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The Impact of COVID-19 on the Returns of South African Exchange Traded Funds

Damien Kunjal[1]

Abstract: The recent COVID-19 outbreak has created economic turmoil around the world. Given the soaring popularity of exchange traded funds in recent years, this study investigates the impact of COVID-19 on the returns of South African exchange traded funds. Using a sample period of March 5, 2020 to June 4, 2020, this study reports that, after controlling for alternative explanations of returns and conditional market volatility, the returns of exchange traded funds exhibit a significant, negative relationship with the growth in the total number of COVID-19 confirmed cases. On the contrary, the returns of exchange traded funds exhibit an insignificant, positive association with the growth in the total number of COVID-19 deaths.

Keywords: Coronavirus; COVID-19; exchange traded fund; financial market; pandemic; return.

JEL Classification: G11; G12; G14

1. Introduction

The recent outbreak of the coronavirus (COVID-19) from Wuhan city in China is rapidly spreading around the world. Globally, the World Health Organization (WHO) reports that there 216 countries and territories with COVID-19 cases as of June 5, 2020 and the number of confirmed COVID-19 cases is approximately 6,5 million, including 380 000 deaths caused by virus (WHO, 2020). With regards to South Africa, on June 5, 2020, the WHO reports approximately 40 000 COVID-19 cases which include 848 deaths (WHO, 2020). In an attempt to reduce the spread of the COVID-19 virus, governments around the world have adopted strict social distancing and quarantine policies while closing their borders and implementing restrictions on travel (Nicola, et al., 2020). This is also the case in South Africa where the South African government has responded to the COVID-19 outbreak by enforcing social distancing measures,

[1] Lecturer, University of the Free State, South Africa, Address: 205 Nelson Mandela Dr, Park West, Bloemfontein, 9301, South Africa, Corresponding Author: KunjalD@ufs.ac.za.

travel bans, school closures as well as a ban on the sale of tobacco (IMF, 2020a). However, the problem is that in a world with high levels of globalization and international trade and investment, the impact of the pandemic traces beyond health factors and mortality rates.

In addition to deteriorating health conditions and rising mortality rates, the COVID-19 pandemic is creating economic turbulence around the world. Factors fueling this economic turbulence, include; disruptions in national economies, decreasing export demands, volatility in commodity prices as well as reducing international capital flows. As a result, the International Monetary Fund (IMF) forecasts a global recession for 2020 (IMF, 2020b). Specifically, the IMF projects that the global economy will contract by 3 percent in 2020, in which case, the recession caused by the COVID-19 pandemic is expected to be greater than the recession experienced during the 2008 global financial crisis. Consequently, investors around the world have suffered significant losses due to unprecedented increases in the volatility of financial markets (Zhang, et al., 2020). Therefore, the COVID-19 pandemic has changed the landscape of financial markets, including the prices at which assets trade, the manner in which firms raise finance, and the cost of capital for firms (Goodell, 2020).

Collectively, Alfaro, et al. (2020), Al-Awadhi, et al. (2020), Ashraf (2020), Baker, et al. (2020), Liu, et al. (2020) argue that stock markets respond significantly to the COVID-19 pandemic. Using data on automated and human readings of newspaper articles, Baker, et al. (2020) discover that, since February 24, 2020, changes in the United States (U.S) stock market are primarily due to news about COVID-19. Further analysis by Baker, et al. (2020) reveals that the COVID-19 outbreak exacerbated stock market volatility in the U.S. Al-Awadhi, et al. (2020) analyses companies trading in the Chinese stock market and document that the daily growth in the total number of confirmed cases adversely impacts the returns from stock markets. In other words, stock market returns decline as the number of confirmed cases rise. Additionally, Al-Awadhi, et al. (2020) find that stock market returns respond negatively to the growth in the number of deaths, that is, stock market returns decrease as the number of deaths increase.

Consistent with Al-Awadhi, et al. (2020), Ashraf (2020) examines the returns of stock market indices from 64 countries and finds that, as the number of confirmed cases increase, stock market return decline. Moreover, the findings of Ashraf (2020) suggests that stock markets respond more to growth in the number of confirmed cases relative to growth in the number of deaths. The negative effect of COVID-19 confirmed cases on the returns of stock market indices is also documented by Liu, et al. (2020). Interestingly, Alfaro, et al. (2020) examine the Wilshire 5000 index (traded in the U.S) and find that, if the trajectory of the COVID-19 virus becomes less severe than anticipated, equity markets become less responsive to new cases, and thus, may recover partially. A key drawback of several studies investigating the impact of

COVID-19 on stock market returns is that their sample data comprise of stock market indices which are often non-tradable, that is, it is not possible to invest directly in these indices. Instead, investors can indirectly invest in these indices through index funds and Exchange Traded Funds (ETFs), and as a result, the importance of index funds and ETFs should not be underrated.

