Lottery Assert Literature

1. Maxing out: Stocks as lotteries and the cross-section of expected returns
2. Do Mutual Fund Investors Overweight the Probability of Extreme Payoffs in the Return Distribution?
3. Why Do Mutual Funds Hold Lottery Stocks?

解读人：陈泽理

2022/11/24

Backgroud

- Existing theoretical models argue that investors' investment decisions may be influenced by extreme positive payoffs in assets' return distributions.
- There is abundant evidence that some investors prefer "lottery stocks" despite the fact that they tend to significantly underperform other stocks.
- How about other asserts like funds?
- How about fund managers?

Mainline

- The Max factor in stock market to explain lottery questions.(Bali,2011)

- Max factor using in fund to explain lottery questions in funds.
  - Flows(Akbas,2020)
  - Return Predictions and Fund Managers' Action (Agarwal, 2022)

Maxing out: Stocks as lotteries and the cross-section of expected returns

Turan G. Bali,
Nusret Cakici,
Robert F. Whitelaw

JFE, 2011.99(02)

解读人：陈泽理

2022/11/24

Content

- Introduction
- Data and Method
- Empirical Result
- Conclusion

1.Introduction

Background and Motivation

- To diversify away idiosyncratic volatility, yet a closer examination of the portfolios of individual investors suggests that these investors are not well-diversified, which indicates that looking more closely at the distribution of individual stock returns as potential determinants of the cross-section of expected returns.

- There is also evidence that investors have a preference for lottery-like assets.(i.e. the favorite-longshot bias in horsetrack betting)

1.Introduction

Questions and Methods

- What's the role of extreme positive returns in the cross-sectional pricing of stocks as a proxy variable for the lottery?
  - portfolio sort.

- The persistence of this phenomenon.
  - cross-sectional regressions.

- Robustness test
  - size, book-to-market ratio, momentum, short-term reversals, and illiquidity.
  - idiosyncratic volatility

2.Data and Method

Data

- All New York Stock Exchange(NYSE), American Stock Exchange (Amex), and Nasdaq financial and nonfinancial firms from the CRSP, 1926.01-2005.12
  - daily/monthly stock returns
  - volume
  - share prices and shares outstanding

- book-to-market ratios of individual firms from Compustat.

- MAX/MAX5
  - the (average of fifth) maximum daily return within the previous month

3.Empirical Result

Returns and alphas on portfolios of stocks sorted by MAX.

- The average returns of deciles 1–7 are approximately the same, but, going from decile 7 to decile 10, average returns drop significantly.
- from MAX(N) N=1 to 5, the conclusion is the same.

	VW Portfolios		EW Portfolios		
Decile	Average return	Four-factor alpha	Average return	Four-factor alpha	Average MAX
Low MAX	1.01	0.05	1.29	0.22	1.30
2	1.00	0.00	1.45	0.33	2.47
3	1.00	0.04	1.55	0.39	3.26
4	1.11	0.16	1.55	0.39	4.06
5	1.02	0.09	1.49	0.31	4.93
6	1.16	0.15	1.49	0.33	5.97
7	1.00	0.03	1.37	0.23	7.27
8	0.86	−0.21	1.32	0.20	9.07
9	0.52	−0.49	1.04	−0.09	12.09
High MAX	−0.02	−1.13	0.64	−0.44	23.60
10-1 difference	−1.03 (−2.83)	−1.18 (−4.71)	−0.65 (−1.83)	−0.66 (−2.31)	

3.Empirical Result

The persistence of extreme positive daily returns

- firm-level cross-sectional regressions of MAX on lagged predictor variables.
- MAX, SIZE and IVOL contribute most to the explanatory power of the regression.

MAX	BETA	SIZE	BM	MOM	REV	ILLIQ	IVOL	R^2
0.4054 (45.34)								16.64%
	0.1116 (4.47)							1.00%
		−1.3381 (−22.42)						15.99%
			0.5334 (6.41)					1.81%
				−1.7264 (−6.87)				3.52%
					−0.0655 (−11.19)			3.31%
						0.1209 (8.13)		4.28%
							0.1643 (86.41)	27.36%
0.3325 (31.31)	0.2500 (12.14)	−0.4737 (−30.45)	−0.1277 (−5.86)	−0.3432 (−4.47)	−0.0504 (−22.25)	0.0200 (6.16)	0.1930 (41.60)	35.10%

3.Empirical Result

The persistence of extreme positive daily returns

- FM regressions of MAX on lagged predictor variables.
- After adding control variables, the coefficients of MAX is more significant.

$$R_{i,t+1} = \lambda_{0,t} + \lambda_{1,t}\mathrm{MAX}_{i,t} + \lambda_{2,t}\mathrm{BETA}_{i,t} + \lambda_{3,t}\mathrm{SIZE}_{i,t} + \lambda_{4,t}\mathrm{BM}_{i,t} + \lambda_{5,t}\mathrm{MOM}_{i,t} + \lambda_{6,t}\mathrm{REV}_{i,t} + \lambda_{7,t}\mathrm{ILLIQ}_{i,t} + \varepsilon_{i,t+1},$$

MAX	BETA	SIZE	BM	MOM	REV	ILLIQ
−0.0434						
(−2.92)						
	−0.0118					
	(−0.43)					
		−0.1988				
		(−4.08)				
			0.4651			
			(6.73)			
				0.7317		
				(4.67)		
					−0.0675	
					(−11.24)	
						0.0371
						(3.87)
	0.0140	−0.0865	0.3390	0.7436	−0.0751	0.0223
	(0.56)	(−1.73)	(4.82)	(5.29)	(−14.15)	(3.64)
−0.0637	0.0485	−0.1358	0.3201	0.6866	−0.0712	0.0224
(−6.16)	(2.18)	(−3.10)	(4.69)	(4.97)	(−13.53)	(3.78)

3.Empirical Result

Main characteristics of decile portfolios sorted by MAX.

- In addition to having a lower average return, high MAX stocks display significantly higher volatility and more positive skewness.
- As MAX increases across the deciles, market capitalization and price decreases, market beta increases, indicates that alphas' differences is less than original return.

