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What Drives the Disposition Effect?

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Abstract

Why do some investors tend to "sell winners too early and ride losers too long"? Such behavior, labeled the disposition effect, has been attributed to biases in return expectations, time-varying risk-aversion based on the value function of prospect theory, and regret theory. I review these explanations and argue that none of them is satisfactory because they either fail to capture the disposition effect or because they are not supported by empirical evidence. I point out that there is a large psychological literature on entrapment, escalating commitment, and sunk cost that studies phenomena that are very similar to the disposition effect. This literature suggests an explanation of the disposition effect based on cognitive dissonance theory.

1 Introduction

From simple observation of friends, colleagues, and maybe ourselves, it is evident that individual investment behavior is often at odds with the assumptions typically made in finance. It is also evident that there are large individual differences in the way investors behave. Recently, some effort has been made to find out how behavior differs *systematically* from the normative models of standard finance theory. One of the better documented behavioral patterns emerging from this research is the disposition effect. The disposition effect describes the tendency to "sell winners too early and ride losers too long" relative to the prescriptions of normative theory (Shefrin and Statman 1985) where the terms "winners" and "losers" refer to assets that have appreciated or depreciated since purchase. That such behavior is relevant for some investors has been documented in a number of studies. See Odean (1998) and Weber and Camerer (1998) for evidence and overviews of the literature. There are of course many good reasons why prior performance and portfolio choices should influence current investment decision such as portfolio rebalancing, transaction costs, capital gains taxes, etc. This is not what the disposition effect is about. The disposition effect describes a tendency to sell winners and hold losers *over and above* what is implied by normative theory.

While the question of *whether* there is a disposition effect (for some investors) arguably has been settled, the question of *why* there is such an effect in the first place has received only little attention. This is unfortunate for at least two reasons. The disposition effect describes sell decisions only and is thus only a partial description of investor behavior. Understanding the driving factors behind it might help us in understanding other aspects of investor behavior, such as how initial buy decisions are made. Also, knowing what drives the disposition effect might help us in determining factors that encourage or discourage it. Such information may be useful to help individual investors avoid the disposition effect.

The existing literature has attributed the disposition effect to biases in return expectations, time-varying risk-aversion based on the value function of prospect theory, and regret theory. I assess these explanations according to two criteria. First, does the explanation really capture the disposition effect, i.e. does it link current portfolio choice to prior returns (whether the asset is a winner or a loser) and prior portfolio choice (whether the asset is held or not)? Second, is there any empirical evidence (other than the fact that there is a disposition effect) that supports the explanation? As it turns out, none of the extant explanations for the disposition effect are satisfactory according to these criteria.

After having established the insufficiency of existing theoretical work on the disposition effect, I go on to point out that the disposition effect is a special case of entrapment, a phenomenon that has been studied extensively by psychologists over the past 25 years (e.g. Staw 1997). The psychological literature on entrapment suggests a different explanation for the disposition effect based on cognitive dissonance theory. According to this theory, motivational factors such as self justification are the driving force behind the disposition effect.

2 Extant Theories

The disposition effect describes the influence of prior performance (winners and losers are treated differently) and prior portfolio decisions (it makes a difference whether a stock is held or not) on current portfolio choice. How can there be such an influence? At the simplest level, standard economic theory implies that investment decisions are driven by expected return, risk, and the trade-off between these two arguments, i.e. risk aversion. From this perspective, the disposition effect can arise if any of these factors is affected by whether the asset is a winner or a loser. Two of the extant theories are based on such an argument. Unjustified belief in mean reversion implies that investors expect lower returns for winners (and conversely higher returns for losers). The value function of prospect theory together with the assumption that investors integrate or "merge" the outcome of successive investment periods implies that risk aversion depends on prior returns, so that investors can have high risk aversion after gains and low risk aversion after losses.¹

Another possibility to obtain the disposition effect is to posit that investors do not care exclusively about risk and return but also about other things that are in turn affected by prior performance and portfolio choice. This is how the third extant explanation, regret theory, works. According to regret theory, individuals care not only about monetary outcomes but also about how these outcomes make them feel about the decision. The disposition effect arises if anticipated regret leads to a preference for selling winners rather than losers.

Supposing preferences over investment decisions can be described by some utility function, the disposition effect can arise, if prior performance and prior portfolio composition affect the arguments of the utility function or if they enter the utility function as distinct

¹I am not aware of any discussion in the literature of the third possibility - that investors prefer to sell winners and hold losers because they think that losers are less risky than winners.

arguments. In the former case the disposition effect links current decisions *indirectly* to prior performance and portfolio. All of the mentioned theories of the disposition effect are based on such an indirect link. In the latter case utility and hence decisions would be *directly* affected by prior performance and portfolio decisions. It is not easy to come up with reasons why utility should depend directly on past performance or decisions. There is consequently only one explanation for the disposition effect along these lines. If investors care only about *realized* returns current decisions are directly influenced by past choices and returns. I briefly discuss this rationale for the disposition effect in section 2.3.

