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# SINGLE-STOCK FUTURES AND THE SPOT VOLATILITY: AN EVENT STUDY IN BORSA ISTANBUL

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**ABSTRACT**

This study investigates the impact of the introduction of Single-Stock Futures (SSFs) on stock volatility and trading volume in Türkiye's Borsa Istanbul. Utilizing an event study methodology with the Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model, it examines 43 stocks listed on Borsa Istanbul with corresponding futures contracts on the VIOP exchange. The results show that introducing SSFs correlates with increased market volatility and trading activity, challenging the traditional market stability theory associated with derivatives. This study contributes significantly to the literature on financial derivatives in emerging markets, highlighting the dynamics and implications of SSFs on underlying stock behavior, and provides insights for investors, fund managers, and policymakers in assessing the impact of derivative trading on market dynamics.

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# TEK HİSSE SENEDİ VADELİ İŞLEMLERİ VE SPOT VOLATİLİTE: BORSA İSTANBUL'DA BİR OLAY ARAŞTIRMASI

MAKALE BİLGİSİ

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Türev Piyasalar, Tek Hisse Senedi Vadeli İşlemleri, Anormal Volatilite, Anormal Hacim, Olay Çalışması

**ÖZ**

Bu çalışma, Tek Hisse Senedi Vadeli İşlem Sözleşmelerinin (SSF'ler) uygulamaya konmasının Türkiye'nin Borsa İstanbul'unda hisse senedi oynaklığı ve işlem hacmi üzerindeki etkisini araştırmaktadır. Üstel Genelleştirilmiş Otoregresif Koşullu Değişken Varyans (EGARCH) modeli ile olay çalışması metodolojisi kullanan bu çalışmada, Borsa İstanbul'da işlem gören 43 hisse senedini VİOP borsasındaki ilgili vadeli işlem sözleşmeleri incelenmiştir. Sonuçlar, SSF'lerin uygulamaya konulmasının artan piyasa oynaklığı ve ticaret faaliyeti ile ilişkili olduğunu ve türevlerle ilgili geleneksel piyasa istikrarı teorisine meydan okuduğunu göstermektedir. Bu çalışma, SSF'lerin temel hisse senedi davranışları üzerindeki dinamiklerini ve etkilerini vurgulayarak, gelişmekte olan piyasalardaki finansal türevler literatürüne önemli ölçüde katkıda bulunmakta ve türev ticaretinin piyasa dinamikleri üzerindeki etkisini değerlendirme konusunda yatırımcılara, fon yöneticilerine ve politika yapıcılara iç görüler sunmaktadır.

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## 1. Introduction

Since the introduction of futures markets, there has been much discussion regarding how futures trading affects the volatility of spot markets. However, the literature has not reached a clear consensus on the issue. Several studies advocate that futures trading increases spot market volatility (Truong et al., 2021; Dong & Feng, 2018; Pok & Poshakwale, 2004). According to researchers, leverage and uninformed speculation in futures markets are the main reasons for the destabilization of spot markets; arbitrage trading can also create additional trading activity and increase volatility.

In contrast, other studies have presented that introducing futures markets stabilizes spot markets or has no significant effect (Ausloos et al., 2020; Kasman & Kasman, 2008; Dennis & Sim, 1999). The reasons for the stabilization presented by some scholars are hedging activities and the price discovery function of futures markets. Hedging reduces the exposure to price movements in the underlying asset, while price discovery improves market efficiency and reduces information asymmetry.

While there is a significant amount of research on the association of derivatives trading and spot market volatility for broad market indices and other futures contracts in well-established and highly liquid markets, limited research analyzes the impact of futures trading on individual stocks, particularly in emerging markets (Dennis & Sim, 1999; Kumar & Tse, 2009; Malik & Shah, 2017; Mutlu & Arık, 2015). Dennis & Sim (1999) state that examining individual share futures is essential because they are more likely to face asymmetric information than an index and are more prone to thin trading problems. In addition, futures markets may be more prominent in price discovery than cash markets. Thus, individual share futures offer an exciting context to study the effects of financial futures on cash market volatility. Furthermore, the existing studies focus on the price discovery function of single-stock futures (SSFs) rather than volatility impact. SSFs are futures contracts that pertain to individual stocks. They are standardized tradable contracts that require the owner to trade a specific stock on an agreed date at an agreed price. Like other futures contracts, SSFs have various applications, including serving as a replacement for equities in investments or speculation, functioning as a means of leveraging for hedging or speculation or aiding in determining prices for underlying stocks.

