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Waning vigilance and the disposition effect: Evidence from Thailand on individual investor decision making

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ABSTRACT

We argue that existing explanations for the stock-market investor's disposition to "ride losers too long" are unsatisfactory because they abstract from any role for information processing. We propose instead that the disposition effect is a special case of "waning vigilance:" investors pay less attention to new information and analysis when making decisions about loss makers and are therefore slower to sell them when arguments in favor of holding cease to be valid. Results from a Thai individual investor survey are presented as empirical evidence in support of the hypothesis that vigilance is reduced following losses.

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1. Introduction

One of the enduring puzzles of behavioral finance is the disposition effect—the tendency of stock-market investors to "sell winners too soon and ride losers too long." The most often cited theoretical explanation for this phenomenon, derived from Kahneman and Tversky's (1979) prospect theory, is that investors are risk averse when in profit, risk loving when in loss (Shefrin and Statman, 1985). Alternatively, in explanations based on regret theory (e.g. Shefrin and Statman, 1985; Fogel and Berry, 2006) it may be optimal to hold losers in order to avoid regret associated with either the original buy decision or the sell decision (in the event that the share price subsequently recovers). It has also been suggested that individuals might believe that returns are mean reverting and therefore tend not to sell when prices fall (Odean, 1998). And Zuchel (2001) has argued for an explanation based on cognitive dissonance—believing that an investment will bounce back helps to reconcile dissonant

cognitions such as "I expected to make money" and "my position is underwater."

All of these explanations abstract from any real information processing on the part of the investor—only the return on the initial investment affects the sell decision. The problem with this approach is that in the absence of any new information or analysis it is not really possible to speak of holding losers "too long." The "right time" to sell can only be when the rationale for the original purchase is no longer valid and a loss-making investor generally has no reason to change her view when nothing has changed but the share price.

The potential relevance of the investor's information processing procedure for the disposition effect is suggested by Brockner and Rubin (1985, Chapter 7), whose laboratory experiments found evidence in support of a "waning vigilance hypothesis:" decision makers become less responsive to new information once a sunk cost has been incurred. Applying this finding to stock-market investing, we have an account of the disposition effect if investors are less vigilant after losses than they are after gains: investors pay less attention to new information and analysis when making decisions about loss makers and are therefore slower to sell them when arguments in favor of holding cease to be valid. This

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explanation is similar to Zuchel's in that both waning vigilance and the need for self justification are hypothesized to be consequences of post-decisional cognitive dissonance. But in our story cognitive dissonance leads to the disposition effect indirectly (through its effect on vigilance) rather than directly (through the need for self justification).

This paper presents the results of a survey designed to test the hypothesis that investors become less vigilant following losses—a necessary condition for waning vigilance to drive the disposition effect. We asked a sample of individual investors in companies listed on the Stock Exchange of Thailand to give their own assessments of some of the factors that had gone into past decisions to buy, sell at a profit, and sell at a loss, rating the importance each factor typically had on a six-point scale. We found that significant percentages of the sample group rated considerations such as the economic outlook, sentiment in foreign markets, or brokers' recommendations as "very important" when buying or selling at a profit. But in decisions to sell at a loss, there were only two considerations on our list that more than 10% of the participants rated as "very important"—"A company's share price fell to a stop loss level you set at the time you bought" and "you needed cash for something."

These findings suggest that our respondents tended to be much less vigilant when in loss than when in profit. If they had continued to make decisions in the same way when positions became loss making, it is unlikely that factors that were important in buy decisions, and which continued to matter when selling winners, would have become less important when selling losers.

It remains unclear how investors ever manage to sell loss-making positions at all. As few of our survey participants reported that any of the factors we listed in our questionnaire had been "very important" when selling at a loss, we believe such sales are in many cases not responses to new information and analysis. When this is true, they can only be the result of autonomous changes in the investor's psychological state, perhaps brought about simply by the passage of time and/or the extent of the losses.

The remainder of the paper is organized as follows. Section 2 reviews theoretical explanations of the disposition effect, while Section 3 discusses the potential relevance of the waning vigilance hypothesis. Section 4 describes our survey method and presents the results. Section 5 concludes.

