



Trading session effects on stock returns and their conditional volatility: Firm-level evidence from a European Union accession country



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HIGHLIGHTS

- Pioneering effort to analyze trading session effects on stock returns and volatility.
- Firm-level data used from Turkey, where stock market trading is non-continuous.
- There are two trading sessions with a two-hour lunch break in between.
- Both return and volatility increase in the second trading session for most firms.
- No asymmetry in volatility in most cases, and only systematic risk is priced.

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ABSTRACT

This paper primarily aims to test (i) the weak-form informational efficiency based on trading session effects on stock returns and their conditional volatility, (ii) the conditional total risk–return relationship and the systematic risk effects, and (iii) volatility persistence and asymmetry in volatility. We use firm level intraday data for two trading sessions with a two-hour lunch break from the Bourse Istanbul for the period 1995 to 2014. First, a strong result can be pronounced for a positive return effect for the second trading session compared to the first session. A similar positive effect is observed for the conditional volatility. Second, it can be concluded that only the systematic risk is priced for the great majority of the selected firms. Third, we cannot observe a significant asymmetry in the conditional volatility in most cases. Finally, it is founded that financial companies have a significantly higher systematic risk than industrial companies.

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1. Introduction

Informational efficiency of the financial markets together with asset pricing has been one of the most important theories of the modern finance since its early development by Fama [1,2]. Our research principally falls into the field of weak form informational efficiency; however, it tries to adapt an approach where different hypotheses can simultaneously, and albeit jointly, be tested. Three areas of research in terms of stock market seasonality, asymmetric time varying volatility, and risk–return relationship constitute our major concerns.

It should first be noted that return and volatility seasonality, if found to be economically significant, can be used for generation of profitable active trading strategies to improve the risk–return profile of managed portfolios. In addition, such

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seasonality effects can be incorporated into market risk management models. Second, financial market volatility, considered as a measure of risk and uncertainty, remains as a fashionable topic for academics, practitioners, investors and regulators; as it is of particular importance, at least, to options traders that require volatility forecasts to price options; central banks that require interval forecasts whether an exchange rate will fluctuate within a pre-defined target zone; international traders for export and import decisions; international investors that require portfolio diversification beyond national borders; or risk managers using internal market risk management models such as value-at-risk applications [3]. One of the most important dynamics of financial market volatility is time variation and asymmetry in volatility of asset returns. Third, risk and return, the twin sisters, lie at the heart of investment decision-making. It has been well documented that research on the relationship between stock returns and their conditional volatility has not reached a consensus. It should be noted that a positive as well as a negative risk–return relationship would be consistent with the finance theory (see Ref. [4]).

We primarily aim to test a relatively new calendar effect, previously untested, on individual stock returns and their conditional volatility. We use a unified methodology to enable us to test the risk–return relationship and asymmetry in conditional volatility of individual stock returns, in addition to our major focus on both return and volatility seasonality. Therefore, our research can be seen as an indirect and joint test of the mean–variance style risk–return relationship and the systematic risk effects on the stock returns, with the allowance of both return and volatility seasonality in an asymmetric time varying volatility framework.

We employ firm-level intra-day data for two trading sessions from the Turkish stock market. It should be noted that several researchers have effectively touched upon one or more aspects of these topics, but not all of them at the same time, or in a combined framework, at least in the Turkish stock market context. Moreover, again, to the best of our knowledge, given the previous research on the Turkish stock market, there has been no firm level empirical evidence regarding these topics.

It should be recalled that the primary interest in this research lies in one country, namely, Turkey, a middle-income, European Union (EU) accession country with a large and diverse hinterland. Being Europe's seventh and the world's sixteenth largest economy, with a gross domestic product of around USD800 billion in 2014, Turkey has had a full customs union with the EU since 1996.

It should be noted that the Bourse Istanbul was reopened as a modern stock market in 1986 and the current account of the country was liberalized in August 1989, with the abolishment of the foreign exchange controls. With a significantly large increase in capital inflows from early 1990s, thanks to the other reforms as well during the late 1980s as well, the stock market activity, including trading volume and foreign ownership, and in turn, the research into the Turkish stock market in the modern sense has also increased.

The important market microstructure characteristics of the stock exchange, in terms of clearing and settlement rules, trading system and trading hours, and price limits, can be summarized as follows. In our opinion, as explained below, the Turkish stock market microstructure characteristics are much closer to those of the Asia-Pacific stock exchanges (see, Ref. [5]). It should first be noted that equity trading is carried out with continuous auction, continuous auction with market maker, and single price trading methods according to price and time priority, with a fully automated electronic trading system. The settlement rule is $T + 2$ business days for all stocks. The cash settlement principle is applied through a central clearing and settlement institution. Applying a multilateral netting system and the principle of delivery versus payment, payments are cleared by same day funds.

During its early years of operation, the Istanbul Stock Exchange used to have one trading session a business day, with a business week running between Monday and Friday, inclusive. Together with the lengthening of the settlement rule to $T + 2$ business days, a two-trading session system was introduced in July 1994. The local trading hours are between 10:00 and 12:00 for the first session, and between 14:00 and 16:00 for the second session, Turkey being in time zone GMT + 2 h. Note that an opening session is held prior to each of the sessions, and a closing session is held at the end of the second session.

Except for five markets, namely, Istanbul, Hong Kong, Malaysia, Shanghai and Tokyo stock exchanges, where there are two trading sessions with a lunch break in between; the trading is continuous in the other markets. We employ firm-level intra-day data for two trading sessions from the Turkish stock market, as a rare example among the world stock markets, which has had two separate trading sessions with a two-hour lunch break since August 1994. Both sessions have a 10% regulatory price limit.

Using figures provided by the World Federation of Exchanges, our calculation shows that the ratio of the total trading volume to the monthly average of the total market capitalization is 1.38, one of the highest among the world markets. This suggests that noise trading may be pronounced more in case of the Turkish stock market, further supported by negligible transactions costs. For the period 2003–2014, the foreign ownership of the Turkish stocks by market capitalization averages 64.2% within a range of 52.2% and 72.4%

However, given the small number of companies listed in the market and the lack of data availability of data in the early years of the financial market development has focused on the fashionable testing of the efficient markets hypothesis.

The early research into testing the informational efficiency of the Turkish stock market deals primarily with testing the weak-form and the semi-strong form of the hypothesis. In the case of weak form efficiency testing, calendar effects have attracted much more interest compared to the other tests. For example; Refs. [6–13] focus on the intraday and the day of the week effects, Balaban [14] on the month of the year effects and the term structure of volatility, and Balaban and Candemir [15] on the holiday effects.

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