國立中山大學財務管理學系

博士論文

Department of Finance

National Sun Yat-sen University

Doctorate Dissertation

風險承受度、行銷訊息與損失規避假設下之投資決策：理論與實證

Risk Tolerance, Marketing Information and Investment Decision Makings under Loss Aversion: Theory and Evidence

研 究 生： 彭琪祿

Chi-Lu Peng

指導教授： 徐守德 博士

Dr. So-De Shyu

陳妙玲 博士

Dr. Miao-Ling Chen

中華民國 100 年 6 月

June, 2011

國立中山大學財務管理學系

博士論文

Department of Finance

National Sun Yat-sen University

Doctorate Dissertation

風險承受度、行銷訊息與損失規避假設下之投資決策：理論與實證

Risk Tolerance, Marketing Information and Investment Decision Makings under Loss Aversion: Theory and Evidence

研 究 生： 彭琪祿

Chi Lu Peng

指導教授： 徐守德 博士

Dr. So De Shyu

陳妙玲 博士

Dr. Miao Ling Chen

國立中山大學研究生學位論文審定書

本校財務管理學系博士班

研究生彭琪祿（學號：D954030003）所提論文

風險承受度、行銷訊息與損失規避假設下之投資決策：理論與實證
Risk Tolerance, Marketing Information and Investment Decision Makings under Loss Aversion: Theory and Evidence

於中華民國 100 年 6 月 23 日經本委員會審查並舉行口試，符合博士學位論文標準。

學位考試委員簽章：

召集人 黃玉娟 黃玉娟　　委　員 徐守德 徐守德

委　員 陳妙玲 陳妙玲　　委　員 李政峰 李政峰

委　員 陳明吉 陳明吉　　委　員 _____

委　員 _____　　委　員 _____

委　員 _____　　委　員 _____

指導教授(徐守德) 徐守德 (簽名)

指導教授(陳妙玲) 陳妙玲 (簽名)

自序

2006 年走入了水光山色映帶左右的中山大學，以為常能享惠風和暢，能觀西子夕照之美，但取而代之的卻是行色匆匆朝而往，披星戴月暮而歸。不過，也因為沒有太多的浪漫生活，以及天佑家人與我身體平安健康，使我能心無旁騖的通過系上所設下之重重關卡，完成博士學位。

能完成此博士論文，首先，要特別感謝父母恩勤與對我的顧復之恩，以及感謝指導教授陳妙玲博士與徐守德博士，在學理知識上的傾囊相授，讓我獲益良多；在論文寫作過程之鞭策，培養我具獨立思考與研究之能力。兩位指導教授亦提供許多研究計劃之參與機會，除了讓我能經濟獨立外，還能因此而增廣見聞，結識許多好友。再者，感謝曾費心教導過我以及在修課過程、學術研討與研究計劃案中給予我許許多多幫助的師長與朋友，李建興博士、陳明吉博士、陳文魁博士、馬黛博士、吳土城博士、李昭蓉博士、郎正廉博士、李建強博士、廖源星博士、何坤龍博士、張玉山博士、彭台光博士、林麗娟博士、鄭義博士、黃一祥博士、郭照榮博士、孫景棠博士、沈鳴良老師、Dr. Kam C. (Johnny) Chan 與 Dr. Desmond Tsang，因為有您們的影響，讓我的學術養成過程具備更多的能量。在博士論文口試儀式時，承蒙高雄第一科技大學黃玉娟博士、高雄應用科技大學李政峰博士與本系的陳明吉博士等提出許多寶貴意見，讓我的研究成果更具價值。

非常感謝同門兄弟魏安平同學總能提供我快速且可靠的程式，以及黃瑋苓同學幫忙我解決數理模型推導過程中的疑難雜症。在博士班修業過程中，當遇到挫折與苦悶時，所幸有逸帆、尚恩、安平、瑋苓、文正、明石和風海鮮料理的小銘師、蔡宗憲大哥等陪伴我一起渡過，讓我沒有落入獨酌無相親，舉杯邀明月之境；還有同學與碩博士班成員，余昭弘、曾建勳、張吉宏、蘇育吟、陳鳳釗、李宛璇、賴怡穎、李佩珊、林玉燕、朱祐瑱、陳盈池、王錦玉、張凱威、賴冠伶、曾至宏博士、高秋芬博士、楊智元博士、張嘉倩博士與陳昌志博士之切磋與鼓勵，謝謝大家，並祝福各位鵬程萬里；更要感謝淑萍的鼓勵與體諒我假日時常會比平日要忙碌的生活型態，方能讓我順利完成學位。同時也要感謝財管系的行政助理們，羅麗瓊小姐、盧香圭小姐、李琪華小姐、吳滿嬌小姐與黃玉舒小姐提供親切且簡便的行政流程給予學生。最後，感謝親人好友等熱情激勵，謹獻上最誠摯之謝意。謝謝您們！

彭琪祿

2011 年 6 月謹誌於高雄西子灣

風險承受度、行銷訊息與損失規避假設下之投資決策：理論與實證

摘要

本文主要是以理論模型建構以及經由實證分析來探討金融市場的行銷訊息是如何影響投資人的風險趨避程度，進而干擾投資人在不確定性環境下的投資決策。在混合假設條件下，本文的理論模型預測具有累計展望理論特性之投資人(CPT 投資人)會傾向認賠殺出其損失的資產，而對於增值的資產亦會有逐步獲利了結的特性。加入行銷訊息的干擾後，本研究之模型預測，相較於低行銷支出之金融資產，CPT 投資人傾向較不願意出售其獲利或者是其損失的高行銷支出之資產。另外，本研究的實證指出，基金的廣告會減低投資者贖回其持有之基金的意願，實證結果發現：相較於低廣告支出之基金，基金投資人贖回其獲利或者是損失之高廣告支出的基金之意願，均顯著低於低廣告支出之基金。根據行為理論，本文對上述之理論與實證結果提出以下的解釋，對於損失的基金，廣告似乎能夠強化投資人過去之決策的信心，並調整投資者的信念使其更加堅信其過去所做的決策的正確性，造成投資人傾向於持有其損失但卻是屬於高廣告支出的基金；在獲利的基金部份，廣告之所以能影響投資人之購後行為，是由於廣告可能具提高金融商品品質的信號功能，且能夠增加金融消費者之滿意度、品牌權益以及提升消費者忠誠度，造成投資人會傾向於持有其獲利之高廣告支出的基金。

關鍵詞：展望理論、風險承受度、資產配置問題、行銷、共同基金

Risk Tolerance, Marketing Information and Investment Decision Makings under Loss Aversion: Theory and Evidence

Abstract

This study models and examines how changes in marketing information affects the degree of investor's risk aversion, and in turn, influences investor's decision-makings process under uncertainty. Under the mixed assumptions, the theoretical evidence in this study indicates that cumulative prospect theory (CPT) investors have propensity to discipline their depreciated assets and to sell their appreciated assets. Further, I find that CPT investors have less incentive to sell their holdings with higher advertising than ones with lower advertising when facing a paper gain or a paper loss. The empirical evidence indicates that advertising can help funds stem cash outflows, and finds investors are less willing to sell high performing investments with high fund family advertising than investments with low fund family advertising, and are more reluctant to redeem losing mutual funds with high fund family advertising than funds with low fund family advertising. For loser funds, a possible explanation from this study is that advertising seems to re-enforce the efficacy of recent investor decisions and adjust their beliefs to confirm past decisions, thus lets investors have more incentive to continue holding losing funds. For winner funds, this study infers that advertising may signal product quality, increase consumer satisfaction, brand equity and consumer loyalty that lead investors satisfied with their past decisions to have a greater propensity to retain their winning investments.

Keywords: Prospect Theory, Risk Tolerance, Decision Making, Marketing Information, Mutual Fund

Contents

Figures

Tables

1. Introduction

It is widely recognized that changes in an individual's emotion, such as changes in risk tolerance, influences an investor's decision makings (Yao, Hanna and Montalto 2002; Chen, Peng, Shyu and Zeng 2011; Peng, Chen, Shyu and Wei 2011). Past literature, for example, Kahneman and Tversky (1979), Tversky and Kahneman (1992) and Campbell (2006) indicates that investors with lower risk tolerance preferences are less likely to invest in risky assets; in contrast, those with higher risk tolerance are more likely to allocate more risky assets than risk-free assets in their portfolio, implying that changes in the degree of risk-aversion/tolerance determines the investor investment behavior.[1]

However, what changes an individual's risk attitude, and in turn, alters the individual's behavior? Erdem, and Keane (1996), McColl-Kennedy and Fetter (1999) and Erdem, Zhao and Valenzuela (2004) express that perceived risk is positively related to information search (the perceived precision of information). Moreover, a numinous of research state that, marketing information such as advertising can reduce information search cost for investors (Sirri and Tufano 1998; Lichtenstein, Kaufmann and Bhagat 1999; Jain and Wu 2000; Huang, Wei and Yan 2007), lower the

[1] Risk aversion can be thought of as inversely related to the concept of risk tolerance (Corter and Chen 2006), so these risk aversion parameters could be used to measure the level of risk tolerance. As the risk-averse parameters become larger, the value function displays larger risk tolerance.

information asymmetry between the issuing firms and the investors (Luo 2008; Chemmanur and Yan 2009) and leads investors have more incentive to invest in risky assets (Cronqvist 2006). They also find that advertising can re-enforce the efficacy of their recent decisions (Ehrlich, Guttman, Schönbach and Mills 1957), increase consumer loyalty (Chen 2004; McAlister Srinivasan and Kim 2007), lower the level of consumer's perceived risk (Rickwood and White 2009) and reduce cognitive dissonance (Goetzmann and Peles 1997) in goods and financial services markets. Combining the above findings, this study argues that advertising seems can reduce investors' risk aversion, and then changes the existing pattern of investors' decision makings.

Advertising plays an important role in the demand for financial services (Jain and Wu 2000; Huang, Wei and Yan 2007; Luo 2008; Gallaher, Kaniel and Starks, 2008; Chemmanur and Yan 2009). However, consumer literature states that advertising influences not only investor pre-purchase behavior but seems to affect post-purchase decision making process (Ehrlich, Guttman, Schönbach and Mills 1957) because they argue that advertising can re-enforce the efficacy of their recent decisions. In financial markets, Goetzmann and Peles (1997) find that advertising may influence investor's liquidated behavior. The purpose of an investor to invest in financial markets is to seek for a munificent reward. Therefore, how an investor sells his/her investments at a good

price is as important as its purchases, and a limited number of studies (Goetzmann and Peles 1997; O'Neal 2004; Gallaher, Kaniel and Starks 2008; Ivković and Weisbenner 2009; Shrider 2009) focus on investor's liquidated decisions. Specially, to the best of my knowledge, no previous papers investigate how changes in advertising information affect investor's selling behavior theoretically and empirically. The purpose of this study therefore is to investigate whether changes in marketing information affects the degree of investor's risk tolerance, and in turn, how it may alter the investor's post-purchase decision-makings.

Based on utility theory, accumulated studies on behavioral finance (Abdellaouri, Bleichrodt and Paraschiv 2007; Gurevich, Kliger and Levy 2009; Hwang and Satchell 2010) generally support that cumulative prospect theory (hereinafter CPT) developed by Kahneman and Tversky (1979) and Tversky and Kahneman (1992), is the most descriptive model of decision making under uncertainty. These studies indicate that investors with preferences according to the value (utility) function of CPT (CPT investors) care about changes in wealth (monetary return) rather than wealth levels and are assumed that the marginal sensitivity to changes in wealth diminishes when further away from a flexible reference point, such as current wealth (Kliger and Levy 2009; Booij, van Praag and van de Kuilen 2010). Under non-mixed assumptions, the CPT investors are assumed to be risk-seeking when facing a loss. In contrast, they are

risk-averse when a certain gain is obtainable (Tversky and Kahneman 1992).[2] However, Abdellaouri, Bleichrodt and Paraschiv (2007) and Kaustia (2010) present that the investor's utility for gains and for losses must be determined simultaneously rather than measuring for gains and losses separately, namely they assume that an investor chooses prospect to reach his/her highest overall utility, called the mixed assumption, indicating the investor's decision-making function is determined by both prospects for gains and for losses utilities.

This study extends Tversky and Kahneman (1992), Homburg, Koschate and Hoyer (2005) and Kalra and Shi (2010), by proposing that the degree of CPT investors' risk tolerance/aversion as a function of the investors' information source such as marketing information (Goetzmann and Peles 1997; Rickwood and White 2009) and investment performance (Durand Simon and Szimayer 2009).[3] Furthermore, according to Abdellaouri, Bleichrodt and Paraschiv (2007) and Kaustia (2010) mixed assumption on the investor's decision makings, I further extend Hwang and Satchell's (2010) research by adding a dynamic decision-making parameter in the modeling process.

---

[2] The term of CPT investor describes investors who make their decisions with Kahneman–Tversky utilities. For example, when CPT investors face a paper loss, they will become to be risk seekers even if their investment payoff has only a small probability (Kliger and Levy 2009).

[3] Durand, Simon and Szimayer (2009) indicate that a happy mood is considered to be a sign of safety. Wright and Bower (1992) show that people in positive affective states have more optimistic view of the future. Moreover, researches document that funds exhibit superior performance could be signal these funds are higher quality funds (Jain and Wu 2000), and support a positive direct effect of perceived quality on purchase intentions (Boulding, Kalra, Staelin and Zeithaml 1993). Combining these findings on behavioral studies and marketing researches, this paper infers that an investor's risk tolerance should be linked to his/her investment returns.

This study attempts to propose several theoretical results for CPT investors' response to their investment performance and marketing information using an asset allocation problem, and reports how marketing information affects the existing pattern of investors' decision making using sensitivity analysis. Past studies indicate that the mutual fund industry provides a useful laboratory for studying the trading behavior of individuals because observable mutual fund cash flows reveal investors' decision making (Ippolito 1992; Sirri an d Tufano 1998; Jain and Wu 2000; Bollen 2007; Zheng 2008; Shrider 2009; Ivković and Weisbenner 2009; Peng, Chen, Shyu and Wei 2011). By employing fund redemption data as a proxy for investors' liquidation, I offer some significant empirical evidence to confirm the hypotheses in this study.

