Behavioral Reactions to the Crisis by Foreign Investors

Case of the Korea Stock Exchange

By

Seo Yeon Hong

THESIS

Submitted to
KDI School of Public Policy and Management
In partial fulfillment of the requirements
For the degree of

MASTER OF BUSINESS ADMINISTRATION

2004

Behavioral Reactions to the Crisis by Foreign Investors

Case of the Korea Stock Exchange

By

Seo Yeon Hong

THESIS

Submitted to
KDI School of Public Policy and Management
In partial fulfillment of the requirements
For the degree of

MASTER OF BUSINESS ADMINISTRATION

2004

Professor Woochan Kim

I. Introduction

This paper studies some different reactions by foreign investors facing the financial crisis in Korean stock markets.

Foreign investors, especially, non-resident foreign institutions, are known as more sophisticated than domestic investors; we are using the three kinds of foreign investor types – foreign resident individuals, foreign non-resident institutions, and foreign non-resident individuals. While many domestic individual investors have a strong propensity to hold onto depreciating stocks too long relative to what is optimal for expected utility maximization -- a behavioral pattern that has been dubbed as loss aversion, institutional or even sophisticated individual investors may do the reverse – to take advantage of tax loss selling or maybe to make a profit from contrarian strategy. This difference is potentially very important for understanding the implication of the loss aversion hypothesis for asset market equilibrium.

The loss aversion hypothesis, also called the "disposition effect" by Shefrin and Statman (1985), originates from Kahneman and Tversky's (1979) prospect theory: people act as if they maximize a value function that is defined not over wealth level, but over gains and losses[1].

There are a number of studies that report evidence that individual investors exhibit aversion to realizing loss. Using information on trades by a set of individual investors, and separate information on redemption of mutual funds by individual investors, Shefrin and Statman (1985) argue that their trading patterns are consistent with loss aversion. In a very careful and innovative paper that uses trading records

[1] This value function increases in gains but decreases in losses, where gains and losses are measured relative to a reference point, typically status quo. Most importantly, the value function is "S-shaped": concave in the domain of gains but convex in the domain of losses. It is also steeper for losses than for gains, which implies that any investor with such a value function would exhibit loss-aversion.

on 10,000 accounts from a discount brokerage house, Odean (1998) reports clear evidence that individual investors are less willing to sell depreciating stocks than appreciating ones.

In a representative investor model, Benartzi and Thaler (1995) argue that loss aversion combined with annual performance review provide one explanation for the equity premium puzzle. Barberis, Huang and Santos (1999) argue, again through a representative investor model, that loss aversion together with some additional assumptions not only help to explain the equity premium puzzle, but also can explain excessive volatility and mean reversion in stock prices. Obviously, whether institutional and sophisticated individual investors also exhibit loss aversion could have important implications for these explanations. First, institutional foreign investors have already accounted for 99.69 percent of the market (in the case of Korea Stock Exchange, See Table [1]), the loss aversion of individual investors have to a lot larger than these models have assumed in order to overcome the trading patterns of the institutional investors in order to have their psychological propensity to be reflected in the asset prices. Second, knowing that individuals may exhibit loss aversion, managers of large funds may systematically exploit this (something that has been called “poaching” by Zeckhauser, etc.)

All of these studies look at the behavior of individual investors alone. Because we do not directly observe the information set that the investors base their decisions on, it is possible that the tendency to sell less of the depreciating stocks in the sample can still be fully rational, i.e., not resulting from loss aversion. For example, if investors anticipate an increase in capital gains tax in the near future, it would be rational for them to all chose to sell appreciating stocks now more than they otherwise would do. This could generate the observation that realized gains are greater than

realized losses even without the loss aversion problem prescribed by the prospect theory.

In this paper, I tackle the problem from a new angle. The aim of this paper is threefold. First, I assume that prospect theory is about unsophisticated individual investors. Hence, on *a priori* ground assuming prospect theory is correct, we would expect unsophisticated individuals to deviate from full rationality and exhibit loss aversion, whereas professional managers at the institutions (mutual funds, investment banks, etc) and even larger and more sophisticated individual investors should suffer less from the loss aversion tendency or not at all[2]. And also, during the financial crisis, the foreign institutions compared with unsophisticated individuals show even less loss aversion because realizing a loss is now no longer shameful. Investors can attribute their loss to crisis, and not to their poor investment skills. Second, we examined whether panic selling among the foreign investors actually occurred during the financial crisis in 1997. Third, I study whether the change of strategy (momentum or contrarian) was implemented by each of three investor types during crisis period.

I implement our idea by making use of a unique data set that details the end-of-month positions in every Korea stock by every single foreign investor. A shortcoming of the data is that we only observe month-end positions rather than the actual transaction data[3]. But the data set also offers a great and unique advantage: it allows us to separate small individual (foreign) investors residing in Korea, from the large institutional investors and more sophisticated individuals from aboard. We are not aware of any other paper in the literature that compares the trading patterns of

---

[2] Of course, professional fund managers could engage in other trading patterns in response to their incentive structure and constraints that may be "undesirable" from a society's point of view. One example is herding behavior. See Lakonishok, Shleifer, and Vishny (1992), Choe, Kho and Stulz (1998), and Kim and Wei (1999) for evidence on this.

[3] So there would be measurement errors in computing expected losses/gains associated with the changes in the positions as we cannot assign precise prices to the transactions.

sophisticated versus naïve investors from a common data source during a common sample period. Moreover, in Korea, the proportion of foreign investors is increasing during the period we collected. Figure [1] and Figure [2] show the increasing ratio of foreign investors and increasing market value of stocks foreign investors hold in the Korea Stock Exchange.

I organize the paper as follows. Section II introduces related literatures. Section III, IV and V explains data, hypothesis and methodology. Empirical study will be analyzed in Section VI. Section VII concludes the paper.