Emerging markets have been a topic of significant interest among investors due to their high return possibilities and diversification benefits. However, the investors' interest in these markets is often accompanied by concerns about their excessive volatility. The instability in emerging markets is primarily attributed to limited liquidity, political and economic instability, currency fluctuations, and other country-specific factors. This study contributes to the existing literature by providing empirical evidence on the effects of Single-Stock Futures (SSFs) on the volatility of underlying stocks in the emerging stock market of Türkiye.

Turkish Derivatives Exchange (TurkDex) is Türkiye's first derivatives trading exchange. It was established in 2001, and the first transaction occurred on February 4, 2005. Since 2012, TurkDex has continued its operations as the "Derivatives Market (VIOP)" under Borsa Istanbul, the seventh biggest futures exchange in the world, with a yearly volume close to $3 billion and 20 million open interests as of December 2022[1]. Although other contracts, such as equity index and currency futures, can be traded in TurkDex since 2005, individual share futures were introduced on December 21, 2012. Initially, only eight individual shares were traded, and the volume constituted a tiny fraction of the total volume in the futures market of Borsa Istanbul. However, that number increased to forty-six shares, constituting approximately %57 of the transaction volume as of December 2022. A few studies were

[1] www.fia.org

conducted on the effects of Single-Stock Futures (SSFs) on the volatility of underlying stocks (Baklaci & Tutek, 2006; Çağlayan, 2011; Kasman & Kasman, 2008; Tokat & Tokat, 2010), but to the best of our knowledge, no study evaluates the impact of single-stock futures on the underlying stock's spot market volatility. Therefore, this study adds empirical evidence to the literature that is expected to serve as helpful information for investors. Moreover, the findings present an opportunity for policymakers to leverage these results, fostering enhanced risk management frameworks and formulating regulations that support the progressive development of the stock market.

This research offers valuable insights into Türkiye's emerging market, which exhibits distinct characteristics in terms of development, liquidity, institutional framework, and regulatory environment compared to developed markets. The scarcity of comprehensive studies on Single-Stock Futures (SSFs) and their potential influence on the spot market volatility of individual stocks in Borsa Istanbul underscores the importance of this study. The increasing sensitivity of Turkish stocks to global shifts makes this investigation particularly pertinent. This study distinguishes it from prior research on the Turkish market in several key respects. Primarily, it shifts focus from the aggregate market index's volatility, the traditional focus of previous studies, to a more granular examination of individual stock futures. As far as we know, this is the first study to analyze individual stock futures. Second, it is the first to apply event study methodologies to these financial instruments within the Turkish context, providing a new approach to analyzing their market impact. Third, unlike previous research that often did not consider trading volume, this study incorporates it, thereby broadening the scope of the analysis to include not just price movements but also changes in market activity. This inclusion allows for a more complete assessment of the implications of stock futures on market dynamics.

This study employs an event study methodology to examine the impact of introducing Single-Stock Futures (SSFs) on the volatility and trading volume of stocks in Borsa Istanbul. Findings suggest that SSF introductions correlate with increased market volatility and trading volume, highlighting the significant influence of derivatives on market behavior, which bears implications for risk management strategies and regulatory frameworks.

The study is structured as follows: Chapter 2 summarizes the relevant literature. Chapter 3 outlines the methodology and data utilized in the research. Finally, Chapter 4 presents the results obtained and concludes.

## 2. Literature Review

The relationship between futures trading and spot market volatility remains a significant topic in financial economics due to its implications for investors, traders, and policymakers. Over the years, research in this area has produced a variety of conclusions without reaching a definitive consensus on how futures trading influences the volatility of underlying assets. This body of literature can broadly be categorized into three groups: those suggesting a positive impact of futures trading on volatility, those indicating a negative or stabilizing effect, and studies presenting mixed or negligible results.

The relevant literature reporting that volatility in spot markets increased after the introduction of transactions in the derivatives markets includes Dong & Feng (2018), Gürbüz & Şahbaz (2022), Pok & Poshakwale (2004), and Truong et al. (2021). The study Pok & Poshakwale (2004) examines the influence of futures trading on market volatility in Malaysia, revealing increased volatility in the spot market following the introduction of futures trading. Their analysis considers both underlying and non-underlying stocks. However, their research indicates a disparity in how futures trading impacts volatility between underlying and non-underlying stocks, with underlying stocks reacting swiftly to current events. In contrast, past

events influence non-underlying stocks more. Dong & Feng (2018) examine the volatility impact of China's first index futures on the CSI 300 index and find that intraday speculation exacerbates spot market volatility. In a recent paper, Truong et al. (2021) study how index futures trading affects the stock market's volatility in Vietnam. Employing the EGARCH model to account for the asymmetric effect, the findings show that introducing future index trading increases the spot market volatility. In most studies that conclude derivatives transactions increase volatility in spot markets, the result is attributed to excessive speculation and inexperienced investors.

