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The role of individual investors' gambling preference in January effect

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THE ROLE OF INDIVIDUAL INVESTORS' GAMBLING PREFERENCE IN JANUARY EFFECT

by

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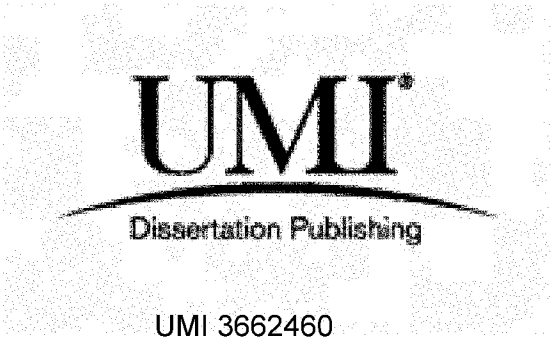

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ABSTRACT

Rozeff and Kinney (1976) were the first to find that stocks in NYSE provide abnormally large returns in January. Following researchers such as Keim (1983), Branch and Chang (1990), and Bhardwaj and Brooks (1992), examine this "January effect" and find that small firms and low price stocks are more prone to this effect. The January effect is so robust that it is not a unique phenomenon in U.S., but also occurs in other countries (e.g., Gultekin and Gultekin, 1983; Kato and Schallheim, 1985; Tong, 1992); In addition, it not only occurs in the stock market, but also in the bond market (e.g., Chang and Pinegar, 1986; Maxwell, 1998; Starks, Yong, and Zheng, 2006) and in option market (Doran, Jiang, and Peterson, 2012).

The current literature provides two main hypotheses to explain the disproportionate January returns in financial markets: the tax-loss selling hypothesis (Wachtel. 1942) and the window dressing hypothesis (Haugen and Lakonishok, 1987. Both theories address the illiquidity factor of individual and institutional investors at the end of the year. In this dissertation, I revisit the January effect in the U.S. stock market, and examine the role of investors' appetite for lottery-type stocks in asset pricing in January.

I utilize five variables – stock price (PRC), idiosyncratic skewness (ISKEW), idiosyncratic volatility (IVOL), maximum daily return (MAX), and the George and Hwang ratio (GH-Ratio) – as measures of stocks' lottery features.

Partitioning stocks into quintiles sorted on these lottery-type characteristics, I find that lottery-type stocks outperform in January from the period of 1965 to 2008, and this outperformance is more significant among past loser stocks. In order to control other variables that may explain stock returns, I also employ Fama-MacBeth (1973) regressions to re-examine the findings, and the results are consistent. Next, to address the issue of individual investors' gambling preference, I equally divide the sample into three sub-samples based on stocks institutional ownership. I find abnormally greater performance from lottery-type stocks among past losers in stocks with the lowest institutional holdings (Group IHL), but not in stocks with the highest institutional holdings (Group IHH). Moreover, the greater performance of lottery-type stocks persists up to six months beyond January. Lastly, I investigate the implication of the "other January effect" (Cooper, McConnell, and Ovtchinnikov (2006)) on lottery-type stocks. The results indicate that investors are more confident to invest in lottery-type stocks in years with positive January market return.

APPROVAL FOR SCHOLARLY DISSEMINATION

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CHAPTER 1

INTRODUCTION

General Overview

The January effect remains a robust anomaly since its discovery by Rozeff and Kinney (1976). The were the first to provide empirical evidence of the effect in the U.S. stock market. They find that stocks in the NYSE have significantly larger average monthly returns in January compared to other months. Since then, subsequent studies investigate this effect in other developed capital markets, including Europe (Gultekin and Gultekin, 1983) and East Asia (Kato and Schallheim, 1985; Tong, 1992), and find strong international evidence for the effect. In addition, it not only occurs in the stock market, but also in the bond market (e.g., Chang and Pinegar, 1986; Maxwell, 1998; Starks, Yong, and Zheng, 2006) and the option market (Doran, Jiang, and Peterson, 2012).

Numerous researches have attempted to explain the abnormally large return in January. Among them, there are two prominent theories. The first one is the tax-loss selling hypothesis (Wachtel, 1942), which suggests that investors, especially individual investors, realize their losses to gain tax benefits by selling past loser stocks at the end of the year. The second one is the window dressing hypothesis (Haugen and Lakonishok, 1987), which suggests that investors, especially institutional investors, in order to present a more attractive portfolio of stocks to their fund holders in the year-end reports, will sell past loser stocks at the end of the year. Both hypotheses suggest that at the beginning of

the New Year, when these selling pressures disappear, stock prices will go up and the January effect is observed. Many empirical studies support these two hypothesis (e.g., Ritter and Chopra, 1989; Lakonishok, Shleifer, Thaler, and Vishny, 1991; Jones, Lee, and Apenbrink, 1991; Poterba and Weisbenner, 2001; Chen and Singal, 2004).

In this dissertation, I examine the role of investors' gambling preference in stock returns in January. Evidence shows that people are more likely to engaged in gambling activities at the New Year, such as casino gambling and lottery play as a way to celebrate, since they receive bonus from work or cash from family at the end of the year, as an alternative, we should also expect that stocks with lottery-like characteristics are more attractive to investors in the New Year. I use five variables – stock price (PRC), idiosyncratic skewness (ISKEW), idiosyncratic volatility (IVOL), maximum daily return (MAX), and George and Hwang ratio (GH-Ratio) – to proxy for lottery-like characteristics, and find that stocks list in NYSE/AMEX/ NASDAQ with lottery-like features outperform other stocks in January from 1965 – 2008.

Moreover, the outperformance of lottery-type stocks is more pronounced in past losers. In addition, by separating stocks based on their percentage of institutional ownership, I find that the loser lottery-type stocks effect in January is observed mainly from stocks with high individual investors' holdings. In summary, my findings indicate that individual investors gambling preference plays a very important role in explaining the January effect. Moreover, I also examine the persistence of the outperformance of lottery-type stock portfolio formed in December, and find that the outperformance persists beyond January. Lastly, I also investigate the implication of "the other January effect" (Cooper, McConnell, and Ovtchinnikov (2006)) on lottery-type stocks. "The other

January effect" basically states that the stock market return in January is the precursor of market returns for the rest of the year. In other words, the market returns from February to December in years with a positive January market return are higher than the corresponding returns in years with a negative January market return. My results demonstrate that in years when the market has positive excess return in January, lottery-type stocks outperform non-lottery-type stocks for the rest of the year, but in years when the market has negative excess return in January, there is no difference of performance between the two groups of stocks. My results seem to indicate that investors are more passionate about gambling in the stock market when the market sentiment in January is strong.

Organization

The remainder of the paper is organized as follows. In Chapter 2, I review the literature on January effect, investors' gambling preference, and other January effect, and develop my primary hypothesis. Chapter 3 provides a discussion of the sample selection procedure, and five characteristics to proxy for lottery-type stocks. In Chapter 4, I discuss methodology and report primary empirical results. Chapter 5 concludes this study.

CHAPTER 2

LITERATURE REVIEW

January Effect

The January effect has been a robust anomaly since Rozeff and Kinney (1976) first provided the empirical evidence for the U.S. stock market. They find that stocks in NYSE have significantly larger average monthly returns in January compared to other months. Subsequent studies such as Keim (1983) confirm the January effect in U.S. stock market, and he finds that small firms are more prone to this effect. Subsequent researchers (e.g., Branch and Chang, 1990; Bhardwaj and Brooks, 1992) further examine this negative relationship between firm size and the January return, and argue that the January effect is a low price phenomenon instead of a size effect. Branch and Chang (1990) use a sample from 1971 – 1983 and find that low price stocks that performed poorly in December tend to rebound in January. Other research also yields international evidence of the January effect in the stock market (e.g., Gultekin and Gultekin, 1983; Kato and Schallheim, 1985; Tong, 1992).

The January effect is so robust that it is not a unique phenomenon in stock market, but also appears in the bond market (e.g., Chang and Pinegar, 1986; Maxwell, 1998; Starks, Yong, and Zheng, 2006) and in option market (Doran, Jiang, and Peterson, 2012). Chang and Pinegar (1986) find there is an excess return for the non-investment-grade bonds in January, but not for treasury bonds or investment-grade bonds.

In the option market, Doran, Jiang, and Peterson (2012) find the January call options are more actively traded and have higher retail demand.

Numerous researchers have attempted to explain the abnormally large return in January. Among the reported results, there are two prominent theories. The first one is the tax-loss selling hypothesis (Wachtel, 1942). This theory suggests that investors, especially individual investors, realize their losses to gain tax benefits by selling past loser stocks at the end of the year. When investigating the seasonal pattern in 16 major developed countries, Gultekin and Gultekin (1983) find stock market gain abnormal large returns in January in 15 of them, but in U.K., it is April. Those months coincide with the turn of the tax year, and it seems that investors sell their stocks at the end of the tax year because of liquidity. The second theory is the window dressing hypothesis (Haugen and Lakonishok, 1987).This theory suggests that investors, especially institutional investors, in order to present a more attractive portfolio of stocks to their fund holders in the year-end reports, will sell past loser stocks at the end of the year. Both hypotheses suggest that at the beginning of the New Year, when these selling pressures disappear, stock price will go up and the January effect is observed. Many empirical studies support these two hypothesis (e.g., Ritter and Chopra, 1989; Lakonishok, Shleifer, Thaler, and Vishny, 1991; Jones, Lee, and Apenbrink, 1991; Poterba and Weisbenner, 2001; Chen and Singal, 2004).

Investors' Gambling Preference

More recently, several studies have explored yet another explanation for the relative higher returns in January arising out of another behavioral bias of investors, which emphasizes that it is the investors' psychological states that tend to be different in

January relative to other months. They argue that the unique psychological tendency of investors in January may influence their investing decision, and thus affect security pricing in that month. For example, Ciccone (2001) believes that investor optimism could at least partly explain the January effect. Doran, Jiang, and Peterson (2012) investigate U.S. stock and option markets, and the Chinese stock market, and find that the relatively strong gambling preference has significant influence on prices and returns of financial assets with lottery features in the New Year months in these two countries.

When analyzing investors' behavior, prior literature tends to separate institutions and individuals as two different types of investors. More specifically, institutional investors are believed to be more sophisticated, rational, and informed than individual investors. Therefore, the latter are more prone to behavioral biases. Many researches use individual investors' behavioral biases to explain stock market puzzles. For example, several studies attribute the Monday seasonal to individual investors because they are less likely to be affected by brokers' recommendation during the weekends (Lakonishok and Maberly, 1990; Chan, Leung, and Wang, 2004); Several studies address the individual investors' role in disposition effect-induced momentum (Odean, 1998; Hur, Pritamani, and Sharma, 2010); There is another behavioral bias that prominently influences individual investors' trading pattern – the preference for gambling. Statman (2002) states that human psychology, such as overconfidence, emotional thinking, and passions for games cause investors to participate in stock trading. For example, Coelho, Taffler, and John (2010) examine the trading of the stocks of bankrupt firms, and find that firms in Chapter 11 status are heavily traded by retail investors who are also the main shareholders. Doran, Jiang, and Peterson (2012) find that in the US option markets, retail

investors exhibit stronger preference for out-of-the-money (OTM) call options in January compared to other months because cheap and highly skewed payoffs make this type of call options candidates for gambling. They also find that retail sentiment is more bullish in stocks with lottery features in January.

