The Winners and Losers of the Zero-Sum Game:

The Origins of Trading Profits,

Price Efficiency and Market Liquidity

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Abstract

Trading is a zero-sum game when measured relative to underlying fundamental values. No trader can profit without another trader losing. People trade because they obtain external benefits from trading. These benefits include expected returns from holding securities, risk reduction from holding correlated assets and gambling entertainment.

Three groups of stylized characteristic traders are examined. Winning traders trade for profit. Utilitarian traders trade because their external benefits of trading are greater than their losses. Futile traders expect to profit but for a variety of reasons their expectation are not realized.

Winning traders make prices efficient and provide most liquidity. Utilitarian and futile traders effectively underwrite the winning traders' efforts.

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1. Introduction

On any given transaction, the chances of winning or losing may be near even. In the long run, however, winners profit from trading because they have some persistent advantages that allow them to win slightly more often (or occasionally much bigger) than losers win. Winners choose better portfolios than do losers, they time their trades better, and they negotiate their trades better.

If you trade securities, you should know whether you are likely to win or lose. Knowing that you can expect to lose on average may save you money in the long run. You may decide not to trade or you may change how you trade. Losers trade for many good reasons, but they should not trade for expected trading profits.

Even if you do not trade securities, you may trust your money to people who do. Knowing whether your money managers will win or lose when trading is very important. If you expect that your managers will win, you may wish to entrust them with more money. If you expect that your managers will lose, you may wish to fire them or restrict their trading activities.

This paper examines the economics that determine who wins and who loses when trading. We will examine many types of traders and we will consider how their trading styles lead to profits or losses. We shall see how access to information of various types creates trading advantages, and we shall see why many losing traders continue to trade.

In the process, we shall obtain a more complete understanding of the origins of market efficiency and liquidity. Trading profits are closely related to efficiency and liquidity because both efficiency and liquidity are created by traders. Traders acquire information and offer liquidity because they hope to profit from these activities. By examining why these profit opportunities arise and how traders act upon them, we shall better understand the origins of efficiency and liquidity. Given various future scenarios, we will be able to predict which trading styles will be profitable and how market quality will change.

Our study will examine many different trading styles. Trading styles generally are associated with specific types of traders. We shall consider the styles of value-motivated traders, inside informed traders, headline traders, event study traders, dealers, market-makers, specialists, scalpers, day traders, upstairs position traders, block facilitators, market data monitors, electronic proprietary traders, quote-matchers, front-runners, technical traders, chartists, momentum traders, contrarians, pure arbitrageurs, statistical arbitrageurs, pairs traders, risk arbitrageurs, bluffers, "pure" traders, noise traders, hedgers, uninformed investors, indexers, pseudo-informed traders, fledglings and gamblers. We will describe each of these traders, explain how their trading generates profits or losses, and consider how they affect price efficiency and liquidity.

Most traders employ several different styles simultaneously. For example, dealers primarily trade to profit from round-trips at the bid/ask spread. Occasionally, however, dealers may trade on current news, on value fundamentals, on hedging relations and on information extracted from the order flow. A successful dealer probably will use all of these styles and many others. The resulting trading behavior can be quite complex and hard to understand.

We shall discuss the various traders as though they used their characteristic styles exclusively. This approach will allow us to decompose complex behaviors into clearly understood elements.

Being able to decompose trading behavior into well understood characteristic styles is a valuable skill if you trade or manage traders. Many traders lose money because they (or their managers) do not understand clearly what they are doing. They may not appreciate the skills and resources required to successfully trade their styles and they may not even be able to recognize what styles they intend to trade. When traders have the skills and resources required to successfully trade their styles, they have an edge over their competitors. To trade profitably in the long run, you must know your edge, you must know when it exists, and you must focus your trading to exploit it when you can. If you have no edge, you should not trade for profit. If you know you have no edge, but you must trade for other reasons, you should organize your trading to minimize your losses to those who do have an edge. Recognizing your edge is a prerequisite to predicting whether trading will be profitable. If you cannot decompose trading behavior into characteristic styles, it can be difficult to recognize your edge.

This paper is organized in four sections. The remainder of this introduction starts with a short digression into the reasons why predicting future performance is difficult. The introduction then discusses the reasons why trading can be characterized as a zero-sum game and their implications for price efficiency. Section 2 describes and analyzes the various trading styles. These discussions are summarized in Table 1. Section 3 considers some future scenarios and their implications for trader profits, market efficiency and liquidity. The paper concludes with a short summary in Section 4.

1.1 Past performance is no guarantee of future results

Many people assume that past performance predicts future performance. Hoping for profits, they often hire managers that have done well in the past. Once hired, these managers typically perform far worse than their performance records would suggest.

Two statistical problems -- low signal to noise ratios and sample selection bias -- ensure that future performance is not easily predicted from past performance. This digression examines these problems and explains why we must use economics to help predict who will trade well.

Trading performance reflects a combination of skill and luck. Successful traders may be skilled traders or simply lucky unskilled traders. Likewise, unsuccessful traders may be unskilled traders or unlucky skilled traders.

We would like to believe that skill accounts for most variation in past performance among traders and managers. Analysts, statisticians and most professional practitioners, however, recognize that luck generally determines performance more than does skill over short intervals. Luck is more important because security prices are very volatile. From past performance alone, you cannot confidently determine who is skilled and who is lucky.

In the long run, skilled traders produce better performance than unskilled traders. Skill systematically affects returns but luck is random. Given enough time, good luck and bad luck tend to offset each other. Luck is not persistent but skill generally is assumed to be persistent.

Unfortunately, the long run may take a long time to be realized. Security price volatility favors luck over skill over short periods.

For example, suppose that a portfolio manager manages a reasonably well diversified portfolio that is no riskier than the market portfolio. Both portfolios have a standard deviation of 15 percent per year and the two portfolios have a correlation coefficient of 0.9. These

assumptions are typical of most equity portfolios. The manager claims that she can produce returns that will average 2 percent per year more than the market index return.[1] To be 95 percent confident that her skills are simply no worse than average, a statistician would have to examine more than 30 years of excess returns.[2] To be merely 75 percent certain would require slightly more than 5 years of data. (To be 50 percent certain would require no data: Excess returns for average managers are positive half of the time.) Clearly, a reliable inference based only on past performance will take a long time to make. The problem is due to the low signal to noise ratio. In this example, the 2 percent signal is small relative to the noise caused by volatile prices.

The sample selection problem arises when you must identify a good manager from among a large group of managers. In a large group, several managers may have exceptional performance records. Even if these managers have produced better than average returns for ten consecutive years, however, they may not all be skilled. In large groups, several individuals almost always will have exceptionally good luck. Unfortunately, the lucky ones cannot be identified a priori. If you choose a manager based only on excellent past performance, you will quite likely choose a manager who was lucky but not necessarily skilled. If the manager is not skilled, his future results are unlikely to be exceptional.

For example, suppose 10,000 unskilled portfolio managers all choose stocks completely at random. In a ten year period, probability theory predicts that approximately ten managers will obtain positive excess returns every year. It would be very surprising if there were fewer than five such managers. (The probability that four or fewer traders outperform the market every year

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[1]Although 2 percent excess returns do not seem high, if the claim were known to be valid, her skills would be in great demand. On average, portfolio managers do not beat the market. Her expected two percent excess return for equivalent risk represents two-thirds of the current annual T-bill rate and three times the typical management fee management fee.

