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Rating on a Curve

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Relative Rating

An Anecdote

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In October of 2013, Greenfield recommended Facebook as a Strong Buy while Kessler recommended Facebook as a Hold.

Greenfield was covering Facebook, Netflix, Twenty-first Century, Pandora Media, and AMC network in October 2013, and Facebook's target return (analyst's target price divided by price before the announcement) was the highest among these stocks covered by Greenfield.

Kessler was covering Facebook, Apple, Baidu, E-bay, Expedia, Google, and Priceline.com in October 2013, and Facebook's target return was the lowest among these stocks covered by Kessler.

More Anecdotes

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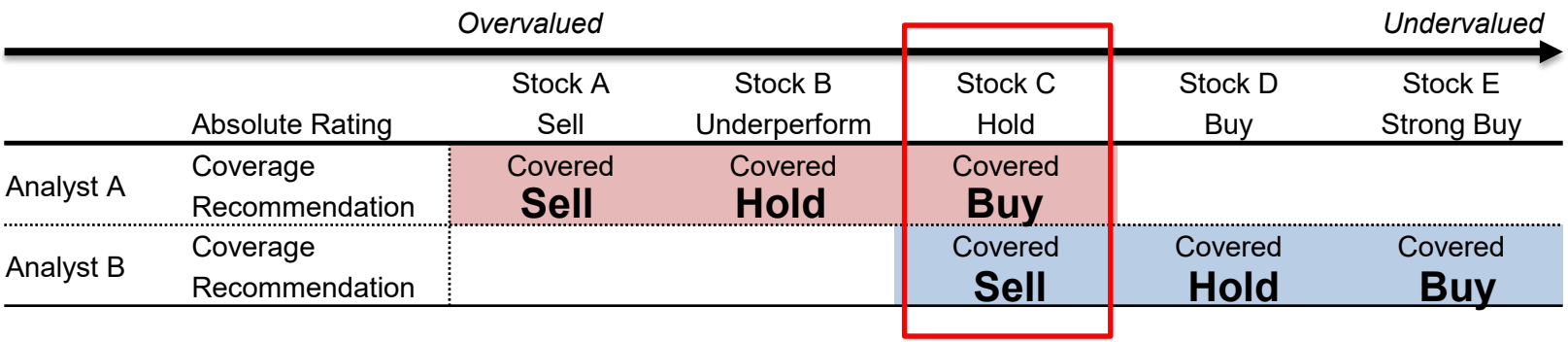
The website https://www.marketwatch.com/tools/guide.asp explains how different analysts rate firms. Of the 69 analysts whose ratings could be classified, we found that 23 use expected raw returns, 27 use expected market-adjusted returns, 15 use expected industry-adjusted returns, and only 4 use expected relative returns (where "relative" means relative to the stocks they cover). But this is what they say; what they do may be different.

1) Here is an example of an absolute grading system from DBSVHK:
"STRONG BUY (>20% total return over the next 3 months, with identifiable share price catalysts within the time)
BUY (>15% total return over the next 12 months for small caps, >10% for large caps)
HOLD (-10% to +15% total return over the next 12 months for small caps, -10% to +10% for large caps)
FULLY VALUED (negative total return i.e. > -10% over the next 12 months)
SELL (negative total return of > -20% over the next 3 months, with identifiable catalysts within this time frame)."

2) Here is an example of a relative grading system from JP Morgan:
"Overweight [Over the next six to twelve months, we expect this stock will outperform the average total return of the stocks in the analyst's (or the analyst's team's) coverage universe.]
Neutral [Over the next six to twelve months, we expect this stock will perform in line with the average total return of the stocks in the analyst's (or the analyst's team's) coverage universe.]
Underweight [Over the next six to twelve months, we expect this stock will underperform the average total return of the stocks in the analyst's (or the analyst's team's) coverage universe.]
The analyst or analyst's team's coverage universe is the sector … shown on the cover of each publication."

Hypotheses Development



1) If relative rating holds, the recommendation on a particular stock depends positively not only on the absolute quality of the stock, but also positively on the rank of the stock in the pool of stocks an analyst is covering.

2) The disagreement here is on Stock C. To generalize, the impact of relative rating is less pronounced for the “corner” stocks (like stock A or stock E).

3) Disagreements amongst analysts, as measured in this case by the spread of recommendations, is also affected by the spread of the relative quality of the stock in the pools of different analysts.