In this research, several restrictions or shortcomings of previous studies are overcome the sample of Taiwanese domestic open-end equity funds collected and tax environment. This study employs data on an exact amount of monthly redemptions of funds rather than using the approximate net fund flows (Ippolito 1992; Chevalier and Ellison 1997; Sirri and Tufano 1998; Jain and Wu 2000; Barber, Odean and Zheng 2005). Moreover, in Taiwan, a capital tax is imposed neither on Taiwanese nor on foreigners, meaning that investor decision-making behavior is simpler and less influenced by tax issues. Furthermore, this research extends and contributes the existing literature in three aspects. First, this study treats the risk tolerance/aversion

parameter of CPT investors as a function of advertising and investment returns rather than a constant value. Second, this study attempts to propose several theoretical results for CPT investors' behaviors using a state-varying asset allocation problem. Third, previous studies on agents' decision making under uncertainty were tested mainly in laboratory experiments (Kahneman and Tversky 1979; Goetzmann and Peles 1997; Xiao, Alhabeeb, Hong and Haynes 2001; Corter and Chen 2006; Rickwood and White 2009; Kalra and Shi 2010), as mentions above, I aim to employ the exact amounts of monthly redemptions out of funds (the realized investors' decision making) to examine how advertising affects the existing redemption-performance relation veritably.

Under non-mixed assumption, if marketing information can increase the degree of investor risk tolerance, then the simulation results that increasing changes in degree of risk-tolerance will slow the speed of diminishing marginal sensitivity to changes in wealth. That is to say, using mixed assumption, this study proposes that when an investor has higher risk-tolerance toward a risky asset, the diminishing rate of demand for the asset due to changes in their investment performance is lower than those has lower risk tolerance toward the homogeneous risky asset. Empirically, using mutual fund cash flows data, I find a positive relation between fund redemption and fund performance for winner funds, while the relation between fund redemption and fund performance for loser funds is negative. In other words, I support the hypotheses in this

study that fund investors tend to sell good performing funds for profit-taking and punish with redemptions from the poor performing funds.

Advertising in mutual fund markets is one of the most important sources of information for investors making their decisions (Sirri and Tufano 1998; Jain and Wu 2000; Gallaher, Kaniel and Starks 2008; Wei, Chen and Peng 2011).[4] Fund sponsors appear to understand the power of advertising on affecting the degree of consumer's perceived risk (Rickwood and White 2009), then moderate their decision-makings. After considering the effect of advertising, I find that fund investors will be less willing to sell their winning funds with higher advertising than those with lower advertising, and are more reluctant to redeem losing mutual funds with higher advertising than those with lower advertising. That is, advertising moderates existing redemption-performance relations, because advertising may change the degree of risk tolerance, which will result in affecting the investor's behavior.

The rest of the paper is organized as follows. Section 2 reviews the related literature, proposes the theoretical propositions and develops the hypotheses in this study. A sensitivity analysis and discussion on the empirical model for the investor's response to changes in their investments performance and on the data is demonstrated.

[4] Cronqvist (2006) shows funds in the U.S. spending $6 billion a year on advertising.

In the following section, an analysis of empirical results is presented, followed by conclusions and suggestions.

2. Literature Review, Modeling and Hypotheses Development

2.1. Cumulative Prospect Theory

The traditional financial analyses of decision making under uncertainty commonly assume investors think of the maximum utility for the wealth. While numerous studies find a decision maker with non-standard preferences makes his/her decisions under uncertainty violate the axioms of expected utility theory (Kahneman and Tversky 1979; Tversky and Kahneman 1992; Starmer 2000; Homburg, Koschate and Hoyer 2005; Fry, Heaney and McKeown 2007; Kliger and Levy 2009; Kalra and Shi 2010; Booij, van Praag and van de Kuilen 2010; Hwang and Satchell 2010), predicting that people make their decisions under risky prospects with numerous of outcomes would tend to be risk-averse when facing a paper gains and tend to be risk-seeking when facing a paper losses because of loss aversion and probability distortion for gains and losses.

The prominent loss aversion utility function is a functional form of CPT developed by Kahneman and Tversky (1979) and Tversky and Kahneman (1992), presenting if preference homogeneity is held, the value function of prospect theory is the form of the utility function for gains and losses relative to the reference point, has the two-part power function form:

$$u(x)=\begin{cases}\dfrac{x^{v_1}}{v_1}, & x\geq 0\\ -\lambda\dfrac{(-x)^{v_2}}{v_2}, & x<0\end{cases} \tag{1}$$

where $x = W-R$, W is the final wealth, R is a reference point, the reference point is usually set to the status quo, that is, the purchase price in an investor's investment.[5] λ >1 is the loss aversion coefficient, indicating that losses yield a higher negative utility than equally large gains, that is, losses are more painful than the corresponding amount of gains are pleasurable. The parameters v_1 and v_2 are used to measure the degree of risk aversion/risk tolerance (the curvature of the value function).

Using Equation (1), this study gets the following marginal utility for changes in investors' investment performance:

$$\frac{\partial u(x)}{\partial x}=\begin{cases}x^{(v_1-1)}, \text{ if } x\geq 0\\ -\lambda(-x)^{(v_2-1)}, \text{ if } x<0\end{cases} \tag{2}$$

If the "reflection" ($v_1 = v_2$) assumption is hold, Equation (2) shows that the slope of the utility function for loss is at least as large as the slope of the utility function for absolutely commensurate gain because of loss aversion (λ). Tversky and Kahneman (1992) observe the loss aversion coefficient of 2.25 in their experiment, are assumed to

[5] Lichtenstein, Kaufmann and Bhagat (1999) recommend that investors should use average benchmark return as a reference point when evaluating their investment returns.

be positive constants and less than one (Kalra and Shi 2010). In Tversky and Kahneman (1992) study, without proof, the degrees of risk aversion v_1 and v_2 are yielded the value of 0.88 and are assumed "reflection," that is $v_1 = v_2$ (Gurevich, Kliger and Levy 2009; Dimmock and Kouwenberg 2010; Kalra and Shi 2010). Assuming λ to be equal to 2.25 and both v_1 and v_2 to be equal to 0.2. Figure 1 plots an example of the S-shaped value function of prospect theory with above parameterization, showing that prospect function distinguishes between gains and losses measured changes with respect to a flexible reference points and posits that agents become risk-seeking in the domain of possible losses and are risk-averse as a certain gain is obtainable.

In the risk and loss-averse frameworks, there have been extensive applications of CPT in explaining investor behavior. For instance, Shefrin and Statman (1985), Odean (1998) and Grinblatt and Keloharju (2001) investigate how investors response to the performance of their investments and propose that investors with cumulative prospect theory preference (CPT investors) tend to choose the less risky option by selling appreciated investments due to its risk-averse preference, and, as a result, tend to choose the risky choice by holding on the depreciated investments because of risk-seeking preference and loss-aversion, which is also known as the disposition effect. This phenomenon not only occurs among the individual investors, but is also seen among institutional investors (Grinblatt and Keloharju 2001; Garvey and Murphy

2004). In line with the disposition effect, mutual fund studies (Ippolito 1992; Chevalier and Ellison 1997; Goetzmann and Peles 1997) find an asymmetric redemption-performance relation supporting the fact that fund investors have a greater tendency to sell assets with paper capital gains than those with paper losses.

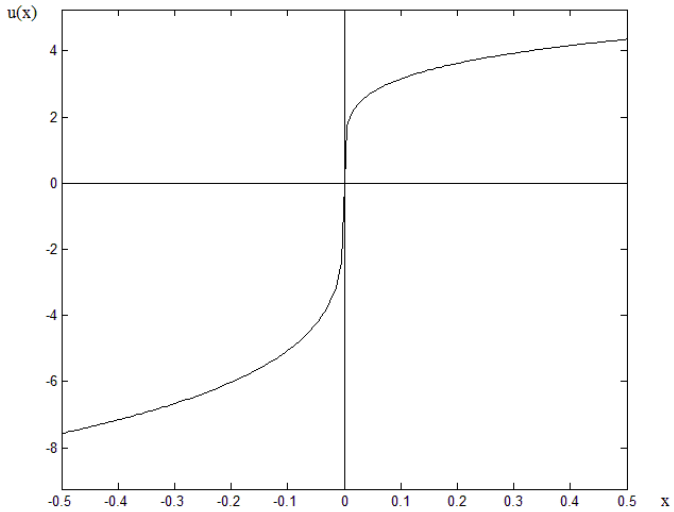

Figure 1 The Value Function of Prospect Theory

This figure plots an example of the S-shaped value function of CPT in Equation (1) with convenient parameterization (λ=2.25, and $v_1 = v_2$=0.2) in this study,

$$u(x) = \begin{cases} \dfrac{x^{v_1}}{v_1}, \text{ if } x \geq 0 \\ -\lambda \dfrac{(-x)^{v_2}}{v_2}, \text{ if } x < 0 \end{cases}$$

where x is changes in wealth (return rate).

Following the law of diminishing marginal utility, Peng, Chen and Wei (2011) implicate that an investor with a concave utility function preference will hold on to his investments until the last monetary increment on his/her investments yield no more

marginal satisfaction (marginal utility), so an investor will liquidate his/her investments when his/her total utility on changes in wealth reaches maximum. In contrast, to minimize displeasure, investors with a convex utility function will be reluctant to realize their loss positions because of loss aversion, and tend to hold the losses in hope that prices will recover.

Moreover, Peng, Chen and Wei (2011) also argue that an investor's demand for assets may be determined by the "speed" to reach his/her maximum total utility (satisfaction) as their investment price changes (or when the acceleration is close to zero; see Figures 2 and 3). They also reveal that the degree of investors' risk aversion is positively related to the speed-to-selling, namely investors with higher risk-averse preferences have greater (lower) incentive to liquidate the appreciated (depreciated) assets than those with a lower risk-averse preference.

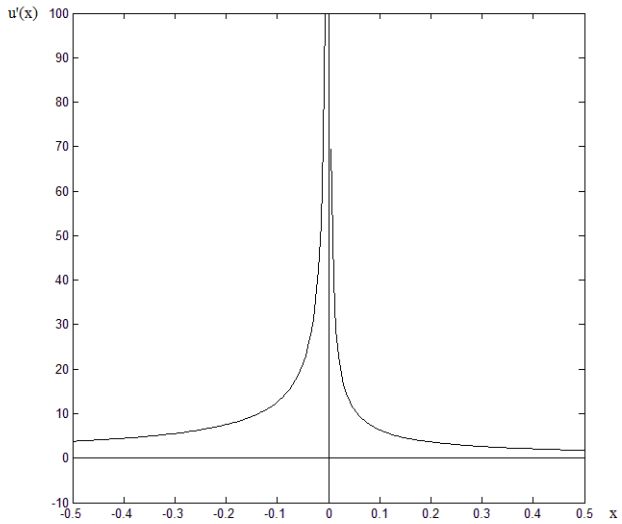

Figure 2 The Marginal Utility Function of CPT

With convenient parameterization (λ=2.25, and $v_1 = v_2$=0.2), this figure plots an example of the first order condition of CPT function using Equation (2):

$$\frac{\partial u(x)}{\partial x} = \begin{cases} x^{(v_1-1)}, \text{ if } x \geq 0 \\ -\lambda(-x)^{(v_2-1)}, \text{ if } x < 0 \end{cases}$$

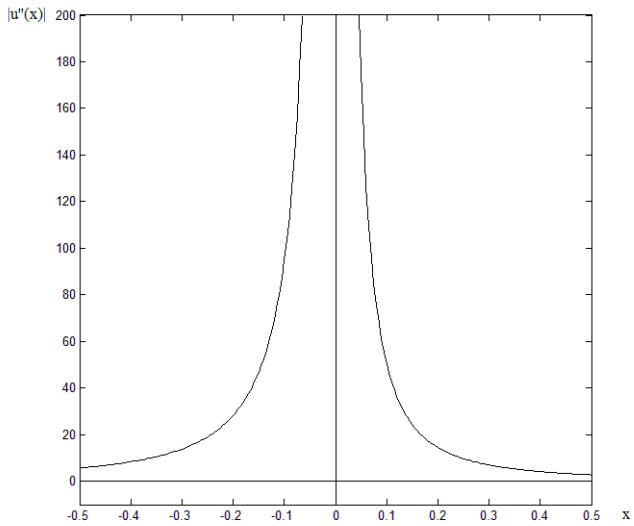

Figure 3 The Absolute Value of Acceleration

With convenient parameterization (λ=2.25, and $v_1 = v_2$=0.2), this figure plots an example of the second order condition of prospect value function from Equation using Equation (1), generated by the following:

$$\frac{\partial u'(x)}{\partial^2 x} = \begin{cases} (v_1 - 1)\, x^{(v_1 - 2)}, \text{ if } x \geq 0 \\ -\lambda (v_2 - 1)(-x)^{(v_2 - 2)}, \text{ if } x < 0 \end{cases}$$

2.2. Decision Making and Prospect Theory

However, past studies demonstrate that investors' asymmetric response to the performance of their investments using prospect theory utility function seem to assume that the individual's utility is measured for gains and losses separately. That is, they assume an investor's prospect that involves either a gain or a loss outcome, called the non-mixed assumption in the past studies (Abdellaoui, Bleichrodt and Parachiv 2007).

Non-mixed assumption seems to ignore that the investor's pre-decision making process should exhibit both losses and gains prospects for their investment candidates. To achieve this, Kaustia (2010) and Dierkes, Erner and Zeisberger (2010) assume an individual's prospect involves a gain or a loss outcome, using the expected value of an individual's prospect to an asset's outcome to demonstrate an investor's behaviors.

