The Profitability of Active Stock Traders

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Abstract

Active stock traders, or day traders, who may account for a sizable proportion of US trading volume, hold stocks for only hours or even minutes. Examination of their trading profits reveals that about half of the 1,386 day traders in this study were profitable after paying commissions. Both profitable and unprofitable traders have very similar trading characteristics; they concentrate their trading at much the same time, on the same stocks, and in the same trading locations. Yet the skilled or lucky traders generate $9.5 million in net intraday profits, and the unskilled or unlucky lost $4.6 million in the same three-month sample period.

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* We would like to thank the CEO and other executives of the US direct access broker that provided the data for this study.

Active traders or day traders differ from long-term investors in that they often hold stocks for minutes or hours, seldom overnight, closing out positions for small profits. Active traders account for a fairly sizable percentage of trading volume in US equities. A study by Bear Stearns finds that approximately 40% of US share volume originates from an estimated 30,000 day traders (Goldberg and Lupercio, 2004). To some, this is surprising, as Barber and Odean (2000) and others show that active trading reduces one's wealth. According to Barber and Odean, overconfidence is the main reason people actively trade.

Active traders are at information disadvantage to better informed market participants such as market makers. Large market-making firms, such as Knight Trading Group, can use order flow information to generate short-term trading profits (Ip, 2000), but individuals trading on their own account do not have this information.

While active traders face disadvantages from the onset, firms that cater to them continue to attract new customers (McGinn, 2003), and "brokerage firms are spending feverishly to attract and retain this lucrative segment of the market" (Patel, 2002).

Individuals engage in active trading strategies because they anticipate trading profitably. Whether they can generate consistent short-term trading profits remains an open question, and there is very little research examining the trading profits of retail day traders in the US. Harris and Schultz (1998) examine the trading profits of retail day traders before electronic communication networks (ECNs) became integrated into the national market system. They find that some day traders generated consistent trading profits under these conditions and that agency costs were the most likely reason.

Retail traders, who trade on their own account, have more of an incentive to trade profitably than market makers because they incur all their trading gains and losses. This incentive can allow retail traders to overcome their information disadvantage and achieve trading profits against the better informed market participants such as market makers.

Are there agency costs on market-making trading desks today? It is difficult to say. There have been significant market structure changes as well as advances in trading technology since the Harris and Schultz study. Moreover, most traders today, who work on behalf of market makers, are heavily compensated on their trading performance. Knight Securities, Nasdaq's largest market maker, compensates its traders solely on trading performance (Ip, 2000).

We examine the trading profits of US retail day traders in today's ECN trading environment and explain why some active traders generate consistent net trading profits under current market conditions. Approximately one-half of the day traders in our sample were profitable after paying commissions. Our results suggest that some traders are able to trade profitably because they form zero-sum games with similar type traders.

I. Dataset of Active Traders

To conduct the study, we obtain a unique transaction dataset from a popular US direct access broker and analyze the trading records. The direct access broker has clients throughout the United States. Clients trade at the firm's 23 branch offices or remotely from home. A small number of traders trade from abroad.

Our data cover the period March 8 through June 13, 2000, which includes 68 trading days and two market holidays. Although this is a relatively short time period, the dataset covers 1,386 client accounts and over 400,000 equity trades.

For each trade we know the trader identification, the time the order was filled on the relevant exchange, the order type (limit order, market order, stop limit order), the action taken (buy, sell, short, or cover), the trade volume, the transaction price, the location of the trade (ECN, NYSE, Nasdaq), the contra party on the trade, the number of parties on the other side of the trade, whether margin was used on the trade, the location of the account in the US (branch office or remote location) or abroad, and whether the account was an institutional or retail account. We also have the commission on each trade, for trades conducted by 1,360 of the 1,386 accounts. The other 26 institutional (proprietary) accounts involved negotiated commission rates that were not available in our dataset (although we know the range and the average amounts paid in commissions).

Because we do not have the profit or loss for round-trip transactions, we match the opening trade for each stock in each trader's account with the subsequent trade of the opposite sign each day. We match a majority of the intraday trades using this matching algorithm, which allows us to determine trading profits.

Over 80% of trades represent a simple sequence of trades returning the trader's inventory to zero. For example, say a trader buys 500 shares of MSFT and then turns around and sells 500 shares of MSFT. These two trades would constitute a sequence of trades resulting in one round-trip trade (one opening and one closing trade).