Lit Review on Analysts (An Outsider's Perspective)

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Papers on sell-side analyst recommendations can broadly be classified under three categories:

1) Do analyst recommendations have informational content?

2) Do analyst recommendations have links with their earnings forecasts?

3) Do analyst recommendations have bias?

   a. Conflict of interest bias?
   b. Optimism bias?
   c. Other Behavioral biases?
   d. Rating on a curve (with respect to own portfolio)?

Hypotheses

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1) The probability of being recommended a "Buy" by an analyst increases as the rank (sorted by global target return) of the stock in the analyst pool increases.

a) Test 1: OLS with multi dimensional fixed effects
b) Test 2: Ordered logistic regression with some fixed effects

2) The effect of "Rating on a Curve" would be more (less) pronounced for the middle (corner) ranged stocks.

a) Test: Interact with dummies for middle/corner stocks in Tests 1 and 2

3) Disagreements amongst analysts, as measured as the spread of recommendations, is also positively affected by the spread of the relative quality of the stock in the pools of different analysts.

a) Test 3: OLS with fixed effects
b) Test 4: Ordered logistic regression with fixed effects

Data

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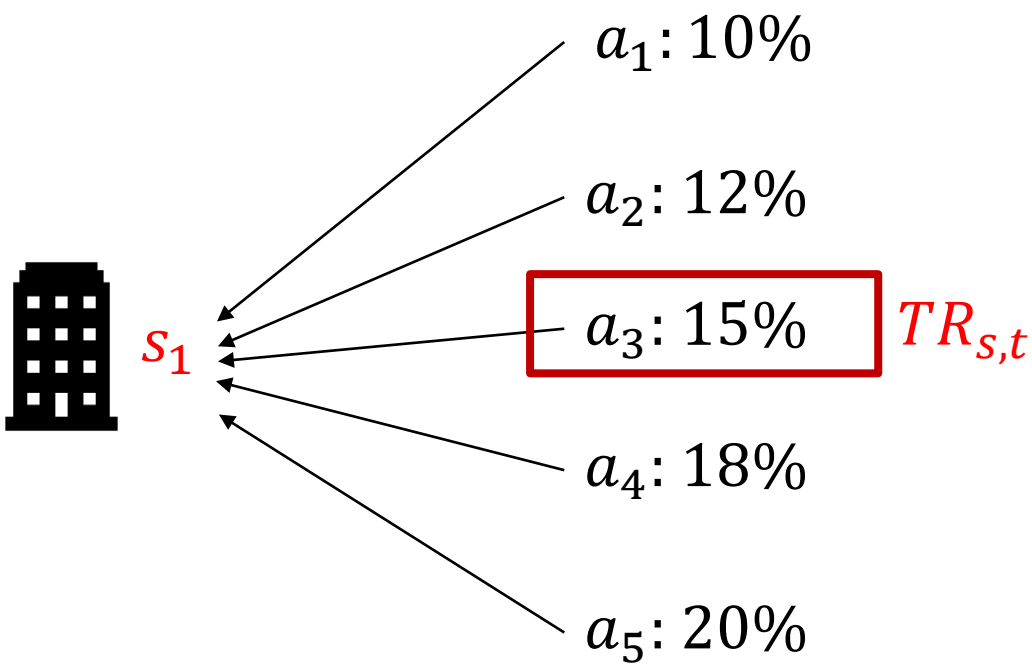
1) I/B/E/S for Analyst Recommendations
   a. Imbalanced panel of 220 months (February of 1999 to June of 2017)
   b. 10,449 different analysts
   c. Covering 7,570 different stocks

LARGE DATA
   a. 559,033 analyst-months
   b. 460,089 stock-months
   c. 5,022,576 analyst-stock-months

SO WE CAN USE MULTI-DIMENSIONAL FIXED-EFFECTS.

