

# Investigation of the disposition effect in Korea

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## Abstract

This study investigates the trading behavior of institutional investors in Korea. For this purpose, 562,560 daily trading records from 348 funds are analyzed during the period from 2006 to 2011. The findings of this study are as follows. First, the disposition effect exists in Korean stock market. Second, a stronger disposition effect is associated with the lower risk. Third, there is no disposition effect if the current price is used as the reference point. However, for bond type fund, disposition effect recurs as the reference point gets closer to the current price. Fourth, degree of the disposition effect increases as the length of the holding period increases. Fifth, a stronger disposition effect is associated with lower returns. Finally, the disposition effect disappears after the global financial crisis, suggesting that Korean investors trade more rationally since the crisis.

Key words: Disposition Effect, Risk, Reference Point, Interval Effect, Financial Crisis

## 1. Introduction

The disposition effect, first labeled by Shefrin and Statman (1985), relates to the tendency of investors to keep losing stocks for too long and sell winning stocks too soon. The disposition effect has been well documented in the previous literatures. This study investigates the disposition effect in Korea. In particular, we examine the relationship between the strength of the disposition effect and the magnitude of investment risk by analyzing the trading pattern of fund managers in Korea. Previous studies suggest that risk may play an important role in revealing the disposition effect. For instance, Cheng, Lee and Lin (2011) suggest that the disposition effect is correlated with old age and gender (female) because of higher risk-averse tendencies of these investors. Barberis and Xiong (2009) argue that greater risk-averse tendencies make investors more likely to postpone losses and realize gains instead. In turn, such tendencies generate a stronger disposition effect. Kahneman and Tversky (1979) show that investors behave as if evaluating the decision consequences on an S-shaped value function, which is concave for gains and convex for losses. The resulting value function is steeper for losses than for gains.

As Kaustia (2010) points out, majority of previous studies in this field focus on the average behavior of investors for the aggregate market. Investors may differ in regard to the causes of the disposition effect for different market conditions. In this paper, we examine whether different types of fund risk have a differential impact on the disposition effect. For this purpose, 564,921 daily transactions for 348 funds in Korea are analyzed during the period of January 2006 to December 2011. Each fund is categorized into stock, mixed, and bonds based on the investment risk. Disposition effect is measured by using Odean (1998)'s methodology which is the difference between the proportion of gains realized and the

proportion of losses realized in stock trading. We investigate if there is any significant difference of the disposition effect among different risk type.

The remainder of the paper is organized as follows. Section 1 provides an introduction. Section 2 reviews previous studies. Section 3 explains the samples and experimental design. Section 4 presents the results of the empirical analysis. Section 5 summarizes the study results.

## **2. Literature review**

Shefrin and Statman (1985) first developed a concept called the “disposition effect”, which implies that investors have great propensity to sell winners rather than losers in an attempt to avoid regrets. Related work and theories proliferated thereafter, and the major previous works are described as follows.

Odean (1998) investigated the presence of the disposition effect in the U.S. stock market. He analyzed 10,000 individual trading accounts of a large discount brokerage firm from 1987 to 1993 and found that when an investor sells shares, he has a great propensity to sell shares of a stock that has risen in value rather than one that has fallen in value. The findings of Odean (1998) showed that the average return of the prior winners that investors sell is 0.05 higher than the average return of the prior losers that they hold.

Barbar and Odean (2001) demonstrated that, in areas such as finance, men are more overconfident than women. Thus, theory predicts that men will trade more excessively than women. They use a data for over 5,000 households from a large discount brokerage and analyze the common stock investments of men and women from February 1991 through January 1997. The findings that men trade 45 percent more than women. Trading reduces men's net returns by 2.65 percentage points a year as opposed to 1.72 percentage points for women.

Grinblatt and Han (2005) show that this momentum effect may be connected to the disposition effect. They present a model with two types of investors: disposition investors and rational traders. Momentum arises from underreaction to new information in the model.

Specifically, when many investors have gains on a particular stock, some of them are more eager to sell due to the disposition effect.