[2]The statistician would construct a one-sided *t*-test in which the mean excess return over the sample period is divided by its standard error. To determine how many years of data are required, the statistician would set the power of the test equal to 0.95. An approximate power calculation can be obtained by examining the ratio of the expected values of the numerator and denominator of the *t*-statistic. The expected numerator is obtained from the manager's claim that she can produce 2 percent excess returns. Let K represent this claim. The expected denominator—the expected standard error of the mean excess return—is $(\sigma_p^2 + \sigma_m^2 - 2p\sigma_p\sigma_m)^{½}/T^{½}$ where σ_p and σ_m are the annual standard deviations of the portfolio and market returns, p is their correlation and T is the sample period in years. From probability theory, we will be 95% certain that the mean is positive if the t-statistic is greater than 1.64. Setting the expected *t*-statistic greater than 1.64 implies

$$T > (1.64)^2 (\sigma_p^2 + \sigma_m^2 - 2p\sigma_p\sigma_m) / K^2.$$

If $\sigma_p = \sigma_m$ = 15 percent, p = .9 and K = 2 percent, T must be greater than 30.4 years.

is only 3.4 percent in this example.) The best and worst of a large random sample tend to be the lucky and the unlucky.

The sample selection problem affects statistical inference whenever managers are selected based on exceptional past performance. Ten years of consecutive above average returns would be impressive for managers selected at random. Most such managers are skilled, although there is a small chance that a few may simply have been lucky. However, if a manager is selected from a large group because he did well in the past, exceptional past performance is neither impressive nor surprising. In such cases, ten consecutive years of above average returns may not be statistically significant. The manager probably was just very lucky.

Sample selection characterizes the process by which good managers come to our attention. Successful managers widely advertise their performance. Unsuccessful and average managers do not advertise. When searching for skilled managers, we naturally focus our attention on successful managers. A successful manager, however, may not be skilled. If he came to our attention merely because he outperformed many other managers, he probably was just lucky.

Both the sample size problem and the sample selection problem make it difficult to identify skilled managers based only on studies of past performance. Additional information is needed to identify skilled traders and to predict future performance. In particular, we must know what training and resources are required to trade profitably. Section 2 describes the economics that explain how various trading styles produce profits and losses.

1.2 The meaning and implications of the zero-sum game

The profits and losses of all players in a zero-sum game sum exactly to zero. The winners' profits are the losers' losses.

Several important implications flow from understanding whether trading is and is not a zero-sum game. The classification depends on how broadly we define the profits and losses of the players. The classification itself is not important to us, but the issues involved are. To introduce these issues and develop our intuition, we will first discuss poker games. Then we will consider trading, for which poker is a good metaphor.

1.2.1 Poker is a zero-sum game

Poker can be played among friends, at card houses, or in tournaments. Consider how these games differ and are alike.

Poker played among friends typically is a zero-sum game. Whatever one player wins, some other player loses. The winnings and losses of the players all sum to zero.

Poker played at a card club at which the house takes a percentage of the pot or a fixed fee per hand is a negative-sum game. The winnings and losses of the players sum to less than zero. (The sum equals the house share.) The players in aggregate lose to the house. If we define the game to include the club as a special type of player, the game would again be a zero sum game. Alternatively, if we examine the winnings and losses net of the house share, they again sum to zero. Whatever one player wins, some other player loses, after accounting for the house share.

Poker played in an invitational tournament at which the sponsor awards prizes is a positive-sum game (if the prize money exceeds the total of the entry fees). If measured net of the prize, however, poker is again a zero-sum game. After accounting for the prize, whatever one player wins, some other player loses.

Wherever poker is played, the character of the game is fundamentally the same. It is a zero-sum game (perhaps relative to a benchmark) in which the winners profit from the losers. In this sense, the three games are identical. Players usually play the same strategies without regard to the benchmark.

The reasons why people play poker do depend on the benchmark. Ignoring differences in skill, players would prefer to play in invitational tournaments where they profit on average than at card houses where they lose on average.

1.2.2 Poker is a positive-sum game

So far, our definition of winnings and losses in poker includes only cash distributions. This definition is too narrow to explain why people play poker in clubs where they expect to lose on average.

Our definition also does not explain why rational players play poker when some players are more skilled than others. Unskilled players interested only in cash winnings and losses will not play with skilled players to whom they lose. Clearly people play poker for more reasons than just expected profits.

Consider in detail four reasons why people play poker. The first two reasons involve external benefits. The third involves futile or irrational behavior. The fourth is expected profits.

First and perhaps most importantly, many players play poker because they simply enjoy playing poker (or learning to play poker). These players are willing to play even though they expect to have less money at the end of the game than at the beginning. This external benefit from playing explains why friends regularly play with each other even though some consistently lose to more skilled players. Poker is a positive-sum game when traders derive pleasure from playing the game.

Second, some players play poker because they may not have learned yet whether they are -- or can reasonably expect to become -- skilled players who make money playing poker. These fledgling players may be poorly informed or they may be of limited mental capacity. They are not irrational, however. If they learn that they cannot make money playing poker, they will quit. Learning whether one can profit at poker can be expensive. This knowledge is a valuable external benefit of playing. Fledgling players are often called fools in the sense that "a fool is borne every minute." They are not, however, since they learn and value their lessons.

Third, some players cannot learn, or will not accept, that they cannot make money at poker. These traders play in a futile search for expected profits that never materialize. They are irrational and may be emotionally troubled. These players are true fools who refuse to learn their lessons (or who insist upon learning their lessons in costly inefficient ways.)

Finally, some players play poker because they are true card sharks. These highly skilled players win money on average from other players. Their winnings cover their expenses, which may include payments to the house, income foregone by not working in some alternative job and expenses incurred to remain proficient and competitive. These players profit only to the extent that other less skilled players are willing to lose money to them (and perhaps to the house). Presumably they are called sharks because they prey upon weaker players. Weaker players often try to avoid playing with sharks. To avoid being recognized, sharks must change costumes and move around a lot. If sharks cannot find prey -- either because the prey successfully avoid them or because the prey simply quit -- the sharks cannot survive.

1.2.3 Trading is a zero-sum game

Like poker, the classification of trading as a zero-sum, negative-sum, or positive-sum game depends on how we define profits and losses.

If we define profits and losses relative to some common benchmark of fundamental value, trading is always a zero-sum game. For example, suppose trading profits and losses are defined relative to fundamental value (which typically cannot be observed). Whenever a buyer and seller trade, they set a price. If the price is greater than the fundamental value, the seller will profit at the buyer's expense. If the price is less than the fundamental value, the buyer will profit at the seller's expense. No trader can profit without another trader losing. Since fundamental value cannot be observed with certainty, neither trader will be able to recognize their profits and losses with certainty. Their uncertainty at the time of the trade does not change the zero-sum character of the game.

The benchmark used to define profits and losses does not affect the zero-sum nature of the game if the benchmark is the same for both buyer and seller. The benchmark does determine how we interpret the profits and losses. When we use fundamental value as a benchmark, we interpret the difference between price and fundamental value as fundamental trading profits or losses. Unfortunately, these profits and losses cannot be estimated without defining and estimating fundamental value.