Hypothesis Development

In this dissertation, I make an attempt to link the literature of individual investors' preference of lottery-type stocks and the January anomaly. My main hypothesis is as follows.

Hypothesis: The greater performance of lottery-type stocks in losers than in winners in January are more concentrated among stocks with high individual investors ownership.

This paper examines the relationship between the stocks' monthly returns, especially in January, and their lottery features using all stocks traded on the NYSE, AMEX, and NASDAQ over the period between 1965 and 2008. I find that lottery-type stocks (low price (PRC), high idiosyncratic volatility (IVOL), high idiosyncratic skewness (ISKEW), high maximum daily return (MAX), and low George and Hwang ratio (GH-Ratio)) have stronger performance in January relative to non-lottery-type stocks. Moreover, the outperformance of lottery-type stocks is more pronounced for past losers. In addition, by separating stocks based on their percentage of institutional ownership, I find that the loser lottery-type stocks' January effect comes mainly from stocks with high individual investors' holdings. In summary, my findings indicate that individual investors gambling preference plays a very important role in explaining the January effect. Moreover, I also examine the persistence of the outperformance of the

lottery-type stock portfolio formed in December, and find that the outperformance persists beyond January. Finally, I investigate the implication of "the other January effect" (Cooper, McConnell, and Ovtchinnikov (2006)) on lottery-type stocks. "The other January effect" basically states that the stock market return in January is the precursor of market returns for the rest of the year. In other words, the market returns from February to December in years with a positive January market return are higher than the corresponding returns in years with a negative January market return. My results demonstrate that in years when the market has positive excess return in January, lottery-type stocks outperform non-lottery-type stocks for the rest of the year, but in years when the market has negative excess return in January, there is no difference in performance between the two groups of stocks. My results seem to indicate that investors are more passionate to gamble in the stock market when the market sentiment in January is strong.

CHAPTER 3

SAMPLE SELECTION AND DATA DESCRIPTION

Sample Selection

The sample in my study includes all NYSE, NASDAQ and AMEX common stocks (share codes 10 and 11) listed in the Center for Research in Securities Prices (CRSP) monthly and daily files. My sample period covers January 1965 through December 2008. Institutional holding data comes from the Thomson-Reuters Institutional Holdings (13F) Database and covers the period from December 1978 to December 2008. I obtain the Fama and French factor returns from Kenneth French's website. When examining how the market return in January affects lottery-type stocks performance, I use CRSP equal-weighted market return (including dividends) minus the one-month T-bill rate to represent the excess market return. The one-month T-bill rate is from Kenneth French's website.

Variable Construction

Following two prior fundamental works on lottery-type stocks from Kumar (2009) and Doran, Jiang, and Peterson (2012), I use stock price (PRC), idiosyncratic skewness (ISKEW), and idiosyncratic volatility (IVOL) to identify lottery-type stocks.

Stocks must be cheap in the first place to be perceived as lotteries because the goal of stock market gamblers is to make huge profits with cheap bets.[1] In order to make profits, cheap stocks also need to generate extreme positive returns by firm-specific factors, and the more volatile the stock is, the more likely the investors are to believe that the extreme positive return would happen again in the future.

PRC is the closing stock price at the end of each month. ISKEW and IVOL for each stock are estimated as follows: at the end of each month t, I run the following firm-level time-series regression for each stock using the stock's past six months (month t-5 to month t) daily return data (I exclude stocks that have missing returns in the past six months):

$$R_{i,d} - RF_d = a_{0,i} + a_{1,i}(R_{MKT,d} - RF_d) + a_{2,i} SMB_d + a_{3,i} HML_d + e_{i,d} \quad (1)$$

where $R_{i,d}$ is the stock return of security i on day d, $R_{MKT,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on size factor on day d, and HML_d is the return on book-to-market factor on day d. All these Fama and French factor returns and risk-free rate data are from Kenneth French's website. From equation (1), ISKEW and IVOL for stock i on month t is the third moment and the standard deviation of the residuals, respectively.

In addition, I also add two variables – MAX (Bali, Cakici, and Whitelaw, 2011; BCW hereafter) and GH-Ratio (George and Hwang, 2004; GH hereafter) – as our lottery-type stocks features. MAX for stock i in month t is the maximum daily return in the month (I exclude stocks with less than 12 trading days in the month). Since investors who

[1] Cheap stocks in this paper are low price stocks so that individual investors can easily afford these stocks. I do not mean that cheap stocks are underpriced stocks based on any theoretical model such as the CAPM or three-factor model.

have a preference for lottery-type stocks expect extreme positive return would repeat in the future, they will find stocks with high MAX more attractive. GH-Ratio is calculated as $P_{i,t}$ / $high_{i,t}$, where $P_{i,t}$ is the price of stock i at the end of month t, and $high_{i,t}$ is the highest price of stock i during the 12-month period that ends on the last day of month t. GH uses GH-Ratio to explain the profits from momentum investing. Here, I believe that low GH-Ratio stocks are more attractive to investors with lottery-type-assets preferences because the current price of this type of stock is far away from its past 52-week high and there is plenty room to reverse, while for high GH-Ratio stocks, investors are reluctant to bid the price because they see the 52-week high as a reference point, and thus there is limited appreciation potential for them.

CHAPTER 4

EMPIRICAL RESULTS

Summary Statistics

Table 1 reports the summary statistics for the five lottery feature measures: PRC, ISKEW, IVOL, MAX, and GH-Ratio. The average of stock price is about \$9.78 ($e^{2.28}$), with the lowest at only 1.6 cents and the highest at \$141,492. The average daily idiosyncratic skewness and idiosyncratic volatility is 0.54 and 3.30%, respectively. The average MAX is 7.77%, and the average GH-Ratio is 0.75, which indicates that in general, the stock price at the end of each month tend to close its 52-week high.

Table 1

Summary Statistics

	Number of firm-month observations	Mean	Median	STD.	Minimum	Maximum
LogPRC	2,396,203	2.28	2.52	1.26	-4.16	11.86
ISKEW	2,396,203	0.54	0.40	1.38	-11.22	11.22
IVOL (%)	2,396,203	3.30	2.61	2.59	0.00	117.21
MAX (%)	2,396,203	7.77	5.37	9.50	0.00	1290.28
GH-Ratio	2,396,203	0.75	0.81	0.22	0.00	1

This table reports the summary statistics of five lottery feature measures: PRC, ISKEW, IVOL, MAX, and GH-Ratio. The stock price (PRC) of firm i in month t is measured at the end of each month. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i} SMB_d + \beta_{3i} HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The sample period is between 1965/01 and 2008/12.

Univariate Analysis

In Table 2, I divide my sample at the end of each month into quintiles based on the five lottery feature variables PRC, ISKEW, IVOL, MAX, and GH-Ratio separately from weak to strong, and then the equal-weighted return of each quintile for the next month is calculated. To be included in the sample, at the end of each month, stocks are required to have all five lottery feature measures available. Portfolio S includes stocks with the strongest lottery features: lowest PRC and GH-Ratio, and highest ISKEW, IVOL, and MAX, while portfolio W includes stocks with the opposite features. My sample period is from January 1965 to December 2008. Since the first GH-Ratio for each stock is available on December 1965, my first formation period is December 1965 and the last one is November 2008. Therefore, there are 516 test periods (from January 1966 to December 2008) for each quintile. The average of the 516 monthly equal weighed returns of each portfolio is reported in Table 2. In order to compare the performance of lottery- and non-lottery-type stocks, I also form the hedge portfolios (S - W) that buy lottery-type stocks and sell non-lottery-type stocks, and calculate the average monthly returns of these hedge portfolios, as well as their alphas from CAPM and the Fama and French (1993) three-factor model. I expect these portfolios have positive average return in January, but not necessarily in other months.

Table 2

Average Monthly Returns of Portfolios on Lottery Features

	(I) PRC	(II) ISKEW	(III) IVOL	(IV) MAX	(V) GH-Ratio
Panel A: All Months					
Weak	1.03	1.06	1.12	1.22	1.24
2	1.09	1.21	1.24	1.35	1.24
3	1.04	1.20	1.23	1.30	1.06
4	0.84	1.18	1.03	1.17	0.80
Strong	1.74	1.06	1.10	0.68	1.38
S - W	0.71**	-0.00	-0.02	-0.54*	0.14
	(2.21)	(-0.02)	(-0.07)	(-1.94)	(0.42)
CAPM α	0.62*	-0.04	-0.28	-0.76***	-0.10
	(1.94)	(-0.34)	(-0.87)	(-3.07)	(-0.33)
3-factor α	0.36	-0.02	-0.32	-0.73***	-0.15
	(1.27)	(-0.20)	(-1.07)	(-3.12)	(-0.51)
Panel B: January					
Weak	1.60	5.15	2.26	3.72	2.10
2	3.03	5.70	3.49	4.27	3.63
3	4.71	6.43	5.16	5.45	4.91
4	7.68	7.23	7.52	7.47	7.40
Strong	15.10	7.51	13.68	11.11	14.02
S - W	13.50***	2.36***	11.42***	7.39***	11.92***
	(7.10)	(4.47)	(6.18)	(5.21)	(5.76)
CAPM α	12.93***	2.41***	10.36***	6.53***	10.73***
	(6.63)	(4.37)	(5.74)	(4.75)	(5.31)
3-factor α	10.31***	2.42***	8.52***	5.48***	8.33***
	(5.83)	(4.22)	(5.42)	(4.48)	(4.36)
Panel C: Non-January					
Weak	0.97	0.69	1.02	0.99	1.16
2	0.91	0.80	1.03	1.08	1.02
3	0.70	0.73	0.88	0.92	0.71
4	0.22	0.63	0.44	0.60	0.20
Strong	0.52	0.47	-0.05	-0.27	0.23
S - W	-0.45*	-0.22*	-1.07***	-1.26***	-0.93***
	(-1.84)	(-1.81)	(-3.43)	(-5.04)	(-3.38)
CAPM α	-0.50**	-0.25**	-1.24***	-1.42***	-1.09***
	(-2.06)	(-2.10)	(-4.49)	(-6.51)	(-4.53)
3-factor α	-0.48**	-0.21*	-1.07***	-1.26***	-0.92***
	(-2.16)	(-1.77)	(-4.14)	(-6.07)	(-4.04)

Table 2 reports the average monthly percentage returns of portfolios formed on each lottery feature measure. At the end of each month t, stocks are sorted into five portfolios based on each lottery feature measure from weak to strong, and then the average monthly percentage returns of each portfolio on month t+1 are calculated. The stock price (PRC) of firm i in month t is measured as the end-of-month price in month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i} SMB_d + \beta_{3i} HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i in month t is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. Panel A provides average monthly percentage return of each portfolio of 12 months, Panel B only provides the results for January, while Panel C for other 11 non-January months. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively.The sample period is between 1965/01 and 2008/12.

