The Role of Investor Attention in ETF Liquidity

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Abstract

ETFs have gained increasing popularity due to their numerous benefits, including their higher liquidity relative to their counterparts. However, the influence of this increasing attention on their liquidity remains unexplored. Therefore, this study investigates the effect of investor attention on ETF liquidity. To achieve this objective, 80 South African ETFs are examined from January 2018 till December 2022 using a panel regression approach. The findings of this study suggest that an increase in investor attention increases the price impact but reduces the cost of trading, ultimately, leading to an improvement in ETF liquidity. Further analysis reveals that investor attention has a greater impact on ETFs tracking domestic benchmarks, and impacts only ETFs tracking equities, bonds, and property. The analyses also reveal that the effect of investor attention is only significant in the short-run and is eliminated in the long-run, and these effects have been intensified by the COVID-19 pandemic. Global investor attention, however, has an opposing effect on ETF liquidity. These findings are important for investors trading in ETF markets and regulators controlling these markets.

Keywords: *Exchange Traded Fund; Google Search Volume Index; Investor Attention; Liquidity.*

JEL Classification: *G11, G12, G40.*

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1. Introduction & Literature

In recent years, the use of Exchange Traded Funds (or ETFs) as investment alternatives has gained traction due to the various benefits offered by these products. By the end of year 2022, the global ETF market comprised of 9 535 ETF products which accumulated assets worth $9 028 billion[1]. In South Africa, the ETF market generated a capitalization of approximately R118 billion from 95 ETFs by the end of 2022 (ETFSA, 2023). Depending on their investment objectives, ETFs can either be actively or passively managed, such that, actively-managed ETFs attempt to outperform the benchmark whilst passively-managed ETFs attempt to replicate the performance of a specific benchmark or index (Liu, 2023). Traditionally, the South African ETF market has been dominated by passive ETFs because the Johannesburg Stock Exchange only revised its listing requirements to allow for the listing of active ETFs in October 2022[2]. Regardless of whether the ETF is actively or passively managed, these funds provide investors with several benefits in comparison to their mutual fund counterparts. These benefits include tax efficiency, improved trade flexibility, lower expense ratios, and increased transparency (Lettau, et al., 2018; Baek, et al., 2020). One of the most prominent advantages of ETFs is their high liquidity (Ben-David, et al., 2017; Nandal and Kumar, 2021; Gao and Li, 2023).

Generally, liquidity refers to the ease and speed at which an asset can be traded at a low-cost (Ma, et al., 2016). One of the earliest studies on asset liquidity was conducted by Black (1971) who suggested that liquidity is associated with immediacy, that is, the speed at which a quantity of securities can be purchased or sold. Kyle (1985) later proposed that liquidity has three additional dimensions; tightness (related to the cost of trading), depth (related to the impact of trading volumes on asset prices), and resilience (related to the speed at which prices return to equilibrium after random shocks). Liquidity is, therefore, fundamental to ensuring that financial markets can function smoothly due to its influence on investment decisions, asset returns, order flows, and corporate decisions, amongst other aspects of financial markets (Wuyts, 2007; Naik and Reddy, 2021). Satisfactory liquidity levels enable investors to adjust their portfolios to capitalize on new opportunities, engage in market timing, and respond to changes in risk (Kinlaw, et al., 2013; Kunjal, 2022). On the contrary, impaired liquidity levels makes trading more difficult and, as a result, market participants are exposed to greater risk because of increased price volatility (Xu,

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[1] ETFGI, (2023). ETFGI ETF/ETP growth charts. Availabe at https://etfgi.com

[2] JSE, (2022). JSE to list actively managed ETFs. Available:
https://www.jse.co.za/news/news/jse-list-actively-managed-etfs

et al., 2019). Furthermore, unsatisfactory liquidity in financial markets may exacerbate market inefficiencies and impede economic growth (Kunjal, 2021). Hence, it has been noted that illiquidity is a key catalyst of market crises (Ma, et al., 2016). Existing research suggests that the liquidity of financial markets is influenced by various factors, including company-specific characteristics (Norvaišienė and Stankevičienė, 2014; Sidhu and Kaur, 2019), macroeconomic components (Igbinosa and Uhunmwangho, 2019; Naik and Reddy, 2021), credit ratings (Saadaoui, et al., 2022), investor sentiment (Kumari, 2019), and investor attention (Wang, et al., 2018).