Commercial vendors estimate transaction costs by examining trade prices relative to benchmarks obtained from contemporaneous market data. The Plexus Group uses the average of the bid and ask at the time an order is submitted to estimate Perold's portfolio implementation cost measure. Abel/Noser uses the volume-weighted average price to estimate transaction costs. SEI uses closing prices. Each method effectively assumes a different estimate for fundamental value and therefore obtain different measures of transaction cost. These measures all define zero-sum trading games because the benchmarks are common to both buyer and seller. Buyers profit from high prices only to the extent that sellers lose from low prices and vice versa.

Contemporaneous market data benchmarks are often poor estimates of fundamental value for the purpose of estimating fundamental trading profits and losses. The opening, closing, high, low and average prices for a day or even a week may all overestimate or underestimate fundamental value with approximately the same error. Performance evaluations based on these estimates therefore are interpreted primarily as transaction costs estimates. These methods

cannot identify performance realized over long time intervals due to skillful portfolio selection.[3] Traders who consistently pick stocks that rise by the end of the next year are great traders. These transaction cost measures, however, only show whether they can execute their trades cheaply.

Portfolio performance evaluation methods that compare portfolio returns to market index returns or to indices of risk-adjusted expected returns attempt to measure total portfolio performance. (Total performance is the sum of implementation performance and selection performance.) If the market portfolio return is the return benchmark, trading is a zero-sum game. Winners beat the average only if losers under perform the average. If the return benchmark is an index of risk-adjusted expected returns, trading may be a positive- or negative-sum game. The type of game depends on whether security returns are greater or less than expected during the evaluation period. Since security returns on average should equal their expected returns, trading is unconditionally an expected zero-sum game relative to the expected return benchmark. In any given evaluation period, trading can be made a zero-sum game by adjusting the expected return benchmark to reflect the realized unexpected component of security returns. The resulting return benchmark is the market portfolio return.

When we use the market portfolio return as the common benchmark for evaluating trader performance, we implicitly estimate fundamental values at the start and end of the evaluation period by market values. Profits and losses measured relative to the market benchmark therefore are only estimates of the fundamental trading profits and losses defined above. These estimates include noise from predictable and unpredictable changes in fundamental values during the evaluation period. Predictable changes in fundamental value are expected returns. They are related to real rates of interest, risk, liquidity and any benefits or costs associated with holding the security. Unpredictable changes are surprises. Measured trading performance thus includes some systematic and random elements.[4] The systematic components complicate portfolio

[3]The distinction between portfolio implementation performance and portfolio selection performance is slightly blurred when volume-weighted average prices or closing prices are used as benchmarks. A broker who trades orders submitted by a well-informed portfolio manager who acts on hot information will look good relative to these benchmarks even if he is a poor negotiator. Buy orders will tend to be executed at low prices relative to the daily average because prices will rise as the hot information becomes public and sell orders will tend to be executed at relatively high prices. The credit for the superior measured performance should go to the portfolio manager and not to the broker.

[4]Performance measurement may be easier to interpret with the assistance of some simple notation. Suppose that a trader buys an asset at price P_o when its fundamental value is f_o. He sells it later (or perhaps merely values it) at

performance evaluation. The random elements make it difficult to infer skill from measured performance.

To this point, our definitions of trading profits and losses are based on common benchmarks that apply to both buyer and seller. Common fundamental value benchmarks produce zero-sum games. Common return benchmarks produce games that can easily be adjusted to produce zero-sum games. In both cases, no trader can profit without some other trader losing. In this sense trading is a zero-sum game.

1.2.4 Trading is positive zero-sum game

Rational traders will not play a true zero-sum game in which they only value trading profits. If all traders were all alike, all expected returns would be zero and no one would benefit from trading. If some traders are more skilled than others, the skilled traders would want to trade but the unskilled traders would not. No one would trade.

To explain why rational traders trade, we must recognize that some people trade for more than just expected profits. People trade to hedge risk, to move funds from one point in time to another, to exchange assets, to earn an unconditional expected return, to learn whether they can expect to profit from trading and to take pleasure from gambling. These external benefits make trading a positive-sum game. If the external benefits to trading are great enough, traders will trade even though they expect to lose. Skilled traders will profit to the extent that unskilled traders are willing to trade for external reasons.

Market prices efficiently incorporate information about value fundamentals when skilled traders obtain this information and trade upon it in search of profits. The activity is profitable if the trading profits exceed the costs of obtaining and acting upon the information. If no one traded for external benefits, skilled traders could not profit from trading. They would quit doing their research, they would not trade, and prices would not be efficient. This problem is known as

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price P_1 when its fundamental value is f_1. The fundamental trading profit from the two trades is the summed difference between the trade prices and their associated fundamental values:

$$(f_o\text{-}P_o) + (P_1\text{-}f_1) = (P_1\text{-}P_o) - (f_1\text{-}f_o).$$

Accounting profits $(P_1\text{-}P_o)$ are equal to the total fundamental trading profits plus the change in fundamental value. Since changes in fundamental value are not observed, the definition and estimation of fundamental trading profits depends on how fundamental value is defined and estimated. Since changes in fundamental value have a random component, good luck may salvage a poor trade and bad luck may savage a good trade.

the Grossman-Stiglitz paradox. Price efficiency depends both on skilled traders and on traders who are willing or irrational losers. The skilled traders make prices efficient and the losers pay for their research efforts.

2. Characteristic Trader Styles

In this section, we describe the stylized traders. We explain why and how they trade. We identify the information resources they use. We analyze their effects on liquidity and price efficiency. We consider the factors that determine whether they will be profitable, and we list the traders from whom they profit and to whom they lose.

The stylized traders are organized into three groups. The winning traders use styles that produce expected profits for skilled, well informed traders. The utilitarian traders trade to obtain external benefits from trading. The futile group includes traders who are unskilled, irrational or poorly advised traders. These traders consistently lose even though they expect to profit.

Utilitarian and futile traders are often collectively called noise traders. Their trading is not normally related to the value fundamentals. They and a few other traders may introduce noise into prices.

2.1 Winning Styles

Winning traders are skilled traders. They choose better portfolios than do losers, they time their trades better than do losers, and they negotiate better terms for their trades than do losers. They are better analysts, they pay more attention, they act faster, and they organize information more efficiently than do losers.

Winning traders trade for expected profits. They generally profit from utilitarian and futile traders. Some winning traders also profit from each other. If winning traders could not profit from other traders, they would not trade.

Prices are made efficient primarily by winning traders. Not all winners contribute to price efficiency, however.

Value-motivated traders analyze fundamental data to identify undervalued and overvalued securities. They form opinions about security values. Their opinions may be absolute opinions such as "this stock is worth 25 dollars" or they may be relative opinions such as "this stock should be worth more than that stock."

The fundamental research that value-motivated traders do can be very expensive. They collect and analyze all substantial fundamental valuation data available to them. Their analyses create useful information about values. Asset allocators generally specialize in macro-economic information and sector-specific information. Stock pickers specialize in firm-specific information.

Value-motivated traders are successful when they are good at organizing and analyzing substantial fundamental data. They also must be good at choosing undervalued or overvalued securities to evaluate. They waste resources when they examine securities already properly valued by the market.

Value-motivated traders are often well trained in financial economics, accounting, marketing, management, demography, statistics, engineering or science. These disciplines provide tools to evaluate new projects and determine how well management organizes company resources in existing projects.

