

Liquidity and Volatility Effects of Introducing Exchange-traded Funds in the Egyptian Exchange

Mahmoud Otaify

Assistant Professor of Finance, Faculty of International Business & Humanities, Egypt-Japan University of Science and Technology, Alexandria, Egypt

Mahmoud.otaify@ejust.edu.eg

Abstract

This paper tests the effects of introducing the first ETF in the Egyptian exchange. We apply econometric models to examine the effects of daily ETF trading activity on both liquidity and volatility of the benchmarked (EGX30) index over the period 2008 – 2022. The current paper applies a multiple regression model to examine the impact of ETF trading activity on market liquidity and finds that ETF has a weak positive impact. Moreover, it uses the GARCH model to investigate the impact of ETF trading activity on index volatility and documents that ETF has a weak negative impact. We associate the weak relations with the infrequent trading on ETF units. Arguably, this paper suggests three possible explanations for the low ETF trading activity in the Egyptian exchange, including lower expected return on ETF trading, less financial knowledge of investors about ETF characteristics, and less incentive for brokers to encourage investors to invest more in ETF units.

Key words: EGX30 index, EGX30ETF, volume-volatility relation, illiquidity

1. Introduction

Trading volume is usually used as a proxy for information disseminated in the market, and asset prices change accordingly. Consequently, it is important to analyze the trading volume-volatility relationship in asset markets to recognize the market microstructure, operational efficiency, and information dynamics (LIN & SUM, 2015). Basically, daily stock return results from the interaction of two components: an *information component* and a *trading noise component* (Chan and Chan, 1993). The information component reflects a rational evaluation of information revealed on that day, while the trading noise component indicates the investors' overreaction to the activities of other investors in the stock market. The information component is supported by the efficient market hypothesis - variation in stock prices

should be fully justified by fundamentals, and hence deviations from fundamental value create arbitrage opportunities through which these deviations would be removed and bring the stock price to its equilibrium or fundamental value (Uygur & Taş, 2012). On the other hand, Behavior financeⁱ assumes that the arbitrage opportunities will be risky and limited because arbitrageurs would face noise trader risk; that is, the pessimistic behavior of investors may continue and reduce price much more (Barberis and Thaler, 2003). The noise trading hypothesis assumes that volatility is extensively derived by the trading noise component. Moreover, the overreaction of noise investors to the trading activities of other investors can be an increasing function of the number of both trading hours and transactions per trading day. Thus, high trading activity could generate more noise trading which causes large changes in stock prices, that is, greater volatility (Chan and Chan, 1993). The empirical evidence on the direction of relation between trading volume and volatility is mixed, and each has its supporters.

Exchange-Traded Fund (ETF) has several advantages as an investment vehicle, such as lower transaction cost, liquid, transparent, etc. However, investing in ETFs involves risks such as market risk, tracking error and foreign exchange risk. Belton Financial Company launched the first ETF in the Egyptian exchange and in the MENA region to track the performance of the official Egyptian index (EGX30) by replicating the same basket of securities included in the EGX30 index, and it has labeled EGX30ETF, which started trading on January 14, 2015. Belton plays as a market player for the ETF units, where it will buy the units from the seller and sell them to the buyers.ⁱⁱ As ETF is a derived asset from an index, it is expected to have negative or positive effects on this tracked index, such as liquidity and volatility. This paper aims to identify the effect of EGX30 ETF on the volatility of the EGX30 index using daily data of trading volume and index values. The current paper is extended into seven sections; Section 2 analyzes the performance of ETF units, while Section 3 explains the research problem. Section 4 reviews basic theories and empirical evidence on ETF trading activity, while sections 5 and 6 describe the econometric models and their estimation results, and eventually, section 7 presents the paper's conclusion.

2. Trading Performance of Egyptian Exchange-Traded Funds (ETFs)

Figure (1) shows the performance of trading volume of ETF units over the period of 2015 -2022. Typically, there is no trading on ETF units in 951 days (out of 1726 days), representing 55% of the trading days. Thus, ETF units suffer from infrequent trading.

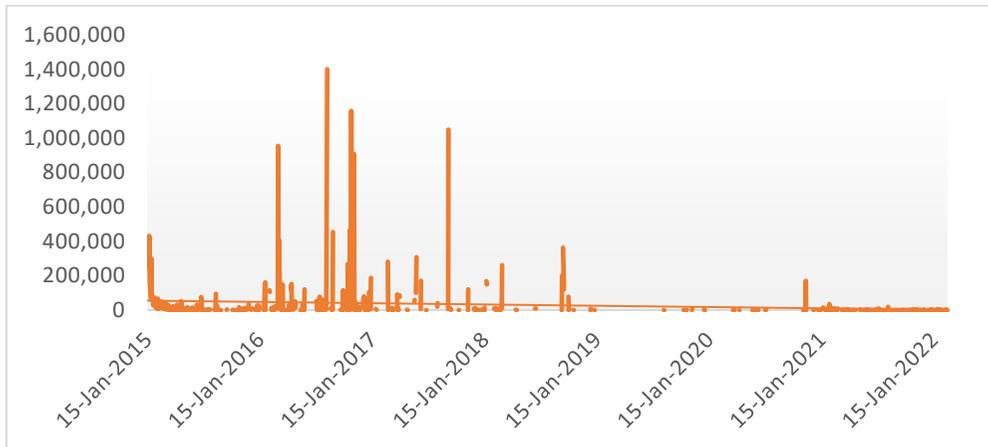


Figure 1: Trading Volume Performance of ETF Units

Figure (2) depicts the price performance of ETF units in comparison to the values of EGX30 index. It reflects a very low tracking error, implying a high opportunity to get a return close to the market return at lower transaction costs. More specifically, investing in ETF units does not require either stock selection or market timing for which professional experience in the stock market is required.