Gneezy (2005) was designed to overcome some of the difficulties involved in using real market data to test the disposition effect. They try to find evidence on how prior gains and losses impact the risk behavior of people, by shifting the reference level. Gneezy, U. (2005) argued that Odean (1998) might have found even a stronger effect by using the pick of the process as a reference level.

Cici (2006) analyzed a sample of 1,960 actively managed U.S. equity funds from 1980–2004 and reported the presence of a weak disposition effect by finding that the average return of prior winners that investors sell is 0.035 higher than the average return of the prior losers that they hold. He found that disposition-prone funds tend to have negative effects on trading performance and lead to the preference for value stocks in portfolio designs.

Xu (2007) argued that the presence of the disposition effect in a large subset of investors could create stock mispricing, which has serious implications for market performance. He found that a significant fraction (32%) of U.S. equity mutual funds exhibits some degree of disposition behavior and these funds underperform funds that are not disposition prone by 4-6% per year.

Ivkovic and Weisbenner (2009) investigated the disposition effect for 32,000 cases of redemptions and purchases by individual mutual fund investors. By separating taxable and tax-deferred accounts and disentangling the net flow into inflows and outflows, Ivkovic and Weisbenner (2009) found that incumbent investors were reluctant to sell funds that perform well and were willing to redeem funds that perform poorly, which is consistent with the tax motivation argument but contradicts the disposition effect documented in other studies.

Dhar and Zhu (2006) analyzed 7,965 accounts of individual investors to determine whether the disposition effect varies with individual preferences. The results supported the presence of the disposition effect by finding that the proportion of gains realized was 0.38 whereas the proportion of losses realized was 0.17. Their study also showed that the disposition effect became stronger among lower income, less sophisticated investors compared to higher income investors who engage in more sophisticated trading.

Barberis and Xiong (2009) argued that an investor's responses toward risk aversion in terms of realizing gains or losses are correlated with the disposition effect. In brief,

investors who prefer less risky assets tend to be risk averse; thus, they fail to realize losses, and gains are swiftly changed into the cash. Additionally, they investigated that the annual gain/loss implementation of prospect theory frequently shows contrary of the disposition effect.

Cheng, Lee and Lin (2011) investigated the trading accounts of 137,572 individual investors on the Taiwan Stock Exchange for 33 months and found that female and elderly investors are highly disposition-prone. The disposition effect was negative 1.8% for males and 2.98% for females. When categorized by age, the disposition effect reached 1.44% and 3.04% for young investors and elderly investors, respectively. Additionally, they investigated TE and TF traders which is different levels of risk appetite. The disposition effect of TE traders was 1.7% and TF traders was 2.67%. TF traders is low risk and exhibits a stronger disposition effect.

Studies that featured Korean cases are described as follows. Choi et al. (2004) analyzed the trading behavior of individual investors by using Odean (1998)'s methodology. The results showed that the proportion of gains realized was 0.159 whereas the proportion of losses realized was 0.136. The disposition effect marked the difference of 0.023 in the two proportions.

Kim (2005) investigated 10,000 trading accounts of individual investors in a medium-sized brokerage firm for three years from January 2001 to December 2003. The proportion of real capitalized gains (PGR) was reported to be 0.56 whereas the proportion of real capital losses (PLR) was 0.306. The results displayed a higher disposition effect by 0.05 compared with Odean (1998).

Ko (2010) investigated the disposition effect of stock fund investors in Korea and reported that performance within the fund was shown to be negatively correlated with cash flow in the account, thus proving the presence of the disposition effect among fund investors. Cho (2010) also applied Odean (1998)'s model to test the presence of the disposition effect among institutional investors in Korea. He traced three years of stock fund volume from 2004 to 2007. The PGR was reported at 0.14 and the PLR was at 0.07, indicating that the disposition effect was present in institutional investment funds. Cho (2010) showed that a 1% increase in the disposition effect resulted in a 0.093% decrease in fund performance.

