CAR(-10, 10) = 8,24\%$. An almost linear progressive loss of returns is observed in the chart/graph on the left in Figure 1. The same behavior is shown by Russia, but with greater negative accumulation ($CAR(-10, 10) = 25,76\%$) and significant at 1%, which is decreasing at a diminishing rate (graph on the left in Figure 2). For its part, India shows unstable behavior with respect to returns, reaching a $CAR(-10, 10) = 10,31\%$, although it was not significant, possibly because the market reacted to the sharp drop in returns. In the case of China, the EMH seems to be fulfilled, as shown in Table 1.

²<https://finance.yahoo.com/>

³*momentum* effect refers to the inertia of a price trend.

Table 1: CARs - H1N1 pandemic announcement

Window	(1) Brazil	(2) Russia	(3) India	(4) China
(-1, +1)	-2.3032*** (-4.1637)	-3.1450** (-2.0416)	-4.2236*** (-4.7908)	1.3965 (-1.3849)
(-2, +2)	-2.1512** (-2.3637)	-7.8103*** (-3.3908)	-1.3018 (-0.8885)	-1.3441 (-0.9513)
(-4, +4)	-4.0672*** (-2.7917)	-16.7855*** (-4.2866)	-10.0007*** (-3.7997)	0.6009 (0.2449)
(-5, +5)	-5.5914*** (-3.2366)	-21.7289*** (-4.3909)	-9.0085*** (-2.7892)	-0.1876 (-0.0631)
(-10, +10)	-8.2362*** (-2.6351)	-25.7619*** (-3.1509)	-10.3130 (-1.5365)	1.6873 (0.3018)

Note: Table 1 reports the CAR results for the equation (1) around the H1N1 pandemic announcement. The values in the first column correspond to the estimated window for the event. While the other columns represent the accumulated abnormal returns for the countries belonging to the BRIC. */**/** indicates that the z-statistic is significant at 10%/5%/1% respectively.

For the COVID-19 pandemic, CAR estimates for BRIC countries are summarized in Table 2. Brazil shows a $CAR(-5, 5) = -28.63\%$, 5 days after the announcement, and then it recovered. In Russia, we observe that its greatest accumulated return loss occurs in the $CAR(-4, 4) = -14.78\%$, which is practically one half of that observed in H1N1. In the case of India, the accumulated returns are negative and decreasing as the study window widens, reaching a significant $CAR(-10, 10) = -28.50\%$. It is striking that, in the case of China, the CARs were negative, but not significant, where almost the same behavior as the H1N1 pandemic announcement was shown.

Table 2: CARs - COVID-19 pandemic announcement

Window	(1) Brazil	(2) Russia	(3) India	(4) China
(-1, +1)	-7.7758*** (-3.2278)	3.4411* (-1.6542)	-5.2788*** (-2.9951)	-2.9568 (-0.8592)
(-2, +2)	-9.3426** (-2.5003)	-6.1575* (-1.6486)	-10.4277*** (-4.4251)	-2.3792 (-0.2938)
(-4, +4)	-27.3937*** (-4.0524)	-14.7809*** (-3.1772)	-20.0392*** (-5.8157)	-6.3054 (-0.4627)
(-5, +5)	-28.6291*** (-3.5683)	-9.3141** (-2.0659)	-25.0007*** (-6.7270)	-3.4945 (-0.2248)
(-10, +10)	-22.8748** (-2.3052)	-8.3997 (-1.4793)	-28.5049*** (-4.7840)	-7.3227 (-0.4349)

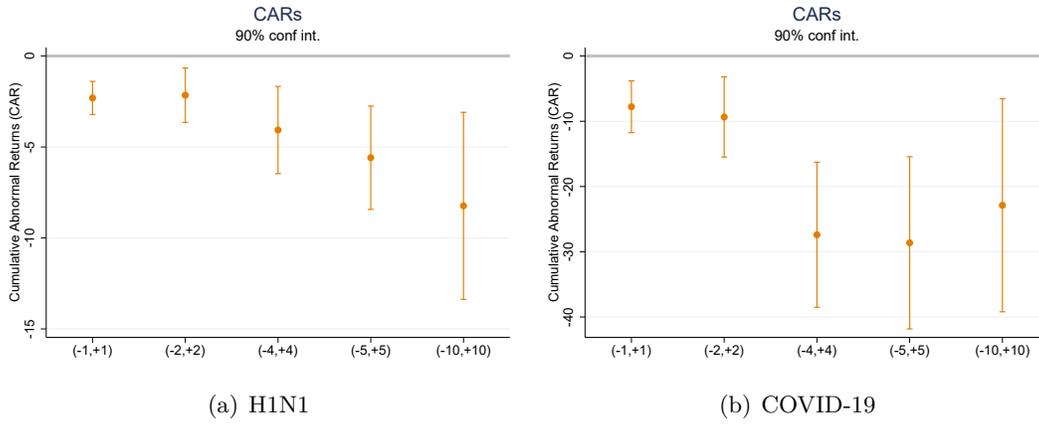
Note: Table 2 reports the CAR results for the equation (1) around the COVID-19 pandemic announcement. The values in the first column correspond to the estimated window for the event. While the other columns represent the accumulated abnormal returns for the countries belonging to the BRIC. */**/** indicates that the z-statistic is significant at 10%/5%/1% respectively.