In recent years, the influence of investor attention on trading behaviour and liquidity has gained considerable interest from academics (Cheng, et al., 2021), however, the majority of this research focuses on stock markets. The seminal work of Merton (1987) on "investor recognition" posits that investors would only invest in securities that they have knowledge about, and information on securities can be sourced from firms, portfolio managers, financial advisors, and brokers. Odean (1999) asserts that investors are unable to evaluate all available securities, thus, their choice is limited to the securities which have recently caught their attention. However, investors cannot purchase all securities that grab their attention, therefore, their investment decisions are based on personal preferences. For instance, momentum traders will purchase recent high performers whilst contrarian traders will opt for out-of-favour securities (Barber and Odean, 2008). Peng and Xiong (2006) contend that attention-constrained investors concentrate on sector- and market-wide information rather than firm-specific information, such that, firm-specific information may be disregarded in extremely constrained circumstances. The theoretical background on investor attention implies that investors are net buyers of attention-grabbing securities which include securities that have recently been in the news, generated extreme returns, or display high trading activity – as found by Barber and Odean (2008).

Prior studies have used advertising costs and media coverage as a measure of investor attention (Ding and Hou, 2015). However, in recent studies, the Google Search Volume Index (GSVI) introduced by Da, et al. (2011) has gained popularity as a measure of investors' attention. This measure has been used to capture investors' attention in markets for various asset classes include stocks (Iyke and Ho, 2021), bond (Pham and Huynh, 2020), oil (Xiao and Wang, 2021), foreign exchange rates (Han, et al., 2018), and cryptocurrency (Smales, 2022). With regards to market liquidity, Ding and Hou (2015) report that increased investor attention widens the shareholder base and improve the liquidity of S&P 500 stocks. Ruan and Zhang (2016) find that greater attention increases stock liquidity in the United States because increased attention is associated with a higher

intensity of trading. Adachi, et al. (2017) also find a positive effect of investor search intensity on the trading volume of Japanese stocks. Cheng, et al. (2021) find that investor attention has a positive effect on the liquidity of the Chinese stock market in the short-run, however, this effect weakens and eventually reverses in the long-run. El Ouadghiri, et al. (2022) find that institutional investor attention also has a positive effect on stock liquidity. Contrary to stock markets, Smales (2022) discover that increased attention leads to lower liquidity in cryptocurrency markets.

Investor attention-related research on ETF markets is very scanty. In 2021, Lee, Chen, and Lee mentioned that there was no research on investor attention and ETF returns, hence, their study was the first to explore the effect of investor attention on ETF returns (Lee, et al., 2021). In particular, Lee, et al. (2021) assess single-country ETFs trading in the United States (U.S.) and report that investor attention in the U.S. does not significantly impact ETFs returns whereas investor attention in the home country significantly influences ETF returns in the low and medium quantiles. In another study, Lee and Chen (2021) discover a robust and non-linear contemporaneous relationship between investor attention and the returns of single-country ETFs trading in the U.S. To the author's knowledge, there has been no attempt to relate investor attention to ETF liquidity. Therefore, the objective of this study is to investigate the effect of investor attention on the liquidity of ETFs, particularly ETFs trading in South Africa.

This study contributes to existing literature in several ways. Whilst the effect of investor attention on stock market liquidity has been widely examined, stock market liquidity differs from ETF liquidity for various reasons[3]. Therefore, it is important to understand how investor attention impacts markets for different asset classes because the effect may not be uniform (Smales, 2022). Hence, the main contribution of this study is that it provides insight into the effect of investor attention on the liquidity of ETF markets. As a result, this study also contributes to research on the sources of ETF liquidity given the importance of ETF liquidity. Particularly, the lack of ETF liquidity could increase investors' trading costs and hinder the development of capital markets (Bae and Kim, 2020). Moreover, whilst the majority of existing investor attention-related literature concentrate on short-run effects (Cheng, et al., 2021), this study explores different time horizons (specifically daily, weekly, and monthly) and, thus, sheds light on the short- and long-term effects. Similarly, while the majority of existing research employ a single measure of liquidity, this study employs different measures of ETF liquidity in order to provide a more robust indication of the response of ETF liquidity to

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[3] Refer to Kunjal (2022) for the conceptualization of ETF liquidity.

investor attention. In particular, this study uses Amihud's (2002) illiquidity ratio and Corwin and Schultz' (2012) high-low spread estimator as measures of liquidity because these measures effectively capture ETF liquidity (Marshall, et al., 2018). Furthermore, a notable contribution of this study is its segmentation of the ETFs based on their benchmarking styles whereas most studies review ETF markets as whole. To be specific, this study segments the South African ETFs according to the asset class that they track as well as whether they track domestic or international benchmarks, thus, providing knowledge on any diversification or liquidity benefits that may arise from international benchmarking or investing in ETFs with different asset classes. Additionally, this study contributes to existing literature on whether the effects of local investor attention differ from global investor attention by considering worldwide attention to ETFs.