The Panel A of Table 2 reveals whether lottery features can affect stock returns across all months. The five measures provide mixed results: Lottery-type stocks, in case of PRC, outperform their counterparties by 0.71% (t = 2.21) on average in the sample period, but underperform by 0.54% (t = 1.94) in case of MAX.[2] Using other measures such as ISKEW, IVOL, and GH-Ratio, I do not find any significant differences between lottery-type stocks and non-lottery-type stocks across 12 months on average. Moreover, consistent with prior research (Bali and Cakici (2008), Doran, Jiang, and Peterson (2012)), I find that the difference of equal-weighted average monthly returns between stocks with highest IVOL and those with lowest IVOL are insignificant. In summary, across all months, the returns on the hedge portfolios S – W vary depending on the lottery features. In panel B and C, I report average returns of each quintile portfolio and our hedge portfolio (S –W) in January and other 11 months (February - December) separately. In January, lottery-type stocks provide incredible returns compared to non-lottery-type stocks for all five lottery features. The most profitable hedge portfolio (in terms of PRC) generates 13.5% (t = 7.10) monthly return in January on average, and even the least profitable hedge portfolio that long highest ISKEW stocks and short the lowest can provide economically and statistically significant returns of 2.36% (t = 4.47) in January on average. All CAPM and Fama-French three-factor alphas of hedge portfolios are positive and significant. On the other hand, all five hedge portfolios generate negative returns in non-January months as reported in Panel C. The worst performing hedge portfolio is formed on MAX. On average, stocks with the highest MAX ratios

[2] Consistent with Bali, Cakici, and Whitelaw (2010), I also find the negative relationship between lagged extreme positive returns (MAX) and future returns across all months (Panel A of Table 2). However, in January (Panel B), lottery-type stocks (with highest lagged extreme positive returns) have the best performance.

underperform by 1.26% (t = 5.04) every month compared to those with the lowest MAX ratios. In general, my results are consistent with Doran, Jiang, and Peterson's (2012) finding – the performance of lottery features and portfolio returns are opposite between January and non-January months.

In prior research, Doran, Jiang, and Peterson (2012) employ Fama-MacBeth (1973) regressions on two different sub-samples (Winner and Loser) and find the investors' preference for lottery-type stocks in January is slightly stronger in the case of loser stocks. In Table 3, I employ the dependent double sorting method to investigate the interaction effect between past performance and lottery features. At the end of each month t, I first sort the sample into quintiles based on the stocks' past 6-month period (month t-5 to month t) buy-and-hold return. M1 represents past losers and contains bottom 20% stocks that experienced weakest performance, while M5 represents past winners and contains 20% top performers. Within each group, I further divide stocks into five portfolios based on each of the lottery features separately from weak to strong, and then the equal-weighted returns of each portfolio for the subsequent month (month t + 1) are calculated. Finally, the average monthly returns of hedge portfolios S – W are obtained by loser- and winner-group separately, and I examine the difference between these two groups (M1 – M5) to investigate which group has stronger lottery preference effect.

Table 3

Average Monthly Returns of Portfolios on Past Return and Lottery Features (All Months)

Panel A: PRC								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	0.71	0.60	0.65	1.20	4.62	3.91***	3.90***	3.67***
						(8.82)	(8.76)	(8.51)
M5	1.31	1.40	1.40	1.33	0.94	-0.37	-0.39	-0.70***
						(-1.54)	(-1.60)	(-3.25)
M1 - M5						4.28***	4.28***	4.37***
						(12.43)	(12.38)	(12.39)
Panel B: ISKEW								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	1.53	1.63	1.59	1.47	1.40	-0.13	-0.21	-0.21
						(-0.59)	(-0.97)	(-1.00)
M5	1.24	1.38	1.38	1.27	1.13	-0.11	-0.09	-0.12
						(-0.79)	(-0.63)	(-0.88)
M1 - M5						-0.02	-0.12	-0.09
						(-0.08)	(-0.55)	(-0.40)
Panel C: IVOL								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	1.39	1.20	1.11	1.29	2.69	1.30***	1.16***	1.03***
						(3.22)	(2.94)	(2.71)
M5	1.26	1.54	1.59	1.45	0.53	-0.74***	-0.90***	-0.93***
						(-2.69)	(-3.50)	(-3.88)
M1 - M5						2.04***	2.07***	1.97***
						(7.01)	(7.10)	(6.64)
Panel D: MAX								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	2.05	1.64	1.35	1.16	1.42	-0.63**	-0.75**	-0.81***
						(-2.08)	(-2.52)	(-2.77)
M5	1.35	1.56	1.51	1.33	0.64	-0.72***	-0.86***	-0.80***
						(-3.24)	(-4.22)	(-4.04)
M1 - M5						0.08	0.11	-0.01
						(0.33)	(0.44)	(-0.05)
Panel E: GH-Ratio								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	1.00	0.97	0.94	1.34	3.47	2.47***	2.24***	2.30***
						(5.67)	(5.39)	(5.73)
M5	1.26	1.43	1.58	1.47	0.64	-0.64***	-0.80***	-0.90***
						(-2.83)	(-3.89)	(-4.44)
M1 - M5						3.10***	3.03***	3.20***
						(8.83)	(8.66)	(9.27)

Table 3 reports the average monthly percentage returns of portfolios formed on each lottery feature measure. At the end of each month t, five portfolios are first formed on 6-month period (month t-5 to month t) holding period return from low to high (M1 to M5). Within each sub-group, five portfolios are formed on each lottery feature measure from weak to strong, and then the average monthly percentage returns of each portfolio on month t+1 are calculated. The stock price (PRC) of firm i is measured at the end-of-month price in month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i}\, SMB_d + \beta_{3i}\, HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d

is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is between 1965/01 and 2008/12.

While Table 3 reports the average returns in month t+1 across all 12 months, Table 4 reports the average returns in month t + 1 ending in January only. From the results reported in Table 3, three out of five lottery feature measures (PRC, IVOL, and GH-Ratio) provide significant greater returns of the hedge portfolio (S - W) in loser stocks (M1) than winner stocks (M5). For example, in case of IVOL, while lottery-type stocks outperform non-lottery-type stocks by 1.30% (t = 3.22) a month in loser stocks, the former underperform the latter by 0.74% (t = -2.69) a month in winner stocks. The difference of returns of our hedge portfolio between loser stocks and winner stocks is statistically significant at 2.04% (t = 7.01). In Table 4, I find results consistent with Doran, Jiang, and Peterson (2012) that investors strongly favor lottery-type stocks in January regardless of their past performance. For example, Panel A of Table 4 where we use PRC as a lottery feature shows that lottery-type stocks outperform non-lottery-type stocks by 21.57% (t = 7.98) and 6.98% (t = 6.08) for loser stocks and winner stocks, respectively, in January. However, I find that there is a significant difference in the lottery preference pattern between loser and winner stocks. The difference in hedge portfolio S – W between M1 and M5 is 14.59% (t = 6.65) in case of PRC, and the other four lottery features provide similar results. In conclusion, the preference of lottery-type stocks in January is more prominent among loser stocks than winner stocks.

Table 4

Average January Returns of Portfolios on Past Return and Lottery Features (January Only)

Panel A: PRC								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	4.34	8.02	11.75	15.36	25.91	21.57***	20.98***	19.99***
						(7.98)	(7.51)	(6.81)
M5	1.25	2.22	3.32	5.07	8.23	6.98***	7.12***	4.77***
						(6.08)	(5.96)	(4.07)
M1 - M5						14.59***	13.85***	15.21***
						(6.65)	(6.18)	(6.07)
Panel B: ISKEW								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	9.26	11.66	13.22	14.50	16.07	6.82***	6.61***	6.35***
						(6.53)	(6.11)	(4.99)
M5	2.81	3.61	4.37	4.57	4.76	1.95***	2.18***	1.43**
						(2.93)	(3.22)	(2.04)
M1 - M5						4.87***	4.42***	4.92***
						(4.78)	(4.32)	(3.85)
Panel C: IVOL								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	6.76	8.96	11.18	14.57	23.64	16.88***	15.90***	14.49***
						(7.36)	(6.89)	(5.95)
M5	1.36	2.55	3.55	5.28	7.36	6.00***	5.64***	3.97***
						(5.18)	(4.76)	(3.35)
M1 - M5						10.88***	10.26***	10.52***
						(6.37)	(5.90)	(5.13)
Panel D: MAX								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	9.29	10.30	11.66	13.60	19.99	10.70***	10.06***	9.73***
						(6.19)	(5.72)	(4.96)
M5	2.73	3.28	3.77	4.79	5.49	2.76***	2.34***	1.58***
						(3.40)	(2.91)	(1.96)
M1 - M5						7.94***	7.72***	8.15***
						(5.71)	(5.35)	(4.64)
Panel F: GH-Ratio								
	Weak	2	3	4	Strong	S - W	CAPM α	3-factor α
M1	6.86	9.42	10.99	13.78	24.13	17.26***	16.01***	15.15***
						(6.25)	(5.78)	(5.53)
M5	1.80	2.45	3.94	5.14	6.72	4.91***	4.48***	2.67***
						(5.42)	(4.96)	(3.29)
M1 - M5						12.35***	11.53***	12.48***
						(5.39)	(4.94)	(5.00)

Table 4 reports the average January returns of portfolios formed on each lottery feature measure. At the end of each December t, five portfolios are first formed on 6-month period (month t-5 to month t) holding period return from low to high (M1 to M5). Within each sub-group, five portfolios are formed on each lottery feature measure from weak to strong, and then the average monthly percentage returns of each portfolio in January (month t+1) are calculated. The stock price (PRC) of firm i is measured at the end-of-month price in month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i} (R_{mkt,d} - RF_d) + \beta_{2i} SMB_d + \beta_{3i} HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the

market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is between 1965/01 and 2008/12.

Prospect theory (Kahneman and Tversky's, 1979) and mental accounting (Thaler 1980) posit that investors are risk loving in the domain of losses and they are risk-averse in the domain of gains. This causes loser stocks to be overpriced and winner stocks underpriced, leading to momentum (Grinblatt and Han (2005) and Frazzini (2006)). These findings are driven by the current shareholders of loser and winner stocks. The future return will be determined by the balance between old and new shareholders (See Grinblatt and Han, 2005 pg 314, and Frazzini, 2006 pg 2019). The findings in this paper and in Doran, Jiang, and Peterson (2012) suggest that stocks in the loser group with lottery features attract more new investors in the following months, especially in January.[3]

Multivariate Analysis

So far, my findings from univariate analyses and the double sorting approach indicate that: (1) Lottery-type stocks outperform in January, but not necessarily in other months. (2) Investors' preference for lottery-type stocks in January are more concentrated in loser stocks. In this section, I employ firm-level Fama-MacBeth (1973) regressions to re-examine these findings, and try to find out whether these findings still hold after controlling for other variables that may also explain stocks returns, such as short-term past returns and firm size.

[3] The findings in this paper may be caused by tax-loss selling effect. I do not try to differentiate two explanations in this paper.

The dependent variable in my regression is stock return in month t + 1. The independent variables are: (1) Lott, which are the five lottery feature measures that are observed at the end of month t, and PRC, ISKEW, and IVOL are in logarithmic form. (2) The indicator variable D equals one if it is a loser stock at the end of month t, and zero otherwise. At the end of each month t, five portfolios are first formed based on 6-month period (month t-5 to month t) holding period return from low to high (M1 to M5). I keep only stocks in the loser- (M1) and winner-groups (M5) in my regressions sample. (3) The other control variables: Ret(-1), LOGME, and the loadings on the Fama-French three-factors. Ret(-1) and LOGME are stock returns and logarithmic firm size at the end of month t, respectively. The market beta (β_{MKT}), SMB loading (β_{SMB}), and HML loading (β_{HML}) are estimated from the three-factor model over the past 6-month period (month t – 5 to month t) using firm-level daily data. My regression specification I contains only the five lottery feature measures each alone, and regression specification II includes all other control variables.