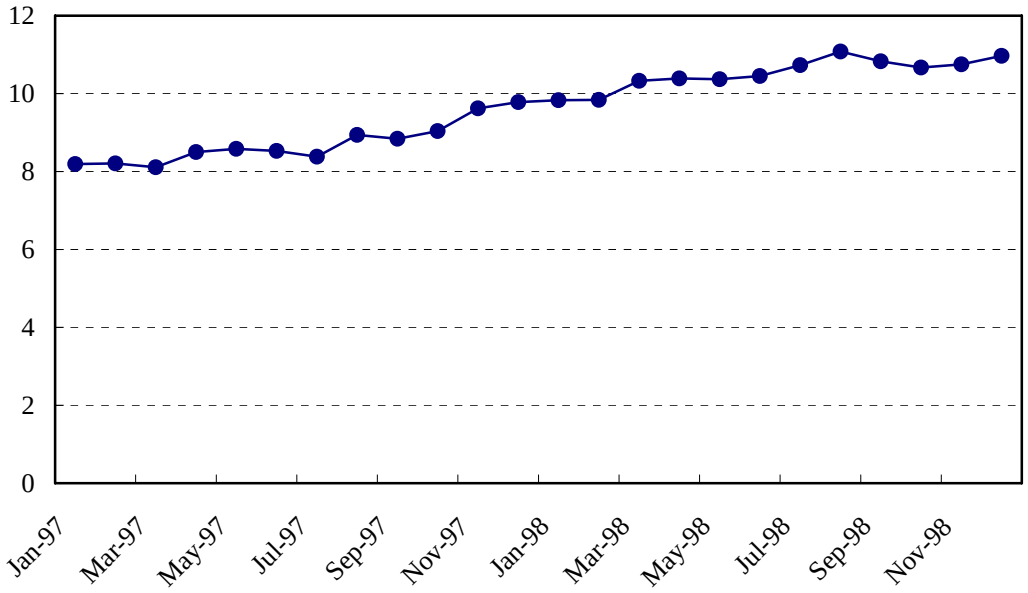
Table [1]

Type of Foreign Investors	number of stocks(10,000)	market value (100million won)	ratio
individuals	1320	2224	0.31
institutions	168080	704319	99.69
mutual funds and trust funds	96671	376065	53.23
bank	33152	187371	26.52
securities company	5491	18918	2.68
pension funds	13899	57658	8.16
insurance company	3974	17594	2.49
others	14893	46713	6.61
sum	169400	706543	100

Financial Supervisory Service, 1999

Figure [1]

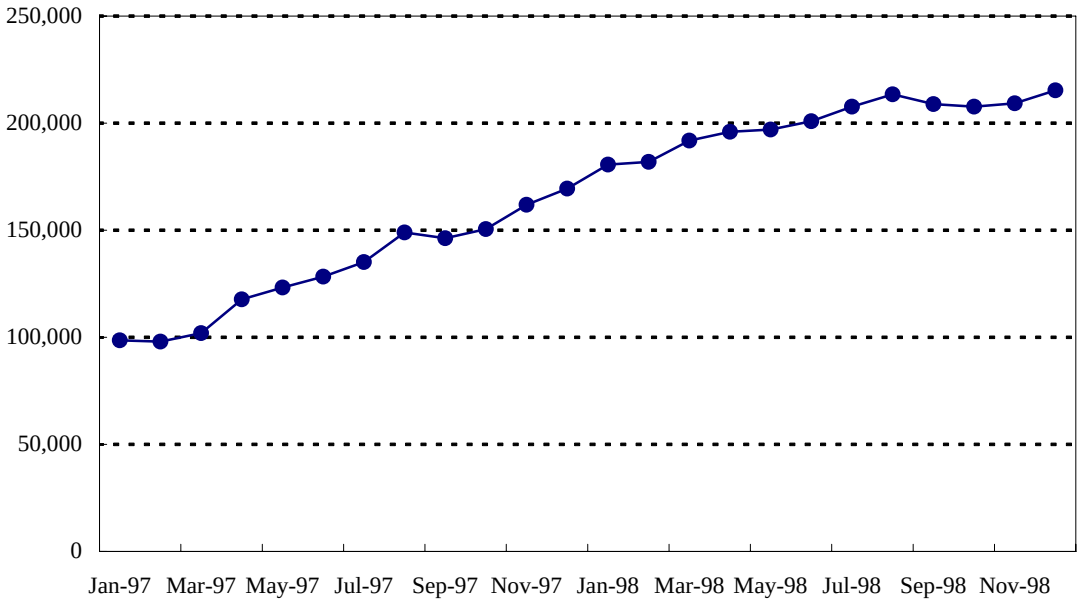
Proportion of foreign investors in Korea Stock Exchange



Financial Supervisory Service, from 1997 to 1999

Figure [2]

Market value of foreign investors holding stocks



Financial Supervisory Service, from 1997 to 1999

II. Related Literatures Review

1. Prospect Theory

Prospect theory can be applied to the explanation of the disposition to sell winners too early and ride loser too long. Daniel Kahneman and Amos Tversky (1979) proposed the value functions different from expected utility theory.

Value function is defined on deviations from the reference point; generally concave for gains and commonly convex for losses; steeper for losses than for gains. [Daniel Kahneman and Amos Tversky, P. 279] The proposed S-shaped value function explains why investors are reluctant to realize losses while they sell winners too soon.

This value function can be easily applied into loss aversion among investors. When investors are facing gains, as the normally accepted utility theory suggested, they express risk averseness and sell the winning stocks too soon, on the other hand, if they confront the loss on their stocks, their behaviors change and go into the gambles – ride a losing stocks too long. The most important features of the prospect theory are the reference point and changes from the reference point (negative or positive magnitudes).

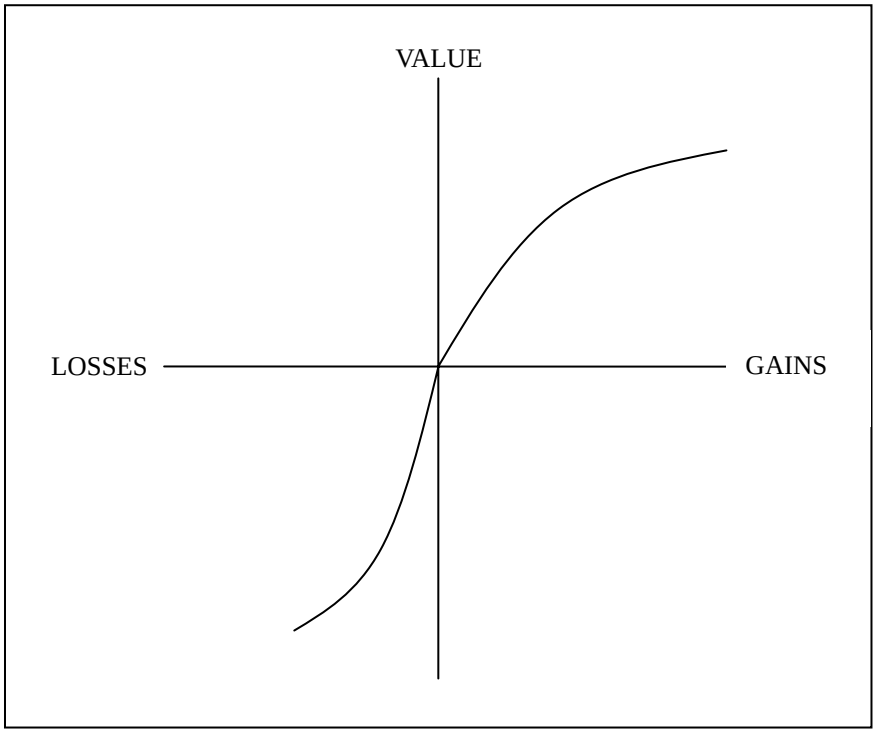
Terrance Odean , in his paper tilted “Are Investors Reluctant to Realize Their Losses?”, suggested some possible choices of reference point for a stock such as average purchase price, the highest purchase price, the first purchase price, or the most recent purchase price, and he found that his results doesn’t change with each choice. In this paper, to estimate loss, we use the average purchase price of stock as a reference point.