Not all round-trips are opened and closed with two trades. A trader can decide to lay off part of an open position or combine a closing transaction with an opening

transaction. Whether the traders opened, closed, or simultaneously opened and closed a position, we search forward in time each day until the opening position is closed out, keeping track of accumulated inventory and the corresponding prices paid or received. Approximately 7% of trades are part of a sequence of trades that did not return the inventory to zero, even though a round-trip trade occurred.

Suppose a trader makes three trades during the day. First, the trader buys 500 shares of MSFT. Second, the trader buys 200 shares of MSFT. Lastly, the trader sells 600 shares of MSFT. The third trade would be the actual round-trip trade, but at this time 100 shares of inventory (from the second trade) is unaccounted for and not factored into our profitability calculations for the round trip.

The remaining 13% of trades are unmatched and labeled as long-term investments. Long-term investments most likely resulted in paper losses over the sample period. Traders traded primarily large-capitalization Nasdaq stocks (93% of trades) in the period, when the Nasdaq composite fell by 22% and the Nasdaq 100 by 14%.

II. Are Active Traders Profitable?

Exhibit 1 reports trader performance by amount of trading activity. Approximately one-half of the active traders who engaged in at least one intraday round-trip transaction traded profitably after paying commission (578 of the 1,146 accounts). 55% of the 190,350 round-trip trades generated a positive profit after trading costs.

Although we do not have detailed commission data for the 26 proprietary accounts in the dataset, examination of gross trading profits in relation to execution costs and liquidity rebates indicates that most of these traders were profitable after

commission. We were told by the firm that it typically charged these traders $1.50 to $3.00 to execute their trades, but institutional traders often receive market rebates on trades that provide liquidity, depending on the market the trade is executed in and the current pricing arrangement between a securities dealer and a particular market. We learned $0.002 per share is a typical rebate for a trade that provides liquidity.

The proprietary traders provided liquidity on approximately two-thirds of their trades (limit orders usually placed on the Island ECN), with an average trade size of 1,179 shares. This means, on average, that liquidity rebates ($2.36) exceeded commission charges ($2.25) for most trades. Traders who were paying closer to $1.50 probably received more in rebates than they actually paid in commissions.

Four proprietary accounts had a negative gross profit, with losses ranging from $179 to $7,377. While some (all) of these accounts may have generated net profitability, we include these traders with the net (gross) unprofitable accounts. The other 22 institutional accounts were highly profitable. Even if these traders paid the standard execution charges on all their trades, it would have little effect on their overall profitability. We thus deem these accounts to be profitable and include them with the net (gross) profitable accounts. The proprietary traders were hired by the firm to trade the firm's capital, and we expect them to display more financial sophistication than retail traders. In total, the combined proprietary accounts earn approximately $2.9 million in gross profits (21% of the profitable trader gross profits) in the sample.

In Exhibit 2, we examine the performance of the profitable and unprofitable traders over the sample period. The combined profitable traders generate over $9.5 million in net profits while the unprofitable traders lost nearly $5 million. Mean (median)

net profit per round-trip was $62 ($22) for the profitable traders and -$134 (-$39) for unprofitable traders.

The profitable traders we observed may have been skilled traders or simply lucky unskilled traders. Likewise, the unprofitable traders may just have been unlucky but skilled traders. It is also quite possible that some of our profitable traders became unprofitable, and some of the unprofitable traders became profitable traders, after this sample period. Of course, these sorts of occurrences should cancel out over time.

It is difficult to say exactly why one active trader is more successful than another. The more successful traders in our dataset may have been better at recognizing and reacting to profitable, albeit very short-term, price trends. More data would be needed to support this claim. The successful traders may also have been more experienced or had more training. Many firms, including the firm that supplied the data, note there is a learning curve in active trading, and suggest that tyro traders should be prepared to take initial losses.

An oft-debated question for practitioners is the success rate of active traders. It is difficult to give a definitive answer to this question for several reasons. First, there are no defined benchmarks for how much a trader needs to earn. An active trader's profitability should be measured over a reasonably long period of time, and should take account of inventory costs as well as intraday and other trading profits. We would also like to know the opportunity costs of traders' time and capital.

Unfortunately, our data period is short, and we have no inventory data. Although 80% of the positions are closed out intraday, some are held overnight. Since we do not

know if these are opening or closing positions, we are unable to calculate the realized trading profits on these trades.