Panel A of Table 5 reports the results of firm-level Fama-MacBeth (1973) regressions across all months. Consistent with what I find from the double sorting approach, the interaction effect between lottery features and past performance show mixed results. The interaction effect between past performance and PRC, IVOL and GH-Ratio, respectively show that preference for lottery-type stocks is stronger for loser stocks. However, the lottery features such as ISKEW and MAX do not show stronger interaction effects within losers.

Table 5

Fama-MacBeth Cross-Sectional Regression

Panel A: All months										
	LogPRC		LogISKEW		LogIVOL		MAX		GH-Ratio	
	I	II	I	II	I	II	I	II	I	II
Intercept	2.44***	3.24***	1.36***	6.23***	2.10*	3.38***	1.56***	5.59***	2.23***	0.72
	(4.89)	(6.59)	(4.22)	(8.66)	(1.80)	(3.78)	(6.06)	(8.96)	(3.57)	(0.80)
Lott	-0.54***	0.27***	-0.05	-0.12***	0.24	-0.98***	-3.08***	2.16**	-1.19**	6.52***
	(-4.53)	(2.73)	(-1.26)	(-3.51)	(0.85)	(-5.68)	(-2.79)	(2.45)	(-2.03)	(11.20)
D		0.97***		-1.36***		2.10***		-1.02***		5.52***
		(3.95)		(-6.89)		(2.85)		(-5.37)		(10.02)
Lott*D		-1.28***		-0.06		1.06***		-5.37***		-10.01***
		(-13.22)		(-0.97)		(5.11)		(-5.42)		(-10.10)
β_{MKT}		-0.02		-0.03		0.05		-0.00		0.00
		(-0.20)		(-0.27)		(0.56)		(-0.05)		(0.01)
β_{SMB}		-0.11**		-0.14***		-0.10**		-0.13***		-0.11**
		(-2.36)		(-2.80)		(-2.29)		(-2.76)		(-2.57)
β_{HML}		0.06		0.08		0.05		0.08		0.06
		(1.07)		(1.40)		(0.95)		(1.44)		(1.19)
Ret(-1)		-6.51***		-6.13***		-6.62***		-6.93***		-7.38***
		(-20.61)		(-18.08)		(-19.85)		(-17.60)		(-22.78)
LOGME		-0.18***		-0.38***		-0.44***		-0.34***		-0.40***
		(-4.79)		(-7.19)		(-11.25)		(-7.25)		(-9.25)

Table 5 (Continued)

	Panel B: January									
	LogPRC		LogISKEW		LogIVOL		MAX		GH-Ratio	
	I	II	I	II	I	II	I	II	I	II
Intercept	19.32***	15.71***	8.49***	32.41***	41.47***	31.11***	5.02***	26.92***	23.19***	31.21***
	(7.53)	(8.12)	(6.01)	(9.43)	(6.80)	(7.90)	(4.77)	(9.21)	(7.28)	(7.50)
Lott	-5.41***	-2.19***	0.13	-0.31**	9.98***	2.24***	30.12***	17.78***	-22.51***	-5.04*
	(-7.81)	(-4.51)	(0.63)	(-2.28)	(6.49)	(3.42)	(6.29)	(4.90)	(-6.99)	(-1.96)
D		7.46***		3.76***		24.69***		0.74		11.79***
		(5.03)		(3.67)		(5.67)		(0.63)		(3.64)
Lott*D		-3.92***		0.84***		7.23***		4.45		-29.79***
		(-6.73)		(3.18)		(5.71)		(1.01)		(-4.04)
β_{MKT}		0.89**		0.71*		0.12		0.52		0.24
		(2.30)		(1.98)		(0.38)		(1.57)		(0.82)
β_{SMB}		-0.06		-0.05		-0.28*		-0.22		-0.21
		(-0.41)		(-0.30)		(-2.00)		(-1.55)		(-1.49)
β_{HML}		-0.21		-0.03		0.16		0.03		0.19
		(-0.82)		(-0.13)		(0.89)		(0.17)		(1.00)
Ret(-1)		-12.33***		-14.35***		-14.49***		-18.11***		-11.76***
		(-7.38)		(-7.15)		(-7.66)		(-8.52)		(-6.62)
LOGME		-0.48**		-2.42***		-1.55***		-1.99***		-1.88***
		(-2.68)		(-9.46)		(-8.37)		(-9.23)		(-9.62)

Table 5 reports the firm-level Fama-MacBeth (1973) regressions results. The sample contains only past loser stocks (stocks in portfolio M1) and winner stocks (stocks in portfolios M5). In Panel A (B), the dependent variable $R_{i,t+1}$ is the monthly return of security i in month t+1 (January). Each month t+1, we regress returns of stocks on each of their lottery features (Lott) obtained from month t in Model I, and we add some other control variables in Model II. D is a dummy variable which equals one if security i is a loser stock based on past six-month holding period return, zero otherwise, and Lott*D is the interaction term between lottery features and D. β_{MKT}, β_{SMB}, and β_{HML} refer to loadings on the three Fama-French factors, which are estimated using 6-month period (month t-5 to month t) daily returns. Ret(-1) is stock's monthly return in month t, and LOGME is log of firm size in month t. Five lottery features (Lott) are defined as following: The stock price (PRC) of firm i in month t is measured as the end-of-month price in month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i}\, SMB_d + \beta_{3i}\, HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is between 1965/01 and 2008/12.

In Panel B of Table 5, I report the results of firm-level Fama-MacBeth (1973) regressions only in January. First, when I consider the five lottery feature measures alone in specification I, all of them except ISKEW provide significant predictive power in the expected direction. Secondly, after I control for other variables in specification II, I confirm that the preference of lottery-type stocks is more concentrated in loser stocks for all five lottery features. I expect the interaction term to be positive for LogISKEW, LogIVOL, and MAX but negative for LogPRC and GH-Ratio. Consistent with my predictions, the coefficients on the interactions between lottery feature measures (Lott) and the loser dummy (D) have the expected signs and are highly significant. For example, while the interaction term between logIVOL and the loser dummy is 7.23 (t = 5.71), it is -29.79 (t = -4.04) for the term between GH-Ratio and the loser dummy. In summary, the preference of lottery-type stocks in January is more concentrated in loser stocks than winner stocks.

Individual Investors and Lottery-Type Stocks

Prior research from Kumar (2009) finds that individual investors prefer stocks with lottery features. Therefore, in this section, I attempt to investigate whether my finding is more prominent with individual investors.

In order to test my hypothesis that individual investors have greater preference for lottery-type stocks in January, I sort the whole sample equally into three sub-samples based on the percentage of institutional investors' holdings. At the end of each month t, three groups of stocks are formed based on their percentage of institutional holdings. Group IHH (IHL) includes top (bottom) 33% institutional investors' holding stocks. Within each group, I then form five portfolios based on each lottery features from weak

to strong. Next, the equal-weighted return of each portfolio for the next month t + 1 is calculated, and the average monthly returns of hedge portfolios (S – W) are computed separately for group IHH and IHL, and their difference is reported as IHL - IHH. I report IHL – IHH across all months in Panel A of Table 6 and only January in Panel B. Panel A shows mixed results.

In the case of PRC, stocks with more individual investors (IHL) show stronger preference of the lottery-type stocks than stocks with greater institutional investors (IHH) since IHL – IHH is 1.30% a month (t = 3.09). However, in case of ISKEW, institutional investors show greater preference for lottery-type stocks since IHL – IHH is -0.47% a month with t-statistic of -2.28. IVOL, MAX, and GH-Ratio do not show statistically significant difference of preference of lottery-type stocks between IHH and IHL. In panel B of table 6, I report returns of hedge portfolios for IHL and IHH only for January months. As I expect, the average January returns of lottery-type stocks is higher than those of stocks with non-lottery features for both IHH and IHL group for all five lottery-type features. It is important to note that the difference of returns of hedge portfolio (S – W) between IHL and IHH are statistically positively significant for all five lottery-type features. For example, in the case of PRC, the hedge portfolio (S - W) in IHL group earn 12.56% (t = 4.89) more than that in IHH group in January and the alphas from the CAPM and three-factor model are also statistically significant. In summary, Table 6 shows that the preference for lottery-type stocks in January is more driven by individual investors than institutional investors.

Table 6

Returns for Portfolios on Lottery Features for High-Institutional-Holding Firms (IHH) and Low-Institutional-Holding Firms (IHL)

	Panel A: All months									
	PRC		ISKEW		IVOL		MAX		GH-Ratio	
	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH
Weak	1.14	1.20	1.02	1.06	1.10	1.26	1.15	1.36	1.50	1.17
2	0.70	1.17	1.15	1.13	1.19	1.25	1.28	1.36	1.11	1.40
3	0.36	1.20	1.06	1.17	0.98	1.36	1.25	1.28	0.39	1.33
4	0.38	1.19	0.88	1.25	0.71	1.21	1.03	1.14	0.12	1.15
Strong	2.41	1.17	0.83	1.34	1.09	0.91	0.37	0.90	1.43	0.94
S - W	1.27**	-0.03	-0.20	0.28**	-0.01	-0.36	-0.78	-0.46	-0.07	-0.23
	(2.49)	(-0.11)	(-0.87)	(2.47)	(-0.02)	(-1.05)	(-1.83)	(-1.48)	(-0.15)	(-0.73)
IHL-IHH	1.30***		-0.47**		0.35		-0.32		0.16	
	(3.09)		(-2.28)		(1.02)		(-1.08)		(0.85)	
CAPM α /	1.13***	1.50	-0.62***	-0.46**	0.27	0.22	-0.38	-0.34	0.20	0.40
3-factor α	(2.72)	(3.58)	(-3.25)	(-2.39)	(0.79)	(0.63)	(-1.30)	(-1.13)	(0.59)	(1.13)
	Panel B: January									
	PRC		ISKEW		IVOL		MAX		GH-Ratio	
	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH
Weak	2.56	1.12	7.24	2.35	2.04	1.19	3.94	1.89	3.04	0.76
2	4.46	1.54	7.55	2.16	3.73	1.92	4.85	2.28	4.03	1.83
3	6.64	1.82	8.39	2.25	6.58	2.21	7.31	2.36	5.54	2.30
4	10.26	2.92	9.44	2.70	9.58	2.74	9.66	2.57	8.67	2.96
Strong	18.98	4.97	9.69	2.82	16.06	3.91	13.39	3.10	16.67	4.39
S - W	16.42***	3.85***	2.45**	0.47	14.02***	2.72**	9.46***	1.21	13.63***	3.64**
	(4.74)	(3.04)	(2.56)	(1.46)	(4.51)	(2.22)	(3.84)	(1.28)	(6.42)	(2.41)
IHL-IHH	12.56***		1.97**		11.30***		8.25***		11.27***	
	(4.89)		(2.10)		(5.37)		(4.54)		(6.50)	
CAPM α /	12.13***	12.89***	1.59	0.82	10.76***	9.90***	7.91***	8.65***	10.87***	10.48***
3-factor α	(4.46)	(4.69)	(1.64)	(1.01)	(4.86)	(4.35)	(4.12)	(4.25)	(5.99)	(5.01)

Table 6 reports average monthly percentage returns of portfolios formed on each lottery feature measure for two different types of firm: high-institutional-holding firm (IHH) and low-institutional-holding firm (IHL). At the end of each month t, all stocks are divided into three groups based on their institutional holdings. IHH (IHL) is group of stocks in top (bottom) 1/3 institutional holdings. In each group, stocks are sorted into five portfolios based on each lottery feature, and then the average monthly percentage returns of each portfolio on month t+1 are calculated.