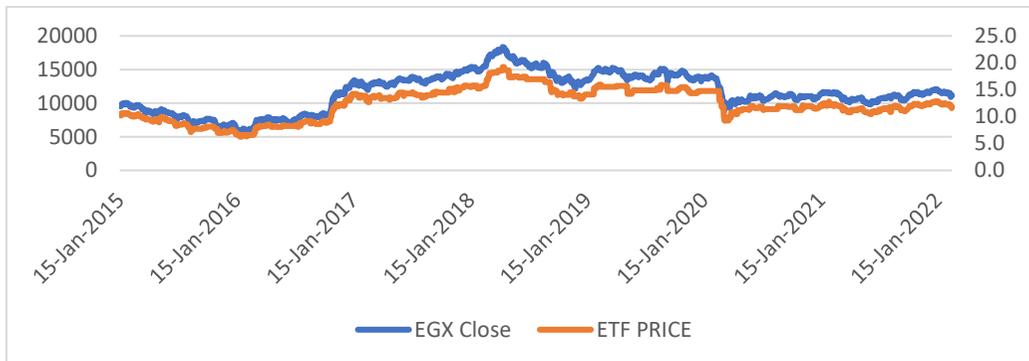


Figure 2: Price Performance of EGX30 Index and ETF Units

Figure (3) depicts the return performance of the EGX30 index and ETF units. EGX30 index has a very low average daily return at 0.03%, and the ETF return is lower at 0.008%, indicating that low expected daily return from investing in both EGX30 and ETF units (as shown in figure 3). This return difference might result from the infrequent trading of ETF units. On the risk side, investing in both EGX30 index and ETF units has a similar risk level where the standard deviation of the daily returns is 1.5%. However, the return on ETFs may deviate from the underlying index (as shown in the figure) due to the illiquidity of ETF trading (Bae & Kim, 2020).

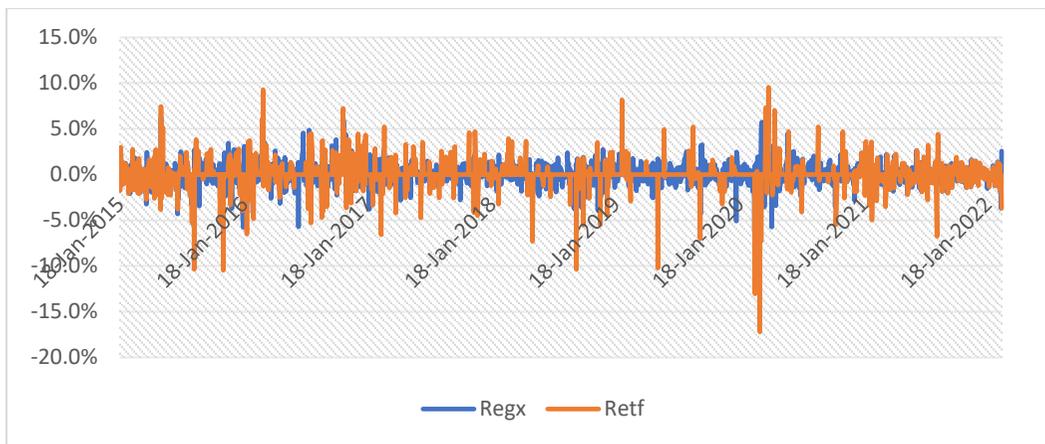


Figure 3: Return Performance of EGX30 Index and ETF Units

3. Research Problem

Capital markets play an important economic role in the financial system as a direct finance route through which business firms and governments can raise funds to finance their expenditures. As these markets become more liquid and larger, as they could perform their economic function more efficiently. In general, emerging stock markets suffer from infrequent trading, less informed participants, a low number of actively traded stocks, and high volatility that eventually decreases market efficiency. Thus, market practitioners and organizers exert efforts to enhance market liquidity by introducing new products, such as Exchange-Traded Funds (ETFs), that could attract new investors to the market. This paper seeks to examine the effect of introducing ETF in the Egyptian stock market on both market liquidity and volatility.

4. Literature Review

The index volume–volatility relation is extensively investigated in different markets, and literature shows different types of relations and assumes explanations to support their findings. The positive volume-volatility relation is supported by two main hypotheses: *Mixture of Distributions Hypothesis* (MDH) and *Sequential Dissemination Hypothesis* (SDH). The former hypothesis suggests that information flows symmetrically to the market where all investors would simultaneously update their buying and selling decisions, resulting in immediate equilibrium in the market. Several studies find strong support for MDH in different markets, for example, Lamoureux and Lastrapes (1990) for the US stock markets, Pyun et al. (2000) for the Korean stock market, Bohl and Henke (2003) for the Polish stock market, Zarraga (2003) for the Spanish stock market. The positive volume-volatility relationship is supported by the *sequential dissemination hypothesis* (SDH), which assumes that information disseminates asymmetrically to the market where each group of informed investors would update their buying and selling decisions until the price reaches its equilibrium (Jennings, Starks, & Fellingham, 1981). SDH implies that as the flow of information to the market increases, the number of transactions sequentially increases, trading volume increases, and stock prices change significantly (Girard & Omran, 2009).

