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Distributional characteristics of interday stock returns and their asymmetric conditional volatility: Firm-level evidence

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ABSTRACT

This paper is a pioneering effort to jointly analyze the characteristics of interday distributions of stock returns and their asymmetric time varying volatility using firm-level data in local currency from an emerging stock market, namely, the Bourse Istanbul, for the period January 1996 to December 2015. Using a modified Threshold Generalized Autoregressive Conditional Heteroscedasticity-in-Mean [TGARCH(1,1)-M] model; these distributional characteristics statistically assess in a unique framework (i) the weak-form informational efficiency based on the stylized facts of day of the week effects on stock returns and their conditional volatility; (ii) volatility persistence and asymmetry in conditional volatility; and (iii) the conditional total risk–return relationship, and the impact of systematic risk as an asset pricing factor. It is found that at firm level there are statistically significant positive or negative day of the week effects on either stock returns or their conditional volatility, or both. However, for a sample of 120 firms, a full and cross-sectional analysis of the interday distributions does not lead to a systematic pattern of return differences across days of the week. The average volatility is found to be highest on Mondays and the lowest on Wednesdays. It is reported that – as a proxy of total risk in a mean–variance framework – the estimated conditional standard deviation does not have a significant impact on stock returns for the great majority of the sample firms. With reference to the total risk–return relationship and the asymmetry in volatility, there are no significant differences between the industrial and financial sector companies. It is reported that the systematic risk is always priced; and the results are highly significant with a high explanatory power. Volatility is decidedly persistent for all firms investigated; while, a significant asymmetry in the conditional volatility cannot be reported for most of the firms. Contributing to the existing literature as a first time analysis of firm-level distributional characteristics of interday stock returns and their asymmetric conditional volatility with an additional proper risk-impact investigation, the empirical results are of importance primarily for asset pricing and risk management research and practice.

1. Introduction

It is widely acknowledged that asset pricing and informational efficiency of financial markets constitute the two cornerstone theories of modern finance. The analysis of distributional characteristics of stock returns and their conditional

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and unconditional volatility appears to be a primary and well-established area of study with voluminous published research from both perspectives. It should, however, be clearly noted that empirical testing of both asset pricing and informational efficiency is inevitably subject to a joint-hypothesis problem where an implicit or explicit assumption on one theory is always necessary to be able to test the other.

It is well-established that deterministic seasonality is a major distributional characteristic which profoundly describes time series behavior of asset returns and their conditional and unconditional volatility. One of the earliest and most widely investigated stock market seasonality is – without doubt – the day of the week effects and their stylized facts. In addition to its use from an asset pricing perspective, seasonality analysis is also a direct assessment of weak-form of informational efficiency.

Within this context of asset pricing and informational efficiency, our research design employs a unique econometric framework with a modified Threshold Generalized Autoregressive Conditional Heteroscedasticity-in-Mean [TGARCH(1,1)-M] model which aims to statistically assess (i) the weak-form informational efficiency based on the stylized facts of day of the week effects on stock returns and their conditional volatility; (ii) volatility persistence and asymmetry in conditional volatility; and (iii) relationship between conditional total risk and stock returns, and the impact of systematic risk as an asset pricing factor.

Our unique framework helps researchers better understand aforementioned dynamics of stock markets. 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 risk–return profile of managed portfolios. In addition, such seasonality effects can and should be incorporated into market risk management models. Second, one of the most important dynamics of financial mâĂĺarket volatility is time variation and asymmetry in volatility of asset returns. Modeling and forecasting of these aspects of volatility is a crucial activity from many and diverse perspectives in financial markets. Third, modeling risk–return trade-off using pre-specified pricing factors lies at the heart of investment decision-making albeit without a universal consensus. While it is almost unanimously accepted that systematic risk should enter return generating process as a pricing factor, it is well documented that the 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.

Our research is a pioneering effort to jointly analyze the characteristics of interday distributions of stock returns and their asymmetric time-varying volatility with an additional proper risk-impact investigation using firm level data from an emerging stock market, namely, the Bourse Istanbul, for the period January 1996 to December 2015.[1] It should be noted that the Bourse Istanbul has been reopened as a modern stock market in 1986; and primarily upon the abolishment of the foreign exchange controls, the current account of the country has been liberalized in August 1989. Following the significantly large increases in capital inflows from early 1990s; the stock market activity, including equity ownership by foreigners and trading volume, has drastically increased. For the period 2003 to 2015, the foreign ownership of the Turkish stocks by tradable market capitalization averages 65%, fluctuating within an annual range of 52% and 72%. It should be noted that regardless of the investor domicile there are no capital gains tax on stock market investments; being another highly attractive incentive for foreign investors. 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 1.4, one of the highest among the world markets. Note that transactions costs are negligibly low, resulting in excessive trading in a volatile market setting.

It is well documented that market microstructure characteristics may serve as a source of the empirically reported return and volatility differences across days of the week. The Bourse Istanbul has its distinguishing market microstructure characteristics[2] in terms of operating a two-trading session system with a two-hour lunch break each trading day; and applying a settlement rule of $T + 2$ business days and a regulatory price limit of 10% in each session for all stocks.

This research contributes to the existing literature using firm-level daily data from a European Union (EU) accession country with developing and volatile financial markets in a dynamic and high growth economy. Turkey is the first and only country having a full customs union with the EU without a full membership. In addition to its globally outstanding strategic and geopolitical importance, Turkey is the sixth largest economy in Europe, with sustained high growth rates. For such a growth-market and economy – where foreign investors are offered competitively attractive incentives – it is worth providing new empirical evidence on the stock return and volatility seasonality, the impact of total and systematic risk on stock returns, and the degree of persistence and existence of asymmetry in conditional volatility. Following this background and information, Section 2 is devoted to the review of key literature in accordance with the aims and scope of our research.

2. Literature review

It should be noted that one of the most investigated seasonal effects is undoubtedly the day of the week effects. A review of trading day seasonality – based on a non-exhaustive list of early and subsequent research – using data from both developed and emerging stock markets is provided by Balaban and Ozgen [5], and Balaban et al. [2]. It should however be noted that most of previous research on the day of the week effects focuses on stock returns at aggregate market level using index data.

[1] Early internationally published evidence on the day of the week effects in Turkey is provided by Balaban [1]. A detailed literature review into the day of the week effects from international stock markets is given in [2].

[2] The Turkish stock market microstructure characteristics are much closer to those of the Asia-Pacific stock exchanges (see, [3–5]).