2.1 Unjustified Belief in Mean Reversion

Consider an explanation for the disposition effect that is based on biased expectations of future returns. Investors might choose to sell winners and hold losers simply because they believe that winners have systematically lower future returns than losers. One reason for such a belief is that investors expect prices to mean revert.

Mean reversion in prices implies negative autocorrelation of returns: Above average returns in one period imply that the expected value of returns in subsequent periods are below the long-run average.² If there is in fact no such mean reversion, i.e. the investor falsely believes returns to be negatively autocorrelated, such a pattern in returns motivates the disposition effect: After high returns, an investor expects lower returns inducing him to sell and after low returns, he expects higher returns inducing him to hold on to the asset or even purchase additional shares. Hence, as was pointed out by Odean (1998) and Weber and Camerer (1998), an unjustified or irrational belief in mean reversion can cause the disposition effect.³ Is there any evidence of this particular bias outside the literature on the disposition effect?

The extent to which individuals form accurate expectations of asset prices has been studied experimentally. Andreassen (1987, 1988) has subjects make predictions of future returns based on historical prices. He studies whether forecasts are extrapolating, i.e. whether recent price trends are expected to continue, or regressive, i.e. whether recent

²Under the assumption that the return process is covariance stationary.

³Note that so far this is not an explanation in the true sense of the word. After all, why do people believe in mean reversion? One way to motivate a belief in mean reversion are the cognitive processes underlying the so-called gambler's fallacy. Just as roulette gamblers display a tendency to assume that red is more likely than black following a black number and vice versa, investors might feel that up-moves are more likely following down-moves.

trends are expected to reverse. If individuals believe in mean reversion, they will make regressive predictions. The evidence on whether predictions are extrapolative or regressive is mixed. While there seems to be a general tendency for individuals to make regressive predictions, possibly motivated by a belief in mean reversion, this tendency is fragile. Andreassen (1987) finds that whether or not predictions are regressive or extrapolative depends crucially on whether or not investors attribute returns to fundamental news. If price movements are news-related, investors expect a continuation of the trend, if there are no fundamental news investors expect a reversal. Maybe more important concerning the disposition effect are the findings in Andreassen (1988). Whether expectations are regressive or extrapolative depends on whether investors focus on price *levels* (leading to regressive predictions) or price *changes* (leading to extrapolative predictions). This observation is particularly damaging to the mean-reversion explanation since the disposition effect stresses the importance of prior price changes not levels. In a survey of individual and institutional investors, Shiller (1998b) finds evidence of extrapolative expectations. In a questionnaire study of MBA students, Siebenmorgen and Weber (2000) find evidence of regressive expectations.

Whether investors believe in mean reversion seems to depend on a variety of factors whose relevance in practice is unclear. There is hence only weak empirical support for the hypothesis that belief in mean reversion explains the disposition effect but conversely also no strong evidence that investors do not believe in mean reversion. But there is a more fundamental concern about explaining the disposition effect through belief in mean reversion. As was stressed in the introduction the disposition effect links current demand to past returns *and* past portfolio choices. While belief in mean reversion provides a rationale for the tendency to sell winners and hold losers, it does not explain why this tendency applies only for stocks that are held. Under belief in mean reversion the desire to sell winners and hold losers is completely independent of whether or not the investor already holds the asset or not! Belief in mean reversion alone does thus not explain the disposition effect.

To summarize, belief in mean reversion does not explain the disposition effect unless one makes additional assumptions about why the belief in mean reversion translates into behavior only for those stocks that are in the portfolio. It remains unclear why investors should consistently overestimate the expected return for losers and underestimate the expected return for winners and there is only weak evidence that they actually do.

Unjustified belief in mean reversion is of course only one reason why investors might have biased expectations of future returns. Another reason that gets around the criticisms

just discussed is that investors have a strong (and unjustified) belief in their stock picking skills: Suppose an investor believes he can successfully spot mispriced assets in the market. Such an investor would buy assets that he perceives to be undervalued. He would sell assets where he thinks the undervaluation that made him purchase the asset has been eliminated through a subsequent price rise (a winner asset) or through deterioration of his expectations for the asset. He would hold on to assets that have not appreciated or even depreciated (losers) because he thinks the initial undervaluation has not yet been corrected by the market. The disposition effect would thus be a simple consequence of the belief in one's stock picking skills. While it seems likely that many market participants are overly confident in their stock picking skills there is no systematic evidence on such behavior. Also, this explanation cannot account for the disposition effect in experimental settings where subjects' expectations can be controlled and the finding that automatic selling eliminates the disposition effect (Weber and Zuchel 2001, Weber and Camerer 1998).