On the contrary, some studies argue that trading in futures markets decreases volatility in spot markets due to the increased market efficiency and flow of information from the futures markets to the spot markets market. These results have been reported by various authors such as Ausloos et al. (2020), Baklaci & Tutek (2006), Çağlayan (2011), Drimbetas et al. (2007), and Kasman & Kasman (2008). For example, Ausloos et al. (2020) aim to investigate the impact of futures contracts on spot price fluctuations by utilizing the TGARCH model for the CSI 300 index. Their findings indicate that the introduction of CSI 300 stock index futures has a positive effect in reducing spot market volatility. In another paper, (Drimbetas et al., 2007) assert that futures contracts decreased spot market volatility and increased the efficiency of the Greek stock market. To put it differently, introducing derivatives leads to a more stable market as it facilitates the rapid flow of information, attracts informed speculators to the market, and allows for risk transfer to professional speculators through its hedging function.

Under the category of studies indicating a mixed or insignificant impact, the works of Edwards (1988a, b) show a decline in volatility after introducing futures for the S&P 500, whereas no substantial difference was observed for the Value Line Index. Extending the sample to other countries, Yu (2001) examines the markets of France, Japan, Australia, the UK, Hong Kong, and the US and reports mixed results on the impact of futures introduction on spot volatility. Finally, in addition to developed markets, Spyrou (2005) indicates that the introduction of futures trading does not impact the volatility of the underlying market for an emerging market, Greece.

Regarding the Turkish stock market, limited papers study the impact of futures introduction on spot market volatility, and these studies solely concentrate on the indices. For example, Baklaci & Tutek (2006) use the Istanbul Stock Exchange 30 (ISE 30) Index Futures to examine its impact on spot volatility. Their study indicates that introducing the futures market reduces the volatility in the underlying spot market, resulting in improved efficiency. In the same vein, Kasman & Kasman (2008) employ an EGARCH model to examine the impact of the futures market on spot market volatility. Their findings provide evidence that the futures market has a stabilizing effect on spot market volatility. In a subsequent paper, Çağlayan (2011) employs symmetric and asymmetric conditional-volatility models to investigate the influence of index futures on spot-market volatility in the Turkish Stock Exchange using the ISE30 index. The data was split into pre-futures and post-futures periods, revealing that GARCH (1,1) and EGARCH (1,1) models were influential in their respective periods. Introducing stock index futures resulted in quicker information incorporation into spot market prices, reduced volatility and persistence, and varied responses to the news. However, unlike other studies, Gürbüz & Şahbaz (2022) argue that transactions in the index futures market increase the volatility of the spot market. Thus, it is crucial to educate inexperienced investors about derivatives markets, and there is needs to deepen the financial markets in Türkiye.

In summary, the research on the impact of futures trading on spot market volatility presents diverse findings; some studies report a positive effect, some report a negative impact, and others document a mixed or no impact. Moreover, the exact effect of futures trading on spot market volatility may depend on several factors, such as the type of futures contract being

traded, the market structure, and the regulatory environment. Overall, the impact of stock futures on spot volatility likely depends on various factors, including the level of liquidity in the futures market, the degree of hedging activity, and the underlying economic and market conditions. Thus, further research is needed to understand better the relationship between futures trading and spot market volatility in different markets and contexts.

## 3. Data and Methodology

### 3.1. Data

In this study, we use the stocks listed on the Borsa Istanbul and have a futures contract traded on the VIOP exchange. Futures contracts for 48 individual stocks in Borsa Istanbul are actively traded in VIOP. However, due to the insufficiency of adequate data for four of these stocks in the estimation window and missing values in another, the remaining sample has been constructed to include 43 stocks. The data for each stock includes daily closing prices adjusted for dividends and daily trading volume. The dataset spans various periods depending on each stock's introduction of the futures contract. The introduction dates of futures trading and the descriptive statistics for each stock's return in the analysis period are presented in Table 1 and 2, respectively.

