MARKET INSIGHTS

The cost of executing large orders: ASX Futures – Update IV

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September 2009 • Edition 29

in association with

ASX
AUSTRALIAN SECURITIES EXCHANGE

FOREWORD

In this 29th Edition of Market Insights, Dr. Andrew Lepone and Rizwan T. Rahman from the Discipline of Finance at the University of Sydney examine the cost of executing large orders in the 3 and 10 Year Bond futures, 90 Day BAB futures, and the ASX SPI200® index futures. Given the recent global financial crisis, this research highlights how the cost of trading has changed through time and has returned to pre-crisis levels. I trust you will find it both interesting and useful when examining the opportunities that the ASX might present to your particular organisation.

Regards

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The cost of executing large orders: ASX Futures Update IV

Dr. Andrew Lepone and Rizwan T Rahman

EXECUTIVE SUMMARY

This paper provides estimates of slippage costs associated with executing large orders on ASX following the global financial crisis. The orders examined include those of the size typically transacted by large institutions such as CTA's and fund managers. Using a sample of orders executed between December 17, 2007 and June 16, 2009, which includes the global financial crisis, we find:

- That there was a spike in slippage costs across all categories following the global financial crisis, but slippage costs have returned to (or improved beyond) pre-global financial crisis levels since the peak in September 2008.
- Slippage costs for small to medium sized orders in interest rate products on the ASX have to a great extent reduced from their peak of about 0.41 basis points in September 2008 to a maximum of 0.15 basis points in June 2009.
- Slippage costs in ASX SPI200® have been consistently improving since December 2007, from their peak of 0.21 basis points to slightly above 0.01 basis points in June 2009 for small to medium sized orders.
- Examination of orders in the largest size category for interest rate products reveal that slippage costs have almost halved from their peak of 1.46 basis points in September 2008 to 0.78 basis points in June 2009.
- Similarly, slippage costs in the largest size category ASX SPI200® have consistently improved from their peak of 0.44 basis points in December 2007 to 0.09 basis points in June 2009.

These findings suggest that slippage costs incurred in executing orders on ASX have significantly improved following the volatility of the global financial crisis and are currently low, reflecting the high liquidity of the contracts.

Introduction

This paper provides estimates of the on-market cost, or 'slippage', of executing orders on ASX. Slippage is defined as the extent to which the execution of a large order adversely affects the futures price. That is, the extent to which buy orders move the futures price upwards, or the extent to which sell orders move the futures price downwards.

Slippage is an implicit cost of trading in futures markets and has two potential causes; a temporary (liquidity) effect and a permanent (information) effect. A temporary price effect occurs when there is insufficient liquidity in the market to accommodate the order, and the price temporarily moves to a market-clearing level. A permanent price effect occurs when the order is perceived to convey information, and the market adjusts the price accordingly.[1]

In this paper we use data for the period December 17, 2007 to June 16, 2009 for the four major contracts trading on ASX. Slippage estimates of orders executed in each quarter from December 17, 2007 to June 16, 2009 are compared to determine changes in the level of slippage over time. To isolate slippage costs incurred by extremely large orders, we further examine the largest category of orders separately within the sample period.

1. Slippage: All orders

A Description of Orders Executed on ASX

To minimise slippage, institutions frequently break up large orders into a sequence of smaller trades executed over a period of time. The data used in this paper allows us to identify trades belonging to the same order. Our analysis focuses on slippage estimates for orders as opposed to individual trades.

Estimates of Slippage

To measure slippage for each institutional order, the volume-weighted average price (VWAP) of each order is calculated. The price 10 trades before the order commenced executing is the benchmark price, as it represents an unperturbed price, independent of the order, observable to all traders prior to execution. Slippage is the difference between the VWAP of the order and the price 10 trades prior to the order. If the VWAP of the order is greater than the price 10 trades before for purchases or less than the price 10 trades before for sales, the order has incurred slippage. The level of slippage sustained depends on the magnitude and direction of price pressure exerted by an order.