	Low MAX	High MAX
Mean	1.26%	0.60%
Median	0.35%	−2.50%
Std dev	12.54%	30.21%
Skewness	4.26	5.80

Decile	MAX	Size (10^6)	Price ($)	Market beta
Low MAX	1.62	316.19	25.44	0.33
2	2.51	331.47	25.85	0.55
3	3.22	250.98	23.88	0.68
4	3.92	188.27	21.47	0.76
5	4.71	142.47	19.27	0.87
6	5.63	108.56	16.95	0.97
7	6.80	80.43	14.53	1.04
8	8.40	58.69	12.21	1.12
9	11.01	39.92	9.57	1.15
High MAX	17.77	21.52	6.47	1.20

3.Empirical Result

- Robustness test1: control variables.
- Bivariate portfolio sorted by MAX and control variables.
- All control variables do not explain the negative relation between maximum daily returns and future stock returns.
- Equal-weighted portfolios' result are the same.

Panel A: Value-weighted portfolios Decile	SIZE	BM	MOM	REV	ILLIQ
Low MAX	1.47	1.22	1.32	1.06	1.29
2	1.60	1.19	1.14	1.18	1.31
3	1.69	1.27	1.17	1.19	1.30
4	1.65	1.19	1.07	1.18	1.23
5	1.57	1.17	1.03	1.15	1.12
6	1.49	1.23	1.03	1.15	1.06
7	1.29	1.13	0.96	1.04	0.99
8	1.20	0.99	0.93	1.07	0.88
9	0.93	0.89	0.88	0.86	0.60
High MAX	0.25	0.29	0.67	0.25	0.18
Return difference	−1.22	−0.93	−0.65	−0.81	−1.11
	(−4.49)	(3.23)	(−3.18)	(−2.70)	(−4.07)
Alpha difference	−1.19	−1.06	−0.70	−0.98	−1.12
	(−5.98)	(−4.87)	(−5.30)	(−5.37)	(−5.74)

3.Empirical Result

- Robustness test2: relevant variables.
- Bivariate portfolio sorted by MAX and volatility /skewness.
- Both volatility and skewness do not explain the negative relation between maximum daily returns and future stock returns.
- MAX5 and equal-weighted portfolios' result are the same.

Panel A: Sorted by MAX and MAX(5) controlling for IVOL

	$N=1$	
Decile	VW	EW
Low MAX(N)	1.12	2.01
2	1.09	1.65
3	0.94	1.54
4	0.93	1.41
5	0.80	1.34
6	0.77	1.22
7	0.79	1.19
8	0.82	1.23
9	0.76	1.04
High MAX(N)	0.77	1.10
Return difference	−0.35	−0.91
	(−2.42)	(−7.86)
Alpha difference	−0.34	−0.92
	(−2.48)	(−7.96)

Decile	TSKEW	SSKEW	ISKEW
Low MAX	1.06	1.12	1.04
2	1.11	1.06	1.14
3	1.21	1.06	1.18
4	1.07	1.10	1.08
5	1.13	1.11	1.17
6	1.14	1.10	1.10
7	0.97	0.98	0.99
8	0.87	0.89	0.91
9	0.76	0.80	0.74
High MAX	0.12	0.03	0.11
Return difference	−0.94	−1.10	−0.93
	(−3.06)	(−3.75)	(−2.96)
Alpha difference	−1.00	−1.23	−1.01
	(−4.34)	(−5.50)	(−4.34)

4.Conclusion

- There is a statistically and economically significant relation between lagged extreme positive returns, as measured by the maximum daily return over the prior month or the average of the highest daily returns within the month, and future returns.

- This result is robust to controls for numerous other potential risk factors and control variables.

Do Mutual Fund Investors Overweight the Probability of Extreme Payoffs in the Return Distribution?

Ferhat Akbas
Egemen Genc

JFE, 2020(02),Vol.55,No.1

解读人：陈泽理

2022/11/24

Content

- Introduction
- Data and Method
- Empirical Result
- Conclusion

1.Introduction

Background and Motivation

- In particular, holding 89% of mutual fund assets ($16 trillion) in 2014, individual investors make up the largest group of investors in mutual funds and increasingly determine the flows for mutual funds.

- Because flows into and out of mutual funds can significantly affect asset prices and fund managers' incentives, understanding how individuals' preferences influence fund flows is important to uncovering the recent investor dynamics in the mutual fund industry.

- One prominent feature of individual investors is that they exhibit a preference for assets with a small probability of a large payoff because they overweight the probabilities of such an extremely positive outcome in a payoff distribution.

1.Introduction

Questions and Methods

- What's the role of large positive payoff in the cross section of fund flows?
  - multivariate regression
- The persistence of this phenomenon.
  - Transition Matrix of MAX
- Is there exist alternative explanations for the positive relationship between MAX and future fund flows?
  - Analysis of heterogeneity.
- The predictive power of MAX.
  - FM regression
  - portfolio sort

1.Introduction

Contributions

- Previous studies focus on option and stock markets to study the preference for extreme payoff states, we show that overweighting positive extreme returns is a more common phenomenon in financial markets than previously thought because it also affects the capital allocations in mutual funds.

- Unlike other studies of the stock market, which infer investor preferences from changes in prices, we utilize fund flows, which provide a unique opportunity to document a clearer link between investors' preferences and the demand for funds.

- Our study reveals an important link between extreme positive returns in the past return distribution and fund flows.

2.Data and Method

Data and Variables

- Fund returns and other fund characteristics are obtained from CRSP Survivor-Bias-Free U.S. Mutual Fund Database. 1992-2015

- Eliminate funds of less than 1 year, funds with less than $1 million in assets under management, funds with 0 (or negative) expenses and observations with a missing fund name in CRSP.

- Flow is defined as:

$$\mathrm{FLOW}_{i,t} = ((\mathrm{TNA}_{i,t} - \mathrm{TNA}_{i,t-1}) \times (1 + R_{i,t}))/\mathrm{TNA}_{i,t-1},$$

where TNA is the total net asset value of fund; R is the return of fund.(quarter)

- Filter out the top and bottom 1% of tails of the flow data.

