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Analysis of DJIA, S&P 500, S&P 400, NASDAQ 100 and Russell 2000 ETFs and their influence on price discovery

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ABSTRACT

This study examines the temporal behavior of price discovery in the spot, ETF and futures markets of the DJIA, S&P 500, S&P 400, NASDAQ 100 and Russell 2000. We document an increasing trend in the price discovery metrics of exchange traded funds for all indexes but the DJIA. Contrary to past studies, our findings show that the spot market rather than the futures market leads the price discovery. The arbitrage process that links exchange traded funds to spot prices, and not the futures prices might explain the results. This daily arbitrage that ensures exchange traded funds prices equal net asset values appear to promote spot market price discovery especially with the popularity of exchange traded funds in more recent years. We additionally document that the temporal behavior of the exchange traded funds price discovery metric affects differently price discovery in the spot and futures markets across indexes.

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1. Introduction

This study extends past research on price discovery in three ways: (1) by employing [Gonzalo and Granger \(1995\)](#) and [Hasbrouck \(1995\)](#) information share methodologies, (2) by allowing for temporal changes in information shares of spot, futures and ETF markets and (3) by examining five indexes, the Dow Jones Industrial Average (DJIA), S&P 500, S&P 400, NASDAQ 100 and Russell 2000 (with ticker symbols DIA, SPY, MDY, QQQQ and IWM, respectively). Moreover, with the rising popularity of ETFs, this study examines whether ETFs have generated a temporal change in the price discovery in these markets.

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While earlier studies use 1990 ETF data when ETFs began trading, by the end of March 2011 there have been 986 ETFs that managed \$1.055 trillion of assets.² We find that the rising significance of ETFs has provided an important price discovery role in the market and has influenced the dynamics of price discovery in the spot market. In fact, contrary to the findings of [Chu, Hsieh, and Tse \(1999\)](#) we find that the spot market consistently dominates the futures and ETF markets in price discovery. The reason for the different findings might be attributed to the extended time period of this study and the rising popularity of ETFs. [Chu et al. \(1999\)](#) use one year of intradaily data starting on January 29, 1993, when the S&P 500 ETF was introduced whereas we examine a period spanning several years – starting in 1998 and ending on March 18, 2011.³ Therefore, the more current and extensive time period examined in this study may help to understand the temporal dynamics of price discovery between spot, futures, and ETF prices.

Our findings support aspects of past studies, showing that in the 1990s the S&P 500 futures market dominates. However, in January 2001 until the end of the examined period (March 2011) the leadership role abruptly reverses to spot market domination. A possible explanation for the reversal in the dominant market to spot rather than futures market might be due to the process of ETF creation and redemption, which provides an arbitrage opportunity between ETFs and the spot market.⁴ To help understand the reasons for the spot market dominance a more detailed explanation of the ETF creation and redemption process is provided in a later section.

The findings of this study are robust with respect to temporal changes in the information shares of ETFs, spot and futures contracts in the five indexes. The temporal behavior of information shares has not been examined in past studies of financial market price discovery, and contributes to the literature. The results of this study suggest that price discovery changes across time and, thus, care must be taken when shorter periods are analyzed. We additionally document that the temporal behavior of the ETF price discovery metric affects differently price discovery in the spot and futures markets across indexes.

The structure of the paper is as follows. [Section 1](#) provides a literature review. [Section 2](#) presents the methodology for the paper. [Section 3](#) describes the data used in the paper. [Section 4](#) provides the basic results and [Section 5](#) provides possible reasons for the findings. [Section 6](#) discusses the temporal dynamics of ETF information shares and [Section 7](#) offers concluding remarks.

2. Literature review

Historically the competition for price leadership has been between the futures and spot markets. The theoretical rationale behind the leverage, trading cost, uptick rule and market-wide information share hypotheses all suggest that the informed traders should converge and trade in the futures market, thereby making it the dominant market. In the late 1990s ETFs were introduced and gained popularity, implying that their importance may create a potential shift in the price discovery processes in their respective markets ([Bernstein, 2009](#)). Finance research shifted to re-examining the old price discovery leadership role provided by the futures markets in light of the new trading vehicle. Even with the introduction of ETFs these more recent studies find that the futures market provides the price leadership relative to the spot and ETF markets ([Hasbrouck, 2003](#); [Chu et al., 1999](#); [Fung, Liu, and Tse, 2008](#)).

[Chu et al. \(1999\)](#) use intradaily data and the [Gonzalo and Granger \(1995\)](#) methodology, and they find that the S&P 500 futures market leads the price discovery function as the S&P 500 spot and ETF markets adjust to changes in the futures market. [Chou and Chung \(2006\)](#) use intradaily data and apply the [Hasbrouck \(1995\)](#) methodology on the DJIA, S&P 500 and NASDAQ100 ETF and futures markets. They exclude the spot market from their study, and cover only a six-month period from October 29, 2000 to April 28, 2001, focusing on the period of decimalization in US stock markets. They document that before decimalization the futures market was dominant for the three indexes, but after decimalization a shift in price discovery dominance occurred from futures to the ETF market.

² Source: Investment Company Institute (www.ici.org).

³ At the time of the [Chu et al.'s \(1999\)](#) study, the S&P 500 ETF was in its infancy and there were no other ETFs. Additionally, they examined S&P 500 ETFs for one year from the date of its introduction on January 29, 1993 to December 31, 1993.

⁴ Financial ETFs are unique in this respect, because there are commodity ETFs available for trading which track the performance of a futures contract, not the spot index market.

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