On the other hand, a negative volume-volatility relation is documented in several studies. Starting by Cohen et al. (1976) who attribute the differences in volatility across exchanges to the differences in market depth and trading arrangements. They argue that thin markets with few numbers of traders are more sensitive to demand shocks than thick markets with large number of traders. Regarding the trading arrangements, the authors observed less volatility in exchanges where trades were handled by specialists who were responsible for keeping prices changes small from transaction to transaction while a higher volatility appeared in exchanges where trades were handled by bookkeepers who were recording transactions (Cohen, Walter L. Ness, Okuda, Schwartz, & Whitcomb, 1975). Consistently, Tauchen and Pitts (1983) attribute the negative relationship between trading volume and volatility to the market breadth and depth. In thinner market where lower number of traders, infrequent trading activity, less information will be available, and mispricing (deviations of prices from their fundamentals) takes

longer time to be corrected. Therefore, an increase in number of active traders and trading volume, much information would be available and consequently market transparency would be enhanced, resulting in less volatility (Tauchen & Pitts, 1983). Similarly, Pagano (1989) explored that thick market was able to absorb large transactions or orders without adverse changes in share prices in contrast to in thin market. Moreover, since this absorptive capacity is an increasing function of trading volume, greater liquidity could reduce stock market volatility (Pagano, 1989). Consistently, Bekaert and Harvey (1997) find that ratio of market capitalization to GDP is negatively related with volatility which implies that larger equity market experiences lower volatility (Bekaert & Harvey, 1997). Ferris and Chance (1988) assumed that volatility is a decreasing function of heterogeneity of investors' expectation. This means that as the number of traders in the market increases, their expectations and interpretation of new information are more likely to be heterogeneous. As a result, they will behave in opposite directions and volatility will be less. This implies that high trading volume due to large number of traders with more heterogeneous expectations is negatively associated with volatility of stock market. Conversely, if there were a few numbers of traders in stock market, their expectations would be more homogeneous (Ferris & Chance, 1988). Therefore, the homogeneity of investors' expectations leads to trading in one direction which causes high volatility.

Some studies use trading volume as proxy of investor sentiment and investigate its relationship with volatility. For example, Uygur and Taş (2012) find asymmetric effect of investor sentiment on volatility according to period of investor sentiment. That is, in periods of high sentiment an increase in trading volume, reflecting high participation of noise traders and less focus on the tradeoff between risk and return, leads to greater volatility. Conversely, in periods of low sentiment noise traders concentrate more on the tradeoff between risk and return, thus an increase in trading volume would decrease volatility. Another asymmetric effect of investor sentiment on volatility is obtained by Verma and Verma (2007) when they explored higher (negative) impact of irrational bullish sentiment on volatility than irrational bearish sentiment. Moreover, Verma and Verma observed also that institutional investor sentiment has more effect on volatility than individual

investor sentiment because institutional investors respond differently than individual investors to new information and they also have sufficient market power. Thereby both types of investors differently affect stock price volatility. Furthermore, in period of economic growth, stock market volatility was more sensitive to shifts in investor sentiment than in recession period (Verma and Verma, 2007).

Trading volume of derived investment vehicle such as ETF is expected to have effect on volatility of its tracked index. Theoretically, ETF trading is expected to affect volatility of tracked index due to shock contagion to demand and supply between the two markets (Xu & Yin, 2017). First channel through which the contagion between ETF and index could extend is creation/redemption mechanism where an increase (decrease) in demand for ETF units would induce the authorized participant (AP) to create (redeem) new units by buying (selling) shares of the index constituents with the same weight in the index and swap them with the ETF units at the same value. Therefore, prices of the constituent stocks would fluctuate and total index value changes accordingly. Second channel is the arbitrage opportunities arise from any deviation between net asset value (NAV) of ETF unit and its market price that are exploited by arbitrageurs who would buy or sell ETF units till this deviation is eliminated. Simultaneously, arbitrageurs should hedge against arbitrage risk by taking opposite position through an active trading in the constituent stocks of the index thereby index value would fluctuate (Xu & Yin, 2017).

