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Patterns of behavior of professionally managed and independent investors

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Abstract

In this paper, we analyze the investment patterns of a large number of clients of a major Israeli brokerage house during 1994. We compare the behavior of clients making independent investment decisions to that of investors whose accounts were managed by brokerage professionals. Our main objective is to investigate whether the disposition effect (i.e., the tendency to sell winners quicker than losers), demonstrated in the US only for individual investors, also holds for professional investors. This analysis is important, as accepted financial theory predicts that prices are determined mainly by decisions made by professionals. We show that both professional and independent investors exhibit the disposition effect, although the effect is stronger for independent investors.

The second objective of our study is the comparison of trade frequency, volume and profitability between independent and professionally managed accounts. We believe that these comparisons not only provide insights of their own, but also help to put the differences in the disposition effect in a wider perspective. We demonstrate that professionally managed accounts were more diversified and that round trips were both less correlated with the market and slightly more profitable than those of independent accounts. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

Traditionally, the finance literature assumes that investors are rational agents who maximize expected utility defined on final wealth. Until recently, widespread acceptance of this assumption dictated little reason for empirical research describing the behavior of real investors (see, however, Lease et al., 1974; Schlarbaum et al., 1978a,b). Instead, finance research has concentrated on investigating the behavior of prices.

Psychologists and some economists, led by Daniel Kahneman and Amos Tversky, claim that investors do not always behave as expected utility maximizers (see, e.g., Samuelson, 1963; Kahneman and Tversky, 1979, 1984; Tversky and Kahneman, 1992; Benartzi and Thaler, 1995, 1999, to name but a few). Kahneman and Tversky (1979) proposed prospect theory as an alternative to expected utility in describing investor behavior. Staw (1997) studied situations in which decision-makers react according to the escalation of commitment principle, while March and Shapira (1992) and Shapira (1995) describe managers as guided by aspirations and targets, rather than by expected utility. The growing sub-field of behavioral finance seeks to explain market anomalies by using such models.

Proponents of expected utility theory (see, e.g., Ross, 1998) insist that the behavior of individual investors is becoming less relevant as financial markets are increasingly driven by institutional investors. These professionals are, it is argued, likely to be rational. Certainly, they enjoy the most efficient analytical tools available. In such a market, it is the marginal sophisticated investor who, by exploiting arbitrage opportunities, sets prices in the market.

Are professional investors really immune to behavioral biases? Our paper seeks to answer this question, and to compare the degree of bias (if any) suffered by professionals to that of individual investors. We focus primarily on the disposition effect (see Constantinides, 1985; Odean, 1998a; Schlarbaum et al., 1978a,b; Shefrin and Statman, 1985), which describes the tendency of investors to sell stocks that appreciated in value (winners) sooner than those whose prices have declined (losers). This behavior has also been noted in the exercise of options and futures (see Heath et al., 1999; Chen et al., 1998; Heisler, 1994, 1998) and in the sale of residential condominiums (see Genesove and Mayer, 1999). Behavioral researchers attribute this phenomenon to a combination of “loss aversion” (Kahneman and Tversky, 1979) and “anchoring” (the purchase price serves as a reference point for evaluating investment alternatives). In an

efficient market, of course, the disposition effect should not be present; the price paid for the asset is a sunk cost by the time of sale.²

Our study maintains significant advantages over previous analyses of the disposition effect. We test the effect on both individual and professional investors, and compare its severity between the two groups, while previous tests investigated only non-professionals (see Ferris et al., 1988; Odean, 1998a; Schlarbaum et al., 1978a,b; Weber and Camerer, 1998).³ Previous tests of the disposition effect were conducted in the US, where it is difficult to disentangle the disposition effect from tax effects, which also influence selling decisions.⁴ However, we conducted our study in Israel, where stock market gains are tax-free.⁵

It is widely accepted that professional investors are better informed than amateurs. However, professional brokers reap rewards both for wise investment decisions and for executing trades on behalf of their clients. Due to the latter motivation, brokers have sometimes been blamed for excess activity (i.e. churning). Clients thus face a trade-off between the benefits of a professional's superior knowledge and expertise and the possible losses incurred by paying for unnecessary transactions. We attempt to shed some light on this dilemma by comparing the trade frequencies, volumes, and profitability of individually vs. professionally managed accounts.⁶ These comparisons not only provide insights of their own, but may also help to put the differences in the disposition effect in a wider perspective.

