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# ORDER PLACEMENT STRATEGY ON AN ORDER DRIVEN MARKET: EVIDENCE FROM THE TUNIS STOCK MARKET

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## Abstract

This paper examines the investor's order placement strategy on the Tunis stock exchange which is an electronic order driven market. Using a sample of limit and market orders submitted in the continuous trading session, we examine the determinants of the choice between market and limit orders using a binary logit model. Our empirical findings show that the probability of placing market orders is negatively related to the spread and order size and positively related to previous same-side market orders. However, the order imbalance and the time left until the market closes, affect buyers and sellers' decisions differently. Temporary volatility and depth are negatively related to the probability of placing a buy market order but are not significant for the sell sample.

**Keywords:** order driven market, limit orders, market orders, order placement strategy.

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## 1. Introduction

Many stock exchanges around the world are based on pure limit order books or rely, at least partially, upon limit orders for the provision of liquidity such as the NYSE. Recent research in market microstructure is interested in examining the placement of limit orders and their contribution to liquidity and price formation. By posting limit orders, traders voluntarily provide liquidity to the market and thus sustain it. The viability of order driven markets depends on the profitability of limit order trading. Therefore, it is important to explore the order flow dynamics, the provision of liquidity and the price formation process on such exchanges.

In a pure order-driven market, investors can choose to place limit orders and supply liquidity to the market or to trade via market orders and consume liquidity. This choice depends on the probability of execution and the degree of patience of the trader. Market orders are executed immediately at the posted prices in the market, but pay an implicit price for immediacy. Limit orders are stored in a limit-order book awaiting future execution at more favorable prices than market orders. A trade-off then exists between price improvement and execution probability.

When submitting a limit order, the trader can profit from supplying liquidity, but faces the risk of non-execution, free option and adverse selection.[1]

The probability of execution of a limit order depends both on the state of the book when the order is placed, and the expected order flow.[2] When the depth at the quotes is large, it is optimal to undercut the best quote, to increase the probability of execution, at the cost of a less favorable execution price.

Furthermore, a trader who submits a buy limit order has written a free put option to the market. The result of his strategy depends on the fluctuation of the asset's underlying value. When the underlying value of the asset moves under the fixed price of the limit buy order, it will be executed, and the trader loses. When the value of the asset moves in favor of the trader, the limit order will never been executed. It is then sub-optimal to trade by limit orders if prices move solely in response to information, and a pure order driven market is no more viable. Consequently, limit orders are profitable if they are executed against liquidity traders because transaction price changes are temporary and reversible. The placement of limit orders will be attractive as the net gain from supplying liquidity instead of consuming it is greater than the risk of trading against informed traders (Handa and Schwartz, 1996).

In fact, an investor placing a limit order faces an adverse selection risk due to the arrival of informed traders. Informed traders induce permanent and irreversible price changes and thus having a limit order execute against such price changes is undesirable.

This paper analyzes trading by limit versus market orders and provides an empirical evidence on traders' order placement strategy in the Tunis Stock Exchange (TSE). The TSE offers an appropriate testing ground for examining this issue for three reasons. First, the TSE is a pure order driven electronic stock market with no designated market maker who has the obligation to provide liquidity. Second, the market is very transparent, the order placement strategies of investors will be influenced by order book information published in real time. Finally, the market is automated and centralized, so the intraday data provided by the TSE

[1] Copeland and Galai (1983) are the first to raise the issue of the option nature of limit order trading.
[2] How the order affects the incentives of future traders to submit either market or limit orders.

fully capture the order flow and execution process. Using order flow and transaction data, we can reconstruct the limit order book at any time during our study period.

Our study is motivated by several theoretical and empirical studies on the investor's choice between market and limit orders in order driven markets. Static and dynamic theoretical models are interested in modelling the investor's order placement strategy with or without asymmetric information. Models that do not allow traders to choose between market and limit orders cannot derive implications about the determinants of such choice.

