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## Revisiting the empirical linkages between stock returns and trading volume

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## ABSTRACT

This paper investigates whether the empirical linkages between stock returns and trading volume differ over the fluctuations of stock markets, i.e., whether the return–volume relation is asymmetric in bull and bear stock markets. Using monthly data for the S&P 500 price index and trading volume from 1973M2 to 2008M10, strong evidence of asymmetry in contemporaneous correlation is found. As for a dynamic (causal) relation, it is found that the stock return is capable of predicting trading volume in both bear and bull markets. However, the evidence for trade volume predicting returns is weaker.

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## 1. Introduction

The relation between stock price changes and trading volume (return–volume relation) has received considerable attention in the field of finance over the past two decades. As discussed in [Karpoff \(1987\)](#), evidence on the return–volume relation not only enhances the knowledge on financial market structure, but also provides information to discriminate between competing theoretical models. For instance, [Campbell et al. \(1993\)](#) show that the return–volume relation helps solve the identification problem for testing different models.

Based on market folklore, it is generally believed that trading volume is positively associated with stock returns. As the old Wall Street adage asserts, “it takes volume to move prices”. However, an early empirical study by [Granger and Morgenstern \(1963\)](#) fails to find a correlation between movements in a Securities and Exchange Commission composite price index and the aggregate level of volume on the New York Stock Exchange (NYSE). Succeeding studies have found more evidence of a positive correlation, but several findings remain that are inconsistent with a positive correlation. See [Karpoff \(1987\)](#) for a thorough survey of empirical evidence before the 1990s.

Note that what is investigated is the *contemporaneous* correlation in the studies mentioned above. Since the 1990s, the focus has moved to *dynamic (causal)* correlation between price changes and trading volume. That is, studies have started to examine the

causal relation by asking questions such as, “does volume help forecast stock returns” or “do investors trade more when stock prices go up”? Typically, bivariate vector autoregressive (VAR) models and Granger causality tests are applied in most studies investigating the dynamic return–volume relation. [Lee and Rui \(2002\)](#) find that trading volume does not Granger-cause stock returns using daily data from three stock markets: New York, Tokyo and London. [Statman et al. \(2006\)](#) use monthly data from the NYSE/AMEX from 1962 to 2001, and provide evidence that trading activity is positively related to lagged returns for many months. [Griffin et al. \(2007\)](#) examine data from 46 developed and developing countries, and show a strong positive relation between turnover and past returns in many markets. Using data from emerging stock markets (six Latin American markets), [Saatcioglu and Starks \(1998\)](#) fail to find strong evidence of stock price changes leading to volume changes. On the other hand, they find that volume seems to lead to stock price changes. [Eleanor Xu et al. \(2006\)](#) use a time-consistent VAR model to test the dynamic return volatility–volume relationship, and find that volatility and volume are persistent and highly correlated with past volatility and volume. [Hutson et al. \(2008\)](#) examine the relation between the first three moments of market returns and trading volumes, and find significant evidence that higher trading volumes trigger subsequent greater negative market return skewness. Finally, [Chuang et al. \(2009\)](#) use quantile regressions to investigate the causal relations between stock return and volume, and show that causal effects of volume on return are usually heterogeneous across quantiles and those of return on volume are more stable.

Departing from the framework of linear models, [Hiemstra and Jones \(1994\)](#) apply nonlinear Granger causality tests to examine

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the dynamic relation between daily Dow Jones stock returns and percentage changes in NYSE trading volume. They find evidence of significant bidirectional nonlinear causality between returns and volume. Moreover, McMillan (2007) finds that lagged volume can be used as a threshold to improve the performance of nonlinear return forecasting models.

In this paper, we add to the existing literature by examining whether the return–volume relation differs during different phases of stock market cycles, i.e., whether or not the relation is asymmetric in bull and bear stock markets. The motivation for such an asymmetric relation is intuitive. First, cyclical variations in stock returns are widely reported in the literature. See, for example, Hamilton and Lin (1996), and Perez-Quiros and Timmermann (2000). Thus, it is empirically evident that nonlinear models of the stock return with switches across bull and bear market regimes fit the data better than do linear models. Second, as the return–volume relation reflects the structure of financial markets, and various factors—such as how investors behave—may change in bull and bear markets, we should expect that the return–volume relation would also change across different phases of market cycles. For instance, in a bull market, overconfidence may grow with long-lasting past success in the market, which would result in a strong positive return–volume correlation. As shown in Hong et al. (2006), overconfidence can lead to stock market bubbles with heterogeneous beliefs and short-sales constraints.

It is worth noting that the proposed asymmetric return–volume relation here is different from the asymmetric relation proposed by Karpoff (1987). Karpoff (1987) hypothesizes that volume is posi-

tively correlated with positive price changes, and negatively correlated with negative price changes (see Fig. 1 in Karpoff, 1987). That is, Karpoff (1987) proposes that the return–volume relation is fundamentally different for positive and negative price changes. However, what we aim to investigate here is that the return–volume relation is fundamentally different for bull and bear markets. Such an asymmetric return–volume relation has been examined in Ning and Wirjanto (2009) for emerging economies. Using a copula approach, they find significant and asymmetric return–volume dependence at extremes for six emerging East-Asian equity markets.

