The Role of Floor Brokers in the Supply of Liquidity: An Empirical Analysis

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This article analyses the role of floor brokers in the supply of liquidity on the Australian Stock Exchange Derivatives market. Floor brokers have valuable order execution skills because of their information advantage over off-floor traders and their ability to mitigate some problems related to the option-like characteristics of limit orders. Our results indicate that floor broker participation in the execution of limit orders tends to be high when the above qualities are most valuable.
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INTRODUCTION

On securities markets with a trading floor, public traders can generally compete with market makers in the supply of liquidity by submitting limit orders. Floor brokers play an important role in this process. For example, Sofianos and Werner (1997) report that on the New York Stock Exchange

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(NYSE), liquidity provided by floor brokers is 34 percent of the total value of all executed orders. Floor brokers sometimes play a more passive role and simply submit their clients' limit orders to the limit order book, leaving it to the specialist or order book official to execute the order. This article provides an empirical analysis of the floor broker's decision to be actively involved in limit order execution or to use the limit order book. A better understanding of the role of floor brokers in the supply of liquidity is of interest since important markets such as the NYSE, the Chicago Board of Exchange (CBOE) and the Chicago Mercantile Exchange (CME) have decided to maintain an active trading floor, whereas several other markets have moved to a floorless trading system (e.g., Deutsche Termin Borse, the Osaka Securities Exchange, the Paris Bourse, and the Tokyo Stock Exchange).

Harris (1990) argues that limit order traders face two problems that can be partially solved by floor brokers. The first problem is what he refers to as *quote matching*. To illustrate, assume that a large order to buy a stock is entered into the limit order book. In reaction to this order, a quote matcher might offer to buy at a slightly higher price. If the quote matcher's quote is hit and the price subsequently rises, the quote matcher makes a profit. If the quote is hit and the stock price falls, the quote matcher may be able to limit his loss by selling to the large buy order in the book. The quote matcher's actions make favorable execution of the limit order less likely. Floor brokers can help to prevent quote matching by concealing limit orders or by adjusting limit orders in response to other market participants' actions.[1]

The second problem of limit orders is that monitoring costs and delays in cancellation and execution prevent investors from continuously updating their limit orders for changes in market conditions. Because of this inflexibility, limit orders are exposed to the arrival of new public information. For example, Berkman (1996) shows that on the European Options Exchange, large limit orders in the book are typically hit after adverse changes in the underlying stock price. Consistent with the idea that these orders are picked off, the post-trade quotes change permanently in the direction of the transaction. Floor brokers provide a solution to this "sitting duck" problem of limit orders, as investors can instruct floor brokers to adjust their limit orders as soon as market conditions change.

In addition to their ability to conceal and adjust limit orders, floor brokers are likely to have an information advantage over off-floor traders.

[1]Harris (1996) analyses the effectiveness of the use of undisclosed limit orders as another way to prevent quote matching.

By standing in the trading crowd, floor brokers receive information about the trading intentions and positions of other market participants. Floor brokers can also communicate their own trading intentions, without giving up the flexibility to adjust quotes. We expect that this information advantage is especially valuable for large limit orders, because these orders are more susceptible to quote matching and picking off.

Because of their information advantage and flexibility, the active involvement of floor brokers in the execution of limit orders can be valuable. The time a floor broker can devote to each limit order is limited, however. We therefore expect that floor brokers are actively involved in limit order execution when their execution skills are most valuable. That is, we expect that floor broker participation in limit order execution increases in order size and is positively related to variables that proxy for the option value of the order. To test this hypothesis, we study floor broker participation in limit order execution on the Australian Stock Exchange Derivatives market (ASXD). Note that we do not analyze the decision of an investor to submit a market order or a limit order. We focus on how a limit order is executed (floor or book) after an investor has decided to submit a limit order.

Several recent articles analyze the costs and benefits of a floor trading system. Benveniste, Marcus, and Wilhelm (1992) concentrate on the information advantage that floor brokers have because of their knowledge of the identity of their clients. They argue that floor brokers reduce problems related to information asymmetry because of their incentive to reveal to the specialist whether their clients are likely to have private information. Note that Benveniste et al. (1992) assume that floor brokers are only involved in the execution of market orders, whereas this article concentrates on limit orders. Handa, Schwartz, and Tiwari (1998) analyze price changes around the execution of floor and non-floor orders on American Stock Exchange (AMEX). They find that floor brokers behave strategically in the execution of their clients' orders and that the timing of their executions depends on the liquidity in the market. Finally, Seppi (1997) develops a model of the strategic behavior of a market maker competing with off-exchange liquidity providers. The off-exchange traders submit their orders to the limit order book and do not use the services of floor brokers. Seppi (1997) predicts that the relative supply of liquidity from limit orders is lower for securities where the ex ante cost of being picked off is higher.[2] The main hypothesis tested in this article is very similar.