2.2 The S-Shape of the Value Function

The second explanation posits that prior returns change an investors preference for bearing risk, i.e. her risk aversion (Shefrin and Statman 1985, Odean 1998, Weber and Camerer 1998).⁴ It is argued that having made a gain on an investment in a stock increases risk aversion and having made a loss decreases risk aversion. Hence prior gains ceteris paribus lower current demand for the asset, and prior losses increase it, so that investors might want to sell winners and hold or even escalate their commitment to losers.

This explanation for the disposition effect is typically loosely based on prospect theory.⁵ Kahneman and Tversky (1979) observed in an experiment the reflection effect, the phenomenon of "risk seeking over losses and risk aversion over gains". They formalized this observation through a utility or value function that is defined over gains and losses relative to a reference point and that is concave over gains and convex over losses. The reference point turns out to be crucial for the disposition effect. It is argued that investors

⁴Here, risk aversion does not refer to the local definition $-\frac{u''}{u'}$ but rather to the global definition: An investor is risk-averse, if his certainty equivalent for a lottery is lower than the expected payoff from the lottery, i.e. when there is a positive risk premium. Higher (lower) risk aversion refers to a higher (lower) risk premium. Note that this definition of risk aversion depends on the lottery in question. I.e. cases are possible where an individual is risk-averse for some lottery A but not for some other lottery B .

⁵Cf. Shefrin and Statman (1985), Odean (1998), Weber and Camerer (1998).

who hold a stock and those who do not use different reference points, or, in the language of prospect theory, "frame" their investment decisions differently. For an investor who does not hold the stock the reference point for her investment decision is simply the current stock price. For an investor who holds the stock, the reference point is instead the initial purchase price.⁶ The idea behind this distinction is that investors, once they purchase a stock, open a mental account for that stock and then "keep a running score on this account indicating gains or losses relative to the purchase price" (Shefrin and Statman, 1985, p.780).

To see how the disposition effect emerges in this framework, consider an investor who has made some losses on a particular stock. For such an investor the decision sell, hold, or to buy the stock is associated with choosing between lotteries whose payoffs are to a large part in the convex portion of his value function. Conversely, for an investor who has made some gains on an investment in a stock deciding whether to buy, sell, or to hold are to a large part in the concave portion of his value function. Consequently, the investor will be more risk-averse if she has prior gains than if has prior losses. This explanation is based on two arguments: Investors integrate prior and future returns and they make portfolio choices so as to maximize the expectation of an S-shaped value function.⁷

Explaining the disposition effect with time-varying risk aversion is not really explaining it. It just begs the question why risk aversion changes over time. If one accepts that investors integrate past and future returns, this question boils down to why the value function has its characteristic S-form. Kahneman and Tversky (1979) attribute the shape of the value function to *decreasing sensitivity* to monetary stimuli.

"Many sensory and perceptual dimensions share the property that the psychological response is a concave function of the magnitude of physical change. For example, it is easier to discriminate between a change of 3° and a change of 6° in room temperature, than it is to discriminate between a change of 13° and 16°. We propose that this principle applies in particular to the evaluation of monetary changes. Thus, the difference in value between a gain of 100 and gain of 200 appears to be greater than the difference between a gain of 1,100

⁶There are alternative hypotheses about the setting of reference points. Gneezy (1998) finds evidence that investors use the highest historic price as reference point. Weber and Camerer (1998) find evidence that investors use the price of the previous trading period.

⁷Gomes (2000) thoroughly discusses asset demand under these assumptions with only slight modifications. He shows that complex behavior arises, some of which is consistent, some of which is inconsistent with the disposition effect.

and a gain of 1,200. Similarly, the difference between a gain of 100 and a gain of 200 appears to be greater than the difference between a gain of 1,100 and a gain of 1,200.” (p. 278)

This is a psychophysical explanation of risk preference. It proposes that the same psychological properties that underlie the perception of physical stimuli (e.g. temperature) underlie the evaluation of monetary stimuli (gains or losses). Decreasing sensitivity means that large gains do not add much more to overall enjoyment and large losses do not diminish overall enjoyment much more than do small losses. The value function is concave for gains and convex for losses. Translated into the context of the disposition effect this means that investors hold on to losers because they are not very sensitive to further losses and eager to sell winners because they are not very sensitive to further gains.

The popularity of the prospect-theory based explanation for the disposition effect - it is the explanation that is most frequently invoked - derives to a large part from the popularity of prospect theory itself. This popularity notwithstanding, the evidence on the S-shaped value function is actually quite mixed (see Hershey and Shoemaker 1980, Schneider and Lopes 1986, and more recently Laury and Holt 2000 and Stocké 2001). Even more importantly, however, the claim that risk aversion decreases after losses and increases after gains is not derived from prospect theory. Prospect theory is a theory of one-shot decision making. The disposition effect is a phenomenon of sequential decision making. Hence any empirical evidence in favor of the S-shaped value function of prospect theory cannot be seen as evidence of this explanation for the disposition effect.