Odean(1998) shows that investors who sell their entire holdings of a stock – and who are thus unlikely to be motivated by diversification- continue to prefer

selling winners. However, Odean could not provide the extent of loss aversion with respect to investors' type – sophisticated investors or naïve investors[4]. This study provides the tendency on loss aversion by sophisticated investors.

Figure [3]

Value Functions



2. Disposition Effect

Many studies have extended this prospect theory into a wider theoretical framework concerning a general disposition to sell winners too early and hold losers

[4] Only the two files are used in his study. The trades file includes account identifier, the trade date, the brokerage house's internal number for the security traded, a buy-sell indicator, the quantity traded, the commission paid, and the principal amount. The positions file contains monthly position information for the numbers. The positions file contains monthly position information for the 10,000 accounts from January 1988 through December 1993.

too long. Hersh Shefrin and Meir Statman(1984) explained disposition effect with some elements – mental accounting, regret aversion, self-control, tax considerations.

A. Mental Accounting

Mental accounting should be considered in accordance with the prospect theory. Recall the importance of reference point when we are discussing the prospect theory. When people purchased stocks, they tend to open new mental accounting – "segregate different types of gambles faced into separate accounts" – and are hesitant to readjust the reference point for a stock. Many investors suffer from closing the mental accounting facing the loss. Hersh Shefrin and Meir Statman(1984) quoted Gross's manual for stock brokers to illustrate the difficulty of loss realization.

"…Investors are also reluctant to accept and realize losses because the very acts of doing so proves that their first judgment was wrong...…The two separate transactions are made to flow together by the magic words "transfer your assets." The prospect thought he was making a single decision, switching one investment into another. He was not being asked to think in terms of selling XYZ and collecting the proceeds, then having to think of many different ways to reinvest the proceeds…"

B. Regret Aversion and Self Control

Another explanation of disposition effect is tendency to avoid regret and seek pride behavior. Investors think that realizing losses is due to their misjudgment so this regret leads to a disposition to realize gains and defer losses.

Thaler and Shefrin(1981) explained the disposition effect by suggesting that

interpersonal conflicts between rational part(planner) and emotional part(doer) who implements the reaction with regard to regret and pride. The rational planner may not be strong enough to prevent the emotional reactions of the doer from interfering with rational decision making.

Here, regret aversion and self control would not be applied to the sophisticated investors (institutional investors). Many professional investors use various techniques to resist the difficulty to realize losses and their emotional reactions. Shefrin and Statman(1985) illustrates the technique and its rationale in their paper.

"… Professional traders often adhere to iron-clad rules that mandate the realization of a loss, once it reaches a predetermined percentage of the original purchase price…. Professionals have a hard and fast rule that they never let losses on a trade exceed ten percent. …. Stop-loss order provides another example. These are usually promoted as devices to limit risk, but their main advantages may be in allowing an investor to make loss realization at a predetermined point automatic…"

Different from Odean's result on loss aversion, we found that loss aversion is not the case of the foreign investors (more rational and professional investors), and furthermore, I study how the propensity to sell changes facing the crisis.

3. Panic Selling

Panic selling is high volume selling brought about by sharp price declines. The main problem with panic selling is that investors are not evaluating fundamentals. Instead, they are selling on pure emotion.

This paper provides the reaction to the crisis by foreign investors and shows

there is no panic selling among foreign investors.

4. Contrarian Strategy vs. Momentum Strategy

Contrarian investing is a strategy that relies on behaving in opposition to the prevailing wisdom; for example, buying when others are pessimistic and selling when they're optimistic, or buying out-of-favor stocks. The thinking behind these moves is that money will eventually flow back to sectors that are currently depressed or ignored.

Mark Grinblatt and Matti Keloharju(2001) interpret lacking sufficient controls, evidence on the disposition effect as a contrarian behavior with respect to past returns[5].

They found contrarian behavior is greatest for the household, government, and nonprofit institution investor categories. By contrast, nonfinancial corporations and finance and insurance institutions, domestic groups that generally are more sophisticated than the other three investor types, exhibit much less of this contrarian behavior with respect to recent stock price run-ups.

In Managers, Investors, and Crisis: Mutual Fund Strategies in Emerging Markets, authors Graciela Kaminsky**,** Richard Lyons**,** and Sergio Schmukler find that during crises, emerging market funds engage in "momentum trading," selling stocks that recently declined and buying recent winners. Contemporaneous momentum trading is stronger during a financial crisis, and fund investors show a

[5] Grinblatt and Keloharju use logit regression to analye separately the sell versus hold decision and the sell versus buy decision. They separated the data to examine the contrarian behaviors, propensity to loss aversion, and interaction between disposition effect and past returns with respect to each investor type suing the data from 1994 to 1997.

stronger inclination to engage in contemporaneous momentum trading than do fund managers.

Kim and Wei(1999) examine the transactions of different types of portfolio investors in Korea before and during the Asian crisis, finding that non-resident institutional investors were always positive feedback traders(using momentum strategy), while resident investors were contrarian traders before the crisis but became positive feedback traders during the crisis. Choe et al(1998) also study transaction data from the Korean stock market during the crisis and find evidence for return chasing among foreign investors before the crisis period.

In this paper, I employ the Logit regression to examine contrarian behavior of each investor's type and how this contrarian behavior changes over the financial crisis using interaction between crisis and past returns.