III. Why Are Some Active Traders Profitable?

If active traders are at an information disadvantage, how can some traders earn consistent and large trading profits, at least during our sample period? To help answer this question, we examine the trading characteristics of the profitable and unprofitable account holders in our sample. The profitable group consists of the traders who earned an overall positive gross profit in the sample period; the unprofitable earned a negative gross profit.

Exhibit 3 shows the pattern of trading by time of day for profitable and unprofitable traders. Both groups have similar trading patterns. This result continues to hold if we segregate trades by trading location (e.g., ECN vs. market maker).

The traders were most active in the morning. Trading activity slumped during the midday and then picked up again toward the end of the day. Very little trading occurred outside the main market hours. Overall, the daily pattern of the traders' activity matches the pattern of Nasdaq activity.

One reason for this is because traders frequently sold as opposed to consumed liquidity. For a majority of transactions, both groups of traders sold liquidity on ECNs. When there is more activity, traders have a greater chance of getting their limit orders filled at favorable prices, thus benefiting from (as opposed to paying) the spread. Another reason traders prefer to trade more frequently at the open and close is because

there is often greater price volatility in these periods. Day traders need price volatility in either direction to make money.

Profitable and unprofitable traders not only traded at the same time, but also generally at the same locations. Exhibit 4 shows that over half of the orders of both groups of traders were executed on the Island ECN. The Island ECN, which has since merged with Instinet and is now called INET, is clearly popular with day traders (Huang, 2003).

Approximately one-third of orders were executed by sending a market or marketable limit order to Nasdaq market makers. Because these orders executed on the other side of the spread, and market makers are presumably better informed, both groups of traders were unprofitable when they traded with market makers. In the dataset, the more profitable group of traders suffered marginal losses but the less skillful lost a lot. When profitable traders traded with market makers, the average loss was $17 before commissions. In the case of unprofitable traders, the average loss was $189.

Both profitable and unprofitable traders also concentrated their trading on the same Nasdaq stocks. Exhibit 5 lists the top 25 loss-making stocks traded by the unprofitable group of traders and reports the trading profits of the profitable group on these stocks. For example, the unprofitable group lost over $665,000 before commissions on Rambus (RMBS), while the profitable group earned over $488,000. We find that the profitable group made money on nearly all the stocks that the unprofitable group lost money on. Very rarely did we find a stock both groups of traders made money or lost money on.

Exhibit 6 reports profits and correlations for various sets of the data. For all 2,412 stocks in our dataset, the correlation between the gross profits on each stock for the two groups (the profitable and the unprofitable) is –0.49. If we confine ourselves to the more actively traded stocks, the 216 stocks with at least 100 round trips per stock, the correlation of the gross profits is –0.47.

In the case of the top 50 winning stocks for the profitable group, we find a correlation of the gross profits on each stock for the two groups of –0.38 (with a bootstrapped 95% confidence interval of –0.81 to +0.11). Moreover, 40 of the 50 pairs of profit figures had the opposite sign. In the case of the worst 50 stocks for the unprofitable group of traders, we find a correlation of –0.60 (with a bootstrapped 95% confidence interval of –0.85 to –0.24), which is significantly different from zero. In addition, 43 out of the 50 pairs had the opposite sign.

Our results suggest that active traders are profitable because they form zero-sum games with similar-type traders. Harris (1993, 2003) and Treynor (1999) note that trading in security markets is a zero-sum game because the accounting gains and losses made by all parties involved in a transaction must sum to zero. Both informed and uninformed traders participate in this zero-sum game, and the informed traders profit only to the extent that the uninformed traders lose.

The unskillful trade for a variety of reasons. They mistakenly believe that they are skillful; they are in the process of learning whether or not they are skillful at trading; or, like most gamblers, they derive some external and non-pecuniary benefits from trading. The underlying result of this continual process is an efficient marketplace, where losing traders underwrite the winning trader's efforts.

Active traders who are more skillful or lucky are probably earning most of their profits from other traders who are less skillful or unlucky at trading. The continued influx of new traders and the concentration of both the skillful and unskillful traders in a particular market, without a designated liquidity provider, helps some traders become profitable. When both skilled and unskilled active traders trade with better informed market participants, they engage in a negative-sum game. This means that the active traders cannot win because they are at a disadvantage. While winning and losing traders battle each other constantly for short-term trading profits, direct access brokers can generate substantial revenues. For example, over the three-month sample period, the direct access brokerage firm earned just over $8 million in commissions on non-institutional/proprietary accounts.