The paper is structured as follows. In the Section 2, we describe the data. In the Section 3, we test for the disposition effect. In Section 4, we examine trade frequency and volume, and in Section 5 we present our results on profitability. Conclusions are described in the last section.

² The disposition effect does not violate rationality if past prices affect investors' beliefs about future returns. The weak form of the efficient market hypothesis implies, however, that past prices provide no information about future returns.

³ A similar comparison has been made by Genesove and Mayers (1999) in the context of the housing market. They found that the anomaly of "loss aversion" exists for both the more sophisticated (investors in real estate) and the less sophisticated (owner occupants) traders in the real estate market in Boston. They found, as we did, that the anomaly was more pronounced for the less sophisticated.

⁴ See Badrinath and Lewellen (1991) for evidence showing the effect of taxes on selling decisions.

⁵ It may seem that if it is found in the US that investors sell winners too soon, then a fortiori the disposition effect is significant since usually, tax considerations in the US will have the investors sell winners later, so as to pay capital gains taxes rather than the higher ordinary taxes. However, taxes sometimes have other effects (see, e.g., Constantinides, 1983, 1984). A test of the disposition effect in a tax-free environment is hence important.

⁶ Lee et al. (1999) found some difference between the patterns of investment of big individual investors, small individual investors, and institutional investors. They did not consider, however, the behavioral patterns we examine.

2. The data

The data consist of records of all investment transactions of a large random sample of clients of one of the largest banks in Israel (banks in Israel also act as brokerage houses) for all of 1994. The data also include initial statements (as of 1 January 1994) of the clients' portfolios in this bank. Thus, we were able to construct a precise value and composition of their portfolio at the bank at any given transaction date. We distinguish between two types of clients: independent and managed. Independent clients manage their own portfolios, but process their transactions through the bank. Managed clients solicit the assistance of professional portfolio and money managers (PMMs) who also act as brokers. Most of these PMMs are not members of the Tel Aviv stock exchange (TASE), so they execute their transactions through an exchange member (usually a large bank or other financial institution). When a client chooses to have her portfolio managed by a PMM, she opens an account at the bank and authorizes the PMM to manage it. The degree to which a "managed" client participates in "managing" his/her account varies. Some clients call their PMMs frequently, while others give them complete freedom in managing their portfolio. We randomly sampled 35% of the bank's brokerage clients, 1642 of these we call "independent", as they did not get any counseling from the bank. The other 2688 clients are "managed", since they either received counseling from the bank or their portfolios were managed by PMMs employed by or affiliated with the bank.

3. Tests of the disposition effect

In testing the disposition effect we used the technique developed by Schlarbaum et al. (1978a,b). That is, we compared the duration of losing round trips (round trips are transactions where there was a buy and a subsequent sale so that at the end of the round trip the client had a zero position in the security) to those of winning round trips. If returns are not negatively correlated over time, and if there are no tax considerations, shorter duration of winning round trips compared to losing round trips would constitute evidence for the disposition effect.⁷

⁷ Since we have the data of only one year, we actually observe a truncated distribution of the durations of round trips. Some round trips were made where either the sale or the purchase was made outside the sample period. Longer round trips are more likely to be lost in the sampling period. Under the null hypothesis, the duration of the round trips is the same for winning and losing stocks and any bias is the same for independent and managed investors. Consequently, using the truncated distribution does not affect the significance tests. Some statistical power, however, may be lost if the behavior of the extreme right hand side of the distribution is radically different than that of the rest of the distribution. We believe the loss of power is minimal since most of the round trips in our sample are short. Also, the round trips constitute 84% of the transactions of the managed investors and 80% of the transactions of the independent ones.