[2]Madhavan and Sofianos (1998) study specialist participation in the supply of liquidity on the NYSE. Their results indicate that specialist participation is inversely related to trading volume and off-exchange participation. Specialist participation is also lower for stocks where the relative tick size is higher.

We expect that floor broker participation is higher for limit orders that are more likely to suffer the costly consequences of their price inflexibility.

We find strong support for our main hypothesis. Participation of floor brokers in the execution of limit orders on the options exchange (as opposed to placing them in the book) increases in option volatility and order size, and decreases in the trading volume of the underlying stock. We also find that floor brokers tend to participate more when the bid ask spread is wide relative to the tick. Finally, we find that the active involvement of floor brokers initially decreases in trading activity, but changes sign when trading activity increases further.

This article is structured as follows. Institutional Background and Data describes the institutional environment of the ASXD and the data. The subsequent sections are Hypothesis Development, Empirical Results, and Conclusion.

INSTITUTIONAL BACKGROUND AND DATA

The ASXD is among the top ten derivative exchanges in the world and trades put and call options on more than 60 Australian companies and indices of the Australian share market. All options are American and standardized by contract size (1,000 shares of the underlying stock), expiry date, and exercise price. The time to expiration of new option series is generally nine months, but the ASXD has recently introduced spot monthly options and long-term options. Other products traded on the ASXD include Low Exercise Price Options (LEPOs), flexible options, and index options. Minimum price increments are 0.5 cents for options with a price lower than 40 cents and 1 cent for options equal to or greater than 40 cents. Trading takes place between 10:00 am to 12:15 pm and 2:00 pm to 4:00 pm and only when the underlying security is being traded on the Australian Stock Exchange (ASX).

The ASXD uses a combination of open outcry and an electronic limit order book, the Derivatives Automated Trading System (DATS). DATS is a semi-automated trading system that enables brokers to submit, cancel, or amend limit orders and gives interstate brokers access to the market. There is no automatic matching of orders in DATS.[3] Orders placed through DATS are immediately routed to order book officials for execution. Trading must occur in the crowd in front of the trading screens. The crowd is composed of market makers (registered traders), order book officials (board brokers), and floor brokers. There is one order book official

[3]The trading system on the ASXD studied in this article was replaced by a fully automated computer trading system in early 1998.

per underlying value. The order book official is purely a brokers' broker and is not allowed to trade for his own account.

Market makers are each assigned one or more series of options and compete with each other, the limit order book, and floor brokers holding limit orders. Primary market makers are obliged to quote for a minimum quantity and within a maximum spread in the classes of options assigned to them. Market makers may trade, but are not required to make a market in option series other than their assigned series.

The trade process usually starts with an order received by a floor broker. This floor broker will enter the crowd and ask for a market. Market orders are executed immediately and limit orders are executed if they fall within the given quotes. If a limit order is not executed, the floor broker can choose to place the order with an order book official or hold the order. Limit orders in the book are given priority according to price and then time and lapse at the close of trading. Order book officials try to obtain optimal order execution for limit orders in the book, but contrary to floor brokers, they can not bargain, conceal limit orders, or adjust limit orders when market conditions change. The limit order book and primary market makers have priority over other suppliers of liquidity giving quotes at the same price (non-primary market makers and floor brokers holding limit orders). When a primary market maker gives the best quote and the order book official holds limit orders at the same price, the primary market maker and the book are each entitled to trade for 50% with the initiator of the transaction.

Data

We have daily data for every option series traded on the ASXD from 1 January 1996 to 31 December 1996. The data are supplied to us by the Securities Industry Research Centre of Asia-Pacific (SIRCA). For each series, for each day, we have the aggregate value of all trading between each of the three sources of liquidity: market makers, the limit order book, and floor brokers. To decide who supplies liquidity in the trades between those groups, we make the following assumptions. First, for all trading involving the limit order book, it is assumed that the limit order book is the supplier of liquidity. Thus, limit order traders are assumed to be patient and do not require immediate execution of their orders. A potential problem with this rule is that interstate brokers sometimes submit "marketable" limit orders to the limit order book. Marketable limit orders are aggressively priced limit orders that jump the spread and are quickly executed. Our rule would incorrectly classify these marketable limit orders

as liquidity supplier.[4] To exclude marketabe limit orders from the analysis, the sample only includes limit orders that have at least 5 seconds between the time of execution and the time the order was entered into the limit order book.[5] The total value of transactions involving the limit order book after deleting marketable limit orders from the sample is 13% of all trading.