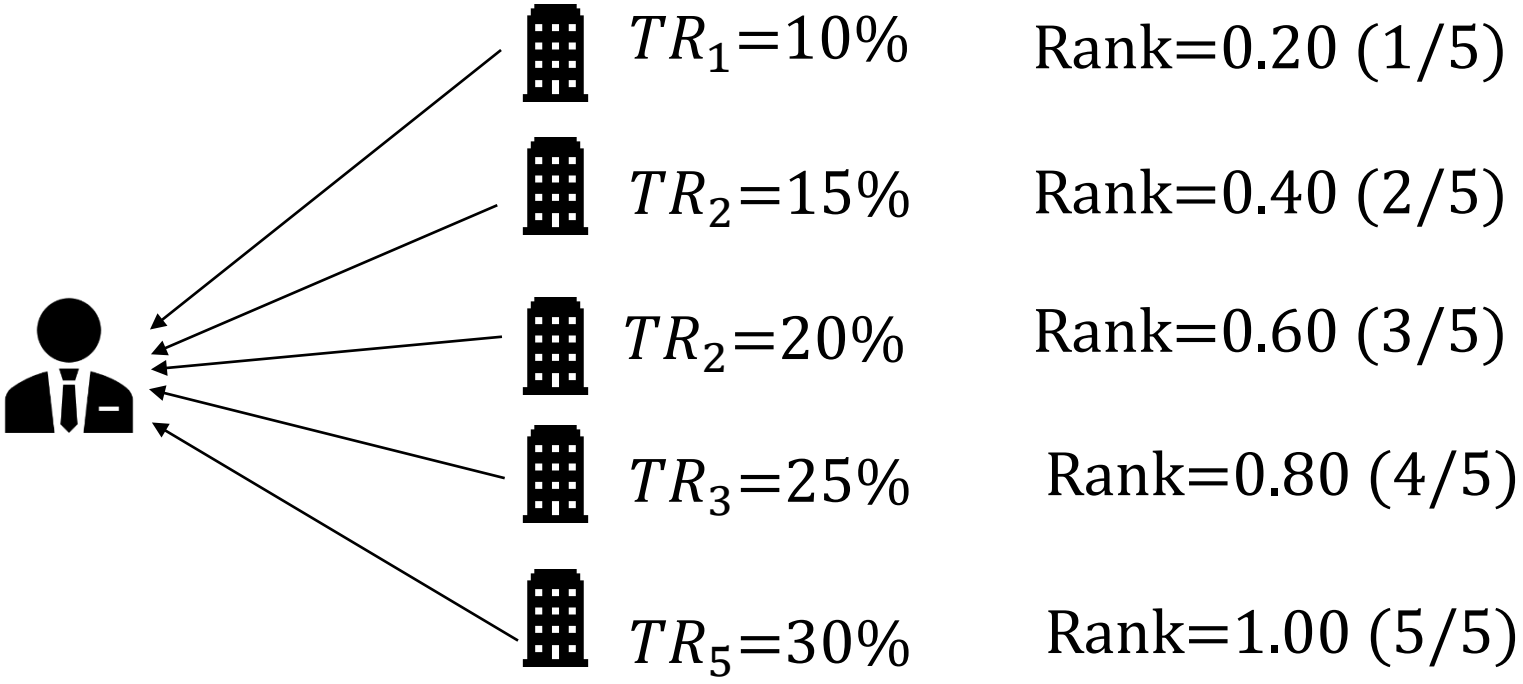
2) CRSP for daily stock returns

Determining Global Target Return of a Stock



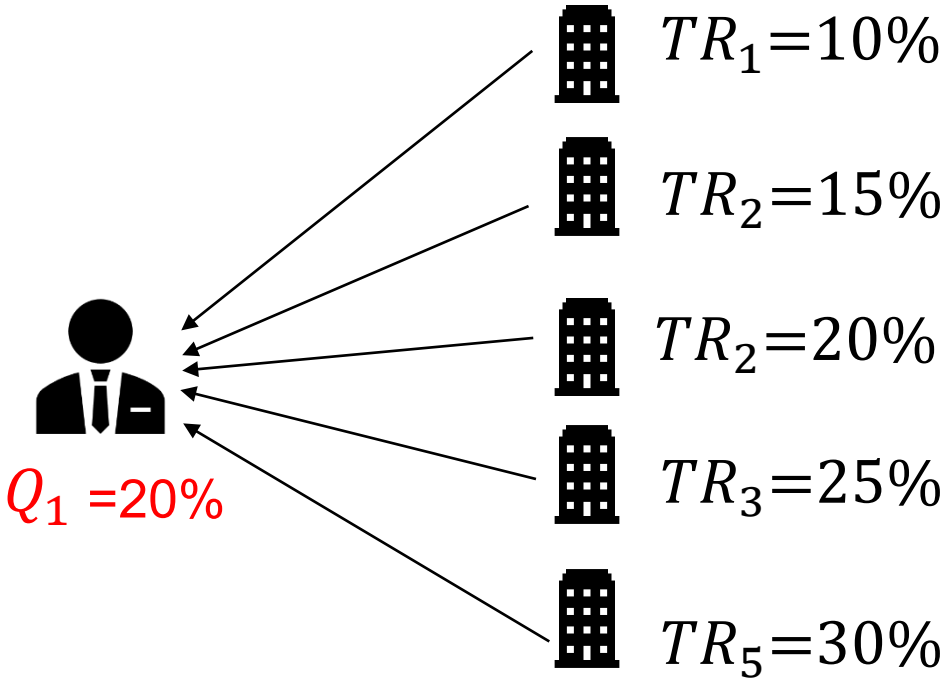
Global Target Return of Stock s_1 *in month t* ($TR_{s,t}$) *is the* ***median target return*** *among* ***all analysts*** *covering the stock in month* ***t***