Like an index fund, an ETF attempts to replicate the performance of a specific benchmark or stock market index by combining securities constituent in the benchmark, and thus, ETFs represent a pooled investment vehicle (Charteris, 2013). The main difference between index funds and ETFs is that index funds can only be traded once per day while ETFs can be traded throughout the day (Farinella and Kubicki, 2018). Thus, a key advantage of ETFs is that their unique creation and redemption process allows them to offer the same benefits as index funds but at a lower cost (Hill, 2016). Narend and Thenmozhi (2016), Aldridge (2016), Da and Shive (2018) and Aquilina, et al. (2020) contend that ETFs represent an increasingly popular investment mechanism since it provides investors with low-cost access to different asset classes. This is also the case in South Africa where the South African ETF market has grown both in the number of ETFs and in the size of ETFs (Steyn, 2019). As at December 31, 2019, the South African ETF market comprised of 78 ETFs trading on the Johannesburg Stock Exchange (JSE) with a combined market capitalization of approximately R89 billion (Brown, 2019). Therefore, the objective of this study is to examine how the returns of South African ETFs respond to the COVID-19 outbreak.

Existing empirical research on the impact of the COVID-19 pandemic on financial markets is quite limited (Goodell, 2020). Therefore, this study contributes to existing research on the response of financial markets to pandemics by providing evidence on the impact of the COVID-19 pandemic on asset returns but from the perspective of ETF markets, which, to the knowledge of the author, has never been done before. Since ETFs represent an individual asset class, the findings of this study shed light on the nature of ETF markets and whether their response to the pandemic is the same as stock markets. Given that the COVID-19 pandemic is rapidly destroying economies around the world, the current study provides insight into investors' expectations of future conditions in ETF markets as well as future payoffs associated with their investments in ETFs. Unlike Al-Awadhi et al. (2020) and Ashraf (2020) who opt for panel data approaches, this study adopts time-series GARCH models to capture the conditional volatility that is present in ETF markets. Therefore, a further contribution of this study is that it models the response of ETF returns to the COVID-19 pandemic by controlling for the conditional volatility that is present in financial markets.

Using a sample period of March 5, 2020 to June 4, 2020, this study reports that the returns of exchange traded funds exhibit a significantly negative relationship with the growth in the total number of COVID-19 confirmed cases. On the contrary, the returns of exchange traded funds exhibit a positive but insignificant association with the

growth in the total number of COVID-19 deaths. These relationships hold after controlling for other possible explanations of ETF returns as well as conditional market volatility.

2. Methodology

The return series of ETFs often exhibit volatility clustering (Kaur and Singh, 2018). Time series models may not be able to capture this persistence in volatility adequately. Thus, volatility models are required to capture the conditional volatility that is present in ETF markets. According to Barro, et al. (2020), a good gauge of the impact of the COVID-19 pandemic is the number of people infected by the virus as well as the number of people killed by the virus. Therefore, the response of ETF returns to changes in the number of COVID-19 confirmed cases/deaths is investigated using Generalized Autoregressive Conditional Heteroskedasticity (GARCH) models. GARCH models are employed for the primary reason that these models capture the time-varying volatility behaviour of ETF returns. A further advantage of GARCH models is that these models can be applied to any time period since they are very flexible (Aktan, et al., 2010).

The model estimated to capture the returns of each ETF is as follows:

$$R_t = \alpha_o + \beta_1 COV19_{t-1} + \sum_{s=2}^{S=5} \beta_s X_{t-1} + e_t \quad (1)$$

$$\sigma_t = \omega + \gamma_1 e_{t-1}^2 + \gamma_2 \sigma_{t-1}^2 \quad (2)$$

where Equation (1) represents the mean equation and Equation (2) represents the conditional variance equation in the estimated GARCH model. In Equation (1), R_t represents the return on the ETF for day t. The daily return of each ETF is dependent on $COV19_{t-1}$ which represents either (i) the growth in the total number of COVID-19 cases or (ii) the growth in the total number of deaths caused by COVID-19. To control for other possible explanations of ETF returns, a vector of ETF-specific control variables (X_{t-1}) is included in Equation (1). The vector of ETF-specific characteristics consists of the daily return on the benchmark (R_TOP40), the daily bid-ask spread ($SPREAD$), the daily price volatility ($VOLATILITY$), and the natural logarithm of daily trading volume ($VOLUME$). Table (1) provides a summary of how each control variable is computed. e_t represents the mean equation's error term on day t and follows a Generalized Error Distribution (GED) to account for non-normality in the distribution of ETF returns. In Equation (2), σ_t represents the conditional volatility on day t which is a function of the lagged squared residuals (e_{t-1}^2) and lagged squared conditional volatility (σ_{t-1}^2). In other words, γ_1 denotes the ARCH term while γ_2 denotes the GARCH term.