Cohen, Maier, Schwartz and Whitcomb (1981) model the investor choice of order type in a market with no asymmetric information. Copeland and Galai (1983) address the adverse selection problem from a dealer's viewpoint. They show that the market maker's returns cover the cost of trading with informed participants.[3] Glosten (1994) provides a rationale for limit order trading. He assumes two distinct classes of investors: "patient" traders who trade by limit order and "urgent" traders who wish to trade immediately, placing market orders. According to Glosten, because of competition and the depreciation of the value of private information as time lapses, informed investors are more likely to be urgent rather than patient traders. Handa and Schwartz (1996) also examine the rationale and profitability of limit order trading and show that transitory volatility attracts limit orders more than market orders as the gains from supplying liquidity exceed the potential loss from trading with informed traders. Handa, Schwartz and Tiwari (1998) model the choice of trading strategy faced by an uninformed trader in a pure order driven market with asymmetric information, and study its impact on price formation. They show that the choice depends on the trader's belief about the probability of adverse selection. Parlour (1998) presents a dynamic model of the evolution of the limit book. He characterizes dynamic equilibrium in a market where traders optimally choose the type of order to submit given no asymmetric information. He shows how the order placement decision is influenced by the depth available at the inside quotes. Foucault (1999) explicitly incorporates an investors' decision of the order type and derives a game theoretic model of order placement and price formation, given no asymmetric information. He finds that the price volatility is a main determinant of the choice between market and limit orders. Foucault, Kadan and Kandel (2001) develop a dynamic model of an order driven market where traders differ according to their impatience and can choose the type of order. The equilibrium is characterized by three patterns related to the degree of impatience of patient traders, their proportion in the population and the tick size.

On the empirical side, Hamon, Handa, Schwartz and Jacquillat (1993) examine the supply of liquidity and the profitability of limit order trading at the Paris Bourse. They note that the lack of a designated supplier of liquidity does not deter the supply of liquidity on the Paris Bourse and that limit order trading is a profitable way of trading for all traders. Biais, Hillion and Spatt (1995) examine the intertwined dynamics of the order flow and order book on the Paris Bourse. They find evidence showing how liquidity is supplied and consumed in the marketplace and the interaction of liquidity and priority considerations. Hollifield, Miller, and Sandâs (1999) empirically analyze limit order trading in the Stockholm Stock Exchange. They show that changes in the relative profitability of limit and market orders are important for explaining the empirical variation in order submission rate. Ahn, Bae and Chan (2000) analyze the role of limit-order trading in liquidity provision in the Hong Kong stock market. They provide results on the relationship between transitory volatility, market depth and order flow composition. Al-Suhaibani and Kryzanowski (2000) study the interaction between the

[3] Limit order trades resemble dealers in that they provide liquidity and immediacy to the market. However, the primary objective of limit order traders is to implement their investment decisions, and they do not continuously post two-sided quotes.

order book and order flow, and limit order execution on the Saudi Stock Market (SSM). They find that limit orders that are priced reasonably have, on average, a shorter time to execution and higher probabilities of execution.

Recent empirical papers examine a trader's choice between market and limit orders. Al-Suhaibani and Kryzanowski (2001) analyze trading by limit versus market orders on the SSM and examine the performance of the orders resulting from traders' decisions. They show that the probability of placing a market order is negatively related to the inside spread and order size, and is positively related to order imbalance and previous same side market orders. The performance measures indicate that limit order strategies perform better than market order strategies. Bae, Jang and Park (2002) find that traders, in the NYSE, place more limit orders relative to market orders when the spread and the order size are large and when transitory price volatility is high.

The paper is relevant for several reasons. First, it is the first empirical analysis of the order flow in the TSE using intraday data. Second, it highlights how the state of the book influences the agent decisions and examines the symmetry of the buyers and sellers' choice of order type. Third, we think that the issue is interesting for market participants and for a better understanding of the TSE market microstructure. Finally, it contributes to improving empirical research on emerging markets.

The paper is organized as follows. Section 2 describes the Tunisian stock market and the data used. In sections 3 and 4, we empirically approach the problem facing the trader in this market using a logit model and then present the determinants of traders' order choice. Section 5 presents the empirical findings and concludes the paper.