On the empirical analysis side, there are several studies attempted to investigate the relationship between the ETF trading activity and volatility of tracked index. Using a sample of nine sector ETFs, Krausea, Ehsanib, & Lienb (2014) apply variance decomposition approach to investigate volatility spillover from ETFs to their largest component stocks. They find that positive relationship between the ownership of a stock by ETFs and volatility of stock return. Moreover, they identify five factors affecting the volatility spillover that are positively related to the ETF trading activity including liquidity, ownership of each stock held by ETF, ETF flow of funds, deviations from net asset value (NAV) and ETF size (market capitalization) (Krausea, Ehsanib, & Lienb, 2014). LIN & SUM (2015) apply quantile regression to comparatively examine the volume-volatility relationship in

Taiwan ETF and in Taiwan stock market. They document a positive relationship between Taiwan ETF trading activity and ETF volatility. They attribute this result to two factors: transaction costs and short-sale restrictions that could change the shape of volume-return relationship from asymmetric relationship documented in the Taiwan stock market to the symmetric relationship observed in the Taiwan ETF market (LIN & SUM, 2015). Xu & Yin (2017) apply ordinary least squares as well as generalized autoregressive conditional heteroskedasticity (GARCH) approaches to examine the concurrent relationship between trading volume of S&P 500 ETF and volatility of the underlying index using daily and monthly data. The findings reveal that ETF trading activity either lagged or contemporaneous is significant determinant of index volatility at both daily and monthly frequency (Xu & Yin, 2017). Xu et al. (2020) explore the heterogeneous volume-volatility relations across the Chinese ETF market and the tracked index. They decompose the ETF trades according to three driving forces: private information, investor agreement and liquidity needs. Their findings reveal that ETF trading driven by disagreement among investors with different interpretations for public information (impatient investors to satisfy liquidity needs) could largely (partially) raise volatility of the tracked index but the privately informed ETF trading has less effect on the volatility (Xu, Gao, Shi, & Zhao, 2020).

The volume-volatility relationship has less attention in the Egyptian stock exchange. However, Girard and Omran (2009) apply TGARCH model and document a negative relation between trading volume and stock return volatility of 79 stocks traded on Egyptian exchange. For the ETF market, to our best knowledge, there is no study explicitly investigate the ETF volume – index volatility relationship in the Egyptian exchange. Therefore, this paper seeks to cover this gap in the literature regarding the Egyptian exchange.

5. Methodology

5.1. DATA

Since units of EGX30 ETF are listed and traded on the Egyptian Exchange (EGX) from January 2015 and this paper extends to February 2022, the ETF will be subject to analysis for 7 years. Therefore, the paper would start the empirical analysis from the end of 2008 to account 6 years before the ETF's advent. Notably, the selected time period ends at February 2022 to exclude the exogenous shocks during COVID-19 pandemic. Moreover, this selection is supported by the most recent empirical evidence that conditional volatility of EGX30 index returns is found insignificant during the COVID-19 period (Otaify, 2021). The daily data of EGX index values and the EGX30 ETF price are extracted from the official website of Egyptian Exchange while the daily data of trading volumes are collected from Thomson Reuter database.

5.2. Econometric Models

We use time-series multiple regression model to estimate impact of ETF trading activity on both the market liquidity and volatility. In model (1), we use multiple regression model to examine effect of ETF trading activity in addition to EGX index trading activity.

$$ILLIQ_{EGX} = \alpha_t + \beta_1 RTA_{ETF} + \beta_2 TA_{EGX} \quad (1)$$

We use trading volume of EGX30 index ($EGXv$) as well as trading volume of ETF ($ETFv$) as proxies of trading activities of EGX30 index (TA_{EGX}) and ETF (TA_{ETF}), respectively. We use the ratio of ETF trading volume to EGX30 trading volumeⁱⁱⁱ as a relative ETF trading volume to avoid problem of multicollinearity between $\log ETFv$ and $\log EGXv$.

We follow Xu and Yin (2017) to apply Amihud's (2002) illiquidity formula to derive daily index illiquidity data as follow:

$$ILLIQ_{EGX} = \frac{|R_{EGX}|}{V_{EGX}} \quad (2)$$

Where $ILLIQ_{EGX}$ measures daily illiquidity of EGX30 index. R_{EGX} is absolute value of EGX30 daily return while V_{EGX} is Egyptian pounds volume^{iv} of EGX30 index.