Table 1. Computation of Control Variables

Variable	Computation
R_TOP40	$\text{R\_TOP40}_t = ln\left(\frac{TOP\_40_t}{TOP\_40_{t-1}}\right) \times 100$
SPREAD	$\text{SPREAD}_t = \left(\frac{ASK_t - BID_t}{BID_t}\right) \times 100$
VOLATILITY	$\text{VOLATILITY}_t = ln\left(\frac{HIGH_t}{LOW_t}\right)$
VOLUME	$\text{VOLUME}_t = ln(V_t)$

Notes: TOP_40_t represents the closing price of the benchmark index on day t. ASK_t, BID_t, $HIGH_t$ and LOW_t represents the ask, bid, high and low prices on the ETF for day t. V_t represents the daily trading volume on the ETF for day t.

3. Data and Preliminary Analysis

To study the impact of COVID-19 on stock market returns, Ashraf (2020) employs the FTSE/JSE Top 40 (J200) Index as a proxy of the South African stock market. To ensure consistency in the comparison of different asset classes, this study surveys ETFs tracking the FTSE/JSE Top 40 (J200) Index. As at March 4, 2020, there are four ETFs trading on the JSE that track the FTSE/JSE Top 40 (J200) Index. Table (2) provides a summary of the ETFs included in the sample of this study.

Table 2. Sample of ETFs

JSE Ticker	ETF Name	Inception Date	Market Capitalization on March 4, 2020
ASHT40	Ashburton Top 40 ETF	15 October 2008	R1 424 183 586
ETFT40	1nvest Top 40 ETF	18 October 2010	R605 106 077
STX40	Satrix 40 ETF	27 November 2000	R8 155 955 210
SYGT40	Sygnia Itrix Top 40 ETF	7 November 2017	R210 529 425

According to WHO (2020), South Africa confirmed its first COVID-19 case on March 5, 2020. Accordingly, the period of observation for this study begins March 5, 2020 and ends June 4, 2020. This results in 93 daily observations for each of the four ETFs. Daily ETF and benchmark data is obtained from the Infront Analytics database, while data on the daily total COVID-19 cases and deaths in South Africa is obtained from the WHO (2020) database. Table (3) summarizes the descriptive statistics of each series used in this study.

Table 3. Descriptive Statistics

Series	Mean	Standard Deviation	Skewness	Kurtosis
Growth in confirmed cases	14.6604	22.1866	3.1780	3.6307
Growth in deaths	8.4153	15.1485	14.4358	18.7091
Returns (ASHT40)	0.0420	3.5935	-0.2658	10.7621
Returns (ETFT40)	0.0465	3.5657	-0.1641	9.4358
Returns (STX40)	0.0454	2.5798	-0.3569	6.2076
Returns (SYGT40)	0.0458	2.5880	-0.9771	6.7037
Returns (TOP40)	0.0288	2.6675	-0.9115	7.4104
Spread (ASHT40)	18.7019	10.7275	1.7611	8.0787
Spread (ETFT40)	16.4752	14.9588	1.6734	5.7612
Spread (STX40)	4.1833	2.4703	1.8411	8.0164
Spread (SYGT40)	12.5503	12.4695	0.4100	2.1175
Volatility (ASHT40)	0.0439	0.0360	1.3814	4.2564
Volatility (ETFT40)	0.0428	0.0516	2.3197	9.1058
Volatility (STX40)	0.0404	0.0261	1.5761	4.4962
Volatility (SYGT40)	0.0176	0.0179	2.9756	14.3070
Volume (ASHT40)	11.1207	1.3940	-0.1213	1.9016
Volume (ETFT40)	7.4524	1.4566	-0.4100	4.4813
Volume (STX40)	12.9716	1.0503	0.6207	2.9542
Volume (SYGT40)	8.6879	1.9207	-0.9575	3.5256

The average daily growth in confirmed cases is 14.660 percent with a standard deviation of 22.187 percent while the average daily growth in deaths is 8.415 percent with a standard deviation of 15.149 percent. Regarding the ETF returns, the average daily return on the ETFs varies from 0.042 percent to 0.045 percent. Notably, the average daily return of the benchmark index (that is, the JSE Top 40 index) is 0.028 percent implying that the four ETFs performed better than their benchmark index. Over the 93 day sample period, the return series of the ETFs exhibit non-normality since their kurtosis values are greater than 3 and their skewness values are not equivalent to 0, thereby, motivating the use of a GED distribution.

