Running head: THE ENIGMA OF FINANCIAL EXPERTISE

The Enigma of Financial Expertise: Superior and Reproducible Investment Performance in Efficient Markets

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Abstract

We review research on financial expertise and provide a foundation for future empirical advances in behavioral finance. The expert-performance approach is introduced and used to reveal the circumstances in which financial professionals display superior and reproducible stock selection skill (expertise). However, expert performance does not on average exceed transaction costs and data suggest that financial expertise is highly specialized (e.g. by sector) rather than general. Consistent with other types of skill, we propose that financial expertise is developed through extended deliberate practice requiring the accumulation of specialized knowledge and the development of cognitive adaptations that functionally expand reasoning abilities and limit biases. Furthermore, we propose that market efficiency is a reflection of financial expertise and a product of the behavior of financial experts. The review concludes that to successfully understand the nature of financial expertise, we must identify ecologically valid investment tasks where some experts are able to attain superior and reproducible performance.

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The Enigma of Financial Expertise: Reproducibly Superior Investment Performance in Efficient Markets

Over the years, the search for financial expertise in open markets has garnered great interest. From a theoretical perspective, the answer is sometimes regarded to be among "the most direct and most interesting tests of market efficiency" (Malkiel, 2003, p. 76). In particular, the form of market efficiency defines whether financial expertise is theoretical possible. The strong form of the efficient market hypothesis (for a review see Fama, 1970, 1991, 1998) assumes that market prices reflect both private and public information, implying that current prices reflect the intrinsic values of securities. The short-term variability of security prices thus reflects random patterns, or walks, such that future prices of stocks must be inherently unpredictable. A strongly efficient market prevents investors, including expert investors, from consistently identifying undervalued stocks regardless of their investment strategy. However, the strong form of the efficient market hypothesis requires that no transaction costs are associated with buying undervalued stocks and selling overvalued stocks. In relaxing the assumptions of his theory, Fama (1991) stated "Prices reflect information to the point where marginal benefits of acting on information (the profits to be made) do not exceed the marginal costs" (p. 1575). His revised theory, the semi-strong form of the efficient market hypothesis, asserts that public information is reflected in security prices. By using private information and private assessment techniques, some individuals might be able to consistently identify undervalued stocks, although the differential in value would be less than the cost of completing the transactions and thus would not allow market-adjusted profits. Another alternative interpretation is that rational investors are only able to profit from those who act less rationally (e.g., Cambell, 2001; Barberis & Thaler, 2003).

Considerable empirical evidence casts doubts about strong market efficiency. It has been shown that stock prices tend to fluctuate in non-random and systematic patterns around certain

times of the year. In theory, such calendar effects should be suppressed by the efficient market once they have been publicly discovered. Yet some effects have persisted for at least 50 years from their initially discovery (cf. Thaler, 1992). Lakonishok and Smidt (1988) analyzed 90 years of daily data on the Dow Jones stock-market index (DJIA) and found empirical support for seasonal patterns. A particularly persistent pattern was the so-called holiday effect. Across all years, days prior to holidays had a mean return of 0.22 percent, which was about 23 times larger ($p<0.01$) than the mean return of regular days (0.0094 percent). On days proceeding holidays the average returns were positive in 63.9% of the cases, but on regular days the returns were only positive 50.1% of the time. Similarly, Ariel (1990) analyzed daily index returns from 1963 to 1982 and found that more than 75 percent of the days prior to holidays had positive return, whereas only 55% of the regular days were linked to positive returns. However, supporters of efficient market hypothesis point out that many calendar effects are not robust across time periods, can be explained by valuation models, and cannot be profitably exploited by investors (Cambell, 2000; Malkiel, 2003). Still financial researchers seem to agree that stock returns are to some extent predictable (Malkiel, 2003).

Evidence from research in behavioral finance casts further doubts about strong market efficiency and its premise that all investors make rational stock investments. In two seminal papers, De Bondt and Thaler (1985, 1987) showed that stock prices tended to revert over a five year period with the result that past losers outperformed past winners. The authors attributed this phenomenon to a tendency among investors to overreact. Empirical investigations indicate that investment behavior does seem to violate the rational investment method, such as speculation-prone investors with limited wealth who exploit every opportunity and naïve investors who are enticed by unrealistic expectations of high profits (Wärneryd, 2001). That is, behavioral finance argues that some investors do not act rationally when buying and selling stocks leading to

consequences for rational investors as well as for market efficiency (Barberis & Thaler, 2002). If some investors are consistently making irrational decisions about stock purchase and sales, it should be possible for financial experts to anticipate and profit from such behavioral patterns, as long as the gross returns exceed the costs of the associated transaction. In this way and others, there may be a window of opportunity for financial experts.

There have been only very limited advances in the empirical study of financial expertise. One likely reason is that it has been difficult to find any evidence that highly experienced experts in investment and auditing are able to make better investments or forecasts than less accomplished individuals in the same domain. Early and modern attempts to measure the benefits of financial expertise indicated that investments by experts (professional fund managers) did not result in superior returns of stocks compared to those selected by chance (Cowles, 1933, 1944; Fama, 1970, 1991, 1998). Furthermore, when financial experts were brought into the laboratory to make judgments and decisions they appeared to lack insight into their decision processes and showed marked individual differences (Slovic, 1969; Slovic, Fleissner, & Bauman, 1972). As well, it has been argued that financial experts do not improve their performance because the outcomes of their actions are delayed and cannot be attributed directly to their actions, meaning that financial experts do not obtain feedback about the accuracy of their behavior (e.g., Tversky and Kahneman, 1986).

The goal of this review is to make an extensive and systematic assessment of the scientific evidence for financial expertise and to lay a foundation for future empirical advances in behavioral finance that extend to financial professionals. To date, no such review has been conducted. Admittedly, there are many kinds of professionals active in the financial domain. For example, Wärneryd (2001) distinguishes between newsletter writers, financial analysts, money managers, financial advisors, and brokers. To simply, however, the tasks of these five types could

be grouped into two categories: (1) issuing recommendations and predictions of stocks, and (2) making decisions about trades and investment. We will demonstrate that aside from involving different amount of risk-taking, the categories are also associated with different abilities and successes among private and professional investors.

The Scientific Study of Expertise

Brief Historical Background: Talent versus Skill

In the early part of the 20th century scientists began studying how experts in the arts and sciences as well as sports and games differed from less accomplished individuals in the same domains. In contrast to the expectations of these scientists, the experts did not reveal superior general powers of speed, memory, and intelligence assessed with psychometric methods. Furthermore, the experts' superior test performance was only observed for tasks in their specific domains of expertise. For example, the superiority of the chess experts' memory was constrained to regular chess positions and did not generalize to other types of materials (Djakow, Petrowski & Rudik, 1927). Moreover, IQ a widely accepted metric of "general intelligence" was not related to chess performance in a sample of skilled players that included grand masters (Doll & Mayr, 1987), nor could it distinguish between the most successful and creative artists and scientists (Taylor, 1975).

In a pioneering empirical study of the thought processes mediating the highest levels of performance, de Groot (1946; 1978) demonstrated that the differences in experts' abilities to recognize rapidly promising potential moves was linked to their *extensive experience and knowledge* of patterns in chess. With their influential theory of expertise, Chase and Simon (1973; Simon & Chase, 1973) proposed that experts with extended experience acquire a larger number of more complex patterns and used these new patterns to store knowledge about which actions should be taken in similar situations. According to this theory, *expert performance is*

viewed as an extreme case of skill acquisition (Proctor & Dutta, 1995; Richman, Gobet, Staszewski & Simon, 1996; VanLehn, 1996). Expertise is the final result of the gradual improvement of performance by additions of new patterns acquired during extended experience in a domain, and thus is attainable by highly motivated, normal and healthy individuals without any requirements for innate talents. These findings have lead to the "10-year" rule (Simon & Chase, 1973) suggesting that winning at an international level in many if not most domains occurs only after at least 10 years or 10,000 hours of deliberate practice (Ericsson, Krampe, & Tesch-Romer, 1993). In this way, not even the most "talented" individuals can attain expert level performance without years of extensive practice and experience. To summarize, research suggests (Ericsson & Lehmann, 1996) that (1) measures of general basic capacities do not predict success in a domain, (2) the superior performance of experts is often very domain specific and transfer outside their narrow area of expertise is surprisingly limited and (3) systematic differences between experts and less proficient individuals nearly always reflect attributes acquired by the experts during their lengthy training.

