Extrapolative Beliefs in the Cross-section: What Can We Learn from the Crowds?

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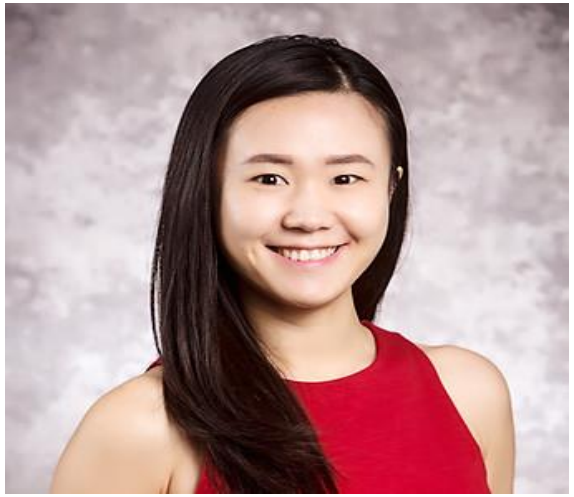
•“Information Consumption and Asset Pricing” (with Azi Ben-Rephael, Bruce Carlin and Ryan D. Israelsen), Internet Appendix, Journal of Finance, Vol 76, 357-394 (2021)



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ABSTRACT

- Using novel data from a crowdsourcing platform for ranking stocks, we investigate how individuals form expectations about future stock returns in the cross-section.
- when forming expectations, investors extrapolate from past returns, with more weight on more recent returns, especially when recent returns are negative.
- The extrapolation bias is stronger among Forcerank users who arenot financial professionals.
- consensus rankings negatively predict future stock returns inthe cross-section,more so among stocks with low institutional ownership and a high degree of extrapolative bias.

Challenge:

- lack of data that directly measure investors' expectations on future returns of individual stocks.

Research content:

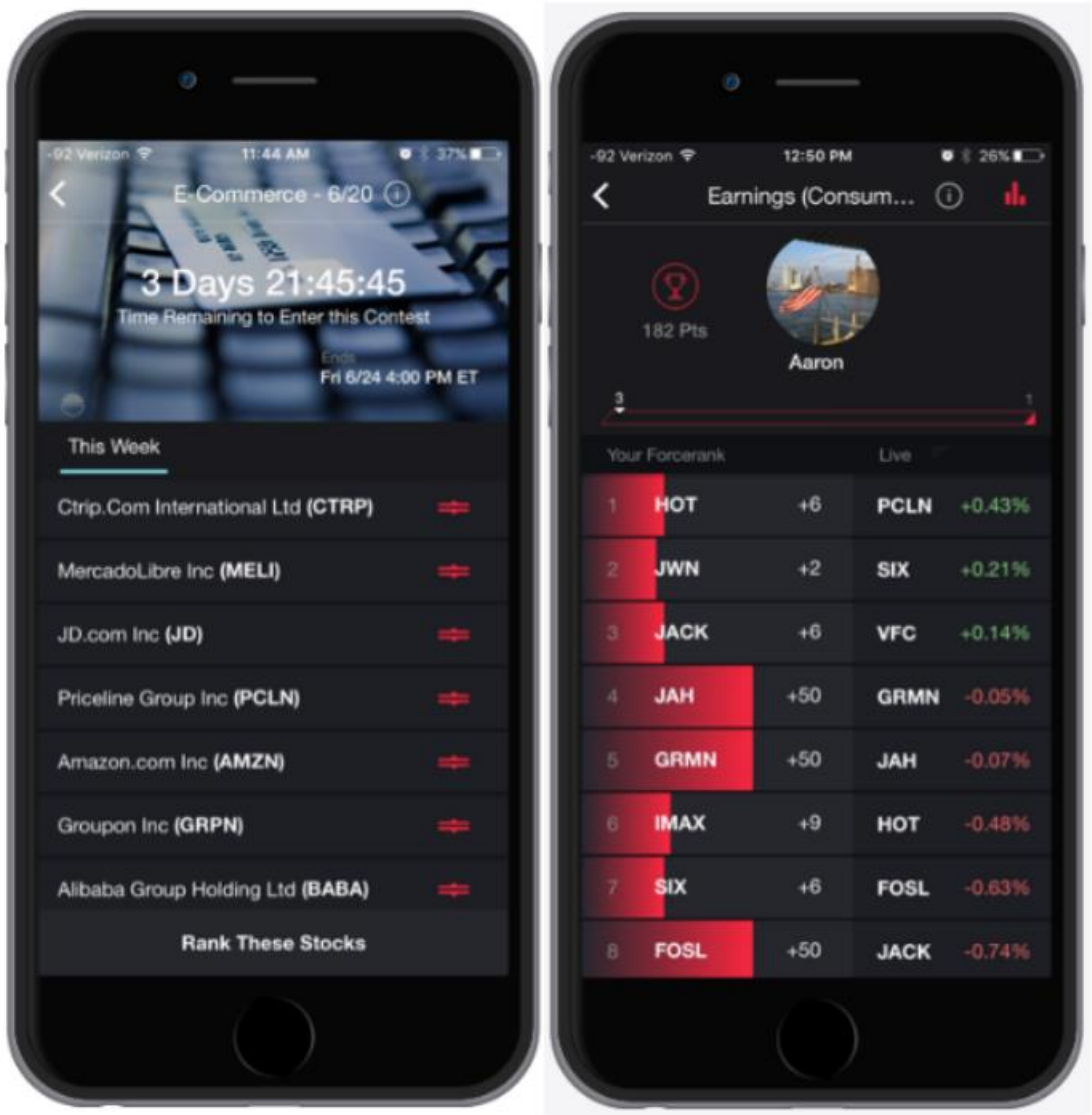
- how individuals form their expectations about future returns on individual stocks;
- how these return expectations affect asset prices.