Determining the Percentile Rank



Percentile rank of Stock s in the pool of Analyst a_1 in month t is the percentile of the stock in the pool sorted by global target returns.

Determining Quality of an Analyst Pool



$$Quality\ of\ Analyst\ a_1\ in\ month\ t = \frac{1}{n}\sum_{j=1}^{n} TR_n$$

Summary Statistics

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Panel A: Summary statistics at analyst-month level

Variable	Abbreviation	Obs.	Mean	S.D.	P25	P50	P75	
Number of stocks covered		559,033	11.310	6.943	6	10	15	1
Mean target return of covered stocks	$Q_{a,t}$	559,033	0.213	0.159	0.120	0.171	0.254	
Spread of target returns of covered stocks		559,033	0.348	0.294	0.168	0.274	0.425	2
Mean recommendation of covered stocks		559,033	2.294	0.510	2.000	2.333	2.667	
Spread of recommendations of covered stocks		559,033	1.820	0.921	1	2	2	3

1. A typical analyst in a typical month covers a portfolio of 10 stocks;

2. A typical analyst in a typical month covers stocks with different target returns (spread of 27.4%);

3. A typical analyst in a typical month tends to differentiate the stocks in their covered portfolio (spread of 2 grades, e.g., Strong Buy-Hold).

Summary Statistics

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Panel B: Summary statistics at stock-month level

Variable	Abbreviation	Obs.	Mean	S.D.	P25	P50	P75
Number of analysts following		460,089	11.416	6.778	6	10	15
Median target return of analysts	$TR_{s,t}$	460,089	0.213	0.227	0.092	0.163	0.263
Spread of target returns of analysts		460,089	0.455	0.380	0.214	0.349	0.562
Mean recommendation of analysts		460,089	2.271	0.497	1.923	2.250	2.600
Spread of recommendations of analysts	$SP(rec_{s,t})$	460,089	2.192	0.895	2	2	3
Spread of percentile rank in the analysts' pools	$SP(rank_{s,t})$	460,089	0.426	0.235	0.250	0.400	0.575
Dummy for the middle stocks in the global pool	$Middle_{s,t}$	460,089	0.601	0.490	0	1	1
Dummy for the corner stocks in the global pool	$Corner_{s,t}$	460,089	0.399	0.490	0	0	1

1
2
3

1. A typical stock in a typical month is covered by 10 analysts

2. A typical stock in a typical month is given different recommendations by analysts with spread of two grades (e.g., Strong Buy to Hold)

3. A typical stock in a typical month is located in different percentile ranks across different analysts with spread of 40 percentile differences.

Research Design I: High Dimensional Fixed Effects

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$$rec_{a,s,t} = \beta_1 TR_{s,t} + \beta_2 rank_{a,s,t} \times Middle_{s,t} + \beta_3 rank_{a,s,t} \times Corner_{s,t} + \theta IBP_{a,s,bt} + \eta_{s,t} + \gamma_{a,s} + \epsilon_{a,s,t}, \quad (1)$$

where

$rec_{a,s,t}$ = *recommendation rating of analyst a on stock s in month t = 1 for Strong Buy, 2 for Buy, 3 for Hold, 4 for Underperform and 5 for Sell;*

$TR_{s,t}$ = *the global target return for a given stock s in month t measured by the median target return of all analysts covering the stock in month t;*

$rank_{a,s,t}$ = *the rank of stock s in the pool of analyst a covering N stocks in month t equals 1 for the stock with the highest global target return in his pool, and 1/N for the stock with the lowest global target return;*

$Middle_{s,t}$ = *1 if a stock s has a global target return that is in the second to fourth quintile ranks of the global pool in month t, 0 otherwise;*