Second, for trades between floor brokers, a floor broker is supplier of liquidity. Trading between floor brokers is 34% of the total value of all trading. Thirdly, for all trading between market makers and floor brokers, market makers are assumed to supply liquidity. Trading between market makers and floor brokers is 48% of the value of all trading. Underestimation of floor broker participation occurs for transactions where market makers initiate the trade against floor brokers holding limit orders. To test the sensitivity of our results to this potential bias, we repeat our analysis on a sample excluding trades between floor brokers and market makers. Finally, in our analysis of the way in which limit orders are traded, we exclude market maker to market maker trades from our sample. Trades between market makers do not involve public limit orders and are likely to reflect inter-dealer inventory smoothing. Trading between market makers is 5% of all trading.

Crossings, trades outside normal trading hours, and composite trades such as spreads and straddles are excluded from the sample as they are subject to special trading rules. We also exclude series with less than five days until expiration, and option series with a closing bid price of less than 1 cent.

Table I, panel A presents details on the supply of liquidity on the ASXD across all days and option series in 1996. Averaged across option series, the total value of liquidity supplied by market makers is 56.9% of the total value of all executed orders. For the limit order book, this number is 33.7% and floor broker participation, 9.3%. Note that these numbers are simple averages across all option series. As reported above, the overall value of liquidity supplied by market makers is 53%; this number is 34% for floor brokers and 13% for the limit order book. The difference between these numbers and Table I results from the fact that floor brokers tend to supply relatively more liquidity for option series with a relatively

[4]This problem does not exist for brokers on the floor receiving marketable limit orders. They will immediately execute marketable limit orders on the floor and these orders would not be classified as supplier of liquidity (see this section).

[5]We use five seconds to allow the crowd to react to and trade with an aggressively priced limit order. Using the five second criterion, the proportion of marketable limit orders is 20% of all executed limit orders in the book. Using a 30-second criterion this number is 24%. Repeating our tests using a 30 second criterion, or a zero second criterion does not materially change any of the results.

TABLE I

Supply of Liquidity on the Australian Stock Exchange Derivatives Market

	Mean	*Median*	*Min*	*Max*	*Std Dev*
Panel A: Sources of Liquidity on the ASXD Across All Option Series Traded in 1996					
Market Makers	0.569	0.685	0	1	0.434
Limit Order Book	0.337	0.017	0	1	0.426
Floor Brokers	0.093	0.000	0	1	0.245
Average Order Size ($)	12,691	3,500	18	5,940,000	60,808
Market Maker Size ($)	11,202	4,000	25	5,940,000	52,390
Limit Book Size ($)	4,136	1,907	18	381,750	175,113
Floor Broker size ($)	74,208	27,500	21	4,943,144	8,476

Panel B: Sources of Liquidity on the ASXD per Trading Volume Decile

Trading Volume Decile	Market Makers	Limit Order Book	Floor Brokers
1 (Lowest)	0.475	0.503	0.022
2	0.506	0.487	0.006
3	0.541	0.451	0.008
4	0.566	0.422	0.011
5	0.587	0.397	0.015
6	0.607	0.357	0.036
7	0.610	0.324	0.064
8	0.621	0.253	0.125
9	0.602	0.183	0.215
10 (Highest)	0.522	0.092	0.386

Notes: Table I presents descriptive statistics of the supply of liquidity on the ASXD. We used daily data for all option series traded on the ASXD in 1996. There are 44,029 observations in the sample. Market maker participation is measured as the dollar value of liquidity supplied by market makers for option series i over trading day t divided by the dollar value of all trading in option series i over trading day t. Limit order book participation is measured as the dollar value of liquidity supplied by the limit order book for option series i over trading day t divided by the dollar value of all trading in option series i over trading day t. Floor broker participation is the dollar value of limit orders executed by floor brokers for option series i over trading day t, divided by the dollar value of all trading in option series i over trading day t. Order size is based on all trades. The table also reports the dollar value of the participation of market makers, the limit order book, and floor brokers in the trades. The trading volume deciles in panel B are based on the trading volume per option series per day. Decile 1 is the decile with the lowest trading volume. The variables in panel A are averaged across all option series. The variables in panel B are averaged across all option series in each trading decile.

high trading volume (see panel B). The average transaction size across all transactions is $12,691. The average value of market makers participation in trades is $11,202. The average value of limit order book participation is $4,136 and for floor brokers it is $74,208. This evidence is consistent with Sofianos and Werner (1997), who report that floor brokers tend to be involved in relatively large transactions.[6]

[6]The average transaction size across all trades counts trades where a demander of liquidity trades with more than one supplier of liquidity as one trade. To calculate the average value of the participation of each supplier of liquidity, we split shared transactions over the suppliers of liquidity involved in those transactions according to the value of their participation and count these fractional trades as separate trades.