Data and Summary Statistics

A.Forcerank platform

- Two main types of games
- the same game is repeatedly conducted every week on the platform
- samples:contain 293 unique stock tickers;12,798 contributions submittedby 1,045 distinct users.

Types of games		Number of contests
Industry		1,318
	Enterprise software (Large: 69; Small/Mid: 67)	136
	Biotech (Large: 95; Mid: 20)	115
	Social media	111
	E-commerce	108
	Apparel	101
	E&P (Large)	96
	Hardware	88
	Fast food	69
	Media	69
	Airlines	68
	Investment banks	68
	Semiconductors (Large)	65
	Restaurants	64
	Other	160
Most heavily shorted (March 2016 to December 2017)		78
Total		1,396


-92 Verizon
11:44 AM
37%
E-Commerce - 6/20
3 Days 21:45:45
Time Remaining to Enter this Contest
Ends
Fri 6/24 4:00 PM ET
This Week
Ctrip.Com International Ltd (CTRP)
MercadoLibre Inc (MELI)
JD.com Inc (JD)
Priceline Group Inc (PCLN)
Amazon.com Inc (AMZN)
Groupon Inc (GRPN)
Alibaba Group Holding Ltd (BABA)
Rank These Stocks
-92 Verizon
12:50 PM
26%
Earnings (Consum...
182 Pts
Aaron
Your Forcerank
Live
1 HOT +6 PCLN +0.43%
2 JWN +2 SIX +0.21%
3 JACK +6 VFC +0.14%
4 JAH +50 GRMN -0.05%
5 GRMN +50 JAH -0.07%
6 IMAX +9 HOT -0.48%
7 SIX +6 FOSL -0.63%
8 FOSL +50 JACK -0.74%

B.Summary Statistics:

Panel A: Stock and user characteristics

Firm-week-level financial characteristics (Number of observations = 11,140)

	mean	sd	p1	p25	p50	p75	p99
Size (in million)	56,602.77	102,785.18	600.73	3,949.91	15,413.54	53,054.52	515,586.56
B/M	0.37	0.37	0.01	0.15	0.26	0.47	1.55
Size quntile	4.20	1.08	2.00	3.00	5.00	5.00	5.00
B/M quintile	2.20	1.31	1.00	1.00	2.00	3.00	5.00
IO	0.48	0.34	0.00	0.00	0.63	0.75	1.00