III. Data

Main data are month-end positions on very Korean stock by every foreign investor from December 1996 to December 1999. Monthly transaction data of each stock foreign investors hold in the Korean Stock Exchange are collected.

Foreign investors can be classified in five different groups: (1) individual foreign nationals who reside in Korea (henceforth “resident individuals” for short), (2) individual foreign nationals who invest in the Korean market from abroad (non-resident individuals), (3) foreign institutional investors who invest from abroad (non-resident institutions), (4) foreign institutional investors who invest inside Korea (resident institutions), and (5) foreign investors who are direct investors. Note that individual investors are those who have opened an investment account in their own name with the Korean authority. Joe Smith’s indirect investment in Korea through the Vanguard Asian Fund would be counted as a part of institutional investment.

This paper focuses only on the first three groups of foreign investors. Resident foreign institutions are excluded because there are too few of them to make meaningful calculations. Director investors are excluded since the objective of the paper is to uncover behavior patterns by portfolio investors (the relative tendency to avoiding realize losses).

I only observe the positions of these investors in the Korean market, but not their global positions. Investors in all three groups could hold non-Korean securities. However, the ratio of global to Korean positions may not be the same for them. It seems reasonable to assume that, on average, non-resident individuals and non-

resident institutions are likely to have a greater share of their investment in non-Korean securities.

The rest of the paper compares the three groups in terms their potentially different tendencies to realize losses relative to realizing gains, their strategic behaviors and panic selling. Table [2] shows number of observations of each investor type from data.

Table [2]

investor type[6]	number of observations	percentage
1	18,650	4.2
2	29,845	6.72
3	9,070	2.04
4	22,213	5
5	198,014	44.6
6	77,120	17.37
7	13,321	3
8	384	0.09
9	53,366	12.02
11	10,163	2.29
12	1,862	0.42
13	786	0.18
14	5,954	1.34
15	33	0.01
20	3,065	0.69

[6] 1: non-resident individual
2: non-resident bank
3: non-resident insurance company
4: non-resident securities firm (includes investment banks and brokerage firms)
5: non-resident investment company (e.g. U.S mutual funds)
6: non-resident investment trust company (e.g. U.K unit trusts)
7: other institutions
8: non-resident Koreans
9: non-resident pension funds and endowements
11: resident individual
12: resident bank
13: resident insurance company
14: resident securities firm (includes investment banks and brokerage firms)
15: resident other institutions
20: direct investment
30: others
Non-resident institutions: 2, 3, 4, 5, 6, 7, 9
Non-resident individuals: 1, 8
Resident institutions: 12, 13, 14, 15
Resident individuals: 11

30	102	0.02

IV. Hypothesis

I hypothesized four different behaviors of each three investor type.

Hypothesis 1: Dispositions Effect

There is no loss aversion among foreign investors.

Loss aversion is only applicable to the naïve investors, otherwise, I view foreign investors more sophisticated investors than domestic investors and hypothesize loss aversion is not the case for the foreign investors.

Hypothesis 2: Behavioral Reaction

During the crisis, I examined how the propensity to sell changes when there is capital loss. I assumed that the propensity to sell will increase because realizing a loss would be no longer to be shameful (contribute the loss to the crisis, justifiable regret).

Hypothesis 3: Panic Selling

During the crisis, investors may blindly sell their share on the belief that share price will fall even further.

Hypothesis 4: Contrarian Strategy

During the crisis, contrarian behavior would exist because of the panic selling by naïve investors, stock prices will be excessively undervalued and this provides greater probability to make money by a contrarian strategist.

V. Methodology

To capture the disposition effect, Odean(1998) calculated two ratios.

$$\frac{\text{Realized Gains}}{\text{Realized Gains + Paper Gains}} = \text{Proportion of Gains Realized (PGR)}$$

$$\frac{\text{Realized Losses}}{\text{Realized Losses + Paper Losses}} = \text{Proportion of Losses Realized (PLR)}$$

The disposition effect was tested by joint test.

The methodology Odean developed could not distinguish disposition effect from contrarian strategy.

Grinblatt and Keloharju used Logit regression to distinguish the disposition effect from the contrarian strategy by controlling for both the stock's patter of past returns and the size of the holding-period capital loss.

This paper utilizes the Logit regression developed by Grinblatt and Keloharju to examine following four behaviors among foreign investors[7]; 1) difference between degrees of loss aversion among three investor types, 2) behavior reactions facing crisis by investors, 3) the existence of panic selling during crisis, 4) employing contrarian strategy or momentum strategy during the crisis by investors.

We determine the binary variables as a dependent variable in the regression:

[7] Grinblatt and Keloharju also analyzed loss aversion with using Logit regression, however they were not able to analyze foreign investors. The aim of their study is to find a evidence that investors are reluctant to realize losses, that they engage in tax-loss selling activity, and that past returns and historical price patters, such as being at a monthly high or low, affect trading. In this paper, we are focusing on behavioral reactions facing crisis.

sell or do not sell. To capture each following effect, we analyzes coefficient between dependent variable and 52 regressors[8]. Using the coefficient of past returns (positive returns and negative returns), we can analyze investors strategy (contrarian strategy or momentum strategy) and with coefficients on the interactive variable between the past return variable and the crisis dummy, we can find the change of strategy during the crisis. Loss aversion can be found by coefficient on capital loss dummies. Behavioral reactions of investors facing during the crisis can be captured by coefficient on the interactive variable between crisis dummy and capital loss dummy. Lastly, panic selling will be captured by crisis dummy. I defined crisis period from November 1997 to December 1997.

[8] See Appendix

VI. Empirical Study

1. Does Disposition Effect exist?

The disposition effect, the tendency to hold losers too long and sell winners too soon, has been tested by Odean in the method of joint test of PGR(Proportion of Gains Realized) and PLR(Proportion of Losses Realized) as I explained early. Odean(1998) concluded that investors realize their profitable stocks investments at a much higher rate than their unprofitable ones. Grinblatt and Keloharju also found disposition by four investor categories.

I used capital loss dummy[9] as an indicator of loss aversion (disposition effect) and Table [3] shows there is no loss aversion for the foreign investors of Korea Stock Exchange. Among three investor types, non-resident individuals show the most propensities to sell when there is capital loss. Non-resident individual are 0.17(calculated by 0.6667/4[10]) less likely to sell stocks with capital loss. In the case of non-resident institutions and resident individuals, capital loss makes a sale 0.039 and 0.07 each less likely than a capital gain. As I mentioned early, foreign investors seem to be more sophisticated and rational than domestic investors[11] so that they do not show any loss aversion.