TABLE II

Summary Statistics

	Mean	*Median*	*Min*	*Max*	*Std Dev*
Underlying Stock Volume ($,000)	26,616	17,810	115	789,194	30,408
Option Price (c)	31.79	20.50	1.75	561	34.95
Option Bid-Ask Spread (%)	18.18	15.38	0.55	182	13.24
Option Trading Volume ($,000)	64.8	9.02	0.018	9489.8	208.18
Option Volatility	3.14	2.66	0.05	35.78	2.03
Average Trade Size ($,000)	14.55	3.85	0.018	2160	49.92
Ticks	5.78	6.00	1	302	6.94

Notes: Table II presents summary statistics of the variables used in model (1) across all days and option series for days on which liquidity was supplied by limit orders (limit order book or floor brokers). The sample period is 1 January 1996 to 31 December 1996. The data set consists of 26,539 observations. To calculate option volatility we multiply the stock price divided by the option price with the volatility of the underlying value and the absolute value of the hedge ratio based on the Black-Scholes option pricing model. The volatility of the underlying value is based on the last 90 trading days. Ticks is defined as the closing bid ask spread of option series i divided by the tick size for option series i.

Table I, panel B splits the sample in 10 deciles based on the total daily turnover of each option series. Market maker participation is 47.5% for the decile with the lowest trading volume (decile 1), goes up to 62.1% for decile 9, and then drops to 52.2% for the most traded options. This result is different from Madhavan and Sofianos (1998), who report that specialist participation decreases monotonically in trading volume. Floor broker participation is 2.2% for the decile with the lowest trading volume. This number drops even further for the next two deciles and then increases to 38.6% for the most actively traded option series. For the supply of liquidity from the limit order book we observe the opposite. The supply of liquidity from the limit order book is 50.3% for the most illiquid series and steadily drops to 9.2% for the most liquid option series.

It is interesting to note that the percentage of liquidity supplied by market makers and all limit orders (limit order book and floor brokers) is relatively constant across the trading deciles. There is much more variation in the way limit orders are executed. For the least liquid options, most limit orders are executed through the limit order book and for the most liquid option series, floor brokers execute the majority of the limit orders. This study focuses on the variation in the way limit orders are traded and the following excludes option series for which no limit orders were executed during a certain trading day.

Table II presents summary statistics for the independent variables in our empirical model of floor broker participation. The average daily trading volume for the underlying stocks is $27 million. The average option price is 32 cents and the average bid ask spread is 18 percent. To calculate

the spread we use the quotes at the close as reported by Autoquote. Autoquote is the automatic quote updating system used on the ASXD and gives indicative quotes only. It is likely that actual trades will occur within the quotes generated by Autoquote. To calculate option volatility, we multiply the volatility of the underlying value with the absolute value of the elasticity of the option (the stock price divided by the option price times the absolute value of the hedge ratio, see Cox and Rubinstein, 1985). The hedge ratio is calculated using the Black-Scholes option pricing model and the volatility of the underlying value is based on the last 90 trading days. Option volatility ranges from 5 percent to 3578 percent, with an average of 314 percent. The average order size is $14,558 and the number of ticks within the bid-ask spread ranges from 1 to 302 ticks, with an average of 5.78 ticks.

HYPOTHESIS DEVELOPMENT

If a trader submits a limit order, a floor broker can execute the order on the floor or place it in the limit order book.[7] As discussed in Harris (1990), floor brokers holding limit orders can mitigate quote matching and prevent orders from being "picked off" when market conditions change. The time a floor broker can devote to order execution is limited, however. The decision to place an order in the limit order book or to be actively involved in order execution is therefore expected to depend on the need for the order execution skills or information advantage of the floor broker.