User-level participation characteristics (Number of observations = 1,045)

	mean	sd	p1	p25	p50	p75	p99
Number of games	4.39	6.61	1.00	1.00	2.00	4.00	31.00
Number of contests	18.85	88.01	1.00	1.00	3.00	8.00	355.00
Number of weeks	3.71	6.59	1.00	1.00	2.00	4.00	38.00

Panel B: User background

	Frequency	Percent
Financial professional ($N = 72$)		
Sell side	47	7.76
Buy side	14	2.31
Independent	11	1.82
Non professional ($N = 172$)		
Financials	6	0.99
Academia	1	0.17
Consumer discretionary	5	0.83
Consumer staples	2	0.33
Energy	1	0.17
Healthcare	6	0.99
Industrials	1	0.17
Information technology	22	3.63
Materials	4	0.66
Student	124	20.46
Missing	362	59.74
Total	606	100.00

Sample characteristics:

- large stocks;
- Our samples gears towards growth stocks;
- The contest participation of users in our sample is highly skewed.

Empirical Analysis Ⅰ: Expectation Formation

A.Expectations and past returns: Linear model

$$\text{Forcerank}_{i,t} = \gamma_0 + \sum_{s=0}^{n} \beta_s \cdot R_{i,t-s} + \varepsilon_{i,t}, \tag{15}$$

- Forcerank is the week-t consensus rank based on investors' expected performance of stock over week t+ 1;
- Ri,t−s represents the lagged return

Panel A: Linear specification

	(1)	(2)	(3)	(4)
Dependent variable:	Forcerank score			
Lagged return in:	level	contest-adj	pos contest-adj	neg contest-adj
Ret(t)	11.21***	16.98***	8.905***	14.10***
	(0.559)	(0.684)	(0.881)	(1.046)
Ret($t-1$)	3.298***	5.139***	0.712	5.954***
	(0.555)	(0.679)	(0.894)	(1.022)
Ret($t-2$)	3.150***	4.327***	0.497	6.135***
	(0.560)	(0.688)	(0.899)	(1.038)
Ret($t-3$)	2.025***	2.821***	0.718	3.841***
	(0.565)	(0.694)	(0.910)	(1.042)
Ret($t-4$)	2.590***	3.703***	0.394	6.111***
	(0.564)	(0.695)	(0.894)	(1.066)
Ret($t-5$)	1.911***	2.259***	−0.139	4.582***
	(0.559)	(0.689)	(0.898)	(1.035)
Ret($t-6$)	0.785	1.188*	−0.778	2.818***
	(0.542)	(0.668)	(0.851)	(1.032)
Ret($t-7$)	2.146***	3.669***	0.105	4.998***
	(0.541)	(0.668)	(0.845)	(1.024)
Ret($t-8$)	0.651	1.503**	−0.651	2.582**
	(0.542)	(0.679)	(0.865)	(1.017)
Ret($t-9$)	1.575***	2.466***	−0.381	3.726***
	(0.535)	(0.669)	(0.864)	(0.996)
Ret($t-10$)	1.339**	1.529**	0.170	2.179**
	(0.520)	(0.659)	(0.845)	(0.951)
Ret($t-11$)	0.838	0.812	−0.844	2.227**
	(0.516)	(0.652)	(0.842)	(0.936)
Observations	12,010	12,010	12,010	
R-squared	0.042	0.064	0.064	

The results show:

- individuals extrapolate past returns;
- investors put higher weight on more recent returns;
- extrapolation is asymmetric: it is stronger on the negative side.