$Corner_{s,t}$ = *1 if a stock s has a global target return that is in the first or fifth quintile rank of the global pool month t, 0 otherwise;*

$IBP_{a,s,b,t}$ *measures the possible conflict of interest that analyst a faces to be partial to stock s that have an underwriting relationship with a bank b in month t;*

$\eta_{s,t}$ *represents fixed-effects capturing stock-month characteristics; and*

$\gamma_{a,s}$ *represents fixed-effects capturing analyst-stock characteristics.*

Research Design I: High Dimensional Fixed Effects

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Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$rec_{a,s,t}$ (1= Strong Buy, 5=Sell)						
$TR_{s,t}$	-1.026***	-0.663***	-0.856***	-0.450***	-0.548***		
	(0.009)	(0.010)	(0.011)	(0.008)	(0.009)		
$rank_{a,s,t}$		-0.431***		-0.268***		-0.022***	
		(0.005)		(0.004)		(0.005)	
$rank_{a,s,t}$			-0.469***		-0.285***		-0.030***
$\times Middle_{s,t}$			(0.005)		(0.004)		(0.006)
$rank_{a,s,t}$			-0.216***		-0.157***		0.002
$\times Corner_{s,t}$			(0.006)		(0.004)		(0.008)
$IBP_{a,s,b,t}$				-0.154***	-0.155***	-0.122***	-0.122***
				(0.024)	(0.024)	(0.023)	(0.023)
Constant	2.502***	2.673***	2.685***	2.538***	2.543***	2.319***	2.317***
	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Analyst-Stock FE	No	No	No	Yes	Yes	Yes	Yes
Stock-Month FE	No	No	No	No	No	Yes	Yes
Observations	5,022,576	5,022,576	5,022,576	4,735,398	4,735,398	4,731,240	4,731,240
R-squared	0.045	0.057	0.063	0.555	0.556	0.645	0.645

Research Design II: Ordered Logistic Regression

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$$rec_{a,s,t} = \beta_1 TR_{s,t} + \beta_2 rank_{a,s,t} \times Middle_{s,t} + \beta_3 rank_{a,s,t} \times Corner_{s,t} + \theta IBP_{a,s,bt} + \tau_t + \epsilon_{a,s,t}, \quad (2)$$

where

$rec_{a,s,t}$ = *recommendation rating of analyst a on stock s in month t = 1 for Strong Buy, 2 for Buy, 3 for Hold, 4 for Underperform and 5 for Sell;*

$TR_{s,t}$ = *the global target return for a given stock s in month t measured by the median target return of all analysts covering the stock in month t;*

$rank_{a,s,t}$ = *the rank of stock s in the pool of analyst a covering N stocks in month t equals 1 for the stock with the highest global target return in his pool, and 1/N for the stock with the lowest global target return;*

$Middle_{s,t}$ = *1 if a stock s has a global target return that is in the second to fourth quintile ranks of the global pool in month t, 0 otherwise;*

$Corner_{s,t}$ = *1 if a stock s has a global target return that is in the first or fifth quintile rank of the global pool month t, 0 otherwise;*

$IBP_{a,s,b,t}$ *measures the possible conflict of interest that analyst a faces to be partial to stock s that have an underwriting relationship with a bank b in month t ; and*

τ_t *represents fixed-effects capturing time (month) characteristics.*

Research Design II: Ordered Logistic Regression

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Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	$rec_{a,s,t}$ (1= Strong Buy, 5=Sell)						
$TR_{s,t}$	-2.249***	-1.416***	-1.861***	-1.051***	-1.486***	-1.056***	-1.509***
	(0.047)	(0.047)	(0.052)	(0.046)	(0.010)	(0.050)	(0.011)
$rank_{a,s,t}$		-0.918***		-1.051***		-1.076***	
		(0.020)		(0.020)		(0.022)	
$rank_{a,s,t}$			-1.003***		-1.107***		-1.126***
$\times Middle_{s,t}$			(0.020)		(0.004)		(0.005)
$rank_{a,s,t}$			-0.462***		-0.637***		-0.652***
$\times Corner_{s,t}$			(0.022)		(0.005)		(0.006)
$IBP_{a,s,b,t}$						-0.435***	-0.442***
						(0.069)	(0.015)
Time FE	No	No	No	Yes	Yes	Yes	Yes
Observations	5,022,576	5,022,576	5,022,576	5,022,576	5,022,576	4,739,823	4,739,823

