

The Disposition Effect and Risk Preference in Losses

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Abstract—We examine whether the risk preference in losses increase the disposition effect. We take 9526 investors' annual trading data of a large china's futures company in 2013 as an example. The results show that most of investors have disposition effect, only the professional investors have a moderate risk preference in loss do not have. Risk preference is an important factor, it increase the hold losses significantly, then the disposition effect increased. Moreover, the disposition effect has a negative impact on investment returns. the higher risk preference is, the more hold losses and cash profit is, but the return determined by hold losses.

Keywords—*disposition effect; risk preference; investment return*

I. INTRODUCTION

The disposition effect is that investors tend to cash profit quickly and hold losses for a long time. it is deviated greatly from the traditional "rational person" investment behavior, which is an important field of behavioral finance research. Disposition effect exists widely in financial markets in developed and underdeveloped countries, such as stock market, bond market, fund market and futures market.

When we measure the disposition effect, most scholars are based on prospect theory. In this method, the reference price is a key-point, which is the standard for judging the profit and loss situation. Kahneman and Tversky^[1] selected the purchase price as the reference price. However, for the same stock, it may be bought and sold by several times, so it is difficult to judge the purchase price. So, Odean^[2] (1998) chose the average holding price as the reference price, Koszegi and Rabin^[3,4,5] (2006, 2007, 2009) used the expected price of investors. Frydman and Rangel^[6] (2014) proposed that the profits and losses situation has great relation to the disposition effect. when investors care about the situation information, the disposition effect is 25% higher than without that information. Barberis^[7] (2013) compared several papers and found that opt a real and reasonable reference price is an important factor, which decide the size of the disposition effect. How to choose a reasonable reference price? The prospect theory told us that reference price should reflect the variation of wealth from beginning to the end, and which leads to the changes of utilities. the target of the reference price is reflecting the changes of wealth, not others. Therefore, we opt real transaction profits and losses in a year to describe the situation, without reference price.

There are few studies on the reason for the disposition effect. Odean^[2] (1998) try to make transaction cost and balanced portfolio returns account for it, but the result is not significant. Brooks et.al (2012)^[10] get the same conclusion by empirical analysis. Shefrin and Statman (1985)^[14] and Odean^[2] (1998)

found that prospect theory can be used to explain that irrational behavior, because investors have different risk preference when they are in different situation: lose and profit. Zuchel H (2009)^[13] believes that the lose and profit is the past, but not now in a year. Shoji, Kanehiro (2016)^[12] prospect that the risk preference in loss is the most important factors, which determined the size of disposition effect, but it lack experience data. From the above analysis, the different risk preference has great power on the disposition effect.

Different kinds of investors have different disposition effect. Dorow and Jr (2018)^[8] tested the changes of neurological status through experiment, found that both professional investors and non-professional investors have disposition effect, but the professional investors is smaller than the non-professionals. Choe and Eom (2010)^[11] get same results, by empirical analysis about Korean Futures Market. Xu Zhi (2013)^[10] prospected that the individual investors also have disposition effect, but which not explored the professionals in China's Futures Market. We investigate the professionals and non-professionals irrational behavior and their difference.

The main contributions as follows: First, we found that risk preference in loss is the important factors which affects disposition effect in China's Futures Market, though empirical analysis. Secondly, we measured the disposition effect by real profits and losses situation in a year rather than by a reference price. Thirdly, we also find the reason why disposition effect enlarged the loss, because of great risk preference in loss.

The structure as follows. The first part is the literature, the second parts introduce definition, data and the method about how to measure the disposition effect. The third part is the empirical analysis, including different disposition effect about different investors, risk preference and disposition effect, disposition effect and losses. The fourth part is the conclusion.

II. METHOD, DEFINITION AND DATA

A. Method

To measure the disposition effect, our studies follow the approach of CHOE and EOM (2010)^[11]. Here we need not select a reference price as a judgement standard to decide the situation of losses and profits. But used the real annual return in2013, which reflects the investors' realistic transaction result accuracy. the research methods as follows:

$$PGR = \frac{N_{RG}}{(N_{RG} + N_{PG})}; PLR = \frac{N_{RL}}{(N_{RL} + N_{PL})}; DE = PGR - PLR$$

the proportion of cashing profits (PGR) is measured as the

ratio of realize profits (N_{RG}) to all profits, which include two parts, realize profits (N_{RG}) and hold profits (N_{PG}). the proportion of cashing losses (PLR) is measured as the ratio of realize losses (N_{RL}) to all losses, which include two parts, realize losses (N_{RL}) and hold losses (N_{PL}).