Regarding the announcement of the H1N1 in Brazil, CARs accumulated negatively beyond the 10 days studied (see graph on the left in Figure 1). However, when faced with COVID-19, its return recovery process started 5 days after the announcement and not 10 days later, as was the case with H1N1, which perhaps was a reflection of experience, but it could also be a market reaction to the sharp decline in returns. In Russia (see Figure 2) returns losses accumulated in a negative and progressive manner. However, in relation to COVID-19, CARs were negative, but they recovered on the fourth day after the announcement, and they were 12% lower than what was experienced with the H1N1 pandemic for the same CAR. On this basis, it is possible to speculate on the internalization of experience involved in the stock market.

Furthermore, India showed unstable behavior with negative CARs comparable to those of Brazil (see Figure 3). Then, when India faced the announcement of the COVID-19, the financial market response was ineffective, causing a drop in returns (see graph on the right of Figure 3), comparable to those of Russia after the announcement of H1N1 (see Table 1 and 2). This shows us that experience could be insufficient when events occur infrequently.

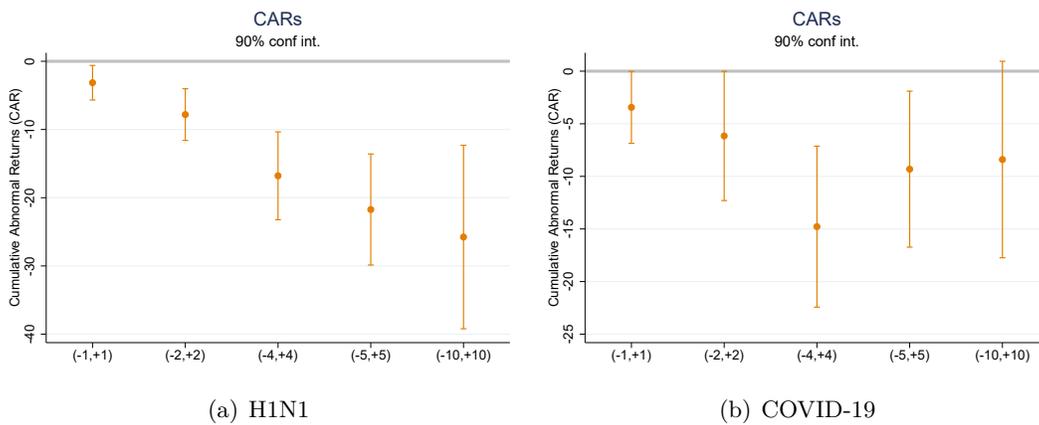
With regards to the announcement of the pandemic of H1N1, our results show that China complies with EMH, since CARs were reduced and not significant (Figure 4). In relation to the announcement of the pandemic of COVID-19, CARs were negative, but similarly, they were not significant, showing that the financial market acted efficiently, which could be related to the substitutability between productive companies (He et al., 2020) or to their flexibility of production (Liu et al., 2021). However, we also believe it could be an appropriate financial market reaction with government support.

Figure 1: Brazil CARs for H1N1 and COVID-19 pandemic announcements.



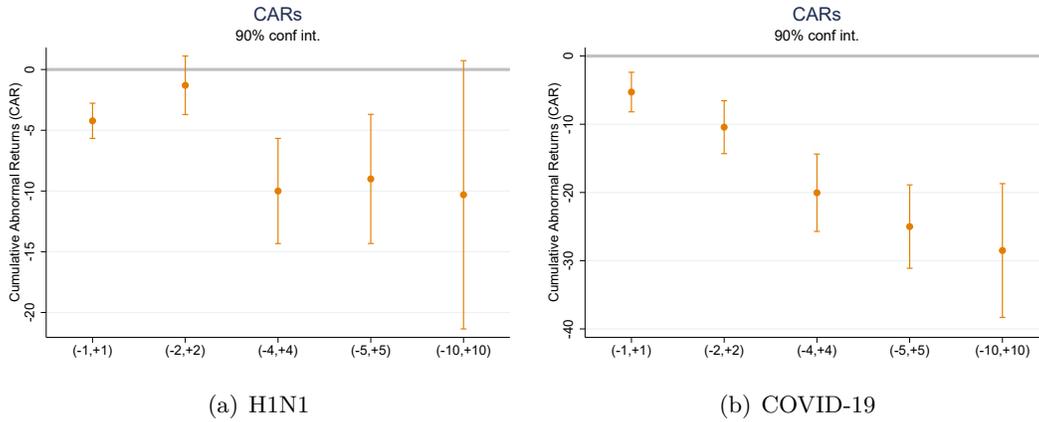
Note: The vertical axis shows the CAR in percentage points and its 90 % confidence interval. The horizontal axis indicates the size of the windows growing to the right.