Value-motivated traders buy undervalued securities and sell overvalued securities. They often trade in large size but their portfolio turnover rates may be quite low. Their trading makes prices reflect fundamental security values because they bid up undervalued securities and sell down overvalued securities.

Value-motivated traders profit from uninformed traders who unknowingly trade at prices that differ from fundamental values. They lose to informed traders who trade on new significant fundamental information that they do not have.

Value-motivated traders supply liquidity in the form of depth to uninformed traders and to dealers at the outside spread. The outside spread is formed by the prices at which value-motivated are likely to intervene. It is wider than the inside spread set by market-makers because value-motivated traders are subject to greater adverse selection risk than are market-makers. Market-makers can identify order flow from informed traders more easily than can value-motivated traders who typically are far from the floor.

Value-motivated traders also make markets resilient. Uninformed traders cannot have a large or enduring effect on prices when value-motivated traders are paying attention.

Value-motivated traders are often called informed investors, value investors and traditional investors.

Informed traders trade on the flow of new fundamental information. The flow may consist of information obtained from news headlines, from public announcements, from expensive private research or from insiders.

The flow of news increases the stock of fundamental information. Informed traders form opinions about changes in fundamental value based on the changes they identify in the stock of fundamental information. They do not form opinions about absolute value or relative value. Value-motivated traders form these opinions based on the stock of information.

Informed traders are successful when they can obtain, properly analyze, and act on information before other traders can. When their information advantage is very perishable, they must act very quickly. They typically demand liquidity. Informed traders who act on perishable information may have high turnovers.

Informed traders create elaborate and expensive news gathering organizations. They try to learn what the market does not already know.

Informed traders buy stocks whose values they think should rise and they sell stocks whose values they think will fall. If their analyses are wrong, they will lose to value-motivated traders. Informed traders make prices more efficient by adjusting prices quickly to changes in fundamental values.

Informed traders often do not use sophisticated financial models of how value changes in response to a new information. They may act only on empirical regularities such as "when Event A happens, prices ultimately rise by X percent." Such traders may be called event study traders.

Informed traders profit from anyone who offers them liquidity. In particular, they profit from dealers and from poorly informed value-motivated traders. They lose to traders who pass rumors.

Market-makers provide liquidity to impatient traders. They try to turn their inventory at a profit. To profit, they must trade at prices that produce a balanced order flow on both sides of the bid/ask spread. They find these prices by experimentation. Their inventory turnover may be extremely high.

Market-makers lose to informed traders. Market-makers must carefully analyze order flow to identify informed traders. The task is difficult because orders typically are identified only by broker and not by beneficial trader. Market-makers widen their spreads to recover from

uninformed traders what they lose to informed traders. This widening of the bid/ask spread is called the adverse selection spread component. Market-makers profit from impatient uninformed traders.

Successful market-makers must pay attention continuously. They must integrate information about the order flow, they must keep tract of their own positions, and they must make good decisions quickly.

Market-makers supply liquidity in the form of immediacy at the inside bid/ask spread. Because they fear trading with informed traders who they cannot identify, they are reluctant to offer liquidity to large traders.

Market-makers make prices more efficient through their efforts to find prices that produce balanced order flow. One-sided order flows often indicate that value-motivated traders or informed traders think securities are misvalued.

Market-makers are called dealers or specialists in the equity and options markets. They are called dealers in the bond markets and in the currency markets. In the futures markets they are often called scalpers or day traders.

Upstairs traders provide liquidity to large traders when they facilitate or position large block trades. Unlike market-makers, they generally know their clients. They therefore can obtain reliable information about whether their clients are well-informed traders.

Upstairs traders try to turn their inventory at a profit. To profit, they must find prices that produce balanced trading interests. They must estimate how well informed is their client, they must be able to identify latent trading interests, and they must accurately estimate the prices that will just activate those latent interests.

Upstairs traders act at moderate speeds. Although they like to turnover quickly, large transactions may be hard to place.

Upstairs traders supply liquidity in the form of depth primarily to large uninformed sellers. Large uninformed buyers are rare because financial theory suggests that uninformed traders should diversify their portfolios. Upstairs traders try to avoid informed traders because any price that they might offer to an informed trader will be the wrong price if the informed trader accepts the offer. Upstairs traders organize liquidity when they act only as broker and not as principal.

Upstairs traders profit from impatient uninformed traders. They lose to informed traders when they unknowingly trade with them and they lose to front-runners when their positions become known.

Upstairs traders are also called block positioners and block facilitators.

Parasitic traders trade to obtain the option value of the order flow. They front-run orders and they match quotes. If they know that a large order to buy is pending, they try to buy before the order executes. If price subsequently rises, they profit to the full extent of the price rise. If price falls, they turn around and sell to the large order at a small loss. The strategy is profitable if parasitic traders can act faster than traders from whom they extract option values.

Parasitic traders lose when other bluffers fool them into offering liquidity. They also lose when supplying liquidity to informed traders.

Front-runners obtain their information about the order flow in a variety of ways. Through careful and attentive analysis, they may be able to anticipate order flow that arises out of certain situations. For example, a good front-runner may be able to anticipate which stock will be added next to the S&P 500 List. Such stocks will be purchased by indexers. Alternatively, they may be tipped off by dishonest brokers or they simply may recognize when a broker is holding a large order by observing the broker's unconscious body language.

Quote-matchers obtain their information about the order flow from market quotes. In markets that enforce time-precedence, they step in front of quotes to offer liquidity at a price one tick better than the quoted price. In markets that do not enforce time-precedence, or in parallel competing markets, they simply match the quote.

Front-running and quote-matching are parasitic in the sense that they take value from large traders. Parasitic traders take opposing side order flow that otherwise would go to large traders or market-makers. Parasitic traders offer liquidity only when they can stand in front of other traders. The liquidity supplied by parasitic traders would not be supplied if they could not appropriate the option value of the order flow.

Parasitic trading may be constructive if their efforts organize liquidity in the form of depth for large traders. However, large traders do not request this service. Large traders who want this service usually can obtain it at lower cost from upstairs traders.

In the short-run, parasitic traders may tighten spreads by improving quotes. In the long-run, parasitic traders may force large traders to hide their orders better and to place their quotes further from the market. These effects decrease market liquidity.

In the short-run, parasitic trading may increase price efficiency slightly by causing prices to adjust faster to information in the order flow. The long-run effect may be to decrease price efficiency if the order flow becomes less transparent.

Electronic proprietary traders use computers to identify and act upon irregularities in the supply of liquidity. They offer liquidity when too little liquidity is offered by market-makers and other traders. They take liquidity when too much liquidity is offered. The models that determine what is too little and what is too much typically are proprietary. Their trading systems may include economic models that describe the supply and demand for liquidity and learning models that filter the order flow for various types of information.

When electronic proprietary traders offer liquidity, they effectively act as market-making dealers. When they take liquidity, they effectively act as parasitic traders.

Electronic traders act very quickly. Their quotes often flicker on and off depending on the information upon which they are based and upon the trading strategy they attempt to implement. Electronic proprietary traders typically turn over their inventory very quickly.

Electronic traders learn about market liquidity from electronic quote and transaction feeds. Their models interpret these feeds to find long-run regularities.