2.Data and Method

Data and Variables

- MAX is defined as the maximum style-adjusted monthly return in the previous 12 months ending at the end of the previous quarter.

- Style-adjusted monthly returns are calculated by subtracting the average monthly returns of all funds with the same style from a fund's monthly returns
  - Style-adjusted returns control for the time-varying style effect and mitigate concerns related to categorizing funds as high-MAX funds because of the popularity of the style to which they belong.

Panel B. Characteristics of Funds Sorted by MAX

	MAX	TNA	FAMILY_ TNA	AGE	EXPENSE_ RATIO	TURNOVER	LOAD	RETURN	CARHART_ ALPHA	FLOW	VOLATILITY	SKEWNESS
Low MAX	0.84%	1,575.6	31,831.9	192.8	1.12%	72.34%	2.10%	−4.19%	−0.19%	0.01%	3.93%	−24.71%
2	1.34%	1,734.3	32,643.3	195.2	1.12%	72.86%	1.98%	−2.27%	−0.14%	2.46%	4.02%	−23.67%
3	1.67%	1,625.2	31,934.4	190.2	1.13%	75.23%	1.92%	−1.58%	−0.12%	3.10%	4.09%	−22.83%
4	1.99%	1,420.9	29,389.8	184.1	1.16%	76.27%	1.91%	−0.92%	−0.10%	1.83%	4.18%	−22.98%
5	2.33%	1,269.0	28,678.4	179.6	1.20%	77.54%	1.89%	−0.42%	−0.08%	5.69%	4.26%	−21.21%
6	2.71%	1,236.6	27,590.5	174.4	1.22%	78.11%	1.88%	0.22%	−0.07%	2.37%	4.35%	−20.89%
7	3.16%	1,115.6	26,165.9	171.3	1.25%	80.25%	1.84%	0.81%	−0.05%	4.75%	4.47%	−19.56%
8	3.75%	1,110.4	25,034.6	165.4	1.29%	84.66%	1.81%	2.19%	−0.03%	4.83%	4.59%	−17.00%
9	4.66%	954.4	22,155.1	159.4	1.33%	90.48%	1.80%	3.87%	−0.01%	5.38%	4.88%	−14.47%
High MAX	7.51%	741.7	18,957.9	156.7	1.47%	111.68%	1.75%	6.69%	0.03%	6.57%	5.93%	−0.08%
All	3.00%	1,277.0	27,431.7	176.9	1.23%	81.95%	1.89%	0.46%	−0.08%	3.70%	4.47%	−18.78%

3.Empirical Result

Flow–MAX Relationship

- FM regression $\mathrm{FLOW}_{i,t} = \alpha + \beta_{i,t-1} \times \mathrm{MAX}_{i,t-1} + \delta_{i,t-1} \times X_{i,t-1} + \varepsilon_{i,t-1}$

- Rank all funds according to their 12-month cumulative returns within their respective styles and assign them a continuous performance rank distributed between 0 (worst performance) and 1 .

- Partition relative performance into three groups, LOW PERF(20%), MID PERF(60%), and HIGH PERF(20%).

- The coefficients of MAX are all statistically significant at the 1% level in all specifications.

3.Empirical Result

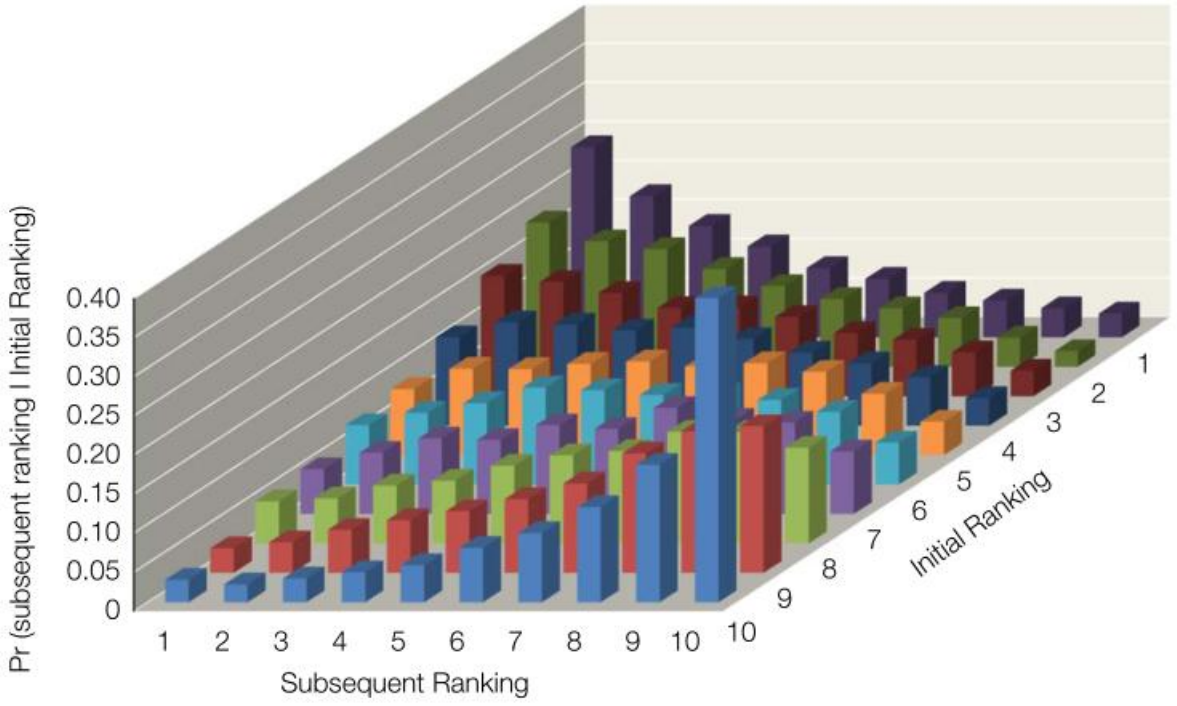
Flow–MAX Relationship $$\mathrm{FLOW}_{i,t} = \alpha + \beta_{i,t-1} \times \mathrm{MAX}_{i,t-1} + \delta_{i,t-1} \times X_{i,t-1} + \varepsilon_{i,t-1}$$