The disposition effect denoted by DE , if $DE > 0$ and it is greater, the investors prefer to cash profits and hold losses. And if $DE < 0$, there is anti-disposition effect, the investors prefer to cash in losses and hold profits.

It is assumed that the investments' decisions are independent, that means the investors holding profits and cashing losses are independent, not affected by others. The standard errors of the T-statistical for difference of PGR and PLR are calculated as follows.

$$\sqrt{\frac{\{PGR \times (1 - PGR)\}}{N_{RG} + N_{PG}} + \frac{\{PLR \times (1 - PLR)\}}{N_{PL} + N_{RL}}}$$

B. Definition of Cash Profits (Losses) and Hold Profits (Losses)

Cash profits or losses (RC_i) and hold profits or losses (PC_i) are the opposite situation in investment, which are calculated as follows.

$$RC_i = RG_i + RL_i; PC_i = PG_i + PL_i$$

Cash profits or losses is the sum of cash profits (RG_i) and cash losses (RL_i), If $RC_i > 0$, the investor tends to cash profits, otherwise tends to cash losses. Hold profits or losses is the sum of hold profits (PG_i) and hold profit losses (PL_i), if $PC_i > 0$ the investor tends to hold profits, otherwise tends to hold losses.

C. Definition of Risk Preference in Loss

In the futures market, if the investor in losses, there are two ways to deal with it, closing position or insisting on holding until receive a margin call. If the investor's cash flow is inadequate, he will be possible to forced liquidation. Compulsory position closing is the last methods of controlling investors' and future companies' risk in futures market. Therefore, if investors continue to add margins meet margin call, it means that investors prefer higher risk. The more additional margins investors have, the greater risk preference in losses. Therefore, we use the amount of additional margin as a proxy variable to measure investors' risk preference in losses. The additional margin is an annual data, it is the sum of the

additional margin for each trading day in a year.

D. Data

The data is come from a big Chinese future company, which includes monthly, quarterly and annual data, the period for 1 January 2013 to 30 June 2014. But we used annual figures only, most research believe that the investors' evaluation term is one year. All the investors are comprised by four kinds: institution investors with delivery, institution investor without delivery, individual investors with delivery and individual investors without delivery, we take the first three sorts as professional investors, the last one is non-professional investors. By that rule, there is only 205 professional investors and 9321 non-professional investors. In order to get a more accurately results, we exclude investors whose turnover is less than 10. Because we regard each investor as independent, making the invest decision by himself. Some studies found that small investors are easy to follow the large investors behavior, in order to decrease the impaction, we will eliminate them.

III. RESULTS

A. Risk Preference and Disposition Effect in Loss

Table I display the impact of risk preference on disposition effect in loss. we classified investors into two groups, additional margin investors and non-additional margin investors. And then each part is divided into two parts, the Professional and the non-professional. compared the four groups, not all the investors display disposition effect, the professional without margin call experience do not have obvious disposition effect, but others all have disposition effect significantly. The investors with margin call experience have bigger PGR and lower PLR than that without margin call experience. it means that, risk preference in loss make the investors increase cashing profits and decrease holding profits, which will lead to greater disposition effect.

Table II explore the impact of investors' risk preference in loss on disposition effect in loss furtherly. We divided the investors into five groups according to the additional margin quintile. Q1 is the first quintile, the amount of additional margin is the biggest, Q5 is the last quintile, the amount is smallest. The result tells us that risk preference in loss is an important factor, which decide the size of disposition effect. If the risk preference in loss is higher, the disposition effect is greater. The mechanism is that risk preference increased the proportion of cash profits, but deceased the proportion of cash losses.