Kaustia (2010) and Dierkes, Erner and Zeisberger (2010) present that the individual evaluates each investment strategy (decision) by the expected prospect value, showing that an individual's motivation to buy and sell their positions is based on whether their expected prospect value of decision making to buy or sell their investments is better than theirs are. The expected prospect value is given by:

$$E\,(\text{Prospect value}) = \int_{-\infty}^{\infty} u(x) f(x)\, dx \qquad (3)$$

where $f(x)$ is a (subjective) probability density function of return regards to the reference point at the end of the investment horizon.[6] Using numerical integration, Kaustia (2010) assumes a risky asset's return follows a normal distribution having an expected value of 12% and a standard deviation of 25%, and yields a positive prospect

[6] Tversky and Kahneman (1992) indicate that CPT agents overweight small probabilities and underweight large probabilities to possible outcomes, that is, the subjective probability weighting function of an agent reflect increased sensitivity to extreme tail of return distributions. However, the subjective probability density function of an investor's decision making is not easy to observe, to simplify the analysis Kaustia (2010) assumes an investor makes his/her investment decision based on a probability density function of the asset's historical return.

value of 3.37 for that risky asset. Equation (3) could be used to evaluate an individual's decision making process implies that the investor's utility for gains and for losses must be determined simultaneously (Abdellaoui, Bleichrodt and Parachiv 2007).

Despite Kaustia (2010) does not make assumptions on his prospect value explicitly, Equation (3) seems to couple with additional assumptions for investors. First, assume that investors will clean up their investments basis on prospect value rather than liquidating a fraction of the total amount of shares of an asset. Second, assume investors' reference point and the degrees of risk tolerance/aversion are constants. However, recent studies show that investors' reference points should not be a constant (Hwang and Stachell 2010), and indicate that risk aversion coefficient should vary over time (Campbell and Cochrance 1999) and increase when asset prices are increasing (Wright and Bower 1992; Durand, Simon and Szimayer 2009). The details of non-constant risk aversion coefficient will be discussed in the following section.

2.3. Asset Allocation Problem under Uncertainty

The objective of this study is to investigate investors' responses to changes in the performance of their investment under uncertainty. Combining these previous studies (Kaustia 2010; Dierkes, Erner and Zeisberger 2010; Hwang and Stachell 2010), this study firstly extends previous studies by modeling investors' asset allocation problem

and assuming investors liquidating behavior affects by the ex post performance of their investment.

The theoretical model of this study mainly follows the setting of Hwang and Satchell (2010), by considering a canonical single-period economy with a standard representative CPT investor, who can invest in *p* perfectly divisible risky assets, where *p* is a large number. Asset return rates, $\mathbf{y} = \left(y_1, ..., y_p \right)$. There is also a riskless asset *f*, with a certain return rate r_f. This study indentifies that the CPT investor's initial wealth is W_0, and the final wealth of the investor is as follows:

$$W = W_0 \left[\left(1 - \boldsymbol{\theta}'(t)\mathbf{e} \right) \left(1 + r_f \right) + \boldsymbol{\theta}'(t) \left(1 + \mathbf{r}_p \right) \right] = R_f + W_0 \boldsymbol{\theta}'(t)\mathbf{y} \qquad (4)$$

where $\boldsymbol{\theta}(t)$ is a serious of the CPT investors' decision making parameter, is the vector of risk asset proportions, $\boldsymbol{\theta}(t) \in [0,1]$. t is the distance from the reference point. $R_f = W_0 \left(1 + r_f \right)$ represents the return of the risk-free assets, $\mathbf{y} = \mathbf{r}_p - r_f \mathbf{e}$ is the excess return of the investors' portfolio, $\mathbf{e}$ is a $(N \times 1)$ vector of ones.

To obtain how the CPT investors' optimal asset allocation $\boldsymbol{\theta}(t)$ varies due to changes in their investment performance *t* (ex post performance of their investment), this study modifies Hwang and Stachell (2010) assumption of $u^{+,HS} = E\left[v(y) \middle| y > 0 \right]$, $u^{-,HS} = E\left[v(y) \middle| y < 0 \right]$ and $p^{HS} = prob(y > 0)$, letting $u^{+} = E\left[v(y) \middle| y > t \right]$ and $u^{-} = E\left[v(y) \middle| y < (-t) \right]$, $p = prob(y > t)$ in this study.

$W_0\boldsymbol{\theta}'(t)\mathbf{y}$ is equivalent to x in Equation (1), the expected prospect value $E(PV)$ is as following:

$$E(PV)=\frac{1}{v_1}\left(\boldsymbol{\theta}(t)W_0\right)^{v_1} pu^{+}-\frac{\lambda}{v_2}\left(\boldsymbol{\theta}(t)W_0\right)^{v_2}(1-p)u^{-} \tag{5}$$

Hwang and Satchell (2010) find a result similar to Equation (5), discarding the fact that they do not explicitly consider whether an investor's asset allocation is affected due to changes in the performance of their investments dynamically. From Equation (5) the first-order condition for maximizing prospect value is

$$\frac{\partial E(PV)}{\partial \boldsymbol{\theta}(t)}=W_0^{v_1}u^{+}p\boldsymbol{\theta}'(t)^{v_1-1}-\lambda W_0^{v_2}u^{-}(1-p)\boldsymbol{\theta}'(t)^{v_2-1}=0 \tag{6}$$

If $v_1\neq v_2$, this study obtains an investor's dynamic optimal asset allocation is as following:[7]

$$\boldsymbol{\theta}(t)=\left[\frac{u^{+}p}{\lambda(1-p)u^{-}}\right]^{\frac{1}{v_2-v_1}}=\left[\frac{p}{\lambda(1-p)}\cdot\frac{\int_t^{\infty}y^{v_1}f(y)dy}{\int_{-\infty}^{-t}(-y)^{v_2}f(y)dy}\right]^{\frac{1}{v_2-v_1}} \tag{7}$$

where W_0=1, $v_1, v_2\in(0,1)$; $v_1<v_2$, $u^{+}=\int_t^{\infty}v(y)f(y)dy=\int_t^{\infty}y^{v_1}f(y)dy$, and $u^{-}=\int_{-\infty}^{-t}v(y)f(y)dy=\int_{-\infty}^{-t}(-y)^{v_2}f(y)dy$.

Equation (7) demonstrates how much an investor should invest in risky assets for

[7] See Hwang and Satchell's (2010; p. 2427) proof of $v_1<v_2$.

given loss aversion (λ) and risk aversion parameters (v_1, v_2) when the performance of their investments changes in t. The investment proportion in this paper is a non-linear function of t and p. This study extends prior researches (Kaustia 2010; Hwang and Satchell 2010) and assumes an investor's optimal asset allocation will be adjusted by the performance of their investments in my model. To simplify the analysis, this paper takes the logarithm function on both sides of the Equation (7) for linearlization in order to analyze the relation between an investor's demand for risky assets and changes in the returns of those assets, the result is:

$$\ln \boldsymbol{\theta}(t) = \frac{1}{v_2 - v_1}\left\{ \ln \frac{p}{\lambda(1-p)} + \ln u^+ - \ln u^- \right\} \tag{8}$$

The first order condition from Equation (8) produces an investor's theoretical response to changes in the performance of his/her investments under CPT. Based on the fundamental theorems of calculus, this study obtains:

$$\frac{\partial \ln \boldsymbol{\theta}(t)}{\partial t} = \frac{1}{u^+} \cdot \frac{\partial u^+}{\partial t} - \frac{1}{u^-} \cdot \frac{\partial u^-}{\partial t} = \frac{-\left[t^{v_1} f(t)\right]}{\int_t^{\infty} y^{v_1} f(y)\, dy} - \frac{t^{v_2} f(-t)}{\int_{-\infty}^{-t} (-y)^{v_2} f(y)\, dy} < 0 \tag{9}$$

where $\partial u^+ / \partial t = -\left[t^{v_1} f(t)\right]$, $\partial u^- / \partial t = t^{v_2} f(-t)$, $t^{v_1} f(t) > 0$, $\int_t^{\infty} y^{v_1} f(y)\, dy > 0$, $t^{v_2} f(-t) > 0$, and $\int_{-\infty}^{-t} (-y)^{v_2} f(y)\, dy > 0$. Therefore, Equation (9) leads to the proposition that $\partial \ln \boldsymbol{\theta}(t) / \partial t < 0$ (see Figure 4).

Equation (9) shows that the relation between an investor's optimal asset allocation and the changes in the performance of their investments is negative (see Figure 2). That is, my model forecasts that investors will tend to liquidate poor performing assets and will have a tendency to sell their appreciated assets in terms of profit-taking. Hence, the following hypothesis is offered:

H1: *Assuming that investors' utility for gain and for losses are determined simultaneously, investors have propensity to liquidate their depreciated assets and appreciated assets because investors are uncertain about the magnitude of the loss and are profit-taking for certain gain .*

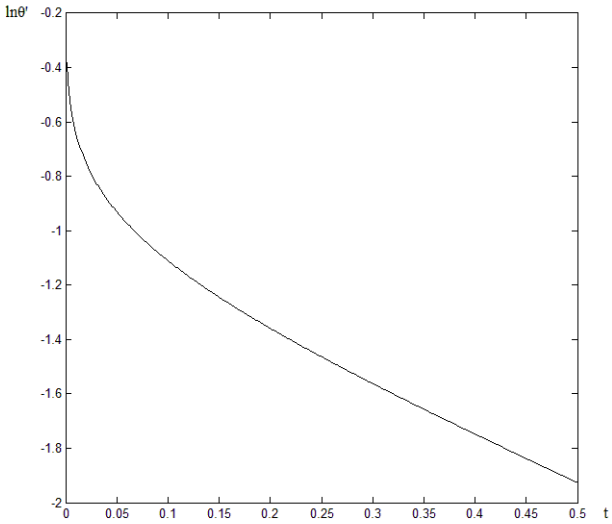

Figure 4 The Dynamic Asset Allocation Problem

The figure plots an example of first order condition from Equation (8) produces a CPT investor's theoretical response to changes in performance of his/her investments.

$$\frac{\partial \ln \theta(t)}{\partial t} = \frac{1}{u^+} \cdot \frac{\partial u^+}{\partial t} - \frac{1}{u^-} \cdot \frac{\partial u^-}{\partial t} < 0$$

where $\frac{\partial u^+}{\partial t} = \frac{\partial \left[\int_t^{\infty} y^{v_1} f(y) dy \right]}{\partial t} = -\left[t^{v_1} f(t) \right]$, $\frac{\partial u^-}{\partial t} = \frac{\partial \left[\int_{-\infty}^{-t} (-y)^{v_2} f(y) dy \right]}{\partial t} = t^{v_2} f(-t)$, the pdf of return (y) is $N(0,1)$

2.4. Asset Allocation Problem with State-varying Risk-aversion Functions

Nevertheless, many studies support loss aversion utility, such as prospect theory, which is the most successful descriptive theories for individual decision making under risk (Kahneman and Tversky 1979; Tversky and Kahneman 1992; Homburg, Koschate and Hoyer 2005; Fry, Heaney and McKeown 2007; Gurevich, Kliger and Levy 2009;

Kalra and Shi 2010) and present that investors' perceived risk tolerance directly affect investor's behavior (Campbell 2006; Rickwood and White 2009). However, those researches are relatively silent about the state-varying aspect of investors' decision-makings. For example, Campbell and Cochrance (1999) find that investor's risk aversion coefficient vary over time. While Wright and Bower (1992) and Durand, Simon and Szimayer (2009) show that the degree of an investor's risk aversion increases when his/her asset prices are increasing.

Based on a review of the psychology consumer behavior literature, it is stated that investor's risk aversion (tolerance) degree to financial products such as mutual fund (Goetzmann and Peles 1997), initial public offerings (IPOs, Luo 2008), and retirement project (Rickwood and White 2009), is related to investor's sources of information and knowledge to produce quality and their investment historical returns. Luo (2008) indicates that a firm's marketing may help provide information about the true value of the firm, and reduce investor's perceived risk to IPOs. Similarly, Rickwood and White (2009) find that advertising can affect investors' behavior because advertising can increase the level of investors' risk tolerance. In mutual fund markets, Jain and Wu (2000), Barber, Odean and Zheng (2005) and Wei, Chen and Peng (2011) present that investors' behavior is affected by, among other things, advertising. Therefore, past researches (Gurevich, Kliger and Levy 2009; Dimmock and Kouwenberg 2010; Kalra

and Shi 2010) that treat investors' perceived risk aversion (tolerance) as a constant may not be appropriated.

The main objective of this study is to investigate whether investor's post purchasing behavior is affected by ex post performance of his/her investment; whether marketing information influences investor liquidation behavior, and further examine whether marketing information interacts with performance. This study sets that the degree of investor's risk aversion is the function of the ex-post performance of their investment (Wright and Bower 1992; Durand, Simon and Szimayer 2009) and the degree of perceptive information precision, such as marketing information (Jain and Wu 2000; Huang, Wei and Yan 2007). Moreover, according to Abdellaoui, Bleichrodt and Paraschiv (2007), this study imposes an additional assumption that a prospect involves both a gain and a loss outcome simultaneously, investigating how an investor's optimal asset allocation varies according to changes in risk aversion/tolerance in loss aversion world. Therefore, this research assumes the risk aversion parameter v_1 and v_2 in CPT to be a function of asset past returns (Sirri and Tufano 1998; Durand, Simon and Szimayer 2009) and marketing (Scott 1976; Turley and LeBlanc 1993; McColl-Kennedy and Fetter 1999; McAlister, Srinivasan and Kim 2007; Luo 2008), $v_1(t, AD)$ and $v_2(t, AD)$.