This paper is structured as follows: Section 2 outlines the computation of the variables and methodology used in this study. Section 3 presents and discusses the results. Section 4 concludes the study.

2. Data and Methodology

The study surveys ETFs listed on the Johannesburg Stock Exchange (JSE) that has been trading for more than one year as at 30 December 2022. Given the varying inception dates of the respective ETFs, the sample includes an unbalanced panel of 80 JSE-listed ETFs after accounting for the data unavailability of 6 ETFs. The 5-year study period varies from 2 January 2018 till 30 December 2022, and the variables are computed as follows.

2.1. Measurement of Investor Attention

Whilst there exists several measures of investor attention, this study uses the Google Search Volume Index (GSVI) as a proxy for investor attention. The choice of this index is motivated by use widespread use in recent investor attention-related research (Pham and Cepni, 2022; Smales, 2022). Compared to traditional indirect measures of investor attention, the GSVI provides a direct reflection of investors' demand for information (Wang, et al., 2022). The GSVI provides an indication of the search activity relating to a particular topic in proportion to all searched topics within a specific region (Smales, 2021). The index is scaled by its time-series mean and takes a value between 0 and 100, such that, an increase in the index indicates an increase in search activity relating to the topic within a specific time frame and location (Swamy, et al., 2019). In line with Peng and Xiong (2006), the study assumes that investors' attention is limited and, therefore, investors concentrate on market-wide information. Accordingly, to measure investor attention to the ETF market, the keywords of interest are "ETF" or "Exchange Traded Fund". The data on GSVI are collected from Google Trends available at: http://www.google.com/trends. The analysis is

restricted to searches conducted in South Africa. In line with existing studies, the GSVI time-series are standardized as follows:

$$Investor\ Attention_t = \frac{GSVI_t - \frac{1}{n}\sum_{i=1}^{n} GSVI_t}{\sigma_{GSVI}} \tag{1}$$

where $GSVI_t$ is the value of Google Search Volume Index for the particular keyword (ETF or Exchange Traded Fund) on day t, n is the total number of daily observations in the sample, and σ_{GSVI} is the standard deviation of the index over the full sample period.

2.2. Measurement of ETF Liquidity

ETF liquidity is measured using Amihud's (2002) illiquidity ratio as well as Corwin and Schultz' (2012) high-low spread estimator due to the availability of the required data and the effectiveness of these proxies in measuring liquidity (Fong, et al., 2017; Będowska-Sójka, 2018; Marshall, et al., 2018). The illiquidity ratio proposed by Amihud (2002) captures the price impact, that is, the sensitivity of the daily price change to trading volume as follows:

$$Amihud_{i,t} = \frac{|r_{i,t}|}{Volume_{i,t}} \tag{2}$$

where $r_{i,t}$ is the return of ETF i on day t and $Volume_{i,t}$ is the trading volume (in South African Rands) of the ETF i on day t. A high value for $Amihud_{i,t}$ implies that the price changes are greater when there is a small change in volume, therefore, suggesting that the security is more illiquid. $Amihud_{i,t}$ is multiplied by 10^6 in order to ensure a common representation within the two proxies of liquidity.

The High-low spread proposed by Corwin and Schultz (2012) provides an alternative estimation of the bid-ask spread using daily high and low prices as follows:

$$S_{i,t} = \frac{2(e^{\alpha_{i,t}} - 1)}{1 + e^{\alpha_{i,t}}} \tag{3}$$

$$\alpha_{i,t} = \frac{\sqrt{2\beta_{i,t}} - \sqrt{\beta_{i,t}}}{3 - 2\sqrt{2}} - \sqrt{\frac{\gamma_{i,t}}{3 - 2\sqrt{2}}} \tag{4}$$

$$\beta_{i,t} = \sum_{k=0}^{1} \left[ln\left(\frac{H_{i,t+k}}{L_{i,t+k}}\right) \right]^2 \tag{5}$$

$$\gamma_{i,t} = \left[ln\left(\frac{H_{i,t,t+1}}{L_{i,t,t+1}}\right) \right]^2 \tag{6}$$

where $S_{i,t}$ represents ETF i's high-low spread on day t. $H_{i,t}$ and $L_{i,t}$ respectively denote the high and low prices on day t while $H_{i,t,t+1}$ and $L_{i,t,t+1}$ are the highest and lowest prices over two consecutive days (that is, day t and day $t + 1$). An increase in $S_{i,t}$ is associated with an increase in transaction costs and, thus, a decrease in liquidity. Daily trading volume, closing, high, and low prices are obtained from the EquityRT database.