	1	2	3	4	5	6
MAX	0.248 (5.05)	0.271 (4.94)	0.313 (5.84)	0.338 (5.75)	0.762 (4.94)	0.952 (5.75)
VOLATILITY	−0.569 (−3.97)	−0.659 (−3.84)	−0.613 (−4.54)	−0.701 (−4.35)	−1.496 (−3.84)	−1.593 (−4.35)
SKEWNESS	0.001 (0.42)	0.002 (0.86)	0.001 (0.39)	0.002 (0.83)	0.103 (0.86)	0.101 (0.83)
ln(AGE)	−0.016 (−12.53)	−0.016 (−11.94)	−0.016 (−12.93)	−0.016 (−12.36)	−1.288 (−11.94)	−1.310 (−12.36)
ln(TNA)	−0.007 (−10.58)	−0.007 (−11.17)	−0.006 (−10.48)	−0.007 (−11.04)	−1.320 (−11.17)	−1.295 (−11.04)
ln(FAMILY_TNA)	0.004 (7.67)	0.004 (7.54)	0.004 (7.72)	0.004 (7.58)	0.995 (7.54)	0.996 (7.58)
EXPENSE_RATIO	−0.137 (−0.69)	−0.260 (−1.47)	−0.182 (−0.91)	−0.307 (−1.71)	−0.118 (−1.47)	−0.140 (−1.71)
TURNOVER	−0.001 (−1.08)	−0.001 (−1.08)	−0.001 (−1.14)	−0.001 (−1.14)	−0.093 (−1.08)	−0.102 (−1.14)
FLOW	0.132 (9.12)	0.131 (9.11)	0.134 (9.07)	0.133 (9.06)	17.963 (9.11)	18.289 (9.06)
LOAD	0.141 (4.26)	0.154 (4.91)	0.142 (4.33)	0.155 (4.99)	0.323 (4.91)	0.325 (4.99)
LOW_PERF	0.154 (10.31)	0.157 (10.06)			0.740 (10.06)	
MID_PERF	0.068 (15.28)	0.071 (14.71)			1.638 (14.71)	
HIGH_PERF	0.401 (17.51)	0.411 (18.15)			1.992 (18.15)	
PERF			0.019 (1.84)	0.019 (1.83)		0.557 (1.83)
$PERF^2$			0.091 (8.44)	0.093 (8.65)		2.779 (8.65)
Style fixed effects	No	Yes	No	Yes	Yes	Yes
N	15,0181	15,0181	15,0181	15,0181	15,0181	15,0181
R^2	0.163	0.167	0.158	0.162	0.167	0.162

3.Empirical Result

Persistence in MAX

- Create a transition matrix, which gives the probability of achieving a ranking of decile j in a period, given an initial ranking of decile i in the previous period.
- Using year-end data to avoid overestimate the persistence.



3.Empirical Result

Persistence in MAX

- In the univariate regression of MAX on the lagged MAX, the average cross-sectional coefficient is significant.

	1	2	3	4	5
MAX	0.515 (16.76)	0.452 (20.28)	0.534 (12.80)	0.509 (12.56)	0.504 (13.19)
VOLATILITY		0.245 (3.92)	0.192 (2.71)	0.157 (2.13)	0.124 (2.07)
RETURN			−0.046 (−4.13)	−0.043 (−3.66)	−0.041 (−3.60)
SKEWNESS				−0.002 (−1.89)	−0.002 (−1.88)
ln(AGE)				0.000 (1.71)	0.000 (1.58)
ln(TNA)				−0.000 (−1.55)	−0.000 (−1.41)
ln(FAMILY_TNA)				−0.000 (−3.25)	−0.000 (−3.39)
EXPENSE_RATIO				0.281 (4.28)	0.281 (5.01)
TURNOVER				0.002 (2.20)	0.001 (2.12)
FLOW				0.000 (0.77)	0.000 (0.60)
LOAD				−0.037 (−3.23)	−0.035 (−3.65)
Style fixed effects	No	No	No	No	Yes
N	36,955	36,955	36,955	35,906	35,906
R^2	0.268	0.307	0.344	0.370	0.387

3.Empirical Result

Distinguishing between Alternative Explanations:Increase in Fund Visibility

- Several studies show that visibility affects investors' decisions.

- If the MAX relates to investors' preferences for lottery-like payoffs, the effect of the MAX should show heterogeneity across funds that cater to clienteles with different risk attitudes.(flow-MAX)

- To capture clienteles with different risk attitudes, we divide our sample of equity funds into three groups, low (bottom 30%), medium, and high (top 30%), based on the extent of their active management using the active-share measure of Cremers and Petajisto (2009).

	Equity Funds									
	Low Active Share		Medium Active Share		High Active Share		Bond Funds		Index Funds	
MAX	0.013	0.069	0.149	0.199	0.230	0.274	0.307	0.329	1.227	0.823
	(0.11)	(0.64)	(2.17)	(2.98)	(3.58)	(4.11)	(1.50)	(1.66)	(1.61)	(1.33)

3.Empirical Result

Distinguishing between Alternative Explanations:Increase in Fund Visibility

- If the positive flow–MAX relationship is solely due to fund visibility, the marginal effect of MAX should be less pronounced among the relatively more visible funds to which investors already pay more attention or are more aware of.

- Identify a fund as a “star” fund if it obtains a 5-star rating from Morningstar.

- Star funds proposed by Morningstar are plausibly very visible, the large increase in the strength of the MAX effect within star funds is hard to reconcile with a pure visibility argument.

	Piecewise Regressions					
	1	2	3	4	5	6
MAX	0.130 (2.49)	0.293 (5.06)	0.211 (2.44)	0.272 (4.57)	0.306 (3.98)	0.316 (4.23)
MAX × STAR_FUND	0.380 (2.26)					
STAR_FUND	0.049 (9.41)					

3.Empirical Result

Distinguishing between Alternative Explanations:Increase in Fund Visibility

- Under the visibility hypothesis, the MAX–flow relationship should be weakened by higher values of the past MAX because funds with a high MAX in the past have already drawn some attention and hence have already been considered in the investment opportunity set of some investors.