**Table 1.** Firms in the sample

| No. | Symbol | Firm Name | SSF Introduction Date |
|---|---|---|---|
| 1 | AEFES | Anadolu Efes Biracılık ve Malt Sanayii A.Ş. | 22-Apr-21 |
| 2 | AKBNK | Akbank T.A.Ş. | 21-Dec-12 |
| 3 | AKSEN | Aksa Enerji Üretim A.Ş. | 1-Nov-22 |
| 4 | ARCLK | Arçelik A.Ş. | 17-Feb-16 |
| 5 | ASELS | Aselsan A.Ş. | 14-Dec-18 |
| 6 | BIMAS | BİM Birleşik Mağazalar A.Ş. | 14-Dec-18 |
| 7 | DOHOL | Doğan Holding A.Ş. | 14-Dec-18 |
| 8 | ECILC | Eczacıbaşı İlaç, Sınai ve Finansal Yatırımlar Sanayi ve Ticaret A.Ş. | 22-Apr-21 |
| 9 | EKGYO | Emlak Konut Gayrimenkul Yatırım Ortaklığı A.Ş. | 11-Feb-16 |
| 10 | EREGL | Ereğli Demir ve Çelik Fabrikaları T.A.Ş. | 21-Dec-12 |
| 11 | FROTO | Ford Otomotiv Sanayi A.Ş. | 15-Nov-19 |
| 12 | GUBRF | Gübre Fabrikaları T.A.Ş. | 16-Oct-20 |
| 13 | HEKTS | Hektaş Ticaret T.A.Ş. | 22-Apr-21 |
| 14 | SAHOL | H.Ö. Sabancı Holding A.Ş. | 28-Dec-12 |
| 15 | ISGYO | İş Gayrimenkul Yatırım Ortaklığı A.Ş. | 22-Apr-21 |
| 16 | KRDMD | Kardemir Karabük Demir Çelik Sanayi ve Ticaret A.Ş. | 16-Feb-16 |
| 17 | KARSN | Karsan Otomotiv Sanayii ve Ticaret A.Ş. | 22-Apr-21 |
| 18 | KCHOL | Koç Holding A.Ş. | 11-Feb-16 |
| 19 | KOZAA | Koza Anadolu Metal Madencilik A.Ş. | 14-Dec-18 |
| 20 | KOZAL | Koza Altın İşletmeleri A.Ş. | 14-Dec-18 |
| 21 | MGROS | Migros Ticaret A.Ş. | 15-Nov-19 |
| 22 | ODAS | Odaş Elektrik Üretim Sanayi Ticaret A.Ş. | 22-Apr-21 |
| 23 | OYAKC | Oyak Çimento Fabrikaları A.Ş. | 16-Oct-20 |
| 24 | PGSUS | Pegasus Hava Taşımacılığı A.Ş. | 5-Apr-16 |
| 25 | PETKM | Petkim Petrokimya Holding A.Ş. | 12-Feb-16 |
| 26 | SASA | Sasa Polyester Sanayi A.Ş. | 15-Nov-19 |
| 27 | SKBNK | Şekerbank T.A.Ş. | 22-Apr-21 |
| 28 | GARAN | T. Garanti Bankası A.Ş | 21-Dec-12 |
| 29 | ISCTR | T. İş Bankası A.Ş | 21-Dec-12 |
| 30 | TOASO | Tofaş Türk Otomobil Fabrikası A.Ş. | 17-Feb-16 |
| 31 | TRGYO | Torunlar Gayrimenkul Yatırım Ortaklığı A.Ş. | 22-Apr-21 |
| 32 | TUPRS | Tüpraş Türkiye Petrol Rafinerileri A.Ş. | 24-Dec-12 |
| 33 | THYAO | Türk Hava Yolları A.O. | 21-Dec-12 |
| 34 | TTKOM | Türk Telekomünikasyon A.Ş. | 3-Mar-16 |
| 35 | TCELL | Turkcell İletişim Hizmetleri A.Ş. | 21-Dec-12 |
| 36 | HALKB | Türkiye Halk Bankası A.Ş. | 11-Feb-16 |
| 37 | TSKB | Türkiye Sınai Kalkınma Bankası A.Ş. | 15-Nov-19 |
| 38 | SISE | Türkiye Şişe ve Cam Fabrikaları A.Ş. | 16-Feb-16 |
| 39 | TAVHL | TAV Havalimanları A.Ş. | 14-Dec-18 |
| 40 | TKFEN | Tekfen Holding A.Ş. | 14-Dec-18 |
| 41 | VAKBN | Türkiye Vakıflar Bankası T.A.O. | 21-Dec-12 |
| 42 | VESTL | Vestel Elektronik Sanayi ve Ticaret A.Ş. | 16-Oct-20 |
| 43 | YKBNK | Yapı ve Kredi Bankası A.Ş. | 21-Dec-12 |

*Source:* Borsa Istanbul

*Note:* Table 1 provides an overview of the 43 firms listed in Borsa Istanbul analyzed in this study, detailing each firm's symbol, name, and the introduction date of their Single Stock Futures (SSFs) in VIOP. The dates range from December 2012 to November 2022.