2.3. Measurement of ETF Liquidity

The baseline model used to investigate the effect of investor attention on ETF liquidity is adapted from Cheng, et al. (2021) as follows:

$$Liquidity_{i,t} = \beta_0 + \beta_1 Investor\ Attention_t + \sum_k \gamma_k Controls_{i,t} + \varepsilon_{i,t} \quad (7)$$

where $Liquidity_{i,t}$ represents the measure of liquidity (that is, either $Amihud_{i,t}$ or $S_{i,t}$) and $Investor\ Attention_t$ is the measure of investor attention as defined in Equation (1). To account for other possible explanations of ETF liquidity, the $Controls_{i,t}$ include $LnPrice_{i,t}$ which is the log of the closing price, $LnVolume_{i,t}$ which is the log of the trading volume, $LnVolatility_{i,t}$ which is the log of the price volatility [4], $LnMarket\ Capitalisation_{i,t}$ which is the log of the market capitalisation. Equation (7) is estimated using cross-sectional fixed or random effects in order to mitigate issues caused by cross-sectional heterogeneity and omissions of ETF characteristics. The Hausman (1978) test is used to identify the optimal model between the cross-sectional fixed or random effects models.

3. Results and Analysis

3.1. Preliminary Analysis

Table 1 provides a summary of the descriptive statistics for the main variables of interest. The descriptive statistics suggest that the surveyed ETFs exhibit an average Amihud ratio (multiplied by 10^6) of 3.014. This implies that the ETFs' daily Amihud ratios are relatively low suggesting that the ETFs exhibit low price impacts on average. Likewise, the high-low spread is also relatively low (-0.108) but negative. These negative spreads result from large volatility in the funds' prices over a 2-day period (Corwin and Schultz, 2012). The average GSVI for

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[4] In line with Aber, et al. (2009), price volatility captures the relative price deviation between the ETF's high and low prices.

"ETF" and "Exchange Traded Fund" are 28.014 and 31.639, respectively, implying that "Exchange Traded Fund" gains more attention on average. Table 2 presents the results of the tests for stationarity in the panels. Except for the ADF test conducted for the $LnPrice$ variable, the results of the stationarity tests suggest that all the variables are stationary and will not lead to spurious regression.

Table 1. Summary of Descriptive Statistics

	$Amihud_{i,t}$	$S_{i,t}$	$GSVI(ETF)_t$	$GSVI(Exchange\ Traded\ Fund)_t$
Mean	3.014	-0.018	28.014	31.639
Std. Dev.	68.161	0.137	24.207	23.948
Skewness	87.505	-9.520	0.613	0.475
Kurtosis	10569.32	94.342	2.905	2.913
Observations	87534	87534	87534	87534

Table 2. Summary of Stationarity Results

	LLC	IPS	ADF	PP
$Amihud_{i,t}$	-88.866*	-103.595*	6842.39*	9394.34*
$S_{i,t}$	-51.587*	-114.909*	9551.08*	11203.2*
$GSVI(ETF)_t$	-95.866*	-93.455*	7347.14*	6820.02*
$GSVI(Exchange\ Traded\ Fund)_t$	-102.609*	-112.347*	9354.73*	9968.43*
$LnPrice_{i,t}$	-6.327*	-2.263**	182.033	499.482*
$LnVolume_{i,t}$	-66.601*	-84.252*	6389.21*	9813.71*
$LnVolatility_{i,t}$	-70.889*	-91.283*	7095.03*	10241.0*
$LnMarket\ Capitalisation_{i,t}$	10241.0*	-2.697*	225.441*	565.773*

Note: LLC denotes the Levin, Lin and Chu test, IPS denotes the Im, Pesaran and Shin test, ADF denotes the Augmented Dickey-Fuller test, and PP denotes the Phillips-Perron test. The *, **, *** represent statistical significance at a 1%, 5%, and 10% level of significance, respectively.