2. Theoretical explanations

Perhaps the best known explanation of the disposition effect (first put forward in Shefrin and Statman, 1985) is based on Kahneman and Tversky's (1979) prospect theory, which posits that individuals may have preferences defined over gains and losses. This idea is a radical departure from expected utility theory, which takes it as axiomatic that the utility function is defined over final wealth states. Under expected utility theory, an investor deciding whether or not to sell a position considers only the probability distribution of possible returns; the price she originally paid is irrelevant. But under prospect theory, if the initial purchase price is the reference point for determining gains and losses, risk preferences depend on whether or not the position is in profit. (The theory can also be extended to allow for reference points that adjust toward the current share price over time. See, for example, Arkes et al., 2008.)

Preferences over gains or losses will lead investors to ride losers too long and sell winners too soon if their utility functions are concave (i.e. they are risk averse) when in profit, but convex (i.e. they are risk loving) when in loss. (Under expected utility theory, the curvature of this function would be the same for a given wealth state in either case.) In that case, as a position moves farther and

farther into profit, the investor becomes less and less willing to gamble on making additional gains, while the greater the loss on a position, the more willing she becomes to accept the risk of holding it.

Regret avoidance has also been proposed as an explanation. In addition to the theory described above, Shefrin and Statman (1985) also consider the possibility that holding losers may be a way to avoid regretting one's original buy decision. This story involves what Kahneman and Tversky (1979) call "editing"—a preliminary stage in the decision-making process during which the decision maker finds the most straightforward way to conceptualize a risky prospect. Shefrin and Statman argue that for stock-market investors editing tends to result in setting up "mental accounts," in which a "running score" is kept of the gains and losses on each holding. The disposition effect then results from an attempt to avoid "not so much loss realization as the closure of a mental account at a loss." (p. 781) While the loss is a fait accompli once the price has dropped, regret is mitigated simply by keeping the mental account open.

Fogel and Berry (2006) suggest that the disposition effect might result from the investor's anticipation that a sell decision would be regretted were the stock subsequently to go up. This approach implies a focus not on the editing process but rather on the maximization problem that follows it, which can be modeled by including regret for past failures as an argument in the utility function. Loomis and Sugden (1982) show how such a modeling strategy can lead to an account in which preferences are defined over final outcomes just as in expected utility theory. In the case of maximizing over {sell, hold}, the rational choice will be "hold" when the expected disutility from selling too soon and missing out on a gain is sufficiently large and/or heavily weighted.

Alternatively, the disposition effect might be due not to special features of the investor's risk preferences but rather to characteristics of her expectations formation mechanism. Such a possibility is raised in Odean (1998), whose evidence is consistent both with prospect theory and with a belief on the part of investors that returns are mean reverting. In the latter case, investor behavior is not necessarily at variance with the predictions of expected utility theory—people hold losers simply because they expect them to "bounce back" while they expect winners to experience "technical corrections." The interesting question then becomes why they should have such expectations if returns do not in fact have any tendency to mean revert.

While all of these theories seem intuitively plausible at first glance, Zuchel (2001) points out that there are some serious conceptual problems with this literature. The prospect-theory story, for example, requires the ad hoc assumption that the initial purchase price serves as the reference point, thus begging the question of why investors care if their positions are in profit or in loss. Similarly, the regret theory of Shefrin and Statman (1985) does not tell us why paper losses do not cause regret; simply asserting that investors are reluctant to close a "mental account" at a loss is more a description than an explanation. And belief in mean reversion only solves the mystery if we change the definition of "disposition effect" so that the term refers to a preference for all stocks that have lost value in the previous period rather than only to those losers that happen to be in the investor's portfolio. (Interestingly, Odean (1999) finds that there is no such general preference for previous-period loss makers; in fact, the opposite is observed. This implies that belief in mean reversion may in fact be an explanation for a nonexistent phenomenon!)

Zuchel does not consider Fogel and Berry's (2006) anticipated regret theory. But their story also does not entirely explain why investors ride losers longer than winners. Any seller will anticipate the regret that would follow a post-sale price rise and it is not clear why this anticipation should have a bigger effect on holders of losers than on holders of winners. As Shefrin and Statman (1985)

point out, “asymmetry between the strength of pride and regret (regret is stronger) leads inaction to be favored over action. Consequently, investors who are prone to this bias may be reluctant to realize both gains and losses.” (p. 782)

Zuchel argues instead for an account based on cognitive dissonance theory (Festinger, 1957). This involves neither risk preferences nor expectation formation but rather the investor’s need for “self justification” when a position is in loss. In order to lessen the dissonance between cognitions such as “I invest to make money” and “My investment is losing money,” investors choose to believe a third cognition such as “My investment will come back.” The investor thus ends up with a belief that share prices will “bounce back” similar to that of someone who believes in mean reversion but for a very different reason: her belief is generated by a psychological need rather than by an intuitive model of the data generating process for returns.