[9] Capital loss dummy is 1 if there is capital loss and zero otherwise. Capital loss is calculated by purchasing price minus month-end price of stock. Here, reference price is average purchasing price.
[10] Assessing economic significans by noting that each regression coefficient is four times the regressor's marginal impact on the probability of selling a stock for regressor values that make the propensity to sell 1/2.
[11] Odean(1998) and Grinblatt and Keloharju(2001) analyzed domestic investors.

Table [3]

Independent variable	Non-resident institutions	Non-resident individuals	Resident individuals
Capital loss dummy			
Capital loss dummy	0.1560 (14.87)	0.6664 (14.97)	0.2829 (3.6)

( ): z-value

2. Are there Behavioral Reactions facing crisis?

Behavioral reactions against crisis can be captured by interaction between capital loss dummy and crisis dummy. Table [4] shows crisis makes investors more likely to sell stocks with capital loss. For example, the coefficient of capital loss dummy is 0.1560 for the non-resident institutions and this coefficient changes to 1.0685 (0.9125 + 0.1560) during the crisis, which means that the propensity to sell increase by 0.228 comparing with no-crisis period. This implies capital loss of investor's portfolio can be attributable to financial environment (crisis) not to their investment decision; therefore, there is no need to avoid regret and seek pride. Moreover, foreign investors already let their planners (rational part) implement their plans do not give any chance to doers (emotional part).

Table [4]

Independent variable	Non-resident institutions	Non-resident individuals	Resident individuals
Interaction between capital loss dummy and crisis dummy			
Capital loss dummy x Crisis dummy	0.9125 (12.62)	1.7010 (3.37)	2.3441 (4.16)

( ): z-value

3. Does a Panic Selling occur by foreign investors?

Panic selling among the foreign investors does not occur during financial crisis. As you can see in Table [5], the coefficients of crisis dummy for all three investor categories shows negative values which implies no panic selling during crisis. Figure [4] shows net amount of purchase (amount of purchase - amount of sell) by foreign investors from 1997 to 2000, and if we see the crisis period (November 1997 and December 1997), we cannot conclude there is panic selling compared with other period(In October 1999 and October 2000, there is less net purchasing amount than financial crisis period.) Figure [5] also shows no panic selling.

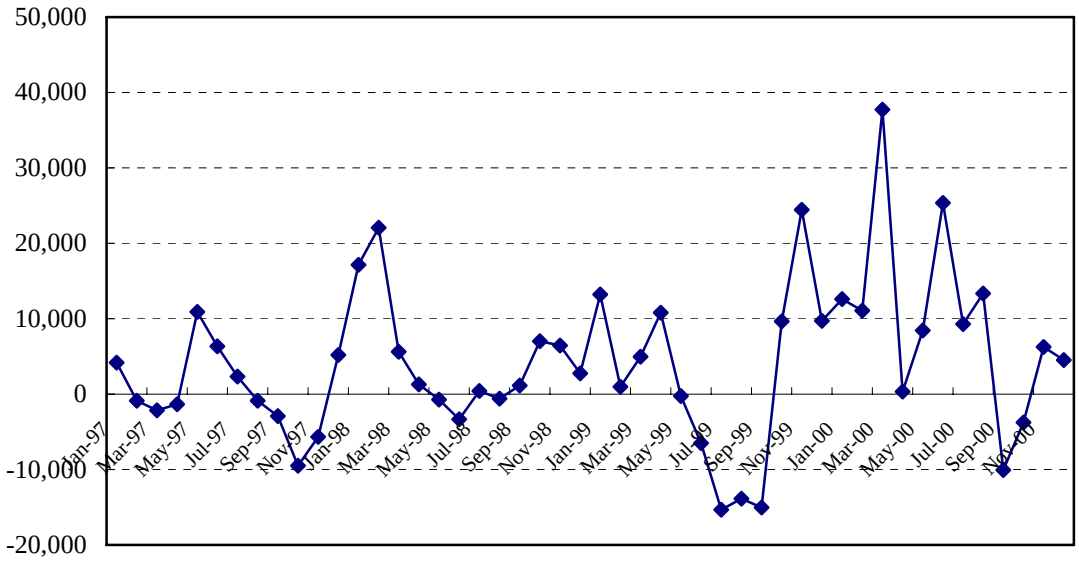
Table [5]

Independent variable	Non-resident institutions	Non-resident individuals	Resident individuals
Crisis dummy			
Crisis dummy	-0.3976 (-3.31)	-1.8126 (-1.84)	-0.6831 (-0.72)

( ): z-value

Figure [4]

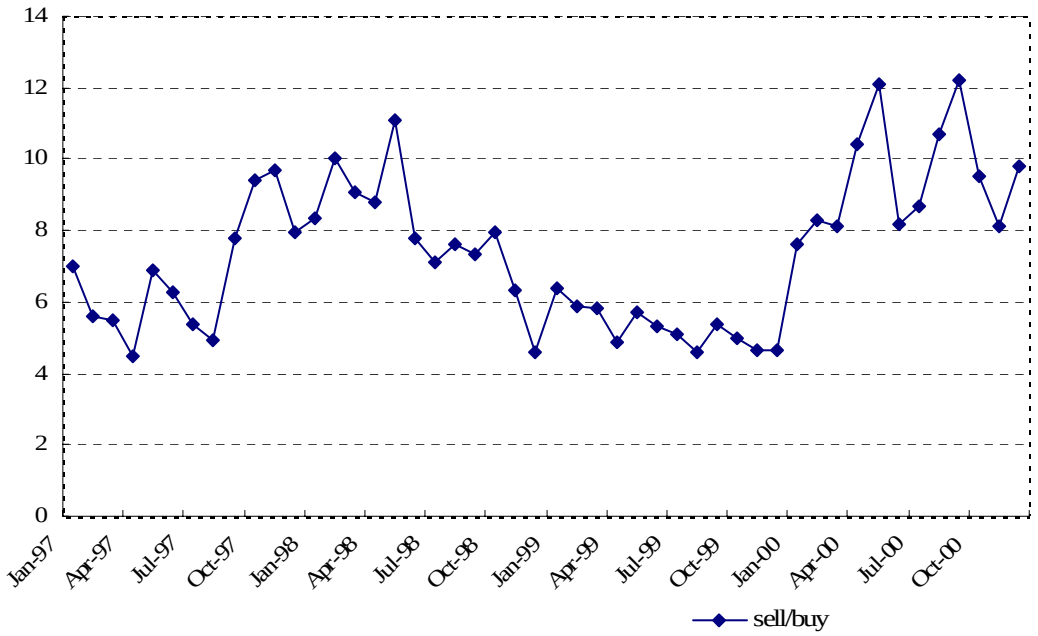
Net sale (= amount of purchasing – amount of sale)



Financial Supervisory Service, from 1997 to 2000

Figure [5]

Proportion of sale to buy



Financial Supervisory Service, from 1997 to 2000

4. Do foreign investors employ the Contrarian Strategy?

Table [6] shows the degree of propensity to sell with respect to past positive and negative returns. The data has only month-end position of the investors; we can calculate the past market adjusted returns on the monthly basis.