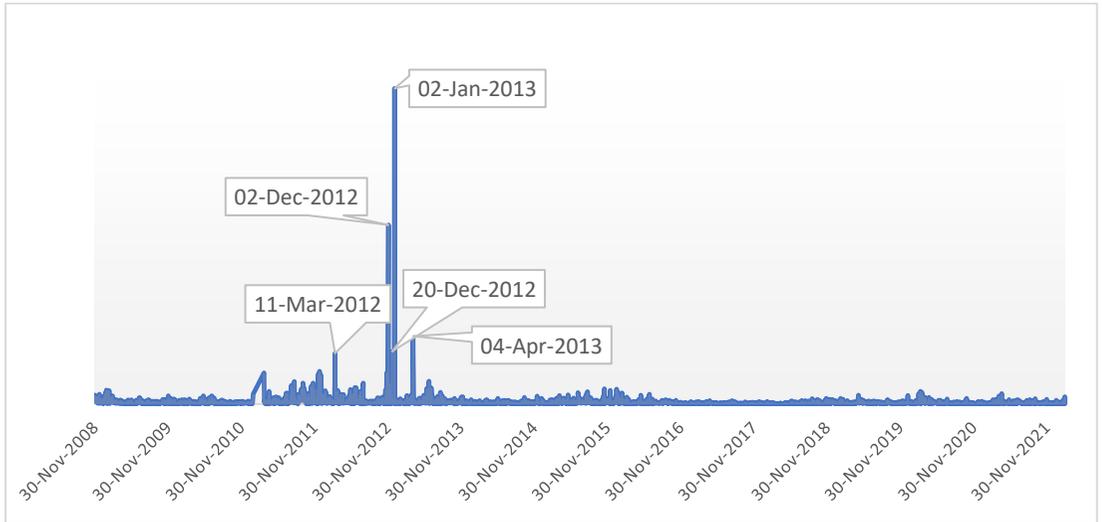


Figure 4: Performance of Estimated Market Illiquidity

Figure (4) shows how the estimated daily illiquidity of EGX30 index changes overtime. As shown, there are five jumps in the illiquidity values over the period of concern. Importantly, all these shifts are due to endogenous shocks and during the period of the political uncertainty after Egyptian revolution in 2011. Thus, the current paper use dummy variable (Shocks) to control the effects of the liquidity endogenous shocks where it takes one on the five days and zero otherwise. Thus, the model extended as follow:

$$ILLIQ_{EGX} = \alpha_t + \beta_1 RTA_{ETF} + \beta_2 TA_{EGX} + \beta_3 Shocks_t \quad (3)$$

We use GARCH (1, 1) model to examine effect of daily ETF trading on conditional volatility of EGX index return. Since volatility model, GARCH, needs estimated daily return, we use the following equation to measure the continuously compounded daily returns of EGX30 index (R_{EGX}):

$$R_{EGX,t} = \ln \left(\frac{INDEX_{EGX,t}}{INDEX_{EGX,t-1}} \right) \times 100 \quad (4)$$

Where $INDEX_{EGX,t}$ denotes the value of EGX index on day t . Notably, this daily return is not adjusted for dividends because the daily fluctuations in stock prices tend to be larger than the amount of dividends distributed over the year on one hand. On the other hand, the only form of return from investing in ETF units is the price return. Thus, it will be more accurate for return comparison purpose to use the traditional $EGX30$ index that measures the price return of its constituents instead of using $EGX30 TR index^v$ that measures total return of its constituents.

The basic version of GARCH model consists of two equations: mean equation and variance equation. In the mean equation, we regress daily return of EGX30 index (R_{EGX}) on its lagged value, so the model is known as the AR (1)-GARCH (1,1) which takes the following empirical setting:

$$R_{EGX,t} = \varphi + \theta R_{EGX,t-1} + \varepsilon_{EGX,t} \quad (5)$$

$$\varepsilon_{EGX,t} | \psi_{t-1} \sim N(0, VOL_{EGX,t})$$

$$VOL_{EGX,t} = \omega + \alpha \varepsilon_{EGX,t-1}^2 + \beta_1 VOL_{EGX,t-1} \quad (6)$$

Equation (5) is the conditional mean equation where the coefficient θ measures the first order serial correlation in the index return, $VOL_{EGX,t}$ is the fitted conditional variance of index return. ψ_{t-1} denotes an extended information set including the history of index returns up to day $t - 1$. The conditional variance equation (6) indicates that the conditional variance of index returns $VOL_{EGX,t}$ is a function of two terms; $\varepsilon_{EGX,t-1}^2$ is the ARCH term and $VOL_{EGX,t-1}$ is the GARCH term. The conditions for non-negative, non-degenerate and covariance stationary are $\omega > 0, 0 < \alpha < 1, 0 \leq \beta < 1$.

To examine effect of both ETF trading activity and EGX30 index trading activity on volatility of EGX30 index, the conditional variance equation (6) is extended as follow:

$$VOL_{EGX,t} = \omega + \alpha \varepsilon_{EGX,t-1}^2 + \beta_1 VOL_{EGX,t-1} + \beta_2 RTA_{ETF} + \beta_3 TA_{EGX} + \beta_4 Pol_t \quad (7)$$

Following Otaify (2021), the paper adds the dummy variable (Pol_t) to capture effect of political uncertainty^{vi} on volatility of EGX30 index returns.

The dummy variable takes one during the period of January 25, 2011 –July 21, 2014, and zero otherwise.

6. Results and Discussion

6.1.Descriptive Statistics

Table (1) presents common descriptive statistics for main variables, EGX30 trading volume and ETF trading volume. Practically, daily trading volume indicates to number of securities traded (bought and sold) in one day. Average daily trading volume of EGX 30 index constituents is 137 million shares during the period 2008, but average number of ETF units that are traded is 13,412 units during the period 2015 – 2022. Remarkedly, ETF trading volume is very low relative to index trading volume where the former does not exceed 1.3% of the latter since the ETF introduction until February 2022 as shown in last column of the table.

Table 1: Descriptive Statistics of Main Variables

	EGX VOLUME (EGX_v)	ETF VOLUME (ETF_v)	Relative Volume (RTV)
Mean	13,700,0000	13412	0.0074%
Median	110,000,000	0	0.0000%
Maximum	1,640,000,000	1400000	1.3416%
Minimum	9,307,110	0	0.0000%
Std. Dev.	106,000,000	78173	0.0448%

Source: Author's calculation by using E-views.

6.2.Stationarity Test

One of the basic pre-estimation tests of time-series analysis is stationarity (unit root) test. Raw financial data such as stock prices and index values have a systematic pattern, so they are non-stationary – have a unit root – at their levels. Table (2) shows results of augmented Dickey–Fuller (ADF) unit root test^{vii} for model variables at level, indicating all variables are stationary at level except EGX30 index value but it is stationary at the first difference. Thereafter, we conduct the regression analysis.