Table 6 (Continued)

The stock price (PRC) of firm i is measured at the end of month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i}\, SMB_d + \beta_{3i}\, HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. Panel A provides average monthly percentage return over 12 months. Panel B reports the results only for January. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively.The sample period is between 1979/01 and 2008/12.

In the last section, I showed that the outperformance of lottery-type stocks (S - W) for past losers (M1) is significantly stronger than that for past winners (M5) in January, which indicates that when investors pick up lottery-type stocks, they tend to choose stocks from past losers relative to winners. The next question is that is this past loser lottery stock effect ($M1|S\text{-}W - M5|S\text{-}W > 0$) a special behavior only limited to individual investors? To answer this question, I examine the past loser lottery stock effect for stocks with highest individual investors' holdings (group IHL) and stocks with highest institutional investors' holdings (group IHH) separately, and then compare this effect between these two group. At the end of each month t, I divide all stocks into three groups based on the percentage of institutional holdings. Group IHH (IHL) includes stocks with highest (lowest) institutional holding positions. Within each group, I sort stocks into quintiles based on stock's past 6-month period (month t-5 to month t) buy-and-hold return from low (M1) to high (M5). Next, in each quintile, five portfolios are formed on each of the lottery features (PRC, ISKEW, IVOL, MAX, and GH-Ratio) separately from weak to strong, and then the equal-weighted average returns of each portfolio for the subsequent month t + 1 are calculated. The difference between past losers (M1) and past winners (M5) on returns of hedge portfolio (S - W) are calculated separately for groups IHH and IHL (reported as M1 – M5), and the difference between these two groups on (M1 – M5) are reported as IHL – IHH in Table 7 and Table 8. While Table 7 reports the results across all 12 month, Table 8 reports the results only for January.

Table 7

Average Monthly Returns of Portfolios on Institutional Holdings, Past Return, and Lottery Features (All Months)

	IHL			IHH			IHL - IHH	CAPM α	3-factor α
	Weak	Strong	S - W	Weak	Strong	S - W			
Panel A: PRC									
M1	-0.10	7.22	7.32	1.06	1.05	-0.02			
			(10.63)			(-0.05)			
M5	1.46	0.84	-0.62	1.50	1.70	0.20			
			(-1.65)			(0.84)			
M1 – M5			7.94			-0.22	8.16***	7.68***	7.68***
			(13.00)			(-0.72)	(12.92)	(12.05)	(11.74)
Panel B: ISKEW									
	IHL			IHH			IHL - IHH	CAPM α	3-factor α
	Weak	Strong	S - W	Weak	Strong	S - W			
M1	2.00	1.63	-0.37	1.12	0.84	-0.28			
			(-0.88)			(-1.44)			
M5	1.32	0.93	-0.39	1.33	1.60	0.27			
			(-1.50)			(1.55)			
M1 – M5			0.02			-0.55	0.57	0.56	0.57
			(0.04)			(-2.18)	(1.17)	(1.14)	(1.13)
Panel C: IVOL									
	IHL			IHH			IHL - IHH	CAPM α	3-factor α
	Weak	Strong	S - W	Weak	Strong	S - W			
M1	1.21	4.17	2.96	1.54	0.36	-1.19			
			(4.79)			(-3.72)			
M5	1.63	0.02	-1.61	1.14	1.61	0.46			
			(-4.20)			(1.29)			
M1 – M5			4.57			-1.65	6.22***	6.66***	6.76***
			(8.58)			(-5.56)	(10.44)	(11.12)	(11.02)

Table 7 (Continued)

	Panel D: MAX								
	IHL			IHH			IHL - IHH	CAPM α	3-factor α
	Weak	Strong	S - W	Weak	Strong	S - W			
M1	2.02	2.65	0.63	1.77	0.10	-1.67			
			(1.11)			(-6.49)			
M5	1.48	0.10	-1.38	1.48	1.50	0.02			
			(-3.81)			(0.05)			
M1 – M5			2.01			-1.68	3.69***	4.10***	4.17***
			(3.66)			(-6.39)	(6.37)	(7.06)	(6.99)
	Panel E: GH-Ratio								
	IHL			IHH			IHL - IHH	CAPM α	3-factor α
	Weak	Strong	S - W	Weak	Strong	S - W			
M1	0.72	5.27	4.54	1.21	1.08	-0.12			
			(5.97)			(-0.34)			
M5	1.80	-0.09	-1.90	0.94	1.72	0.75			
			(-5.42)			(2.57)			
M1 – M5			6.45			-0.89	7.18***	6.59***	6.93***
			(9.35)			(-2.69)	(10.98)	(10.04)	(10.37)

Table 7 reports average monthly percentage returns of portfolios that are formed based on each lottery feature measure and past 6-month holding period returns for two different types of firm: high-institutional-holding firm (IHH) and low-institutional-holding firm (IHL). At the end of each month t, all stocks are divided into three groups based on their institutional holdings. IHH (IHL) is group of stocks in top (bottom) 1/3 institutional holdings. Within each group, five portfolios are then formed on 6-month period (month t-5 to month t) holding period return from low to high (M1 to M5). Within each sub-group, five portfolios are formed on each lottery feature measure from weak to strong, and then the average monthly percentage returns of each portfolio on month t+1 are calculated. The stock price (PRC) of firm i is measured at the end-of-month. ISKEW and IVOL are third moment and standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i} (R_{mkt,d} - RF_d) + \beta_{2i} SMB_d + \beta_{3i} HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is between 1979/01 and 2008/12.

The results in Table 7 indicate that for stocks with low institutional investors' holdings (IHL), the greater performance of lottery-type stocks over non-lottery-type stocks are more concentrated in loser stocks for all lottery features (except the case of ISKEW), while for stocks with high institutional investors' holdings (IHH), it shows the opposite. For example, in group IHL, in case of IVOL, the return of our hedge portfolio (S - W) in loser stocks (M1) perform better than the hedge portfolio in winner stocks (M5) by 4.57% a month (t = 8.58) over 12 months, while in group IHH, this number is -1.65% (t = -5.56).

When comparing this past loser lottery stock effect (M1|S-W – M5|S-W> 0) between group IHL and IHH, I find that the greater performance of the hedge portfolio in losers is more prominent in stocks with highest individual investors' ownership (group IHL). For example, in case of IVOL, IHL group generates 6.22% (t = 10.44) more than IHH group when it comes to the difference of returns of hedge portfolio between losers and winners.

Table 8 shows that in January there is no difference between past losers and winners on lottery-type stocks effect in the IHH group. The difference on returns of hedge portfolios S –W between M1 and M5 are all insignificant for the five lottery feature measures. However, when I examine the IHL group, the results provide strong evidence that the greater performance of lottery-type stocks is more concentrated in past loser stocks (M1) than in past winner stocks for all five lottery feature measures. Comparing these two groups (IHH and IHL), I can find a significant difference on past loser lottery-type stocks.

Table 8

Average Monthly Returns in January of Portfolios Formed on Institutional-Holdings, Past Return, and Lottery Features

	IHL			IHH			IHL - IHH	CAPM α	3-factor α
	Weak	Strong	S - W	Weak	Strong	S - W			
Panel A: PRC									
M1	9.00	34.39	25.40	2.88	7.40	4.52			
			(6.22)			(2.92)			
M5	2.93	9.08	6.15	0.89	3.61	2.71			
			(3.91)			(2.95)			
M1 – M5			19.24			1.85	17.43***	16.69***	17.80***
			(5.47)			(1.62)	(5.41)	(4.87)	(4.41)
Panel B: ISKEW									
M1	15.71	21.66	5.94	3.59	4.76	1.17			
			(3.68)			(2.50)			
M5	4.21	5.43	1.22	1.69	2.14	0.45			
			(1.17)			(0.66)			
M1 – M5			4.72			0.75	3.99**	4.43*	5.24*
			(2.84)			(1.15)	(2.18)	(2.29)	(2.24)
Panel C: IVOL									
M1	11.24	31.11	19.88	3.89	5.54	1.65			
			(5.86)			(1.50)			
M5	3.00	7.09	4.08	0.67	2.47	1.81			
			(2.32)			(1.78)			
M1 – M5			15.80			-0.15	15.95***	16.21***	18.13***
			(6.20)			(-0.25)	(5.71)	(5.48)	(5.36)

Table 8 (Continued)

	Panel D: MAX								
	IHL			IHH			IHL - IHH	CAPM α	3-factor α
	Weak	Strong	S - W	Weak	Strong	S - W			
M1	13.59	28.67	15.08	4.34	3.83	-0.51			
			(4.21)			(-0.55)			
M5	3.85	5.39	1.54	1.61	2.31	0.70			
			(1.12)			(0.78)			
M1 – M5			13.54			-1.21	14.75***	15.32***	15.66***
			(4.71)			(-1.43)	(4.71)	(4.62)	(4.11)
	Panel E: GH-Ratio								
	IHL			IHH			IHL - IHH	CAPM α	3-factor α
	Weak	Strong	S - W	Weak	Strong	S - W			
M1	10.63	34.46	23.93	3.34	5.82	2.47			
			(4.88)			(1.71)			
M5	4.91	7.30	2.39	-0.06	3.06	3.12			
			(1.50)			(3.34)			
M1 – M5			21.45			-0.65	22.10***	20.75***	22.21***
			(5.15)			(-0.50)	(5.63)	(5.02)	(4.86)

Table 8 reports average January percentage returns of portfolios that are formed based on each lottery feature measure and past 6-month holding period returns for two different types of firm: high-institutional-holding firm (IHH) and low-institutional-holding firm (IHL). At the end of each month t, all stocks are divided into three groups based on their institutional holdings. IHH (IHL) is group of stocks in top (bottom) 1/3 institutional holdings. Within each group, five portfolios are then formed on 6-month period (month t-5 to month t) holding period return from low to high (M1 to M5). Within each sub-group, five portfolios are formed on each lottery feature measure from weak to strong, and then the average monthly percentage returns of each portfolio on month t+1 are calculated. The stock price (PRC) of firm i is measured at the end-of-month. ISKEW and IVOL are third moment and standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i}\, SMB_d + \beta_{3i}\, HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is between 1979/01 and 2008/12.

For example, in the case of IVOL, while the IHL group shows that the past loser effect on greater performance of lottery stock is 15.80% (t = 6.20), the corresponding number for the IHH group is -0.15% (t = -0.25), and the difference is 15.95% (t = 5.71), which supports my hypothesis that the greater performance of lottery-type stocks in losers in January is more prominent for stocks with high individual investors ownership.