Figure 2: Russia CARs for H1N1 and COVID-19 pandemic announcements.



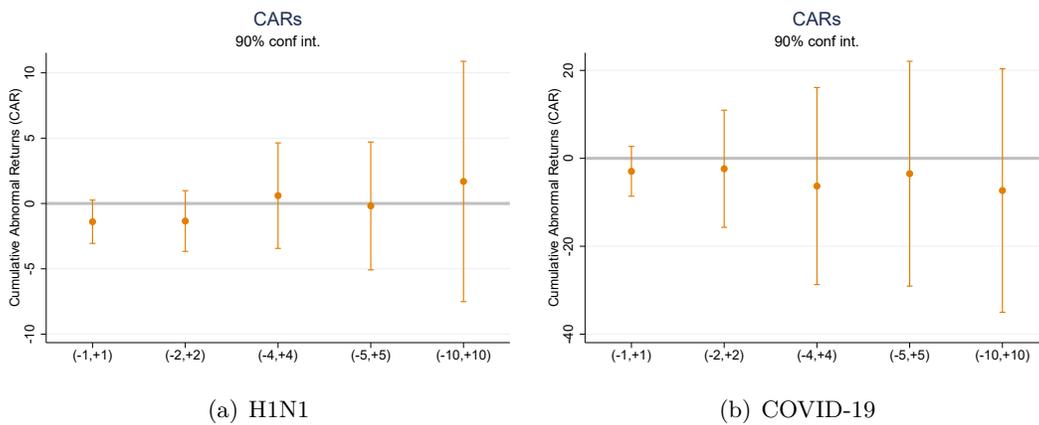
Note: The vertical axis shows the CAR in percentage points and its 90 % confidence interval. The horizontal axis indicates the size of the windows growing to the right.

Figure 3: India CARs for H1N1 and COVID-19 pandemic announcements.



Note: The vertical axis shows the CAR in percentage points and its 90 % confidence interval. The horizontal axis indicates the size of the windows growing to the right.

Figure 4: China CARs for H1N1 and COVID-19 pandemic announcements.



Note: The vertical axis shows the CAR in percentage points and its 90 % confidence interval. The horizontal axis indicates the size of the windows growing to the right.

IV. Conclusions

At the beginning of the 21st century, we have already faced two global pandemics, causing the stock markets to decline as a result of the uncertainty produced by the pandemic announcements. With the use of the event study methodology, based on the pandemic announcements of H1N1 and COVID-19 made by the WHO for BRIC, we have found significant evidence that the announcements had a negative impact on the cumulative stock returns of these countries with the exception of China. It is striking that just the announcement of the pandemic caused a drop in returns despite the fact that the level of infected people and deaths in the observed period were practically nil.

The announcement of a pandemic causes uncertainty, which accelerates the drop in returns, however, its magnitude and duration depends on the reactions of the stock market. Our evidence shows that the assimilation of the experience from the stock markets when facing a pandemic, after having experienced one previously, is diverse, but it is equally valuable to face, what could be, the potential next pandemic. When Brazil went from H1N1 to COVID-19, the duration of drop in returns was reduced, but not for the magnitude, which could be due to the experience acquired or due to forced actions as a result of the sharp drop in returns. In the case of Russia, going from one announcement to the other, showed a reduction in the duration and magnitude of the drop, which shows a more experienced market. However, from one pandemic to the other, India showed an opposite reaction to that expected, with greater losses of returns when facing COVID-19.

Among the BRIC countries, China had a better response to the pandemic announcement of H1N1 and COVID-19, possibly thanks to the transformation capacity of their companies, thus complying with the EMH. However, we must consider that it also acted early with COVID-19, since it reduced the investors' anxiety, causing a more effective reaction from stock markets, and complying with the semi-strong form of the EMH, which we could interpret as the assimilation of experience due to its confrontation with H1N1.

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