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Int. Fin. Markets, Inst. and Money 16 (2006) 231–245

Journal of
INTERNATIONAL
FINANCIAL
MARKETS,
INSTITUTIONS
& MONEY

www.elsevier.com/locate/intfin

Relative performance of bid–ask spread estimators: Futures market evidence

Amber Anand^{a,1}, Ahmet K. Karagozoglu^{b,*}

^a Department of Finance, College of Business Administration, University of Central Florida,
P.O. Box 161400, Orlando, FL 32816-1400, USA

^b Department of Finance, Frank G. Zarb School of Business, Hofstra University, Hempstead, NY 11549, USA

Received 2 October 2004; accepted 24 February 2005

Available online 6 September 2005

Abstract

The issue of transaction costs is the mainstay of the equity market microstructure. Research in the microstructure of futures markets has lagged behind. A primary reason is that futures exchanges in the U.S. do not record bid–ask quotes, requiring these costs to be imputed from transaction price data. A reliable estimator of bid–ask spreads would significantly enhance microstructure research in futures markets. Unique intraday data from the Sydney Futures Exchange (SFE) that include both transaction prices and bid–ask spreads allow us to compare bid–ask spread estimation techniques proposed in the literature against the benchmark of actual spreads in a futures market, and thus identify the best-performing estimator. To maximize relevance, we impose all the constraints that apply in U.S. futures data to perform our estimations. We find that the four bid–ask spread estimators considered significantly underestimate the actual spreads. However, simple moments-based estimators perform better in predicting spreads.

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JEL classification: G10

Keywords: Transaction costs; Bid–ask spreads; Spread estimators; Futures markets

* Corresponding author. Tel.: +1 516 463 5701; fax: +1 516 463 4834.

E-mail addresses: aanand@bus.ucf.edu (A. Anand), finakk@hofstra.edu (A.K. Karagozoglu).

¹ Tel.: +1 407 823 3690; fax: +1 407 823 6676.

1. Introduction

The microstructure of security markets influences investor, exchange, and regulator decisions. While microstructure issues have been studied extensively in equity markets, similar studies in futures markets are constrained by the absence of recorded bid–ask spreads in U.S. futures exchanges. Studies in these markets typically use an estimator to impute spreads from the price data available.

We contribute to this research by comparing the performance of four commonly used spread estimators, [Bhattacharya \(1983\)](#), [Roll \(1984\)](#), [Smith and Whaley \(1994\)](#), and [Thompson and Waller \(1988\)](#), to actual spreads found in a market with a structure similar to U.S. futures exchanges, the Sydney Futures Exchange (SFE).² This comprehensive analysis of the most commonly used estimators as well as actual spreads in a futures exchange makes our study unique in the futures market literature.

Before its recent switch to electronic trading, SFE largely followed trading mechanisms used by major U.S. exchanges. We only use data before the advent of electronic trading, thus giving us a sample very similar to one obtained from exchanges in the U.S. To maximize further relevance, we impose all the constraints that apply in U.S. futures data to perform our estimations. Actual market quotes give us a benchmark for measurement of performance of the estimators. Thus, our empirical results are applicable to research using data from U.S. futures exchanges.

Continuing advances in technology and a regulatory focus on enhancing competition have roiled global exchanges. Both these developments have significantly changed the competitive landscape, and nowhere have these changes been more apparent than in futures markets. Competition among exchanges most commonly occurs on the basis of costs and liquidity; markets with lower transaction costs are more efficient.

Exchanges face a variety of decisions regarding optimal market structures. The success of any alternative choice will depend on how well it achieves the objectives of reducing costs and enhancing liquidity. The common measure of market liquidity and costs incurred by investors is the bid–ask spread.

Research on the microstructure of futures markets is yet to catch up with equity market microstructure. One of the primary reasons is that the absence of recorded bid and ask quotes in U.S. futures markets, meaning we must impute transaction costs from price data.³ A reliable estimator of costs in terms of bid–ask spreads would significantly enhance participants' ability to choose between different market structures.

² [Roll \(1984\)](#) developed a simple method that provided an estimate of bid–ask spreads using the transactions prices prior to the availability of quote data in US equity markets. [Bhattacharya's \(1983\)](#) method was initially developed to estimate the spreads in U.S. options markets where no quote data existed at the time. [Thompson and Waller \(1988\)](#) and [Smith and Whaley \(1994\)](#) methods were specifically developed to estimate the bid–ask spreads in U.S. futures markets using transactions data from floor-based markets. All four of these estimators have extensively been used in futures markets literature to estimate bid–ask spreads.

³ During the last decade, bid and ask quotes in U.S. equity markets have been recorded and made publicly available for research. Therefore, bid–ask spreads are calculated without using any estimation methodology in equity market microstructure research. However, floor-based U.S. futures markets still do not record bid and ask quotes. Research in these markets necessitate the estimation of bid–ask spreads.

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