**Table 2.** Descriptive Statistics

| Firm | Mean | Median | SD | Skewness | Kurtosis | J-B (p-value) |
|---|---|---|---|---|---|---|
| AEFES | 0.001406 | 0.003436 | 0.021806 | -0.580272 | 1.424850 | .000001 |
| AKBNK | 0.001337 | 0.000000 | 0.015680 | -0.121600 | 1.221949 | .001711 |
| AKSEN | 0.007257 | 0.003086 | 0.029109 | 0.248313 | 0.919628 | .013248 |
| ARCLK | 0.001324 | 0.000000 | 0.019275 | 0.256991 | 1.208102 | .000817 |
| ASELS | -0.001237 | 0.000000 | 0.023827 | -0.206869 | 1.844617 | .000000 |
| BIMAS | 0.000992 | 0.000000 | 0.016338 | 0.651640 | 1.690593 | .000000 |
| DOHOL | -0.001561 | 0.000000 | 0.028696 | 0.016302 | 3.675178 | .000000 |
| ECILC | 0.000671 | 0.001301 | 0.025367 | -0.087265 | 3.359130 | .000000 |
| EKGYO | -0.001551 | -0.001461 | 0.016896 | -0.802161 | 5.372665 | .000000 |
| EREGL | 0.000468 | 0.000000 | 0.016078 | -0.177213 | 3.182649 | .000000 |
| FROTO | 0.000875 | 0.000422 | 0.018392 | -0.246399 | 1.600149 | .000011 |
| GUBRF | 0.006287 | 0.001671 | 0.040447 | 0.295458 | 0.958622 | .006965 |
| HEKTS | 0.006432 | 0.000824 | 0.043752 | 2.935148 | 22.274318 | .000000 |
| SAHOL | 0.001634 | 0.000000 | 0.017439 | 0.663587 | 1.518648 | .000000 |
| ISGYO | -0.000216 | 0.000000 | 0.029501 | 0.132561 | 2.864936 | .000000 |
| KRDMD | -0.001487 | 0.000000 | 0.021591 | 0.169637 | 4.229401 | .000000 |
| KARSN | 0.001855 | 0.003190 | 0.036553 | -0.105442 | 1.393255 | .000314 |
| KCHOL | 0.000154 | 0.000000 | 0.016119 | 0.321895 | 0.274666 | .132540 |
| KOZAA | 0.000906 | 0.000000 | 0.035302 | 0.115726 | 0.356575 | .476310 |
| KOZAL | 0.001168 | 0.000000 | 0.031511 | -0.393439 | 0.496631 | .028625 |
| MGROS | 0.001671 | 0.001263 | 0.023216 | -0.500163 | 1.674861 | .000000 |
| ODAS | 0.00017 | 0.000000 | 0.035716 | -0.228880 | 1.281756 | .000539 |
| OYAKC | 0.001465 | 0.000000 | 0.033422 | -0.047020 | 3.343138 | .000000 |
| PGSUS | -0.002017 | 0.000000 | 0.020029 | -0.351568 | 1.272263 | .000164 |
| PETKM | 0.001719 | 0.000000 | 0.015987 | 0.308954 | 0.094922 | .201093 |
| SASA | 0.000327 | 0.000000 | 0.022856 | 1.222772 | 8.401881 | .000000 |
| SKBNK | -0.000087 | 0.000000 | 0.029960 | 0.024522 | 2.040594 | .000000 |
| GARAN | 0.001497 | 0.000000 | 0.015476 | 0.080703 | -0.136261 | .832666 |
| ISCTR | 0.001855 | 0.000000 | 0.015454 | 0.196331 | 0.275064 | .389335 |
| TOASO | 0.000866 | 0.000000 | 0.019931 | 0.080448 | -0.354178 | .535671 |
| TRGYO | -0.000724 | 0.000000 | 0.028339 | -0.430424 | 2.547492 | .000000 |
| TUPRS | 0.001286 | 0.000000 | 0.013697 | -0.062751 | 0.570521 | .246467 |
| THYAO | 0.004412 | 0.003419 | 0.019142 | 0.428074 | 1.675020 | .000000 |
| TTKOM | -0.000384 | 0.000000 | 0.017188 | 0.025383 | -0.023371 | .987199 |
| TCELL | 0.001376 | 0.000000 | 0.013728 | 0.433793 | 0.758573 | .004292 |
| HALKB | -0.001558 | 0.000000 | 0.023690 | 0.626953 | 6.761450 | .000000 |
| TSKB | 0.00098 | 0.000000 | 0.020098 | -0.492053 | 3.152828 | .000000 |
| SISE | 0.000476 | 0.000000 | 0.020790 | -0.190408 | 0.229487 | .442439 |
| TAVHL | -0.000103 | 0.000000 | 0.030454 | -0.072834 | 1.176130 | .003138 |
| TKFEN | 0.001094 | 0.000000 | 0.025403 | -0.002167 | 0.203602 | .843488 |
| VAKBN | 0.001756 | 0.000000 | 0.017100 | -0.013859 | -0.135809 | .924178 |
| VESTL | 0.000997 | 0.001129 | 0.032167 | -1.657499 | 11.194189 | .000000 |
| YKBNK | 0.001909 | 0.000000 | 0.016337 | -0.142601 | 0.034194 | .712743 |