In constrast to past researches (Tversky and Kahneman 1992; Durand, Simon and Szimayer 2009; McAlister, Srinivasan and Kim 2007; Luo 2008; Kaustia 2010), this study sets that the degree of investors' risk aversion decreases with the past performance of their investments and advertising increase, that is, $\partial v_1(\cdot)/\partial t > 0$, $\partial v_1(\cdot)/\partial AD > 0$, $\partial v_2(\cdot)/\partial t > 0$, $\partial v_2(\cdot)/\partial AD > 0$, $\left|\partial v_1(\cdot)/\partial t\right| < \left|\partial v_2(\cdot)/\partial t\right|$ and $\left|\partial v_1(\cdot)/\partial AD\right| > \left|\partial v_2(\cdot)/\partial AD\right|$, and assumes that the exogenous given ex post information t and AD is independent of each other, and defines that $0 < v_1(\cdot) = v_1^* < v_1 < 1$ and $0 < v_2(\cdot) = v_2^* < v_2 < 1$. Inconsistent with prior studies (Tversky and Kahneman 1992; Homburg, Koschate and Hoyer 2005; Abdellaoui, Bleichrodt and Paraschiv, 2007; Kaustia 2010; Hwang and Stachell 2010), the three exogenous variables in this study are changes in investment performance t, loss-aversion coefficient λ and marketing information after purchasing AD. Here the CPT investors' post-purchasing behavior is affected by two endogenous variables: the degree of risk aversion functions are given by $v_1(t, AD)$ and $v_2(t, AD)$.

Contrary to Equation (9), an investor's asset allocation problem under uncertainty with risk aversion functions of t and AD could be rewritten as the following equation:

$$\ln \boldsymbol{\theta}^*(t, AD) = \frac{1}{v_2^* - v_1^*}\left\{\ln \frac{p}{\lambda(1-p)} + \ln u_+^* - \ln u_-^*\right\} \qquad (10)$$

where $v_1^* = v_1(t, AD)$, $v_2^* = v_2(t, AD)$, $v_2^* > v_1^*$, $\ln u_+^* = \int_t^{\infty} y^{v_1(y,AD)} f(y)\,dy$, $\ln u_-^* = \int_{-\infty}^{-t} (-y)^{v_2(y,AD)} f(y)\,dy$ and $u_+^* \geq u_-^*$ (the usual demand properties to risky assets of an investor imply that $u_+^* \geq u_-^*$).

In this study, I firstly discuss how changes in the performance of investors' investment affect their post-purchasing behaviors, then address the issue of whether marketing information such as advertising help keep investors in their investments, and examine whether advertising interacts with ex post investment performance.

The first order condition from Equation (10) produces an investor's theoretical response due to changes in performance of his/her investments under CPT with state-varying risk aversion functions. Based on the fundamental theorems of calculus, an investor's decision making due to changes in performance of his/her investments is as follows:

$$\frac{\partial \ln \boldsymbol{\theta}^*(t)}{\partial t} = \frac{\left[\left(\frac{1}{u_+^*}\cdot\frac{\partial u_+^*}{\partial t} - \frac{1}{u_+^-}\cdot\frac{\partial u_-^*}{\partial t}\right)\left(v_2^* - v_1^*\right)\right] - \left(\ln u_+^* - \ln u_-^*\right)\left(\frac{\partial v_2^*}{\partial t} - \frac{\partial v_1^*}{\partial t}\right)}{\left(v_2^* - v_1^*\right)^2} < 0 \qquad (11)$$

Since the first term in the numerator of Equation (11) is negative, that is, $\frac{1}{u_+^*}\cdot\frac{\partial u_+^*}{\partial t} - \frac{1}{u_+^-}\cdot\frac{\partial u_-^*}{\partial t} = \frac{-\left[t^{v_1(y,AD)} f(t)\right]}{\int_t^{\infty} y^{v_1(y,AD)} f(y)\,dy} - \frac{t^{v_2(y,AD)} f(-t)}{\int_{-\infty}^{-t} (-y)^{v_2(y,AD)} f(y)\,dy} < 0$, $\left(v_2^* - v_1^*\right) > 0$, the second term in the numerator in the same equation is positive, $\ln u_+^* - \ln u_-^* \geq 0$ and

$\frac{\partial v_2^*}{\partial t} - \frac{\partial v_1^*}{\partial t} > 0$ (because the decrease in utility by a marginal loss is greater than the increase in utility from a marginal gain). The results of Equation (11), consistent with Equation (9), showing that the relation between a state-varying CPT investor's optimal asset allocation and changes in the performance of their investments is negative. The model in this study forecasts that investors with state-varying risk aversion functions will tend to liquidate poor performing assets to recognize losses and will have tendency to sell their appreciated assets for profit-taking.

However, how would advertising affect investors' post-purchasing behavior? The first order condition for Equation (10) produces CPT investor's theoretical response to changes in their information set. Based on the fundamental theorems of calculus, an investor's decision-making, due to changes his/her information set (such as increasing in advertising), is as follows:

$$\frac{\partial \ln \boldsymbol{\theta}^*(t)}{\partial AD} = \frac{\left[\left(\frac{\partial \ln u_+^*}{\partial AD} - \frac{\partial \ln u_-^*}{\partial AD}\right)\left(v_2^* - v_1^*\right)\right] - \left[\left(\ln u_+^* - \ln u_-^*\right)\left(\frac{\partial v_2^*}{\partial AD} - \frac{\partial v_1^*}{\partial AD}\right)\right]}{\left(v_2^* - v_1^*\right)^2} > 0 \quad (12)$$

As demonstrated, the first term in the numerator of Equation (12) is positive ($\frac{\partial \ln u_+^*}{\partial AD} - \frac{\partial \ln u_-^*}{\partial AD} > 0$ and $\left(v_2^* - v_1^*\right) > 0$), and the second term in numerator of Equation (12) is negative, $\left(\ln u_+^* - \ln u_-^*\right)\left(\frac{\partial v_2^*}{\partial AD} - \frac{\partial v_1^*}{\partial AD}\right) < 0$. Equation (12) shows that the relation between a state-varying CPT investor's optimal asset allocation and changes in

their information set is positive, indicating that investors who receive more marketing information have more incentive to invest in risky assets, or hold their investments because marketing information can lower the degree of an investor's risk aversion. The second hypothesis of this study is developed as follows:

H2 *Investors with more advertising information have more incentive to holding their investments*

2.5. How Marketing Information Interacts with Ex post Investment Performance under State-varying Risk Aversion World

In this section, I address the issue of whether marketing information interacts with performance. That is, I carry a theoretical result for discuss whether marketing information changes the existing investor's response to changes in their investments performance. Before I discuss the model in this study, the following example should of an investor with CPT preferences has two risk aversion/tolerance functions to two homogeneous assets such as mutual funds, Fund X and Fund Y.[8] Suppose that Fund X is an advertised fund while Fund Y is not. According to Scott (1976), Turley and LeBlanc (1993), Jain and Wu (2000), McAlister, Srinivasan and Kim (2007) and Rickwood and White (2009), the CPT investor values higher risk tolerance value on

[8] Under the mean-variance framework, a rational investor construct portfolio following the principle of maximization of return for a given level of risk (minimization risk for a given level of return). However, Stracca (2002) find that CPT investors have a tendency to invest in homogeneous assets.

the advertised Fund X than on non-advertised Fund Y. Therefore, when the values of both Funds X and Y have increased by the same amount of money *t*, the investor is less willing to sell Fund X. However, if the values of funds X and Y have decreased by the same amount of money; according to the findings of Ehrlich, Guttman, Schönbach and Mills (1957), Goetzmann and Peles (1997), Chen (2004) and Rickwood and White (2009), the investor is less reluctant to sell the Fund X because advertising increases his/her risk tolerance level.

The third objective of this study is to investigate how marketing information changes the existing investor's response to changes in their investing performances. Furthermore, this study investigates the interaction of post-determined marketing information with investors' post-purchasing response to changes in their investment performance. Due to the ex post investment performance, *t* and *AD* is independent of each other, this study could obtain whether advertising interacts with investor's liquidated behavior by multiplying the Equation (11) and Equation (12), getting the following results:

$$\frac{\partial^2 \ln \boldsymbol{\theta}^*(t)}{\partial t \partial AD} < 0 \qquad (13)$$

Equation (13) is negative, indicating that advertising information cannot sufficiently change the existing performance-liquidation relation. However, Equation

(11) indicates that investors are likely to liquidate winner and loser assets, Equation (12) shows that investors with more advertising information have more incentive to invest in risky asset. If the implications of Equations (11) and (12) could be combined, this study forecasts that investor may be less reluctant to liquidate their investments with higher marketing because advertising increases the degree of their risk tolerance. In other words, such an outcome infers that an investor with lower degree of risk aversion has less incentive to sell their holdings than ones with higher risk aversion level when facing a paper gain or a paper loss. The third hypothesis of this study is as follows:

H3 *Investors for his/her investments with higher risk tolerance have level less incentive to sell their holdings than ones with lower risk tolerance level when facing a paper gain or a paper loss.*

3. Sensitivity Analysis

As mentioned before, Campbell (2006) and Rickwood and White (2009) present that investors' perceived risk attitudes directly affect investor's behavior, while investor's risk attitude should vary over time (Campbell and Cochrance 1999) and increase when asset prices are rising (Wright and Bower 1992; Durand, Simon and Szimayer 2009). Based on a review of the psychology consumer behavior literature, that investor's risk tolerance degree to financial products such as mutual fund (Goetzmann and Peles 1997), IPOs (Luo 2008), retirement projects (Rickwood and White 2009) are related to investor's sources of information and knowledge to product quality. In this section, I address this gap in the existing literature using sensitivity analysis by changing risk-aversion coefficients to forecast investor's decisions. Sections 3.1 and 3.2 analyze an investor's response to the investment performance and advertising under the non-mixed and mixed assumptions, respectively.

3.1. Risk Aversion Coefficient and Marketing Information

This study regards the degree of investors' risk aversion as a function of investors' ex post performance of their investments and advertising. Having that said, I assume that the degree of risk aversion decreases with investment performance and advertising information. In other words, $\partial v_1(\cdot)/\partial x > 0$, $\partial v_1(\cdot)/\partial AD > 0$,

$\partial v_2(\cdot)/\partial x > 0$ and $\partial v_2(\cdot)/\partial AD < 0$. For simplicity, the numerical simulations of this study directly define that $0 < v_1(\cdot) = v_1^* < v_1 < 1$ and $0 < v_2(\cdot) = v_2^* < v_2 < 1$. For v_1^* and v_2^* I use a range of 0.2-0.6 in increments of 0.008 increases with *x* percentage changes in wealth. Under non-mixed assumptions, the state-varying cumulative prospect theory (SV-CPT) value function has the following structure:

$$u\left(x, v_1^*, v_2^*\right) = \begin{cases} \dfrac{x^{v_1^*}}{v_1^*}, & x \geq 0 \\ -\lambda \dfrac{(-x)^{v_2^*}}{v_2^*}, & x < 0 \end{cases} \tag{14}$$

Figure 5 plots the SV-CPT value function and traditional CPT function, showing that the curvature of S-shaped value function in the SV-CPT value function is smoother and becomes less steep than the traditional one. Figure 5 on the other hand seems to imply that an investor's risk tolerance level play a considerable role to slow the speed of diminishing marginal sensitivity to changes in wealth.

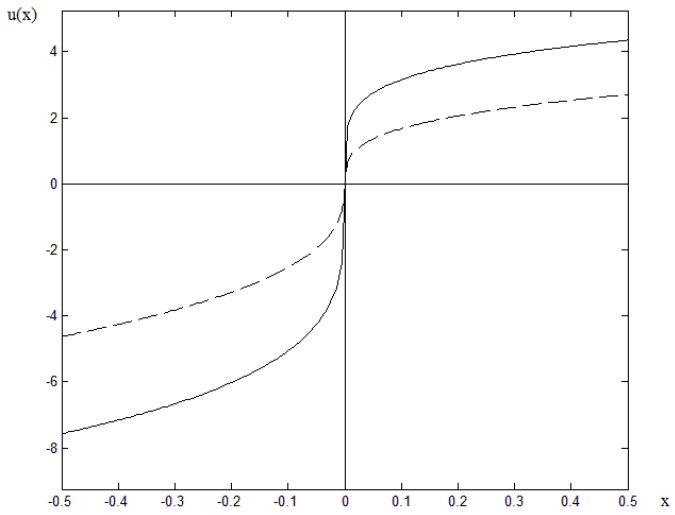

Figure 5 Traditional Prospect Theory and SV-CPT Value Functions

The figure of solid and dotted lines plot an example of standard prospect function and SV-CPT function using Equations (1) and (14), respectively.

Using Equation (14), I get the following marginal utility to observe whether increases in investor's risk tolerance level the speed of diminishing marginal sensitivity to changes in wealth:

$$\frac{\partial u(x, v_1^*, v_2^*)}{\partial x} = \begin{cases} x^{\left(v_1^* - 1\right)}, \text{ if } x \geq 0 \\ \lambda \left(-x\right)^{\left(v_2^* - 1\right)}, \text{ if } x < 0 \end{cases} \tag{15}$$

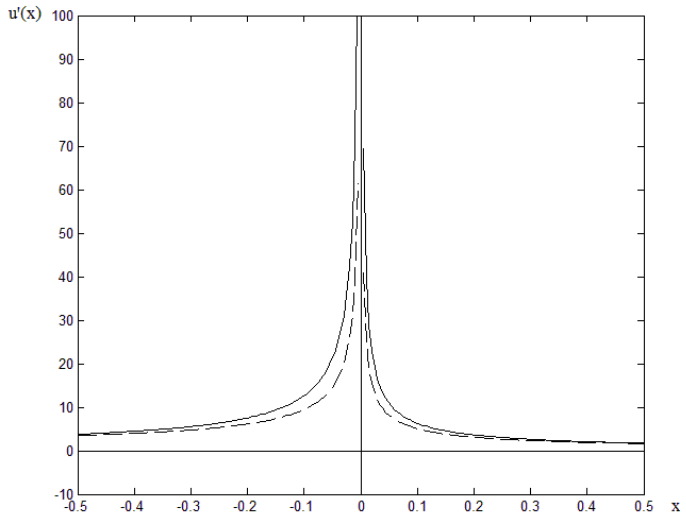

Figure 6 Marginal Utility of SV-CPT and Traditional CPT

This figure of solid and dotted lines show the traditional CPT marginal utility functions and SV-CPT marginal utility, respectively.

