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Price discovery in the round-the-clock U.S. Treasury market

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ABSTRACT

We evaluate the efficacy of price discovery in the round-the-clock U.S. Treasury market. Using a comprehensive intraday database, we explore informational role of trades over the 24-hour day. We find that information asymmetry is generally highest in the preopen period and lowest in the postclose period. Information asymmetry in the overnight period is comparable to that in the regular trading period. However, on days with macroeconomic announcements, information asymmetry peaks shortly after the news release at 8:30. Moreover, information asymmetry is higher on Monday morning and higher immediately before than after the open of U.S. Treasury futures trading. Although volume is low after hours and trading cost is relatively high, overnight trading generates significant price discovery. Results suggest that overnight trading activity is an important part of the Treasury price discovery process.

1. Introduction

Price discovery—the efficient and timely incorporation of new information into security price—is arguably the most important function of securities markets. Modern technology has dramatically changed the trading mechanisms of secondary markets. It is now relatively easy to trade securities in the U.S. markets after hours. However, trading after hours continues to be dominated by professional

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traders, and trading volume is low. This raises a concern about the efficacy of price discovery in the after-hours market.

The dramatic change in the way securities markets operate has drawn financial researchers' attention to trading outside exchange trading hours.[1] In an important paper, Barclay and Hendershott (2003) investigate the effects of trading after hours on the magnitude and timing of price discovery in the equity market. They find that the price discovery process is considerably different in the after-hours market. Although prices are more efficient and more information is revealed per hour during the regular trading period, after-hours trading generates significant price discovery and individual trades contain more information after hours than during the day on a per trade basis.

While studies on the after-hours markets have generated important insights on the amount and timing of price discovery over the trading day, empirical investigations are complicated by the large shifts in the trading process at the open and close of the regular daytime market. As a consequence, it is not clear whether the significant change in the price discovery pattern after hours is due to the change in trading mechanisms associated with different platforms, or the fundamental variation in the informational role of trades over the day.

The market for U.S. Treasury securities provides an excellent forum to isolate the effect of the change in the trading process. Trading in the Treasury market takes place round the clock in the U.S. and from overseas and the trading mechanism is virtually the same wherever a trade takes place. For instance, U.S. Treasuries are traded by the same dealers and interdealer brokers using the same settlement procedure around the world. In addition, these securities are relatively homogeneous in terms of risk and return characteristics. These unique features make the Treasury market an ideal forum to study how heterogeneous traders impound new information into prices at different trading time and markets under the same trading mechanism. Thus, a finding of significant differences in price discovery between market segments (e.g., domestic vs. overseas) using intraday data of Treasury securities trading cannot be attributed to variations in the trading mechanism or securities characteristics.

In this paper we examine the informational role of trades in the U.S. Treasury market during and outside the regular domestic trading hours. We are particularly interested in the effects of trading after hours on the amount and timing of price discovery over the 24-hour day. We analyze informed trading activity and their effects on prices and trading cost components of U.S. Treasury securities across trading periods.[2] Besides looking into the information effect on price, we estimate components of trading costs and volatility over the day using a large sample of intraday data spanned over a long time horizon.

In addition to uncovering the relationship between pricing efficiency and trading after hours, an understanding of the price discovery process of the Treasury market is in itself important for academic researchers as well as practitioners. From an investment perspective, it is of interest to understand how Treasury security price is determined. More importantly, Treasury price movement affects the performance of every facet of financial markets since riskfree rates of different maturities are benchmarks for pricing other financial assets. Understanding Treasury security price changes is thus an integral part of any unified theory of asset pricing.

Our study on price discovery of the U.S. Treasury market is related to several recent papers. Huang et al. (2002) examine intraday trading patterns, information content of trades, macroeconomic announcement effects, adverse information component of bid–ask spreads, and volatility–volume relations using the interdealer Treasury market data. They find that trading frequency reflects information-based trading activity while trade size has no information content, and that information asymmetry increases around macroeconomic announcements. Green (2004) examines the impact of trading on government bond prices after the release of macroeconomic news. His study documents a significant increase in the informational role of trading following macroeconomic announcements,

[1] See, for example, Biais et al. (1999), Cao et al. (2000), and Barclay and Hendershott (2003, 2004).

[2] While the issue of information-based trading in the equity markets has been examined extensively, much less effort has been devoted to the fixed income markets. Studies on the equity markets include, among others, Barclay et al. (1990), Easley and O'Hara (1992), McInish and Wood (1990, 1992), Hasbrouck (1993, 1995), Chan et al. (1995a, 1995b), Kim and Verrecchia (1994, 1997), Krinsky and Lee (1996), Easley et al. (1996), Greene and Watts (1996), Madhavan et al. (1997), Biais et al. (1999), Koski and Michaely (2000), Cao et al. (2000), Huang (2002), Barclay and Hendershott (2003) and Li and Wu (2006).