Multivariate Regressions

In order to control for other variables that may affect stocks monthly returns, I use Fama-MacBeth (1973) regressions. In Table 9, I repeat the firm-level Fama-MacBeth regressions in Table 5 for the IHL and IHH groups separately and compare the regression coefficients between the two groups (reported as IHL – IHH(Lott*D)). The dependent variable is monthly returns of stocks in month t, and the independent variables are measured at the end of month t-1. I define the dummy variable D as one if the stock is a loser (M1) and zero otherwise. Lott*D is the interaction variable between the lottery feature and the dummy variable. My interest is the comparison of the interaction variable between the IHL and IHH groups and I expect the difference should be negative for PRC and GH-Ratio, and positive for ISKEW, IVOL, and MAX. While Panel A of Table 9 reports the results for all 12 months, Panel B of Table 9 reports the results only for January. Both Panel A and B show that the difference of the interaction term between IHL and IHH are statistically significant with the expected sign for PRC, ISKEW, IVOL, and GH-Ratio, but not for MAX. For example, in case of IVOL, the difference of the interaction term is 4.40 (t = 6.87) for all months and 9.30 (t = 2.52) for January. These results confirm that the greater performance of lottery-type stocks in losers than in winners is driven by stocks with high individual investors' ownership.

Table 9

Fama-MacBeth Cross-Sectional Regressions

	Panel A: All months									
	PRC		ISKEW		IVOL		MAX		GH-Ratio	
	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH
Intercept	-0.16	2.90***	14.52***	3.35***	14.72**	5.16***	13.09***	3.46***	6.38	3.17**
	(-0.02)	(3.28)	(7.73)	(4.14)	(2.15)	(4.12)	(10.59)	(4.11)	(1.61)	(2.40)
Lott	1.18***	0.27	-0.23**	0.12*	-1.44**	0.38	0.42	2.58	12.09***	0.60
	(3.13)	(1.21)	(-2.56)	(1.94)	(-2.10)	(1.47)	(0.12)	(1.19)	(4.95)	(0.60)
D	1.54	-0.71	-1.83***	-1.43***	6.06**	-6.63***	-1.73***	-0.38	10.08***	-1.70*
	(0.86)	(-1.05)	(-5.01)	(-6.27)	(2.26)	(-6.20)	(-3.69)	(-1.37)	(4.11)	(1.86)
Lott*D	-2.62***	-0.09	0.08	-0.36***	2.88***	-1.51***	-8.90	-10.69***	-20.85***	0.79
	(-8.57)	(-0.43)	(0.58)	(-3.74)	(4.81)	(-5.47)	(-1.31)	(-3.03)	(-5.82)	(0.71)
β_{MKT}	2.33	0.04	-0.34	0.29	-1.05	0.18	-0.41	0.16	-0.51	0.13
	(1.03)	(0.21)	(-1.25)	(1.50)	(-0.83)	(1.08)	(-1.58)	(0.95)	(-0.83)	(0.79)
β_{SMB}	-0.88	0.09	0.22	-0.07	0.59	-0.04	0.19	-0.08	0.31	-0.04
	(-0.95)	(0.79)	(1.56)	(-0.67)	(1.18)	(-0.41)	(1.58)	(-0.69)	(1.19)	(-0.39)
β_{HML}	2.38	-0.03	-0.33	-0.14	-1.15	-0.10	-0.19	-0.10	-0.39	-0.08
	(1.05)	(-0.28)	(-1.10)	(-1.34)	(-1.09)	(-1.16)	(-1.30)	(-1.11)	(0.76)	(-0.87)
Ret(-1)	-2.22	-5.88***	-8.15***	-4.35***	-10.06***	-4.98***	-7.92***	-4.88***	-9.24***	-5.23***
	(-0.55)	(-5.82)	(-7.31)	(-6.27)	(-3.99)	(-8.25)	(-6.72)	(-7.06)	(-5.66)	(-8.08)
LOGME	-0.50	-0.15**	-1.18***	-0.13**	-1.44***	-0.16***	-1.05***	-0.14***	-1.34***	-0.15**
	(-1.19)	(-2.51)	(-8.83)	(-2.40)	(-7.03)	(-3.24)	(-10.61)	(-2.61)	(-8.88)	(-2.57)
IHL – IHH(Lott*D)	-2.53***		0.44**		4.40***		1.80		-21.64***	
	(-7.82)		(2.35)		(6.87)		(0.19)		(-5.87)	

	Panel B: January									
	PRC		ISKEW		IVOL		MAX		GH-Ratio	
	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH
Intercept	-92.05	6.69	59.47***	13.29***	117.38	22.92***	41.65***	12.72***	71.64*	23.98***
	(-0.81)	(1.47)	(4.03)	(3.92)	(1.48)	(4.39)	(5.65)	(4.37)	(1.94)	(3.33)
Lott	2.61	0.53	0.17	0.22	9.42	2.83***	51.48	11.06*	-8.10	-8.16*
	(0.63)	(0.23)	(0.61)	(1.57)	(1.31)	(3.44)	(1.52)	(1.84)	(-0.84)	(-1.91)
D	26.60	5.83	4.53*	0.47	13.64	-5.09	1.22	1.40	11.00	-7.77
	(1.28)	(1.11)	(1.77)	(0.43)	(0.58)	(-1.24)	(0.56)	(0.95)	(0.88)	(-1.49)
Lott*D	-8.61***	-1.90	0.88	-0.68	7.82*	-1.48	-13.94	-10.52	-62.66**	8.05
	(-3.17)	(-1.23)	(1.37)	(-1.20)	(1.81)	(-1.47)	(-0.59)	(-1.38)	(-2.17)	(1.15)

Table 9 (Continued)

β_{MKT}	28.20	0.03	-2.06	0.47	-14.45	0.08	-1.57	0.27	-6.67	0.29
	(1.04)	(0.05)	(-0.70)	(0.60)	(-0.97)	(0.12)	(-0.67)	(0.42)	(-0.93)	(0.41)
β_{SMB}	-11.47	0.41	1.04	-0.14	5.85	0.10	0.80	0.05	2.96	-0.04
	(-1.03)	(0.61)	(0.78)	(-0.38)	(0.98)	(0.31)	(0.79)	(0.17)	(1.00)	(-0.11)
β_{HML}	27.36	-0.05	-2.58	-0.16	-12.66	-0.46	-1.14	-0.37	-6.11	-0.55
	(1.01)	(-0.15)	(-0.93)	(-0.43)	(-1.00)	(-1.46)	(-0.94)	(-1.17)	(-0.99)	(-1.54)
Ret(-1)	34.22	-13.40	-23.08**	-9.58***	-42.76	-8.99***	-28.05***	-8.89***	-30.20	-5.81***
	(0.71)	(-2.05)	(-2.66)	(-5.04)	(-1.56)	(-5.24)	(-2.77)	(-5.00)	(-1.67)	(-3.68)
LOGME	3.64	-0.47	-4.48***	-0.83***	-4.44**	-0.75***	-3.18***	-0.83***	-4.22***	-1.08**
	(0.75)	(-1.46)	(-5.30)	(-3.67)	(-2.07)	(-2.82)	(-6.77)	(-4.06)	(-3.03)	(-2.74)
IHL – IHH(Lott*D)	-6.71***		1.55		9.30**		-3.42		-70.70**	
	(-4.41)		(1.65)		(2.52)		(-0.15)		(-2.58)	

Table 9 reports the firm-level Fama-MacBeth (1973) regressions results. At the end of each month t, all stocks are divided into three groups based on their institutional holdings. IHH (IHL) group is stocks with top (bottom) 1/3 institutional holdings stocks. Within each group, stocks are divided into five portfolios based on the 6-month holding period returns (month t-5 to month t). We include only stocks in loser (M1) or winner (M5) to improve the power of the test. In Panel A (B), the dependent variable is monthly returns of stocks in month t+1 (January), and the independent variables are measured at the end of month t (December). D is a dummy variable which equals one if security i is a loser stock based on past six-month holding period return, and zero otherwise, and Lott*D is the interaction term between lottery features and D. β_{MKT}, β_{SMB}, and β_{HML} refer to loadings on the three Fama-French factors, which are estimated using 6-month period (month t-5 to month t) daily returns. Ret(-1) is stock's monthly return in month t, and LOGME is log of firm size in month t. Five lottery features (Lott) are defined as following: The stock price (PRC) of firm i in month t is measured as the end-of-month price in month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i} SMB_d + \beta_{3i} HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is between 1979/01 and 2008/12.

Persistence of Lottery-Type Stocks Beyond January

From the previous sections, we see the profound January effect of lottery-type stocks among stocks that are losers and have high individual investors' ownership. People may wonder how long this effect would persist. In this section, I address this issue by examining the returns of portfolios formed in each December over 1) three months (from January to March), 2) six months (from January to June), and 3) 12 months (from January to December). At the end of each December, I sort the whole sample into quintiles based on each lottery features from weak to strong, and then the equal-weighted average monthly return of each quintile for the next 3, 6, and 12 months is calculated. Table 10 reports the returns and alphas of hedge portfolios S – W for each time horizon. For the 3-month period, hedge portfolios S – W have statistically significant positive returns for all five lottery feature measures in terms of raw returns as well as alphas from CAPM and the three-factor model. For example, in case of IVOL, portfolio S earns 4.12% (t = 4.49) more than portfolio W from January to March on average. For 6-month period, however, even though all five hedge portfolios S – W still earn statically significant positive monthly return, these returns can be explained by either CAPM or the three-factor model for IVOL, MAX, and GH-Ratio. For 12 month period, except for PRC, no hedge portfolio can earn statistically significant positive return. In summary, the findings in Table 10 suggest that the greater performance of lottery-type stocks persist until March.

Table 10

Persistence of the Effect of Lottery-Type Stocks

Panel A: PRC						
	3-Month		6-Month		12-Month	
Weak	1.30		1.19		0.95	
Strong	6.58		3.84		1.76	
S - W	5.27***		2.65***		0.81***	
	(6.07)		(5.19)		(2.65)	
CAPM α / 3-factor α	4.97***	3.66***	2.46***	1.57***	0.75**	0.48*
	(5.80)	(4.21)	(4.86)	(3.33)	(2.46)	(1.78)
Panel B: ISKEW						
	3-Month		6-Month		12-Month	
Weak	2.57		1.70		0.97	
Strong	3.58		2.25		1.19	
S - W	1.01***		0.55***		0.23*	
	(3.65)		(3.03)		(1.92)	
CAPM α / 3-factor α	0.94***	0.88***	0.45**	0.35*	0.17	0.24**
	(3.40)	(2.79)	(2.55)	(1.87)	(1.51)	(2.12)
Panel C: IVOL						
	3-Month		6-Month		12-Month	
Weak	1.62		1.36		1.10	
Strong	5.73		3.22		1.36	
S - W	4.12***		1.85***		0.26	
	(4.49)		(3.85)		(0.76)	
CAPM α / 3-factor α	3.54***	2.65***	1.38***	0.76	0.02	-0.01
	(4.17)	(2.92)	(2.75)	(1.53)	(0.06)	(-0.05)

Table 10 (Continued)

	Panel D: MAX		
	3-Month	6-Month	12-Month
Weak	2.28	1.72	1.19
Strong	4.61	2.64	1.13
S - W	2.33***	0.91**	-0.05
	(3.29)	(2.17)	(-0.20)
CAPM α / 3-factor α	1.83*** 1.42**	0.49 0.15	-0.27 -0.22
	(2.86) (2.02)	(1.29) (0.40)	(-1.12) (-1.00)
	Panel E: GH-Ratio		
	3-Month	6-Month	12-Month
Weak	1.81	1.58	1.24
Strong	5.42	2.86	1.14
S - W	3.62***	1.28**	-0.10
	(3.85)	(2.40)	(-0.32)
CAPM α / 3-factor α	3.06*** 2.23**	0.91* 0.38	-0.27 -0.41
	(3.48) (2.55)	(1.80) (0.79)	(-0.91) (-1.57)

At the end of each December, all stocks are sorted into five portfolios based on each of the five lottery features from weak to strong, and then the average monthly return of each portfolio for following 3, 6, and 12 months are calculated and reported separately in each panel for each lottery feature. The stock price (PRC) of firm i in month t is measured as the end-of-month price in month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i} SMB_d + \beta_{3i} HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is 1965/01 - 2008/12.