This paper contains an updated measure of slippage costs. Previous editions of Market Insights implemented the opening price on the first day of the order as the benchmark price; however, this no longer provides the most accurate measure of slippage. As a result of the global credit crisis there has been a substantial increase in price volatility at the open of trade in all Australian securities markets. Therefore, this paper implements intraday benchmarks to provide a more accurate measure of slippage costs.[2]

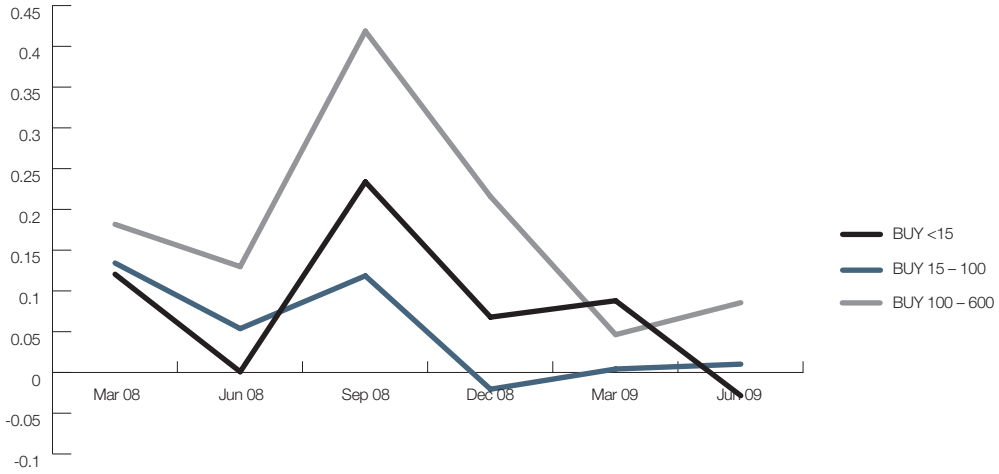
Figures 1 – 4 illustrate the average slippage incurred over time when executing various sized orders in 3 Year Bond futures, 10 Year Bond futures, 90 Day BAB futures, and SPI200® futures. Orders are ranked by their total volume and divided into 4 (approximately) equal groups for analysis.

1 Chan, L.K.C. and J. Lakonishok, 1993, "Institutional Trades and Intraday Stock Price Behavior," *Journal of Financial Economics*, 33, 173-200.

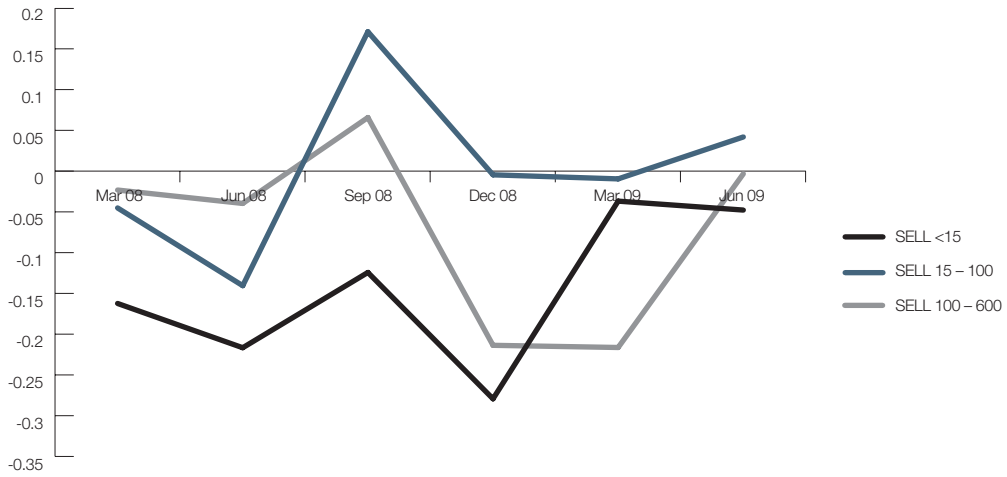
2 See Appendix for further details of slippage calculation.