Since taxes do not influence decisions in the Israeli market, as capital gains on stock market transactions are tax-free, and since there is no evidence of significant short-term negative serial correlation in stock returns at the TASE, data from the Israeli stock market are appropriate to test for the disposition effect.⁸

Most round trips are what we call “simple”, that is, involving just one buy and one sell order. Some fraction (around 20%, depending on the group) of the round trips in our sample were what we call “sequential,” where more than one sale or purchase were involved. In such cases, the definition of a round trip may be ambiguous. For example, if there are two buy orders of 100 shares of some stock at prices of 50 and 60 and one sell order of 200 shares, this may be considered as two round trips of 100 shares each. We considered this, however, as just one round trip, where the price of the purchase is the weighted average (according to value) of the two prices. The duration of the round trip is the weighted average of the time from the first buy to the sale and the time from the second buy to the sale. The reason is that an investor who considers whether the deal was successful or not, may look at it as just one deal of getting involved with the particular security. We then tested the adequacy of this procedure by comparing the behavior of “simple” to “sequential” round trips.

Means and standard deviations of the duration of all round trips (simple and sequential) of both groups are presented in Table 1. The average duration of a losing (winning) round trip is 55.42 (24.84) days for the managed group, and 63.27 (20.24) for the independent group. The average duration of losers is significantly longer than that of winners for both groups ($p < 0.001$ for each group), as suggested by the disposition effect. We observe however, that the average duration of the winning round trips is longer while the duration of the losing round trips is shorter in the managed group in comparison with the independent group. Therefore, the disposition effect, defined as the difference between the average duration of a losing round trip and a winning round trip, is smaller in the managed group.

We then categorized the data in terms of simple and sequential deals in order to analyze the behavior within each type of deal. The means and standard deviations of duration of round trips broken into these categories are also presented in Table 1. We also note that the disposition effect prevails for the managed and for the independent groups for both simple and sequential deals. The difference in the disposition effect between the independent and the managed groups is 16.12 (46.37–30.25) days in the simple deals category, compared with 4.73 (34.99–30.26) days in the sequential deals category. This suggests that the difference in the disposition effect between the groups stems mainly from the simple deals.

⁸ See Levy et al. (1980) and Ben-Horin (1996).

Table 1
Duration of round trips in days for ‘all round trips’, ‘simple’ and ‘sequential’ round trips^a

	Managed group			Independent group		
	Losing stocks	Winning stocks	Difference	Losing stocks	Winning stocks	Difference
<i>Panel A: All deals</i>						
<i>N</i>	29662	21670		6640	3884	
Average	55.42	24.84	30.58*	63.27	20.24	43.03*
S.D.	58.80	34.44		72.78	29.30	
<i>Panel B: Simple deals</i>						
<i>N</i>	22150	17208		4594	2859	
Average	53.71	23.46	30.25*	65.62	19.25	46.37*
S.D.	59.00	33.88		76.34	29.12	
<i>Panel C: Sequential deals</i>						
<i>N</i>	7512	4462		2046	1025	
Average	60.44	30.18	30.26*	57.99	23.00	34.99*
S.D.	57.93	36.00		63.78	29.65	

^a *N* denotes the number of observations (round trips). * denotes that the difference between the mean duration of losing and winning round trips is significant at the 0.001 level.

4. Trading frequency and volume

We analyze differences between the behavior of independent and managed investors, not only on the question of when to terminate an investment (i.e., the duration of a round trip), but also on the issues of when to start one (that is on the frequency of trading) and how much to invest (volume). These are important questions since brokers are often accused of “churning”, i.e., creating unnecessary transactions in order to benefit from the fees.

We examined whether the managed group made more transactions than the independent group. To that end, we calculated the number of round trips and the number of transactions each investor conducted during the year. Means and standard deviations of the number of round trips and the number of transactions in each group are presented in Table 2. From this table, one observes that the managed accounts were significantly more active than the independent ones. On average, a managed client had almost three times as many round trips (20.69) as her independent counterpart (6.51). Also, a similar proportion was found between the number of transactions of managed and independent investors: 48.83 transactions per client in the managed group vs. 16.30 in the independent group. The number of transactions includes sales or purchases which were not included in round trips if only one end of the round trip took place during the sample period.