The Expert-performance Approach: Superior Reproducible Performance

In most professions and activities it is relatively easy to identify the most respected individuals, e.g. experts. There are many indicators of reputation within a domain, such as fame, salary, and awards. In some domains, such as music, chess, and sports, there are also frequent competitions where the performance of individuals can be measured and compared. In these domains, there is often a close relation between the amount of prize money accumulated in a given year and one's level of recognized expertise. In contrast, most professional domains do not regularly organize competitions nor are their incomes closely tied to performance outcomes. For example, many professionals' fees reflect their professional reputation and are not contingent on outcome, such as success of projects, so long as adequate service has been provided.

Furthermore, there are many domains where the length of experience and the educational achievements, such as doctoral and masters degrees, are unrelated or at best only weakly related to outcomes, such as of psychological therapy of patients (Dawes, 1994) or diagnostic performance of medical doctors (Ericsson, 2004). In these ways and others experts' decisions are sometimes no better than beginners' decisions or recommendations of simple decision aids (Camerer & Johnson, 1991; Bolger & Wright, 1992).

The failure to identify experts based on their basic mental abilities and their reputation or experience in the domain led some investigators (Ericsson & Smith, 1991) to question the traditional expertise approach, with its focus on using social criteria for finding experts and then comparing their performance to that of novices. An alternative approach, the expert-performance approach (Ericsson & Smith, 1991), was proposed where the goal was to identify *naturally occurring demonstrations of superior reproducible performance*, where this performance captured the essence of expertise in a domain. For example, if we are interested in superior running performance for short distances, we should study athletic competitions where elite sprinters display their superior performance. Similarly, we might go to medical clinics to observe doctors' diagnoses and surgeons' operations and the resulting outcomes of treatments.

However, two professionals rarely encounter the same challenges (e.g. the same patient with the same medical problem or the same chess position playing the same chess player). Therefore, a fundamental idea of the expert-performance approach is to identify *representative situations* that capture essential challenging activities in a given domain and standardize them into tasks that can be presented to many experts and novices under the same conditions. It is critical to identify tasks that are challenging even for skilled and expert performers, because some typical situations do not elicit differential performance among experts and less skilled individuals. Flying an airplane under good weather conditions and completing a standard medical

procedure without complications is not likely to elicit differences between individuals with different levels of attained skill. In contrast, unexpected problems and technical malfunctions are likely to challenge even the most skilled performers and thus elicit reliable differences in performance outcomes. The central claim is that only when individuals are able to consistently perform at a superior level relative to other individuals, under standardized representative conditions, can we legitimately infer that superior performance is attributable to individual differences in skill (expertise).

The approach of recreating representative tasks in the laboratory that capture the essence of expertise has been quite successful in many domains (Ericsson, 1996; Ericsson & Lehmann, 1996). In many sports for example, the conditions of regular competition are often so standardized that recreated performance conditions in the laboratory hardly differs (Ericsson, 2001, 2003b). As well, the best task for capturing elite chess playing is still the same task used by de Groot (1978/1946), where players are presented with chess positions and asked to select the best move for each of them (Ericsson, Patel, & Kintsch, 2000). In medical diagnosis, investigators present doctors and medical students with descriptions of the symptoms and charts of patients with rare or complex diseases and then ask for the appropriate diagnosis. Consequently, the expert-performance approach has developed a collection of representative tasks and scenarios that under standardized presentation yield a consistent and ecologically valid performance advantage for expert performers (Ericsson, 2002, 2003b, 2004).

Our analysis of financial expertise is based on the search for superior and reproducible investment performance. According to the expert-performance approach, it is not possible to extrapolate processes or mechanisms of naïve and unskilled participants found in typical economic and psychological laboratory experiments (Hertwig & Ortmann, 2001; Smith 2002) to those of experts with extended knowledge and practice (Ericsson, 1988, 2003a). The central

question for the expert-performance approach is whether superior and reproducible investment performance exists and whether it is possible to identify individual experts with investment skill, regardless of the margin of profit. Only by studying individual performers can we uncover the detailed mechanisms and knowledge structures that mediate superior performance, as well as the potential activities of deliberate practice that mediate the acquisition of financial expertise. Consequently, the expert-performance approach examines financial performance under ecologically valid conditions that are representative of the domain of financial expertise. Through the expert-performance approach we intend to clarify the enigma of financial expertise, illuminate mechanisms of market efficiency, and investigate the nature of bounded rationality in financial experts.

Financial Expertise: Measurement and Performance

Financial skill or expertise cannot be determined by observing only a few cases of transactions. For example, a small number of successful business transactions do not provide statistically reliable empirical evidence for business skills, just as a few winning bets in a casino do not reflect gambling skill. Beyond uncontrollable external factors, in their review Ericsson and Smith (1991) claimed that the outstanding achievements of many kings, generals, inventors, and even scientists are better explained by their unique opportunities rather than any superiority of ability or skill. It is unknown what would happen if we were to reconstruct the contexts of famous decisions by battle commanders or discoveries by scientists and allow a large sample of individuals the opportunity to act in the recreated situations. A small number of studies that have recreated such situations suggest that many, if not most, people with similar goals and basic skills (e.g. skill in mathematics) in these situations would be likely to generate the same discoveries (Ericsson, 1996, Qin & Simon, 1990). Likewise, as many financial decisions are made in unique situations, by people with unequal wealth and different access to information, it is difficult to

assess the skill involved in their decisions. From the perspective of the expert-performance approach we must search for representative tasks, where many individuals make decisions under comparable and reproducible conditions, yet only a few consistently perform better.

Therefore, it is necessary to identify individuals who make a series of independent superior decisions in situations that are available to other decision makers. Ideally we seek to find situations in which all individuals have similar access to opportunities. It follows that examining stock selection and forecasting skill in open financial markets offers a reasonably standardized task or starting point for the further examination of financial expertise. Assuming that investors have equal access to information and the ability to invest in a large number of companies with advertised stock prices, an expert financial performer should be able to identify superior investments with gross returns that exceed the market indexes, regardless of the net profitability of these investments.

History of the Search for Financial Skill

Initial research on financial expertise was motivated by theoretical and practical issues including a desire to assess the quality of expert financial advice. About 70 years ago, Alfred Cowles (1933), a pioneer in econometrics, compiled evidence from a number of financial service agencies for the period 1928 – 1932. He wanted to rely on "the existence in individuals or organizations of the ability to foretell the elusive fluctuation, either of particular stocks, or of stocks in general" to develop "economic theories or statistical practices whose soundness had been established by successful predictions" (p. 309). In analyzing the financial outcomes of 7,500 buy and sell recommendations made by 16 financial service agencies, Cowles found that the raw annual average return of the agencies' transactions did not result in the expected gain. In fact, the average return was below the market by an estimated -1.43 percent. Only six agencies managed to perform better than the market but statistical (probability) tests showed that this observation

was more likely to be a result of chance factors than skill. In addition to exploring the usefulness of the agencies' stock recommendations, Cowles analyzed 3,300 forecasts issued by 24 financial publications from 1928 to 1932. His comparison demonstrated that the mean forecast failed to perform better than a random selection and that the most successful forecast was also not better than could be expected by chance. Eleven years later, Cowles (1944) reported additional evidence over a 10-15 year period on the continued failure of financial publications to successfully predict the trend of the US stock market.

Inspired by the seminal work of Herbert Simon and Allen Newell on thinking aloud during the solutions of logic problems (Newell, Shaw, & Simon, 1958; see also Ericsson & Simon, 1980, 1993, 1998, for protocol analysis), Clarkson and Meltzer (1960) interviewed one investment officer and captured protocols of his verbalized decision processes, while he reviewed a variety of past and present decisions on stock portfolios. Based on the collected data, Clarkson and Meltzer were then able to construct a sequential model that successfully simulated the decisions made by the investment officer. Unfortunately, interpretations based on these result are limited as Clarkson and Meltzer did not demonstrate that the investment officer was able to exhibit superior financial performance nor was their constructed model capable of making superior decisions.