3.2. Baseline Analysis

Equation (7) is estimated using cross-sectional fixed effects as selected by the Hausman test, and the results are presented in Table 3. The results in Table 3 suggest that, regardless of the keyword, $GSVI_t$ has a positive and significant effect on $Amihud_{i,t}$ but a significant, negative effect on $S_{i,t}$. This finding implies that the influence of investor attention on ETF liquidity is dependent on the measure of liquidity. In particular, investor attention, as captured by the search frequency, exhibits a positive relationship with ETF illiquidity as reflected by the Amihud

ratio. This finding is attributed to market uncertainty whereby an increase in investor attention is associated with an increase in market uncertainty and, subsequently, an increase in market illiquidity (Aouadi, et al., 2013). An increase in investor attention is also associated with a decrease in informational asymmetry costs and, thus, a reduction in transaction costs (as reflected by the spread), thereby, accounting for the negative effect of investor attention on the ETF spread. Given that the Amihud ratios are multiplied by 10^6, the magnitude of the coefficients suggest that investor attention exhibits a greater impact on the spread and, therefore, investors' attention may help improve ETF liquidity through a reduction in transaction costs. Noteworthy is that investor active searches relating to "Exchange Traded Fund" exhibits a greater influence on liquidity relative to "ETF" searches regardless of the liquidity measure. These findings are consistent with Ding and Hou (2015) who report that investor attention inversely influences the spread of S&P 500 stocks but positively influences its Amihud illiquidity ratio although this positive effect is statistically insignificant.

For completion, the results also suggest that the fund's price, volume, volatility, and market capitalization significantly influence its liquidity. In particular, $LnPrice_{i,t}$, $LnVolume_{i,t}$, and $LnVolatility_{i,t}$ negatively influence $Amihud_{i,t}$ whilst $LnMarket\ Capitalisation_{i,t}$ positively influences this liquidity measure. The opposite holds true for the $S_{i,t}$ measure of liquidity.

Table 3. Estimations from Panel Regressions

	Dependent Variable: $Amihud_{i,t}$		Dependent Variable: $S_{i,t}$	
$Constant$	-62.619***	-64.787**	-0.176*	-0.173*
$GSVI(ETF)_t$	0.717*		-0.001**	
$GSVI(Exchange\ Traded\ Fund)_t$		1.032*		-0.002*
$LnPrice_{i,t}$	-6.007**	-5.661**	0.043*	0.042*
$LnVolume_{i,t}$	-3.640*	-3.640*	0.001**	0.001**
$LnVolatility_{i,t}$	-4.632*	-4.643*	0.003*	0.003*
$LnMarket\ Capitalisation_{i,t}$	5.163**	5.136**	-0.007***	-0.007***
Fixed Effects	Yes	Yes	Yes	Yes
Hausman Test Stat.	42.339*	42.776*	90.823*	90.005*

Note: The *, **, *** represent statistical significance levels at a 1%, 5%, and 10% respectively.

3.3. Further Analysis

3.3.1. The Role of Benchmarking Styles

According to Kunjal (2022), the liquidity of JSE-listed ETFs tracking domestic and international benchmarks differs for several reasons, including the higher trading costs associated with ETFs that have foreign exposures. On this basis, the surveyed ETFs are segregated into ETFs tracking domestic benchmarks and ETFs tracking international benchmarks, and the role of investor attention is explored. The results are presented in Table 4. The results in Table 4 are consistent with the home bias because investor attention exhibits a strong influence on ETFs with domestic benchmarks but a weak influence on ETFs with international benchmarks. This home bias may be attributed to investors' preference for local assets because of behavioural reasons such as familiarity or relative optimism (Huang, et al., 2016). Specifically, the positive effect on the Amihud ratio and the negative effect on the spread still holds for ETFs with domestic benchmarks, and these effects are significant at a 1% level of significance. On the contrary, only searches for "ETF" influence the spread of ETFs with international benchmarks, and this effect is statistically significant at a 10% level of significance suggesting that investor attention exhibits a weak influence on ETFs with foreign benchmarks. This finding is consistent with Lee, et al. (2021) who find that U.S. investor attention does not significantly influence ETFs with offshore benchmarks.