With coefficient on past market adjusted returns, we can analyze whether each investor category has a contrarian strategy or momentum strategy. Statistical result shows that there is particular strategy among the investors during the non-crisis period. In the case of non-resident institutions, positive and negative market adjusted returns affect selling decision significantly, however, for both non-resident and resident individuals; their propensity to sell is not affected by past returns significantly.

On the other hand, during the crisis period, non-resident institutions employed momentum strategy. For example, for the non-crisis period, the -0.2347 coefficient of current return makes the propensity to sell 0.06 lower and for the crisis period, the degree of less propensity to sell increase by 0.135 (calculated by (-0.2347 – 0.3053) /4). In other words, positive past returns make lower the propensity to sell for both period. In the case of negative return, the coefficient of negative past returns during non-crisis period is -0.43 which doesn't make the propensity to sell less likely. However, during the crisis period, the coefficient of negative past returns on the propensity to sell changes to 0.105(-0.43 + 0.5351) which means that negative past returns increase the propensity to sell by 0.026. Therefore, the momentum strategy is utilized by non-resident institutions during the crisis. This result is consistent with the conclusion by Choe et al. (1999) reporting that foreign investors exhibit momentum strategy. However, they couldn't categorize foreign investors into institutions and individuals. In this paper, we found that momentum strategy was adopted by non-resident foreign institutions and there is no specific strategy done by foreign

individuals[12].

The past returns variables are more important for the non-resident institutions and resident individuals than capital loss dummy. Excluding past returns makes pseudo-R^2 lower from 0.0317 to 0.0290 for the non-resident institutions and from 0.0558 to 0.035 for the resident-individuals and pseudo-R^2 is 0.0303 with excluding capital loss dummy for the non-resident institutions and 0.0485 for the resident-individuals. On the other hand, for the non-resident individuals, capital loss was more important decision variable than past returns.

Table [6]

Independent variable	Non-resident institutions	Non-resident individuals	Resident individuals
Positive returns			
Current	-0.2347 (-6.07)	0.0086 (0.08)	0.1103 (0.94)
One month prior	0.5795 (10.73)	-0.0720 (-0.37)	-0.8666 (-2.49)
Two month prior	-0.4097 (-6.85)	-0.3611 (-1.47)	0.1870 (0.43)
Three month prior	0.1932 (3.63)	0.4007 (1.79)	0.3972 (0.99)
4month to 6 month prior	0.0469 (4.31)	-0.0521 (-1.78)	-0.0618 (-1.22)
7month to 9month prior	0.0707 (6.23)	0.0884 (2.79)	-0.1233 (-1.76)
10 month to 12 month prior	0.0240 (1.85)	-0.0471 (-1.24)	-0.0970 (-1.3)

( ): z-value

[12] Their coefficients of past negative returns are not significant. See Table [ ]

Table [7]

Independent variable	Non-resident institutions	Non-resident individuals	Resident individuals
Negative returns			
Current	-0.4301 (-7.61)	1.0157 (5.17)	1.4144 (3.77)
One month prior	0.1113 (1.79)	0.4359 (1.76)	0.4311 (1.05)
Two month prior	-0.6100 (-12.7)	-0.3069 (-1.47)	0.4909 (1.48)
Three month prior	0.0505 (1.27)	0.1461 (0.85)	0.3761 (1.27)
4month to 6 month prior	0.2434 (8.07)	0.1368 (1.35)	0.2636 (1.51)
7month to 9month prior	0.1819 (5.3)	0.0851 (0.81)	0.0268 (0.14)
10 month to 12 month prior	0.1996 (5.21)	0.1742 (1.45)	0.8306 (3.45)

( ): z-value

Table [8]

Independent variable	Non-resident institutions	Non-resident individuals	Resident individuals
Interaction between Crisis dummy and Positive returns			
Current	-0.3053	1.7903	6.3068
	(-1.96)	(-1.07)	-3.29
One month prior	0.4627	-3.5567	0.4208
	(1.42)	(-1.18)	(0.16)
Two month prior	-1.6844	-0.4053	-3.7795
	(-6.81)	(-0.19)	(-1.59)
4month to 6month prior	0.2583	-0.5351	-3.7660
	(1.92)	(-0.53)	(-2.66)
7month to 9month prior	-0.2041	-0.0346	-0.6028
	(-1.61)	(-0.05)	(-0.89)
10month to 12month prior	0.4503	1.4745	1.8509
	(2.96)	(1.32)	(1.63)
Interaction between Crisis dummy and Negative returns			
Current	0.5351	-0.4447	-2.8327
	(2.77)	(-0.28)	(-2.69)
One month prior	-0.3346	2.2898	1.3922
	(-0.58)	(0.55)	(0.33)
Two month prior	-0.0935	-0.3926	-3.4465
	(-0.16)	(-0.09)	(-0.8)
Three month prior	0.7727	0.4839	4.0526
	(0.9)	(0.07)	(0.59)
4month to 6month prior	-1.5767	-3.2723	0.6530
	(-5.84)	(-1.77)	(0.42)
7month to 9month prior	0.4594	-3.0671	-1.0135
	(1.75)	(-1.19)	(-0.51)
10month to 12month prior	-0.8018	2.0587	2.6556
	(-2.4)	(0.75)	(1.43)

( ): z-value

5. Other factors affecting the selling decision

Portfolio size, average volatility of the stock, minimum price and maximum price also affect selling decision by investors significantly; all of these variables z-value is higher enough to confirm their significance. For example, if a current price of the stock is higher than maximum price of the stock over 1 year period, all three investors tends to sell.