Electronic trading is extremely disciplined. Computers are patient, they have infinite attention spans and they never make mistakes.

If the computers are properly programmed, electronic traders profit when market-makers make mistakes. These mistakes typically occur when market-makers are not paying attention. Electronic traders often lose when market-makers have information about the order flow that is not transmitted in the electronic feeds. The proprietary models then may misinterpret market conditions. When electronic traders supply liquidity, they profit from impatient traders but they lose to informed traders.

Electronic proprietary traders must be very careful when designing their models to be sure that they cannot be manipulated by bluffers. If bluffers can paint the tape, proprietary trading systems may misinterpret market conditions and offer liquidity when they should not.

Electronic proprietary traders increase price efficiency by reducing transitory volatility and by updating stale prices. They supply liquidity when eliminating transitory volatility and they take liquidity when updating stale prices.

Pure arbitrageurs look for cross-sectional price discrepancies among instruments for which physical or institutional processes imply a stable price relation. They then trade to construct a very low risk hedge portfolio that eventually can be liquidated at a profit. (They buy the low price instrument and sell the high price instrument.) The physical or institutional processes that imply the stable price relation insure that returns to the hedge portfolio will be near certain.

Examples of physical processes that generate stable price relations are the shipping of wheat from one market to another, the processing of soybeans into soy meal and soy oil, and the stripping of bonds into coupon and principal bundles. Institutional processes that generate stable price relations include the cash and physical settlement mechanisms that define derivative contracts.

Pure arbitrageurs examine current prices and quotations and act quickly when price discrepancies arise. They increase price efficiency by maintaining a single price for fundamentally identical risks.

Arbitrageurs move liquidity from one market to another. Price discrepancies in fundamentally identical risks arise when buyers in one market cannot find sellers in another market. Acting independently of each other, market-makers in each market adjust prices to separately satisfy the demands for liquidity. Arbitrageurs move securities (or the risks inherent in securities) from sellers in one market to buyers in another market to equalize the price pressures that may form in one or both of the markets. Arbitrageurs thus are cross-sectional porters of liquidity. In contrast, market-makers are time-series porters of liquidity. They move securities from sellers to buyers who arrive asynchronously.

Pure arbitrageurs profit from dealers, from impatient uninformed traders and from traders who are slow to adjust their limit orders when values change. Pure arbitrageurs lose to other traders only when prices change while they are constructing their hedge portfolios. Arbitrageurs also lose to value-motivated traders if they do not understand the pricing relation.

Arbitrageurs do not need to trade from a net zero position. Arbitrageurs who trade from long positions are often called substitution traders or index enhancers.

Statistical arbitrageurs speculate on cross-sectional price relations among instruments or baskets whose prices are correlated due to common fundamental factors. When they identify an apparent price discrepancy, they buy the low price instrument and sell the high price instrument. If the apparent price discrepancy is due to mispricing of the common fundamental factors, the resulting hedge portfolio will increase in value as prices return to their former relation. If the change in the price relation is due to instrument specific factors, the hedge portfolio will not produce a profit. The hedge portfolios of statistical arbitrageurs therefore can be quite risky.

Statistical arbitrageurs trade when current prices and quotes deviate from historic price relations. They typically act quickly and they may have high turnover.

Statistical arbitrageurs generally increase efficiency by enforcing single prices for common factor risks. When they fail to recognize that a price relation has changed, however, they decrease price efficiency as they trade to maintain the former relation.

Like pure arbitrageurs, statistical arbitrageurs move liquidity among markets. When the price relation has not changed, statistical arbitrageurs profit from dealers, from impatient uninformed traders and from traders who are slow to adjust their limit orders when values change. Unlike pure arbitrageurs, however, statistical arbitrageurs risk losses from supplying liquidity to informed and value-motivated traders acting on instrument specific information.

Statistical arbitrageurs differ from value-motivated traders who form hedge portfolios to speculate on fundamental price relations. The former employ on pure statistical models while the latter employ financial models.

Statistical arbitrageurs are often called pairs traders because they trade pairs of securities or pairs of baskets against each other.

Technical traders trade on various systematic patterns they identify in prices, order flows and volumes. These patterns may arise when uninformed traders react to the same stimuli, when informed investors overreact to new information, or when dealers are slow to react to new information.

Technical traders make prices more efficient when they trade against predictable patterns. Contrarians remove transitory volatility and negative serial correlation in prices that result when

uninformed traders trade or when informed investors overreact to new information. Momentum traders remove positive serial correlation in prices caused by dealers who are slow to react to new information. Technical traders make prices weak-form efficient.

Technical traders supply liquidity if contrarian and demand liquidity when they follow momentum.

Some technical traders make prices less efficient when they trade in anticipation of order flows from uninformed traders. These technical traders speculate on the market price impacts of uninformed traders. They generally demand liquidity.

Skilled technical traders profit from dealers and uninformed traders. They lose to value-motivated traders, informed traders and bluffers.

Market-makers and electronic proprietary traders are similar to technical traders. All three trader types monitor and act upon market time-series data. Market-makers typically have better access to order flow information. Electronic proprietary traders typically act upon econometric models. Technical traders typically act upon statistical models that describe time-series regularities or on psychological models that describe possibly irrational human behavior. Some technical traders invest heavily into pattern recognition systems.

Chartists are among the most commonly recognized technical traders. Charting may give skilled technicians an edge if it allows them to identify and organize information about patterns in trading behavior. Most traders who use charts, however, probably do not profit from them.

Bluffers are traders who try to fool other traders into offering liquidity at disequilibrium prices. For example, a typical bluffing strategy is to buy stock patiently until a large position has been acquired with relatively small market impact. Then buy stock aggressively to push up the price. Appear as though you are trading on perishable information. Time the second set of trades to occur after some good news has been announced by the firm. The announcement need not be significant. However, the announcement must be one which, when associated with the quick price run up, fools traders into thinking the announcement is more significant than it truly is. Finally, sell stock at the higher price to traders who jump on the bandwagon and to traders who misvalue the stock following the run-up.

This bluff is that the stock is worth more than it actually is. If traders fall for the bluff, the bluffer profits because he will be able to sell his stock without driving the price down as

much as he drove it up. Traders who rely on the efficient market hypothesis are most vulnerable to a bluff. They believe that prices reflect fundamental values when in fact they may not.

Bluffers risk having their bluff called by value-motivated traders. In our example, value-motivated traders trade against the bluffer when he wants to raise prices above fundamental value, and they compete with the bluffer when he wants to get out of the stock at the end. If the bluff is called, the bluffer will lose money in transaction costs as he pays up to buy the stock and pays down to sell it.

All traders who rely upon market data to form their orders risk falling into a bluffer's trap, although not necessarily the bluff described in our example. The example bluff is particularly dangerous to momentum traders. Contrarians, however, profit by trading against it. Value-motivated trading is the only sure defense against all bluffs.

Some bluffs may be illegal market manipulations, but they may be hard to prosecute successfully. If charged, the bluffer using the above strategy would defend himself by claiming that he bought the stock because he thought it was undervalued. When the announcement was made, he feared that other traders would get in before he could finish his buy program so he started to buy aggressively. Finally, satisfied with his profits, he sold out.

Some bluffers create and pass rumors to move prices by exciting or scaring traders. Such manipulations are easier to prosecute successfully.

Bluffers trade on valuable private information that they create: Only they know that they are responsible for changing prices.