Table 4. Estimations from Panel Regressions after Accounting for Benchmark Domicile

	Segment A: Domestic Benchmarks				Segment B: International Benchmarks			
	$Amihud_{i,t}$		$S_{i,t}$		$Amihud_{i,t}$		$S_{i,t}$	
$Constant$	-64.440	-59.728	-0.524*	-0.537*	-11.199	-11.304	-0.057	-0.065
$GSVI(ETF)_t$	1.062*		-0.002*		-0.001		0.001***	
$GSVI(Exchange$ $Traded\ Fund)_t$		1.652*		-0.002*		-0.044		-0.001
$LnPrice_{i,t}$	-8.999***	-8.106	0.026*	0.024**	-0.583	-0.574	0.040*	0.040*
$LnVolume_{i,t}$	-4.557*	-4.563*	0.003	0.003	-0.982*	-0.981*	0.001*	0.001*
$LnVolatility_{i,t}$	-6.154*	-6.174*	0.002*	0.003*	-0.823*	-0.821*	0.002*	0.003*
$LnMarket$ $Capitalisation_{i,t}$	6.275	5.788	0.012	0.014	0.895***	0.897***	-0.011*	-0.011*
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HausmanTest	37.144*	35.140*	45.955*	44.713*	51.316*	50.056*	146.711*	154.650*

Note: The *, **, *** represent statistical significance levels at a 1%, 5%, and 10% respectively.

Additionally, the role of investor attention across ETFs tracking different asset classes is explored by segregating the surveyed ETFs into categories relating to the different asset classes; equities, bonds, commodities, and property. Funds tracking multi-assets and the money market are excluded from this analysis due to an insufficient number of ETFs to form an adequate panel for analysis. The results for the Amihud measure are presented in Table 5 while the results for the spread measure are presented in Table 6. Together, these results show that investor attention significantly influences the liquidity of ETFs tracking equities, and the direction of this influence is consistent with the baseline results. In addition, the results suggest that searches for "ETF" significantly influence the liquidity of ETFs tracking bonds (both liquidity measures) and the spread of ETFs tracking property. However, investor attention as captured by the GSVI has no significant impact on ETFs tracking commodities. The greater influence of investor attention on equity ETFs is attributed to the increasing popularity of equity ETFs which provide investors with diversification benefits since they pool multiple stocks instead of bond and commodity ETFs which generally track one type of bond or commodity, respectively.

Table 5. Estimations from the Amihud Panel Regressions after Accounting for Benchmark Asset Class

	Equities		Bonds		Commodities		Property	
$Constant$	-110.4**	-113.6**	-12.04**	-12.24**	-9.49	-9.47	34.20*	-22.52
$GSVI(ETF)_t$	1.050*		0.279*		0.004		-0.189	
$GSVI(Exchange\ Traded\ Fund)_t$		1.444*		0.026		0.045		-0.203
$LnPrice_{i,t}$	-10.84*	-9.98*	-1.11*	-1.10*	-1.50	-1.51	-1.23**	-4.60
$LnVolume_{i,t}$	-5.68*	-5.67*	-0.85*	-0.84*	-0.63*	-0.63*	-1.37*	-1.45*
$LnVolatility_{i,t}$	-7.33*	-7.33*	-0.87*	-0.87*	-0.73*	-0.74*	-0.54	-0.62
$LnMarket\ Capitalisation_{i,t}$	8.95*	8.80*	1.04*	1.04*	1.07	1.08	-0.57	2.88
Fixed Effects	Yes	Yes	No	No	Yes	Yes	No	No
Hausman Test	60.59*	60.49*	4.34	5.26	11.32**	22.76	3.94	4.01

Note: Dependent variable: Amihud ratio. The *, **, *** represent statistical significance levels at a 1%, 5%, and 10% respectively.

Table 6. Estimations from the Spread Panel Regressions after Accounting for Benchmark Asset Class

	Equities		Bonds		Commodities		Property	
$Constant$	-0.14**	-0.14**	-3.02*	-3.02*	0.14	0.142	-0.33**	-0.34**
$GSVI(ETF)_t$	-0.001***		-0.003***		-0.001		0.002**	
$GSVI(Exchange\ Traded\ Fund)_t$		-0.002*		-0.000		-0.001		0.001
$LnPrice_{i,t}$	0.03*	0.03*	0.05	0.05	0.07*	0.07*	0.02	0.02
$LnVolume_{i,t}$	-0.00	-0.00	-0.00	-0.00	0.00*	0.002*	0.001*	0.001*
$LnVolatility_{i,t}$	0.002*	0.002*	0.003*	0.003*	0.01*	0.005*	0.004*	0.004*
$LnMarket\ Capitalisation_{i,t}$	-0.01	-0.01	0.11*	0.11*	-0.03	-0.03	0.01	0.01
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman Test	40.06*	40.46*	83.25*	79.35*	63.43*	63.57*	98.94*	99.21*

Note: Dependent variable: High-low spread. The *, **, *** represent statistical significance levels at a 1%, 5%, and 10% respectively.