Table 2 Results of augmented Dickey–Fuller unit root test of Variables.

Variable	Level Series			1 st difference	
	1% Critical Value	Test Statistic	P value for Z(t)	Test Statistic	P value for Z(t)
EGX30 index	-3.432212	-1.4927	0.5374	-45.9292	0.0001
<i>EGXv</i>	-3.432214	-8.5902	0.0000		
<i>logEGXv</i>	-3.432214	-7.3653	0.0000		
<i>ILIQ_{EGX}</i>	-3.432225	-5.5966	0.0000		
<i>ETFv</i>	-3.432214	-15.4874	0.0000		
<i>logETFv</i>	-3.432219	-5.5395	0.0000		
<i>RTA</i>	-3.432220	-10.1267	0.0000		

Source: Author's calculation by using E-views.

6.3.Effect of ETF Trading on Illiquidity of EGX30 Index

As expected, EGX trading activity (*logEGXv*) significantly decreases the market illiquidity, but the ETF trading volume has a weak impact on the market illiquidity due to the low weight of ETF activity relative to index trading activity (*RTV*). The market illiquidity increased significantly as response to the endogenous shocks. Despite the estimated model could explain 53% of variation in market illiquidity, the degree of effects of independent variables are slightly small, indicating to the presence of noise trading in the Egyptian market.

Table 3: Results of Regression Model for ETF Activity's Impact on Index Liquidity

Dependent Variable: ILIQEGX					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
C	2.97E-10	0.0000	13.9810	0.0000	
LogEGXv	-3.36E-11	0.0000	-4.1269	0.0000	
RTV	-1.80E-09	0.0000	-0.1856	0.8528	
SHOCKS	1.59E-09	0.0000	652.562	0.0000	
AR(1)	0.079116	0.0086	10.7366	0.0000	
R-squared	0.532361	F-statistic	724.25		
Adjusted R-squared	0.531626	Prob(F-statistic)	0.0000		
Durbin-Watson stat	2.015256				

*Indicates significant at 1% level. Source: Author's calculation by using E-views.

6.4. Post-Estimation Tests

The Durbin- Watson (DW) statistic of the original regression model is 1.81, that is lower than 2, indicating presence of serial correlation. Thus, the paper adds autoregressive variable of order one (AR (1)) to correct the serial correlation as shown in regression results in table (3), Durbin- Watson statistic becomes 2.02, indicating that there is no serial correlation in the error term, so there is no evidence of a serious problem in the model misspecification. The paper uses Variance Inflation Factors (VIFs) to measure the level of collinearity between the independent variables. All VIF values for independent variables are less than 10, so there is no multicollinearity problem (as shown in table 4).

Table 4: Multicollinearity test: Variance Inflation Factors

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.74E-21	1343.517	NA
LOGEGXV	2.86E-23	1427.231	1.592952
RTV	1.78E-16	1.015688	1.013495
Shocks	8.35E-24	5.327432	1.588664
AR(1)	0.000106	1.032996	1.027134

Source: Author's calculation by using E-views.

The paper uses ARCH-LM test of heteroskedasticity, and the probability value is insignificant, so the null hypothesis - there is no ARCH effect in the residuals - is not rejected, indicating that residuals are homogeneous, indicating that the estimated model is reliable (as reported in table 5).

Table 5: Heteroskedasticity Test: ARCH

F-statistic	0.028188	Prob. F(1,3184)	0.8667
Obs*R-squared	0.028205	Prob. Chi-Square(1)	0.8666

Source: Author's calculation by using E-views.

6.5. Estimating Effect of ETF Trading on Volatility of EGX30 Index

The current paper conducts Ljung-Box Q^2 test^{viii} to examine if the EGX30 index return has serial correlation (H_0) or not (H_1) by regressing the index return on a constant and one-period lagged value. The results (reported in appendix 1) could reject the null hypothesis at 1%, indicating that EGX30 index return has no serial correlation. For testing presence of “ARCH effects”, the paper uses a Lagrange multiplier test (ARCH-LM) of Engle (1982) to examine heteroscedasticity for EGX30 index return series. In ARCH-LM test, we regress the squared residuals on a constant and 10 period lagged values of index return and results could reject the null hypothesis of no ARCH effects at 1%. Thereafter, we can use GARCH model to estimate the response of EGX30 index volatility to ETF trading activity.

Table 6 Results of ARCH-LM Test

	EGX30 Index Return (R_{EGX})
F-statistic (Prob.)	2.4097 (0.0075)
Obs*R-squared (Prof. Chi-Square(10))	24.0063 (0.0076)

Source: Author's calculation by using E-views.

6.6. Estimation Results of Volatility Model

Table (5) presents results of GARCH (1, 1) model. Consistent with volatility modelling studies on EGX 30 index (Otaify, 2021), both ARCH (α) and GARCH (β) effects are positive and significant at 1% level of significance. Thus, volatility persistence, measured as ($\alpha + \beta = 0.95$) approaches to one, indicating that volatility persists for long time till disappear.