Figure 1
ESTIMATES OF SLIPPAGE INCURRED IN EXECUTING DIFFERENT SIZE ORDERS IN 3 YEAR BOND FUTURES (IN POINTS)

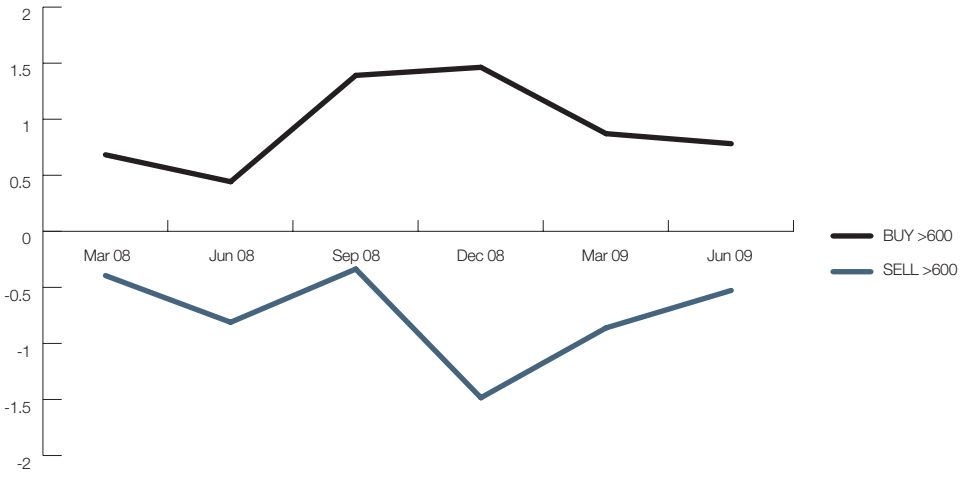
PANEL 1A: SMALL TO MEDIUM TRADES, BUY ORDERS



PANEL 1B: SMALL TO MEDIUM TRADES, SELL ORDERS



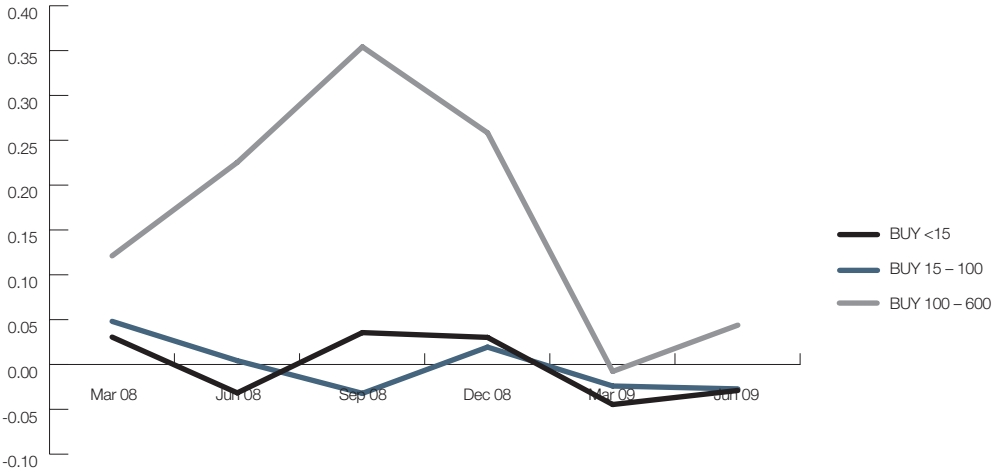
PANEL 1C: LARGE TRADES, BUY AND SELL ORDERS