	Piecewise Regressions			Quadratic Regressions		
	1	2	3	4	5	6
MAX	−0.026 (−0.33)	−0.178 (−1.41)	−0.151 (−1.13)	−0.024 (−0.31)	−0.194 (−1.57)	−0.185 (−1.41)
MAX × L4.MAX$_{\text{above median}}$	0.220 (2.67)			0.290 (3.57)		
L4.MAX$_{\text{above median}}$	0.003 (1.30)			0.002 (0.66)		
MAX × L5.MAX_RANK[1:5]		0.070 (2.66)			0.089 (3.45)	
L4.MAX_RANK [1:5]		0.002 (2.50)			0.002 (1.95)	
MAX × L5.MAX[QUINTILE_2]			0.148 (0.97)			0.211 (1.35)
MAX × L5.MAX[QUINTILE_3]			0.023 (0.14)			0.113 (0.71)
MAX × L5.MAX[QUINTILE_4]			0.332 (2.06)			0.446 (2.81)
MAX × L5. MAX[QUINTILE_5]			0.313 (2.26)			0.425 (3.10)

3.Empirical Result

MAX as a Measure of Future Fund Performance

- To examine whether a high MAX also predicts superior future performance.

$$\mathrm{PERF}_{i,t+k} = \alpha + \beta_{i,t-1} \times \mathrm{MAX}_{i,t-1} + \delta_{i,t-1} \times \mathrm{CONTROLS}_{i,t-1} + \varepsilon_{i,t-1},$$

	Betas Calculated From:								
	Monthly Regressions over the Previous 36 Months						Short-Window Regressions		
	Style-Adjusted	CAPM	Fama–French	Carhart	Treynor–Mazuy	Ferson–Schadt	CAPM	Fama–French	Carhart
One quarter (3 months)	−0.069 (−1.97)	−0.018 (−0.58)	−0.027 (−1.17)	−0.015 (−0.59)	−0.047 (−1.22)	−0.000 (−0.01)	−0.012 (−0.34)	−0.029 (−1.04)	−0.030 (−1.12)
Two quarters (6 months)	−0.114 (−1.74)	−0.014 (−0.23)	−0.041 (−0.94)	−0.025 (−0.55)	−0.050 (−0.70)	−0.017 (−0.15)	−0.008 (−0.11)	−0.039 (−0.73)	−0.041 (−0.84)
Four quarters (1 year)	−0.154 (−1.24)	−0.020 (−0.20)	−0.070 (−0.97)	−0.039 (−0.54)	−0.054 (−0.44)	0.019 (0.12)	−0.022 (−0.17)	−0.064 (−0.66)	−0.057 (−0.65)

- The insignificant relationship between MAX and future returns suggests that high-MAX funds do not outperform otherwise-similar funds.

3.Empirical Result

MAX as a Measure of Future Fund Performance:portfolio sort

- Funds with MAX in a given month seem to exhibit no superior future performance in the cross section suggests that directing incremental flows into funds with a high MAX is not beneficial to fund investors in terms of average returns.

	Equal-Weighted			Value-Weighted		
Model	Low MAX	High MAX	Difference	Low MAX	High MAX	Difference
CAPM	−0.004	−0.006	−0.002	−0.003	−0.006	−0.003
	(−2.10)	(−1.21)	(−0.37)	(−2.88)	(−1.35)	(−0.53)
Treynor–Mazuy	−0.001	−0.007	−0.007	0.000	−0.006	−0.007
	(−0.50)	(−1.90)	(−1.50)	(0.22)	(−1.55)	(−1.52)
Fama–French	−0.005	−0.003	0.003	−0.004	−0.002	0.002
	(−3.82)	(−0.81)	(0.64)	(−3.51)	(−0.57)	(0.55)
Carhart	−0.004	−0.006	−0.003	−0.003	−0.006	−0.003
	(−2.98)	(−2.73)	(−0.95)	(−2.24)	(−2.45)	(−1.35)
Ferson–Schadt	−0.005	−0.007	−0.002	−0.003	−0.004	−0.002
	(−2.67)	(−3.50)	(−0.87)	(−1.83)	(−1.76)	(−0.54)

3.Empirical Result

Robustness Test: volatility and skewness

- The impact of MAX is robust to the inclusion of idiosyncratic volatility and idiosyncratic skewness.

- By using other measure of MAX (SMAX, DMAX, et al.), the result of flow-MAX is still strong.

- SMAX : the next paper, to exam the predict performance of MAX.

4.Conclusion

- There exists a positive relationship between maximun style-adjusted monthly returns(MAX) over the previous year and future fund flows.

- Results are robust to various control variables and subsample analysis.

- Distinguish the argument of a preference for extreme payoffs from the visibility argument using three additional tests.

- Investing in MAX cannot be a good metric to identify higher-quality funds.

Further Discussion

- Mutual fund managers would benefit from MAX because their compensation is tied to total assets under management.

- It would be interesting to determine whether fund managers have incentives to compete on MAX-based strategies in order to boost their flows.

Why Do Mutual Funds Hold Lottery Stocks?

Vikas Agarwal
Lei Jiang
Quan Wen

JFQA，2022(05)

解读人：陈泽理

2022/11/24

Content

- Introduction
- Data and Method
- Empirical Result
- Conclusion

1.Introduction

Background and Motivation

- Previous studies show that lottery preferences also extend to mutual fund investors, because their investment flows respond strongly to extreme positive fund returns.

- Then whether fund managers select lottery stocks in their funds and what are the motivations if they do this need to be explored.

1.Introduction

Questions and Methods

- Whether fund managers select lottery stocks
  - to cater to fund investors' preferences for lottery-like returns
    - regression of flows and MAX, DID and heterogeneity.
  - to satisfy their own preferences for such returns
    - the predict performance: portfolio sort
  - due to strategic risk-shifting considerations.