Of course, illustrating that the active trader market is in itself a zero-sum game would require one to directly match the ECN trades of the active trader population. Our analysis presents only overall profitability figures disaggregated by whether traders were profitable or unprofitable over a three-month sample period. We follow this approach rather than attempt to directly match trades of profitable and unprofitable groups of traders for several reasons.

First, we are looking at a sample from the population of active traders, so not all trades can be matched up within our dataset. Yet we know that both profitable and unprofitable traders traded at much the same time, on the same stocks, and at the same locations, and approximately one-half of the traders were able to trade profitably. The geographic diversity and the number of accounts in our sample leads us to believe that our results should be representative of the active trader population.

Second reason, we measure gains and losses in a broader sense because active traders trade anonymously with each other on ECNs. Even if we identify matching opposite trades in our data, we cannot be certain that the trades actually involve the two traders in our sample.

Furthermore, many trades on ECNs are split up among several contra parties. Our transaction database aggregates these trades, although we do know the number of parties on the opposite side of the trade. For example, suppose a trader simultaneously bought 500 shares of Dell from five different traders selling 100 shares each. If two of these traders were in our sample, we would not be able to identify them because of the difference in trade size.

IV. Conclusion

Active day traders account for a sizable proportion of the trading volume and value in US equities. The two most appealing questions as to this market segment may be: 1) Do active traders really trade profitably? and 2) If so, how? We provide some insight into question 1 and some conjecture on question 2. We find that approximately one-half of the day traders in our sample were profitable after paying commissions, and some traders consistently earned large net trading profits.

How can this be, given the obstacles that these traders face? To help answer this question, we divide the sample into winning and losing traders and analyze the trading records of each group.

The profitable and unprofitable accounts display very similar trading characteristics. Both groups trade the same stocks, at the same time, over the same

trading locations. In the great majority of cases, the traders traded either directly with a Nasdaq market maker or on Island ECN (INET). This occurred despite direct links to numerous Nasdaq trading venues. The geographic diversity and the number of accounts in our sample lead us to speculate that these trading similarities may be replicated at competing firms.

When the profitable and the unprofitable traded with market makers during our sample period, they both lost money. Yet the profitable traders achieved overall net profitability through their ECN trading, while the unprofitable did not. Since active day traders are not informed, this suggests that skillful active traders can profit only as long as unskilled day traders are willing to enter the market and lose.

The concentration of active traders in a particular market, without a designated liquidity provider, creates trading profits for the more skillful active traders.

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Exhibit 1. Trading Profitability

Percentage of trading accounts and round-trip trades that were profitable before (gross) and after commission (net). Accounts are disaggregated by number of intraday round-trips conducted over the sample period. 1,146 of the 1,386 accounts in the dataset engaged in at least one intraday round-trip. There were 190,350 round trips in total.

No. of Intraday Round Trips	No. of Accounts	Profitable Accounts (%)		No. of Round Trips (000s)	Profitable Round Trip # (%)	
		Gross	Net		Gross	Net
1 to 49	614	65%	56%	10.2	62%	56%
50 to 99	178	67%	45%	12.7	60%	55%
100 to 199	164	60%	36%	24.0	58%	52%
200 to 299	61	72%	48%	14.6	62%	56%
300 to 499	54	57%	30%	21.2	56%	52%
500 to 749	33	85%	58%	19.7	58%	56%
750 plus	42	90%	71%	87.9	58%	56%
All	1,146	66%	50%	190.4	58%	55%

Exhibit 2. Trading Profitability for Profitable and Unprofitable Traders

Gross and net round-trip trading profits of profitable and unprofitable traders.

	No. of Round Trips (000s)	Gross Profits			Net Profits		
		Mean	Median	Total ($000s)	Mean	Median	Total ($000s)
Profitable Traders	153.2	$93	$35	$14,178	$62	$22	$9,523
Unprofitable Traders	37.2	-$85	$0	-$3,152	-$134	-$39	-$4,973
All Traders	190.4	$58	$30	$11,027	$24	$15	$4,550