In this paper, we first use Markov-switching models to identify the bull and bear regimes in the stock market and then examine the possible asymmetric return–volume relation. However, as discussed in Candelon et al. (2008), there is no consensus in the academic literature on what bear and bull markets actually are, even though recessions and booms in stock returns are widely acknowledged. One main alternative approach to identify stock market fluctuations is based on a nonparametric methodology. For instance, Candelon et al. (2008) use the Quarterly Bry–Boschan method to examine monthly stock price series. Therefore, in order to check the robustness of our main findings, we also employ the Bry–Boschan dating method as well as a naive moving average approach to identify the fluctuations in the stock markets. Moreover, as well as examining the contemporaneous return–volume correlation, we use a joint two-state Markov-switching model to study the dynamic (causal) link between returns and volume. We would like to know if lagged volume is able to predict stock returns, and vice versa.

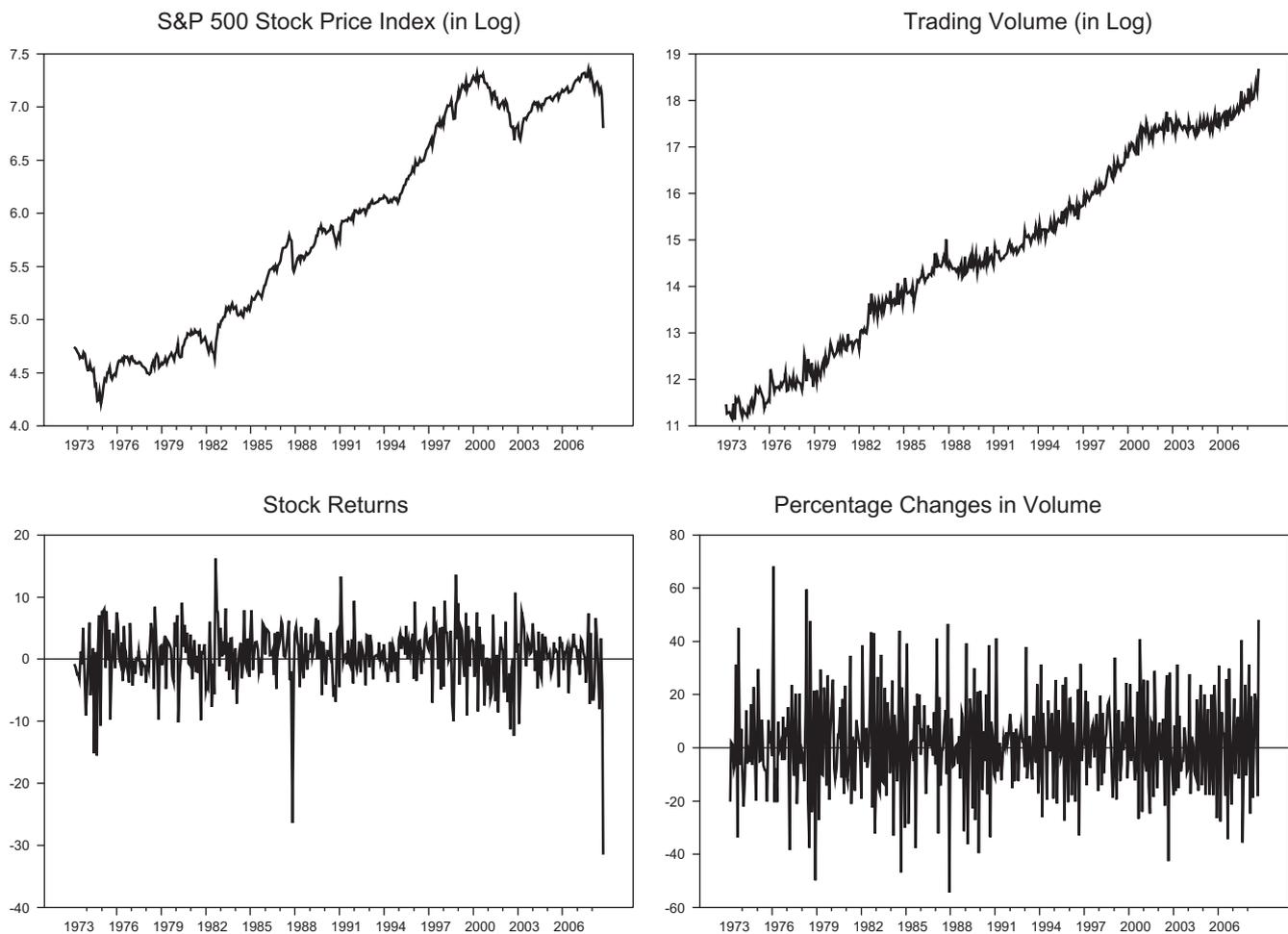


Fig. 1. Data plots.

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