### 3. Sample and research model

#### 3.1 Research sample

Daily transaction data for 1,281 funds invested in Korea stocks market from January 2006 to December 2011 were collected from FN guide Database ([www.fnguide.com](http://www.fnguide.com)). For a given date and fund, the database provides the name and identifier of each fund. These data were supplemented with prices, volume, and other fund information. To be included in our sample, a fund must have more than 4 million US \$ of asset size.<sup>1</sup> Our final sample consists of 564,912 daily transactions of 348 funds. Each fund is categorized into stock, mixed, and bond types based on the type of investment risk.<sup>2</sup>

**<Table 1> Basic information of Korean fund market**

This table reports summary characteristics for the Korea funds in our sample during the January 2004-December 2012 sample period. Table 1 reports sample characteristics for each fund of net asset value, and Cash flow volatility. Classifications of funds are as follows: stock (invests more than 60% in stocks and stock-related derivatives), pure stock (invests more than 60% in only stocks), mixed asset (invests in non-stocks and non-bonds), bond (no stock investments, invests more than 60% in bonds), and pure bond (no investments in stock and stock derivatives, invests more than 60% only in bonds).

			Year	Year	Year	Year	Year	Year	Year	Year	
			2004	2005	2006	2007	2008	2009	2010	2011	2012
Stock	Net Asset Value	100M (KRW)	5,078	24,149	35,673	63,400	48,446	64,781	57,937	56,899	57,993
Mixed	Net Asset Value	100M (KRW)	13,216	16,678	16,503	12,700	8,813	8,746	9,382	8,031	8,070
Bond	Net Asset Value	100M (KRW)	23,786	10,347	7,651	5,245	4,718	6,726	7,911	7,478	9,324
Stock	Cash flow volatility (1 yr.)	100M (KRW)	-	-	-	17,531	10,425	-9,017	-17,603	6,055,	-2,946

<sup>1</sup>This requirement is needed to prevent the infrequent trading problem of the fund.

<sup>2</sup>Classifications of funds are as follows: stock (invests more than 60% in stocks and stock-related derivatives), pure stock (invests more than 60% in only stocks), mixed asset (invests in non-stocks and non-bonds), bond (no stock investments, invests more than 60% in bonds), and pure bond (no investments in stock and stock derivatives, invests more than 60% only in bonds).

Mixed	Cash flow volatility (1 yr.)	100M (KRW)	-	-	-	-2,083	-1,491	-1,248	317	-624	-142
Bond	Cash flow volatility (1 yr.)	100M (KRW)	-	-	-	-1,906	-154	3,196	1,265	-231	1,600

Table 1 shows the basic fund information for the sample. It shows the rapid growth of fund in Korean stock market from 2005 when Korean government allowed the introduction of asset securitization. Table 1 also shows that the cash flow volatility and annual return of all funds display a diminishing trend since 2007, reflecting the effect of the global financial crisis originated from the U.S.

### 3.2 Model

We measure disposition effect by using Odean (1998)'s model. Odean (1998) defines the proportion of gains realized, *PGR*, and the proportion of losses realized, *PLR*, as equations (1) and (2). Then, the disposition effect is measured as the difference between the two proportions. It show the presence of the disposition effect if  $PGR - PLR > 0$ . Odean (1998) reports the disposition effect based on the results of  $PGR = 0.148$  and  $PLR = 0.098$  in his study.

$$PGR = \frac{\textit{Realized Gains}}{\textit{Realized Gains} + \textit{paper Gains}} \quad (1)$$

$$PLR = \frac{\textit{Realized Losses}}{\textit{Realized Losses} + \textit{paper Losses}} \quad (2)$$

For every stock in the investor's portfolio on that day that is *sold*, a "realized gain" is counted if the stock price exceeds the average purchased price and a "realized loss" is counted if the stock price is below the average purchased price. For every stock in the



investor’s portfolio on that day that is *not* sold, a “paper gain” is counted if the stock price exceeds the average purchased price and a “paper loss” is counted if the stock price is below the average purchased price.

## 4. Empirical Results

### 4.1 Analysis of the disposition effect

We examine the relationship between the strength of the disposition effect and the magnitude of investment risk by analyzing the trading pattern of fund managers in Korea. Kaustia (2010) points out, majority of previous studies in this field focus on the average behavior of investors for the aggregate market. Investors may differ in regard to the causes of the disposition effect for different market conditions. Table 2 and Table 3 report between different risk of fund and the degree of the disposition effect in Korea. The average difference between PGR and PLR is 0.0279, indicating the presence of the disposition effect in Korea. In addition, the results also show that the lower risk type of funds tend to exhibit the higher degree of the disposition effect. Disposition effects for stocks, mixed, and bonds are 0.0215, 0.0275 and 0.0642, respectively. Table 3 shows that differences between different types of funds are statistically significant.