The effect of lottery-type stocks may persist beyond March if we look at the effect using only loser stocks. In Table 11, I compare the average monthly returns of hedge portfolios (S – W) between past losers (M1) and winners (M5) for over 3 months from January to March, 2) 6 months from January to June, and 3) 12 months from January to December. I find that the hedge portfolio S – W earns higher return in loser group (M1), and this outperformance could persist up to 12 months in the case of PRC, IVOL, MAX, and GH-Ratio. For example, in the case of IVOL, hedge portfolio (S - W) in loser stocks earn 4.75% (t = 6.16), 2.86% (t = 6.19), and 1.77% (t = 6.17) a month more than the one in winner stocks from January to March, from January to June, and from January to December, respectively. In Table 12, I confirm the findings in Table 11 by the Fama-MacBeth regression. The dependent variable is monthly stock returns from January to March for Panel A and from January to June for Panel B. Loser/Winner dummy variable D equals one if the stock is a loser at the end of December, and zero otherwise. Lott*D is the interaction term between each lottery feature and the dummy variable, D. The results from firm-level Fama-MacBeth regressions in Table 12 show that in both periods of Panel A and B, the interaction term Lott*D is statistically significantly positive for ISKEW, IVOL, and MAX, and negative for PRC and GH-Ratio. For example, in the case of IVOL, the interaction term is highly significant at 3.16 (t = 5.65) from January to March and at 5.77 from January to June. In summary, Table 11 and 12 confirm that greater performance of lottery-type stocks in losers than in winners persists up to six months beyond January.

Table 11

Persistence of the Effect of Lottery-Type Stocks and Past Performance

	(1) PRC S - W	(2) ISKEW S - W	(3) IVOL S - W	(4) MAX S - W	(5) GH-Ratio S - W
Panel A: 3-Month (January ~ March)					
M1 – M5	6.69***	1.75***	4.75***	2.74***	4.45***
	(7.02)	(3.57)	(6.16)	(4.14)	(4.50)
CAMP α	6.43***	1.49***	4.54***	2.62***	4.04***
	(6.77)	(3.20)	(5.90)	(3.94)	(4.19)
3-factor α	6.10***	1.43***	3.89***	2.20***	3.91***
	(5.77)	(2.72)	(4.55)	(2.99)	(3.65)
Panel B: 6-Month (January ~ June)					
	(1) PRC S - W	(2) ISKEW S - W	(3) IVOL S - W	(4) MAX S - W	(5) GH-Ratio S - W
M1 – M5	4.31***	0.78**	2.86***	1.50***	2.42***
	(7.91)	(2.55)	(6.19)	(3.82)	(4.34)
CAMP α	4.18***	0.62**	2.82***	1.52***	2.18***
	(7.66)	(2.07)	(6.06)	(3.83)	(3.96)
3-factor α	3.79***	0.51	2.25***	1.07***	1.86***
	(6.57)	(1.61)	(4.61)	(2.59)	(3.21)
Panel C: 12-Month (January ~ December)					
	(1) PRC S - W	(2) ISKEW S - W	(3) IVOL S - W	(4) MAX S - W	(5) GH-Ratio S - W
M1 – M5	2.54***	0.34*	1.77***	0.70***	1.10***
	(7.47)	(1.67)	(6.17)	(2.86)	(3.42)
CAMP α	2.55***	0.24	1.82***	0.75***	1.03***
	(7.46)	(1.24)	(6.35)	(3.06)	(3.22)
3-factor α	2.61***	0.29	1.72***	0.65***	1.03***
	(7.45)	(1.47)	(5.87)	(2.60)	(3.18)

Table 11 reports monthly return difference between loser stocks (M1) and winner stocks (M5) of the hedge portfolios (S - W) for 3, 6, and 12 months period. At the end of each December, five portfolios are formed on 6-month period (month t-5 to month t) holding period return from low to high (M1 to M5). Within each sub-group, five portfolios are formed on each lottery feature measure from weak to strong, and then the average monthly return of each portfolio are calculated from January to March (Panel A), from January to June (Panel B), and from January to December (Panel C). The stock price (PRC) of firm i in month t is measured as the end-of-month price in month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i}\, SMB_d + \beta_{3i}\, HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is between 1965/01 and 2008/12.

Table 12

Fama-MacBeth Cross-Sectional Regression

	Panel A: 3-Month (January ~ March)									
	LogPRC		LogISKEW		LogIVOL		MAX		GH-Ratio	
Intercept	7.04***	8.78***	3.38***	15.88***	11.49***	13.80***	2.25***	14.18***	7.85***	13.14***
	(6.45)	(8.54)	(5.58)	(8.82)	(4.81)	(6.65)	(5.25)	(9.24)	(5.23)	(6.28)
Lott	-1.76***	-0.70***	0.23***	-0.26***	2.37***	0.25	9.13***	3.35*	-6.77***	1.38
	(-6.35)	(-3.16)	(2.71)	(-4.18)	(4.30)	(0.70)	(3.82)	(1.85)	(-4.56)	(1.19)
D		2.37***		0.38		9.76***		-0.85*		4.96***
		(3.56)		(0.74)		(4.99)		(-1.74)		(3.71)
Lott*D		-1.89***		0.48***		3.16***		2.70		-11.61***
		(-7.18)		(3.61)		(5.65)		(1.40)		(-3.89)
β_{MKT}		0.02		-0.08		-0.24		-0.11		-0.17
		(0.13)		(-0.43)		(-1.55)		(-0.63)		(-1.08)
β_{SMB}		-0.17*		-0.16*		-0.25***		-0.23***		-0.17**
		(-1.97)		(-1.85)		(-3.11)		(-2.75)		(-2.07)
β_{HML}		0.16		0.22*		0.27***		0.23**		0.25**
		(1.23)		(1.97)		(2.70)		(2.10)		(2.38)
Ret(-1)		-4.17***		-5.04***		-4.95***		-5.90***		-4.43***
		(-4.96)		(-5.14)		(-5.30)		(-5.32)		(-5.23)
LOGME		-0.34***		-1.13***		-0.84***		-0.97***		-0.98***
		(-4.22)		(-8.39)		(-9.08)		(-8.60)		(-9.49)

Table 12 (Continued)

	Panel B: 6-Month (January ~ June)									
	LogPRC		LogISKEW		LogIVOL		MAX		GH-Ratio	
Intercept	3.93***	5.76***	2.18***	9.81***	5.52***	7.52***	1.70***	9.18***	3.54***	7.14***
	(5.79)	(7.94)	(5.49)	(8.65)	(3.69)	(5.57)	(6.01)	(9.38)	(3.91)	(5.38)
Lott	-0.86***	-0.14	0.12**	-0.21***	1.00***	-0.35	2.94*	-0.28	-2.31***	2.56***
	(-5.30)	(-0.98)	(2.32)	(-4.87)	(2.99)	(-1.43)	(1.90)	(-0.24)	(-2.67)	(3.38)
D		1.32***		-0.44		5.77***		-1.07***		3.12***
		(3.64)		(-1.51)		(5.15)		(-3.83)		(3.91)
Lott*D		-1.28***		0.26***		2.02***		2.89**		-6.86***
		(-8.55)		(3.15)		(6.25)		(2.39)		(-4.20)
β_{MKT}		-0.08		-0.12		-0.17*		-0.14		-0.14
		(-0.63)		(-0.92)		(-1.66)		(-1.14)		(-1.28)
β_{SMB}		-0.17***		-0.18***		-0.20***		-0.20***		-0.17***
		(-3.20)		(-3.14)		(-4.05)		(-3.82)		(-3.17)
β_{HML}		0.17**		0.19***		0.20***		0.20***		0.18***
		(2.15)		(2.61)		(3.15)		(2.83)		(2.77)
Ret(-1)		-1.74***		-2.40***		-2.17***		-2.52***		-2.24***
		(-3.59)		(-4.26)		(-4.04)		(-3.89)		(-4.60)
LOGME		-0.28***		-0.66***		-0.56***		-0.59***		-0.62***
		(-4.87)		(-7.88)		(-9.29)		(-8.29)		(-9.27)

Table 12 reports firm-level Fama-MacBeth (1973) regressions results. At the end of each December (month t), five portfolios are formed based on 6-month period (July - December) holding period return from low to high (M1 to M5). In Panel A (B), the dependent variable is monthly returns of stocks in January – March (January - June), and the independent variables are measured at the end of December. D is a dummy variable which equals one if security i is a loser stock, and zero otherwise, and Lott*D is the interaction term between lottery features and D. β_{MKT}, β_{SMB}, and β_{HML} refer to loadings on the three Fama-French factors, estimated using daily returns from month t-5 to month t. Ret(-1) is stock's monthly return in month t, and LOGME is log of firm size in month t. The stock price (PRC) of firm i is measured at the end of month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(Rmkt_d - RF_d) + \beta_{2i}SMB_d + \beta_{3i}HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $Rmkt_d$ is the market return on day d, RF_d is the risk-free rate on day d, SMB (HML) is the return of size (book-to-market) factor . MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively.The sample period is between 1965/01 and 2008/12.

Next, I examine whether this persistence varies between stocks with high institutional holdings (group IHH) and those with high individual investors' holdings (group IHL). See Table 13.

Table 13

Persistence of the Effect of Lottery-Type Stocks and Individual Investors

	Panel A: 3-Month (January ~ March)									
	PRC		ISKEW		IVOL		MAX		GH-Ratio	
	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH
Weak	1.61	1.26	3.17	1.42	1.81	1.33	2.51	1.58	2.29	1.57
Strong	7.81	2.28	4.02	1.82	6.77	1.41	5.43	1.39	7.26	1.45
S - W	6.20	1.01	0.85	0.40	4.96	0.09	2.92	-0.20	4.97	-0.12
	(4.09)	(1.83)	(1.68)	(1.62)	(3.36)	(0.11)	(2.45)	(-0.30)	(2.94)	(-0.17)
IHL-IHH	5.24***		0.47		4.90***		3.10***		5.06***	
	(4.26)		(1.07)		(5.03)		(3.66)		(4.21)	
CAPM α	4.85***		0.31		4.64***		2.89***		4.71***	
	(4.04)		(0.72)		(4.82)		(3.44)		(3.98)	
3-factor α	5.72***		0.48		4.35***		2.83***		5.02***	
	(4.22)		(0.99)		(3.98)		(2.95)		(3.77)	
	Panel B: 6-Month (January ~ June)									
	PRC		ISKEW		IVOL		MAX		GH-Ratio	
	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH	IHL	IHH
Weak	1.42	1.42	2.18	1.52	1.64	1.50	1.97	1.57	1.95	1.72
Strong	4.87	1.98	2.64	1.79	4.11	1.42	3.15	1.40	4.17	1.33
S - W	3.45	0.58	0.46	0.27	2.47	-0.08	1.18	-0.17	2.22	-0.38
	(3.98)	(1.73)	(1.31)	(1.58)	(2.87)	(-0.15)	(1.70)	(-0.42)	(2.35)	(-0.87)
IHL-IHH	2.90***		0.20		2.56***		1.39***		2.56***	
	(4.03)		(0.61)		(4.26)		(2.71)		(3.67)	
CAPM α	2.43***		0.11		2.32***		1.17**		2.19***	
	(3.45)		(0.37)		(3.84)		(2.29)		(3.18)	
3-factor α	2.83***		0.17		1.90***		0.90		2.15***	
	(3.68)		(0.52)		(2.89)		(1.61)		(2.85)	

Table 13 reports monthly return difference of hedge portfolio between low institutional holdings group and high institutional holdings group for three and six months period. At the end of each month December, all stocks are divided into three groups based on their institutional holdings portion. IHH is the top 1/3 institutional holdings group and IHL is the bottom 1/3 three institutional holdings group. Within each group, all stocks are sorted into five portfolios based on each of the five lottery features from weak to strong. We report returns of these portfolios for three month period (January ~ March) in Panel A and six month period (January ~ June) in Panel B. The stock price (PRC) of firm i in month t is measured as the end-of-month price in month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i} SMB_d + \beta_{3i} HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is between 1979/01 and 2008/12.