We examine both effect of ETF trading activity ($LogETF_v$) and relative trading volume, RTV (as alternative variable of ETF activity) on volatility of EGX30 index return with considering the effect of political uncertainty period. In contradiction with the empirical findings of Lin and Sum (2015) and Xu, Gao, Shi, & Zhao (2020), we find that trading activity of EGX30 has a negative significant explanatory power of the index volatility, but the ETF activity has insignificant effect on the index volatility. Consistent with Otaify

(2021), the conditional volatility of EGX index returns increases significantly (at 10% level) during the period of political uncertainty post the January revolution.

Table 7: Estimation Results of Volatility Model

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.000526	0.00022	2.391458	0.017
REGX(-1)	0.200288	0.020015	10.0071	0.000
Variance Equation				
C	6.46E-05	1.82E-05	3.547529	0.0004
RESID(-1)^2	0.161933	0.011153	14.51963	0.0000
GARCH(-1)	0.785822	0.012483	62.94919	0.0000
LOGEGXV	-6.53E-06	2.21E-06	-2.958206	0.0031
RTV	-0.003207	0.003857	-0.831548	0.4057
POL	2.57E-06	1.49E-06	1.721605	0.0851
R-squared	0.040417			
Adjusted R-squared	0.040115			
Durbin-Watson stat	1.97944			

*, ** and *** indicate to significance level of 1%, 5% and 10% respectively. Source: Author's calculation by using E-views

The paper checks if there is remaining of ARCH effects by conducting ARCH-LM test on the standardized residuals. Table (8) reports the result of ARCH-LM test that does not reject the hypothesis of no ARCH effects, so there is no evidence of heteroskedasticity is found.

Table 8: ARCH-LM Test for Heteroskedasticity

F-statistic	0.505522	Prob. F(1,3183)	0.4771
Obs*R-squared	0.505760	Prob. Chi-Square(1)	0.4770

Source: Author's calculation by using E-views

Figure 5: Conditional Standard Deviation

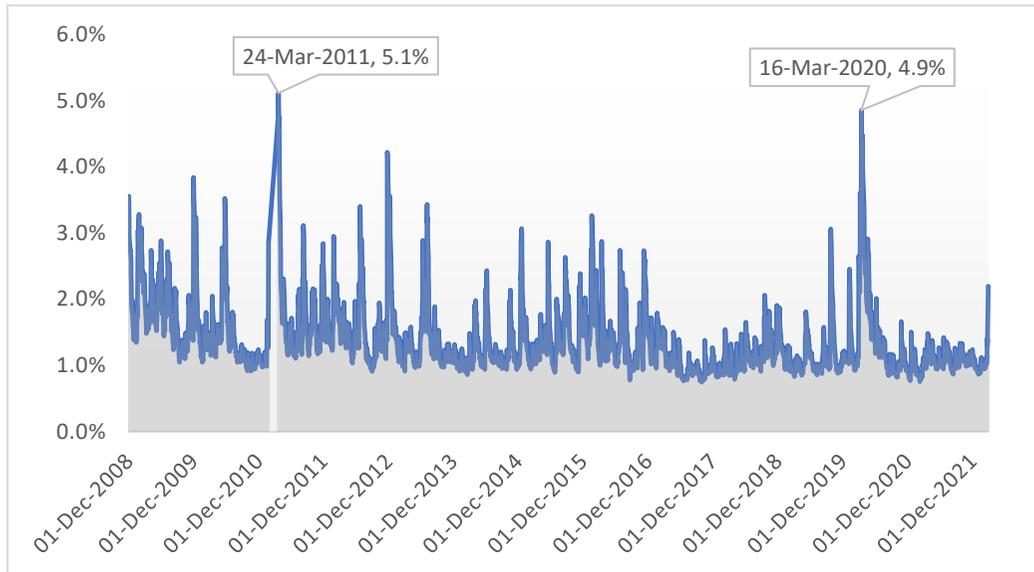


Figure (5) depicts the conditional standard deviation of the estimated model. It presents the well known volatility characteristics of financial data; volatility clustering and persistence. The highest values are reported on March 24 , 2011 when the trading on EGX released after closing for 2 months after January revolution. The second jump in volatility is recorded on March 16, 2020 when impact of covid-19 outspreads in Egypt.

Consistent with Girard and Omran (2009), we find strong evidence on negative relationship between EGX index trading volume and volatility of its returns which contradicts with assumptions of *Mixture of Distributions Hypothesis* (MDH) and *Sequential Dissemination Hypothesis* (SDH). On the other hand, the negative volume-volatility relationship is supported by assumption of market size (Tauchen & Pitts, 1983; Pagano, 1989; Bekaert and Harvey, 1997) and heterogeneity of investors' expectation (Ferris and Chance,1988).

7. Conclusion

In 2015, Egyptian exchange (EGX) and Belton Holding company as market maker introduced the first Exchange-Traded Fund (ETF) in Egypt and in MENA region to attract new investors to the market. However, the ETF trading (relative to EGX30 index trading) still relatively since its inception. This paper examines effects of launching the first ETF in the Egyptian exchange on both liquidity and volatility of the tracked index. We use daily trading data of EGX 30 index and EGX30ETF over the period 2008 – 2022. We find week positive and negative impacts of ETF trading activity on liquidity and volatility of EGX30 index, respectively. The weak negative ETF volume – index volatility relation contradicts most empirical evidence on other ETFs in different markets. The current paper argues that ETF trading activity has a weak effect on liquidity and volatility of benchmark index due to its infrequent trading.