Some years later, Paul Slovic conducted two studies (Slovic, 1969: Slovic, Fleissner, & Baumann, 1972) demonstrating that stockbrokers had limited understanding of their decision-making processes when they were presented with standardized decision-making tasks in the laboratory. In fact, student participants showed better insights and greater agreement. Similarly, Stael von Holstein (1972) studied the ability of financial experts to quantify their beliefs about the future course of the stock market in probabilistic terms and found that they failed to forecast better than a simple statistical model. These laboratory studies differ from the study of Clarkson

and Meltzer (1960) in that among other issues they did not use representative tasks. For example, in Slovic et al., (1972), 13 stockbrokers (average experience was 4.5 years) and five MBA-students evaluated 64 fictitious stocks by using eight dichotomous factors (e.g., stable vs. dynamic industry, good vs. bad P/E-ratio) purposely arranged so that pairs of factors would be uncorrelated. These tasks may not have captured the representative financial tasks, as the stockbrokers themselves raised concerns about the realism of the task and the format of the presented information (see Slovic et al., 1972).

Despite the limits of early work, there was soon renewed interest in behavioral decision-making theory (Kahneman, Slovic, & Tversky, 1982) although there was less focus on ecologically valid and representative tasks, and experts were typically ignored. Following the mainstream of cognitive psychology most researchers turned to study more abstract problems (e.g., choices between gambles represented by probabilities) and to explore essential characteristics (e.g., risk, uncertainty, ambiguity) of decision-making with naive subjects (e.g., students) (cf. Keren, 1996). This line of research of behavioral decision-making has been particularly successful in providing explanations for anomalies and suboptimal behavior of investors (Glaser, Nöth, & Weber, 2004). In analyzing stock data as well as thousands of trading accounts collected from stockbrokers, behavioral finance has established that many phenomena captured in laboratory sessions with novices and students can apply for experienced investors and traders in the real world (cf., Barberis & Thaler, 2003). For example, studies have found that both professional and private investors tend to hold losing stocks too long but to sell winners too early (Garvey & Murphy, 2004; Odean, 1998). Initially introduced by Shefrin and Statman (1985), this tendency referred to as the disposition effect is consistent with predictions made by the well-known prospect theory (Kahneman & Tversky, 1979).

In summary, early research on professional investment and financial decision-making processes of experienced stockbrokers revealed no compelling evidence that experts' cognitive processes and performance differed from college students. When these findings are taken together with the subsequent demonstrations of poor accuracy of judgments and forecasting by experts in business and related domains several researchers have concluded that experts do not exhibit superior decision-making performance (Camerer & Johnson, 1991; Shanteau & Stewart, 1992). The more recent evidence that investors, both professional and private, exhibit detrimental judgment biases has strengthened this unflattering view of professional investors.

Alternatively, the expert-performance approach to financial expertise takes issue with these earlier studies and their conclusions. According to the expert performance approach we must first identify superior performance of select individuals in the everyday activities and then capture it with representative tasks in the laboratory. The laboratory studies reviewed above with the exception of Clarkson and Metzler (1960) have constructed tasks that do not preserve the relevance of the professionals' idiosyncratic and extensively developed knowledge and skill. Similarly, the effects of judgment biases have been shown to decrease or even disappear when highly skilled individuals are asked to make judgments in their domain of expertise (Smith & Kida, 1991). Even more relevant is the finding that when experts in a domain of games of chance, such as bridge, are asked to make probability judgments their estimates are very accurate and bias free (Keren, 1987).

The Transactional Costs of Buying and Selling for Profit—A Window on Expert Performance

There are several costs associated with transactions leading to a profit. First, the prospective buyer has to make a purchase request and a broker will charge the buyer a fee, either a fixed fee or a percentage of the value of the stock. For companies with small market capitalization **(**small cap) and for larger orders the buyers must also expect to pay more than the current market price to complete the purchase request (the bid-ask spread). The increased cost for the stock

compared to the initiation of the purchase should be viewed as part of the transaction cost. For large transactions the completion of the purchase may take time and there are costs associated with keeping capital on hand. Similarly, broker fees have to be paid for selling the stock to realize the profit. There are also costs associated with required lowering of the stock price to complete the sale, especially for small cap stock and large sales of stocks. Keim and Madhavan (1997) estimated average total cost of buy order to be 1.23% and sell orders 1.43% for Nasdaq. The fees charged by a broker depend on the client and large-volume fund mangers are likely to pay lower fees than private investors. In a relatively recent study Odean (1999) calculated that in his data set of a million transactions by private investors, the average cost for a buy order and sell order was 2.2% and 2.8% of their respective prices, or 5% for the complete buy-sell cycle. Chan and Lakonishok (1997) estimated round-trip execution costs ranging from on the average, .86% (NYSE) and 1.09% (Nasdaq) for stocks of mid to large companies to 3.31% (NYSE) and 2.22% (Nasdaq). Other estimates suggest average round-trip costs suggest costs in excess of 1% (Chan & Lakonishok, 1995).

In our analysis of expert-performance we will analyze professional investors' ability to pick stocks that are undervalued by analyzing their buy recommendations. It is also possible to examine individual differences in the raw market-adjusted returns (disregarding transaction costs) for those investors who conduct trades. All professional financial investors have to make investments for new clients and it should be possible to monitor their expected gross market-adjusted returns and use that as an index of investment skill. Our expert-performance approach draws upon a weaker version of the efficient market hypothesis, which provides a gray zone with small differences between current and true values of stocks. Within this gray zone skilled and informed investors have the opportunity to select undervalued stocks with above average gross returns—even when average risk-adjusted gains are zero percent.

Given that all costs of stock transactions are rarely reported, we will make the assumption that transaction costs (e.g., broker's fees, increased purchase and decreased sales prices, and capital expenses) will range from 1.5% to 6%. Any average market-adjusted returns that are above the high end (6 %) would be viewed as likely profitable and any returns below 1.5% would be associated with losses, with only a few exceptions from recent day-trading transactions of small volumes and very low fees.

Evidence for Superior Stock-Selection Performance

In this section we will review evidence that professional investors are able to select stocks that yield reliably positive gross returns. We will first examine the investment advice given by professional investors about stocks that should be bought and then we will examine fund managers' investments in stocks via reported gross market-adjusted returns. This section will conclude with a review of findings from private investors and their returns.

Some Professionals Select Stocks Better than Those Made by Chance

Perhaps the most famous test for stock-picking ability was the Wall Street Journal column which compared the value of stock selections made by financial experts to those of randomly picked stocks (determined by throwing darts at a dartboard) as well as the stocks contained in the Dow Jones Index. In the 147 monthly contests spanning over a decade and involving than 200 different experts, around 63% and 56% of time the experts' selections outperformed these two benchmarks (Jasen, 2002). The Wall Street Journal column has been subjected to scientific inquiries (e.g., Sundali and Atkins, 1994; Atkins & Sundali, 1997) indicating statistically reliable superior aggregate performance of the "experts."

The evidence from the experts' stock selections in the study by Wall Street Journal is potentially compromised by the fact that the experts' selections were published in newspapers and thus readers are likely to have tried to buy the recommended stock thereby increasing its

market price. The superior future value of the stocks selected by the experts compared to other stocks may be an artifact of increased prices resulting from readers' attempts to buy the stock. These announcement effects resulting from experts' stock advice given as part of the Wall Street Journal column have been systematically studied. Barber and Loeffler (1993) demonstrated a dramatically increased turnover of the stock and a rapid increase in price of roughly four percent of excess raw returns. After a couple of days, the announcement effects on trading volume disappeared along with one half of the increase in stock value. After 25-30 days there is no discernable evidence of changes in the value of the stock and a stable gain in the value of the stock remains.

The initial studies of a couple of hundred newsletters (Jaffe & Mahoney, 1999; Metrick, 1999), and around 250 stock recommendations (Schadler & Eakins, 2001) found no reliable information that would allow readers of these newsletters to identify stocks with reliably abnormal gross returns. In a more comprehensive study involving 1751 stock recommendations, data indicated that selected stocks did not perform significantly better than matched stocks for a period from the day after the published announcement to six months and three years later (Desai & Jain, 1995). However, Desai and Jain (1995) did observe a superior ability to make valid sell recommendations where the selected stocks decreased in value by an additional 8% (compared to the matching stocks) over the 250 days following the announcement. Furthermore, in an analysis of 1,573 investment recommendations Womack (1996) found that the value of the stock did not revert back toward the market average after the announcement. Instead the value of the stock moved slowly in the predicted direction giving investors with rapid trade responses increased gross returns or decreased raw losses.