Zuchel believes this cognitive dissonance model is preferable for two reasons. First, unlike any of the other theories, it accounts for the importance both of previous portfolio choice and of returns following the initial purchase decision. Whether or not the stock is already held is important because there is no need to justify purchases that were never actually made. And prior returns matter because dissonant cognitions are only generated when losses occur. Second, over the past few decades similar phenomena in a variety of settings have been well documented in the psychology literature on sunk costs and entrapment while the empirical evidence for the alternative explanations is mixed.

3. Waning vigilance and the disposition effect

None of the explanations reviewed in Section 2 provides an entirely satisfactory account of the disposition effect because none of them involve any real information processing: returns are the only inputs into the decision-making process. The idea that investors hold losers “too long” only really makes sense in contexts where there is some reason for initial buy decisions to be reevaluated. In general, this must involve new information and/or a change in the way information is analyzed. While there may be special cases in which a share price fall alone could trigger a sell decision—for example, an investor using “technical analysis” might sell if she concluded that an uptrend had been broken—in a model where only the share price changes there will generally be no reason for the investor to change her view and therefore no “right” time for her to sell.

If an investor is riding a loser too long, there must have been some time in the past when she should have sold and this can only have been a point at which arguments in favor of holding ceased to be valid. The disposition effect must thus be more than just a failure to respond to falling share prices. It must be essentially a failure to analyze information following losses and therefore a special case of what Brockner and Rubín (1985, Chapter 7) refer to as “waning vigilance”—the tendency for information processing to become less “vigilant” once a sunk cost has been incurred. (Their examples of sunk costs involve things such as time spent waiting and bids in dollar-auction games.)

The concept of “vigilant information processing” was introduced in Janis and Mann (1977). It is defined as decision making satisfying seven criteria that their review of earlier psychological research identified as being characteristic of “high quality” decision-making procedures (i.e. procedures that are “likely to lead to satisfaction” (p. 11)). Of these, two are particularly relevant to stock-market investing. “The decision maker, to the best of his ability and within his information-processing capabilities”: (1) “intensively searches for new information relevant to further evaluation of the alternatives” and (2) “correctly assimilates and takes account of any new

information or expert judgment to which he is exposed, even when the information or judgment does not support the course of action he initially prefers.” (p. 11)

Brockner and Rubín (1985) found evidence in a variety of laboratory experiments that decision makers, “after having made a substantial investment . . . may be less vigilant and thus less affected by the very same information that influenced earlier commitment decisions.” (pp. 159–160). Their conclusion was that “when decision makers are psychologically occupied with the process of entrapment, they may be less responsive to information concerning appropriate investment behavior” (p. 164).

Note that the underlying cause of the disposition effect is the same in both Zuchel’s story and our waning vigilance account—cognitive dissonance following losses. The difference is simply that Zuchel has dissonant cognitions resulting in an irrational belief that the investment will “come back” while we have the same dissonance leading to non-vigilant information processing. Like Zuchel’s, our theory does not predict any tendency to sell winners too soon (i.e. before there is any reason to suppose that they will stop going up), only that investors will not tend to hold winners as long as they do losers because they will be quicker to take profits than to realize losses when circumstances change.

Obviously a necessary condition for waning vigilance to drive the disposition effect is that investors are in fact less vigilant following losses. In the next section, we present evidence in support of this claim from a survey of Thai individual investors.

4. The survey

The most straightforward way to test for a link between losses and reduced vigilance would be to ask people about decisions to hold losers. Alternatively, however, one can also ask about decisions to sell at a loss. This amounts to the same thing because a decision to hold is nothing more than a decision not to sell. If we know what circumstances cause an investor to sell loss makers, we necessarily know that her decisions to hold them must result from an absence of those circumstances. For example, someone who only sells loss makers when there is bad news about the corporate-earnings outlook must necessarily hold them when the earnings news is not bad. As decisions to act are generally easier to recall than decisions not to, we opted to ask about the former in order to make our survey questions easier to answer.

We asked investors what they recalled as having been important reasons for decisions they had made over the previous 3 years to “buy,” “sell at a profit,” and “sell at a loss.” If considerations important when buying or selling at a profit tend to become less important when selling at a loss, there is a strong case that vigilance is reduced at the time of the loss-making sale. Otherwise, we would have to assume that the relevance of different categories of information or methods of analysis to our investors varied systematically with the returns on their holdings.