TABLE I. THE RISK PREFERENCE IN LOSS AND DISPOSITION EFFECT

Investor	number	RG	RL	PG	PL	PGR	PLR	DE	t
Margin call (Professional)	106	63	43	22	84	0.74	0.34	0.4	6.35
Non-Margin call (Professional)	99	51	48	43	56	0.54	0.46	0.08	1.14
Margin call(non-Professional)	4906	2636	2270	840	4066	0.76	0.36	0.4	42.41
Non-Margin call(non-Professional)	4415	1772	2643	1214	3201	0.59	0.45	0.14	12.72

TABLE II. RISK PREFERENCE QUINTILE AND IT'S DISPOSITION EFFECT

investors	number	RG	RL	PG	PL	PGR	PLR	DE	t
Q1	1002	622	380	107	895	0.85	0.30	0.56	30.29
Q2	1003	592	411	151	852	0.80	0.33	0.47	23.81
Q3	1003	529	474	163	840	0.76	0.36	0.40	19.34
Q4	1003	499	504	193	810	0.72	0.38	0.34	15.56
Q5	1001	457	544	248	753	0.65	0.42	0.23	10.12
total	5012	2699	2313	862	4150	0.76	0.36	0.40	42.87

B. Isposition Effect and Investment Return

Table III suggest that the disposition effect have negative effect on return. The results is accordance with previous results, Xuzhi(2013) disposition effect is a typical irrational investment behavior, which will bring significant negative influence on returns. But he did not investigate the reason, we profound its research, we divide the investors into five groups according to the additional margin quintile, and then calculate each parts' average cash profits, average hold profits, average return and disposition effect. The result display that disposition effect is bigger, the amount of hold losses is bigger, but the cash profits have an obvious changing rule. The amount of hold losses decides the return.it means that the risk preference in losses make the investors prefer to hold losses, which decide the total margin, which is the reason why disposition effect enlarge the losses.

TABLE III. DISPOSITION EFFECT AND INVESTMENT RETURN

investors	number	Cash profits	Hold losses	return	DE
Q1	1002	207950	-942557	-734607	0.555
Q2	1003	-2732	-137435	-140168	0.471
Q3	1003	-18449	-49081	-67530	0.404
Q4	1003	-6887	-25411	-32298	0.338
Q5	1001	-1854	-13717	-15571	0.229
total	5012	35586	-233587	-198000	0.4

C. Regression Results

Table IV explore the relationship between risk preference in loss, disposition effect and returns by line regression model. We divide the investors into 22 groups according to the risk preference in loss, the number of each parts is equal. Because each index has different dimension, we used Z standardization to eliminate the impact of dimension. The line regression model is estimated by least square method.

TABLE IV. REGRESSION ANALYSIS RESULTS

	Preference and DE		DE and returns		
	PLR	DE	Cash profits	Hold losses	return
Coefficients	-0.39	0.35	0.43	-0.46	-0.47
t Stat	-1.88	1.66	2.1	-2.34	-2.4
R Square	0.15	0.12	0.18	0.21	0.22

The results display that risk preference in losses has significant effect on the disposition effect, the mechanism is that it will increase holding losses obviously, but it affects cashing profits not obvious. The relationship between disposition effect and return, our result is consisted with most formal results, that the disposition effect had negative effect on return. The principle is that disposition effect not only increase the offset margin, but also enlarge the position margin.

IV. CONCLUSION

We explored the risk preference in loss and disposition effect, take 9526 investors 2013 annual trading data as an example. The results display that not all the investors have obvious disposition effect, the professional investor without margin call experience have not. But others all have that irrational behavior, including parts of professionals and all the non-professionals. The results is partly in accordance with Xuzhi^[10] (2013), he proposed that the individual investors have disposition effect, but he do not found parts of them have no significant disposition effect. The results also proved the viewpoint suggested by Kanehiro (2016)^[12], the risk preference is an important factor affect disposition effect. The preference in loss is greater, the disposition effect is bigger. Because of that risk preference increase ratio of holding losses, but it has no effect on ratio of cashing profits. At the same time, we also find the relationship between disposition effect and returns, the disposition effect increased hold losses, it also increased cash profits, But the formal impact is greater than the latter, so the disposition effect have negative effect on returns.

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