**<Table 2> Degree of the disposition effect (DDE).**

Table 2 report the degree of the disposition effect to each fund category. We have a total number of 564,912 daily transactions of 348 funds. Each fund is categorized into stock, mixed, and bond types based on the type of investment risk. The disposition effect, PGR-PLR, for aggregate, stocks, mixed, and bonds are 0.0279, 0.0215, 0.0275 and 0.0642, respectively. Classifications of funds are as follows: stock (invests more than 60% in stocks and stock-related derivatives), pure stock (invests more than 60% in only stocks), mixed asset (invests in non-stocks and non-bonds), bond (no stock investments, invests more than 60% in bonds), and pure bond (no investments in stock and stock derivatives, invests more than 60% only in bonds).

	Mean	Std. Dev	t Value	Pr >  t
Aggregate	0.0279	0.0956	5.4	<.0001
Stock	0.0215	0.0963	3.23	0.0014
Mixed	0.0275	0.0871	3.07	0.0028
Bond	0.0642	0.1058	3.74	0.0006

**<Table 3> Difference of the disposition effect between fund types**

Table 3 shows that differences between different types of funds are statistically significant. These test show that the differences in proportions are equal to zero assuming that the disposition effect of stock, mixed, bond result from independent decisions.

	N	Mean	Std. Dev	Std. Err	Minimum	Maximum	t Value	Pr >  t
Stock	337377	0.0221	0.0958	0.0001	-0.2154	0.3061	25.50	<.0001
Mixed	162010	0.0272	0.0868	0.0002	-0.1550	0.3813		
Diff		-0.0051	0.0929	0.0002				
	N	Mean	Std. Dev	Std. Err	Minimum	Maximum	t Value	Pr >  t
Mixed	162010	0.0272	0.0868	0.0002	-0.1550	0.3813	90.75	<.0001
Bond	65525	0.0636	0.1050	0.0004	-0.1539	0.3343		
Diff		-0.0363	0.0924	0.0004				
	N	Mean	Std. Dev	Std. Err	Minimum	Maximum	t Value	Pr >  t
Stock	337377	0.0221	0.0958	0.0001	-0.2154	0.3061	103.5	<.0001
Bond	65525	0.0636	0.105	0.0004	-0.1539	0.3343		
Diff		-0.0414	0.0973	0.0004				

Table 4 shows the effect of the reference point on the analysis of the disposition effect. Kahneman and Tversky (1979) predict that outcomes are interpreted as gains or losses relative to a reference point. Weber and Camerer (1998) argue that the closer is the reference price to the current price, the smaller the magnitude of the disposition effect. Gneezy (2005) was designed to overcome some of the difficulties involved in using real market data to test the disposition effect. They try to find evidence on how prior gains and losses impact the risk behavior of people, by shifting the reference level. Gneezy (2005) argued that Odean (1998) might have found even a stronger effect by using the pick of the process as a reference level. They predict that if the current price is the reference point from which gains and losses are valued, rather than the purchase price, then there should be no disposition effect.

We test Weber and Camerer (1998)'s prediction by measuring the disposition effect by using various reference points. Table 4 shows the result. MA3, MA5, MA9 and MA12 represent the moving average of stock price for the latest 3 days, 5 days, 9 days and 12 days. For the entire sample, DDE value was -0.1046, -0.0476, -0.0282, and -0.0269 for MA3, MA5, MA9 and MA12, respectively, indicating the absence of the disposition effect when current price is used as the reference point. Similar patterns can be found for stock type.

However, mixed and bond types show the opposite pattern. In particular, for bond type, disposition effect appears as the reference point gets closer to the current price. The result contradicts the Weber and Camerer (1998)'s prediction.