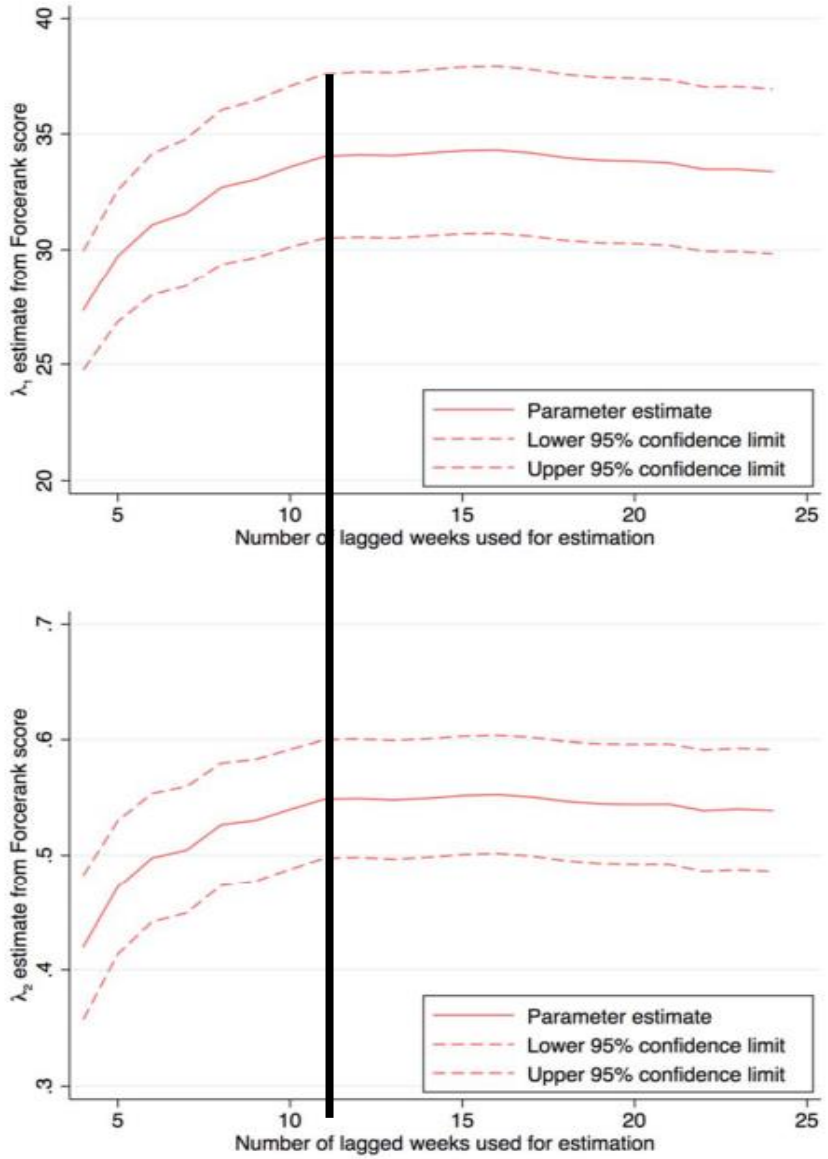
B.Expectations and past returns: Exponential decay model

B1.assumption:

- an exponential decay of weights on past returns;
- the two parameters to be constants .

$$\text{Forcerank}_{i,t} = \lambda_0 + \lambda_1 \cdot \sum_{s=0}^{n} w_s R_{i,t-s} + \varepsilon_{i,t}, \qquad \text{where} \quad w_s = \frac{\lambda_2^s}{\sum_{j=0}^{n} \lambda_2^j}. \tag{16}$$

- λ1:It is a scaling factor. That is, the overall extent to which individuals respond to these past returns;
- λ2:This is the weight investors put on distant past returns relative to recent past returns


λ1 estimate from Forcerank score
20
25
30
35
40
5
10
15
20
25
Number of lagged weeks used for estimation
Parameter estimate
Lower 95% confidence limit
Upper 95% confidence limit
λ2 estimate from Forcerank score
.3
.4
.5
.6
.7
5
10
15
20
25
Number of lagged weeks used for estimation
Parameter estimate
Lower 95% confidence limit
Upper 95% confidence limit

Panel B: Nonlinear specification

	(1)	(2)	(3)
Dependent variable:	Forcerank score		Realized return
Lagged return in:	level	contest-adj	contest-adj
lambda 0	5.401***	5.498***	5.504***
	(0.027)	(0.025)	(0.026)
lambda 1	23.83***	34.12***	–5.430**
	(1.586)	(1.820)	(2.263)
lambda 2	0.590***	0.549***	0.705***
	(0.030)	(0.026)	(0.157)
Observations	12,010	12,010	12,010
R-squared	0.037	0.056	0.001