Figures 6 and 7 show the marginal utility value of Equation (2) and (15) and their second order conditions, respectively. Figures 6 and 7 indicate that the speed of the diminishing marginal sensitivity to monetary outcome for a given x is lower for an investor has higher risk tolerance than for one has lower risk tolerance.

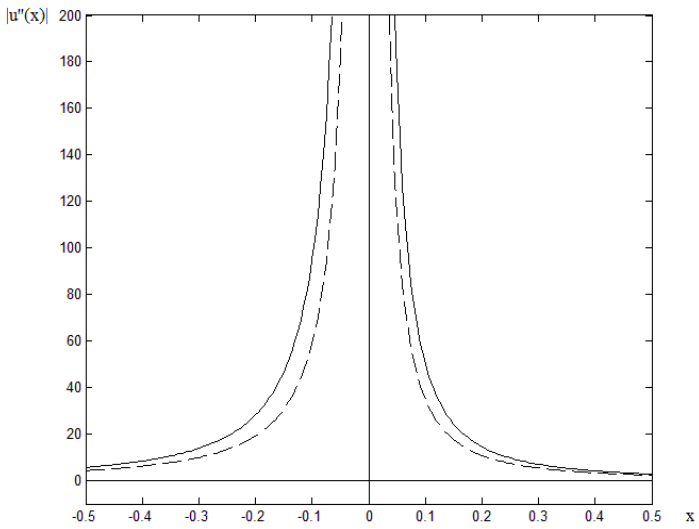

Figure 7 The Second Order Conditions of the SV-CPT and CPT

This figure of solid and dotted lines show the example of the second order condition of traditional CPT value function and SV-CPT utility function, respectively.

3.2. CPT Investor's Asset Allocation and Risk Aversion Coefficients

Above section follows Shefrin and Statman (1985), Grinblatt and Keloharju (2001) and Peng, Chen and Wei (2011) in simulating the individual's behavior follows with non-mixed assumption. According to Abdellaoui, Bleichrodt and Paraschiv (2007), this section firstly imposes an additional assumption that a prospect involves both a gain and a loss outcome simultaneously, and investigates how an investor's optimal asset allocation changes according to the various risk aversion/tolerance coefficients in loss aversion world. Moreover, I propose that the degree of CPT investors' perceived risk is a function of the investors' information source such as marketing information

(Rickwood and White 2009) and investment performance (Durand, Simon and Szimayer 2009).

In this section this study varies the coefficient of risk-aversion to simulate how an investor demands for two homogeneous assets varies due to changes in his/her investment performance using Equation (10). Consider an asset returns with a standard normal distribution, and has an expected value of 0 and a variance of 1. Under mixed assumption, in Figure 8, both the solid and dotted lines show that an investor's demand for a risky asset decreases as the price of the investment departs from the reference point in both directions. That is, investors have propensity to liquidate their depreciated assets and have the tendency to sell their appreciated assets. Figure 8 also expresses that an investor with a higher risk tolerance degree toward a risky asset has a lower diminishing rate of demand for the asset than those who with lower risk tolerance toward a risky asset.

The numerical simulation results seem to support the hypothesis in this study that investors with higher risk tolerance have less incentive to sell their holdings than ones with lower risk tolerance level when facing a paper gain or a paper loss. A plausible explanation of this finding is that advertising may increase investors' risk tolerance, lower the "speed" to reach their maximum total utility, and then change the existing pattern of investors' decision makings.

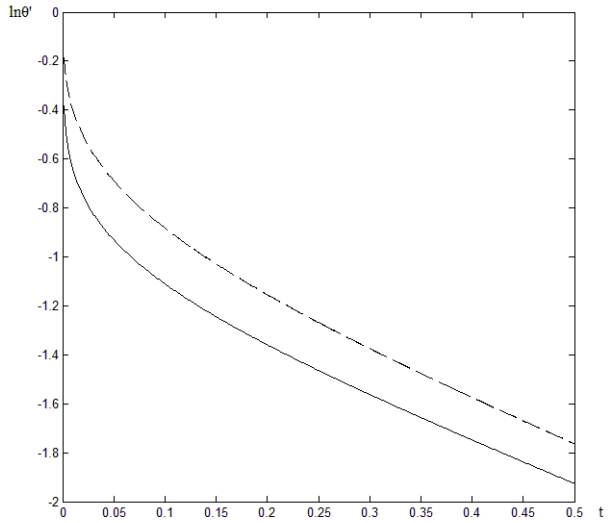

Figure 8 SV-CPT and CPT Investor's Dynamic Optimal Asset Allocations

The figure of solid line plots an example of first order condition from Equation (9) produces an investor's theoretical response to changes in performance of his/her investments. The figure of solid line generates by assuming the degree of a CPT investor's risk aversion is a constant. The figure of dotted line plots an example of first order condition from Equation (11), assuming the degree of a CPT investor's risk aversion changes by investment performance and marketing information.

To further examine whether marketing information and investment performance affect investor's liquidated behaviors in real world. In my next section I empirically test the hypotheses using Taiwanese mutual fund flows data. I employ individual fund redemptions as a proxy for investors' liquidation and uses fund advertising expenditure as a proxy for the fund's marketing information to investigate whether advertising higher investors' risk tolerance, and then alter the existing pattern of investors' decision making.

4. Mutual Fund Research, Empirical Model, Data and Summary Statistics

The primary goal of this investigation is to examine whether advertising moderates the existing investor's liquidated behavior, that is, whether advertising interacts with mutual fund performance. I use individual fund's redemption data as a proxy for aggregated investors' liquidation, and employ monthly fund-level advertising as a proxy for marketing information, which are collected from RXKM International Corporation to examine the hypotheses in this study.

4.1. Mutual Fund Investor Behavior

Mutual fund industry provides a useful laboratory for studying the trading behavior of individuals because observable mutual fund cash flows reveal investors' decision making (Sirri and Tufano 1998; Zheng 2008). Previous studies on the relation between fund net flow and past fund performance is mixed. For instance, Ippolito (1992), Chevalier and Ellison (1997) and Shu, Yeh and Yamada (2002) find a positive and significant relation between net fund flows and past fund performance, showing that fund investors have a propensity to cash in gains soon, and are reluctant to sell their funds at a loss. This asymmetric flow-performance relation is in line with the disposition effect (Shefrin and Statman 1985). While O'Neal (2004), Gallaher, Kaniel and Starks (2008) and Ivković and Weisbenner (2009) find the relation between fund redemption and fund performance turns out to be significantly negative for loser

funds and be significantly positive for (moderated) winner funds. That is, fund investors tend to sell good performing funds for profit-taking and punish with redemptions from the poor performing funds.

4.2. Mutual Fund Advertising

In mutual fund markets, Jain and Wu (2000), Barber, Odean and Zheng (2005) and Wei, Chen and Peng (2011) present that mutual fund investors' behavior is affected by, among other things, advertising. Past studies use behavioral theories to explain why advertising influences investor behavior, and found out that advertising influences not only investor pre-purchase behavior but also post-purchase decision making process.

According to cognitive dissonance theory, Ehrlich, Guttman, Schönbach and Mills (1957) indicate that advertising can lead people to adjust their beliefs as a means to justify bad decision-making. Moreover, past studies show that advertising can reduce the degree of investor uncertainty (Rickwood and White 2009), cognitive dissonance (Goetzmann and Peles 1997) and increase consumer loyalty (Chen 2004). Those findings imply that advertising may increase the degree of investor risk tolerance and then change the existing pattern of redemption-performance relation. If so, according to behavioral theories, this study inquires whether advertising can actually help keep investors in the fund? That is, I examine whether fund advertising lowers or interacts with mutual fund performance.

4.3. Empirical Model

The study mainly analyzes the relation between investor liquidated behavior and advertising information. So the empirical model in this study aims to examine whether advertising changes the existing redemption-performance sensitivities (Hypothesis 3). Moreover, this study investigates whether investors' responses are different to higher and lower performing funds (non-linearity redemption-performance relation), and, furthermore, whether advertising changes investors' responses to higher and lower performing funds. This study runs regressions in spirit similar to Jain and Wu (2000), Ivković and Weisbenner (2009), and Shrider (2009), employing interaction variables to capture potential asymmetries in the relation between fund redemptions and fund returns, and to examine whether advertising interacts these asymmetric relations. Because of the structure of the dataset is unbalanced panel data, I use fixed effects regression approach to examine investors' redemption behavior. The results of this study controls fund-family effects rather than individual fund effects because of the existence of the advertising spillover effect (Nanda, Wang and Zheng 2004; Wei, Chen and Peng 2010). This study also uses time fixed effects method to control for the seasonal effects (e.g., January effect).

In this research, I have included a host of control variables in my regression model because these factors may affect investor's redemption behaviors. For example,

the larger size funds (Shu, Yeh and Yamada 2002) and older funds (Shrider 2009) may signal they are well-known or reputable funds, so those funds' redemption should appear less sensitive to a fund's performance than others. The relation between fund redemption between fees, turnover rate, and past fund return volatility (O'Neal 2004; Gallaher, Kaniel and Starks 2008; Ivković and Weisbenner 2009) should be positive, because higher fees and turnover rates lead to higher investment cost, while higher fund return volatility may change investors risk attitude toward their risk assets. I regard the variables above as the control variables. I estimate the following model using fund the family (time) fixed effects approach:

$$\begin{aligned} Redrate_{i,j,t} = & \sum_{i=1}^{n}\sum_{j=f}^{F}\alpha_{i,j}D_{i,j} + \beta_1 PastReturn_{i,j,[t-1,t-12]} + \beta_2 AD_{j,[t-1,t-3]} \\ & + \beta_3 PastReturn_{i,j,[t-1,t-12]} * AD_{j,[t-1,t-3]} \\ & + \sum_{q=4}^{7}\sum_{r=1}^{5}\beta_q RelativeReturn^{r}_{i,j,[t-1,t-12]} \\ & + \sum_{q=8}^{11}\sum_{r=1}^{5}\beta_q RelativeReturn^{r}_{i,j,[t-1,t-12]} * AD_{j,[t-1,t-3]} \\ & + \boldsymbol{\beta}'\mathbf{OtherControls} + \sum_{m=1}^{96}\beta_m MonthDummies_m + \varepsilon_{i,j,t} \end{aligned} \tag{16}$$

where $Redrate_{i,j,t}$ is monthly redemption rate of fund *i* in fund family *j* during month *t*. Thus, following Ivković and Weisbenner (2009) and Shrider (2009), this study defines $Redrate_{i,j,t}$ as a relative measure of fund flows: $Redrate_{i,j,t} = Redeem_{i,j,t} / TNA_{i,j,t-1}$, where $Redeem_{i,j,t}$ denotes the dollar value of shares of redeemed fund *i* in fund family *j* during month *t*. $TNA_{i,j,t-1}$ (or $Size_{i,j,t-1}$) is the total dollar value of shares held of fund *i* in fund family *j* at the end of month *t*-1.

$D_{i,f}$ is used to examine family fixed effects, and the fixed-effects formulation. I set out to estimate the model precludes the inclusion of time-invariant fund family (*f*) dummies in the model. O'Neal (2004) indicates that the fund-family fixed effects adequately control for factors that are similar across funds.

$PastReturn_{i,j,[t-1,t-12]}$ denotes past one-year cumulative excess returns ($r_{i,j,t-u}$) over the market returns ($R_{m,[t-1,t-12]}$) of fund *i* in the preceding the months as a measure for fund performance:

$$PastReturn_{i,j,[t-1,t-12]} = \left[\prod_{u=1}^{12}\left(1+r_{i,j,t-u}\right)-1\right]-\left[\prod_{u=1}^{12}\left(1+R_{m,j,t-u}\right)-1\right] \qquad (17)$$

Recent redemption-performance studies on mutual funds, such as Ivković and Weisbenner (2009) and Shrider (2009), measure performance with raw one-year total returns.[9]

$RelativeReturn^{r}_{i,j,[t-1,t-12]}$ are binary variables used to examine non-linearity in the redemption-performance relation, representing one-year relative performance through dummies, each denoting the deciles of the quintile ranking of one-year returns (the

[9] Recent redemption-performance studies on mutual funds, O'Neal (2004), Ivković and Weisbenner (2009), and Shrider (2009), measure performance with raw one-year total returns. In addition to fund flow data from TEJ, Chen, Lai and Peng (2011) obtain a proprietary data set from a domestic bank providing the number of detailed transactions by 961 individual mutual fund investors from 1987 to 2008. The data show that the average holding period of an investor are 13.25 months. I measure performance with raw returns because previous studies have shown that investors base their decisions on raw return numbers rather than risk-adjusted returns (Lichtenstein, Kaufmann and Bhagat 1999). They indicate that risk-adjusted returns, for example, Jensen's alpha, are difficult to understand for retail investors.

omitted group is the combined 3th quintile). For each fund, I look for the quintile performance rank among all sampling funds for past one-year cumulative returns every month. For instance, $RelativeReturn^{r=1(5)}_{i,j,[t-1,t-12]}$ denotes bottom-quintile (top-quintile) funds, which equals 1 if fund *i*'s excess return over the stock market return is in the bottom 20% (top 20%) performing ranked against other funds in the total Taiwanese equity open-ended mutual funds for the year prior to year *t* and zero otherwise.