- Whether investor sophistication plays a role in observed outcomes.
  - portfolio sort and FM

- Whether the aggregate lottery holdings of institutional investors influence the valuation of lottery stocks.
  - portfolio sort

1.Introduction

Contributions

- Provide new evidence on costs and benefits arising from mutual fund investment in lottery stocks. Funds suffer worse future performance when they invest in lottery stocks but benefit from more flows.

- Uncover a new channel, namely investment in lottery stocks, through which funds can engage in risk-shifting behavior in an attempt to outperform their peers and attract more capital.

- Provides novel evidence on asset-pricing implications of mutual funds holding lottery stocks.

2.Data and Method

Data and Variables

- **Returns** and **fund characteristics** such as total net assets (TNAs), expense ratio, and turnover ratio from the CRSP.(2000.01-2018.02)
- Drop ETFs, annuities, and index funds based on either indicator variables or fund names from the CRSP data.
- Require 80% of assets under management to be in common stocks.
- Restrict the sample to funds that are at least 1 year old and have at least $20 million in assets.

- Fund's **investment objective code** and **share volume of portfolio holdings** from the Thomson Reuters Mutual Fund Holdings S12 database.

- **Daily flows** from the TrimTabs database.

2.Data and Method

Data and Variables

- **MAX_HOLD/MAX5_HOLD(similar to SMAX)**
  - Using portfolio weights in the last month of each quarter, we construct the holding-weighted lottery characteristics to obtain a fund-level measure of lottery holdings.

$$\mathrm{SMAX}_{f,t} = \sum_{i=1}^{n} w_{i,t}\mathrm{MAX}_{i,t},$$

Variable	*N*	Mean	Median	Q1	Q3
Panel A. Quarterly Lottery Holding Measures (%)					
$\mathrm{MAX}^{\mathrm{HOLD}}$	166,578	4.30	3.65	2.86	4.91
$\mathrm{MAX5}^{\mathrm{HOLD}}$	161,459	2.56	2.18	1.74	2.89
Panel B. Other Variables					
Alpha (%)	207,388	−0.38	−0.20	−1.79	1.27
TNA ($ million)	207,750	1,471.45	284.40	87.70	979.20
Age (year)	207,750	12.98	10.00	5.42	16.58
Expense (%)	194,714	1.14	1.12	0.82	1.43
Turnover (%)	194,714	92.51	55.00	27.00	101.00
Flow (%)	207,075	3.23	−0.79	−4.18	4.42

3.Empirical Result

Fund Characteristics Associated with Lottery Holdings:Portfolio sort, FM

- Funds in the highest MAX decile perform significantly worse than funds in the lowest MAX decile portfolio.
- Note that High MAX_HOLD funds are more likely to hold small cap, growth, and recent winner stocks compared with lower ones.

Panel B. Fund Factor Exposures and Alpha

	β^{MKT}	β^{SMB}	β^{HML}	β^{UMD}	Alpha (%)
Low MAX^{HOLD}	0.82	−0.07	0.08	−0.02	−0.01
5	0.90	0.04	0.01	0.01	−0.35
High MAX^{HOLD}	0.91	0.55	0.02	0.03	−1.11
Difference	0.09	0.62	−0.06	0.05	−1.10
t-stat	(−2.64)	(26.25)	(−2.41)	(2.13)	(−2.64)

Panel C. Holding-Weighted Stock Characteristics

	Size	BM	MOM
Low MAX^{HOLD}	10.34	0.39	7.10
5	9.87	0.34	9.03
High MAX^{HOLD}	7.49	0.36	17.41
Difference	−2.85	−0.03	10.31
t-stat	(−20.85)	(−2.08)	(2.33)

3.Empirical Result

Economic Explanations for Holding Lottery Stocks

Do Funds Cater to Their Investors by Holding Lottery Stocks?

- Check the Flow-MAX relationship with regression

$$\begin{aligned}\mathrm{FLOW}_{i,t+1} = {} & \lambda_0 + \lambda_1 \times \mathrm{LH}_{i,t} + \lambda_2 \times \mathrm{LOW}_{i,t} + \lambda_3 \times \mathrm{MID}_{i,t} + \lambda_4 \times \mathrm{HIGH}_{i,t} \\ & + \lambda_5 \times \mathrm{LOW}_{i,t} \times \mathrm{LH}_{i,t} + \lambda_6 \times \mathrm{MID}_{i,t} \times \mathrm{LH}_{i,t} + \lambda_7 \times \mathrm{HIGH}_{i,t} \times \mathrm{LH}_{i,t} \\ & + \sum_{k=1}^{K} \lambda_k \times \mathrm{FUND\_CONTROLS}_{k,t} + \varepsilon_{i,t+1},\end{aligned}$$

- where LH is the proxy for lottery holding, that is, MAX_HOLD; MAX_PROP; TOP10_MAX_HOLD
- LOW(RANK 0.2); MID(RANK 0.6); HIGH(RANK0.2)
- MAX,volatility are included in CONTROL variables.

3.Empirical Result

Economic Explanations for Holding Lottery Stocks

Do Funds Cater to Their Investors by Holding Lottery Stocks?

- MODEL 4-6 add control variables.
- funds holding stocks with high MAX values attract more flows.

Variables	1	2	3	4	5	6
MAX^{HOLD}	0.809***			0.531***		
	(5.37)			(4.77)		
MAX_PROP		0.799***			0.522***	
		(8.07)			(4.34)	
$TOP10\_MAX^{HOLD}$			1.029***			0.826***
			(8.54)			(2.94)

$$FLOW_{i,t+1} = \lambda_0 + \lambda_1 \times LH_{i,t} + \lambda_2 \times LOW_{i,t} + \lambda_3 \times MID_{i,t} + \lambda_4 \times HIGH_{i,t} + \lambda_5 \times LOW_{i,t} \times LH_{i,t} + \lambda_6 \times MID_{i,t} \times LH_{i,t} + \lambda_7 \times HIGH_{i,t} \times LH_{i,t} + \sum_{k=1}^{K} \lambda_k \times FUND.CONTROLS_{k,t} + \varepsilon_{i,t+1}.$$

3.Empirical Result

Economic Explanations for Holding Lottery Stocks

Investor Sophistication and Lottery Preferences

- Prior studies document that investors of direct-sold funds are more sophisticated than investors of broker-sold funds.