Table (4) summarizes the correlation matrix between the returns of each ETF and the daily growth in the total number of COVID-19 cases and deaths. Table (4) suggests that the daily returns of each ETF is negatively correlated with the daily growth in the total number of confirmed COVID-19 cases. On the contrary, the daily returns of each ETF is positively correlated with the daily growth in the total number of deaths caused by COVID-19. Interestingly, Table (4) shows that the daily growth in the total number of confirmed cases and the daily growth in the total number of deaths is negatively correlated over the 93 day sample period.

Table 4. Correlation Matrix

	Growth in confirmed cases	Growth in deaths
Growth in confirmed cases	1.0000	
Growth in deaths	-0.2442	1.0000
Returns (ASHT40)	-0.1064	0.0679
Returns (ETFT40)	-0.1414	0.1202
Returns (STX40)	-0.1962	0.0458
Returns (SYGT40)	-0.1649	0.0534

To confirm the heteroskedastic behaviour of ETF returns, Equation (1) is estimated using an OLS method for each ETF. The residuals of the estimated OLS regressions are then tested for heteroskedasticity using the ARCH LM test, and the results are presented in Table (5). Table (5) indicates that the null hypothesis of no ARCH effects up to lag order 8 of the residuals is rejected for all ETFs in both models. Therefore, the return series of all ETFs exhibit significant ARCH effects up to lag order 8, suggesting that GARCH models are appropriate for modelling the returns of the respective ETFs.

Table 5. Summary of ARCH LM test

	Returns (ASHT40)	Returns (ETFT40)	Returns (STX40)	Returns (SYGT40)
Model (1) with daily growth in the total number of confirmed COVID-19 cases				
F-statistic	2.7067**	2.7387**	6.1195***	12.4957***
Obs*R-Squared	18.7891**	18.9604**	33.0471***	47.6942***
Model (2) with daily growth in the total number of COVID-19 deaths				
F-statistic	2.6260**	2.6543**	6.3323***	1.9457*
Obs*R-Squared	18.3528**	18.5067**	33.7294***	9.3242*

*Notes: ***, ** and * indicates statistical significance at a 1 percent, 5 percent, and 10 percent level of significance, respectively.*

4. Empirical Results

Table (6) presents the results of the GARCH models estimated for each ETF using the daily growth in confirmed COVID-19 cases as a measure of the impact of the COVID-19 pandemic.

Table 6. Impact of Growth in Confirmed COVID-19 Cases on ETF Returns

	ASHT40	ETFT40	STX40	SYGT40
Mean Equation				
Constant	-0.8207	0.3630	-0.1339	-0.0164
	(1.8261)	(1.7315)	(4.2667)	(1.1922)
Growth in confirmed cases	-0.0328***	-0.0464***	-0.0416***	-0.0663***
	(0.0103)	(0.0137)	(0.0105)	(2.65E-05)
R_top40	0.1927	0.1602	0.1210	-0.0609
	(0.1417)	(0.0978)	(0.0989)	(0.0894)
Spread	-0.0022	-0.0804***	0.1895*	0.0135
	(0.0252)	(0.0273)	(0.1065)	(0.0150)
Volatility	-13.3064	36.0033***	7.7522	18.9238
	(12.8548)	(9.0421)	(14.3434)	(26.3494)
Volume	0.1390	0.0062	-0.0254	0.0348
	(0.1712)	(0.2529)	(0.3501)	(0.1465)
Conditional Variance Equation				
Constant	0.0939	0.3903	0.1486	0.01564
	(0.2025)	(0.4542)	(0.1600)	(0.0444)
ARCH term	0.2626**	0.2780	0.0968	-0.0783**
	(0.1055)	(0.1690)	(0.0770)	(0.0386)
GARCH term	0.7556***	0.7163***	0.8478***	1.0700***
	(0.0735)	(0.1541)	(0.1019)	(0.0560)

*Notes: ***, ** and * indicates statistical significance at a 1 percent, 5 percent, and 10 percent level of significance, respectively while values in parenthesis represent standard errors.*

The results in Table (6) suggest that, after controlling for other possible explanations of ETF returns and conditional market volatility, growth in the total number of confirmed COVID-19 cases exhibits a negative relationship with the returns of each ETF. This relationship is statistically significant for all ETFs at a 1 percent level of significance. The negative and statistically significant relationship between growth in confirmed cases and the returns of each ETF implies that an increase in the number of confirmed COVID-19 cases is accompanied by a decrease in ETF returns. This finding is consistent with Al-Awadhi et al. (2020) and Ashraf (2020) who find that stock markets respond negatively to growth in confirmed COVID-19 cases, thus, indicating that ETF markets react to growth in COVID-19 confirmed cases in a manner similar to stock markets.