The relevant issue for the disposition effect is the influence of prior investment returns on subsequent risk taking behavior, an issue on which there is little evidence. The little evidence we have is completely contrary to the explanation for the disposition effect based on the value function of prospect theory. Thaler and Johnson (1990) investigate ”the effect of prior outcomes on risky choice.” In the context of choices between two-outcome gambles their results indicate behavior that contradicts the disposition effect: They find that prior gains lead to risk-seeking behavior and prior losses lead to risk-averse behavior! See also Barberis, Huang, and Santos (2001) for a formalization of the results of Thaler and Johnson (1990) and a discussion of further evidence.

The presumed link between prior outcomes and current risk preferences that generates the disposition effect is hence rejected. One interpretation of this result is that individuals are actually more sensitive to losses that come on the heels of prior losses rather than less

as implied by the joint assumption of decreasing sensitivity and integration of successive returns. It is hence useful to reconsider the rationale behind the S-shape of the value function: decreasing sensitivity, i.e. the assumption that the psychological intensity of an outcome diminishes with its magnitude. While this is plausible for comparisons between changes in one-shot outcomes, its plausibility in the context of sequential decision making is less clear. Kahneman and Snell (1990) investigate the distinction between one-shot and sequential decision making for gambles involving losses in a different context. Subjects were asked whether some stimulus such as a severe headache was getting better or worse over several days. Most subjects thought that the headache was getting worse, i.e. that a day of headache was more painful following days with headache than following days without headache. Note that this is a question about a sequence of losses (days of headache). In contrast, in one-shot gambles involving "days of headache" as pay-offs, subjects gave risk-seeking responses, consistent with decreasing sensitivity. The analogy to the case of an investment situation is straightforward. Investors display decreasing sensitivity to payoffs in one-shot gambles. They do also display increasing sensitivity to incremental losses following prior losses in a sequence of decisions. Since the disposition effect arises in the context of sequential decisions, Kahneman and Snell's results cast doubt on the validity of prospect-theory based explanation for the disposition effect.

To summarize, the assumption that investors integrate past and future returns and maximize an S-shaped value function as in prospect theory can mean that risk aversion is higher following gains than following losses, which would imply the disposition effect. The most powerful element of this explanation is that investors who hold the asset frame their investment decisions differently, and hence act differently, compared with the case if they did not hold the asset. It seems plausible that investors think about the price of an asset in their portfolio in relation to historical prices such as the initial purchase price. The idea that the initial purchase price serves as point of comparison for subsequent prices is an appealing rationale for why it makes a difference whether the investor already holds the asset or not. The contention that risk aversion following gains is higher than following losses is, however, not supported by the evidence.

2.3 Regret Theory

Shefrin and Statman (1985) put forward regret, "an emotional feeling [sic!] associated with the ex post knowledge that a different past decision would have fared better than the one chosen" (p. 781), as one of the factors resulting in the disposition effect. Shiller

(1998a) argued that "Regret theory may apparently help explain the fact that investors defer the selling of stocks that have gone down in value and accelerate the selling of stocks that have gone up in value." (p. 1313)

Regret theory is a motivational theory of decision making. Its basic assumption is that individuals are concerned with how the outcome of the decision is going to make them feel *about the decision itself*. In contrast, the traditional expectancy value theories such as prospect theory or expected utility theory emphasize that decisions are a function of probabilities and values or utilities of outcomes alone. How regret can be incorporated into the expected utility framework was suggested by Bell (1982) and Loomes and Sugden (1982). To capture regret, a two-attribute utility function $u(x, y)$ is used, where x denotes final assets and, this is the novel feature, y denotes *foregone assets*. Regret then stems from the particular shape of the utility function. As an example consider the functional form suggested by Bell (1982)

$$u(x, y) = v(x) + f(v(x) - v(y))$$

where v and f are increasing functions. Now, and this is the crucial point, what is actually meant by the term foregone assets. Bell (1982) and Loomes and Sugden (1982) stated their theories for choice between two gambles. In that case, foregone assets simply means the level of assets in a given state of the world that would have obtained had the individual chosen the foregone gamble. It is not clear how to generalize this to the case of choices between more than two alternatives, which is the case confronting an investor contemplating adjustments of her portfolio. But suppose an investor who holds an asset is simply considering the two alternatives to hold or to sell (and hold the cash). Does regret theory imply the disposition effect under any circumstances?