## 2. Market and Data Description

### 2.1 The structure of the TSE

Since 1996, the TSE has been an electronic pure order driven market. The trading is conducted through terminals in the trading hall of the exchange. Orders are placed by investors through brokers and are consolidated into an electronic limit-order book and executed through an automated trading system, known as SUPERCAC. [4] Investors can submit orders at any price taking into account the tick size (0.01; 0.02; 0.1 Dinars). [5]

On the TSE, a trading session takes place once a day from 8:30 a.m to 11:30 a.m including pre-opening, opening and trading phases. It operates a continuous market for frequently traded securities and a call auction (fixing) for infrequently traded securities. Phases of pre-opening and opening are common to the two systems.

During the pre-opening phase (from 8:30 a.m. to 10:00 a.m.), buy and sell orders are accumulated in the centralized order book but remain unexecuted until the opening. A theoretical equilibrium price determined with three criteria is displayed systematically during this period. This price must maximize the number of stocks traded, minimize the number of securities not served and finally must be the closest to the previous price. During this phase, orders can either be modified or cancelled and prices are displayed and followed-up in real time.

The opening phase takes place by "fixing" at 10:00 a.m. It is no more possible to cancel or to modify previous orders and all transactions are executed at the theoretical equilibrium price computed at the end of the pre-opening phase. For securities in the "fixing" category, a second

[4] There are no market makers or floor traders with the obligation to supply liquidity.
[5] The tick size depends on the price level of the security.

call takes place at 10:15 a.m. for stocks which have not been exchanged at the opening and a last "fixing" is set at 11:00 a.m. for all stocks. The continuous market operates from 10:00 a.m. to 11:30 a.m. When a new order to buy (sell) matches an existing order to sell (buy) on the centralized book, one or more transactions are immediately executed using time priority at a given price and price priority across prices, and the computerized order book is instantaneously updated. The highest limit price of all buy orders for a particular stock is the best bid price for the stock, and the lowest limit price of all sell orders for a particular stock is the best ask price for the stock. Orders that are not executed remain in the order book for later execution.

Investors can choose between limit or market orders. A limit buy (sell) order specify the maximum (minimum) price at which the investor will accept to exchange. The execution of such orders relies on a strict price and time priority basis but is not certain. When a limit order is not fully executed, the remaining amount is placed at the same price and time priority as the original order.

However, a market order is executed immediately against the best quote on the opposite side, but any excess that cannot be executed at that price, will remain in the order book as a limit order at the transaction price. [6] It has the price priority but not the time priority.

Investors can submit orders that cannot be fully observed by other traders, called as "Hidden orders". Just a fraction of the order is visible in the book. The remaining fraction non observed by the other traders retains price priority but not time priority. If, the visible fraction is fully executed, another part of the order, equal to the amount initially disclosed, becomes visible.

Orders and trade's information are updated and disseminated to investors in a real time, but they can observe only the best five bids and asks in an aggregate format (i.e. only the best quote with all quantities available at that quote). However, the electronic limit order book is fully visible to brokers and regulatory authorities.

The system has daily price limits of ±3% of the previous day's close price. When a stock reaches its price limit, trading in this stock is halted for 30 minutes after which new limits (±1.5 percent) are applied. This practice limits the size of price reversals and may then reduce the profitability of a limit order strategy.

**2-2. The data set**

The data set provided by the TSE include intraday data on all submitted market and limit orders for 65 trading days (from September 1, 1999 to November 30, 1999). It contains buy order data, sell order data and transaction data.

The data on the buy and sell orders report the security code; the price, quantity, the date and time of order entry; execution, cancellation or modification indicator.[7] The transaction data include the orders executed, the date and time of transaction, the transaction price, the number of shares traded.

We focus on the continuous trading session and eliminate orders submitted before the opening call because we think that the determinants of the investor's choice between limit and market orders are different in the two sessions: pre-opening and trading sessions.

Using these order processing details, we reconstruct the limit order book at the time of order submission. We differentiate between market and limit orders using the characteristics

[6] In the NYSE, market orders are not executed in the same way. In fact, if a market order is submitted, it will be fully executed. The part which cannot be executed at the best quote, will be executed at less favorable prices in the order book.

[7] A modified order is considered as a new order.

of the order and the order book. A market order typically has zero duration and has a price at the prevailing opposite quote. Orders submitted in the form of limit orders that match the best price on the other side of the book are thus considered as market orders. We could not, however, decompose the order into the hidden and the displayed components, we can only observe the sum of both components.