Table [9]

Independent variable	Non-resident institutions	Non-resident individuals	Resident individuals
Other factors to affect the propensity to sell			
Ln(Value of Portfolio)	-0.1860 (-81.66)	-0.0547 (-5.14)	-0.1313 (-6.56)
Mean Volatility	38.3189 (9.91)	-1.5668 (-0.12)	50.8700 (2.36)
Sell price < min price over 1 year	0.0506 (3.45)	-0.2413 (-3.56)	-0.2717 (-2.55)
Sell price < max price over 1 year	0.2367 (16.9)	0.4099 (7.18)	0.5221 (4.95)
horizon	0.0243 (30.07)	-0.0199 (-4.52)	-0.0400 (-6.55)

( ): z-value

VII. Conclusion

This paper examines factors which affect their selling decision. As many paper studied disposition effect of investors, this paper also studies disposition effect, however, the disposition effect is not found among foreign resident and non-resident investors; furthermore, investors facing crisis more actively sell stocks with capital loss than when they do not face crisis. Moreover, no evidence of panic selling of foreign investors is found during financial crisis. Lastly, no specific strategy of resident and non-resident individuals exists and momentum strategy is done by non-resident institutions during crisis.

Appendix

Dependent Variable: 1 if sell, 0 otherwise

(Non-resident Institutions)

Independent variables	Coefficient	Standard Error	Z value	p-value
Positive market returns [0]	-0.2347	0.0387	-6.07	0
Positive market returns [1]	0.5795	0.0540	10.73	0
Positive market returns [2]	-0.4097	0.0598	-6.85	0
Positive market returns [3]	0.1932	0.0532	3.63	0
Positive market returns [4,6]	0.0469	0.0109	4.31	0
Positive market returns [7,9]	0.0707	0.0113	6.23	0
Positive market returns [10,11]	0.0240	0.0130	1.85	0.065
Negative market returns [0]	-0.4301	0.0565	-7.61	0
Negative market returns [1]	0.1113	0.0623	1.79	0.074
Negative market returns [2]	-0.6100	0.0480	-12.7	0
Negative market returns [3]	0.0505	0.0397	1.27	0.204
Negative market returns [4,6]	0.2434	0.0301	8.07	0
Negative market returns [7,9]	0.1819	0.0343	5.3	0
Negative market returns [10,11]	0.1996	0.0383	5.21	0
Capital Loss Dummy	0.1560	0.0105	14.87	0
Crisis Dummy	-0.3976	0.1200	-3.31	0.001
Crisis x Positive market returns[0]	-0.3053	0.1561	-1.96	0.05
Crisis x Positive market returns[1]	0.4627	0.3270	1.42	0.157
Crisis x Positive market returns[2]	-1.6844	0.2474	-6.81	0
Crisis x Positive market returns[4,6]	0.2583	0.1345	1.92	0.055
Crisis x Positive market returns[7,9]	-0.2041	0.1270	-1.61	0.108
Crisis x Positive market returns[10,12]	0.4503	0.1519	2.96	0.003
Crisis x Negative market returns[0]	0.5351	0.1932	2.77	0.006
Crisis x Negative market returns[1]	-0.3346	0.5765	-0.58	0.562
Crisis x Negative market returns[2]	-0.0935	0.5814	-0.16	0.872
Crisis x Negative market returns[3]	0.7727	0.8551	0.9	0.366
Crisis x Negative market returns[4,6]	-1.5767	0.2701	-5.84	0
Crisis x Negative market returns[7,9]	0.4594	0.2621	1.75	0.08
Crisis x Negative market returns[10,12]	-0.8018	0.3343	-2.4	0.016
Crisis x Capital Loss Dummy	0.9125	0.0723	12.62	0
Ln(Portfolio)	-0.1860	0.0023	-81.66	0
Mean Volatility	38.3189	3.8655	9.91	0
Price < Min Price	0.0506	0.0146	3.45	0.001
Price > Max Price	0.2367	0.0140	16.9	0
horizon	0.0243	0.0008	30.07	0
bank	0.0661	0.0285	2.32	0.02
Insurance Company	-0.1137	0.0373	-3.05	0.002
Securities Company	0.2394	0.0304	7.86	0
Mutual Funds	0.1091	0.0246	4.43	0
Trust Company	0.0559	0.0257	2.18	0.029
Pension Funds	-0.0849	0.0269	-3.15	0.002
February	-0.0297	0.0274	-1.08	0.279
March	-0.1035	0.0282	-3.67	0

April	0.0375	0.0261	1.44	0.151
May	0.1407	0.0253	5.56	0
June	-0.0080	0.0260	-0.31	0.758
July	0.3450	0.0244	14.17	0
August	0.0829	0.0250	3.32	0.001
September	0.0073	0.0254	0.29	0.772
October	0.1264	0.0245	5.16	0
November	0.1523	0.0257	5.93	0
December	-0.0331	0.0262	-1.26	0.206

Number of observations: 306827

Pseudo-R^2: 0.0317

(Non-resident individuals)

Independent variables	Coefficient	Standard Error	Z value	p-value
Positive market returns [0]	0.0086	0.1127	0.08	0.939
Positive market returns [1]	-0.0720	0.1943	-0.37	0.711
Positive market returns [2]	-0.3611	0.2454	-1.47	0.141
Positive market returns [3]	0.4007	0.2245	1.79	0.074
Positive market returns [4,6]	-0.0521	0.0293	-1.78	0.075
Positive market returns [7,9]	0.0884	0.0316	2.79	0.005
Positive market returns [10,11]	-0.0471	0.0380	-1.24	0.215
Negative market returns [0]	1.0157	0.1965	5.17	0
Negative market returns [1]	0.4359	0.2473	1.76	0.078
Negative market returns [2]	-0.3069	0.2084	-1.47	0.141
Negative market returns [3]	0.1461	0.1717	0.85	0.395
Negative market returns [4,6]	0.1368	0.1013	1.35	0.177
Negative market returns [7,9]	0.0851	0.1054	0.81	0.42
Negative market returns [10,11]	0.1742	0.1199	1.45	0.146
Capital Loss Dummy	0.6664	0.0445	14.97	0
Crisis Dummy	-1.8126	0.9850	-1.84	0.066
Crisis x Positive market returns[0]	1.7903	1.6788	1.07	0.286
Crisis x Positive market returns[1]	-3.5567	3.0151	-1.18	0.238
Crisis x Positive market returns[2]	-0.4053	2.0823	-0.19	0.846
Crisis x Positive market returns[4,6]	-0.5351	1.0016	-0.53	0.593
Crisis x Positive market returns[7,9]	-0.0346	0.7018	-0.05	0.961
Crisis x Positive market returns[10,12]	1.4745	1.1183	1.32	0.187
Crisis x Negative market returns[0]	-0.4447	1.5727	-0.28	0.777
Crisis x Negative market returns[1]	2.2898	4.1287	0.55	0.579
Crisis x Negative market returns[2]	-0.3926	4.5289	-0.09	0.931
Crisis x Negative market returns[3]	0.4839	6.9648	0.07	0.945
Crisis x Negative market returns[4,6]	-3.2723	1.8484	-1.77	0.077
Crisis x Negative market returns[7,9]	-3.0671	2.5826	-1.19	0.235
Crisis x Negative market returns[10,12]	2.0587	2.7623	0.75	0.456
Crisis x Capital Loss Dummy	1.7010	0.5053	3.37	0.001
Ln(Portfolio)	-0.0547	0.0106	-5.14	0
Mean Volatility	-1.5668	12.6896	-0.12	0.902
Price < Min Price	-0.2413	0.0678	-3.56	0
Price > Max Price	0.4099	0.0571	7.18	0