The answer is emphatically no! To obtain the disposition effect current decisions need to be in some way linked to whether there are prior gains or losses. Under regret theory there is no such link and consequently no disposition effect. To see this more formally, suppose the investor holds n units of a risky asset with current price P_t and risky future price \tilde{P}_{t+1} , and suppose the investor uses mental accounting, i.e. she thinks about her investments at the level of the individual asset rather than at the portfolio level.⁸ Maximization of expected utility then implies that the investor will continue to hold the asset whenever $E[u(n\tilde{P}_{t+1}, nP_t)] > E[u(nP_t, n\tilde{P}_{t+1})]$ and sell when $E[u(n\tilde{P}_{t+1}, nP_t)] < E[u(nP_t, n\tilde{P}_{t+1})]$. Assuming no autocorrelation of asset returns,

⁸Without mental accounting the reasoning behind the result that there is no disposition effect is the same, but the notation is more cumbersome.

these inequalities, and hence behavior, are simply unaffected by past prices so there is no scope for the disposition effect. Thus expected regret does not explain the disposition effect.

In a different sense, suggested by Shefrin and Statman (1985), regret is sometimes invoked as an explanation for the disposition effect: Investors might feel regret when they *realize* a loss, and, conversely, feel pride when they *realize* a paper gain. So it is not losses per se, but rather the realization of losses that brings about regret. Conversely it is not gains, but the realization of gains that brings about pride. In this case, investors might display the disposition effect. They might sell winners to rejoice over their past decision and they might refrain from selling losers to avoid feeling the regret over their initial purchase. The disposition effect here stems not so much from regret and pride but rather from the failure to understand that paper gains and losses are as real as realized gains or losses. Why realizing a loss should cause regret is unclear.⁹ After all any gain or loss is there irrespective of whether or not it is realized. The only difference selling makes is in the resulting portfolio composition (ignoring transaction costs and taxes). According to the definition by Shefrin and Statman (1985) themselves regret is caused by *the knowledge* that a different past decision would have fared better, not by the act of realizing a loss.

This is not to argue that there are no investors who fail to understand that paper gains and losses are just as real as realized gains and losses, but simply that such a failure may not be relevant for all investors who display the disposition effect. E.g. it seems unlikely that the professional futures traders whose livelihood depends on their trading successes should fail to take unrealized gains or losses for real. Nevertheless, such investors do display the disposition effect (Coval and Shumway 2000, Locke and Mann 1999, Heisler 1994)

⁹There are studies that show that decision makers protect their self-image by avoiding feedback on foregone alternatives (see Larrick (1993) for a discussion of such studies and other studies that have found a contrary pattern). To the extent that realizing a loss creates a more vivid feedback on the initial purchase decision than simply seeing the loss on the account statement, the tendency to avoid feedback is a possible reason why realization can increase regret.

3 Entrapment, Escalating Commitment, and Sunk Cost

Extant theories of the disposition effect are unsatisfactory. In this section I try to make the case for an alternative explanation for the disposition effect based on the (motivational) notion that investors prefer to hold losers so as to justify the initial purchase decisions. Such an explanation is suggested by the psychological literature on "entrapment", "escalating commitment", and "sunk cost". In this literature, psychologists have studied phenomena that are very similar to the disposition effect.¹⁰ The parallels are clear from the definition of entrapment research by Schulz-Hardt and Frey (1998)

"Research on "entrapment", "escalation of commitment" and "sunk cost" [...] deals with the question why and under what conditions people irrationally stick to or even intensify losing courses of action." (p. 487)

Entrapment research has used experiments, case studies, as well as field studies to show that entrapment occurs in such diverse contexts as capital budgeting decisions, professional sports, loan decisions in banks, policy decisions, and queuing. See Schulz-Hardt and Frey (1998) and Staw (1997) for overviews of the literature.

An entrapment situation is characterized by repeated (rather than one-shot) decision making under uncertainty, in the face of negative feedback about prior decisions, and choice about whether to continue. The fact that according to the disposition effect, investors irrationally stick to a losing investment neatly fits the definition of an entrapment situation. Staw (1997) explicitly refers to investment decisions as an example of an entrapment situation. "When people have lost money in common stocks or mutual funds, they often face a dilemma. Should they stick with their losing investments, increase their stake (perhaps through dollar cost averaging), or move to an entirely different investment vehicle?" (p. 191) So the research on entrapment, escalation of commitment, and sunk cost (collectively referred to henceforth as entrapment research) may provide some insights as to why investors are reluctant to realize losses.

¹⁰This link has been suggested at least twice in the literature on the disposition effect. Shefrin and Statman (1985) and Weber and Camerer (1998) suggest looking into the psychological literature on the sunk-cost fallacy as an avenue for future research.

How do psychologists explain entrapment? The major explanation for entrapment is the *self-justification hypothesis* (Staw 1976, Brockner 1992).¹¹ According to this hypothesis individuals stick to a course of action because they feel the need to justify or rationalize their decisions.