Another measure of activity is the turnover rate (number of transactions divided by the number of stocks held at the beginning of the period). In our

Table 2
Number of transactions and round trips per client^a

	Managed group		Independent group	
	Number of transactions	Number of round trips	Number of transactions	Number of round trips
<i>N</i>	2688	2688	1642	1642
Average	48.83	20.69	16.30	6.51
S.D.	67.15	26.05	39.00	13.79

^a *N* denotes the number of observations (clients). Transactions could be either purchases or sales.

sample, the average turnover rate was slightly higher for the managed group (2.76 compared with 1.96) but because of the high standard deviations (17 and 4.3, respectively) the difference is not statistically significant.

The results indicate that independent investors are much less active than professionals. One explanation for the paucity of trades of independent investors compared with managed accounts is the “status quo bias”, a phenomenon discovered by Samuelson and Zeckhauser (1988), who found that faculty members make on average just about one asset allocation in their retirement TIAA-CREF accounts and seldom change it.⁹ Another explanation is “churning”. Odean (1998b) attributes “excess” activity to the overconfidence of investors (in general), but he did not test whether independent investors “suffer” from this bias more than professionals. If professionals are more overconfident than independent investors, then this could contribute to the difference in activity between these two groups of investors. Yet another explanation may be found in the agency theory of Shleifer and Vishny (1990) and Lakonishok et al. (1992), who claim that money managers may trade too frequently in order to signal that they are doing some work to preserve their jobs. The fact that the turnover rates in our sample are quite similar between the groups indicates that activity depends to a large extent on the number of stocks held.

Volume of trade is another measure of activity. Thus we also compared two dimensions of volume between the two groups. We computed the average volume of purchases per round trip and the total volume of purchases of the round trips performed by the client. A summary of these volume variables is presented in Table 3. The average total volume was higher for the managed

⁹ In a more recent study, Bodie and Crane (1997) claim that TIAA-CREF investors exhibit a more rational behavior than that evidenced by Samuelson and Zeckhauser (1988). They show that the composition of the portfolios held by TIAA-CREF members depend on their age and economic status in a manner consistent with theoretical predictions concerning how investors should allocate their savings between risky and safe assets during their life cycle. Investors may have become more sophisticated since the time of Samuelson and Zeckhauser’s study.

Table 3
Volume measures per client^a

	Managed group		Independent group	
	Total volume per client	Average volume per round trip per client	Total volume per client	Average volume per round trip per client
<i>N</i>	2688	2688	1642	1642
Mean	491302*	17362*	193735	29487
S.D.	2385990	33847	1325526	95593

^a *N* denotes the number of observations (clients). Entries are in terms of IS (3 IS = 1 \$ in 1994). Total volume per client sums all purchases of the client in deals that resulted in a round trip. Average volume per round trip per client denotes the average volume of purchases per round trip. This average is calculated by dividing the total volume by the number of purchases the client has made. * denotes that the difference in the mean volume between the groups is significant at the 0.001 level.

group, 491,302 IS (approx. 3 IS = \$1 in 1994) compared with the independent group 193,735 IS. The average volume per transaction, however, was smaller for the managed group, 17,362 IS, vs. 29,487 IS in the independent group. Thus the managed investor seems to make more frequent but smaller transactions than the independent investor.

Next we investigated if there were also differences in transaction costs, which may have affected trading intensity. At the time the trades were made, stocks were traded at the TASE by auction. Stock exchange members made buy and sell offers, and trades were made if the offers intersected. For each trade, the price determined was the price established by the auction. There were no bid-ask spreads, and the buyer (seller) paid (received) the established price plus (minus) the broker's commission.¹⁰ Transaction costs were quite uniform across round trips and clients. The average transaction cost was 0.431% of the transaction value (114 IS per round trip which is about \$38), in the managed group and 0.499% (142 IS which is about \$47) in the independent group. These figures are quite low relative to commissions in the US (see Sharpe and Alexander, 1990, p. 53). This may explain in part the high turnover, compared to