Analyses of larger databases confirm the findings of these studies. For example, Stickel (1995) analyzed over 16,000 stock recommendations (half sell recommendations and the other

half buy recommendations) and found evidence for valid buy and sell recommendations (especially strong buy and strong sell recommendations) as well as temporary effects of the announcement of the recommendations. Similarly, in the recent and the most comprehensive study, Barber, Lehavy, McNichols, and Trueman (2001) analyzed 361,620 stock recommendations and documented annual abnormal gross returns of on the average of 4.1% for buying the most recommended stocks and avoidance of 4.9% raw loss by selling the stocks recommended for sale. Although expert recommendations are reliable, it is essential for stock investors to react rapidly to the recommendations because even a week's to a month's delay of executing the trade will reduce the projected benefits by around 50%. Moreover, a careful analysis showed that it is unlikely that stock investors could be able to benefit financially from these valid stock recommendations because the most profitable recommendations involved small- and medium-sized firms where trades with high transaction costs, especially large bid-ask spreads, are likely to cancel out any gains.

This initial examination suggests that financial experts, as a group, are capable of identifying undervalued and overvalued stocks better than a random process, although the size of the differential gain will not in general exceed the costs of executing the transactions (is it supported). Issuing stock-recommendations involves, however, limited investment risk for the advice-giving experts and no explicit concern for the transaction costs. In their analyses of the Wall Street Journal Dartboard, Barber and Loeffler (1993) found that the stocks picked by the experts tended to have certain characteristics (e.g., low dividends, high historical and projected growth in earnings per shares, high price-earning ratios, and high betas), indicating a tendency to select high growth firms. If the experts had to invest in their recommended stocks, they might have been more conservative in their selections. Thus, another test of superior stock selection by

financial experts is to examine the success for trading performance by professional investors and fund managers.

Some Professionals Make Better Investments than Those Made by Chance

For the last half century there has been an ongoing debate on whether managers of mutual, and more recently hedge funds, are able to select portfolios that outperform index funds. This debate is well captured by a series of influential reviews (Carhart, 1997; Gruber, 1996; Malkiel, 1995). Malkiel (1995), for example, showed that it is necessary to consider the time period and the general market in making inferences about abnormal returns of mutual funds. Malkiel found clear evidence for persistent advantage of actively traded mutual funds over passive index funds in the 1970's, thus supporting superior stock selection abilities, but this advantage did not extend to the 1980's. Claims made by researchers, such as Ippolito (1989) and Grinblatt and Titman (1989, 1992) that the returns of mutual funds were sufficiently large to exceed reliably the transaction costs were also challenged by Malkiel (1995). He suggested that those claims were based on questionable assumptions regarding probability of survivorship of funds, and the estimation of transactions costs. Similarly, Carhart (1997) questioned Hendricks, Patel, and Zeckhauser's (1993) claim for stock selection skill based on the persistence of abnormal returns. According to Carhart (1997), this skill effect could be explained by investment strategies (e.g., buying and selling high vs. low beta stocks, large vs. small capitalization stocks, value vs. growth stocks) and variations in transaction costs. These reviews (Carhart, 1997; Gruber, 1996; Malkiel, 1995) rejected the claim of net abnormal returns where these returns on the average would exceed transaction costs and fund-related expenses of actively managed mutual funds. However, these reviews are not inconsistent with the hypothesis that skilled and knowledgeable investors can achieve gross abnormal returns.

Consistent with our limited gross adjusted returns hypothesis, analyses of one of the largest hedge fund data sets examining 2,796 funds (including 801 dissolved funds helping to control for survivorship bias) revealed the presence of limited persistent abnormal returns during the period from 1984-2000 (Capocci & Hübner, 2004). The data were further analyzed in order to examine the persistence and superior performance across a number of market strategies. For example, analysis of two superior investment strategies (Market Neutral & Global Macro) suggested that the persistence of abnormal returns was lowest among the best and worst performing funds reflecting their increasingly risky investments, while the middle of performing funds that followed a less variable investment strategy were most persistent across a one year horizon. Although these results provide additional evidence that hedge funds in some cases consistently and reliably outperform the market, they also indicate reliable and persistent individual differences in performance across investment strategies. Similarly, analysis of 273 pension funds (Christopherson, Ferson, & Glassman, 1998,) largely from the 1979-1990 period, also indicate reliable performance persistence, this time in a sample of institutional equity managers. However, in contrast to the hedge funds of Capocci and Hübner (2004) the persistence of pension fund performance is best explained by the poor performance of some managers, again suggesting the presence of individual skill differences.

Other investigators have tried to focus more directly on measures of the skill of fund managers, namely their ability to buy stocks with superior future returns and sell stocks with inferior future returns, rather than other types of market-adjusted performance. For example, using passive portfolios equated across characteristics as a benchmark, a set of more than 2,500 funds was examined for evidence of superior timing and selectivity of stock selection for the period from 1975-1994 (Daniel, Grinblatt, Titman, & Wermers, 1997). Results indicate a small yet superior stock picking ability of fund managers although no such difference in timing was

evident. Similarly, Chen, Jagadeesh, and Wermers (2000) investigate stock selection ability by comparing fund performance for stocks sold, bought, and held, for all funds in existence during the period from 1975-1995. Results revealed that when actively traded stocks were compared small yet reliable superior stock selection skill was again revealed, as compared to stocks sold or held. Futhermore, Wermers (2000) again examined the entire U.S. mutual fund industry from 1975-1994 demonstrating that, excluding costs, actively managed funds significantly outperformed passive benchmarks. A similar approach was also taken by Pinnuck (2004) who examined Australian mutual funds showing that actively bought stocks outperformed those sold. Thus, on the whole, these results indicate that active fund managers reliably select superior stocks, although the benefit is typically very limited and fits the weaker version of the efficient markets hypothesis. However, large transactions by institutional investors are likely to have reactive effects on the value of stocks. To complete a large order of stock shares it is frequently necessary to increase prices of purchased stocks and lower prices for sold stocks in order to attract willing trading partners. Although these price effects of the transaction may be short-lived, there is evidence to suggest that some small investors monitor and try to mimic the transactions of large investors, which might exacerbate the reactive effects. Consequently, such reactive effects may in part affect the evidence of abnormal raw returns, discussed in this section.

Private Investors with Consistent Market-Adjusted Losses

If some professional investors are able to purchase undervalued stocks and realize a raw gain there must be other investors who sold these stocks and had corresponding losses (when appropriate adjustments are made for changes in the price levels for the general stock market). Most of these investors are private. Odean (1999) analyzed 10,000 accounts of private customers of a discount broker. After excluding trades motivated by portfolio rebalancing, tax loss, and other trades not primarily made for profit, Odean (1999) found that trading was associated with

reliably negative excess returns even before transaction costs were considered. He identified some potential cues, such as recent increases in stock prices and information in financial media, that would explain the below average selection performance. In a subsequent study, Barber and Odean (2000) analyzed investments by 65,000 households and found that these household lost money on the average from their stock transactions and would have earned reliably more money by simply holding on to their stocks for the entire investment period. They estimated that on top of this average loss, the transactional costs of completing a complete buy-and-sell cycle increased the loss by an additional 6%, on the average. Nevertheless, it should be noted that a quarter of the households managed to outperform market index by more than 6% per year when accounting for transaction costs. In a re-analysis of the same data, Barber and Odean (2001) showed that the excess net returns of men's investments were reliably lower than that of women because the men engaged in more trading activity with larger accumulated trading costs.

Similarly, a very recent study by Shu, Chiu, Chen and Yeh (2004) analyzed over 50,000 accounts and over 10,000,000 transactions from a brokerage house in Taiwan. They replicated the earlier findings showing that stock transactions did not lead to reliable accrual of wealth. Shu et al. (2004) also showed that when they divided the account by the number of trades made, the more transactions completed during the investment period the greater the loss, with one exception—the most active trading group showed better performance than the groups with average trading activity. The most active trading group had a large variability in outcomes leading Shu et al. (2004) to infer that it must consist of, at least some, successful traders for the observed trading period.