Table 1 presents some summary statistics of our order sample which consists of 7621 orders: 3952 buy orders and 3669 sell orders. Market orders represent 49,09% of the submitted orders in the sample and 50,91% were limit orders. Buy market (limit) orders account for 60,44% (43,58%) of the total market (limit) orders. This reveals that buyers use market orders more often than sellers.

For limit orders, there were 1691 (2189) buy (sell) orders among which 44% (46,37%) are executed. The average time to execution of a limit order is quite similar for buy and sell orders. The time between the order entry and a first execution in the same trading session is on average 8mn 47s (8mn 24s) for buy (sell) orders; (min = 1s and max =55mn20s (buy); 58mn30s (sell)).

For the estimation of the logit regression, 3% of orders were eliminated because they were not preceded by a valid bid-ask spread.[8]

**Table 1. Summary statistics for orders submitted on the TSE**

The sample consists of 7621 submitted orders of 9 stocks traded in continuous during the period from September 1, 1999 to December 31, 1999. The orders are classified by order nature (market or limit), by order direction (buy or sell) and execution (executed, unexecuted). The order execution is differentiated by the date of execution (Ts=Te, Te>Ts). Ts and Te are trading sessions at which the order is submitted, executed, respectively.

| | ***Market Orders*** | | ***Limit Orders*** | |
|---|---|---|---|---|
| | Buy | Sell | Buy | Sell |
| | % | % | % | % |
| ***Executed orders*** | | | | |
| Totally executed (Ts=Te) | 94,56 | 91,89 | 30,69 | 30,20 |
| Partially executed (Ts=Te) | 5,44 | 8,11 | 6,62 | 7,31 |
| Totally or partially executed (Te>Ts) | | | 6,68 | 8,86 |
| ***Unexecuted orders*** | | | 56,00 | 53,63 |
| All orders | 29.67 | 19.42 | 22.18 | 28.73 |
| (100%) | 49.09 | | 50.91 | |

## 3. The model for trader choice of order type

The choice of order placement involves a trade-off between the transaction price and the probability of execution. This decision has also cost implications that depend on the relative patience of the trader. So a trader chooses to trade with a limit order rather than a market order if his expected utility from placing the limit order, $U_L$, exceeds that from placing a market order, $U_M$. We do not observe the utilities but the observed choice reveals which one provides the greater utility. We suppose that the utility can be explained by variables related to the market, order and security characteristics.

[8] A bid-ask spread can be estimated only if both the bid and ask prices exist

Our analysis focuses on a binary choice model: the endogenous variable (y) can assume only two outcomes: market order (y=1) or limit order (y=0). Let the probability of (y=1) be p and the probability of (y=0) be (1-p). Then the expected value of y is the probability that the event occurs. If this probability is a function of a vector of explanatory exogenous variables, x, and a vector of unknown parameters β, our binary choice model can be written as follows:

$$\Pr ob\left[y = 1 / x\right] = F\left(b^{'} x\right)$$
$$\Pr ob\left[y = 0 / x\right] = 1 - F\left(b^{'} x\right)$$

So, the set of parameters reflects the impact of changes in X on the probability of placing a market order. The logit model corresponds to:

$$F\left(b \quad x\right) = \frac{e^{b \quad x}}{1 + e^{b \quad x}}$$

The maximum likelihood method is used to estimate the parameter vector, β. The coefficients' signs must be interpreted as follows: (+) means that a market order is more likely; (-) means that a limit order is more likely.

This approach has the advantage of providing a framework for statistically measuring the magnitude and significance of the marginal effects of various potential explanatory variables on the choice of the investor. The model also allows the estimation of the predicted probability of placing a market order given anticipated values of the explanatory variables.

## 4- Determinants of traders' order choice

In our empirical analysis, we propose a set of explanatory variables using the theoretical and empirical literature.