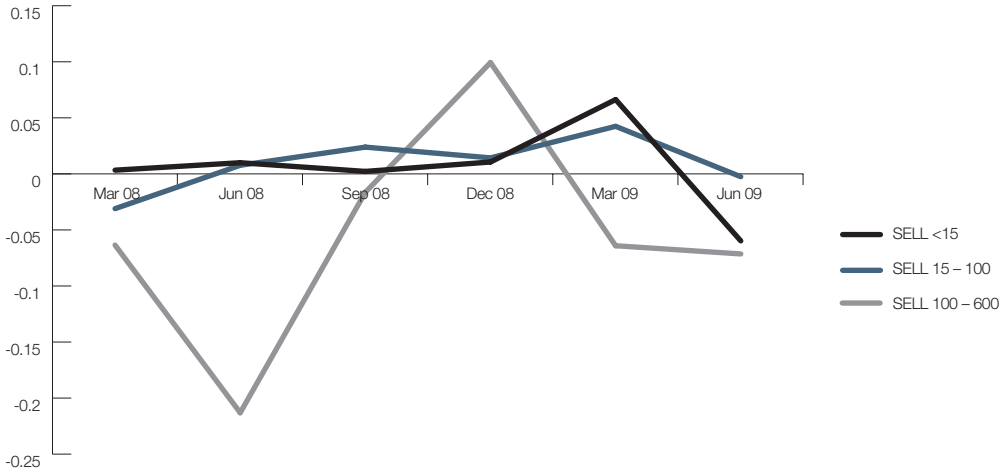
In Panel 1A-B of Figure 1, slippage costs for 3 Year Bond futures are at their highest at 0.41 basis points between June and September 2008, and reduce down to a high of 0.08 basis points between March and June 2009 for small to medium sized orders. This evidence is consistent with the increase in volatility and slippage costs following the global financial crisis. As is expected with the larger orders executed in 3 Year Bond futures in Panel 1C, slippage costs increase to a high of 1.46 basis points between September and December 2008 and level off at 0.78 basis points between March and June 09. This reduction in transaction costs allows institutions to trade larger orders in interest rate products more profitably.

Figure 2
ESTIMATES OF SLIPPAGE INCURRED IN EXECUTING DIFFERENT SIZE ORDERS IN 10 YEAR BOND FUTURES (IN POINTS)

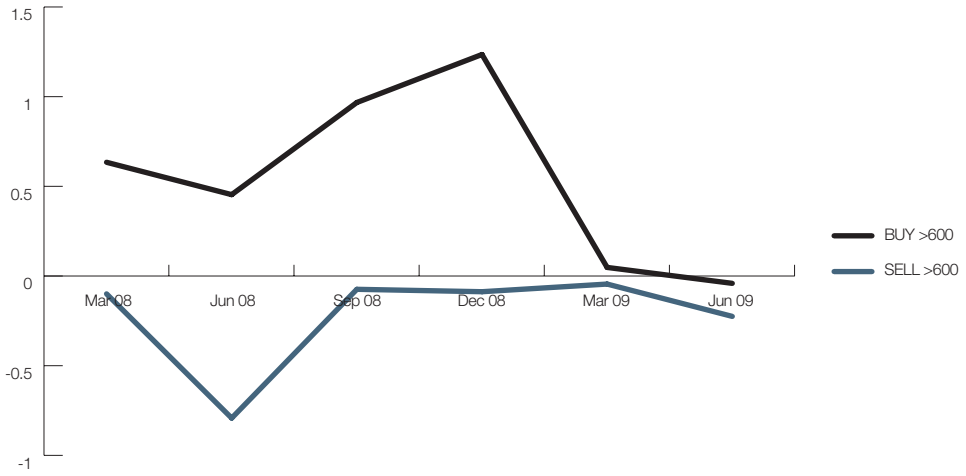
PANEL 2A: SMALL TO MEDIUM TRADES, BUY ORDERS