**<Table 4> Analysis of reference point effect**

Table 4 shows the difference between the disposition effect and holding period. MA3 means 3days moving average that investors hold the fund to 3 day regardless gain or lose. A negative mean shows not only the disposition effect do not predict, but also the more negative mean explain the strong disposition effect. The result in Table 4 show that the disposition effect of aggregate and stock DDE significantly observe closer to the MA3, but Mixed and bond DDE show no statistically significant.

Aggregate DDE				
Reference point	Mean	Std. Dev	t Value	Pr >  t
MA3	-0.1046	0.1667	-11.6	<.0001
MA5	-0.0476	0.1226	-7.18	<.0001
MA9	-0.0282	0.1036	-5.03	<.0001
MA12	-0.0269	0.1084	-4.6	<.0001
Stock DDE				
Reference point	Mean	Std. Dev	t Value	Pr >  t
MA3	-0.1706	0.1366	-18.1	<.0001
MA5	-0.0757	0.1071	-10.25	<.0001
MA9	-0.0378	0.0901	-6.08	<.0001
MA12	-0.0281	0.1037	-3.92	0.0001
Mixed DDE				
Reference point	Mean	Std. Dev	t Value	Pr >  t
MA3	-0.0049	0.1368	-0.35	0.7266
MA5	-0.0068	0.1121	-0.6	0.5526
MA9	-0.0003	0.1115	-0.03	0.9772
MA12	-0.0090	0.1074	-0.82	0.4144
Bond DDE				
Reference point	Mean	Std. Dev	t Value	Pr >  t
MA3	0.0135	0.1988	0.42	0.6779
MA5	0.0069	0.1746	0.25	0.8068
MA9	-0.0438	0.1381	-1.96	0.0578
MA12	-0.0646	0.1271	-3.14	0.0033

Table 5 shows the effect of trading interval on the degree of the disposition effect (DDE). Kaustia (2010) reports that DDE is sensitive to the length of the holding period. He

shows that the likelihood of a sale is much higher if a gain is realized. However, this tendency weakens toward the longer holding periods (i.e., longer than 3 years). He also finds that there are some exceptions to the general tendency to realize gains: large capital gains relative to the length of the holding period are associated with a lower propensity to sell. Jordan and Diltz (2004) argued that the disposition effect will cause the average trader to hold unprofitable trades longer than profitable ones. Therefore, this paper explored all investors trading pattern how long investors retain the stock until they are trading. We investigate this issue by measuring DDE for different holding periods. Table 5 shows the results. DDE values are 0.0181, 0.0136, and 0.0279 for day, week and month, respectively. The results show that DDE increases as the length of the holding period increases.

**< Table 5> Analysis of interval effect**

We investigated relation between holding period and the magnitude of the disposition effect. According to Jordan and Diltz (2004), the disposition effect will cause the average trader to hold unprofitable trades longer than profitable ones. Therefore, this paper explored all investors trading pattern how long investors retain the stock until they are trading. Table 5 explained that DDE values are 0.0181, 0.0136, and 0.0279 for day, week and month, respectively. As a result, the disposition effect will cause to increase holding period.

Aggregate DDE				
Interval	Mean	Std. Dev	t Value	Pr >  t
Day	0.0181	0.0825	4.07	<.0001
Week	0.0136	0.0742	3.41	0.0007
month	0.0279	0.0956	5.4	<.0001
Stock DDE				
Interval	Mean	Std. Dev	t Value	Pr >  t
Day	0.0266	0.0669	5.77	<.0001
Week	0.0157	0.0689	3.3	0.0011
month	0.0215	0.0963	3.23	0.0014
Mixed DDE				
Interval	Mean	Std. Dev	t Value	Pr >  t
Day	0.0173	0.0920	1.83	0.0709
Week	0.0100	0.0805	1.21	0.228
month	0.0275	0.0871	3.07	0.0028
Bond DDE				
Interval	Mean	Std. Dev	t Value	Pr >  t
Day	-0.0269	0.1164	-1.43	0.1622

Week	0.0114	0.0873	0.81	0.4238
month	0.0642	0.1058	3.74	0.0006

#### 4.2 Regression analysis for the effect of fund performance on the disposition effect

Cici (2006) found that disposition-prone funds tend to have negative effects on trading performance. Goetzmann and Massa (2008) find that a stronger disposition effect is associated with lower returns. We investigate this issue by analyzing the relationship between return and DDE. Table 6 shows the result of the simple regression which regresses DDE on the fund's performance. The coefficients are -0.00005, 1.2747, -2.1906, and -18.9829 for total sample, stock, mixed and bond, respectively. The result shows that disposition effect is negatively related to the fund's performance, supporting Goetzmann and Massa (2008)'s finding.