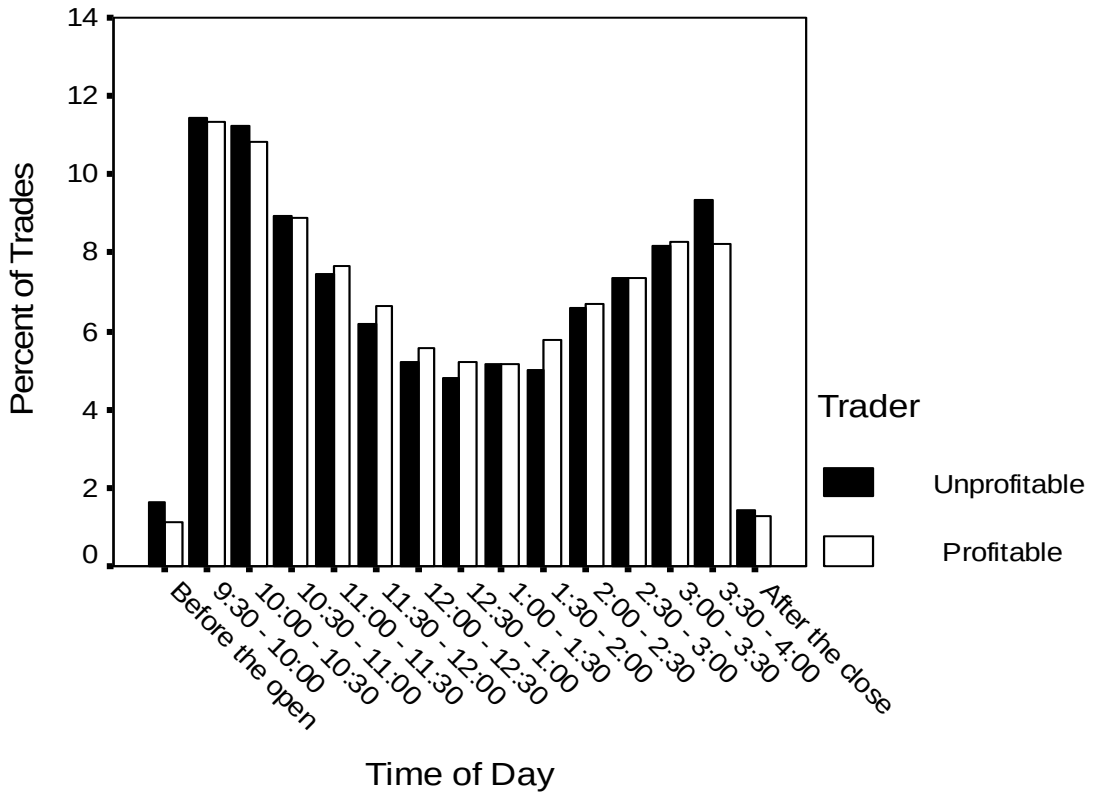

Exhibit 3. Time of Day Distribution of trades by time of day for profitable and unprofitable traders. Trading outside the primary market hours occurs on ECNs.