PANEL 2B: SMALL TO MEDIUM TRADES, SELL ORDERS



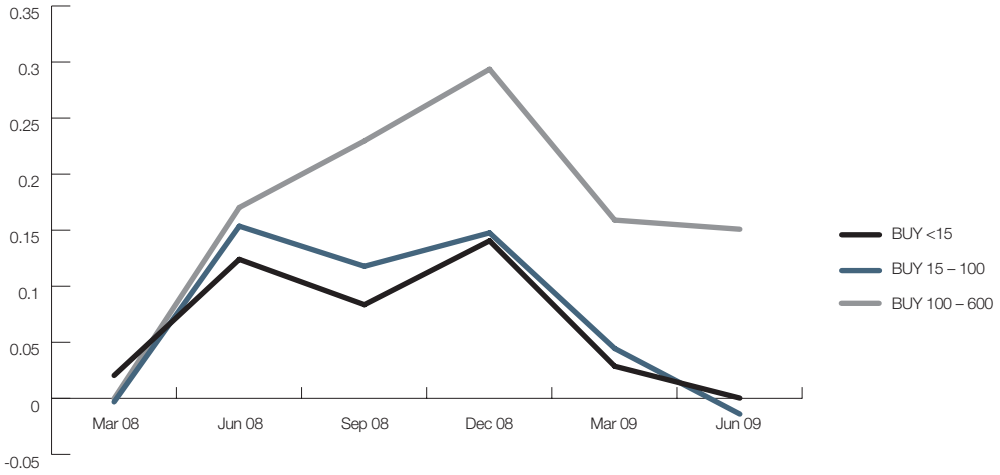
PANEL 2C: LARGE TRADES, BUY AND SELL ORDERS



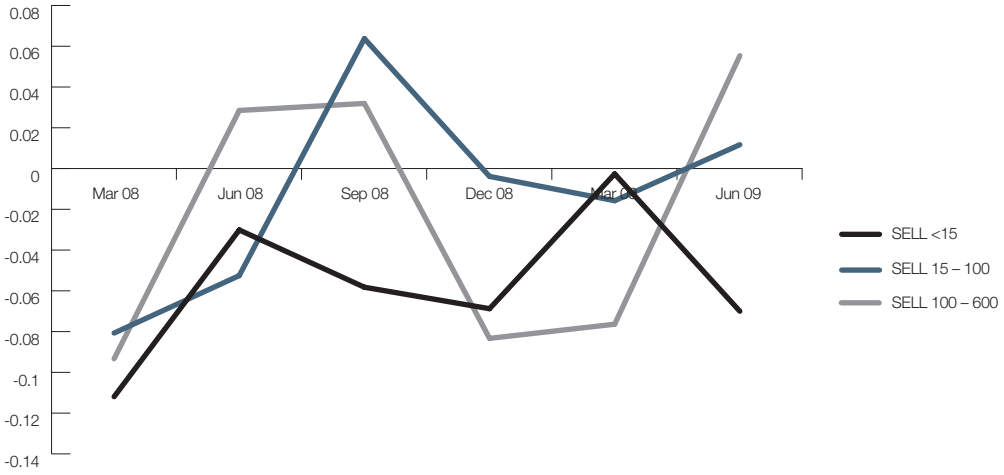
In Panel 2A-B of Figure 2, slippage costs for 10 Year Bond futures are at their highest at 0.35 basis points between June and September 2008, and reduce down to a high of 0.07 basis points between March and June 2009 for small to medium sized orders. This evidence is consistent with the increase in volatility and slippage costs following the global financial crisis. As is expected with the larger orders executed in 10 Year Bond futures in Panel 2C, slippage costs increase to a high of 1.23 basis points between September and December 2008 and level off at 0.22 basis points between March and June 09. This reduction in transaction costs allows institutions to trade larger orders in interest rate products more profitably.

Figure 3
ESTIMATES OF SLIPPAGE INCURRED IN EXECUTING DIFFERENT SIZE ORDERS IN 90-DAY BAB FUTURES (IN POINTS)