¹⁰ The largest 100 stocks were traded several times a day. There were three arenas (each arena consisting of 33–34 stocks). A stock exchange “announcer” would call trade in a stock, say, A. Buy and sell offers were made by stock exchange members, and trades were made if the offers intersected. After some minutes (seconds), when interest in the stock dwindled, the announcer declared that trade had moved to stock B, until all stocks in the arena had been traded. Trading then returned to stock A, and the process continued until the end of the day. In addition, there was a similar electronic trade at the opening and closing stages of the day where exchange members electronically submitted their offers of buy and sell and the exchange cleared offers that matched. The smaller stocks were traded by similar electronic methods but trades were made at most three times a day (usually only once in the opening, but sometimes also in mid-day and at closing).

the US. In the US the turnover rate was 50% in 1994 (NYSE Fact Book for the year 1994) whereas we find a much higher turnover rate. Commissions (as percentage of transaction values) were on average higher for the independent group even though the average transaction is not smaller for that group. The higher frequency of trading of the managed group can be partially explained by the lower costs. However, if the minute differences in transaction costs account for the huge differences in the frequency of trading, it implies an extremely high sensitivity of trading to transaction costs.

5. Profitability

As seen above, managed accounts experienced more activity than independent ones. One may wonder if this additional activity was beneficial. We compare below the profitability of round trips made by the two groups.¹¹ It should be noted that during 1994, the period analyzed, the stock market in Tel Aviv declined, so that more activity during that year meant, on average, more losing transactions.

To measure profitability, we first calculated raw returns (holding period returns) per round trip. This measure is defined as the difference between the sum of sales price (adjusted for splits) and dividends and the purchase price, divided by the purchase price. Since round trips generally come in different lengths, and since the average round trip length of the independent clients was different from that of the managed clients, we had to convert the returns to some common holding period. There are many alternative ways to achieve this, so we examined two such measures. The first measure, daily returns per round trip, R_D , was calculated using the formula

$$R_D = (1 + R_R)^{1/T} - 1, \quad (1)$$

where R_R denotes the raw return of the round trip and T denotes its length in days. We considered daily rather than annualized returns, since some of the latter were extremely high. For example, some round trips yielded 50% in one day. This round trip return, when annualized, becomes $[1.5^{365} - 1]$, which is approximately 10^{64} , a value which cannot be calculated by conventional computers. Even if such values could be calculated, they would have little meaning, since they imply that an investor could earn each day the same return as in a specific highly profitable round trip.

¹¹ Round trip profitability may differ from portfolio profitability since round trips constitute only a portion of the transactions made during the test period, and they do not reflect the in-actions of the investors. However, since in our case the round trips constitute a large sample (around 80%) of the transactions, and due to the large turnover of trade, round trip profitability also provides a good indication of portfolio profitability.

Table 4
 Measures of returns on round trips (in %) before commissions^a

	Managed group		Independent group	
	Annualized returns R_A	Daily returns R_D	Annualized returns R_A	Daily returns R_D
<i>Panel A: All round trips</i>				
<i>N</i>	55614	55614	10696	10696
Mean	10.14*	-0.012	5.60	-0.067
S.D.	28.52	6.18	33.15	2.60
<i>Panel B: Winning round trips only</i>				
<i>N</i>	21670	21670	3884	3884
Mean	29.55*	1.45*	34.19	1.70
S.D.	25.24	7.46	21.82	2.86
<i>Panel C: Losing round trips only</i>				
<i>N</i>	29662	29662	6640	6640
Mean	-5.45*	-1.08	-11.50	-1.10
S.D.	22.97	5.31	26.76	1.77

^a *N* denotes the number of observations (round trips) made. * denotes that the difference in the mean return between the groups is significant at the 0.001 level.