$AD_{j,[t-1,t-3]}$ is the primary variable of interest in this study. Due to the existence of advertising spillover effect (Wei, Chen and Peng 2011), I aggregate all individual funds' dollar amounts spent on advertising in fund family *j* during month *t*-3 to *t*-1 to a proxy for a fund family marketing information, which takes a value of one if the fund family spent money on advertising in months *t*-1 to *t*-3 more than zero.

$\mathbf{Other\ Controls}_{i,j,t-1}$ is a vector of control variables including variables $LnSize_{i,j,[t-12,t-1]}$, $Stdev_{i,j,[t-12,t-1]}$, $Fees_{i,j,t-1}$, $LnAge_{i,j,t}$ and $Turnover_{i,j,t}$, where $LnSize_{i,j,[t-12,t-1]}$ is the natural log of the average total assets of fund *i* during month *t*-12 to month *t*-1; $Stdev_{i,j,[t-12,t-1]}$ is the standard deviation of fund *i*'s past 12-month returns; $Fees_{i,j,t-1}$ is the average fees ratio of fund *i* during month *t*-1; $LnAge_{i,j,t}$ denotes the age in months of fund *i* at the end of month *t*; $Turnover_{i,j,t}$ is the average turnover ratio of fund *i* during month *t*-1, is the total fee ratio charged by a financial

institution or fund corporation (e.g., management fee and custodian fee), and is defined as the total fees divided by the TNA.

$MonthDummies_m$ are the monthly fixed effects, are used to control time-fixed effects.

Since capital-gain taxes are not imposed for investors in Taiwan, investors' trading behavior should not be affected by tax-motivated trading. So, the expected sign on $PastReturn_{i,j,[t-1,t-12]}$ and $RelativeReturn^{r}_{i,j,[t-1,t-12]}$ is positive based on CPT. I expect that the sign on $AD_{j,[t-1,t-3]}$, $PastReturn_{i,j,[t-1,t-12]} * AD_{j,[t-1,t-3]}$ and $PastReturn_{i,j,[t-1,t-12]} * AD_{j,[t-1,t-3]}$ is negative, due to the fact that advertising can signal higher quality, increase brand loyalty, re-enforce the efficacy of investor recent decisions, reduce cognitive dissonance and increase risk tolerances (Ehrlich, Guttman, Schönbach and Mills 1957; Lichtenstein, Kaufmann and Bhagat 1999; McColl-Kennedy and Fetter 1999; Chen 2004; Cronqvist 2006). The coefficients of $\beta_q RelativeReturn^{r=1}_{i,j,[t-1,t-12]} * AD_{j,[t-1,t-3]}$ can be interpreted as percentage flow out of funds with high fund family advertising when fund *i* is a *k*-quintile performing fund. I expect that the sign on $\beta_q RelativeReturn^{r=5}_{i,j,[t-1,t-12]} * AD_{j,[t-1,t-3]}$ is significant and negative because advertising can increase consumer loyalty as well as marketer's confidence.

4.4. Data

The data in this study are obtained from two sources. First, the mutual fund data I used are collected from the Taiwan Economic Journal (TEJ) survivorship free data sets and the SITCA which cover all the Taiwanese mutual funds from January 2001 to December 2008, including fund characteristics, monthly redemptions, monthly fund total net assets (TNA), monthly amount of turnovers, monthly management fees, monthly fund returns and fund ages. The sample funds are collected as they exist for a minimum of one year. The sample consists of 273 open-end equity mutual funds and a total of 15,794 observations. Second, the data for the monthly fund-level advertising in this research are collected from RXKM International Corporation. This database provides the names of the companies that place the advertising, the publication, the size of advertising and estimates the cost of the advertising from published advertising rates and adjusted for estimated discounts.

Panels A of Table 1 describe the samples and advertising characteristics of individual mutual funds and fund families, which include the entire sample over the 2001-2008 time period. Table 1 shows that the average monthly dollar amounts of purchases and redemptions were NT$ 111,674.5 thousand and NT$ 99,599.24 thousand, indicating that the assets under management were in fact increasing. By December 2008, the statistics indicate that there were 190 open-end equity mutual

funds, managing over NT$ 189 billion. Panel A of Table 1 shows that the monthly dollar amount of fund (family) advertising expenditures are NT$ 605.4 (NT$ 1,513.5) thousand during 2001 and NT$ 1,356.8 (NT$ 8,753.6) thousand during 2008. In addition, Panel B reports the statistics for benchmark index returns and risk-free rates. This paper demonstrates that average funds performed better than market-returns for the years during the observation period in this study. Moreover, Table 2 shows that the largest correlation coefficient for the independent variables in Equations (16) is -0.335, which is lower than 0.7, thus the influence of the multicollinearity problem between the variables in this study could be ignored temporarily (Lind, Marchal and Wathen 2004). Table 3 shows that on average monthly excess returns for top-performing funds is 21.78% while for worst-performing funds is -11.86%.

Table 1 Summary Statistics for Taiwanese Open-End Mutual Funds and Advertising

	Panel A Fund characteristics								
	2001	2002	2003	2004	2005	2006	2007	2008	Ave.
Number of fund families	37	40	40	41	41	39	38	38	39
Number of ad families	20	23	25	23	14	12	22	31	21
Number of equity funds	190	194	192	191	192	187	191	190	191
	2001	2002	2003	2004	2005	2006	2007	2008	Ave.
					Mean				
Fund family ad exp. ($1,000; monthly)	1513.48	816.114	791.693	1246.704	615.742	1026.146	855.583	8753.63	1952.39
Fund ad exp. ($1,000; monthly)	605.392	360.974	238.462	512.039	232.984	535.381	482.637	1356.813	540.585
Equity fund size ($1,000)	1187754	1367999	1240910	1345479	1305870	1287830	2103638	1894954	1466804
Equity fund return (%; annual)	29.64	-18.283	22.313	0.421	33.479	17.939	11.968	-57.309	5.021
Prior 1-year return (%; annual)	-54.845	29.64	-18.283	22.313	0.421	33.479	17.939	11.968	5.329
Prior 2-year return (%; annual)	-20.872	-7.318	1.09	4.384	10.557	16.957	24.676	13.756	5.404
Fees ratio (%)	0.143	0.145	0.147	0.145	0.144	0.145	0.141	0.144	0.144
Turnover (%; monthly)	38.236	41.264	36.988	26.628	22.796	28.941	28.878	26.902	31.329
Purchases ($1,000; monthly)	72736.45	123472	62864.12	72900.31	81325.74	89276.89	292998.8	97821.56	111674.5
Redemptions ($1,000; monthly)	72532.05	86895.23	70303.61	76042.38	109660.4	108061.8	185316.0	87982.47	99599.24

(continued)

Table 1-*Continued*

	Panel A-*Continued*								
	2001	2002	2003	2004	2005	2006	2007	2008	Ave.
	Standard deviation								
Fund family ad exp. ($1,000; monthly)	1914.913	944.304	1216.328	2010.476	1017.932	1970.860	1186.931	15781.33	3255.38
Fund ad exp. ($1,000; monthly)	724.786	393.481	432.172	538.785	225.540	774.888	551.902	2203.004	730.570
Equity fund size ($1,000)	1271635	1422936	1273961	1424490	1386578	1380839	2423580	2316781	1612600
Equity fund return (%; annual)	6.671	13.109	3.312	2.515	5.591	4.387	3.995	4.299	5.485
Prior 1-year return (%; annual)	7.633	6.671	13.109	3.312	2.515	5.591	4.387	3.995	5.902
Prior 2-year return (%; annual)	10.510	6.920	5.463	12.105	2.705	3.052	4.177	4.967	6.237
Fees ratio (%)	0.012	0.011	0.013	0.012	0.011	0.012	0.011	0.011	0.012
Turnover (%; monthly)	21.103	22.696	19.750	14.945	14.768	19.635	21.745	25.941	20.073
Purchases ($1,000; monthly)	131872.0	415825.8	106213.2	111239.9	150861.6	115324.1	436851.8	156976.1	203145.6
Redemptions ($1,000; monthly)	99376.62	125912.1	88319.26	85170.16	125767.5	106797.3	237508.1	121517.3	123796.0

(continued)

Table 1-*Continued*

	Panel B Market returns and risk-free rates								
	2001	2002	2003	2004	2005	2006	2007	2008	Ave.
					Mean				
Current market return (%; annual)	25.869	-19.402	31.256	5.596	7.480	18.81	9.920	-55.342	3.023
Prior 1-year market return (%; annual)	-52.167	25.869	-19.402	31.256	5.596	7.480	18.810	9.920	3.420
Prior 2-year market return (%; annual)	-10.124	-13.149	3.234	5.927	18.426	6.538	13.145	14.365	4.795
Current risk-free rate (%; annual)	3.668	1.671	1.000	1.092	1.790	2.098	2.392	2.500	2.0264
Prior 1-year risk-free rate (%; annual)	5.000	3.668	1.671	1.000	1.092	1.790	2.098	2.392	2.339
	2001	2002	2003	2004	2005	2006	2007	2008	Ave.
					Standard deviation				
Current market return (%; annual)	47.640	23.064	25.335	17.823	14.953	14.016	18.034	31.522	24.048
Prior 1-year market return (%; annual)	30.340	47.640	23.064	25.335	17.823	14.953	14.016	18.034	23.901
Prior 2-year market return (%; annual)	32.003	40.719	37.208	24.843	21.754	16.091	14.272	15.850	25.343
Current risk-free rate (%; annual)	1.238	0.167	0.000	0.214	0.124	0.062	0.161	0.382	0.294
Prior 1-year risk-free rate (%; annual)	0.000	1.238	0.167	0.000	0.214	0.124	0.062	0.161	0.246

Note. This table presents the summary statistics of the sampling funds' characteristics, risk-free rates and market index returns from 2001 to 2008. The figures in the table are annualized percentage returns. In panel A, the table shows the means and standard deviations of the following funds' characteristics: the number of fund families, the number of advertising families, the monthly dollar amount of advertising on fund families, the number of equity mutual funds, the monthly dollar amount of advertising on individual funds, the monthly fund scales, the fund's current fiscal year returns, the past one- and two-year returns, the fund fees ratio, the monthly turnover rate, as well as the monthly purchases and redemptions. Panel B presents the risk-free rates and market index returns.

Table 2 Correlation Matrix for Variables in Proposed Model

	AD	*Past Return*	*LnSize*	*Stdev*	*Fees*	*LnAge*	*Turnover*
AD	1						
PastReturn	-0.065	1					
LnSize	0.061	0.015	1				
Stdev	0.047	-0.335	0.045	1			
Fees	0.022	-0.143	-0.105	0.032	1		
LnAge	0.039	0.097	0.102	-0.130	-0.175	1	
Turnover	-0.024	-0.081	-0.295	0.211	0.020	-0.128	1

Note. This table presents the correlation coefficients for the variables in proposed model.

Table 3 Summary Statistics of Fund Relative Performance

	Mean	S.D.	Skewness	Kurtosis	Max	Median	Min
$RelativeReturn^{r=1}$	-11.860	10.017	-0.112	3.528	16.424	-11.386	-54.403
$RelativeReturn^{r=2}$	-2.290	10.277	0.607	3.206	32.800	-3.706	-26.080
$RelativeReturn^{r=3}$	3.581	11.875	0.843	3.409	43.352	1.045	-20.483
$RelativeReturn^{r=4}$	10.055	13.830	1.070	3.717	65.216	6.272	-14.613
$RelativeReturn^{r=5}$	21.780	18.626	1.518	7.030	172.261	16.802	-8.292

Note. This table presents summary statistics of the sampling funds' relative performance (excess returns over the market returns) over the sampling period. Figures in the Table are monthly percentage returns.

5. Empirical Results

Panels A and B of Table 4 present the results of the fund family fixed effects and time fixed effects model based on equation (16). For the sake of parsimony, though, this study discusses only two explanatory variables that literature has shown to be predictors of fund redemptions: fund past performance and advertising.

5.1 Is the Redemption-Performance Relation Asymmetric?

In Column 1 of Table 4, the evidence confirms that investors' redemptions are asymmetric to fund past performance. This shows that the fund redemptions are positive and significantly related to the previous one-year cumulative returns ($PastReturn_{i,j,[t-1,t-12]}$), which suggests that the increase (decrease) of fund's performance induces (reduces) the investors' redemptions. Further, following O'Neal (2004) and Ivković and Weisbenner (2009), this study on the other hand considers the possibility of the investors' nonlinearity responses to fund performance, represents one-year relative performance by dummies, each denoting the deciles of the quintile ranking of one-year returns within whole open-end equity funds. After controlling for $PastReturn_{i,j,[t-1,t-12]}$, this study finds that the sign on each coefficient of $RelativeReturn^{r}_{i,j,[t-1,t-12]}$ except for $RelativeReturn^{r=2}_{i,j,[t-1,t-12]}$ is significant and positively, indicating that investors are willing to redeem higher-performing funds (top-20% performing funds) and are not reluctant to liquidate their worst investments

(bottom-20% performing funds). That is, this study is consistent to and affirms the first hypothesis that investors have propensity to sell their depreciated assets if their investments perform worst and also will liquidate their appreciated assets for taking-profit. This evidence supports O'Neal (2004) and Gallaher, Kaniel and Starks (2008) findings, that investors have propensity to dispose their good performing funds and discipline their worst performing investments simultaneously.[10] What causes this phenomenon? This study connects above phenomenon to psychological factors, such as cognitive dissonance (Goetzmann and Peles 1997) and Kahneman and Tversky's CPT under mixed assumption, or rational expected theories, such as the significant evidence of worst performance persistent (Carhart 1997).

A plausible explanation for the positive redemption-performance relations is typically provided by psychological theories. Under the mixed assumption (Abdellaoui, Bleichrodt and Parachiv 2007; Kaustia 2010), this paper partially supports the hypothesis one in this study that fund investors have propensity to discipline their depreciated assets only when their investments perform worst and to liquidate their appreciated assets for profit-taking (Odean 1998). It is an intuitive linkage between mutual fund performance and the fund manager's stock selection and

[10] As showing in Table 5, our substantive conclusions remain similar when using the individual fund fixed effects model.

timing capabilities. The worst performing funds may illustrate that the fund managers did not have superior skill, Carhart (1997) indicating that funds with a record of higher performance did not guarantee persistent performance but poorly performing funds did. The sample investors in this study may make a smart choice to punish poorly performing funds by increasing redemptions.