### A. *Inside spread:*

The optimal order choice involves a trade-off between the cost of a delayed execution and the cost of immediate execution which is measured by the size of the inside spread. Theoretical models predict that traders in a pure order driven market are more likely to submit limit orders if the spread is large. Handa & Schwartz (1996) show that larger inside spreads increase short-run volatility, increasing the probability of trading via limit orders. Parlour (1998) demonstrates that wider spreads extend the feasible set of limit order prices.[9] Biais, Hillion & Spatt (1995) note that the probability that investors place limit orders rather than hitting the quotes is larger when the spread is large. Traders provide liquidity when its price is high but consume it when it is plentiful.

We compute the inside spread as the ratio of the difference between the prevailing first best ask (*A*) and bid (*B*) at time of order entry to the mid-quote.

$$SP = \frac{A - B}{(A+B)/2}$$

### B. *Volatility:*

Theoretical models show that volatility affects the choice of investors in placing limit and market orders and distinguish between transitory and fundamental volatility. Transitory

[9] Given price and time priority rules, traders having a larger opportunity set can increase the probability of executing their limit orders simply by undercutting or overbidding the prevailing quotes.

volatility is induced by uninformed liquidity traders and is temporary. Fundamental volatility is related to changes in the stock's fundamental value which have permanent effects on prices.

Handa & Schwartz (1996) point out a positive relation between short-term price volatility and the placement of limit orders. They show that a short term price volatility is induced by a temporary order imbalance due to a paucity of the limit orders. Investors will be more interested in placing limit orders rather than market orders, as the gain from supplying liquidity can more than offset the potential loss from trading with informed traders.

Using data from the stock exchange of Hong Kong, Ahn, Bae, & Chan (2000) find that investors submit more limit sell (buy) orders than market sell (buy) orders if transitory volatility arises from the ask (bid) side.

The return variance is often used in empirical studies as a proxy of the volatility. Since there are periods during which there is not a large number of transactions, we measure the transitory volatility by the high-low price ratio as Bae, Jang & Park (2002). This ratio is calculated as follows :

$$V = \frac{H - L}{(H + L)/2}$$

H and L are respectively the high and low transactions' prices in the trading session before order submission.

**C. *Order imbalance:***

Parlour (1998) shows that the trader's decision to submit a market or limit order depends critically on the thickness of both sides of the book at the time of order placement. Any change in the balance of book depth alters the probability of execution of the subsequent order, and therefore the decision of the next trader. Handa et al (1998) show that the non-execution risk for the buyer (seller) is positively related to the proportion of buyers (sellers) in the market. So trading via a market order at the posted ask is more attractive as this proportion increases.[10] Then, the probability of executing a limit buy (sell) order decreases, and a market order becomes more attractive as the buy (sell) side is thicker than the sell (buy) side.

Order imbalance is calculated as the ratio of the quoted volume (number of shares) on the sell side ($Q_s$) or the buy side ($Q_b$) to the quoted volume on both sides of the book at time of order entry.

$$OI = \frac{Q_i}{(Q_s + Q_b)}; with i = b, s$$

**D. *Prior market order:***

According to Parlour (1998), the past through the state of the book and the future through expected order flow affect the placement strategy of individual agents. A market buy (sell) order reduces the depth at the ask (bid) and increases the probability of executing a limit sell (buy) order next. Biais, Hillion & Spatt (1995) find that after a market order has been placed, the probability that the next order will be a limit order is relatively high. They also notice that the market response to market orders tends to be rapid, which reflects competition in supplying liquidity. Al-Suhaibani & Kryzanowski (2001) note that the history of trade pattern may provide information to market participants and affect their decisions.

We count the number of market orders submitted in the same trading session before the order entry in the same side of the book as a measure for the prior order market variable.

[10] Foucault (1999) reaches the same prediction.

**E. *Order size:***

The pure order driven market models usually assume a fixed number of shares, so they do not have predictions regarding order size. However, Harris & Hasbrouck (1996) and Hollifield et al (1999) show empirically that limit orders tend to be larger. Larger order size may require the trader to be more patient because such an order will be more difficult to execute. We measure the order size by the logarithm of the number of shares in the order.

**F. *Depth:***

When the depth of the limit order book is large, a trader is more likely to submit a market order than a limit order. The trader will benefit from an immediate execution without bearing a high cost of execution (Biais et al, 1995). We measure the depth at the buy side or sell side of the book using the ratio of order size to the quoted volume on the opposite side of the order book at time of the order entry.