horizon	-0.0199	0.0044	-4.52	0
February	-0.3603	0.1187	-3.04	0.002
March	-0.3405	0.1189	-2.86	0.004
April	-0.0695	0.1043	-0.67	0.505
May	-0.2278	0.1146	-1.99	0.047
June	-0.2217	0.1104	-2.01	0.045
July	0.0115	0.0991	0.12	0.908
August	-0.2815	0.1091	-2.58	0.01
September	-0.4435	0.1091	-4.06	0
October	-0.3371	0.1034	-3.26	0.001
November	0.1977	0.0973	2.03	0.042
December	0.0748	0.1078	0.69	0.488

Number of observations: 13712

Pseudo-R^2: 0.0244

(Non-resident individuals)

Independent variables	Coefficient	Standard Error	Z value	p-value
Positive market returns [0]	0.1103	0.1180	0.94	0.35
Positive market returns [1]	-0.8666	0.3475	-2.49	0.013
Positive market returns [2]	0.1870	0.4326	0.43	0.666
Positive market returns [3]	0.3972	0.4015	0.99	0.323
Positive market returns [4,6]	-0.0618	0.0507	-1.22	0.223
Positive market returns [7,9]	-0.1233	0.0702	-1.76	0.079
Positive market returns [10,11]	-0.0970	0.0749	-1.3	0.195
Negative market returns [0]	1.4144	0.3748	3.77	0
Negative market returns [1]	0.4311	0.4094	1.05	0.292
Negative market returns [2]	0.4909	0.3308	1.48	0.138
Negative market returns [3]	0.3761	0.2953	1.27	0.203
Negative market returns [4,6]	0.2636	0.1749	1.51	0.132
Negative market returns [7,9]	0.0268	0.1900	0.14	0.888
Negative market returns [10,11]	0.8306	0.2411	3.45	0.001
Capital Loss Dummy	0.2829	0.0787	3.6	0
Crisis Dummy	-0.6831	0.9532	-0.72	0.474
Crisis x Positive market returns[0]	6.3068	1.9169	3.29	0.001
Crisis x Positive market returns[1]	0.4208	2.6447	0.16	0.874
Crisis x Positive market returns[2]	-3.7795	2.3745	-1.59	0.111
Crisis x Positive market returns[4,6]	-3.7660	1.4171	-2.66	0.008
Crisis x Positive market returns[7,9]	-0.6028	0.6795	-0.89	0.375
Crisis x Positive market returns[10,12]	1.8509	1.1382	1.63	0.104
Crisis x Negative market returns[0]	-2.8327	1.0531	-2.69	0.007
Crisis x Negative market returns[1]	1.3922	4.1570	0.33	0.738
Crisis x Negative market returns[2]	-3.4465	4.3250	-0.8	0.426
Crisis x Negative market returns[3]	4.0526	6.8919	0.59	0.557
Crisis x Negative market returns[4,6]	0.6530	1.5675	0.42	0.677
Crisis x Negative market returns[7,9]	-1.0135	1.9758	-0.51	0.608
Crisis x Negative market returns[10,12]	2.6556	1.8608	1.43	0.154
Crisis x Capital Loss Dummy	2.3441	0.5637	4.16	0
Ln(Portfolio)	-0.1313	0.0200	-6.56	0

Mean Volatility	50.8700	21.5491	2.36	0.018
Price < Min Price	-0.2717	0.1067	-2.55	0.011
Price > Max Price	0.5221	0.1054	4.95	0
horizon	-0.0400	0.0061	-6.55	0
February	-0.2722	0.1952	-1.39	0.163
March	0.4407	0.1836	2.4	0.016
April	0.6060	0.1655	3.66	0
May	0.6380	0.1762	3.62	0
June	0.6801	0.1778	3.82	0
July	0.3024	0.1688	1.79	0.073
August	0.2411	0.1826	1.32	0.187
September	0.1078	0.1969	0.55	0.584
October	0.3151	0.1847	1.71	0.088
November	0.4568	0.1883	2.43	0.015
December	0.6492	0.1976	3.28	0.001

Number of observations: 5252

Pseudo-R^2: 0.0558

References

Choe, Hyuk, Bong-Chan Kho, and Rene Stulz, 1998, Do Foreign Investors Destabilize Stock Markets? The Korean Experience in 1997, *NBER Working Paper No. 6661*.

Eduardo R. Borensztein and R. Gaston Gelos, 2000, A Panic-Prone Pack? The Behavior of Emerging Market Mutual Funds, *IMF Working Paper, WP/00/198*.

Kahneman, Daniel, and Amos Tversky, 1979, Prospect theory: An analysis of decision under risk, *Econometrica 46, 171-185*.

Kim, Woochan and Shang-Jin Wei, 1999, Foreign Portfolio Investors Before and During a Crisis, *mimeo, Harvard University*.

Mark Grinblatt and Matti Keloharju, 2001, What makes investors to trade?, The Journal of Finance LVI, ….

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*.

Terrance Odean, 1998, Are investors Reluctant to Realize Their Losses?, *The Journal of Finance LIII, …*

Thaler and Richard, 1985, Mental accounting and consumer choice, *Marketing Science 4, 199-214.*

Thaler and Shefrin, 1981, An Economic Theory of Self-Control, *Journal of Political Economy 89, 392-410.*

Thaler and Eric Johnson, 1985, The Break Even Effect, *Forthcoming working paper.*