We began by informally interviewing investors to find out what types of things they thought were important for making trading decisions. These conversations allowed us to identify fourteen broad categories covering everything they had mentioned. (See Table 1.) Not surprisingly, these consist primarily of factors identified in earlier investor surveys—“fundamental” and “technical” analysis (Lease et al., 1974) as well as “stories in the news media, conversation, and tips from friends or financial advisors” (DeBondt, 1998). (As far as we know, the only previous survey of Southeast Asian individual investors is that of Isa and Fong (1995). They found that the Malaysian investors they interviewed focused on fundamental considerations during bear markets while relying on “tips, rumors, or just random picking of stocks” in pursuit of short term gains during bull markets.)

Our survey was carried out by two trained interviewers, who used a questionnaire to conduct 220 face-to-face interviews over a six-week period from mid February through March, 2003. Interviews were conducted randomly in brokerage trading rooms throughout Bangkok, often during periods when trading was suspended and investors had idle time on their hands. A screening

question was used to ensure that respondents had invested in the stock market within the past 3 years.

The questions were developed in English and then translated into Thai by a bilingual individual. To verify the accuracy and quality of the translation, pretests were conducted using both the original and translated Thai version on bilingual respondents, as

Table 1
Influences on individual investor decision making.

	A	B		C		
	Buy	Sell at a profit		Sell at a loss		
	Mean score	Mean score	Test statistic for H_0 A = B	Mean score	Test statistic for H_0 A = C	Test statistic for H_0 B = C
(a) You heard that big speculators were manipulating prices (or would stop doing so)	4.30	4.54	$t = -2.5$ df = 219 Sig. = .011	2.63	$t = 13.7$ df = 219 Sig. = .000	$t = 15.9$ df = 219 Sig. = .000
(b) There was news about a company's business or about a sector in which it does business	5.10	5.00	$t = 1.13$ df = 219 Sig. = .262	2.58	$t = 21.6$ df = 219 Sig. = .000	$t = 19.4$ df = 219 Sig. = .000
(c) The economic outlook seemed to have changed (including the outlook for interest rates, economic growth, trade, etc. both in Thailand and overseas)	5.05	4.84	$t = 2.43$ df = 218 Sig. = .016	2.57	$t = 20.0$ df = 218 Sig. = .000	$t = 17.2$ df = 218 Sig. = .000
(d) Technical indicators (price chart patterns, moving averages, etc.) signaled a buy or sell	4.51	4.69	$t = -2.6$ df = 218 Sig. = .011	3.09	$t = 12.1$ df = 218 Sig. = .000	$t = 12.4$ df = 218 Sig. = .000
(e) TV/radio program's recommendation	3.70	4.06	$t = -4.6$ df = 218 Sig. = .000	2.75	$t = 9.8$ df = 218 Sig. = .000	$t = 11.3$ df = 218 Sig. = .000
(f) Sentiment in foreign stock markets seemed to have changed	4.41	4.48	$t = -.90$ df = 218 Sig. = .369	2.51	$t = 16.3$ df = 218 Sig. = .000	$t = 16.1$ df = 218 Sig. = .000
(g) You had a strong intuition that a certain share would go up or down	3.35	3.86	$t = -5.9$ df = 219 Sig. = .000	2.56	$t = 8.3$ df = 219 Sig. = .000	$t = 11.6$ df = 219 Sig. = .000
(h) A fortune teller, monk, or horoscope said this was a good or bad time to invest	2.21	2.75	$t = -5.6$ df = 219 Sig. = .000	1.85	$t = 4.2$ df = 219 Sig. = .000	$t = 7.5$ df = 219 Sig. = .000
(i) A broker's recommendation	4.22	4.47	$t = -3.4$ df = 219 Sig. = .001	3.03	$t = 11.6$ df = 219 Sig. = .000	$t = 11.8$ df = 219 Sig. = .000
(j) A friend or relative's recommendation	3.71	4.05	$t = -4.9$ df = 219 Sig. = .000	2.70	$t = 10.3$ df = 219 Sig. = .000	$t = 10.9$ df = 219 Sig. = .000
(k) A company's share price rose to a target level you set at the time you bought	n/a	5.39	n/a	n/a	n/a	n/a
(l) A company's share price fell to a stop loss level you set at the time you bought	n/a	n/a	n/a	3.74	n/a	n/a
(m) You got a margin call	n/a	n/a	n/a	2.60	n/a	n/a
(n) You needed cash for something	n/a	4.82	n/a	3.50	n/a	$t = 9.2$ df = 218 Sig. = .000

Table 2

Reasons for selling at a loss.