To summarize the above, the empirical evidence in this study, which is consistent with the findings of O'Neal (2004) and confirms the proposition of this study, showing investors increase redemption from both poor and good performing funds.

Table 4 Effect of Advertising on Investors' Redemptions

Panel A Fund family fixed effects								
	(1)		(2)		(3)		(4)	
	Coefficient	T-stats	Coefficient	T-stats	Coefficient	T-stats	Coefficient	T-stats
PastReturn	0.0006	(24.63)***	0.0007	(24.37)***	0.0007	(23.71)***	0.0007	(23.28)***
AD			-0.0104	(-5.40)***	-0.0102	(-5.34)***	-0.0043	(-1.34)
*PastReturn*AD*					-0.0002	(-2.74)***	-0.0001	(-1.77)*
$RelativeReturn^{r=1}$	0.0078	(3.74)***	0.0076	(3.62)***	0.0076	(3.65)***	0.0073	(3.29)***
$RelativeReturn^{r=2}$	0.0019	(1.05)	0.0018	(0.98)	0.0019	(1.01)	0.0028	(1.39)
$RelativeReturn^{r=4}$	0.0065	(3.54)***	0.0066	(3.53)***	0.0064	(3.46)***	0.0074	(3.62)***
$RelativeReturn^{r=5}$	0.0317	(13.74)***	0.0320	(13.81)***	0.0320	(13.82)***	0.0341	(13.31)***
$RelativeReturn^{r=1}$*AD							0.0032	(0.53)
$RelativeReturn^{r=2}$*AD							-0.0082	(-1.86)*
$RelativeReturn^{r=4}$*AD							-0.0073	(-1.61)
$RelativeReturn^{r=5}$*AD							-0.0156	(-3.01)***
LnSize	-0.0100	(-8.08)***	-0.0098	(-8.00)***	-0.0098	(-8.03)***	-0.0099	(-8.05)***
Stdev	-0.0001	(-1.17)	-0.0000	(-0.98)	-0.0001	(-1.02)	-0.0001	(-1.05)
Fees	-0.0067	(-0.50)	-0.0063	(-0.47)	-0.0064	(-0.48)	-0.0065	(-0.48)
LnAge	-0.0001	(-3.39)***	-0.0007	(-3.07)***	-0.0008	(-3.21)***	-0.0008	(-3.17)***
Turnover	-0.0000	(-0.09)	-0.0000	(-0.16)	-0.0000	(-0.17)	-0.0000	(-0.21)
Obs. (R2)	15794	(0.1520)	15794	(0.1521)	15794	(0.1524)	15794	(0.1529)

(continued)

Table 4-*Continued*

Panel B Time fixed effects								
	(1)		(2)		(3)		(4)	
	Coefficient	T-stats	Coefficient	T-stats	Coefficient	T-stats	Coefficient	T-stats
PastReturn	0.0017	(10.53)***	0.0018	(10.5)***	0.0018	(10.50)***	0.0018	(10.41)***
AD			-0.0058	(-3.21)***	-0.0057	(-3.19)***	0.0000	(0.01)
*PastReturn*AD*					-0.0001	(-0.88)	0.0000	(0.02)
$RelativeReturn^{r=1}$	0.0235	(8.23)***	0.0234	(8.16)***	0.0234	(8.16)***	0.0232	(7.78)***
$RelativeReturn^{r=2}$	0.0073	(3.72)***	0.0073	(3.69)***	0.0073	(3.69)***	0.0083	(3.86)***
$RelativeReturn^{r=4}$	0.0013	(0.67)	0.0013	(0.67)	0.0013	(0.66)	0.0019	(0.91)
$RelativeReturn^{r=5}$	0.0146	(4.57)***	0.0148	(4.62)***	0.0148	(4.64)***	0.0169	(5.05)***
$RelativeReturn^{r=1}*AD$							0.0011	(0.17)
$RelativeReturn^{r=2}*AD$							-0.0089	(-2.14)**
$RelativeReturn^{r=4}*AD$							-0.0044	(-1.08)
$RelativeReturn^{r=5}*AD$							-0.0151	(-3.21)***
LnSize	-0.0140	(-15.60)***	-0.0139	(-15.55)***	-0.0139	(-15.56)***	-0.0140	(-15.58)***
Stdev	0.0007	(4.54)***	0.0007	(4.53)***	0.0007	(4.52)***	0.0007	(4.36)***
Fees	0.0128	(0.96)	0.0128	(0.96)	0.0128	(0.96)	0.0126	(0.95)
LnAge	-0.0015	(-4.99)***	-0.0015	(-5.00)***	-0.0015	(-5.01)***	-0.0015	(-5.00)***
Turnover	0.0001	(3.47)***	0.0001	(3.48)***	0.0001	(3.47)***	0.0001	(3.41)***
Obs. (R^2)	15794	(0.2565)	15794	(0.2569)	15794	(0.2569)	15794	(0.2573)

Note. This table presents the advertising effect on fund redemptions using fixed effects regression. The *t*-statistics based on the Newey-West (1987) covariance matrix are reported in parenthesis. Statistical significance is denoted only for relative performance rankings indicators $RelativeReturn^{r}$, *AD* and the interaction terms $RelativeReturn^{r}*AD$. *LnSize*, *Stdev*, *Fees*, *LnAge*, and *Turnover* are control variables. Obs. is the number of observations and R^2 is the fixed effects regressions' R-squared value. * Significance at 10% level. **Significance at 5% level. *** Significance at 1% level.

5.2 Does Advertising Moderate the Existing Redemption-Performance Relation?

In Column 2 of Table 4, this study gives a report on the results of whether

advertising affects investors' redemption decisions. The evidence confirms the second hypothesis in this study, showing that the coefficient on $AD_{j,[t-1,t-3]}$ is significant and negative, indicating that fund family advertising can indeed significantly lower the advertised family member funds' redemptions. With respect to the sign on the coefficients of $RelativeReturn^{r}_{i,j,[t-1,t-12]}$, the results are consistent with the results in the previous section, showing that fund redemptions are sensitive to a fund's relative performance (except for $RelativeReturn^{r=2}_{i,j,[t-1,t-12]}$). This further supports the idea that investors tend to sell their good performing investments and are not reluctant to dispose their underperforming investments (O'Neal 2004; Ivković and Weisbenner 2009).

The interaction term $PastReturn_{i,j,t-1} * AD_{j,t-1}$ is used to examine the primary hypothesis in this study. After controlling a past year's returns, in Column 3 of Table 4 it is showed that the sign on the coefficient of interactive term $PastReturn_{i,j,[t-1,t-12]} * AD_{j,[t-1,t-3]}$ is significant and negative (except for the time fixed effects model). Furthermore, in Column 4 of Table 4 shows that the sign on the coefficient of interactive term $RelativeReturn^{r}_{i,j,[t-1,t-12]} * AD_{j,[t-1,t-3]}$ is significantly negative for top-performing funds and moderate-below-market return funds ($RelativeReturn^{r=2}_{i,j,[t-1,t-12]}$, referred to as moderate-losers in this study), that is, I find evidence supporting the notion that investors are more reluctant to sell their

appreciated investments (moderate-losers) when their allocations are with high fund family advertising than those with low fund family advertising, and in turn they are more reluctant to redeem losing mutual funds with high levels of fund family advertising than others whose fund family has low level of advertising. This study finds evidence that advertising enhances the existing redemption-performance relation.[11]

Moreover, this study applies psychological theories to explain the findings. In terms of losing fund holders, according to the cognitive dissonance theory, this study infers that the effects of advertising may re-enforce the efficacy of investors' recent choices and adjusts their beliefs to support past decisions. Fund families' advertising lowers the level of cognitive dissonance and gives investors more incentive to continue to hold losing funds. For winning fund holders, however, according to Kirmani and Wright (1989) and Vakratsas and Ambler (1999), I infer that advertising may signal product quality, increase consumer satisfaction, brand equity and consumer loyalty (Chen 2004). This may lead investors being satisfied with their past decisions to have propensity to keep their investments in the domain of certain gains.

[11] Following Grinblatt and Keloharju (2001), investments are referred to as moderate losers when they perform negatively but are not the worst.

Table 5 Fund Fixed Effects Model for Redemption-Performance Relation

	(1)		(2)		(3)		(4)	
	Coefficient	T-stats	Coefficient	T-stats	Coefficient	T-stats	Coefficient	T-stats
PastReturn	0.0007	(24.03)***	0.0007	(23.78)***	0.0007	(23.36)***	0.0007	(23.99)***
AD			-0.0095	(-5.19)***	-0.0092	(-5.09)***	-0.0065	(-2.19)**
*PastReturn*AD*					-0.0002	(-3.07)***	-0.0002	(-2.25)***
$RelativeReturn^{r=1}$	0.0065	(3.20)***	0.0062	(3.06)***	0.0063	(3.11)***	0.0058	(2.71)***
$RelativeReturn^{r=2}$	0.0022	(1.31)	0.0022	(1.23)	0.0022	(1.28)	0.0025	(1.31)
$RelativeReturn^{r=4}$	0.0047	(2.67)***	0.0048	(2.67)***	0.0046	(2.59)***	0.0054	(2.75)***
$RelativeReturn^{r=5}$	0.0247	(11.46)***	0.0250	(11.56)***	0.0250	(11.56)***	0.0263	(11.02)***
$RelativeReturn^{r=1}*AD$							0.0049	(0.83)
$RelativeReturn^{r=2}*AD$							-0.0023	(-0.55)
$RelativeReturn^{r=4}*AD$							-0.0058	(-1.31)
$RelativeReturn^{r=5}*AD$							-0.0095	(-1.92)*
Obs. (R^2)	15794	(0.2402)	15794	(0.2413)	15794	(0.2416)	15794	(0.2419)

Note. This table presents the advertising effect on fund redemptions using fund fixed effects regression. The *t*-statistics based on the Newey-West (1987) covariance matrix are reported in parenthesis. Statistical significance is denoted only for relative performance rankings indicators $RelativeReturn^{r}$, *AD* and the interaction terms $RelativeReturn^{r}*AD$. The same control variables as in Table 4 are included in the models, but their coefficients are not explicitly reported. Obs. is the number of observations and R^2 is the fixed effects regressions' R-squared value. * Significance at 10% level. **Significance at 5% level. *** Significance at 1% level.

5.3 Major findings

In Taiwan, capital-gains taxes are not imposed on investors, therefore investors' trading behavior can be assumed as only slightly affected by tax-motivated trading. Their behavior, then, should be simple and being less influenced by the external interferes. In short, the empirical evidence of this study establishes two key findings. First, confirming Gallaher Kaniel and Starks (2008) hypothesis and the proposition in this study, I find that the relation between advertising and redemptions is significantly negative, indicating advertising can help retain investors in the funds. Second, the

evidence shows that the coefficients of interactive effects between advertising and past performance are negative and significant.

Moreover, this study shows that investors are less willing to sell better performing funds with high fund family advertising compared to those with low fund family advertising, and they are more reluctant to redeem moderate on below-market return funds with high fund family advertising than others whose fund family has low advertising. For holder of losing funds, according to the literature on consumer behavior and on behavioral finance, this study infers that advertising may re-enforce the efficacy of recent investor decisions and adjust their beliefs to support past decisions. A fund family's advertising may reduce investors' cognitive dissonance and enhance the participants' confidence in the fund quality, thus giving investors more incentive to continue to hold losing mutual funds. For winning fund holders, according to signal theory, I infer that advertising may create brand equity and brand loyal (Chen 2004) to increase investors' risk tolerance that gives winning fund holders the propensity to retain their investments in the domain of certain gains. The findings above thus support the hypothesis that advertising affects the pattern of existing redemption-performance relations.

6. Conclusions and Suggestions

This study examines how changes in marketing information and investment performances affect investor's decision-makings process under uncertainty. Under the assumption that the investor's utility for gains and for losses must be determined simultaneously rather than measuring for gains and losses separately, this study offers several theoretical results for CPT investors' response to changes in their investment performance, and investigates how advertising affects the existing pattern of investors' decision making.

The theoretical evidence indicates that CPT investors have propensity to liquidate their depreciated assets, and have tendency to sell their appreciated assets, and CPT investors with higher risk tolerance level to their investments have less motivation to sell their holdings than ones with lower risk tolerance level when facing a paper gain or a paper loss. This study also offers empirical evidence to examine the theoretical proposition employing mutual fund cash flows data. The key findings emerge from this study. First, advertising can help funds stem cash outflows. Second, the evidence shows that investors are less willing to sell high performing investments with high fund family advertising than investments with low fund family advertising, and are more reluctant to redeem losing mutual funds with high fund family advertising than funds with low fund family advertising.

According Kahneman and Tversky (1979), CPT posits that investor risk attributes should differ between the domain of possible losses and certain gains. A possible explanation from this study is that advertising seems to re-enforce the efficacy of recent investor decisions, and adjust their beliefs to confirm past decisions, thus giving investors more incentive to continue holding losing funds. On the other hand, the evidence supports that advertising may signal product quality, increase consumer satisfaction, brand equity and consumer loyalty (Kirmani and Wright 1989; Vakratsas and Ambler 1999). That may lead investors to be satisfied with their past decisions to have a greater propensity to retain their winning investments.

As a conclusion, this study supports the hypotheses that advertising can influence the pattern of existing redemption-performance relations. This result is valuable from the perspectives of both financial consumer and financial services. For investors, the previous literature shows that funds with a history of higher performance did not guarantee persistent performance but poorly performing funds did (Carhart 1997). Therefore, consumers who are more reluctant to redeem losing mutual funds with high fund family advertising may lead to investment losses. For financial services, advertising could help stem cash flows out of their management funds.