C.Expectations and past returns: Professional vs. Non-professional

	(1)	(2)	(3)	(4)
Dependent variable:	Professional		Non-professional	
Lagged return in:	level	contest-adj	level	contest-adj
lambda 0	5.431***	5.498***	5.403***	5.494***
	(0.031)	(0.029)	(0.029)	(0.028)
lambda 1	17.68***	26.35***	23.61***	33.77***
	(2.273)	(2.784)	(1.820)	(2.055)
lambda 2	0.776***	0.773***	0.608***	0.552***
	(0.042)	(0.035)	(0.034)	(0.030)
Observations	9,658	9,658	10,261	10,261
R-squared	0.010	0.015	0.032	0.050

Empirical Analysis Ⅱ: Return Predictability in the Cross-section

The dependent variable:

- the daily stock return of week t + 1;

The explanatory variables:

- the average Forcerank score,
- variables related to the lagged stock returns: The predicted score is computed as the fitted value from the nonlinear regression in Panel B of Table 3 (Column (2)).
- the residual score orthogonal to past returns. The residual of this regression is labeled as the residual score.

$$\text{Forcerank}_{i,t} = \lambda_0 + \lambda_1 \cdot \sum_{s=0}^{n} w_s R_{i,t-s} + \varepsilon_{i,t}, \qquad \text{where} \quad w_s = \frac{\lambda_2^s}{\sum_{j=0}^{n} \lambda_2^j}. \tag{16}$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent variable:	Daily return in week $t+1$								
Forcerank score	–0.0246***						–0.0293***		
	(–2.75)						(–3.22)		
Predicted score		–0.0321***						–0.0716***	
		(–4.22)						(–4.41)	
Residual score			–0.0162*						–0.0238***
			(–1.86)						(–2.71)
Ret(t) score				0.00250			–0.0221	0.0245	–0.0255
				(0.25)			(–1.02)	(1.32)	(–1.18)
Ret($t-3,t$) score					–0.0267**		0.00493	0.0264	–0.00112
					(–2.30)		(0.24)	(1.20)	(–0.06)
Ret($t-11,t$) score						–0.00510	0.00576	0.00316	0.00836
						(–0.40)	(0.44)	(0.22)	(0.64)
Observations	59,929	59,929	59,929	59,929	59,929	59,929	59,929	59,929	59,929
R-squared	0.019	0.013	0.018	0.024	0.027	0.035	0.096	0.094	0.096

	(1)	(2)	(3)	(4)
Dependent variable:		Ret$(t+1)$		
	Low *IO*	High *IO*	Low *IO*	High *IO*
Forcerank score	–0.0398***	–0.0125		
	(–3.13)	(–1.12)		
Predicted score			–0.0880***	–0.00617
			(–4.28)	(–0.30)
Ret(t) score	–0.0132	0.0230	0.0408**	0.0146
	(–0.86)	(1.50)	(2.45)	(0.77)
Ret$(t-3,t)$ score	–0.00234	–0.00568	0.00524	–0.0455**
	(–0.33)	(–0.66)	(0.27)	(–1.99)
Ret$(t-11,t)$ score	–0.00291	0.00176	0.0398**	–0.00609
	(–0.30)	(0.41)	(2.14)	(–0.34)
Observations	30,014	29,915	30,014	29,915
R-squared	0.148	0.176	0.135	0.171

Conclusion

- Investors extrapolate recent past returns of individual stocks when forming expectations about their future returns;
- We find a stronger extrapolation bias among users who are not financial professionals;
- Consensus rankings negatively predict future stock returns in the cross-section;
- A ranking predicts the stock's future return better than its past return;
- Combined with the fact that our sample contains mostly large stocks, suggests that our results are not driven by liquidity-shock-induced short-term return reversals;
- The residual component of the consensus rankings orthogonal to past stock returns also negatively predicts future returns.

谢谢大家！

请大家批评指正