We also calculated annual returns by extending the holding period to one year, assuming that while the investor is not invested in the specific stock for which the measure is computed, she earns the “risk free rate”, R_f .¹² The annual return per round trip, R_A , is thus defined

$$R_A = (1 + R_R)(1 + R_f)^{(365-T)/365}. \quad (2)$$

The averages and standard deviations of the daily returns, as well as annualized returns before commissions, are presented in Table 4 (panel A) for all roundtrips. One observes that the annualized returns of the managed group were significantly higher ($p < 0.001$) than those of the independent group. The daily returns of the managed group were also higher, but not significantly so ($p < 0.13$). We computed separate returns for the winning round trips and for the losing round trips. These were intended to ascertain whether the difference in total returns could be traced to differences in the performance of the groups in winning vs. losing deals. The returns, broken down to returns on winning round trips and losing round trips, are also presented in Table 4

¹² We used a nominal risk free rate of 20% in our calculations (which was about the average rate on short term government bonds in 1994, when the annual inflation rate was 14.5%). Returns on these securities are usually considered as the risk free rate, however since the rates of return of these bonds were quite volatile during the period analyzed, the term “risk free” should be used with caution.

(panels B and C). The returns of the managed group in the winning deals were lower than those of the independent group, but the former group did better in the losing round trips. The overall higher returns of the managed group were therefore attributable to the managed accounts' behavior in the losing transactions.¹³

By using the market model to estimate the β 's of the round trips, we obtained some insights into the profitability and the riskiness of the groups' trades. These parameters were estimated as follows. For each round trip, we calculated the return on the market index during that period. For example, if a round trip started on 5 April 1994 and concluded on 16 May 1994, we defined the raw market parallel return, R_M , as the return on the market for that period.¹⁴ From the raw market parallel returns we calculated the equivalent daily market returns, R_{MD} , on the round trip, using the formula

$$R_{MD} = (1 + R_M)^{1/T} - 1. \quad (3)$$

Estimates of the β 's were then obtained by running a regression of R_R on R_M , and a regression of R_D on R_{MD} for β 's of raw returns and daily returns, respectively. We used both daily returns and raw returns since β 's could be sensitive to the holding period (see, e.g., Levhari and Levy, 1977).

We found that the returns of the managed group were far less correlated with the market than the returns of the independent group. The β 's of the managed group (1.45 for raw returns and 0.98 for daily returns) were lower than those of the independent group (1.70 for raw returns and 1.49 for daily returns). This may partially explain the managed group's better performance since the market generally declined over the period. It may also indicate an effort to choose stocks based on their merit, rather than "following the herd". For both groups, and especially for the independent one, the stocks picked were quite aggressive, with β 's well above 1. Since we only have ex-post β 's, which tend to converge to 1, we used Blume's (1977) adjustment technique (with Blume's parameters) to estimate the ex-ante β 's. As in the case of the ex-post β 's, the estimated ex-ante β 's of the managed group (1.68 for raw returns and 0.97 for daily returns) proved lower than the β 's of the independent group (2.06 for raw returns and 1.74 for daily returns). Since this technique makes a stronger upward adjustment the higher the ex-post β is, and since the ex-post

¹³ Since commissions were quite low compared to returns and uniform across investors, their inclusion does not alter the qualitative comparisons of the profitability and the correlation with the market between the two groups. We therefore chose not to present the after commission returns to save space.

¹⁴ For the market return we used the "Mishtanim" index which was based on the returns of the 100 largest firms in Israel (the Israeli equivalent of the S&P 500; this index is currently called Tel Aviv 100).

β 's of the independent group are higher than those of the managed group, this result is robust with respect to the choice of the particular parameters of the adjustment.

Some idea about the quality of market timing of the groups can be obtained from the parallel returns. These returns show how well the market performed while the investor was engaged in the round trips. Lower parallel returns imply that the investor was active in trading during a less favorable period of the stock market, and hence that her choice of when to “enter” the market was poorer. The market timing of the independent group seems inferior to that of the managed group. This is inferred from the fact that the independent group's parallel daily returns, averaging -0.102 , were significantly lower ($p < 0.001$) than the comparable returns of the managed group, averaging -0.067 . It appears therefore that the main reasons for the slightly higher returns of the managed group were better market timing and lower β 's.