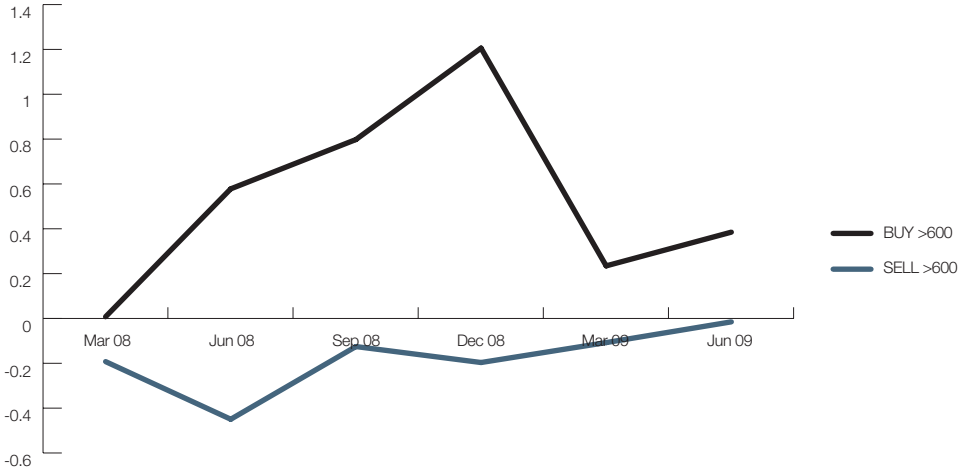
PANEL 3A: SMALL TO MEDIUM TRADES, BUY ORDERS



PANEL 3B: SMALL TO MEDIUM TRADES, SELL ORDERS



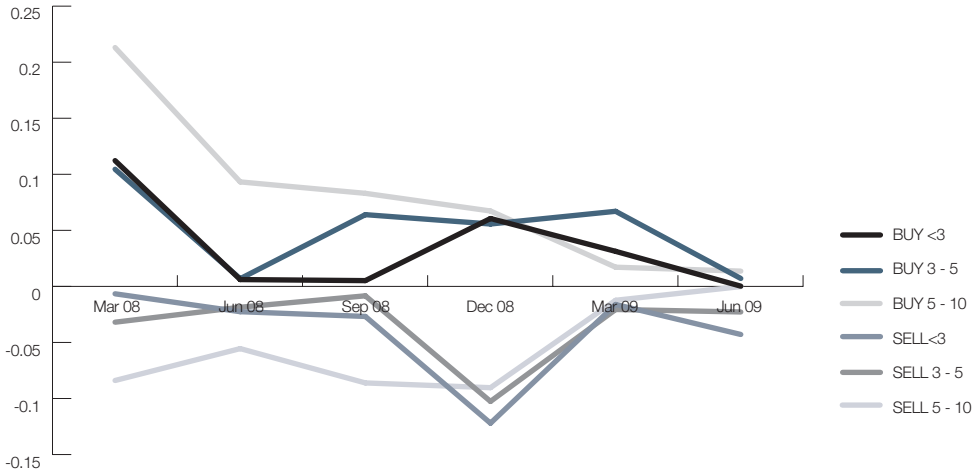
PANEL 3C: LARGE TRADES, BUY AND SELL ORDERS



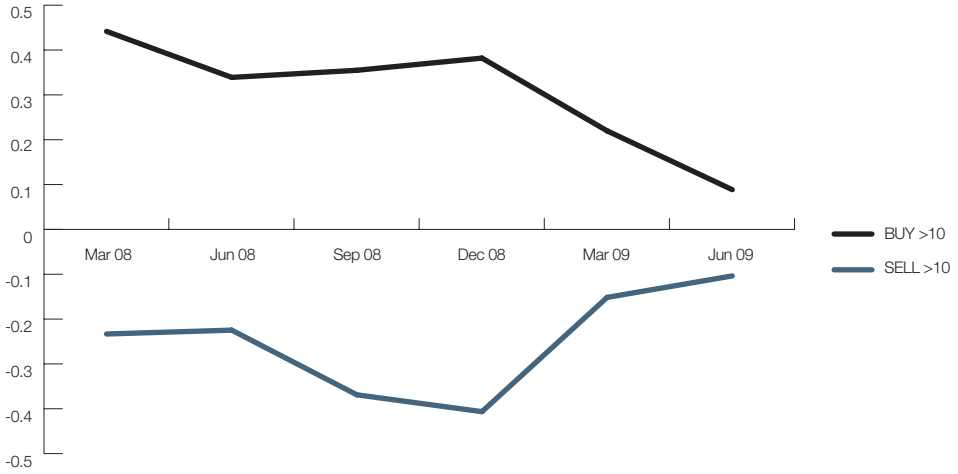
In Panel 3A-B of Figure 3, slippage costs for 90 Day BAB futures are at their highest at 0.29 basis points between September and December 2008, and almost halve to a high of 0.15 basis points between March and June 2009 for small to medium sized orders. As expected for larger orders executed in 90 Day BAB futures in Panel 3C, slippage costs increase to a high of 1.2 basis points between September and December 2008 and level off at 0.38 basis points between March and June 09.