”Decision makers become entrapped in a previous course of action because of their unwillingness to admit - to themselves or others - that the prior resources were allocated in vain. Put simply, people do not like to admit that their past decisions were incorrect, what better way to (re)affirm the correctness of those earlier decisions than by becoming even more committed to them.” (Brockner 1992, p. 41)¹²

In the context of the disposition effect the self-justification hypothesis implies that investors are reluctant to realize losses. Investors hold a losing stock because they do not want to admit to themselves that the initial purchase was - with the benefit of hindsight - a mistake. Holding the stock apparently justifies both the initial purchase decision and the losses already endured. This raises two immediate questions: Why do individuals feel the need to justify their initial decision in the face of negative feedback (e.g. losses on an investment), and how does sticking with their initial decision justify the initial decision? The need to justify past decisions can be derived from cognitive dissonance theory. Making a loss on an investment creates the cognition ”my investment is losing” that is dissonant with other cognitions such as ”I invest to make a profit” or ”I am a skillful investor”. According to the self-justification hypothesis, the discomfort caused by cognitive dissonance creates the desire to rationalize ex post the initial action, possibly so as to protect a positive self-image.¹³ This rationalization works through the creation of new cognitions such as ”my investment will come back” or ”the loss is only temporary”. These cognitions reflect biased estimates of the future outlook of the investment. It is

¹¹There is also a strand in the psychology literature that tries to explain entrapment with the S-shaped value function of prospect theory (e.g. Whyte 1993). Whatever the merits of this explanation in more general entrapment situations, as was shown in section 2.2 it is only a weak explanation of the disposition effect.

¹²Some authors emphasize the need to distinguish between internal self-justification, i.e. justification toward oneself, and external justification or self-presentation, i.e. self justification tendencies towards others (e.g. Bobocel and Mayer 1994). Self-presentation tendencies can often be explained by standard agency arguments (Kanodia, Bushman, and Dickhaut 1989).

¹³Dissonance could of course be reduced in many other ways that do not imply entrapment.

important to stress, however, that it is not biased expectations that cause entrapment but rather entrapment that causes biased expectations (Arkes and Hutzler 2000).¹⁴

Note that cognitive dissonance (and hence the desire to reduce it) is reinforced by certain characteristics of investment situations. The intensity of cognitive dissonance depends upon commitment and responsibility (Gilad, Kaish, and Loeb 1987). Commitment to a course of action creates ego-involvement, in the sense that the decision maker cannot deny the significance of his or her behavior to the occurrence of subsequent events. Responsibility means that there is a free choice and the possibility of adverse consequences can be foreseen. Both conditions are clearly met in the context of sequential investment decisions. Moreover, an investor typically receives frequent feedback about the initial action.

The major supporting evidence for the self justification hypothesis is described in Staw (1976) and Brockner (1992). Entrapment occurs more frequently for individuals who were responsible for the initial decision to pursue the course of action. Translated to the context of investment decisions, this means that an investor would be most likely to display the disposition effect if he was responsible for the initial purchase decision. (See, however, Schulz-Hardt, Thurow-Kröning, and Frey (2000) for a critical assessment of the evidence)

At a more general level, as suggested by Larrick (1993), individuals focus on two goals when they make a decisions. One goal is to maximize their expected outcomes (i.e. the expected utility of wealth or wealth changes) the other goal is to maintain a positive self image. Consistent with this hypothesis, psychologists have identified a number of factors that encourage or discourage entrapment. In addition to economic factors (expected return, transaction costs, etc.) these factors are (translated to the context of the disposition effect from Schulz-Hardt and Frey 1998): responsibility for the initial purchase of the asset, having invested a large share of one's resources, high external pressure to justify the initial investment, ego-relevance of losses. Factors that discourage the disposition effect are frequent and accurate feedback about the losses, salient opportunity costs, existence of alternative investment opportunities, and the possibility to attribute responsibility for the losses to others. It is worth emphasizing that, in the context of financial investments,

¹⁴Arkes and Hutzler (2000) emphasize this difference using the bonmot by J.P.Morgan that "man has always two reasons for doing anything - a good reason and a real reason." In the case of the disposition effect, an overly optimistic stance on the future outlook of an investment serves as a "good reason" to rationalize the decision, while the "real reason" is the desire to justify the initial purchase decision.

the continuation of losing investments does not require any out-of-pocket expenditure.¹⁵

To summarize, the self-justification hypothesis is a robust explanation for the disposition effect with some empirical evidence to back it up. It provides a clear explanation for why investor behavior differs depending on whether investors hold the stock already or not. From a theoretical perspective, a major disadvantage of the theory is that it does not specify how exactly sticking to a course of action serves to justify the initial action. It is evident that having made losses on a stock may conflict with the view of oneself as a skillful investor. How holding the stock serves to justify the initial purchase remains somewhat unclear. Also, entrapment describes behavior in the face of losses and consequently does not imply any direct tendency towards profit taking. A preference for profit taking, i.e. for selling winners can be an indirect consequence of entrapment, only if the investor has a general tendency to sell some of his assets from time to time, be it for the purchase of other assets (e.g. to escalate his commitment to losers) or consumption goods. In this case, selling winners is simply the converse of not selling losers.