Panel B. Dependent Variable = Flows During Quarter $t \pm 1$

	1	2	3	4	5	6
		Broker-Sold			Direct-Sold	
MAX^{HOLD}	0.861***			0.413**		
	(4.18)			(2.30)		
MAX_PROP		0.641***			0.403***	
		(2.63)			(2.97)	
$TOP10\_MAX^{HOLD}$			1.121***			0.627**
			(3.07)			(2.65)
Diff. in coef. (broker-sold – direct-sold)	0.448***	0.238**	0.494***			
p-value	(0.01)	(0.03)	(0.01)			
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Fund/time fixed effects	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes	Yes/Yes
No. of obs.	51,791	51,784	51,784	80,871	80,858	80,859
Adj. R^2	0.097	0.096	0.097	0.070	0.070	0.070

3.Empirical Result

Economic Explanations for Holding Lottery Stocks

Why Do Investors Respond to Lottery Holdings?

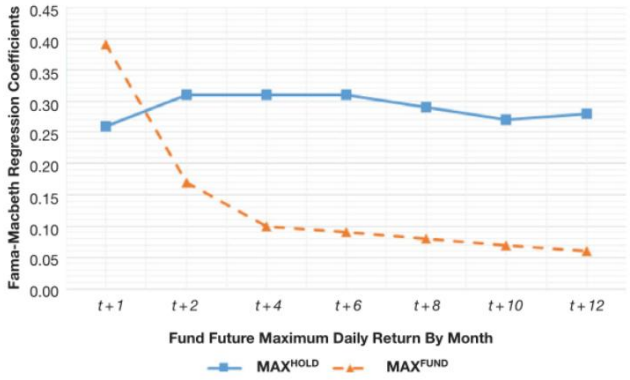
- In attempting to select funds that will deliver lottery-like returns in the future, investors can examine a fund's past returns or a fund's stock holdings.
- Our results so far suggest that in making their investment decisions, investors rely more on funds' lottery holdings than on funds' past lottery-like returns.
- investigate the predictive power of MAX_HOLD and MAX_FUND(or just MAX) for funds' future lottery-like returns.

$$\mathrm{MAX}_{i,t+\tau}^{\mathrm{FUND}} = \lambda_{0,t} + \lambda_{1,t} \times \mathrm{MAX}_{i,t}^{\mathrm{HOLD}} + \lambda_{2,t} \times \mathrm{MAX}_{i,t}^{\mathrm{FUND}} + \sum_{k=1}^{K} \lambda_{k,t} \times \mathrm{FUND\_CONTROLS}_{k,t} + \varepsilon_{i,t+1},$$

3.Empirical Result

Economic Explanations for Holding Lottery Stocks

Why Do Investors Respond to Lottery Holdings?



Coef.	MAX^{FUND}_{t+1}	MAX^{FUND}_{t+2}	MAX^{FUND}_{t+3}	MAX^{FUND}_{t+4}	MAX^{FUND}_{t+5}	MAX^{FUND}_{t+6}
MAX^{HOLD}_{t}	0.26***	0.41***	0.34***	0.31***	0.34***	0.31***
	(2.84)	(5.39)	(5.18)	(4.99)	(4.96)	(4.65)
MAX^{FUND}_{t}	0.39***	0 17***	0.09*	0.10*	0.09	0.09
	(3.84)	(3.72)	(1.92)	(1.88)	(1.50)	(1.04)
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.69	0.67	0.65	0.64	0.64	0.60
Coef.	MAX^{FUND}_{t+7}	MAX^{FUND}_{t+8}	MAX^{FUND}_{t+9}	MAX^{FUND}_{t+10}	MAX^{FUND}_{t+11}	MAX^{FUND}_{t+12}
MAX^{HOLD}_{t}	0.29***	0.27***	0.29***	0.27***	0.25***	0.28***
	(4.26)	(3.12)	(4.53)	(3.59)	(3.84)	(3.88)
MAX^{FUND}_{t}	0.08	0.08	0.05	0.07	0.03	0.06
	(1.06)	(1.17)	(1.11)	(0.97)	(0.67)	(0.48)
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.58	0.56	0.55	0.52	0.52	0.50

3.Empirical Result

Economic Explanations for Holding Lottery Stocks

Do Fund Managers Themselves Prefer Lottery Stocks?

- It is also possible that relatively more sophisticated fund managers themselves prefer lottery stocks.
- Edelen et al. (2016) show that institutional investors tend to buy stocks considered to be overvalued.
- If managers do not prefer lottery stocks, we would expect portfolio managers with greater ownership to hold fewer lottery stocks.

$$\mathrm{LH}_{i,t} = \alpha + \beta \mathrm{OWNERSHIP}_{i,t-1} + \gamma \mathrm{FUND\_CONTROLS}_{i,t-1} + \varepsilon_t.$$

FUND-YEAR

LH: MAX_HOLD; MAX5_HOLD

OWNERSHIP: OWM_DUM:equals 1 if manager has a nonzero stake in a fund.

OWN_RANK1-7:0; 1w; 5w; 10w; 50w; 100w; above 100w.