In two other studies, Grinblatt and Keloharju (2000, 2001) cast additional light on investment behavior of private investors (and professionals). Their studies were based on a data set involving the 16 largest shares traded and held by all investors operating on the Finnish stock

market for a two-year period starting in 1995. On average, the buying activity of the Finnish private investors corresponded to 7.3% of the total buy volume concerning those shares; corresponding numbers for Finnish and foreign professional investors were 30.2% and 62.5%, respectively. Grinblatt and Keloharju (2000) concluded that the private investors, as an aggregate, tended to follow contrarian-strategies resulting in negative adjusted performance, as indicated by the so-called buy-ratio. In contrast, foreign investors were shown to follow momentum strategies and have positive adjusted performance. Most Finnish professionals were classified to be adapters of contrarian-strategies, but few managed to excel financially. In their paper, Grinblatt and Keloharju (2001) found that private investors, as an aggregate, were reluctant to realize losses except at the end of the year when tax purposes motivated realizations of losses. Consistent with their earlier study, Grinblatt and Keloharju (2001) observed a tendency among private investors to sell rather than to buy stocks with large past returns.

Our review of aggregate, fund, and team managed investing performance by large number of fund managers and other experts reveals evidence for, on average, consistently superior performance in selecting and then trading stocks with gross abnormal and risk adjusted returns, as compared to stock indices and random selection methods. However, as predicted, the gains of the superior investment choices by the experts are small and they do not, on average, exceed the costs associated with completing the transactions. We found corresponding evidence that many private investors' stock selections are consistently worse than chance at the aggregate level, with some evidence of skill in a subset of the sample. In summary, analyses of average investment performance across many professionals and private investors, covering numerous years and entire populations of funds (e.g. all funds in the U.S. market) suggest support for our hypothesis and indicate the existence of financial expertise.

Capturing Reproducibly Superior Investment Performance

We will first attempt to estimate the average sizes of the superior stock selection of experts by reviewing databases of individuals with a large number of observed investment decisions. Then we will discuss how much data would be necessary to identify individual experts as consistently superior investors. This section will conclude with a search for individual differences of professional investors that are statistically associated with the superior stock-trading performance and for forecasting tasks associated with financial expertise.

Several investigators have tried to estimate the size of the stock traders' stock-selection advantage. For example, Sundali and Atkins (1994) analyzed the stock prices after a one-month delay to avoid temporary announcement effects in their analysis of data from Wall Street Journal's dartboard column. They found that the participating experts recommended stocks yielded higher raw returns than a stock index (Dow Jones Industrial Average, DJIA) as well as randomly thrown darts by an average of 1.41 and 3.16 percent, respectively. The differences in returns between the DJIA and the experts' selections were statistically reliable ($p < 0.05$) but the effect size was small (the average difference in returns was equal to a tenth of one standard deviation or $d=0.1$). Based on our estimates of the costs of completing the stock transactions it is unlikely that the raw returns in the range of 1-3.5% would exceed transaction costs, especially for the complete buy-and-sell cycle.

An analysis of average stock recommendations by Desai and Jain (1995) allows us to calculate effect sizes (d) and we found average differences of around 0.1 and around 0.2 standard deviations for buy and sell recommendations, respectively. These small effect sizes are consistent with reports of very limited predictability of daily abnormal returns with an adjusted R^2 of around 1% (Stickel, 1995). The stock-selection advantage of financial experts is comparatively small and it is questionable if and how one would be able to identify individuals

with consistently superior investment performance based on buy or sell recommendations alone. In fact, Desai and Jain (1995) concluded from analyzing between 50 to 500 buy recommendations for each of several "superstar" investors that they could not confidently identify even a single investor as having consistently superior skill when adjustment for the large number of statistical tests were made. Based on the effect sizes estimated in this section it is possible to apply power analysis to determine how many observations would be necessary to reach 90% confidence level that one would detect an advantage corresponding to an effect size (d) of 0.1 or 0.2. To detect an expertise difference corresponding to d = 0.1 with high confidence it would be necessary to collect as many as 1050 observations and for a slightly larger effect size (d=0.2) 263 observations would be needed for reliable detection with a 5% significance level.

Identifying Individual Investors with Reproducibly Superior Performance: The Case of Day-Traders

We have found only a few investment activities where large numbers of investment decisions are recorded for individual investors. Some promising data are available for day trading, namely trades that commonly include the purchase and sale of a stock during the course of one day. Day trading exhibited a rapid growth during the late 1990's, which was in large part due to the improvements in information technology that made it possible to trade stocks via the Internet with very low fixed transaction costs. Indeed, day trading is one observable everyday activity that satisfies many of the requirements of the expert performance approach and merits consideration, although the skill of day trading appears to involve some mechanisms that that differ from those used by other financial experts.

In one of the first studies of day-traders, Harris & Schultz (1998) investigated the complete trading records from two brokerage firms. They analyzed over 5,000 round-trip transactions from one firm for a five day period and found a mean gross return of $72 per

complete transaction (0.12 % gain on investment), which was reliably greater than zero. The data from the other firm also consisted of around five thousand round-trip transactions and the mean gross return was $34 (0.10 % gain on investment), which was reliably higher than zero. Only in the case of the data from firm A did the average gross return reliably exceed the transaction costs. Based on a statistical analysis of the 69 most active day-traders, Harris and Schultz (1998) found that 14 had gross returns that were reliably greater than zero at the 1% level. Hence, there is clear evidence that many day traders were able to trade with reliably higher gross returns and even perhaps in some cases consistent net gains.

Jordan and Diltz (2003) also studied day traders, including 324 high activity traders (10 or more trades per day) using corporate day trading records, for the periods ranging from February 1998 to October 1999. Based on a trade-matching methodology they found that average gross return of transactions was $8,435 or $28 dollars per transaction or around (0.10 % average gain on each investment assuming average transactions of $30,000). These gross returns are reliably greater than zero—a one-sample t-test yields a $t(323)= 3.13$, $p<0.01$. A regression analysis indicates that the daily gross gains of day trades were correlated with increases in the overall market (NASDAQ). When Jordan and Diltz (2003) reanalyzed the data with a flat stock methodology they estimated an average gross return of $1,906 or $6 per transaction—a one-sample t-test shows that these abnormal returns were not reliably different from zero, $t(333)= 0.69$, $p>0.05$). Hence, the evidence for a reliable effect of skill in selecting stocks during day trading disappeared when Jordan and Diltz controlled for the market trends with their flat stock methodology.

Analyses of Taiwanese day trading (Barber, Lee, Liu, & Odean, 2005a) further suggest the existence of expertise, as a group the Taiwan day traders were able to select reliably undervalued stocks. Perhaps more importantly, the more successful traders were also increasingly

active suggesting not only superior but reproducible performance. Furthermore, a subsequent study of the five year stock performance from 1994-1999 in Taiwan (Barber, Lee, Liu, & Odean, 2005b) suggested that skilled investors profited in direct proportion to the mistakes (losses) of unskilled investors, where both institutional investors and corporations select reliably undervalued stock. Institutional investors were also able to achieve persistence of superior performance documented at six-month horizons. Thus, the study shows that skilled investors outperform unskilled investors and their profits of skilled investors are related to the losses of unskilled ones.

This evidence suggests that some day traders are able to select undervalued stocks and other more skilled traders are able to accumulate reliable net investment returns when the transaction costs are low (Barber et al., 2005a, 2005b), even if many day traders are overconfident and have poor performance (Odean, 1999). Consistent with the expert performance approach, day trading is an observable everyday activity that is representative and in which individual investors can be observed under controlled conditions. The individual investors and day traders operate without announcing their purchases and sales, such that the observations would not be biased by announcement effects and thus provide a standardized situation. Given the typically limited volume of purchases it is also less likely that other reactive effects from a single trader would influence the market and provide artificial, profitable momentum. Therefore, the task of day trading seems to satisfy the requirements of a well-defined standardized task for demonstrating reliable superior performance within the expert-performance approach. It is noteworthy, that the expertise of day trading appears to involve mechanisms that that differ from those used by other financial experts. For example, day-traders buy and then sell stocks within a very short period of time. Harris and Schultz (1998) estimated that the studied traders kept a position on average for 5 minutes and 36 seconds, on the average. As well, day-traders tend to be

specialized, trading few stocks because it is difficult to simultaneously cover positions in multiple stocks as well as to have updated knowledge of multiple stocks (cf. Harris & Schultz, 1998).