Noteworthy is the relationship between ETF returns and growth in deaths caused by COVID-19. Table (7) presents the results of the GARCH models estimated for each ETF using the daily growth in COVID-19 deaths as a measure of the COVID-19 impact. The results suggest that ETF returns are positively related to the daily growth in deaths caused by COVID-19. However, this relationship is statistically insignificant. This finding implies that ETF returns are not significantly impacted by growth in COVID-19 deaths, thus, indicating that the ETF markets do not strongly respond to deaths caused by COVID-19. The positive relationship between growth in

deaths and ETF returns does not conform to the results obtained by Al-Awadhi et al. (2020) and Ashraf (2020) who find that stock markets respond negatively to deaths caused by COVID-19, therefore, implying that the response of the ETF markets to COVID-19 deaths is not consistent with the reaction of stock markets.

Overall, the results in Table (6) and Table (7) suggest that, in ETF markets, the impact of growth in COVID-19 confirmed cases is more pronounced than the impact of growth in COVID-19 deaths. According to Ashraf (2020), this finding is because death is a consequence of a confirmed case, and therefore, investors price growth in confirmed cases before they respond to deaths which occur as a result of confirmed cases. Unreported diagnostic tests results[1] confirm that the residuals of the estimated GARCH models in Tables (6) and (7) do not exhibit heteroskedastic behaviour, and therefore, the results interpreted in this study are reliable.

Table 7. Impact of growth in COVID-19 deaths on ETF returns

	ASHT40	ETFT40	STX40	SYGT40
Mean Equation				
Constant	-0.8084	0.0355	2.1036	-0.2182
	(1.9033)	(1.8679)	(3.5803)	(1.0169)
Growth in deaths	0.0233	0.0224	0.0185	0.0080
	(0.0519)	(0.0485)	(0.0328)	(0.0298)
R_top40	0.2576*	0.2358***	0.1666*	-0.0216
	(0.1324)	(0.0787)	(0.0938)	(0.0298)
Spread	-0.0146	-0.0815***	0.1774*	0.0128
	(0.0255)	(0.0309)	(0.1021)	(0.0156)
Volatility	-16.9934	35.4993***	1.2326	1.6361
	(11.4038)	(9.3447)	(12.7854)	(19.0338)
Volume	0.1297	-0.0105	-0.2176	0.0312
	(0.1713)	(0.2729)	(0.2924)	(0.1309)
Conditional Variance Equation				
Constant	0.0412	0.3879	0.1124	0.0698
	(0.1690)	(0.4614)	(0.1152)	(0.0795)
ARCH term	0.2021**	0.2429**	0.0714	0.0363
	(0.0845)	(0.1149)	(0.0516)	(0.0303)
GARCH term	0.8045***	0.7510***	0.8827***	0.9206***
	(0.0639)	(0.1072)	(0.0658)	(0.0429)

*Notes: ***, ** and * indicates statistical significance at a 1 percent, 5 percent, and 10 percent level of significance, respectively while values in parenthesis represent standard errors.*

[1] Results available on request.

5. Conclusion

Research on the impact of the COVID-19 pandemic is quite limited. Whilst the majority of studies examining the impact of the COVID-19 on asset returns is conducted using stock market indices, these indices are non-tradable. Therefore, this study investigates the impact of COVID-19 on the returns of ETFs, which represent an individual asset class that allows investors to indirectly trade in stock market indices. Using the daily growth in the total number of COVID-19 confirmed cases and the daily growth in the total number of COVID-19 deaths as a gauge of the impact of the COVID-19 pandemic, this study reports that the South African ETF market responds negatively to growth in confirmed cases but positively to growth in deaths caused by COVID-19. However, the response of ETF returns to growth in deaths is statistically insignificant suggesting that the South African ETF market does not price risks related to the growth in COVID-19 deaths. On the contrary, ETF returns significantly respond to growth in confirmed cases, thus, indicating that risks pertaining to growth in confirmed COVID-19 cases are significantly priced in the South African ETF market.

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