**G. *Time to close:***

Because of option features of limit orders, the longer the time to maturity, the higher the value of the option. So, traders will place more limit than market orders when the remaining time to market close is longer. However, as the remaining time to market close decreases, the proportion of market orders submitted will increase because investors will become more concerned about the execution of orders than about better prices. Bae, Jang & Park (2000) show theoretically and empirically using NYSE stocks that traders are more likely to place limit orders when there is more time left until the market closes. The time to close is measured as the time left from the time of order submission until the market closes.

**Table 2. Summary statistics for the explanatory variables**

The table reports the summary statistics for the explanatory variables used in the logit regressions. The *spread* is the ratio of the difference between the best ask and bid to the mid quote (expressed in percentage). *Volatility* is measured by the high-low price ratio (expressed in percentage). *Order imbalance* is the depth at the same side divided by total depth. *Prior market order* is the number of market orders submitted before the order entry. *Order size* is the logarithm of the number of shares in the order. *Depth* is the ratio of order size to the quoted volume available on the opposite side of the order book. *Time to close* is expressed in seconds and divided by 1000.

| | ***Buy Orders*** | | ***Sell Orders*** | |
|---|---|---|---|---|
| ***Variables*** | *Mean* | *Standard deviation* | *Mean* | *Standard deviation* |
| *Spread* | 1.192 | 1.007 | 1.200 | 1.136 |
| *Volatility* | 0.762 | 0.889 | 0.811 | 0.957 |
| *Order imbalance* | 0.436 | 0.256 | 0.569 | 0.258 |
| *Prior market order* | 4.791 | 6.786 | 2.834 | 3.756 |
| *Order size* | 5.596 | 1.435 | 5.660 | 1.616 |
| *Depth* | 0.142 | 1.057 | 0.319 | 1.604 |
| *Time to close* | 1.842 | 1.119 | 1.855 | 1.079 |

**5- Empirical results**

Table 3 presents the logit regression coefficients. Our model is tested for the buy and sell samples separately to examine the symmetry of the buyers and sellers' choice of order type given the state of the book at the time of order placement.

Our results show that the probability of placing market orders is negatively related to the spread. When the spread is large, the immediacy cost is high which incites traders to supply liquidity by placing limit orders. However, traders consume liquidity by placing market orders when its price is plentiful. This result is consistent with the theoretical prediction and the empirical findings of other studies (Biais, Hillion & Spatt, 1995; Chung, Van Ness & Van Ness, 1999; Al-Suhaibani & Kryzanowski, 2001; Bae, Jang & Park, 2002).

**Table 3. Logit regression results**

This table presents the logit regression results estimated for the 9 stocks in the sample on 65 trading days. The dependant variable is a binary variable that equals one for market orders and zero for limit orders. The explanatory variables are defined in table 2.

| | ***Buy Orders*** | | ***Sell Orders*** | |
|---|---|---|---|---|
| *No. of observations* | 3820 | | 3548 | |
| *Dependent variable equals one (%)* | 58.24% | | 41.15% | |
| *Orders correctly classified (%)* | 65.26% | | 63.47% | |
| *Mc Fadden pseudo R-squared* | 8.06% | | 4.11% | |
| *Independent variables* | *Coefficient* | *t- statistic* | *Coefficient* | *t- statistic* |
| *Constant* | 2.460* | 12.82 | -0.098 | -0.501 |
| *Spread* | -0.434* | -10.32 | -0.349* | -7.48 |
| *Volatility* | -0.281* | -6.27 | 0.026 | 0.56 |
| *Order imbalance* | 0.432* | 2.94 | -0.365* | -2.58 |
| *Prior market order* | 0.036* | 5.47 | 0.078* | 7.54 |
| *Order size* | -0.262* | -9.42 | -0.047** | -2.10 |
| *Depth* | -0.374* | -2.64 | 0.032 | 1.11 |
| *Time to close* | -0.120* | -3.46 | 0.193* | 5.32 |

* and ** indicate significance at 1% and 5% levels, respectively.