Percent of investors choosing	1 (Not important at all)	2	3	4	5	6 (Very important)
(a) You heard that big speculators were manipulating prices (or would stop doing so)	29	16	27	21	6	1
(b) There was news about a company's business or about a sector in which it does business	33	16	23	21	8	1
(c) The economic outlook seemed to have changed (including the outlook for interest rates, economic growth, trade, etc. both in Thailand and overseas)	32	17	25	16	9	1
(d) Technical indicators (price chart patterns, moving averages, etc.) signaled a buy or sell	24	17	18	16	16	9
(e) TV/radio program's recommendation	25	17	25	24	7	1
(f) Sentiment in foreign stock markets seemed to have changed	31	20	25	16	5	2
(g) You had a strong intuition that a certain share would go up or down	30	23	21	18	7	2
(h) A fortune teller, monk, or horoscope said this was a good or bad time to invest	52	22	15	8	2	1
(i) A broker's recommendation	21	16	21	26	14	3
(j) A friend or relative's recommendation	26	22	21	21	9	1
(k) A company's share price fell to a stop loss level you set at the time you bought	15	15	11	20	19	21
(l) You got a margin call	48	8	8	19	9	9
(m) You needed cash for something	19	11	18	19	20	13

Note: Some rows do not add to exactly 100% due to rounding.

suggested by Douglas and Craig (1983). Six point Likert type scales were utilized with no neutral point in an attempt to avoid problems common to research conducted in Asia—too many neutral responses. This may be due to ambivalence, trying to take the middle path, or perhaps trying to maintain politeness. Nowlis (2002) found that excluding the neutral point is only likely to affect choice if the attitude or preference evokes ambivalence. Peterson's (1994) meta-analysis revealed that the number of items used in a scale has virtually no effect on the scale's reliability, provided the scale has at least four points.

The sample was comprised of 62% men and 28% women, with an average of 7.3 years of investing experience. We asked the following questions:

How important have each of the following items typically been for decisions you have made during the last three years to (A) buy, (B) sell at a profit, and (C) sell at a loss? Please rate the importance of these factors on a scale from 1, "not important at all", to 6 "very important."

The items and results are presented in Table 1.

The mean scores across the columns of Table 1 clearly support a link between returns and information processing. There was little difference between the means in the "buy" and "sell at a profit" columns, while those in the "sell at a loss" column were all significantly lower.

We also asked the following two questions. The percentages of respondents choosing each answer are given in parentheses:

- (1) During the last 3 years, how many trades have you typically made in a month? (a) 0–1 (4%), (b) 2–3 (24%), (c) 4–6 (21%), (d) 7–10 (19%), (e) more than 10 (32%).
- (2) During the last 3 years, how many positions have you typically held at a time? (a) 1 (3%), (b) 2–3 (13%), (c) 4–6 (34%), (d) 7–10 (26%), (e) more than 10 (25%).

The responses to the first of these questions make it clear that most of our respondents were active traders whom we would expect to have had many experiences selling both winners and losers. The second set of responses suggests that many of the respondents might have sometimes held both winners and losers in the same portfolio. We discuss this possibility further at the end of this section.

As our respondents rated the same things as having been important when buying or selling at a profit but not when selling at a loss, we can reject the null hypothesis that whether a position has made or lost money has no effect on information processing. The mean scores in the "buy" and "sell at a loss" columns are statistically dif-

ferent in every case, as are the scores in the "sell at a profit" and "sell at a loss" columns. And our finding that every factor on our list became less important when selling at a loss strongly suggests that waning vigilance occurs following losses but not following profits.

Naturally, we cannot rule out the possibility that recollections of decisions to sell loss makers tend to be skewed in a way that helps to justify the losses. But it is not clear how the need for such self justification could result in all the "sell at a loss" mean scores being lower. To the extent that our respondents exaggerated the importance of new information and analysis as a way of transferring blame from themselves to external circumstances beyond their control, the items in our survey would have been even less important when selling losers than our results indicate, implying a stronger case for our claim that vigilance is reduced following losses.