*Source:* Author's calculations

*Note:* This table presents key statistical measures regarding the log returns for the 43 firms in Borsa Istanbul with futures contracts in VIOP. It shows the descriptive statistics calculated over the event and estimation window, from -260 days to +15 days around each firm's Single Stock Futures (SSF) introduction date. The statistics include mean, median, standard deviation (SD), skewness, kurtosis, and Jarque-Bera (J-B) test results (with p-values).

The descriptive statistics reveal that mean log returns across firms exhibit modest fluctuations, indicating that the introduction of SSFs has a differentiated impact on the price movements of individual stocks. The median log returns, commonly close to zero, suggest that price changes are symmetrically distributed about the median, with half of the observations falling above and half below this value.

Volatility, measured by the standard deviation of stock returns, varied significantly across the firms. Some stocks demonstrate higher volatility, as larger standard deviations indicate, while others maintain lower volatility levels. The skewness of the return distributions offers insights into their asymmetry. Negative skewness values, observed in firms like AEFES and ECILC, denote distributions with elongated left tails. In contrast, positive skewness, as seen in firms such as ASELS and SAHOL, indicates distributions with extended right tails, highlighting the directional biases in the return distributions.

Kurtosis provides an understanding of the 'tailedness' of the return distributions. High kurtosis values, as evidenced in firms like HEKTS, VESTL, and SASA, denote heavy-tailed and peaked distributions, suggesting a propensity for extreme returns. On the other hand, lower kurtosis values, seen in firms like KCHOL and KOZAL, imply distributions that more closely resemble the normal distribution, characterized by less extreme tail behavior. The relatively large value of kurtosis statistics suggests that the underlying data are leptokurtic, or fat-tailed, and sharply peaked about the mean compared to a normal distribution. This characteristic of leptokurtosis is expected to be partially described by the EGARCH model, which is employed in the analysis.

Lastly, the Jarque-Bera test, a measure for assessing the normality of return distributions, revealed divergent patterns. Firms with smaller p-values, such as AEFES and DOHOL, indicate significant deviations from normality. Conversely, firms with larger p-values, such as TOASO and TTKOM, align more closely with a normal distribution, suggesting fewer aberrations in their return behavior.

### 3.2. Event Study

In this study, the impact of the initiation of Single-Stock Futures (SSFs) on the underlying stock's volatility and volume is assessed through an event study framework, following the methodology outlined by Prasad et al. (2021). Specifically, we employ an event study to quantify Abnormal Return Volatility (AVAR) and Abnormal Trading Volume (AVOL) during the introduction of the SSF, designated as the event window, contrasting these with a baseline trading period, referred to as the estimation window.

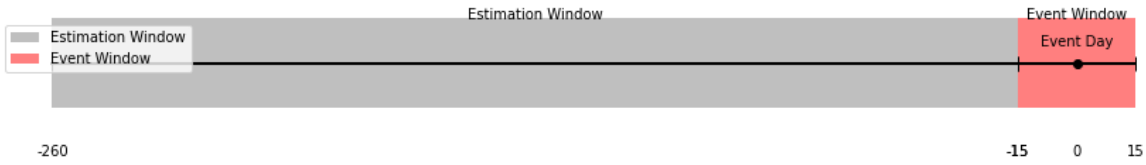
This study integrates Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) components to enhance the precision of the Abnormal Volatility (AVAR) measure. This approach is adopted to capture the dynamic nature of stock return volatility effectively. Many past studies have employed standard GARCH models to measure the impact of derivatives trading on market volatility, permitting time-varying volatility influenced by historical innovations and volatility. However, these models do not accommodate asymmetric responses or leverage effects observed in time series data, such as the impact of good and bad news on stock price volatility. Additionally, these models impose non-negativity constraints on the coefficients, creating difficulties in estimation. Nelson (1991) introduced the EGARCH model to address these limitations, which captures asymmetric responses observed in financial time series. The EGARCH model has several advantages over GARCH models, including eliminating non-negativity constraints on coefficients and simplifying parameter estimation. Moreover, the EGARCH model guarantees the stationarity of the process if the sum of the terms does not exceed unity. Thus, applying EGARCH allows

for a more nuanced understanding of the asymmetric responses in volatility, effectively capturing the leverage effect.