The individual transactions of the managed group certainly appeared less risky, but we did not know if this result also extended to portfolios. We began to investigate this question by looking at how well diversified the portfolios were. One measure for diversification is the number of stocks in the portfolio. The managed accounts had, on average, 17.8 securities in their portfolios (as of the beginning of the year), compared to 6 in the portfolios held by the independent group. We also examined the following measure of diversification: for each client we calculated the proportion of the portfolio represented by the three largest stocks contained in it. It appears that the average concentration measure for the independent client was 0.83 (median is 0.94), which is significantly higher than the 0.56 average (median is 0.51) measure calculated for the managed clients. This supports our hypothesis that the managed portfolios were better diversified.¹⁵

6. Conclusion

Our results demonstrate that the disposition effect exists not only for independent investors, as previous studies have found, but also for professionals. This suggests that the effect may exercise a far more significant influence on pricing than hitherto believed. However, the disposition effect was significantly weaker for professional investors than for amateurs, indicating that profes-

¹⁵ The investor's portfolio in the bank may not be his only portfolio, as he may hold other financial assets in other banks or other financial institutions. The evidence on diversification is therefore not conclusive. We believe however, that the evidence here is instructive since it is hard to imagine that investors would exhibit the exact opposite pattern of diversification in other institutions.

sional training and experience may reduce judgmental biases, even though it cannot eliminate them. This finding indicates a possible advantage in enlisting professional advice, but also describes some limitations of such counsel.

Whereas the disposition effect has been detected for both groups and a difference between the behavior of these two groups has been demonstrated, the reasons for these findings may stem from different theoretical approaches. These phenomena can be explained by investors' deviations from expected utility theory and a lower degree of bias for the managed group, but they cannot completely rule out other theories. One alternative theory is that investors believe that past prices affect future returns. In terms of this theory, the higher disposition effect for the independent group implies a lesser advocacy of market efficiency compared with the managed group. Since there is ample evidence in favor of market efficiency, the theory suggests that differences may exist in the information the two groups possess or in the way they process it. Distinguishing between these alternative theories requires more detailed data and is beyond the scope of this paper.

We discover that professionally managed accounts experienced more activity and better roundtrip performance than these administered independently. Professionals' investments were also less correlated with the market and more diversified. Apparently, the behavioral patterns of individual and professional investors differ, so one may not automatically infer the behavior of one group from observations of the other.

Our findings suggest that market microstructure models assuming the existence of noise traders (irrational) and informed traders (rational) could be enriched by incorporating investors with varying degrees of biases or information. Further research should scrutinize the effects of potential judgmental biases beyond the disposition effect for a better understanding of patterns of trading behavior.