3.3.2. The Role of COVID-19

The liquidity of financial markets has been significantly influenced by the COVID-19 pandemic (Tiwari, et al., 2022). Accordingly, this section explores the effect of COVID-19 on the role of investor attention. To achieve this, the full sample period is divided into pre- and post-COVID subsamples where the pre-COVID sample varies from 2 January 2018 till 4 March 2020 which is the day before South Africa reported its first case of COVID-19. The post-COVID subsample varies from the date South Africa recorded its first COVID-19 case, that is, 5 March 2020 to 30 December 2022. The results for each subsample are presented in Table 7. The magnitudes and levels of statistical significance suggest that the effect of investor attention on ETF liquidity is greater after South Africa reported its first case of COVID-19. This finding may be attributed to the increase market attention and uncertainty brought about by the COVID-19 pandemic. Smales (2022) mentions that the restrictions imposed as a result of the COVID-19 pandemic also intensified the effect of investor attention on liquidity.

Table 7. Estimations from Panel Regressions after Accounting for COVID-19

	Segment A: Pre-COVID				Segment B: Post-COVID			
	$Amihud_{i,t}$		$S_{i,t}$		$Amihud_{i,t}$		$S_{i,t}$	
$Constant$	-162.32	-10.67	-0.08	-0.06	122.4***	115.4***	-0.50*	-0.49*
$GSVI(ETF)_t$	0.04		-0.002**		0.53		-0.001***	
$GSVI(Exchange$ $Traded\ Fund)_t$		0.53**		-0.002**		0.93*		-0.001*
$LnPrice_{i,t}$	-10.60	-3.85*	0.11*	0.11*	-9.69**	-9.21***	0.04*	0.04*
$LnVolume_{i,t}$	-2.94*	-2.79*	-0.00	-0.00	-4.44*	-4.44*	-0.001**	-0.001**
$LnVolatility_{i,t}$	-3.69*	-3.54*	0.004*	0.004*	-5.51*	-5.52*	0.002*	0.002*
$LnMarket$ $Capitalisation_{i,t}$	10.59***	2.15*	-0.03	-0.03	-0.98	-0.85	0.01	0.01
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HausmanTest	24.08*	28.15*	151.03*	147.98*	46.17*	45.24*	57.39*	54.90*

Note: The *, **, *** represent statistical significance levels at a 1%, 5%, and 10% respectively.

3.3.3. The Role of Global Attention

In the baseline analysis, the GSVI has been restricted to search activity in South Africa. However, in this section, the GSVI captures worldwide search activity relating to "ETF" and "Exchange Traded Fund", thus, representing global investor attention for the ETF market in general. In Equation (7), local investor attention is replaced with global investor attention, and the results are presented in Table 8. The results in Table 8 suggest that global investor attention has an opposing effect on ETF liquidity in South Africa. In particular, global investor attention exhibits a negative effect on $Amihud_{i,t}$ but a negative effect on $S_{i,t}$ which contradicts the findings for local investor attention. Similarly, Yuan, et al. (2022) report that stock returns respond differently to local and non-local investor attention. Overall, the analysis of global investor attention suggests that global investor attention increases the spread of South African ETFs but decreases the Amihud ratio of these funds. Together, these results indicate that investor attention (both local and global) exhibits differential effects on alternative liquidity measures.

Table 8. Estimations from Panel Regressions with Global Investor Attention

	Dependent Variable: $Amihud_{i,t}$		Dependent Variable: $S_{i,t}$	
$Constant$	-65.337***	-65.277***	-0.175*	-0.175*
$GSVI(ETF)_t$	-0.498***		0.006*	
$GSVI(Exchange\ Traded\ Fund)_t$		-0.491***		0.005*
$LnPrice_{i,t}$	-5.591**	-5.601**	0.043*	0.043*
$LnVolume_{i,t}$	-3.627*	-3.626*	0.001**	0.001**
$LnVolatility_{i,t}$	-4.618*	-4.618*	0.003*	0.002*
$LnMarket\ Capitalisation_{i,t}$	5.143**	5.144**	-0.008***	-0.008***
Fixed Effects	Yes	Yes	Yes	Yes
Hausman Test Stat.	43.869*	43.754*	94.133*	94.574*

Note: The *, **, *** represent statistical significance levels at a 1%, 5%, and 10% respectively.