### 3.3. Estimation and Event Windows

In our event study methodology, we closely align with the specifications outlined in the seminal study of Brown & Warner (1985) and the recent study Prasad et al. (2021) to examine the market response to the introduction of Single Stock Futures (SSFs) in Borsa Istanbul. The estimation and event window selection is pivotal to accurately capturing the market's reaction to such financial events. Following the approach detailed in (Prasad et al., 2021) we adopt an estimation window of [-260, -16] days, which precedes the event window set at [-15, +15] days around the introduction of SSFs, as shown in Figure 1.

**Figure 1.** Estimation and event windows




Source: Author

To ensure the robustness and reliability of our results and by the practices in event study methodology in Türkiye presented, we also report findings from narrower event windows of [-5, +5] and [-10, +10] days. These additional windows allow us to assess the sensitivity of our results to the chosen time frame and to corroborate the findings from the broader window.

### 3.4. Abnormal Volatility and Abnormal Volume

This study utilizes the Capital Asset Pricing Model (CAPM), as developed by (Sharpe (1964), to compute the abnormal returns for individual stocks. The formula for this model is represented as follows:

$$\mu_{i,t} = r_{i,t} - (\alpha_i + \beta_i r_{\text{mkt}})$$

where $\mu_{i,t}$ represents the abnormal return for firm $i$ at time $t$; $r_{i,t}$ is the actual log return of the firm; $\alpha_i$ is the stock's alpha, a measure of its performance on a risk-adjusted basis; $\beta_i$ is the stock's beta, indicating its volatility relative to the market; and $r_{\text{mkt}}$ is the log return of the market. This model posits that the expected return on an asset in excess of the risk-free rate is proportional to the market excess return, with the proportionality factor being the asset's beta.

In alignment with the methodology outlined by Landsman & Maydew (2002) and Prasad et al. (2021), this study computes the $AVAR_{i,t}$ for each firm $i$ in the event window $t$ using the following formula:

$$AVAR_{i,t} = \frac{\mu_{i,t}^2}{\sigma_i^2}$$

Here, $AVAR_{i,t}$ is explicitly computed for the event window $t$, from -15 to +15 days relative to the day of the SSF introduction (day 0). In this context, $\mu_{i,t}^2$ represents the mean of the squared abnormal returns for firm $i$ within the event window $t$. The $\sigma_i^2$ denotes the variance of the firm's returns as predicted by the market model during the estimation window, which

extends from -260 days to -16 days before the introduction. The $AVAR_{i,t}$ measure is instrumental in assessing the volatility of returns during the event window. An AVAR value below 1 indicates reduced volatility compared to the norm during the event window. A value precisely at 1 suggests no significant deviation from usual return volatility. In contrast, an AVAR greater than 1 points to increased volatility beyond the normal range, denoting abnormal return volatility within the event window.

The improved version of AVAR to account for the EGARCH (Nelson, 1991) effects is formulated as:

$$AVAR - EGARCH_i, t = \left(\mu_{i,t}^2\right)/h_i$$

$$h_i = \alpha_{(i,0)} + \alpha_{(i,1)} * \left(\varepsilon_{(i,t-1)}/\sqrt{\left(h_{(i,t-1)}\right)}\right) + \gamma_{(i,1)} * \left|\varepsilon_{(i,t-1)}/\sqrt{\left(h_{(i,t-1)}\right)}\right| + \beta_{(i,1)} * log\left(h_{(i,t-1)}\right)$$

where $h_i$ is the conditional variance of firm $i$'s returns during the estimation window of [−260, −16] days.

Finally, the AVOL is formulated as:

$$AVOL_{i,t} = \frac{AV_{it}^{(ev)}}{AV_i^{(est)}}$$

where; $AV_{it}^{(ev)}$ represents the average trading volume of firm $i$ during the event window of [-15, +15] days. $AV_i^{(est)}$ symbolizes the average trading volume of firm $i$ during the estimation window of [−260, −16] days.

An AVOL value below one reflects trading volumes that are lower than typical during the event window. A value of precisely one implies a normal level of trading activity in the event window. Conversely, an AVOL value exceeding one signals trading volume higher than expected during the event window, indicating unusual trading activity compared to the estimation window.

## 4. Findings and Discussion

This section presents the findings of the analysis. Table 3 shows the results of the analysis for AVAR, AVAR-EGARCH and AVOL for our base event window [-15, +15] and in addition, two other event windows [-5, +5] and [-10, +10].