**<Table 6> Regression analysis between DE and Return**

$$DDE = b_0 + b_1RT + \varepsilon$$

We perform a regression analysis to estimate on the return of fund on the disposition effect. The regression function is specified as follow:  $DDE = b_0 + b_1RT + \varepsilon$ . Where DDE is the disposition effect and RT is classifications of funds return. The classifications of funds are as follows: stock (invests more than 60% in stocks and stock-related derivatives), pure stock (invests more than 60% in only stocks), mixed asset (invests in non-stocks and non-bonds), bond (no stock investments, invests more than 60% in bonds), and pure bond (no investments in stock and stock derivatives, invests more than 60% only in bonds). Table 6 show that stock DDE is 0.0215 less than bond 0.0642 while stock return is positive 1.12 more than bond negative 18.98. As a result, strong disposition effect cause to decrease the fund performance.

Variable	DDE	$b_1$	SE	t Value	Pr >  t
Aggregate	0.0279***	-0.00005	0.000004	-12.43	<.0001
Stock	0.0215***	1.2747	0.5710	2.23	0.0256
Mixed	0.0275***	-2.1906	0.4831	-4.53	<.0001
Bond	0.0642***	-18.9829	0.5300	-35.81	<.0001

\*Significant at 10% level; \*\*Significant at 5% level; \*\*\*Significant at 1% level.

Table 7 shows the results of the regression analysis which shows the relationship between the changes in cash balance in funds and stock price (measured by cumulative returns (CR)) while controlling the other variables such as additional cash inflow (NF) and fund size measured by natural log of fund asset (LA). Increase in cash balance indicates the sales of stock, *ceteris paribus*. For instance, a positive  $\beta_1$  indicates a realization of gain (increase in cash balance due to a stock selling) and a negative  $\beta_1$  indicates a purchases of stock when stock price increases. Table 7 shows that, regardless of fund type,  $\beta_1$  is significantly negative, indicating that fund manager in Korea tend to purchase more when stock price increases.

**<Table 7> Multiple regression analysis**

$$CB = b_0 + b_1CR + b_2NF + b_3LA + \varepsilon$$

We perform a multiple regression analysis to show related by variable and the disposition effect. The regression function is specified as follow:  $CB = b_0 + b_1CR + b_2NF + b_3LA + \varepsilon$ . Where the CB is Changes in cash flow of institutional investor, CR is cumulative return, NF is net flow, and LA is natural log of total asset. CR and CB positive relationship is to mean winning stocks (losing stocks) to sell (buy or hold). However, CR and CB negative relationship is to mean winning stocks (losing stock) to buy or hold (sell).

Variable	Coefficient			
	Aggregate	Stock	Mixed	Bond
Intercept	9.1440***	6.1559***	12.6131***	12.8729***
CR	-0.0504***	-0.0284***	-0.0572***	-0.0983***
NF	0.0070***	0.0109***	0.0112	-0.0260*
LA	-0.0001***	3.2200***	-0.0010***	-0.0014***
R-Square	0.0438	0.0412	0.0135	0.0388
Adj R-Sq	0.0437	0.041	0.0132	0.0379

\*Significant at 10% level; \*\*Significant at 5% level; \*\*\*Significant at 1% level.