Individual Differences and Contextual Factors Associated with Superior Investing

The investment advantage may be relatively small overall, but it is possible that one would be able to find individual characteristics of investors that are associated with much larger differences and effect sizes. Several studies have searched for characteristics of fund managers who generate returns superior to other professionals. In one pioneering study, Golec (1996) analyzed the performance of 530 mutual funds for 1988-1990 where the average abnormal return was -2.83 %. Golec found that the best predictor of abnormal return (alpha) of investors was the length of time that the investor had served as a manager, where longer job tenure predicted better performance. Subsequently Chevalier and Ellison (1999) analyzed a large sample of 2029 fund managers and examined their ability to predict the performance of their fund for the following year. They found that after controlling for risk, survivorship, expense ratios, etc., the best predictor was related to education: the managers from more "elite" undergraduate universities outperformed others; however, this factor might reflect networking or other differences rather than differences in investing skill. They also found that younger managers (below age 45) tended to perform better than those of 45 years of age and older. More generally, the amount of variance explained by the characteristics of the fund managers is small (around 3 %) with small associated effect sizes.

Several other studies have uncovered effects of elevated motivation, superior academic training, and specialized knowledge of various types of companies. Consistent with the earlier reviewed evidence for superior investment performance of hedge funds, Fung, Xu, & Yau (2002) found that profitability was positively related to incentive fees and leverage. Similarly, Ackermann, McEnally, and Ravenscraft (1999) suggest that from 1988-1995 hedge fund

managers demonstrated selection skills that provided superior returns such that all fees and costs were recovered, where incentive fees were again the best predictors of superior risk-adjusted returns. They note that larger funds realize greater performance, as do funds with greater incentives, perhaps suggesting the ability to attract and keep more skilled managers. This finding does not necessary imply a causal influence by the characteristics of the managers. It is possible that managers of larger funds may have more opportunity to capitalize on short-term momentum and may have better access to research and the best advice from consultants. Incentives may also influence the general style of investing rather than a specific ability to differentially select better investment opportunities. Recent research has documented effects of general managerial style where, analysis of 3336 US mutual funds by Chan, Chen, & Lakonishok (2002) found that growth managers outperformed value managers. Chan et al. suggest, in passing, that career risks and short evaluation horizons might drive managers to favor more market-benchmark or safer selections rather than risk more aggressive growth stocks, which may yield superior performance.

Turning to investments strategies, there is a large body of research on strategies, or as they are also referred to, investment styles. In a seminal study, Jensen (1968) analyzed the performance of 115 mutual funds for the period of 1945 – 1964 and concluded these funds were on average outperformed by the simple strategy of buy the market and hold. Gruber (1996) tackled the question of why the actively managed mutual funds grow fast while their performance is outperformed by the passively managed index fund. By analyzing 270 funds for the period of 1985 – 1994 he concluded that future performance was somewhat predictable and that there were mutual funds that performed persistently well. Using one a sample of 1892 mutual funds, Carhart (1997) analyzed performance between 1962 and 1993. His results showed that although top-ranked mutual funds generally failed to maintain their high returns, mutual funds did in the short run have

persistent monthly returns of 0.68% but this performance could be explained by common factors like expenses and transaction costs rather than skills.

However, an opposite picture of persistent performance among mutual fund managers has been provided by other studies. For example, Lakonishok, Shleifer and Vishny (1992) analyzed performance of 341 different money managers during the period 1985-1989. In addition to discovering that the average manager was unable to outperform stock index, they concluded that even managers who seemed to achieve consistently superior financial performance, when accounting for management fees, performed below the benchmark. As well, based on 1458 mutual funds sampled 1990 – 1998, Edwards and Caglayan (2001a) showed that only three strategies were associated with persistent performance: (1) allocating capital to vast amount of funds (funds of funds), (2) internationally taking advantage of macro changes (global-macro), and (3) neutralizing market risk by investing long and short (long/short). On the other hand, Capocci and Hübner (2004) analyzed the performance of 2796 funds for the period 1984 – 2002. Their analyses indicated that best performing funds relied on momentum strategies, while the worst performing funds used contrarian strategies; a finding that is consistent with that of the experimental study by Morrin et al (2002).

Obviously, there is inconsistent evidence on the performance of mutual fund managers. One alternative explanation might be that the sample data are associated with a survival bias in that poorly performing funds are merged into other funds eliminating the records of unskilled money managers (cf. Malkiel, 1995). However, some studies (e.g., Capocci & Hübner, 2004; Edwards & Caglayan, 2001a) have controlled for this bias. The inconsistency may also be partly explained by the use of different time periods. The studies indicating non-persistent performance (e.g., Jensen, 1968; Carhart, 1997) have been based on samples from longer time periods than the studies showing persistent performance (e.g., Lakonishok et al., 1992; Capocci & Hübner (2004);

Edwards & Caglayan, 2001a). Consequently, the inconsistent evidence might result from different windows of economic conditions.

Research shows that performance of investment strategies is dependent upon economic conditions. Edwards and Caglayan (2001b) evaluated the success of various investment strategies with respect to rising and falling stock-markets. Their dataset consisted of 1665 mutual funds sampled between 1990 and 1998. Edwards and Caglayan (2001b) found that there were only two strategies that performed well in bear markets including funds based on market neutralization and short-selling achieved average (value-weighted) annual returns of 5% and 41%, respectively. In rising markets, strategies that take advantage of global macro events, are specialized (industry specific), and invest for a long horizon are successful with average annual (value-weighted) returns with range of 32% to 40%. Moreover, Capocci and Hübner (2004) assessed the profitability of various investment styles with respect to different time periods and concluded that three (fund) strategies seemed to be robust in that they consistently outperformed the market regardless of time period. Two of these strategies were based on market neutralization, while the third strategy could not be classified (see Table 6 in Capocci & Hübner, 2004).

There are other factors, such as increased knowledge about specific industries, and particular companies, that have been linked to superior abnormal returns on investments. Coval and Moskowitz (2001) show that fund managers have abnormal returns for stock of companies that they are geographically near. They attribute this advantage to better contacts and information about the state of the companies. Shukla and van Inwegen (1995) found that Americans generated returns for funds with US company stocks that were reliably better than those of foreign fund managers, although the difference was very small 0.002 %. Kacperczyk, Sialm, and Zheng (2004) found that managers who concentrate on stocks for companies in a few industries exhibit superior investment performance as compared to managers who manage more diversified

portfolios. Kacperczyk et al. (2004) use this evidence suggest that specialization might be a major aspect of successful strategies of actively trading stocks.

Another estimate of the benefits of highly specialized information comes from studies of trading by insiders working in the same company. When insiders trade their stock they show large abnormal returns. Seyhun (1992) analyzed transactions in over 9,000 companies in 1975 to 1989. He found that the number of times insiders bought and sold stocks in their company could account for over half the variability of stock returns predicted one year later. More recently, Lakonishok and Lee (2001) found that differences in the stock returns of around 10% when insiders bought stocks versus when they sold stocks. Similarly, Etebari, Tourani-Rad, and Gilbert (2004) found abnormal gains from purchases to be on the average 6.5 % during the following 250 day period. There is, however, only mixed evidence that outsiders can gain abnormal returns that exceed transaction costs from mimicking the insiders. Lakonishok and Lee (2001) show that insider trading is more predictive for small-cap stocks, but argue that transactions in stocks of smaller companies is more costly and thus mimicking such purchases would likely not result in net abnormal gains by outsiders.

In summary, consistent with other research on expertise we find that specialization in particular industries and in-depth (insider) knowledge about specific companies are related to reproducibly superior investment performance.

Finding Investment-Related Tasks with Higher-Levels of Reproducibly Superior Performance

The efficient market hypothesis restricts the possibility for skilled investors to trade stocks and attain large abnormal gross returns. We will therefore examine other types of tasks where there may be more room to identify effects of expertise that can in turn be validated against criteria for assessing the value of stocks on the market, such as the prediction of company earnings.