Research Design III: Explaining the Spread of Recommendations

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$$SP(rec)_{s,t} = \beta_1 SP(rank)_{s,t} + \eta_s + \tau_t + \epsilon_{s,t}, \quad (3)$$

where

$SP(rec)_{s,t}$ *is the Spread of Recommendations,* $rec_{a,s,t}$*, across all analysts for stock s in month t.*
Here $rec_{a,s,t}$ *is the recommendation rating of analyst a on stock s in month t = 1 for Strong Buy, 2 for Buy, 3 for Hold, 4 for Underperform and 5 for Sell;*

$SP(rank)_{s,t}$ *is the Spread of Ranks,* $rank_{a,s,t}$*, across all analysts for stock s in month t.*
Here $rank_{a,s,t}$ *= the rank of stock s in the pool of analyst a covering N stocks in month t= 1 for the stock with the highest global target return in his pool, 1/N for the stock with the lowest global target return;*

η_s *is the stock fixed-effects; and*

τ_t *is the time fixed-effects.*

Research Design III: Explaining the Spread of Recommendations

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	(1)	(2)	(3)	(4)	(5)
		Fixed Effects		Ordered-Logit	
Variable	$SPrec_{s,t}$	(0=No disagreement, 4=Maximum disagreement)			
$SP(rank_{s,t})$	1.727***	1.368***	1.329***	3.440***	3.440***
	(0.005)	(0.009)	(0.009)	(0.012)	(0.022)
Constant	0.723***	0.833***	0.983***		
	(0.002)	(0.003)	(0.001)		
Stock FE	No	Yes	Yes	No	No
Month FE	No	No	Yes	No	Yes
Observations	432,196	432,196	432,196	432,196	432,196

Rating on a Curve and Returns

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Panel A: Raw Returns

Raw returns	Strong Buy	Buy	Hold and Sells	All recommendations	Strong Buy-Hold and Sells
Worst Pool	0.64%	0.74%	0.23%	0.42%	0.41%
Normal Pool	1.10%	[illegible]	0.80%	0.96%	0.30%
Best Pool	0.97%	0.97%	0.88%	0.94%	0.10%
All pools	0.88%	0.90%	0.49%	0.70%	0.39%
Best-Worst	0.33%	0.23%	0.64%	0.52%	

Blindly following recommendations (long strong buy, short hold and sells) would generate returns of 39 bps per month.

But going long strong buys from analysts with the best pools and shorting the holds and sells of analysts with the worst pools would yield 74 bps per month – nearly double!

Surprisingly, the worst recommended stocks from the best pools (0.88%) even out-perform the best recommended stocks from the worst pools (0.64%).

Rating on a Curve and Returns

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Panel B: Alphas of 6 Factor (Fama-French 5 Factor and Momentum Factor) Model

FF5+Mom alphas	Strong Buy	Buy	Hold and Sells	All recommendations	Strong Buy-Hold and Sells
Worst Pool	0.36%	0.32%	0.06%	0.25%	0.29%
Normal Pool	1.17%	[illegible]	0.70%	0.99%	0.47%
Best Pool	1.24%	1.53%	0.91%	1.22%	[illegible]
All pools	0.92%	0.99%	0.56%	0.82%	0.36%
Best-Worst	0.88%	1.20%	0.85%	0.98%	

Blindly following recommendations (long strong buy, short hold and sells) would generate risk-adjusted returns of 36 bps per month.

But going long strong buys from analysts with the best pools and shorting the holds and sells of analysts with the worst pools would yield risk adjusted returns 118 bps per month – nearly triple!

Surprisingly, the worst recommended stocks from the best pools (0.91%) even out-perform the best recommended stocks from the worst pools (0.36%).

CONCLUSION

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1) We document that if an analyst is covering a strong pool, the best firm is rated less highly than it would be otherwise, and if the analyst is covering a weak pool, the worst firm is rated less badly than it would be otherwise.

2) We next analyse the disagreen amongst analysts. We find that the dispersion in analyst forecasts is affected by these relative ratings.

3) We find that blindly following recommendations (long strong buy, short hold and sells) would generate returns of 39 bps per month. However, using the logic of relative ratings documented in our paper, going long strong buys from analysts with the best pools and shorting the holds and sells of analysts with the worst pools yields 74 bps per month (0.97% - 0.23%) – nearly double! Surprisingly, the worst recommended stocks from the best pools (0.88%) even out-perform the best recommended stocks from the worst pools (0.64%).