LN_OWN: the nature logarithm of the managerial ownership.20%60%20%

3.Empirical Result

Economic Explanations for Holding Lottery Stocks

Do Fund Managers Themselves Prefer Lottery Stocks?

$$LH_{i,t} = \alpha + \beta OWNERSHIP_{i,t-1} + \gamma FUND\_CONTROLS_{i,t-1} + \varepsilon_t.$$

	Dep.Var. = MAX_{t+1}^{HOLD}			Dep.Var. = $MAX5_{t+1}^{HOLD}$		
	1	2	3	4	5	6
OWN_DUM	−0.262**			−0.146***		
	(−2.59)			(−2.95)		
OWN_RANK_2		0.036			0.002	
		(0.40)			(0.03)	
OWN_RANK_3		−0.053			−0.024	
		(−1.01)			(−0.85)	
OWN_RANK_4		−0.095			−0.089	
		(−0.76)			(−0.53)	
OWN_RANK_5		−0.245**			−0.121**	
		(−2.55)			(−2.08)	
OWN_RANK_6		−0.276**			−0.250**	
		(−2.67)			(−2.71)	
OWN_RANK_7		−0.343***			−0.297**	
		(−3.06)			(−2.63)	
LN_SOWN_LOW			0.002			0.001
			(0.10)			(0.29)
LN_SOWN _MID			−3.109**			−2.354**
			(−2.08)			(−2.62)
LN_SOWN_HIGH			16.847***		-	14.597***
			(−3.18)			(−2.92)

3.Empirical Result

Economic Explanations for Holding Lottery Stocks

Risk-Shifting Behavior Through Lottery Investments

- many investors evaluate funds on a calendar-year basis, which may incentivize funds performing poorly earlier in a year to invest in lottery stocks later in the year.

$$\Delta MAX = \left(\sum_{i=1}^{N} MAX_{i,t} \times w_{i,t+1} \right) - \left(\sum_{i=1}^{N} MAX_{i,t} \times w_{i,t} \right)$$

	Dep. Var. = ΔMAX in the 2nd Qtr.		Dep. Var. = ΔMAX in the 3rd Qtr.		Dep. Var. = ΔMAX in the 4th Qtr.	
	1	2	3	4	5	6
ADJ_RET in the 1st qtr	0.001 (0.39)					
RET_RANK in the 1st qtr		0.001 (0.66)				
Avg. ADJ_RET (1st + 2nd)			−0.004*** (−3.22)			
Avg. RET_RANK (1st + 2nd)				−0.003** (−3.08)		
Avg. ADJ_RET (1st + 2nd + 3rd)					−0.012*** (−3.42)	
Avg. RET_RANK (1st + 2nd + 3rd)						−0.013*** (−3.51)
MAX^{HOLD} in the 1st qtr	−0.012 (−1.39)	−0.011 (−1.20)				
Avg. MAX^{HOLD} (1st + 2nd)			−0.012 (−1.11)	−0.013 (−1.20)		
Avg. MAX^{HOLD} (1st + 2nd + 3rd)					−0.013 (−1.07)	−0.013 (−1.06)
No. of obs.	43,675	43,675	42,299	42,299	40,883	40,883
Adj. R^2	0.01	0.01	0.01	0.01	0.01	0.01

3.Empirical Result

Cross-Sectional Evidence on the Lottery Premium and Changes in Institutional Ownership

- compute the quarterly percentage change in the number of institutional investors for each firm (ΔINST) .

$$\Delta \mathrm{INST}_{i,t} = \frac{\#\,\mathrm{INST}_{i,t} - \#\,\mathrm{INST}_{i,t-1}}{\#\,\mathrm{INST}_{i,t-1}}, \tag{6}$$

where $\#INST_{i,t}$ and $\#INST_{i,t-1}$ are the number of institutional investors holding stock i in quarters t and $t-1$, respectively.

- the underperformance of lottery stocks is more pronounced when there is more selling by institutions (i.e., more retail buying), which contributes to greater overpricing of lottery stocks.

3.Empirical Result

Cross-Sectional Evidence on the Lottery Premium and Changes in Institutional Ownership

Panel A. Average Excess Return

	Low MAX	2	3	4	High MAX	High MAX – Low MAX	Average AINST
Low ΔINST	0.78***	0.64***	0.44	−0.01	−0.47	−1.25***	−0.57%
	(4.43)	(2.86)	(1.67)	(−0.03)	(−1.02)	(−3.43)	
2	0.84***	0.69***	0.52*	0.43	−0.11	−0.94***	−0.09%
	(4.52)	(3.05)	(1.96)	(1.36)	(−0.30)	(−3.23)	
3	0.67***	0.82***	0.68**	0.42	−0.06	−0.73**	0.03%
	(3.38)	(3.50)	(2.70)	(1.34)	(−0.16)	(−2.25)	
4	0.69***	0.74***	0.72***	0.53	0.28	−0.41	0.20%
	(3.86)	(3.49)	(2.92)	(1.82)	(0.72)	(−1.24)	
High ΔINST	0.60***	0.71***	0.87**	0.87**	0.55	−0.04	0.85%
	(3.15)	(3.29)	(3.32)	(2.57)	(1.30)	(−0.13)	

Panel B. Fama–French (2015) 5-Factor Alpha

	Low MAX	2	3	4	High MAX	High MAX – Low MAX
Low ΔINST	0.11	−0.08	−0.23	−0.63***	−1.03***	−1.13***
	(1.08)	(−0.52)	(−1.66)	(−3.53)	(−5.19)	(−5.51)
2	0.12	−0.14	−0.49***	−0.48***	−0.77***	−0.89***
	(1.12)	(−1.18)	(−4.03)	(−3.47)	(−4.93)	(−4.49)
3	−0.05	0.11	−0.14	−0.36***	−0.75***	−0.70***
	(−0.43)	(0.86)	(−1.13)	(−2.94)	(−4.76)	(−3.58)
4	−0.02	−0.14	−0.09	−0.25*	−0.26	−0.24
	(−0.13)	(−1.42)	(−0.75)	(−1.83)	(−1.51)	(−1.03)
High ΔINST	−0.04	0.03**	0.28**	0.38**	0.20	0.24
	(−0.51)	(0.39)	(2.04)	(2.28)	(0.96)	(1.01)

4.Conclusion

- Managers with high dollar ownership tend to avoid lottery stocks, suggesting that managers themselves do not prefer such stocks.
- Funds with more lottery holdings attract larger flows, which is consistent with managers catering to investors' preferences for lottery stocks.
- Funds with worst and midrange performance have stronger incentives to invest in lottery stocks, because benefits outweigh costs at a smaller threshold of lottery holdings.
- Compared with lottery-like fund returns, lottery holdings significantly predict funds' future lottery-like returns over a longer period.