References

Abdellaoui, Mohammed, Han Bleichrodt and Corina Parachiv (2007), "Loss aversion under prospect theory: A parameter-free measurement," *Management Science*, 53(10), 1659-1674.

Barber, Brad M., Terrance Odean and Lu Zheng (2005), "Out of sight, out of mind: The effects of expenses on mutual fund flows," *Journal of Business*, 78(6), 2095-2110.

Bollen, Nicolas P. B. (2007), "Mutual fund attributes and investor behavior," *Journal of Financial and Quantitative Analysis*, 42(3), 638-708.

Booij, Adam S., Bernard M. S. van Praag and Gijs van de Kuilen (2010), "A parametric analysis of prospect theory's functional for the general population," *Theory and Decision*, 68(1-2), 115-148.

Boulding, William, Ajay Kalra, Richard Staelin and Valarie A. Zeithaml (1993), "A dynamic process model of service quality: From expectations to behavioral intentions," *Journal of Marketing Research*, 30(February) 7-27.

Campbell, John Y. (2006), "Household finance," *Journal of Finance*, 61(4), 1553-1604.

Campbell, John Y. and John C. Cochrance (1999), "By force of habit: A consumption-based explanation of aggregate stock market behavior," *Journal of Political Economy*, 107(2), 205-251.

Carhart, Mark M. (1997), "On persistence in mutual fund performance," *Journal of Finance*, 52(1), 57-82

Chemmanur, Thomas and An Yan (2009), "Product market advertising and new equity issues," *Journal of Financial Economics*, 92(1), 40-65.

Chen, Miao-Ling (2004), "The effects of advertising on retail price competition under vertical restraint: A Japanese case," *Journal of Business Research*, 57(3), 277-283.

Chen, Miao-Ling, Kuan-Ling Lai and Chi-Lu Peng (2011), "The disposition effect and mutual fund marketing, Working paper, National Sun Yat-sen University.

Chen, Ming-Chi, Chi-Lu Peng, So-De Shyu and Jing-Hong Zeng (2011), "Market states and the effect on equity REIT returns due to changes in monetary policy stance," *Journal of Real Estate Finance and Economics*, Forthcoming.

Chevalier, Judith and Glenn Ellison (1997), "Risk-taking by mutual funds as a response to incentives," *Journal of Political Economy*, 105(6), 1167-1200.

Corter, James E. and Yuh-Jia Chen (2006), "Do investment risk tolerance attitudes predict portfolio risk?" *Journal of Business and Psychology*, 20(3), 369-381.

Cronqvist, Henrik (2006), "Advertising and portfolio choice," Working paper, Ohio State University, USA.

Dierkes, Maik, Carsten Erner and Stefan Zeisberger (2010), "Investment horizon and the attractiveness of investment strategies: A behavioral approach," *Journal of Banking and Finance,* 34(5), 1032-1046.

Dimmock, Stephen G. and Roy Kouwenberg (2010), "Loss-aversion and household portfolio choice," *Journal of Empirical Finance*, 17(3), 441-459.

Durand, Robert B., Marta Simon and Alex Szimayer (2009), "Anger, sadness and bear markets," *Applied Financial Economics*, 19(5), 357-369.

Erdem, Tülin and Michael P. Keane (1996), "Decision-making under uncertainty: Capturing choice dynamics in turbulent consumer goods markets," *Marketing Science*, 15 (1), 1-20.

Erdem, Tülin, Ying Zhao and Ana Valenzuela (2004), "Performance of store brands: A cross-country analysis of consumer store brand preferences, perceptions and risk," *Journal of Marketing Research*, 41 (February), 86-100.

Ehrlich, Danuta, Isaiah Guttman, Peter Schönbach and Judson Mills (1957), "Postdecision exposure to relevant information," *Journal of Abnormal and Social Psychology*, 54(1), 98-102.

Fry, Tim, Richard Heaney and Warren McKeown (2007), "Will investors change their superannuation fund given the choice?" *Accounting and Finance*, 47(2), 267-283.

Gallaher, Steven, Ron Kaniel and Laura Starks (2008), "Advertising and mutual funds: From families to individual funds," Working paper, University of Texas at Austin,

USA.

Garvey, Ryan and Anthony Murphy (2004), "Are professional traders too slow to realize their losses," *Financial Analysts Journal*, 60(4), 35-43.

Goetzmann, William N. and Nadav Peles (1997), "Cognitive dissonance and mutual fund investors," *Journal of Financial Research*, 20(2), 145-158.

Grinblatt, Mark and Matti Keloharju (2001), "What makes investors trade?" *Journal of Finance*, 56(2), 589-616.

Gurevich, Gregory, Doron Kliger and Ori Levy (2009), "Decision-making under uncertainty: A filed study of cumulative prospect theory," *Journal of Banking and Finance*, 33(7), 1221-1229.

Homburg, Christian, Nicole Koschate and Wayne D. Hoyer (2005), "Do satisfied customers really pay more? A study of the relationship between customer satisfaction and willingness to pay," *Journal of Marketing*, 69(April), 84-96.

Huang, Jennifer C., Kelsey D. Wei and Hong Yan (2007), "Participation costs and the sensitivity of fund flows to past performance," *Journal of Finance*, 62(3), 1273-1311.

Hwang, Soosung and Steve E. Satchell (2010), "How loss averse are investors in financial markets?" *Journal of Banking and Finance*, 34(10), 2425-2438.

Ippolito, Richard A. (1992), "Consumer reaction to measures of poor quality: Evidence from the mutual fund industry," *Journal of Law and Economics*, 35(1), 45-70.

Ivković, Zoran and Scott Weisbenner (2009), "Individual investor mutual fund flows," *Journal of Financial Economics*, 92(2), 223-237.

Jain, Prem C. and Joanna, Shuang Wu (2000), "Truth in mutual fund advertising: Evidence on future performance and fund flows," *Journal of Finance*, 55(2), 937-958.

Kahneman, Daniel and Amos Tversky (1979), "Prospect theory: An analysis of decision under risk," *Econometrica*, 47(2), 263-291.

Kalra, Ajay and Mengze Shi (2010), "Consumer value-maximizing sweepstakes and

contests," *Journal of Marketing Research*, 47(2), 287-300.

Kaustia, Markku (2010), "Prospect theory and the disposition effect," *Journal of Financial and Quantitative Analysis*, 45(3), 791-812.

Kirmani, Amna and Peter Wright (1989), "Money talks: Advertising extravagance and perceived product quality," *Journal of Consumer Research*, 16(December), 344-353

Kliger, Doron and Ori Levy (2009), "Theories of choice under risk: Insights from financial markets," *Journal of Economic Behavior and Organization*, 71(2), 330-346.

Lichtenstein, Donald R., Patrick J. Kaufmann and Sanjai Bhagat (1999), "Why consumers choose managed mutual funds over index funds: Hypotheses from consumer behavior," *Journal of Consumer Affairs*, 33(1), 187-205.

Lind, Douglas A., William G. Marchal and Samuel A. Wathen (2004), *Statistical Techniques in Business and Economics*. McGraw-Hill/Irwin, Boston, MA.

Luo, Xueming (2008), "When marketing strategy first meets Wall Street: Marketing spending and firms' initial public offerings," *Journal of Marketing*, 72(September), 98-109.

McAlister, Leigh, Raji Srinivasan and MinChung Kim, (2007), "Advertising, research and development, and systematic risk of firm, *Journal of Marketing*, 71(1), 35-48.

McColl-Kennedy, Janet R. and Richard E. Fetter Jr. (1999), "Dimensions of consumer search behavior in services," *Journal of Services Marketing*, 13(3), 242-265.

Nanda, Vikram, Z. Jay Wang and Lu Zheng (2004), "Family values and star phenomenon: Strategies of mutual fund families," *Review of Financial Studies*, 17(3), 667-698.

Newey, Whitney K. and Kenneth D. West (1987), "A simple, positive semidefinite heteroskedasticity and autocorrelation consistent covariance matrix," *Econometrica*, 55(3), 703-708.

O'Neal, Edward S. (2004), "Purchases and redemption patterns of US equity mutual funds," *Financial Management*, 33(1), 63-90.

Odean, Terrance (1998), “Are investors reluctant to realize their losses?” *Journal of Finance*, 53(5), 1775-1798.

Peng, Chi-Lu, Miao-Ling Chen and An-Pin Wei (2011) “Advertising, risk tolerance and investor’s behaviors: Theory and evidence from the mutual fund industry,” *The 2011 World Marketing Congress*. Academy of Marketing Science, Reims, France.

Peng, Chi-Lu, Miao-Ling Chen, So-De Shyu and An-Pin Wei (2011) “When is money likely to be smart: Evidence from mutual fund market in Taiwan,” *Investment Analysts Journal*, 73, 13-25.

Rickwook, Catherine and Lesley White (2009), “Pre-purchase decision-making for a complex service: Retirement planning,” *Journal of Services Marketing*, 23(3), 145-153.

Scott, Carol A. (1976), “The effects of trial and incentives on repeat purchase behavior,” *Journal of Marketing Research*, 13(3), 263-269.

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(3), 777−790.

Shrider, David G. (2009), “Running from a bear: How poor stock market performance affects the determinants of mutual fund flows,” *Journal of Business Finance and Accounting*, 36(7), 987-1006.

Shu, Pei-Gi, Yin-Hua Yeh and Takeshi Yamada (2002), “The behavior of Taiwan mutual fund investors: Performance and fund flows,” *Pacific Basin Finance Journal*, 10(5), 583-600.

Sirri, Erik R. and Peter Tufano (1998), “Costly search and mutual fund flows,” *Journal of Finance*, 53(5), 1589-1622.

Starmer, Chris (2000), “Developments in non-expected utility theory: The hunt for a descriptive theory of choice under risk,” *Journal of Economic Literature*, 38(2), 332-382.

Stracca, Livio (2002), “The optimal allocation of risks under prospect theory,” Working paper, European Central Bank.

Turley, L.W. and Ronald P. LeBlanc (1993), “An exploratory investigation of

consumer decision making in the service sector," *Journal of Services Marketing*, 7(4), 11-18.

Tversky, Amos and Daniel Kahneman (1992), "Advances in prospect theory: Cumulative representation of uncertainty," *Journal of Risk and Uncertainty*, 5(4), 297-323.

Vakratsas, Demetrios and Tim Ambler (1999), "How advertising works: What do we really know?" *Journal of Marketing*, 63(1), 26-43.

Wei, An-Pin, Miao-Ling Chen and Chi-Lu Peng (2011), "The advertising spillover effect: Implications for mutual fund families, *Journal of Management*, Forthcoming.

Wright, William F. and Gordon H. Bower (1992), "Mood effects on subjective probability assessment," *Organizational Behavior and Human Decision Process*, 52(2), 276-291.

Xiao, Jing J., M. J. Alhabeeb, Gong-Soog Hong and George W. Haynes (2001), "Attitude toward risk and risk-taking behavior of business-owing families," *Journal of Consumer Affairs*, 35(2), 307-325.

Yao, Rui, Sherman D. Hanna and Catherine P. Montalto (2002), "Factors related to meeting the capital accumulation ratio guideline," *Financial Services Review*, 11(2), 153-171.

Zheng, Lu (2008), "The behavior of mutual fund investors," *Handbook of Intermediation and Banking*, 259-283, Elsevier.

Resume

Chi Lu (Edward) Peng

PhD Candidate in Finance, National Sun Yat-sen University
Master in Finance, I-Shou University
chilupeng@gmail.com

Journal articles

1. Chen, MC., **CL. Peng**, SD. Shyu and ZH. Zeng. Market states and the effect on equity REIT returns due to changes in monetary policy stance. *Journal of Real Estate Finance and Economics*, Forthcoming【SSCI】(國科會財務領域A級期刊)
2. Wei, AP., ML. Chen, and **CL. Peng**, The advertising spillover effect: Implications for mutual fund families, *Journal of Management* (管理學報), Forthcoming【TSSCI】
3. **Peng, CL**., ML. Chen, SD. Shyu and AP. Wei (2011) When is money likely to be smart? Evidence from mutual fund investors in Taiwan, *Investment Analysts Journal*, 73, 13-25.【SSCI】
4. **Peng, CL.**, JS. Lee, KJ. Chan and SD. Shyu (2010). Momentum effect of high- and low-performing stocks in Taiwan: A quantile regression analysis. *International Research Journal of Finance and Economics*, 52, 104-112.【EconLit】

Conference papers

1. **Peng, CL.**, ML. Chen and AP. Wei (2011) Advertising, risk tolerance and investor's behaviors: Theory and evidence from the mutual fund industry, The 2011 World Marketing Congress. Academy of Marketing Science, Reims, France.
2. **Peng, CL**., ML. Chen and AP. Wei (2010) The effect of advertising on investor's post-purchase decisions: Evidence from the mutual fund industry? The 18th Conference on the Theories and Practices of Securities and Financial Markets, Kaohsiung, Taiwan.
3. **Peng, CL**., ML. Chen, SD. Shyu and AP. Wei (2010) The smart money effect, mutual fund cash flows and investor sentiment. The 18th Conference on the Theories and Practices of Securities and Financial Markets, Kaohsiung, Taiwan.
4. Chen, ML. and **CL. Peng** (2009) Marketing, innovation spending and investment risk. 2009 International Conference of Taiwan Finance Association, Taoyuan, Taiwan.
5. **Peng, CL**., JS. Lee and SD. Shyu, (2008) The difference in the momentum effects of overperforming versus underperforming stock returns using quantile regression. 8th Accounting and Finance Conference, Xiamen University, Xiamen, China.
6. **Peng, CL**., JS. Lee and JR. Li (2006) The disposition effect of Taiwanese open-end mutual fund investors: Recursive threshold model in variable. Western Economic Association International 81st Annual Conference, San Diego, USA.