Bluffers decrease price efficiency when they demand liquidity to push prices away from their fundamental values.

Bluffers are sometimes called "pure" traders because they make their money purely on trading skill. They often claim that they make their money by testing market resolve.

2.2 Utilitarian Styles

Utilitarian traders expect to lose from trading on average. They are willing to trade because they obtain external benefits from trading. They trade when they value these benefits by more than their expected trading losses.

Utilitarian traders generally are uninformed traders. In a narrow sense, their trading can occasionally make prices less efficient. In a broader sense, however, they are as responsible for

price efficiency as are the winning traders (primarily value-motivated and informed traders) whose trading makes prices efficient. Winning traders only profit from trading when utilitarian and futile traders lose money to them. If winners cannot profit, they will do no fundamental research, they will not trade, and prices will not be efficient.

In general, markets work well for utilitarian traders when they are liquid and when prices reflect fundamental values.

Uninformed investors trade to manage time misaligned life cycle, investment, and revenue and expense cash flow problems. These traders receive and spend money at different points in time. They buy securities to obtain unconditional risk-adjusted expected returns when they move money forward through time. They sell securities when they move money up in time. These traders include workers saving for their retirements, parents saving for their children's education, newlyweds saving for a house, firms saving to finance new projects, and governments that borrow in anticipation of tax revenues.

Uninformed investors avoid trading too often because they have no edge. They buy and hold securities and they often use index funds. They are generally patient traders with low turnover. When they do trade, they may supply liquidity in an attempt to lower the costs of trading.

Uninformed investors lose on average to winning traders. They also lose to corporate managers and other corporate claim holders when they fail to provide adequate managerial oversight.

Uninformed traders are willing to lose when trading because they earn positive expected returns for bearing risk and deferring consumption while they hold their securities.

Among practitioners, uninformed investors are often called indexers and passive traders. In the academic market-microstructure literature, uninformed investors are frequently called pure liquidity traders.

Exchangers trade instruments that do not serve them well for instruments that provide greater service. The foreign exchange market is the largest market serving such traders. Traders involved in international commerce and finance convert money from one currency to another because some currencies are more useful in one place than another.

Exchangers lose primarily to dealers.

Hedgers hold instruments to offset correlated risks in other activities. Their reduced risk exposure may simply make them happier, if they are risk averse, or it may allow them to increase productive efficiency by reducing costs associated with unexpected contingencies.

Hedgers include farmers who sell their wheat for future delivery when they plant it and bakers who buy wheat for future delivery when they enter long-term contracts to supply bread. Both traders are better able to organize their production when they know in advance the price they will receive or pay for wheat. The farmer can decide better what to plant. The baker can bid more aggressively for the bread contract and, if successful, better decide whether to train new workers and build new ovens.

Other hedgers include value-motivated traders who specialize in valuing firm-specific common stock risks. They trade index futures to offset market-wide risk in their positions. The hedged portfolio exposes them only to the risks over which they have expertise.

Hedgers may increase price efficiency if their trading reveals information about the risks that they hedge. Hedgers generally take liquidity. If they do not need to establish their hedges quickly, they may offer liquidity to lower their trading costs.

Gamblers trade because they enjoy placing bets on uncertain future events. Gambling for them produces valuable entertainment, excitement and war stories. Gamblers who recognize that they lose on average when trading are utilitarian traders. They continue to trade because the external gambling benefits are worth more to them than the losses they incur.

The notion that some traders are gamblers is controversial and requires more elaboration. Before considering the regulatory issues, however, recall that this summary only describes characteristic trading styles. Traders generally trade for many different reasons. Gambling entertainment may only be one of those reasons. Those who gamble in the markets typically trade more intensely than they should when trading other styles. Few traders may be pure gamblers.

Many markets must regularly defend themselves against regulators who believe that they are gambling markets. The derivative markets are most often accused. Regulators who worry about gamblers typically fear the damage that they do to themselves and to the markets. Consider both concerns.

Gamblers damage themselves, and perhaps ultimately the state, when they lose money.[5] Many people believe that the state has a legitimate interest in protecting citizens who cannot, or perhaps will not, recognize the negative consequences of their behavior. In this classification of trading styles, such traders are futile traders, not gamblers. The laws and regulations that govern customer-broker relations are designed to deny such traders access to the markets when their trading losses reasonably could be expected to impoverish them or to significantly lower their lifestyles. Brokers are required to determine whether the trading they facilitate is appropriate for their customers.

Gamblers damage a financial market when the public widely believes that the market serves gamblers. Financial markets are designed to discover values, transfer assets from savers to managers, transfer risks to natural hedgers and share out risks among many investors. These activities all produce valuable economic products. When an association with gambling scares people away from using a financial market, these valuable products may be lost. To preserve these benefits, markets continuously educate the public about them. They never promote markets as gambling forums.

Some regulators and traders believe that gambling makes financial markets function less well by increasing volatility and decreasing price formation efficiency. The actual effects are probably just the opposite. In a broad sense, gamblers and other utilitarian and futile traders pay to make markets efficient and liquid. Without their losses, winning traders could not afford the research necessary to supply liquidity and make prices efficient. The markets would function less well.

Many people associate options markets with gamblers. Some gamblers appear to like high leverage bets that win big with low probability and lose small with high probability. (Consider the popularity of public lotteries.) Options contracts frequently provide similar highly-skewed return distributions.

Regulators concerned about gamblers in the options markets should note that careful empirical studies show that underlying stock volatilities decrease when associated options are listed. This result ultimately may be due to the money lost by gamblers to fundamental traders.

[5]A gambler in the financial markets who makes money on average would not be is not a gambler. As noted above, winning traders make money because they have some edge. Gamblers do not have an edge.

It also may be due to other factors. The result does suggest, however, that gambling in the options markets does not increase volatility.

If gamblers do indeed contribute to market quality in the long run by subsidizing information acquisition, an intriguing argument can be made about public lotteries. Lotteries would appear to compete with financial markets for gamblers willing to lose money. Lottery gamblers subsidize the state through their voluntary participation in a negative-sum game. Financial market gamblers subsidize productive information acquisition. Perhaps prices, and ultimately economic production, would be more efficient if gamblers gambled exclusively in the financial markets.

Market professionals do not seriously consider this argument because of the damage gambling can do to a market's reputation. They also should avoid this argument because the removal of lottery gamblers to the financial markets might increase the probability that a new transaction tax would be placed on trading. Collecting state revenue from lotteries has little effect on productive efficiency because the taxes are borne only by lottery gamblers. Although the lottery tax decreases their pleasure, few people seem concerned about lost gamblers' utility. Taxing the financial markets, however, could greatly decrease efficiency because the tax would be borne by all traders. Such taxes would hurt traders who use the markets for financial purposes and traders who make prices efficient.

Fledglings trade to learn whether they are any good at trading and analysis and to learn whether they enjoy the game. They are willing to lose money when trading to find answers to these questions. Fledglings may try a variety of styles or they may concentrate on a single style.

Fledglings become winning traders if they learn to trade well. They eventually quit or are fired if they cannot trade effectively or if they do not enjoy trading. Fledglings who never learn that they cannot trade well are futile traders.

Since it is very difficult to measure trading performance, lucky fledglings may falsely conclude that they are skilled. A lucky, but unskilled fledgling is still a fledgling. Many traders, including professional portfolio managers, are probably fledglings.