Early studies of forecasts of company earnings (see O'Brien, 1990, for a review) were unable to detect reliable differences in ability among individual analysts. Subsequent studies (Clement, 1999; Mikhail, Walther, & Willis, 1997) drawing on vastly larger samples and the use of relative forecasting error as the dependent variable have been able to find very reliable individual differences among analysts. These studies find reliable effects on earnings forecast as function of a wide range of variables associated with the broker house, work responsibilities, and experience of the analysts. Mikhail et al. (1997) analyzes 38,505 forecasts and documents a striking decrease in the forecast error from the first few times an analyst makes a forecast (M= 0.017) to the 40^{th} or more times (M=0.007), but they are unable to differentiate different experiential factors, such as industry specialization, firm-specific and general forecast experience.

In an analysis of 189,639 forecasts Clement (1999) found evidence for reduction in forecast error as a function of increased experience of forecasting and lower workload (fewer firms to monitor, and work in a large broker house). The firm-specific experience was correlated with the general experience (r=0.63) and associated with greater reduction in forecast errors due to firm specific experience than general experience. However, Jacob, Lys, and Neale (1999) were not able replicate the effects of resources (work load), industry specialization and experience variables. Instead, they proposed an alternative hypothesis for the assumed effects of experience and rejected the idea that analysts improve with additional experience. They assumed a fixed forecast ability for each analyst (hence no improvement). By estimating the forecast error of each analyst they were able to remove reliable effects of experience and the relation between years of experience was explained by selective retention of superior analysts. Namely the brokers would promote the best analysts and get rid of the poor forecasters during the observational period of 12 years. Subsequent studies have confirmed that forecasters with high accuracy are promoted. Furthermore, young forecasters are terminated if their forecasts are poor or, most importantly, do

not agree with the consensus forecasts of the "expert" forecasters (Hong, Kubik, & Solomon, 2000). A recent update shows that promotion of forecasters is not due just to accuracy of their forecasts but with their degree of optimism of their earnings forecasts during bullish market periods. Hong and Kubik (2003) make another intriguing observation that sometimes accuracy is less important than optimism, namely for the stocks of companies that are promoted by the analysts' broker house.

Even in spite of these biases Mikhail, Walther, and Willis (2003) have found consistent evidence for the superior earnings forecasts of firms with more experienced analysts. Clement, Rees and Swanson (2003) found in an analysis of 384,112 forecasts from 24 different countries that firm-specific experience was a better predictor of reduced forecast errors and that brokerage size was consistently related to lower errors. Brown and Mohd (2003) showed that analyst-related factors (e.g., firm-specific experience, broker size, and frequency of forecasts) were not predictive of future forecast errors and found that the only reliable predictor of future forecasts was the time between the forecast and the predicted event (forecast age). There is common agreement that forecast age is much stronger predictor of forecast error than analyst characteristics, such as firm-specific experience. For example, Clement (1999) found the correlation with forecast age to be 0.347 whereas the correlation with firm-specific experience was only -0.022—a ratio of 250:1 in the variance explained by the two respective variables.

It is clear that the reputation and experience of analysts and their associated brokerage houses influence the reaction of the stock market to their announcements. First, when analysts are making corrections of their forecasts, the change in stock prices is larger for the high profile analysts (Park & Stice, 2000). Second, there is less adjustment in prices after the announcement by experienced analysts than after the reports by less experienced analysts. More generally, it appears to be impossible to rely on the forecasts of the most experienced analysts to allow

investors to trade stocks with returns that exceed transaction costs (Mikhail, Walther, & Willis, 2004).

In closing, our review demonstrates reliable and reproducible effects of consistently superior performance in investment and forecasting even for markets that are consistent with the efficient market hypothesis (Fama, 1970, 1991). With the possible exception of the advantage of trading by insiders, the advantage offered by expert investors is too small to allow profitable transactions, yet sufficiently large to show reliable gross abnormal returns, before the costs of the transaction are subtracted. From the point of view of expertise research we find that there are consistent individual differences among experts, with experts exhibiting specialization, and demonstrating superior and reproducible investment and forecasting performance.

General Discussion

In this paper we have applied the theoretical framework of the expert-performance approach to review studies of financial professionals in open markets and to examine evidence of financial expertise. This framework led us to focus on superior and reproducible investment performance and related earnings forecasts. This focus differs qualitatively from traditional economics in that it focuses on the identification of evidence of stock selection and financial skill, regardless of the margin of profit or any associated stock transactions costs.

Our framework is able to incorporate findings about some professionals' superior ability to identify over and under valued stocks, and the existence of systematic biases in stock prices. Our review further indicated that most private investors were systematically biased resulting in transactions that led to losses—even before any costs of the transactions were considered. However, while the superior stock selections by professionals led to gross gains, these gains did not on the average exceed the transaction costs. These results are consistent with the findings from research on behavioral finance (Barberis & Thaler, 2003) showing that stock prices are

often found to be systematically different from their "fundamental" value, and that there are many types of biases in stock trading behavior, especially for unskilled investors. These biases were found, however, to be small compared to the transaction costs required for skilled investors to capitalize on them for purposes of making profits. Hence, our review supported the semi-strong form of the efficient market hypothesis. To be clear, the review indicates that the experts' superior ability to detect discrepant market prices accounted only for a very small amount of the variability (variance) of daily returns, on the order of 1-4%. Furthermore, these findings were documented in conditions, where several artifacts were controlled, such as no public disclosure of purchases and sales so the experts' recommendations and purchases could not lead to biases that artificially inflated or deflated prices of stocks.

Superior Financial Performance: Evidence and Mechanisms

Our review meets Cowles' (1933) original goal of studying superior prediction performance to accumulate empirical evidence for economic theories and the processes underlying market behavior. If our analyses of the role of expert investors and analysts in determining the prices of stocks are valid then they have important implications for the empirical study of financial behavior. Of note, one key finding of our review, demonstrated in three different contexts, suggests that the superior performance of investors and expert financial analysts was specific rather than generalizable across companies and sectors of industry. The most successful day traders focused their transactions on a small number of companies, and they developed methods to detect when the stock value was likely to rise due to recent news or to the execution of larger buy orders. Similarly, other superior stock selections were made by investors or forecasters who specialized in particular types of companies along with insiders and other individuals with more in-depth knowledge about the future of companies. Finally, we reviewed evidence that financial analysts who specialize in a small number of companies produce the most

accurate and influential earning forecasts. Taken together these findings suggests that the superiority demonstrated by expert investors and analysts can be traced to deeper and more accurate knowledge about companies, a finding consistent with evidence from other domains of expertise like accounting (see Ericsson and Lehmann, 1996, for a review) and medicine (for a review see Ericsson, 2004). In fact, virtually all experts are remarkably specialized, such as scientists working on very constrained research problems, elite musicians only playing a limited repertoire on a single instrument, and expert athletes only excelling in one type of sport.

Let us now carefully discuss the arguments raised against the possibility of skilled decision-making by some expert performers involved in financial and investment activities. The trend toward specialization on transactions with a small number of companies allows financial investors and forecasters to avoid the problem of having to make unique decisions without relevant experience. Drawing on their knowledge and experience of similar situations the investors can make predictions about current investment opportunities and receive feedback about their expectations. Hence, Tversky and Kahneman's (1986) arguments against the availability of feedback do not apply to the financial analysts who make repeated public predications of a company's reported earnings. Similarly, the day-traders get immediate feedback on their buy-and-sell transactions that are completed within minutes. The arguments against skilled decision-making based on real-time constraints of processing capacity (Simon, 1997) may be valid for unskilled investors and to some degree the skilled day-traders, but do not apply in a similar manner to most other investors and analysts who might have hours and even days to make an investment decision. Our review suggested that day-traders specializing on a few companies may rely on pattern recognition to detect situations when the stock is likely to increase in value to allow them to make very rapid decisions. In contrast, the financial analyst responsible for a company may have years of experience with that company and would have weeks developing

their forecasts for earnings. When we are considering an expert forecaster we are dealing with an individual who has accumulated extensive knowledge and has had numerous opportunities to predict forecasts and receive detailed feedback that would allow for the learning and the development of expert performance. This is consistent with expert performance in other domains (Ericsson, 2004; Ericsson & Lehmann, 1996) where limits on processing capacity are functionally expanded through the acquisition of working-memory mechanisms based on long-term memory (Ericsson & Kintsch, 1995; Gobet & Simon, 1996).