Trading Activity

When trading activity is low, the time between trades is long and the option value of limit orders in the book is relatively high. Limit orders for option series with low trading volume will therefore benefit relatively more from protection by floor brokers. On the other hand, because floor brokers try to maximize their turnover they will, ceteris paribus, avoid holding limit orders for inactive option series. For active option series, the opposite reasoning applies. The benefit of broker participation per transaction is relatively low, but turnover is high. To reflect these opposing effects, our empirical model allows for a non-linear relation between floor broker participation and trading activity.

[7]We are unable to determine whether a client has explicitly instructed the broker to hold an order or whether it is the broker's decision. The factors affecting the way in which the limit order is executed are expected to be similar in both cases.

Order Size

By standing in the crowd, floor brokers are able to obtain information about undisplayed trading intentions of other market participants. Floor brokers can also communicate their own trading intentions while maintaining the flexibility to adjust quotes. We expect that these skills are most valuable for large limit orders, since large orders have more option value. Madhavan and Cheng (1997) also emphasize the reluctance of traders to submit large limit orders because of their option value.

Volatility

The value of the option given to market participants by traders who place orders in the book is higher for more volatile securities (Copeland and Galai, 1983). We therefore predict that the need for floor brokers to execute discretion regarding the execution of limit orders increases with volatility.

Stock Trading Volume

Madhavan and Sofianos (1998) argue that better public information is available for larger firms. Limit order traders for options on more liquid stocks can therefore base their decisions on more precise stock prices, reducing the option value of their limit orders.

Tick Size

Seppi (1997) argues that a larger tick decreases the probability that market makers can undercut the limit order book. The need for floor broker protection is therefore low if the tick is large relative to the spread. Furthermore, because limit orders in the book have priority over other limit orders at the same price, floor brokers sometimes use the book in order to obtain time priority. Time priority is likely to be more valuable when the tick is large relative to the spread and limit orders tend to cluster at the same price.

EMPIRICAL RESULTS

This section presents the results of an empirical model of floor broker participation in the execution of limit orders. Floor broker participation for option series i over trading day t is the dollar value of limit orders

executed by floor brokers for option series i over trading day t, divided by the dollar value of all executed limit orders in option series i over trading day t. To account for the limited range of the dependent variable we use an ordered probit model. The dependent variable, $FBPart_{it}$, can take on four values. $FBPart_{it}$ equals 1 if floor broker participation for option series i on day t equals 0. $FBPart_{it}$ equals 2 if floor broker participation is between 0 and 50%, $FBPart_{it}$ equals 3 if floor broker participation is between 50% and 100%, and $FBPart_{it}$ equals 4 if floor broker participation equals 100%. Based on the discussion in the previous section we estimate the following model:

$$FBPart_{it} = \beta_0 + \beta_1 VOL_{it} + \beta_2 VOLSQ_{it} + \beta_3 SIZE_{it} + \beta_4 VOLAT_{it} + \beta_5 STOCKVOL_{it} + \beta_6 TICK_{it} + \varepsilon_{it} \quad (2)$$

VOL_{it} = the natural logarithm of the dollar value of trades in option series i over trading day t;

$VOLSQ_{it}$ = the squared value of VOL_{it};

$SIZE_{it}$ = the natural logarithm of the average dollar value of the trades in option series i during day t;

$VOLAT_{it}$ = the natural logarithm of the volatility for option series i on day t. To calculate VOLAT we multiply the stock price divided by the option price with the volatility of the underlying value and the absolute value of the hedge ratio based on the Black-Scholes option pricing model;

$STOCKVOL_{it}$ = the natural logarithm of the dollar value of the trades in the underlying stock of option series i over trading day t;

TICKSit = the natural logarithm of the closing bid ask spread divided by the tick size for option series i.

Results

Table III presents the results of our ordered probit model (1). The dependent variable is the floor broker participation in limit order execution per option series per trading day. For trading activity we find strong evidence of a U-shaped relation with floor broker participation. The U-shape is consistent with the idea that floor broker protection is valuable for limit orders in option series with low trading volume, but that, ceteris paribus, floor brokers prefer to participate in more active option series. The other

TABLE III

Empirical Model of Floor Broker Participation

Variable	*Coefficient*	*Std Error*
VOL	−1.329	0.168
VOLSQ	0.059	0.006
SIZE	0.672	0.026
VOLAT	0.267	0.031
STOCKVOL	−0.437	0.016
TICK	0.205	0.031