The paper could suggest some reasons that may contribute to the low ETF trading activity. *Firstly*, low ETF trading activity backs to less expected price returns from investing in ETFs. *Secondly*, many investors or even traders know less information about ETF characteristics and advantages. *Thirdly*, one of the most advantages of ETF investing is to decrease transaction costs when investor could buy only one (ETF) share instead of investing in 30 stocks. Typically, the transaction costs or brokerage commissions in developing markets such as Egypt are the main source of revenues to the brokerage firms, thus the traders/portfolio managers tend to encourage their clients (investors) to invest in individual stocks rather than the ETF to increase the commission on trading execution to the brokerage firm and the commission to the traders accordingly. Nonetheless, these suggestions are subject to more investigation in future research. Moreover, the current study could be extended to examine effects of introducing ETF on the price discovery.

This paper provides policy implications to market practitioners and regulators. *Firstly*, delivering training course about ETFs to traders and brokers to be highly educated about the ETF's characteristics and suitability to retail investors whose less money and experience. *Secondly*, increasing financial literacy for retail investors and university students about advantages of ETF investing that may encourage them to invest in the ETF.

Notes

ⁱ Behavior finance depends on irrational behavior of investors to explain variation in stock prices that cannot be justified by fundamentals (Wei and Zhang, 2006).

ⁱⁱ For more information about the EGX30ETF, you can visit its website; <http://egx30etf.com>.

ⁱⁱⁱ The trading volume EGX30 index is constructed by the weighted average of trading volumes of all EGX30 constituents

^{iv} Egyptian Pounds volume or total value traded is calculated as share price times number of shares traded

^v The Egyptian exchange launched total return (price change plus dividends allocated) version of EGX30 index, known as "EGX30 TR" index on 22nd of August 2019.

^{vi} Egyptian market regulators impose precautionary procedures to open trading after closure for more than 50 days due to 25 January revolution

^{vii} The null hypothesis of ADF test is that series has a unit root, indicating the non-stationarity of the series.

^{viii} We firstly applied Ljung-Box Q test but the results appear mixed, so we conducted a more powerful serial correlation test, Ljung-Box Q² test.

References

- Bae, K., & Kim, D. (2020). Liquidity risk and exchange-traded fund returns, variances, and tracking errors. *Journal of Financial Economics*, 138(1), 222-253.
- Bekaert, G., & Harvey, C. R. (1997). Emerging equity market volatility. *Journal of Financial Economics*, 43(1), 29-77.
- Cohen, K. J., Walter L. Ness, J., Okuda, H., Schwartz, R. A., & Whitcomb, D. K. (1975). The Determinants of Common Stock Returns Volatility: An International Comparison. *The Journal of Finance*, 31(2), 733-740.
- Cornelius, P. K. (1993). A note on the informational efficiency of emerging stock markets. *Review of World Economics*, 129(4), 820-828.
- Ferris, S. P., & Chance, D. M. (1988). Margin Requirements and Stock Market Volatility. *Economics Letters*, 28(3), 251-254.
- Girard, E., & Omran, M. (2009). On The Relationship between Trading Volume and Stock Price. *International Journal of Managerial Finance*, 5(1), 110 - 134.
- Jennings, R. H., Starks, L. T., & Fellingham, J. C. (1981). An Equilibrium Model of Asset Trading with Sequential Information Arrival. *The Journal of Finance*, 36(1), 143-161.
- Krausea, T., Ehsanib, S., & Lienb, D. (2014). Exchange-traded funds, Liquidity and Volatility. *Applied Financial Economics*, 24(24), 1617–1630.
- Lee, W. Y., Jiang, C. X., & Indro, D. C. (2002). Stock market volatility, excess returns, and the role of investor sentiment. *Journal of Banking & Finance*, 26, 2277–2299.
- LIN, J.-C., & SUM, V. (2015). A Comparative Analysis on the Volume-Return Relationship of the Exchange-Traded Fund and the Stock Market. *THE JOURNAL OF TRADING*, 5-22.
- Otaify, M. (2021). Environmental, Social, and Governance (ESG) Investing: Risk and Return Analysis of Egyptian Sustainable Equity Index. *Financial & Commercial Studies Journal*, 31(1), 1-23.
- Pagano, M. (1989). Endogenous Market Thinness and Stock Price Volatility. *Review of Economic Studies*, 56, 269-288.
- Tauchén, G. E., & Pitts, M. (1983). The Price Variability-Volume Relationship on Speculative Markets. *Econometrica*, 51(2), 485-505.

-
- Verma, R., & Verma, P. (2007). Noise trading and stock market volatility. *Journal of Multinational Financial Management*, 17, 231-243.
- Xu, L., & Yin, X. (2017). Exchange Traded Funds and Stock Market Volatility. *International Review of Finance*, 17(4), 525-560.
- Xu, L., Gao, H., Shi, Y., & Zhao, Y. (2020). The heterogeneous volume-volatility relations in the exchange-traded fund market: Evidence from China. *Economic Modelling*, 80, 400-408.