Table 13 reports that the IHL group has greater return for the hedge portfolio than the IHH group for all lottery features (except ISKEW) for three months in Panel A and for six months in Panel B. For example, in the case of IVOL, IHL group produce 4.90% (t = 5.03) a month for three month period and 2.56% (t = 4.26) a month for six month period more than IHH group. Moreover, this greater performance is not explained by the CAPM or three factor model. Therefore, the greater performance of lottery-type stocks driven by individual investors' enthusiasm on those persist goes beyond January.

The Other January Effect and Persistence of Gambling Preference

"The other January effect" by Cooper, McConnell, and Ovtchinnikov (2006) states that the market return in January could be seen as a predictor of market returns for the rest of the year.[4] The market return from February to December in years with positive January market return is significantly higher than the corresponding return in years with negative January market return. Therefore, it is worthwhile to test the relation between market return in January and the persistence of the lottery-type stock effect, since it is possible that a positive January market may affect investor sentiment, making investors more confident about the choice of lottery-type stocks and keep stock returns high during following months. I separate years with positive January market excess return and those with negative ones.

[4] Cooper, McConnell, and Ovtchinnikov (2006) use both value-weighted and equal-weighted market returns as well as market excess return in January in their paper. This paper reports the results using only equal-weighted market excess return for the sake of convenience. But, the results in this paper are robust for value-weighted market return as well as excess return.

Throughout the sample period from 1965 to 2008, there are 34 years with positive January equal-weighted market excess return, and 10 years with negative ones. Table 14 reports the average monthly return of portfolios for 3-, 6-, and 12-month period during positive January years and negative January years separately.

During years with positive January market return, investors' enthusiasm on lottery-type stocks could last at least six months from January to June. All five lottery feature measures provide significantly positive average monthly returns on portfolio (S – W) during 3- and 6-month period, and three out of five measures (except MAX and GH-Ratio) show significantly positive returns up to 12 months. On the other hand, during the 10 negative years, all five lottery feature measures provide either significantly negative or insignificant monthly returns of portfolio S – W even during 3-month period. For example, in the case of IVOL, the average monthly returns of portfolio S – W during 3-, 6-, and 12-month period are -1.04%, -1.59%, and -2.04%, respectively. These results suggest that investors prefer lottery-type stocks beyond January during years with positive January market return, and avoid them during those with negative January market return.

Table 14

Persistence of the Effect of Lottery-Type Stocks and Market Condition in January

	Positive Year (N = 34)			Negative Year (N = 10)		
	3-Month	6-Month	12-Month	3-Month	6-Month	12-Month
			Panel A: PRC			
Weak	2.15	1.94	1.38	-1.50	-1.27	-0.32
Strong	8.81	5.42	2.81	-0.32	-1.02	-1.48
S - W	6.66***	3.48***	1.43***	1.18	0.26	-1.16***
	(6.06)	(5.36)	(3.72)	(1.53)	(0.49)	(-2.79)
CAPM α	5.88***	2.90***	1.24***	0.10	-0.02	-1.19***
	(5.19)	(4.35)	(3.22)	(0.12)	(-0.04)	(-2.80)
3-factor α	4.37***	1.84***	0.83**	-0.45	-0.22	-1.26***
	(3.91)	(2.96)	(2.46)	(-0.52)	(-0.46)	(-3.54)
			Panel B: ISKEW			
Weak	3.60	2.54	1.48	-0.99	-1.14	-0.69
Strong	5.12	3.41	1.91	-1.19	-1.31	-0.96
S - W	1.52***	0.87***	0.43***	-0.20	-0.17	-0.27*
	(4.28)	(3.80)	(2.94)	(-0.85)	(-0.90)	(-1.89)
CAPM α	1.43***	0.64***	0.30**	-0.12	0.03	-0.23
	(3.82)	(2.77)	(2.09)	(-0.41)	(0.13)	(-1.58)
3-factor α	1.34***	0.51**	0.35**	-0.10	0.08	-0.18
	(3.27)	(2.06)	(2.44)	(-0.31)	(0.48)	(-1.42)
			Panel C: IVOL			
Weak	2.20	1.89	1.41	-0.38	-0.40	0.07
Strong	8.06	4.90	2.44	-1.42	-1.99	-1.97
S - W	5.86***	3.02***	1.03**	-1.04	-1.59***	-2.04***
	(5.09)	(4.37)	(2.45)	(-1.58)	(-2.96)	(-4.27)
CAPM α	4.49***	1.81***	0.48	-0.84	-0.92*	-1.59***
	(3.98)	(2.75)	(1.23)	(-1.09)	(-1.70)	(-3.69)
3-factor α	3.42***	1.02	0.31	-0.45	-0.73	-1.39***
	(2.89)	(1.57)	(0.85)	(-0.53)	(-1.65)	(-4.08)
			Panel D: MAX			
Weak	3.02	2.37	1.58	-0.18	-0.40	-0.03
Strong	6.78	4.22	2.16	-1.88	-2.11	-1.88
S - W	3.76***	1.85***	0.58*	-1.69***	-1.71***	-1.85***
	(4.19)	(3.37)	(1.72)	(-3.69)	(-4.28)	(-5.15)
CAPM α	2.62***	0.79	0.09	-1.35**	-1.08***	-1.46***
	(3.01)	(1.55)	(0.29)	(-2.57)	(-2.84)	(-4.73)
3-factor α	2.07**	0.33	0.04	-0.94	-0.89***	-1.31***
	(2.22)	(0.64)	(0.14)	(-1.62)	(-2.85)	(-5.42)
			Panel E: GH-ratio			
Weak	2.62	2.27	1.65	-0.89	-0.68	-0.09
Strong	7.49	4.36	2.09	-1.39	-2.10	-1.99
S - W	4.86***	2.09***	0.44	-0.49	-1.42***	-1.90***
	(4.12)	(3.12)	(1.15)	(-0.72)	(-3.26)	(-5.31)
CAPM α	3.35***	1.03	0.03	-1.25	-1.42***	-1.70***
	(2.94)	(1.58)	(0.08)	(-1.66)	(-2.98)	(-4.85)
3-factor α	2.33**	0.39	-0.25	-1.47	-1.56***	-1.68***
	(2.12)	(0.64)	(0.76)	(-1.69)	(-3.49)	(-5.52)

Table 14 (Continued)

Each December, all stocks are sorted into five portfolios based on each of the five lottery features from weak to strong, and then the average monthly return of each portfolio for following 3, 6, and 12 months are calculated. Positive (negative) year is the year with positive equal-weighted market excess return in January. The stock price (PRC) of firm i in month t is measured as the end-of-month price in month t. ISKEW and IVOL are the third moment and the standard deviation, respectively, of the residuals from the following regression over 6-month period (month t-5 to month t): $R_{i,d} = \alpha_i + \beta_{1i}(R_{mkt,d} - RF_d) + \beta_{2i}\, SMB_d + \beta_{3i}\, HML_d + e_{i,d}$, where $R_{i,d}$ is the daily return of security i on day d, $R_{mkt,d}$ is the market return on day d, RF_d is the risk-free rate on day d, SMB_d is the return on the size factor on day d, and HML_d is the return on the book-to-market factor on day d. MAX of firm i is stock i's highest daily return in month t. GH-Ratio of firm i in month t is stock i's end-of-month price in month t divided by the past 52-week highest price. The t-statistics are reported in parentheses. ***,**, and * denote significance at the one percent, five percent, and 10 percent levels, respectively. The sample period is between 1965/01 and 2008/12.

CHAPTER 5

CONCLUSION

In this dissertation, I revisit the January effect in the U.S. stock market, and I document the explanatory power of individual investors' gambling preference in stock market January return. I hypothesize that since the investor sentiment and gambling preference peak in January, and individual investors are more prone to be affected by this psychological bias, the greater performance of lottery-type stocks in January should be stronger for stocks with greater individual investor ownership. Consistent with this hypothesis, I find that: First, lottery-type stocks dominate in January, especially among past loser stocks. For example, using low stock price (PRC) as a lottery characteristic, the long-short strategy (long lottery-type stocks and short non-lottery-type stocks) can gain 13.50% in January from 1965 to 2008. Secondly, the outperformance of lottery-type stocks in January increases with the level of individual investors' ownership in the stock. When partitioning stocks into three sub-samples sorted on stocks' percentage of institutional ownership, distinct difference between lottery- and non-lottery-type stocks in January return is observed in sub-sample IHL (stocks with highest individual investors ownership), while no significant results found in sub-sample IHH (stocks with highest institutional investors). These results are robust after controlling for other variables that may affect stocks monthly returns.

Moreover, the outperformance of lottery-type stocks persists up to six months beyond January. In addition, I also investigate the implication of the "other January effect" (Cooper, McConnell, and Ovtchinnikov (2006)) on lottery-type stocks, and our results indicate that when the market condition is favorable, investors are more passionate to gamble in the stock market in January, while the market condition is unfavorable, non-lottery-type stocks dominate the stock market, which could last to 12-month period.

This dissertation contributes to the literature in several ways. First, in addition to three characteristics widely used in the literature to proxy for lottery-type stocks, I add MAX (Bali, Cakici, and Whitelaw, 2011) and the GH-Ratio (George and Hwang, 2004) as other proxies, and all five variables provide consistent results. Secondly, different from prior research, I investigate the persistence of the lottery-type stocks' January effect, and find that the outperformance of lottery-type stocks could last up to 6-month period. Thirdly, in prior research, Doran, Jiang, and Peterson (2012) utilize Barber, Odean, and Zhu's (2009) measure of retail investor order imbalance to investigate whether retail investors are the driving force of lottery-type stocks returns in January. In this dissertation, I use another measure – the percentage of institutional ownership – to distinguish the effects between individual and institutional investors, and the findings are consistent with those in Doran, Jiang, and Peterson's (2012) work. Finally, I link the lottery-type stocks with the "other January effect" and find opposite patterns of lottery-type stocks price change in years with positive January market return and in years with negative January market return.

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