Notes: No. of observations 26,539.
Floor broker participation is the dollar value of the limit orders for option series i executed by floor brokers during day t divided by the total dollar value of all executed limit orders of option series i on day t. To account for the limited range of the dependent variable we use an ordered probit model. The dependent variable, $FBPart_{it}$, can take on four values. $FBPart_{it}$ equals 1 if floor broker participation for option series i on day t equals 0. $FBPart_{it}$ equals 2 if floor broker participation is between 0 and 50% and $FBPart_{it}$ equals 3 if floor broker participation is between 50 and 100%. $FBPart_{it}$ equals 4 if floor broker participation equals 100%. Intercepts are included in the estimation of model (1), but not reported. VOL_{it} is the natural logarithm of the dollar value of trades in option series i over day t and $VOLSQ_{it}$ is the squared value of VOL_{it}. $SIZE_{it}$ is the log of the average dollar value of the trades in option series i during day t. $VOLAT_{it}$ is the natural logarithm of the volatility of option series i. $STOCKVOL_{it}$ is the natural logarithm of the dollar value of the trades of the underlying value of option series i on trading day t. $TICKS_{it}$ is the natural logarithm of the closing bid ask spread of option i divided by the tick size for the option.

results indicate that floor brokers tend to participate more when their trading skills are more valuable. Floor broker participation in the execution of limit orders for options increases in trade size, option volatility, and decreases in the trading volume of the underlying stock. We also find evidence that floor broker participation is higher when the bid-ask spread is large relative to the tick size. Overall, our results indicate that floor brokers are actively involved in limit order execution to avoid problems related to the option-like characteristics of limit orders in the limit order book.

Robustness

To determine if in- or out-of-the-money option series are driving our results, we also test a subsample of at-the-money options. The results are very similar to the results presented in Table III. Inclusion of option characteristics such as moneyness, days to expiration, and a put/call dummy variable, did not materially alter any of the results.

To test the sensitivity of our results to the assumptions regarding the source of liquidity, we restrict the sample to observations where only limit orders (book or floor) supplied liquidity on a certain trading day. This restriction reduces any bias that might exist because of classifying all trades between floor brokers and market makers as trades where market

TABLE IV

Floor Broker Participation Restricted Sample

Variable	*Coefficient*	*Std Error*
VOL	−0.792	0.332
VOLSQ	0.043	0.012
SIZE	0.795	0.060
VOLAT	0.501	0.057
STOCKVOL	−0.345	0.031
TICK	0.265	0.066

Notes: No. of observations 12,127.
The sample is restricted to observations where only limit orders (book or floor) supplied liquidity on a certain trading day. There are 12,127 observations. Floor broker participation is the dollar value of the limit orders for option series i executed by floor brokers during day t divided by the total dollar value of all executed limit orders of option series i on day t. To account for the limited range of the dependent variable we use an ordered probit model. The dependent variable, $FBPart_{it}$, can take on four values. $FBPart_{it}$ equals 1 if floor broker participation for option series i on day t equals 0. $FBPart_{it}$ equals 2 if floor broker participation is between 0 and 50% and $FBPart_{it}$ equals 3 if floor broker participation is between 50 and 100%. $FBPart_{it}$ equals 4 if floor broker participation equals 100%. Intercepts are included in the estimation of model (1), but not reported. VOL_{it} is the natural logarithm of the dollar value of trades in option series i over day t and $VOLSQ_{it}$ is the squared value of VOL_{it}. $SIZE_{it}$ is the log of the average dollar value of the trades in option series i during day t. $VOLAT_{it}$ is the natural logarithm of the volatility of option series i. $STOCKVOL_{it}$ is the natural logarithm of the dollar value of the trades of the underlying value of option series i on trading day t. $TICKS_{it}$ is the natural logarithm of the closing bid ask spread of option i divided by the tick size for the option.

makers supply liquidity. For all trading involving the limit order book, we assume that the book supplied liquidity (i.e., the counterparty to the transaction with the book initiated the transaction). For all trading between floor brokers, we assume that one side to the transaction supplied liquidity and the other side initiated the transaction. The results for this restricted sample, reported in Table IV, are very similar to our earlier results.

CONCLUSION

This article examines the role of floor brokers in the supply of liquidity on the Australian Stock Exchange (ASExD). Our results are consistent with the notion that floor brokers reduce problems related to the option-like characteristics of limit orders and that floor brokers have a valuable information advantage over off-floor traders. Floor brokers tend to exercise more discretion in the execution of limit orders when option volatility and trade size are large, when trading volume in the underlying stock is low, and when the bid ask spread is wide relative to the tick. The active involvement of floor brokers initially decreases in trading activity of the option series, but changes sign when trading activity increases further.

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