Figure 4
ESTIMATES OF SLIPPAGE INCURRED IN EXECUTING DIFFERENT SIZE ORDERS IN SPI200® FUTURES (IN POINTS)

PANEL 4A: SMALL TO MEDIUM TRADES, BUY AND SELL ORDERS



PANEL 4B: LARGE TRADES, BUY AND SELL ORDERS



Panel 4A of Figure 4 reports average slippage for different sized orders in SPI200® futures contracts. In contrast to the interest rate products, the slippage costs in SPI200® futures do not exhibit a large spike in slippage costs from December 2007 to June 2009. Instead slippage costs steadily decrease, with a slight increase between September and December 2008. For small to medium orders, slippage costs are at their peak between December 2007 and March 2008 at 0.21 basis points and consistently decrease to 0.02 basis points between March and December 2009. Similarly for large orders, slippage costs of 0.44 basis points between December 2007 and March 2008 decrease to 0.1 basis points between March and June 2009.

These findings confirm the liquidity of ASX interest rate products and the SPI200® since the peak of the global financial crisis, and highlights that slippage costs in exceptionally large orders in interest rate contracts and the SPI200® on ASX have continued to improve and incur minimal market impact costs.

APPENDIX 1

Data and methodology used to calculate slippage

Data

This paper uses a unique data set that contains date, price, time, volume, direction, contract code and account identifier fields for each trade executed between December 17, 2007 and June 16, 2009. The account identifier field is an alphanumeric code indicating the account executing each order within the sample period.

Packaging trades into orders

A sequence of trades is classified as an order if they

1) originate from the same account,

2) are in the same direction (buy or sell), and

3) are executed with less than a one-day trading break.[3]

This implies that an order from a nominated account ends when either the direction of trade changes or they stay out of the market for a period greater than one trading day.

We examine daytime trades executed in the near and deferred contracts and exclude trades that (1) occur 10 days prior to the expiration of the near contract, and (2) are executed completely by means of one contract.[4] Trades executed close to the expiration of the near contract are essentially investors rolling their position from the near to deferred contract, and trades executed using one contract by definition do not incur slippage. In order to proxy for institutional trades, locals are excluded from analysis.

Measuring slippage

The slippage for order i with first trade t is calculated as

$$Slippage_i = VWAP_i - Price_{t\text{-}10}$$

Where $Price_{t\text{-}10}$ is the price 10 trades prior to the first trade t in the package. $VWAP_i$, the volume weighted average price at which order i is executed, is calculated as follows:

$$VWAP = \frac{\sum_{i=1}^{n} S_i * P_i}{\sum_{i=1}^{n} S_i}$$

S_i is the size of trade i making up the order, and P_i is the price at which trade i is executed and n is the separate number of transactions which make up the order.

The benchmark used to calculate slippage is the price 10 trades prior to the first trade in the order. We use the price 10 trades before as it is an unperturbed price that is independent of the order and is observed by all traders prior to executing their order. Using a benchmark price that prevailed prior to the order is consistent with current futures market literature.[5]

3 This criteria of a one-day trading gap is consistent with current academic practice. See Frino, A. and T. Oetomo, 2005, "Slippage in Futures Markets: Evidence from the SFE," *Journal of Futures Markets*, 25(12), 1129-1146.

4 See Frino, A. and M. D. McKenzie, 2002, "The Pricing of Stock Index Futures Spreads at Contract Expiration," *The Journal of Futures Markets*, 22(5), 451-469.

5 See Berkman, H., T. Brailsford, and A. Frino, 2005, "A note on execution costs for stock index futures: Information versus liquidity effects", *Journal of Banking and Finance*, 29, 565-577.

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