#### 4.3 Financial crisis and the disposition effect

Research related to asset price theory argued that macroeconomic shocks lead to higher risk-averse tendencies among investors that, in turn, increase the risk premiums on financial assets. If macroeconomic shocks provoke investors' perception of risks, these shocks may also affect investors' trading behavior. To further investigate this possibility, we analyze the disposition effects in two different categories: before and after the global financial crisis (GFC) on September 15, 2008. Table 8 shows the results. DDE decreases from 0.0253 for the pre-crisis period to -0.0096 for the post-crisis period. The disposition effect seems to disappear after the crisis, implying that investors tend to behave rationally because of their accumulated investment experiences. The finance field has experienced paradigm shifts since the GFC. Traditional finance assuming the rational investor was the dominant paradigm. However, behavioral finance has provided more understanding of psychological aspects of investment. Behavioral finance deals with how investors actually behave while traditional finance focuses on optimal investment decisions. These new understandings of investor's behavior provide by behavioral finance may play as a useful information for investors to trade more efficiently since the crisis. The results in this paper suggest that the global financial crisis affect investor behavior, especially institutional investors, regarding their risk tolerance and willingness to invest in stocks so that they can trade more wisely.

**<Table 8> Disposition effect (DDE) before and after the financial crisis**

Table 8 explained that macroeconomic shocks impact investors how strong relation investment decision. To investigate the effect, we analysis the disposition effect in two different categories: before and after the global financial crisis (GFC) on September 15, 2008. The result in this table show that pre-crisis positively influence DDE, but post-crisis diminish the DDE. However, post-crisis DDE is no significant.

	Mean	Std. Dev	t Value	Pr >  t
Pre- crisis DDE	0.0253	0.0103	2.04	0.042
Post-crisis DDE	-0.0096	0.0081	-1.26	0.210
Pre-Post	0.0340	0.0145	2.34	0.022

## 5. Summary and Conclusions

This study investigates the trading behavior of institutional investors in Korea. For this purpose, 562,560 daily trading records from 348 funds are analyzed during the period from 2006 to 2011. The findings of this study are as follows.

First, the disposition effect exists in Korean stock market. The average DDE is 0.0279, indicating the presence of the disposition effect.

Second, a stronger disposition effect is associated with the lower risk. Disposition effects for stocks, mixed assets, and bonds are 0.0215, 0.0275 and 0.0642, respectively.

Third, there is no disposition effect if the current price is used as the reference point. Weber and Camerer (1998) predict that if the current price is the reference point from which gains and losses are valued, rather than the purchase price, then there should be no disposition effect. We confirm Weber and Camerer (1998)'s prediction except for bond type fund. For bond type, disposition effect appears as the reference point gets closer to the current price, contradicting the Weber and Camerer (1998)'s prediction.

Fourth, degree of the disposition effect increases as the length of the holding period increases. Kaustia (2010) argues that DDE is sensitive to the length of the holding period. We find that DDE values are 0.0181, 0.0136, and 0.0279 for day, week and month, respectively. The results indicate that DDE increases as the length of the holding period increases.

Fifth, a stronger disposition effect is associated with lower returns. Goetzmann and Massa (2008) find that a stronger disposition effect is associated with lower returns. Evidence in this paper shows that disposition effect is negatively related to the fund's performance, supporting Goetzmann and Massa (2008)'s finding.

Finally, the disposition effect disappears after the global financial crisis, suggesting that Korean investors trade more rationally since the crisis. DDE decreases from 0.0253 for the pre-crisis period to -0.0096 for the post-crisis period. The disposition effect seems to disappear after the crisis, implying that investors tend to behave rationally because of their accumulated investment experiences. Traditional finance assuming the rational investor used to be the dominant paradigm. However, behavioral finance has provided more understanding of psychological aspects of investment since the global financial crisis. These new



understandings of investor's behavior may play as a useful information for investors to trade more efficiently since the crisis. The results in this paper suggest that the global financial crisis affects investor behavior regarding their risk tolerance and trading strategy so that they can trade more wisely.

Given the evidence discussed above, the question of what causes the disposition effect still remains. Although the results are consistent with the behavioral interpretation of the disposition effect, the present paper has not addressed to the issue of the other potential factors of the disposition effect. In this regard, we suggest the following topic for the future study. A study for considering investor heterogeneity is needed. For instance, it will be an interesting subject to identify the effect of information asymmetry on the dispositional trading pattern. Informed investors and uninformed investors may differ in regard to the causes of the disposition effect.

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