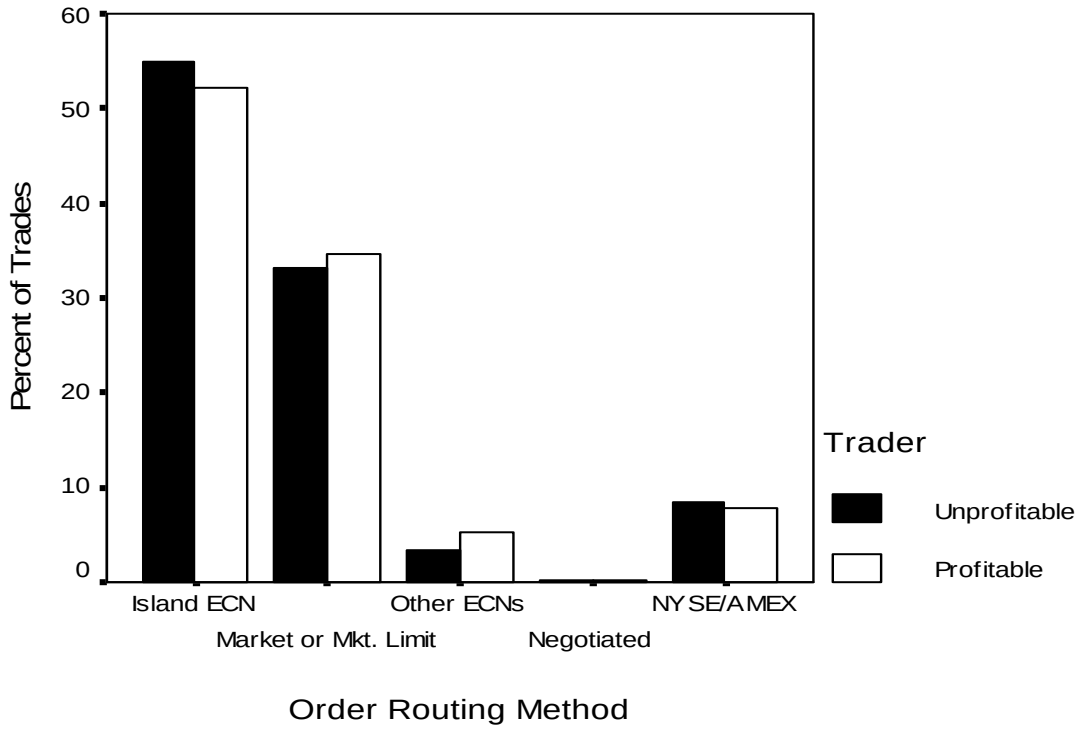

Exhibit 4. Trading Location Where profitable and unprofitable trader groups executed their orders. Approximately 93% of trading involved Nasdaq-listed stocks. Orders were executed 1) on the Island ECN, 2) on some other ECN, 3) by sending a market or marketable limit order against Nasdaq market participant quotes, 4) on a specialist exchange (NYSE/AMEX), or 5) by negotiating with a Nasdaq market participant.

Exhibit 5. Trading Profitability by Stock – Worst 25 Stocks for Unprofitable Traders

Gross and net trading profits of profitable and unprofitable traders on the worst 25 (losing) stocks for the unprofitable traders.

Stock	Gross Profits		Net Profits	
	Unprofitable Traders ($000s)	Profitable Traders ($000s)	Unprofitable Traders ($000s)	Profitable Traders ($000s)
RMBS	-$665.7	$488.1	-$725.0	$376.4
MSTR	-$161.4	$106.9	-$183.2	$68.8
SCMR	-$139.9	$150.1	-$153.2	$111.6
CIEN	-$98.8	$96.8	-$124.7	$46.1
CMRC	-$88.9	$165.7	-$110.3	$119.6
ARBA	-$77.7	$69.0	-$90.6	$39.3
YHOO	-$75.5	$168.5	-$106.5	$106.5
SDLI	-$75.2	$72.3	-$114.6	$28.1
BRCD	-$73.6	$79.6	-$78.4	$67.5
CRA	-$66.6	$140.3	-$73.4	$128.1
QCOM	-$64.8	$448.5	-$125.8	$271.0
ORCL	-$58.9	$283.2	-$138.7	$191.5
CSCO	-$58.2	$105.3	-$127.9	-$3.1
EXDS	-$57.8	$145.4	-$79.5	-$28.9
PDLI	-$57.7	$50.2	-$64.7	$38.6
VIGN	-$51.7	$77.8	-$57.8	$46.4
PPRO	-$41.3	-$25.7	-$42.6	-$30.7
CMGI	-$40.7	$109.0	-$63.7	$78.5
ITWO	-$40.4	$145.4	-$61.8	$124.5
HGSI	-$38.7	$84.7	-$43.1	$72.1
JNPR	-$38.4	$136.4	-$53.6	$64.9
AMCC	-$36.0	$266.4	-$43.2	$233.4
CHINA	-$34.4	-$4.9	-$38.3	-$11.5
QXLC	-$33.7	$0.5	-$36.3	-$3.5
ZIXI	-$28.5	-$5.6	-$31.5	-$6.9
Total	-$2,204.5	$3,353.9	-$2,768.6	$2,128.3

Exhibit 6. Profits and Losses of Profitable and Unprofitable Traders

Gross and net profits/losses of profitable and unprofitable groups of traders and correlations between trading profits and losses.

	No. of Stocks	Gross or Net Profit	Profit/Loss of Profitable Traders ($000s)	Profit/Loss of Unprofitable Traders ($000s)	Correlation
All Stocks	2,412	Gross	$14,178	-$3,152	-0.49
		Net	*$9,525*	*-$4,973*	*-0.53*
Most Active Stocks (100+ Round Trips)	216	Gross	$10,979	-$2,729	-0.47
		Net	*$7,304*	*-$4,278*	*-0.50*
Top 50 Stocks for Profitable Traders	50	Gross	$8,005	-$2,078	-0.38
		Net	*$5,864*	*-$3,000*	*-0.35*
Worst 50 Stocks for Unprofitable Traders	50	Gross	$4,371	-$2,757	-0.60
		Net	*$2,815*	*-$3,562*	*-0.66*