3.3.4. The Role of Time Horizons

According to Pham and Huynh (2020) and Cheng, et al. (2021), the influence of investor attention varies over time whereby the effect is greater in the short run. On this basis, the effect of investor attention on ETF liquidity is explored for weekly and monthly horizons. To compute the weekly Amihud ratio, the daily ratios are averaged over positive trading volume days in the respective week. The weekly high-low spread is computed by averaging the daily spreads over all trading day in the week, however, negative daily spreads are set to zero before computing the average in line with Corwin and Schultz (2012). A similar approach is followed for the monthly computations. Equation (7) is then estimated with weekly and monthly observations and the results are provided in Table 9. The results in Table 9 suggest that investor attention exhibits a weak effect on liquidity over weekly horizons but no significant effect on monthly ETF liquidity. These findings imply that, as the time horizon increases, the effect of investor attention diminishes and is eventually eliminated.

Table 9. Estimations from Panel Regressions after Accounting for COVID-19

	Segment A: Weekly				Segment B: Monthly			
	$Amihud_{i,t}$		$S_{i,t}$		$Amihud_{i,t}$		$S_{i,t}$	
$Constant$	0.74	0.71	-0.00	-6.38E-06	20.24	20.24	0.01	0.01
$GSVI(ETF)_t$	0.03		-0.0003**		-0.13		-0.00	
$GSVI(Exchange\ Traded\ Fund)_t$		-0.04		-0.0003**		-0.11		-0.00
$LnPrice_{i,t}$	-2.24	-2.19	0.00	0.00	0.22	0.20	0.001**	0.001**
$LnVolume_{i,t}$	-0.28***	-0.28***	0.001*	0.001*	-0.10	-0.11	0.001*	0.001*
$LnVolatility_{i,t}$	1.48*	1.49*	0.004*	0.003*	1.08*	1.07*	0.003*	0.004*
$LnMarket\ Capitalisation_{i,t}$	1.14**	1.12**	-4.56E-05	-3.94E-05	-0.67	-0.66	-0.002**	-0.001**
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	No	No
HausmanTest	60.85*	61.31*	11.52**	11.12**	15.42*	15.53*	8.47	9.01

Note: The *, **, *** represent statistical significance levels at a 1%, 5%, and 10% respectively.

4. Conclusion

The popularity of ETFs as investment funds has soared and these funds have gained increasing attention in recent years. One of the primary advantages of these funds is their high liquidity relative to their traditional counterparts. However, the influence of this increasing attention on their liquidity remains unexplored. Therefore, this study investigates the effect of investor attention on ETF liquidity. To achieve this objective, this study surveys JSE-listed ETFs from January 2018 till December 2022 using a panel regression approach. The findings of this study suggest that the effect of investor attention on ETF liquidity depends on the liquidity measure under consideration. In particular, an increase in investor attention increases the price impact but reduces the cost of trading, ultimately, leading to an improvement in ETF liquidity. Further analysis reveals that investor attention has a greater impact on ETFs tracking domestic benchmarks, and impacts only ETFs tracking equities, bonds, and property. The analyses also reveal that the effect of investor attention is only significant in the short-run and is eliminated in the long-run, and these effects have been intensified by the COVID-19 pandemic. On the contrary, global investor attention has an opposing effect on ETF liquidity.

These findings are important for investors investing in ETF markets as well as regulators regulating these markets. In particular, these findings suggest that investors need to consider investor attention as a determinant of ETF liquidity in addition to primary sources of liquidity. Most importantly, investors need to monitor active market-related

attention in order to identify the optimal time to invest (that is, when the market is liquid) and avoid trading in illiquid markets. For policymakers and regulators, these findings suggest that regulators should identify policies to improve liquidity in response to changes in investor attention. One possibility is the introduction of restrictions on bid-ask spreads whereby the spread should not substantially increase (fostering illiquidity) when there is a reduction in attention. A key limitation of this study is its use of only two liquidity measures. Given that liquidity measures are not free of drawbacks, future research can explore the effect of investor attention on market liquidity using alternate liquidity measures. Moreover, this study only considers market-wide investor attention. Further research could explore the effect of ETF-specific attention on the fund's liquidity.

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