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Market structure and microstructure, in international interest rate futures markets

Frank McGroarty [a,*], Owain ap Gwilym [b], Steve Thomas [c]

[a] University of Southampton, School of Management, Highfield, Southampton, Hampshire SO17 1BJ, United Kingdom
[b] Bangor Business School, United Kingdom
[c] CASS Business School, United Kingdom

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ABSTRACT

We examine the role of market structure in identifying microstructure features of the NYSE.Euronext-LIFFE STIR futures market by comparing the ability of two bid–ask spread component models to explain bid–ask spreads. These two models differ only in their assumptions about whether or not market makers are present. The period we analyze includes data from pit-based trading alongside electronic market data. We explore how market structure affects the way private information influences bid–ask spreads and return volatility. A second part of our study employs intraday correlation to investigate these links in greater depth, while a third part looks at how private information and trading noise contribute to price evolution.

1. Introduction

Mainstream market microstructure models have long assumed that informed traders are the initiating party in a trade. However, a number of recent studies dispute this assumption. Oliven and Rietz (2004), Bloomfield et al. (2005), Goettler et al. (2006) and Kaniel and Liu (2006) all conclude that, given the choice, informed traders prefer to play the passive role of liquidity provider. The microstructure dynamics cannot be the same in that situation as they are when informed traders are the initiating party. This leads us to argue that understanding a market's structure is critical to understanding its microstructure. We compare an empirical bid–ask spread component model, which is consistent with the initiating informed trader assumption, with an alternative model which is built

* Corresponding author. Tel.: +44 23 8059 2540.
E-mail address: fjm1@soton.ac.uk (F. McGroarty).

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around the assumption of an informed liquidity provider. We also explore an empirical model which explores how private information influences bid–ask spreads and return volatility under different market structures.

We explore this issue in the context of one of the world's largest and most heavily traded financial instruments, namely, short term interest rate (STIR) futures contracts. Our data come from the world's largest financial derivatives exchange, NYSE.Euronext-LIFFE. BIS (2000) lists total annual turnover (notional amounts) in STIR futures on LIFFE for the years 1997, 1998 and 1999 as $223.4tr, $241.4tr and $213.5tr, respectively, compared with a total domestic 1997 turnover of $7tr for the world's largest equity market, the NYSE. The STIR futures market is an important inter-bank market where banks trade to secure future interest rates for international deposits and loans. We concentrate on the 4 most liquid STIR futures contracts (Euromark, Euribor, Euroswiss and Short Sterling) between 1997 and 2000, which made up well over 90% of NYSE.Euronext-LIFFE STIR futures trading volume at that time.

We use empirical models from Huang and Stoll (1997) and from McGroarty et al. (2007, 2009). Huang and Stoll (1997) examine the composition of bid–ask spreads among NYSE specialists who are deemed to provide liquidity to informed and uninformed traders, i.e. it is assumed to conform to the conventional microstructure model. McGroarty et al. (2007) is also a bid–ask spread decomposition model but this is set in the order-driven, electronic, inter-dealer foreign exchange (FX) market, where informed traders are assumed to prefer to provide liquidity. A comparison of the results of these two models constitutes a test of market structure. Our third model, McGroarty et al. (2009), also analyzes the order-driven, electronic, inter-dealer FX market. It examines how private information and temporary buy–sell volume imbalances separately influence volatility and the bid–ask spread. Different market structures lead us to expect different relationships between these variables. Our analysis contributes to the existing literature in three ways. First, we characterize the structure of the STIR futures market, in its various states. Second, we present the components of STIR futures bid–ask spreads produced by the alternative approaches. Third, our identification of the sources of STIR futures price volatility is another new contribution.

2. Data

STIR futures contracts are primarily used to facilitate banks and large corporations in managing interest rate risk, i.e. to secure a future interest rate. Speculators and arbitrageurs also participate in this market when they perceive profit opportunities. We obtained 4 years of LIFFE STIR futures tick data from the LIFFE-style online data service. Data include both quote and trade price data for Euromark/Euribor,[1] Euroswiss and Short Sterling, which are all time-stamped to the nearest second. The contracts cover the 4 quarterly expiry months (March, June, September and December), spanning the period 1st January 1997 to 31st December 2000. This period is unusually rich in changes to the market structure. In the early part of this period, trading was done in trading pits via open outcry. Later in this period, the market switched to exclusively electronic trading. This period also includes European Monetary Union (EMU), when 11 countries swapped their national currencies for the euro. This precipitated the transition from the Deutschemark (DEM) denominated Euromark to the euro (EUR) denominated Euribor. Also within our sample period, the minimum pricing increment for the Euromark contract was halved.

Our data is divided into 4 separate sub-blocks of broadly similar size. Each break between the data blocks coincides with a major structural change in the LIFFE STIR futures market. The first data block covers the period 1st January 1997 up to 19th January 1998, when the Euromark tick size was reduced from 1 to 0.5. The Euroswiss and Short Sterling data are also split at this date to enable comparison across different futures contracts. The second data block spans the period 20th January 1998 to 31st December 1998, which is the period from the start of the new Euromark tick size, up to the advent of

[1] We treat the Euribor futures contract as the direct successor to the Euromark futures contract for comparison purposes. Prior to EMU, the Euromark was by far the largest European futures contract, by volume traded. After EMU, the Euromark contract disappeared and the Euribor rapidly took over the mantle of most traded European contract.