**Table 3.** Abnormal return volatility (AVAR), Abnormal-EGARCH volatility and Abnormal trading volume

| Event window | AVAR | AVAR-EGARCH | AVOL |
|---|---|---|---|
| [-5, +5] | 0.58 | 1.43 | 0.99 |
| [-10, +10] | 0.56 | 1.37 | 1.02 |
| [-15, +15] | 0.59 | 1.44 | 1.04 |

Source: Author's calculations

*Note:* This table shows the mean AVAR, AVAR-EGARCH, and AVOL estimates of the firms in the sample. A value less than 1 signifies low volatility or trading volume relative to normal market conditions. A value equal to 1 suggests that initiating Single Stock Futures (SSFs) had no significant influence on market volatility or trading volume. Conversely, a value higher than

1 denotes abnormal volatility and trading volume, indicating that the SSF introduction had a substantial impact.

The initiation of Single-Stock Futures (SSFs) on Borsa Istanbul's underlying stock volatility and volume has been analyzed using a robust event study framework, considering both Abnormal Volatility (AVAR) and Abnormal Trading Volume (AVOL) around the SSF introduction event. By applying an Exponential Generalized Autoregressive Conditional Heteroskedasticity (EGARCH) model, this study has allowed for a more sophisticated understanding of volatility, capturing its asymmetric nature, and accommodating the leverage effect seen in financial markets (Nelson, 1991).

The findings from the event study indicate that the introduction of SSFs is associated with notable changes in stock volatility. Specifically, the AVAR measures during the [-5, +5], [-10, +10], and [-15, +15] event windows reveal very similar abnormal volatilities. For three of the event windows, the AVAR is below 0.60, suggesting a reduction in volatility compared to the estimation period. This contraction in volatility may imply market assimilation of SSFs without significant disruption.

The EGARCH-AVAR measure extends the analysis of abnormal volatility by accounting for volatility's time-varying nature and leverage's impact. The EGARCH-AVAR results for the three windows ([-5, +5], [-10, +10], and [-15, +15]) are 1.43, 1.37, and 1.44, respectively, which are also very similar. Unlike the AVAR results, these values surpass unity across all windows, implying that introducing SSFs leads to a more volatile market environment than predicted by historical trends. The EGARCH-AVAR findings affirm that SSF introductions contribute to increased volatility, with the most pronounced effect observed in the broadest event window examined.

Finally, the AVOL measures for the three windows portray a consistent pattern where trading volume is very close to normal levels (values equal to 1), with the [-5, +5] window at 0.99, the [-10, +10] at 1.01, and the [-15, +15] at 1.03. These results indicate stable trading activity at the narrowest window and suggest that introducing SSFs might attract slightly increased trading interest in the two more expansive windows, potentially due to liquidity infusion and speculative trading behaviors. The incrementally higher AVOL in the extended [-15, +15] window may also reflect a cumulative effect of market participants' reactions over time.

The empirical results suggest that the introduction of SSFs in Borsa Istanbul significantly impacts both the volatility and trading volume of the underlying stocks, especially when the EGARCH effect is considered. The observed increase in abnormal volatility and trading volume around the SSF introduction aligns with the hypothesis that derivative trading may amplify market reactions, possibly due to increased speculation or the entry of new market participants. These results corroborate the findings of prior studies like Dong & Feng (2018), Gürbüz & Şahbaz (2022), Pok & Poshakwale (2004), and Truong et al. (2021), which identify that derivatives introductions as events that potentially elevate market dynamics. The additional insight provided by the EGARCH model underscores the importance of accounting for asymmetries in volatility responses, particularly relevant in financial markets where news and events can have disproportionate effects on stock prices.

The impact of stock index futures trading on the volatility of the spot market is the subject of considerable debate in the extant literature. In addition, the increasing popularity of individual shares futures trading may raise new regulatory questions and concerns regarding its impact on spot market volatility. The effect of derivative trading on the volatility of the underlying spot market is a matter of particular significance for fund managers, given its implications for risk management. Policymakers are also keen to investigate the probable

consequences of introducing derivatives trading on the volatility of the spot market, as it would determine whether additional financial market regulations are required. The result of this study indicates that the introduction of SSFs in Borsa Istanbul is accompanied by heightened volatility and trading volumes, affirming the significant role that derivatives play in the financial ecosystem. These findings contribute to the ongoing discourse on the impact of financial derivatives on stock market behavior, with implications for investors, regulators, and the broader financial community in understanding the dynamics introduced by derivative instruments. Finally, valuable conclusions can be obtained from this study in case emerging markets exhibit these effects differently than more mature ones.

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