4 Conclusion

Traditional theories of the disposition effect- belief in mean reversion, the S-shaped value function, and regret theory - either do not capture the disposition effect adequately or are not supported by empirical evidence. The large psychological literature on entrapment points to motivational factors such as self justification as the driving force behind the disposition effect. Of course the disposition effect lends itself to more than one explanation, and the explanations reviewed are not mutually exclusive.¹⁶

To the extent that one considers the disposition effect a central feature, these results indicate that motivational concerns, such as the desire for self-justification, are important determinants of investor behavior. Unfortunately, motivational factors are ignored in recent attempts to model investor behavior, perhaps because decision theories based mostly on psychophysical and cognitive processes such as prospect theory are more elegant

¹⁵An exception is the investment in derivatives (e.g. futures) that are marked to market.

¹⁶This point is stressed by Shiller (1998a): "[...] each anomaly in finance typically has more than one possible explanation in terms of [...] theories from the other social sciences. The anomalies are observed in complex real world settings, where many possible factors are at work, not in the experimental psychologist's laboratory. Each of their theories contributes a little to our understanding of the anomalies, and there is typically no way to quantify or prove the relevance of any one theory." (p. 1307)

and lend themselves more easily to modeling. Examples are Gomes (2000) and Barberis. Huang and Santos (2001) who study asset demand using some features of prospect theory. Motivational theories have, to my knowledge, so far not been considered. There are a few formal models of cognitive dissonance (Gilad, Kaish, and Loeb 1987, Rabin 1994) in abstract decision situations, which (with some changes) could be applied to investment contexts.

It seems difficult to draw conclusions from the self-justification hypothesis regarding aspects of investor behavior not described by the disposition effect, e.g. how buy decisions are made. This is in contrast to some of the traditional theories which make precise predictions on all aspects of investor behavior. E.g. Gomes (2000) derives a complete description of investor behavior under the assumption that investors maximize the expectation of a (modified) value function of prospect theory. The self-justification hypothesis does, however, provide some additional insight in that it suggests factors that encourage or discourage the disposition effect. Some of these factors have already been confirmed in empirical research on entrapment. As an example, consider the following corollary of the self-justification hypothesis: Psychologists have shown that providing individuals with positive information about themselves (raising their self-esteem) can reduce the desire for self-justification (Steele 1988). So reminding an investor of something good about him- or herself might reduce the disposition effect.

This paper stresses that the psychological literature on entrapment contains results that are relevant to economists studying the disposition effect. It should also be mentioned, that, conversely, the economics literature contains some results of relevance for psychologists. E.g. psychologists have so far studied situations where there are no similar alternative investment options available should the decision maker decide to discontinue the course of action. The disposition effect suggests that this condition is not necessary. The stock market provides a plethora of alternative investment opportunities and individuals still stick to losing stocks. Second, the question whether entrapment can be explained "rationally" is still not settled in the psychological literature (e.g. Schulz-Hardt and Frey 1998). The disposition effect provides a clear-cut example of "irrational" entrapment.

References

- [1] Andreassen, Paul B. (1987): On the Social Psychology of the Stock Market: Aggregate Attributional Effects and the Regressiveness of Prediction, *Journal of Personality and Social Psychology*, 53, 490-496
- [2] Andreassen, Paul B. (1988): Explaining the Price-Volume Relationship: The Difference between Price Changes and Changing Prices, *Organizational Behavior and Human Decision Processes*, 41, 371-389
- [3] Arkes, Hal R. and Laura Hutzel (2000): The Role of Probability of Success Estimates in the Sunk Cost Effect, *Journal of Behavioral Decision Making*, 13, 295-306
- [4] Barberis, Nicholas, Ming Huang, and Tano Santos (2001): Prospect Theory and Asset Prices, *Quarterly Journal of Economics* (forthcoming)
- [5] Bell, David E. (1982): Regret in Decision Making Under Uncertainty, *Operations research*, 30, 961-981
- [6] Bobocel, D. Ramona and John P. Meyer (1994): Escalating Commitment to a Failing Course of Action: Separating the Roles of Choice and Justification, *Journal of Applied Psychology*, 79, 360-363
- [7] Brockner, Joel (1992): The Escalation of Commitment to a Failing Course of Action: Toward Theoretical Progress, *The Academy of Management Review*, 17, 39-61
- [8] Coval, Joshua D. and Tyler Shumway (2000): Do Behavioral Biases Affect Prices?, Working Paper
- [9] Gilad, Benjamin, Stanley Kaish, and Peter D. Loeb (1987): Cognitive Dissonance and Utility Maximization, *Journal of Economic Behavior and Organization*, 8, 61-73
- [10] Gneezy, Uri (1998): Updating the Reference Level: Experimental Evidence, University of Haifa Working Paper
- [11] Gomes, Francisco J. (2000): Loss Aversion and the Demand for Risky Assets, Harvard University Working Paper
- [12] Heisler, Jeffrey (1994): Loss Aversion in a Futures Market: An Empirical Test, *Review of Futures Markets*, 13, 793-822
- [13] Hershey, John C. and Paul H.J. Schoemaker (1980): Prospect Theory's Reflection Hypothesis: A Critical Examination, *Organizational Behavior and Human Performance*, 25, 395-418
- [14] Kahneman, Daniel and Jackie Snell (1990): Predicting Utility, in Hogarth, Robin M.: *Insights in Decision Making*, University of Chicago Press, Chicago