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References

- Badrinath, S.G., Lewellen, W.G., 1991. Evidence on tax motivated securities trading behavior. *Journal of Finance* 46, 369–383.
- Benartzi, S., Thaler, R.H., 1995. Myopic loss aversion and the equity premium puzzle. *Quarterly Journal of Economics* 110, 75–92.
- Benartzi, S., Thaler, R.H., 1999. Risk aversion or myopia: The fallacy of small numbers and its implications for retirement savings. *Management Science* 45, 364–381.
- Ben-Horin, M., 1996. *Securities and the Capital Market*. Tel Aviv, Tcherikover Publishers (in Hebrew).
- Blume, M.E., 1977. Betas and their regression tendencies. *Journal of Finance* 10, 785–795.
- Bodie, Z., Crane, D.B., 1997. Personal investing: Advice, theory, and evidence. *Financial Analysts Journal* 53, 13–23.
- Chen, F., Figlewski, S., Heisler, J., Weigend, A.S., 1998. Uncovering hidden structure in bond futures trading. Working Paper IS-98-01, Stern School of Business, New York University, New York.
- Constantinides, G.M., 1983. Capital market equilibrium with personal tax. *Econometrica* 51, 611–636.
- Constantinides, G.M., 1984. Optimal stock trading with personal taxes. *Journal of Finance* 13, 65–89.
- Constantinides, G.M., 1985. The disposition to sell winners too early and ride losers too long: Theory and evidence: Discussion. *Journal of Finance* 40, 791–792.
- Ferris, S.P., Haugen, R.A., Makhija, A.K., 1988. Predicting contemporary volume with historic volume at differential price levels: Evidence supporting the disposition effect. *Journal of Finance* 43, 677–697.
- Genesove, D., Mayer, C.J., 1999. Loss aversion and seller behavior: Evidence from the housing market. Working Paper, Department of Economics, The Hebrew University, Jerusalem.
- Heath, C., Huddart, S., Lang, M., 1999. Psychological factors and stock options exercises. *Quarterly Journal of Economics* 114, 601–627.
- Heisler, J., 1994. Loss aversion in a futures market: An empirical analysis. *The Review of Futures Markets* 13, 793–815.
- Heisler, J., 1998. Loss aversion among small speculators in a futures market. Working Paper, School of Business, Boston University.
- Kahneman, D., Tversky, A., 1979. Prospect theory: An analysis of decision under risk. *Econometrica* 46, 171–185.
- Kahneman, D., Tversky, A., 1984. Choices values and frames. *American Psychologist* 39, 341–350.
- Lakonishok, J., Shleifer, A., Vishny, R.W., 1992. The structure and performance of the money management industry. *Brookings Papers on Economic Activity: Microeconomics*.
- Lee, Y.T., Lin, J.C., Liu, Y.J., 1999. Trading patterns of big vs. small players in an emerging market: An empirical analysis. *Journal of Banking and Finance* 23, 701–725.
- Lease, R.C., Lewellen, W.G., Schlarbaum, G.G., 1974. The individual investor: Attributes and attitudes. *Journal of Finance* 29, 413–433.
- Levhari, D., Levy, H., 1977. The capital asset pricing model and the investment horizon. *Review of Economics and Statistics* 59, 92–104.
- Levy, H., Smith, M., Sarnat, M., 1980. *The Stock Exchange*. Tel Aviv, Israel Schocken Publishing (in Hebrew).
- March, J.G., Shapira, Z., 1992. Variable risk preferences and the focus of attention. *Psychological Review* 99, 172–183.
- Odean, T., 1998a. Are investors reluctant to realize their losses. *Journal of Finance* 53, 1775–1798.
- Odean, T., 1998b. Volume, volatility, price and profit when all traders are above average. *Journal of Finance* 53, 1887–1934.

- Ross, S.A., 1998. Samuelson's fallacy of large numbers revisited, Working Paper. MIT, Cambridge, MA.
- Samuelson, P., 1963. Risk and uncertainty: A fallacy of large numbers. *Scientia* 98, 108–113.
- Samuelson, W., Zeckhauser, R.J., 1988. Status quo bias in decision making. *Journal of Risk and Uncertainty* 1, 7–59.
- Schlarbaum, G.G., Lewellen, W.G., Lease, R.C., 1978a. Realized returns on common stock investments: The experience of individual investors. *Journal of Business* 51, 299–325.
- Schlarbaum, G.G., Lewellen, W.G., Lease, R.C., 1978b. The common-stock-portfolio performance record of individual investors: 1964–1970. *Journal of Finance* 33, 429–441.
- Shapira, Z., 1995. *Risk Taking: A Managerial Perspective*. Russell Sage Foundation, New York.
- Sharpe, W.E., Alexander, G.J., 1990. *Investments*. Prentice-Hall, Englewood Cliffs, NJ.
- Shleifer, A., Vishny, R.W., 1990. Equilibrium short horizons of investors and firms. *American Economic Review, Papers and Proceedings* 80, 148–152.
- Staw, B., 1997. The escalation of commitment: An update and appraisal. In Z. Shapira (Ed.), *Organizational decision making*. Cambridge University Press, New York.
- Shefrin, H., Statman, M., 1985. The disposition to sell winners too early and ride losers too long: Theory and evidence. *Journal of Finance* 40, 777–790.
- Tversky, A., Kahneman, D., 1992. Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty* 5, 297–323.
- Weber, M., Camerer, C., 1998. The disposition effect in securities trading: An experimental analysis. *Journal of Economic Behavior and Organization* 33, 167–184.