Naturally, fledglings prefer to learn using other people's money. Few traders get the opportunity to do so. Those who do, however, may control very large sums of money.

Fledglings who trade other people's money probably do not learn as quickly as fledglings who trade their own money. They may lose large sums before they get fired by their sponsors.

Occupational training is expensive in many professions. The trading and money management professions are expensive to learn and not everyone who attempts to learn succeeds. Those who do succeed may profit handsomely. In this respect, the trading profession is no different from the medical, engineering, technical, artistic, sporting, and political professions.

Cross-subsidizers trade to produce commission revenues for their brokers in return for various services. These services often would be purchased directly by the cross-subsidizer if not provided by the brokers. The commissions decrease portfolio returns. The cost savings from having brokers provide services decreases visible accounting expenses. Cross-subsidizers thus are able to bury expenses in total performance. An extensive soft dollar accounting system has evolved to ensure that brokers provide services commensurate with the commissions they receive.

Other cross-subsidizers may trade to reward their brokers for friendship, for companionship or for their brokers' respect. These external benefits presumably offset the transaction cost losses they incur from trading.

Cross-subsidizers typically demand liquidity and trade frequently.

2.3 Futile Styles

Futile traders expect to profit from trading but they do not profit on average. These traders cannot recognize or refuse to recognize the difference between their expectations and their results. They may be irrational, they may be of limited mental capacity, they may have emotional problems or they may rely on untrustworthy agents. Futile traders generally use winning styles but they are unable to profit from them.

Inefficient traders lack the skills, analytic resources and access to information that make winning traders successful. They do everything that winning traders do, but they just don't do it as well. Depending on their style, they may profit on average from other traders. Those profits, however, are not sufficient to cover their losses to better skilled and better informed traders.

Pseudo-informed traders are a subset of inefficient traders. They trade like informed traders, but they obtain their information too late. Their information is already reflected in prices, but they do not realize this. They lose to dealers, value-motivated traders and bluffers.

If many pseudo-informed traders trade in response to the same information, short-term transitory volatility may increase as price adjustments over-shoot changes in fundamental values. Such trading mistakes make contrarian trading profitable.

Victimized traders rely on brokers and advisors who fail to meet their fiduciary responsibilities. These agents may simply fail to provide services for which they are paid, or they may deliberately exploit their clients to their own advantage.

Victimized traders believe that they will profit from trading, but they do not on average. In a sense, victimized traders are fledglings since they have not learned yet how to manage their money. They are victimized because they rely on violated contractual relationships.

Traders who hire conscientious but incompetent managers to profit from trading are fledglings who have not yet learned how to manage their money. If they refuse to learn, they become inefficient traders.

Victimized traders generally demand liquidity and suffer high turnover. They lose to everyone, but most especially to their brokers and advisors.

3. Implications for Future Scenarios

In this section we introduce three scenarios for the future changes in trading and quickly consider the implications of the zero-sum game for profits, price efficiency, and liquidity.

3.1 Passive Trading Continues to Grow

The last 15 years have seen huge growth in passive investing. Most of the growth has occurred because many traders have realized that they have no edge when trading. These traders now index their money to avoid trading losses. In the language of this paper, inefficient fledglings have learned that they cannot make money. They now choose to be uninformed investors.

What will happen is passive trading continues to grow?

As inefficient active traders convert to passive trading styles, less money will be available to fund the revenues of the winning styles. Fewer traders who trade the winning styles will be able to profit. Expenditure on research must decline and prices will become less efficient.

The remaining order flow will contain relatively more informed orders so bid/ask spreads will increase and depths will decline. Passive traders whose cash flow problems require that they trade often will lose more when they trade.

Even though prices will become less efficient, profits from fundamental trading will decline because the market impacts of their trading will increase. Fundamental traders will be able to complete less size when they want to trade.

3.2 Transaction Taxes are Imposed

All forms of trading will decrease as traders try to avoid the tax.

A transaction tax takes wealth out of the zero-sum game. The flow of wealth currently moves from utilitarian and futile traders to winning traders. The tax effectively makes the state a player in the game. What the winning traders formerly earned from the other traders must now be shared with the state.

The entire burden of the tax must fall upon the utilitarian and futile traders because the winning traders will exit if their trading becomes unprofitable. Noise trading therefore will become more expensive both because of the direct costs of the tax and because of the indirect increase in transaction costs necessary to cover the taxes paid by the remaining profitable winning traders. Therefore, the tax will have a larger than expected effect on the market. Liquidity will decrease and prices will become less efficient.

3.3 Fundamental Information and Reporting Systems Improve

As fundamental information dissemination and report systems improve, more traders will incorporate value-motivated investing styles into their trading. Existing value-motivated investors who profit on their ability to better organize information will see their edge disappear. It will become more difficult to profit as a value-motivated trader as more traders use value-motivated strategies. Liquidity and price efficiency will both increase and utilitarian trading will increase.

4. Summary

This paper provides a survey of various characteristic stylized traders. It describes their activities and how they profit or lose to each other.

Skilled traders generally can profit when they have access to information of one kind or another. Value-motivated traders access the entire stock of fundamental information. Informed traders have first access to news events which change the stock of fundamental information. Market-makers have access to the order flow. Upstairs traders have access to latent trading demands. Bluffers create and access their own information.

Prices are made efficient primarily by the winning traders. Value-motivated traders set fundamental price levels and maintain cross-sectional relations based on value fundamentals among asset classes and individual securities. Informed traders update prices to reflect new information. Technical traders ensure that no predictable components in returns exist. Arbitrageurs ensure that common risks have common prices.

Liquidity also is supplied primarily by winning traders. Value-motivated traders are the ultimate source of depth and resiliency. Upstairs traders provide depth and organize liquidity for large traders. Market-makers provide immediacy by connecting liquidity demands through time. Arbitrageurs connect liquidity demands across space.

The winning traders can only profit to the extent that other traders are willing to lose. Traders are willing to lose when they obtain external benefits from trading. The most important external benefits are expected returns from holding risky securities that represent deferred consumption. Hedging and gambling provide other external benefits.

Markets would not exist without utilitarian traders. Their trading losses fund the winning traders who make prices efficient and provide liquidity.

Table 1

Stylized Trader Summary

This table summarizes the trading styles that traders use.