More generally, we speculate that skilled investors who are specializing in a small number of companies or a sector of industry attempt to simplify their prediction task much like the investors seeking arbitrage. In arbitrage the investor is seeking a company that is in all respects comparable to their currently owned company with the exception of its current market price. Although complete correspondence is rare, one can view a specialist monitoring a collection of very similar companies as coming close to that situation, where the number of significant parameters differentiating the companies is quite manageable. Changes in these parameters for one or more of these companies would allow an expert to anticipate changes in the future value of the stock and thus signal promising investment opportunities. Finally, insiders sometimes have unique information that would allow them to make predictions of changes in future prospects and thus market value. Although the task of making absolute evaluations of the value of companies stocks would require vast information, the focus on specialization and the current changes in the prospects of companies would allow financial experts to acquire expert performance relying on similar principles as those observed in other domains.

Toward the Empirical Study of Superior Financial Performance

If a primary source of the superior investment performance is based on in-depth knowledge about specific companies and sectors of industry then it would suggest behavioral

studies to date have yielded only limited benefits from laboratory studies of college students' performance on unfamiliar tasks involving judgments and decision-making. The uncovered heuristics and biases studied in these unskilled populations are theoretically assumed to reflect cognitive processes that individuals use as a default when they lack in-depth knowledge of an issue or skilled behaviors that are appropriate for the situation (Todd & Gigerenzer, 2003). As a general trend, researchers have found that "experts" are less affected by these types of biases (Smith & Kida, 1991). In fact, recent studies of professional dealers of memorabilia, such as baseball cards, show that highly experienced dealers do not show any of the traditional biases (List, 2002, 2003, 2004). Similarly, when biases and judgments of expert performers in other domains, such as weather and bridge, have been studied their estimates appear to be not amenable to the heuristic biases so prevalent in situations with limited knowledge (Murphy & Winkler, 1984; Keren, 1987). Therefore, we suggest that our scientific understanding of financial markets and behavior is more likely to improve from the study of financial experts in ecologically valid tasks rather than simply from studies of unskilled participants performing abstract laboratory tasks (Hertwig & Ortmann, 2001; Smith, 2002).

As noted, an empirical program of research on financial expertise that is based on the expert-performance approach must search for superior reproducible performance in everyday life, such as superior investment and financial analysis involving specific companies. This approach therefore questions the appropriateness of the designs of laboratory studies of investment conducted in 1960's and 1970's. These studies presented socially defined "experts" (experience and credentials) and college students with descriptions of fictitious companies that were described with dichotomous variables and asked for investment judgments. Based on this lack of representativeness of every-day investment tasks, the lack of verified superior performance under normal work conditions, and the small differences between judged and market value of stocks

(weak effects) estimated by our review of investment performance, the early failures of these laboratory studies to find superior performance are consistent with our general theoretical framework.

Unfortunately, the small effect size of professional investment expertise on investment and forecast performance presents a serious challenge for empirically studying the structure of the mechanisms mediating successful predictions and stock selections. In contrast to other domains such as sport and games the average advantage of financial experts would seem to be very small. The differences might even be perceived to be so small as to make further investigation of the effects uninteresting, especially in light of the necessary average differences in stock prices that are required to make stock purchases and sales profitable with the current level of transaction costs. However, research of many types of expertise in other domains has confronted similar problems in finding representative tasks that capture large reproducible effects that distinguish the best performers. For example, it has been difficult to identify a superior diagnostic performance of highly experienced doctors for common diseases and the execution of routine procedures. A clear advantage in diagnostic performance for specialists is only revealed for rare diseases or combinations of common diseases (Norman, Trott, Brooks, & Smith, 1994, and see Ericsson, 2004 for a review), which represent situations that the doctors rarely experience first hand. More generally, experts will not typically display any clearly superior performance for mundane situations, but their superiority will only emerge in challenging situations, such as emergencies and complex events.

However, it may be difficult to extend this methodology to expert investors because they are rarely required to respond to external demands for real-time action in the representative everyday situations. Our review also found that superior investors awaited opportunities involving a small set of companies for which they have the most in-depth knowledge. Consistent

with the expert-performance approach the first step would be to observe the superior performer while they are working normally in everyday life to identify representative situations that captures their superiority. Once we can capture the structure, processes, and knowledge that mediate this type of superior evaluation performance we should be able to assess the mediating mechanisms and describe the types of deliberate practice activities that are required to reach a level of expert performance, in line with the successful research on the acquisition of expert performance in many other domains of expertise (Ericsson, 2002, 2003b, 2004; Ericsson et al., 1993, Ericsson & Lehmann, 1996).

Toward a Resolution of the Enigma of Financial Expertise

Given that financial experts' are specialized, have extended experience, and access to in-depth financial analyses of the companies associated with prospective stock transactions their investment decisions and behaviors are likely to converge toward external standards. That is, we attribute the efficiency of the markets to the trading behavior of financial experts. While the private investors' transactions are, on the average, associated with losses, expert investors and their advisors are constantly searching for promising trades and their trading activities actively make all stocks more closely approximate their efficient values. Without this constant expert competition actively searching for market-value discrepancies stock prices would likely diverge markedly from their fundamental and efficient values. A paradox only emerges if financial experts claim to be able to make trades where the estimated value of the stock transaction exceeds the total costs of completing the transaction, especially when the commissions of the expert traders are considered. In this way, we interpret the efficiency of the markets as a reflection and product of financial expertise.

When we view the current market as a reflection of the accumulated knowledge of all active investors, including expert investors, the difficulty of detecting considerably under- or

over-valued stocks becomes clear. In the same way that peer reviews monitor new submissions of articles as potential contributions, the market prices are constantly monitored and maintained by many teams of highly skilled experts. We have already discussed how some investors with specialization can learn from feedback and attain a consistently superior investment performance, but the average advantage is small. Finding stocks that allow for extraordinary profits over the next years and decades is a different matter. If the small consistent advantage of skilled investors is comparable to the consistent skill of other expert performers then identifying extraordinarily profitable stocks, such as Microsoft, might be like trying to compose new music that far surpasses compositions by world-class composers, writing books and stories that outshine the classic novels, or making scientific discoveries that go far beyond current knowledge and revolutionize disciplines (Ericsson, 1999; Ericsson et al., 1993; Simonton, 1997). Within this view very large discrepancies would only emerge due to a small number of uncommon factors, such as unpredictable accidents and events, discrepancies between public and insider information, or innovations in products, methods, and services. Thus, although some experts may continue struggling to go beyond the current knowledge and skills in a domain very few will succeed to make dramatic significant innovative contributions that permanently transform boundaries (Ericsson et al., 1993). The consensus view is that the making of major innovations is inherently unpredictable and major innovators are only distinguished by the frequency of their attempts (Ericsson, 1999; Simonton, 1997, 1999), e.g. productivity. Innovators will for a time be ahead of their colleagues, but soon their new innovations will be assimilated and will become part of the shared knowledge of the domain. Therefore, based on evidence of the scarcity of major innovation in the arts and sciences and other domains of expertise, it would be unreasonable to expect that financial experts would consistently and singly be able to identify companies that are producing innovative products and services that would lead to dramatic growth in the value of

their stocks. However, while even the most skilled experts are unlikely to dramatically transform the market, the value of expertise remains clear. The cumulative knowledge and actions of expert investors produces small and consistent contributions that maintain equilibrium and create market efficiency.

Conclusions

In conclusion we propose there is considerable evidence for financial expertise as demonstrated by the very small but reliable superiority of stock selection and forecasting performance of experts. We further propose that market efficiency is due to the behavior of these experts and that market efficiency is further evidence of financial expertise. Through extended experience (deliberate practice), specialization, and the development complex mental representations (Ericsson & Kintsch, 1995; Ericsson et al., 2000) some experts are able to predict the future changes in market value for a small number of companies in a given sector of the market. Therefore, financial experts have acquired skills that are qualitatively different from those of naïve subjects typically used to demonstrate biases and decision-making in behavioral finance.

To be successful in understanding the nature and implications of financial expertise, we cannot rely on reputation, credentials, or experience alone, for the identification of financial experts. Instead, we must create ecologically valid tasks that assess investing and forecasting where some experts are able to exhibit superior and reproducible performance. Only by examining the structure and acquisition of these types of performances will we inform the pursuit, acquisition, and structure of financial expertise. Only by developing a deeper understanding of the full range of human behavior and rationality can we create comprehensive economic and decision-making models.

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