Transitory volatility is a significant determinant of the mix between market and limit orders only for buyers. In fact, the probability of placing a buy market order decreases with an increase of short-term volatility. As temporary price fluctuations result from liquidity imbalance of the order book, buyers are incited to submit limit orders to benefit from supplying liquidity (Handa & Schwartz, 1996). This argument is not valid for sellers since their decision is not affected by volatility.

The order imbalance variable is significant for traders' decisions. From the buyer's point of view, the thicker is the book on the buy side, the higher is the probability to submit a market order (Handa, Schwartz & Tiwari, 1998). This is consistent with Biais et al (1995) who note that traders place limit orders when the order book is thin. However, asymmetric significant results hold for sellers. They place market orders if their own side is thinner than the buy side. In fact, high quoted volume in the bid side seems to attract hidden sell orders.

Our empirical result for the prior order market variable is in line with the results of Biais et al (1995) and Al Suhaibani & Kryzanowski (2001). Biais et al (1995) find that trades on one side of the market are most frequent after trades on the same side of the market. Al Suhaibani & Kryzanowski (2001) find that placing market orders is more likely if the ratio of trades initiated by the same side of the market increases. Our findings show that the probability of placing a market order increases with the number of market orders previously

submitted in the same side. In fact, if many investors choose to place market orders, the average time to execution of a limit order in the same side of the limit order book increases. Berkman (1996) finds that the longer an order takes to execute, the more likely that the order will suffer the adverse selection problem. Anand and Martell (2001) also show that the longer a buy order has to wait, the worse will be his performance.

As Bae, Jang & Park (2002) and Al Suhaibani & Kryzanowski (2001), buyers and sellers' behaviors are similar for order size. Order size tend to be larger for limit orders. In fact, larger order size may require the trader to be more patient because it will be more difficult for such an order to be totally executed. Easley and O'hara (1987) find that large orders are more informative than small orders. In addition, the lack of liquidity on the TSE does not permit an immediate execution for a large quantity.

The depth variable affects only buyers' trading strategies. Buy market orders are more likely to be submitted when the market is deep, (ie order size is lower than the quoted volume in the opposite side). If the depth variable is high when placing a buy order, it indicates a paucity of limit sell orders and so liquidity-driven price volatility arises from the ask price side (Ahn, Bae & Chan, 2000). Then potential buyers will submit limit orders rather than market orders.

Finally, the likelihood that a buyer places a market order when the time left until the market closes decreases which is consistent with the result of Bae, Jang & Park (2002) who observe that the proportion of limit-order submissions declines throughout the day during the last 30 minutes before the market closes. Furthermore, buyers might be reluctant to show at the beginning of the trading session that they are interested by the purchase of the security to limit stock prices increase. However, sellers behave differently and rapidly place market orders as soon as the session opens. The explanation commonly associated with this observation is that buyers are likely to be more information motivated than sellers (Chan & Lakonishok, 1995). Investors have often more liquidity reasons to sell than to buy and then would like to maximize the probability of having the order totally executed.

## 7- Conclusion

This paper provides an empirical study of the investor's placement strategy of order type in the Tunis Stock Exchange which uses a computerized limit-order trading system. The investor can trade by placing a market order or a limit order. The choice is based on a tradeoff between the probability of execution and the price at which the order will be executed.

Using a logit model, we have examined the determinants of the trader's choice between market and limit orders using intraday data on orders submitted during the continuous session.

Our results show that the probability of placing a market order decreases with spread and order size but increases with the number of market orders previously submitted for sellers and buyers.

However, we find asymmetric effects for the other variables. The probability of placing a buy market order decreases with short-term volatility and market depth. In addition, buyers are more likely to place market orders when the order book is thicker at the buy side and when the time left until the market closes decreases. Sellers behave differently, placing market orders even at the beginning of the trading session and when the ask side of the book is thinner than the bid side. Sellers' decisions are not affected by transitory volatility and depth.

Our study delivers some insights on the symmetry of the buyers and sellers' choice of order type. First, we note that buyers place more often market orders than limit orders during

the study period. Second, buyers seem to be more concerned about the opposite side of the book while sellers are more concerned about their own side. Finally, buyers' behavior is consistent with our predictions and seems to be more rational than sellers.

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