Stylized Trader	Description	Speed & Turnover	Trading Goal	Information Resources	Effect on Price Efficiency	Effect on Liquidity	Trading Style Profits from	Trading Style Loses to
Panel A: The winners. If skilled, these traders will profit from trading in the long run.								
Value-motivated traders Informed investors Stock pickers Asset allocators Value investors	Speculate on opinions about value obtained from analyses of micro- and macroeconomic fundamental information.	Slow acting. Low turnover.	Expected profits.	The available stock of fundamental valuation data rendered into information by analysis.	Cause prices to reflect fundamental values.	Supply depth to dealers and uninformed traders at the outside spread.	Uninformed traders	Informed traders with more current information. Value-motivated traders with superior analyses.
Informed traders Headline traders Event study traders Risk arbitrageurs Inside traders	Speculate on news, events, announcements, private information and inside information.	Fast acting. Turnover varies.	Expected profits.	Flow of new fundamental information about value.	Cause prices to adjust quickly to changes in fundamental values.	Demand liquidity, especially immediacy.	Dealers Uninformed traders Poorly informed value-motivated traders	Bluffers and market manipulators (if trading on rumors.)
Market-makers Dealers Scalpers Day traders	Speculate on finding a balanced order flow to trade both sides of the bid/ask spread.	Fast acting. High turnover.	Expected profits.	Current and recent order flow, often identified by broker but not by source.	Discover prices that produce balanced order flow.	Supply immediacy at the inside bid/ask spread.	Impatient, uninformed traders	Informed traders
Upstairs traders Block positioners Block facilitators	Facilitate, position or arrange large trades. Speculate on placing large blocks.	Moderate speed. Turnover varies.	Expected profits.	Audits of initiating trader motives. Information about latent trading interests.	Discover prices that produce balanced trading interest.	Supply market depth, especially for uninformed traders.	Impatient, uninformed traders	Informed traders
Parasitic traders Quote-matchers Front-runners	Trade in front of orders and quotes to obtain the option value of the order flow.	Fast acting. Turnover varies.	Expected profits.	Current and impending order flow.	Long-run effect uncertain. In short-run, prices may adjust faster to information in the order flow.	Effect depends on market structure. Probable long-run negative effect on depth and short-run positive effect on spreads.	Large, slow traders Stale limit order traders Market-makers Upstairs traders	Informed traders Bluffers and manipulators

(continued)

Table 1, Continued

Stylized Trader	Description	Speed & Turnover	Trading Goal	Information Resources	Effect on Price Efficiency	Effect on Liquidity	Trading Style Profits from	Trading Style Loses to
Panel A, Continued: The winners. If skilled, these traders will profit from trading in the long run.								
Electronic proprietary traders	Trade inventory to enforce regularity constraints on the supply of liquidity using fast models with wide scope.	Fast acting. High turnover.	Expected profits.	Short-term electronic transaction and quote histories interpreted in context of long-run regularities.	Increase efficiency by eliminating transitory volatility and stale prices.	Supply liquidity when eliminating transitory volatility. Take liquidity when eliminating stale prices.	Inattentive dealers Impatient traders	Informed traders Bluffers and manipulators
Pure arbitrageurs Index enhancers	Lock-in price discrepancies among instruments for which physical or institutional processes imply a stable price relation.	Fast acting. Turnover varies.	Expected profits.	Current prices and quotations.	Increase efficiency by maintaining a single price for related risks.	Move liquidity among market segments.	Dealers Impatient uninformed traders Stale limit order traders	Informed traders if caught with one leg up. Value-motivated traders if arbitrageurs do not understand the pricing relation.
Statistical arbitrageurs Pairs traders	Speculate on price discrepancies among instruments or baskets whose prices are correlated due to common fundamental factors.	Fast acting. High turnover.	Expected profits.	Current quotes and historic price relations.	Increase efficiency by obtaining a single price for common factor risks.	Move liquidity among market segments.	Dealers Impatient uninformed traders Stale limit order traders	Informed and value-motivated traders acting on instrument specific information.
Technical traders Chartists Contrarians Momentum and trend traders	Trade on various systematic price, order flow and volume patterns.	Speed varies. Turnover varies.	Expected profits.	Price, order flow and volume histories.	Increase efficiency when countering predictable patterns. Decrease efficiency when exacerbating uninformed order flows.	Increase liquidity if contrarian. Decrease liquidity if trading with the trend.	Dealers Uninformed traders	Value-motivated traders Informed traders Bluffers
Bluffers Market manipulators "Pure" traders	Fool other traders into offering liquidity at disequilibrium prices.	Generally slow acting. Turnover varies.	Expected profits.	The relation between one's own order flow and past price changes. Rumors.	Decrease efficiency.	Take liquidity.	Uninformed traders Momentum traders	Value-motivated traders Contrarians Statistical arbitrageurs Dealers Other bluffers

(continued)

Table 1, Continued

Stylized Trader	Description	Speed & Turnover	Trading Goal	Information Resources	Effect on Price Efficiency	Effect on Liquidity	Trading Style Profits from	Trading Style Loses to
Panel B: Traders who expect to lose in the long run from trading. They trade for other reasons.								
Uninformed investors Indexers Passive traders	Trade to manage time mismatched life cycle and investment cash flow problems.	Slow acting. Low turnover.	Unconditional risk-adjusted expected returns and convenience yield.	None.	Increase efficiency by making informed trading profitable. Correlated arrivals may increase short-term transitory volatility.	Supply or take liquidity depending on how cash flow problems are managed.	No one	Everyone but other uninformed traders
Exchangers	Trade to convert asset types, typically currencies.	Speed varies. Turnover varies.	Obtain more useful assets.	None.	Minimal.	Generally take liquidity.	No one	Everyone but other uninformed traders
Hedgers	Hold instruments to offset correlated risks in other activities.	Slow acting. Low turnover.	Risk reduction.	None.	Increase efficiency by incorporating information about related risks and by making informed trading profitable. Possible short-run decrease if hedgers trade together.	Generally take liquidity.	No one	Everyone but other uninformed traders
Gamblers	Place bets on uncertain future returns.	Fast acting. High turnover.	Entertainment, excitement and war stories.	None.	Increase efficiency by making informed trading profitable.	Varies.	No one.	Everyone but other uninformed traders
Fledglings	Experiment with various styles to learn whether they are good at analysis and trading.	Speed varies. Turnover often high.	Knowledge about personal skills and preferences.	Various.	Increase efficiency by making informed trading profitable.	Varies.	No one, unless talented	Skilled traders Informed traders
Cross-subsidizers	Trades to provide wealth to brokers and advisors in return for services. Trading may bury expenses in total performance. Soft-dollars accounting often used.	Speed varies. High turnover typical.	Clients may seek specific services from their brokers and advisors or they may merely take pleasure from their personal relationships.	None.	Varies.	Typically take liquidity.	No one	Brokers Advisors Everyone but other uninformed traders

(continued)

Table 1, Continued

Stylized Trader	Description	Speed & Turnover	Trading Goal	Information Resources	Effect on Price Efficiency	Effect on Liquidity	Trading Style Profits from	Trading Style Loses to
Panel C: Losers who expect to profit from trading but will not. These traders cannot recognize or refuse to recognize the contraction.								
Inefficient traders Unskilled traders Poorly informed traders	Trade to profit from one of the winning styles but they have poor skills and/or poor information and analysis.	Speed varies. Turnover varies.	Expected profits (that will not be realized.)	Poor information and analysis relative to successful competitors.	May increase efficiency by making informed trading profitable.	Varies.	Various traders	Better informed and more skilled traders
Pseudo informed traders (A notable type of inefficient trader)	Speculate on stale information already reflected in prices.	Fast (but late) acting. Turnover varies.	Expected profits (that will not be realized.)	Stale information.	Increase efficiency by making value-motivated trading profitable. Correlated arrivals may increase short-term transitory volatility.	Take liquidity.	No one	Dealers Value-motivated traders Bluffers
Victimized traders	Brokers and advisors advise and trade their clients' accounts for their own benefit.	Speed varies. High turnover typical.	Clients expect profits that will not be realized. Brokers and advisors expect commissions and/or trading profits.	None.	Varies.	Typically take liquidity.	No one	Brokers Advisors Everyone but other uninformed traders