- [15] Kahneman, Daniel and Amos Tversky (1979): Prospect Theory: An Analysis of Decision under Risk, *Econometrica*, 47, S. 263-291
- [16] Kanodia, Chandra, Robert Bushman, and John Dickhaut (1989): Escalation Errors and the Sunk-Cost Effect: An Explanation Based on Reputation and Information Asymmetries, *Journal of Accounting Research*, 27, 59-77
- [17] Larrick, Richard P. (1993): Motivational Factors in Decision Theories: The Role of Self-Protection, *Psychological Bulletin*, 113, 440-450
- [18] Laury, Susan K. and Charles A. Holt (2000): Further Reflections on Prospect Theory, Working Paper
- [19] Locke, Peter R. and Steven C. Mann (1999): Do Professional Investors Exhibit Loss Realization Aversion, Working Paper
- [20] Loomes, Graham and Robert Sugden (1982): Regret Theory: An Alternative Theory of Rational Choice Under Uncertainty, *Economic Journal*, 92, 805-824
- [21] Odean, Terrance (1998): Are Investors Reluctant to Realize their Losses, *The Journal of Finance*, 53, 1775-1798
- [22] Rabin, Matthew (1994): Cognitive Dissonance and Social Change, *Journal of Economic Behavior & Organization*, 23, 177-194
- [23] Schneider, Sandra L. and Lola L. Lopes (1986): Reflections in Preferences under Risk: Who and When May Suggest Why, *Journal of Experimental Psychology: Human Perception and Performance*, 12, 535-548
- [24] Schulz-Hardt, Stefan and Dieter Frey (1998): Sind wir unfähig Verluste zu stoppen? Eine kritische Bestandsaufnahme der Entrapment-Forschung, in Hacker, Winfried and Mike Rinck: *Zukunft gestalten - Bericht über den 41. Kongreß der Deutschen Gesellschaft für Psychologie*, Berlin
- [25] Schulz-Hardt, Stefan, Birgit Thurow-Kröning, and Dieter Frey (2000): The Responsibility Effect as an Artifact: Evidence against a Self-Justification Explanation of Entrapment and Escalation of Commitment, Working Paper
- [26] Shefrin, Hersh and Meir Statman (1985): The Disposition to Sell Winners too Early and Ride Losers too Long: Theory and Evidence, *Journal of Finance*, 40, 777-790
- [27] Shiller, Robert J. (1998a): Human Behavior and the Efficiency of the Financial System, in Taylor, John B. and Michael Woodford (eds.): *The Handbook of Macroeconomics*
- [28] Shiller, Robert J. (1998b): Measuring Bubble Expectations and Investor Confidence, Working Paper

- [29] Siebenmorgen, Niklas and Martin Weber (2000): The Influence of Different Investment Horizons on Risk Behavior, SFB 504 Discussion Paper 00-48, Universität Mannheim
- [30] Staw, Barry M. (1976): Knee-deep in the big muddy: A study of escalating commitment to a chosen course of action, *Organizational Behavior and Human Performance*, 16, 27-44
- [31] Staw, Barry M. (1997): The escalation of commitment: An update and appraisal, in Shapira (Hrsg.): *Organizational Decision Making*, Cambridge University Press
- [32] Steele, Claude M. (1988): The Psychology of Self-Affirmation: Sustaining the Integrity of the Self, *Advances in Experimental Social Psychology*, 21, 261-302
- [33] Stocké, Volker (2001): An Empirical Examination of Different Interpretations of the Prospect Theory's Framing-Hypothesis, SFB 504 Discussion Paper 01-23, Universität Mannheim
- [34] Thaler, Richard H. and Eric J. Johnson (1990): Gambling with the House Money and Trying to Break Even: The Effects of Prior Outcomes on Risky Choice, *Management Science*, 643-660
- [35] Weber, Martin and Colin Camerer (1998): The Disposition Effect in Securities Trading: An Experimental Analysis, *Journal of Economic Behavior & Organization*, 33, S. 167-184
- [36] Weber, Martin and Heiko Zuchel (2001): How Do Prior Outcomes Affect Risky Choice? Further Evidence on the "House-Money Effect" and the Disposition Effect, Working Paper

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