Alternatively, some respondents might have felt that they should have been able to predict when their original reasons for buying would cease to be valid and therefore have underrated the importance of new information and analysis in decisions to sell losers. In this case, however, we would generally expect such investors to underrate primarily those factors that had been important for their original buy decisions rather than everything covered by our survey. For example, suppose someone bought property stocks in the expectation that interest rates would stay low, only to end up selling at a loss after a surprise rate hike by the central bank. While such a person might not like to admit that she had made a bad call on the central bank's next move, there would typically be many other things that she could recall having based her sell decision on—perhaps foreign markets were falling at about the same time or a broker had issued a "sell" recommendation. As a result, while we might find that particular respondents cited reasons for selling at a loss that differed from their reasons for buying, there would be no reason to expect such ex-post rationalization to result in all the means in the "sell at a loss" column to be lower than the corresponding means in the "buy" column.

It is also possible that our results are biased by recent market events, with the result that particular items were rated as more or less important than they ordinarily would be. This would be consistent with Isa and Fong's (1995) finding that investors focused on different considerations in bull and bear markets. Again, however, it is hard to see how such a bias would result in all of the "sell at a loss" means being lower.

It remains something of a mystery what considerations were important to investors when selling at a loss. All of the means for this column were less than 4 in Table 1, and as can be seen from Table 2, there were only two items which more than 10% of the

respondents rated as “very important” for sales of losers—stopping loss (item *l*) and raising cash (item *n*).

It is possible that other varieties of information and analysis that do not appear on our list are important in decisions to sell losers, but it is hard to imagine what these might be. We believe our results instead suggest that many decisions to sell at a loss do not result from new information or analysis at all but rather are the result of autonomous changes in the seller's psychological state. For example, investors may simply “grow tired” of holding loss makers once enough time has passed and/or money has been lost. If this is true, waning vigilance can only be an explanation of the disposition effect if such psychological changes happen slowly relative to the frequency with which new information and analysis becomes available. But of course if the opposite is the case there would be no disposition effect in the first place—instead we would find that investors sold losers “too soon,” i.e. before there was any reason to do so.

Finally, the fact that all of our respondents reported typically holding more than one stock at a time raises the question of how they made decisions in cases where they were holding both winners and losers in the same portfolio. While our survey did not cover this possibility, it is worth noting that it is possible for one of two simultaneous decisions to be made more vigilantly than the other. If the same considerations are relevant for both, the decision maker can obviously make only a single “intensive search for new information” (as Janis and Mann put it) but it is certainly possible for her to “correctly assimilate and take account of” what she finds out to a greater extent in one case than in the other. Thus, an investor holding both winners and losers might pay sufficient attention to the new information and analysis relevant to both but only make adequate use of it in deciding when to sell the winners.

5. Conclusion

We have argued that the disposition to “hold losers too long” should be seen primarily as an information-processing issue because only when decisions to sell loss makers occur as a reaction to new information or analysis does it make sense to speak of them happening “too late.” Thus we feel it is more appropriate to characterize this phenomenon as a special case of waning vigilance rather than as the result of the special features of investor risk preferences or expectation formation that previous authors have postulated. The idea that losses cause investors to be less vigilant is supported by our survey results, which show that considerations important in buying or selling at a profit become significantly less so when selling at a loss, implying a link between previous-period returns and the quality of investor decision-making procedures.

As we did not ask our survey respondents about the length of time positions were held, our survey does not directly address the relationship between waning vigilance and the disposition effect. By establishing that investors are less vigilant following losses, however, we have made a case that a necessary condition for our waning vigilance explanation is satisfied. Our results should thus be viewed as *prima facie* evidence rather than as proof.

Our focus on information processing leads to a theory in which changes in the degree of investor rationality play a key role. When

buying or in profit, even investors who make decisions on the basis of horoscopes exhibit what Simon (1976) calls “procedural rationality”—their decision making is the result of some sort of deliberative process. But once their positions are in loss, investors may become entirely “irrational”—making decisions “without adequate intervention of thought” (Rubinstein, 1998, p. 21). Earlier models (with the exception of Zuchel's) assume some form of procedural rationality in all cases, even when they involve behavior that is inconsistent with the “rational man” paradigm (for example, in the prospect theory-based explanation, because choices between logically equivalent alternatives are affected by framing effects). If waning vigilance is involved, however, it is not risk preferences and expectations but rather investor rationality itself that must be modeled as a function of previous-period returns.

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