The Value of Crowdsourced Earnings Forecasts

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1. Introduction

1.1 Background

- "Crowdsourcing" is the act of a company (institution) taking a function once performed by employees and outsourcing it to an undefined, generally large network of people in the form of an open call.

- Nearly one in three individuals in the United States relies on investment advice transmitted via social media outlets(e.g. Whisper website, StockTwits and Seeking Alpha).

- Estimize is a private company with the objective of crowdsourcing earnings and revenue forecasts. The contributors include independent, buy-side, sell-side analysts, and private investors and students.

1. Introduction

1.2 Research Hypotheses

The demand for crowdsourced earnings forecasts is likely driven by:

- The known shortcomings of sell-side forecasts, such as bias, inefficiency, and a tendency not to update immediately before earnings announcements.

- The apparent failure of the whisper sites to become a pervasive source for earnings forecasts.

- The belief that the forecasts of a larger, more independent, and more diverse collection of people can bring new information to the market.

1. Introduction

1.2 Research Hypotheses

- The first hypothesis is that crowdsourced forecasts only compensate for sell-side forecasts' bias and reluctance to update in the period immediately prior to earnings announcements.

- The second and more consequential hypothesis asserts that crowdsourced forecasts convey new information to the market.

1. Introduction

1.3 Framework

	Aspects	Methods	Answer
Assess the value of crowdsouced earnings forecasts	Whether the forecasts are incrementally useful in predicting earnings.	By quantifying the accuracy benefits from combining Estimize forecasts with the IBES consensus.	**YES**
	Whether the forecasts are incrementally useful in measuring the market's expectation of earnings.	Based on a regression of three-day size adjusted earnings announcement returns.	**YES**
	Whether the forecasts convey new information.	By estimate two-day size-adjusted returns following Estimize consensus forecast revisions.	**YES**

1. Introduction

1.4 Conclusion

- Estimize has incremental information in predicting earnings, and this incremental information increases with the size of the crowd.

- Estimize is incrementally useful in measuring the market's expectations, and the relative importance is increasing with the size of the contributor base.

- Estimize conveys new information to the market.

1. Introduction

1.5 Contribution

- Our primary contribution is to introduce a new phenomenon, crowdsourced earnings forecasts, and explore its significance.

- Our conclusion illustrates that the value of crowdsourcing is a function of crowd size.

- Our study also contributes to the literature that explores different approaches to forecasting earnings.

- This paper fits into a broader literature that explores how technological and institutional changes influence the sourcing and dissemination of financial information in today's capital markets.

2. Data and Descriptive Statistics

2.1 Sample

- An important objective of our study is to conduct a comparative analysis of crowdsourced forecasts(Estimize), and sell-side forecasts(IBES). We therefore create an Estimize–IBES matched sample by requiring that :

  ➢ An Estimize firm-quarter includes at least one IBES EPS forecast.

  ➢Estimize and IBES report actual EPS that match to two decimal places.

  ➢Exclude forecasts more than 90 days before the announcement.

- The final Estimize–IBES matched sample includes 2,835 contributors providing 37,031 forecasts for 1,601 firms.

2. Data and Descriptive Statistics

2.2 Characteristics of the firms

|	Firm-Quarters	Estimize Coverage	IBES Coverage	Size	BM	Vol	Turnover
Panel A: Sorts by existence of IBES and Estimize coverage							
Estimize and IBES	6,580	6.07	10.45	13.48	0.49	2.26	12.62
IBES only	18,041	0	5.11	2.77	0.77	2.80	8.79
Estimize only	750	2.99	0	4.11	0.63	2.50	10.15
Panel B: Sorts by magnitude of Estimize coverage (Estimize and IBES samples)							
4 (*Coverage.* ≥7)	1,746	16.00	13.87	26.90	0.37	2.36	16.76
3 (*Coverage.* 4–6)	1,187	4.85	10.37	12.23	0.44	2.16	12.18
2 (*Coverage.* 2–3)	1,829	2.44	9.14	8.46	0.54	2.20	11.12
1 (*Coverage.* 1)	1,818	1.00	8.54	6.46	0.58	2.29	10.43

- Panel A reveals a considerable gap in breadth of coverage between Estimize and IBES.
- The Estimise are larger, less volatile but more growth oriented, and more liquid.
- Panel B reveals there is a strong, monotonic relation between Estimize coverage and IBES coverage, the latter ranging from 8.54 (bottom quartile) to 13.87 (top quartile), suggesting that common factors drive Estimize and sell-side coverage decisions.
- Large, growth-oriented, and liquid firms attract more Estimize coverage.

2. Data and Descriptive Statistics

2.3 Comparison of Estimize and IBES forecasts

	Obs.	Mean	Std. Dev.	Q1	Median	Q3
Panel A: Estimize forecast characteristics						
Forecasts per firm-quarter	5,455	6.79	13.84	1.00	3.00	7.00
Contributors per firm-quarter	5,455	6.44	12.30	1.00	3.00	7.00
Forecasts per firm-quarter per contributor	35,121	1.05	0.27	1.00	1.00	1.00
Estimize firms covered by contributors (per quarter)	4,168	8.41	36.73	1.00	1.00	3.00
Forecast horizon	5,455	5.03	9.20	1.00	2.00	5.67

- The mean (median) number of firms covered is 8.41 (1), suggesting that most Estimize contributors cover a single company.
- Estimize forecasts concentrate in the period immediately prior to earnings announcements, as evidenced by the mean (median) forecast horizon of 5 days (2 days).

The Distribution of Estimize and IBES Forecasts
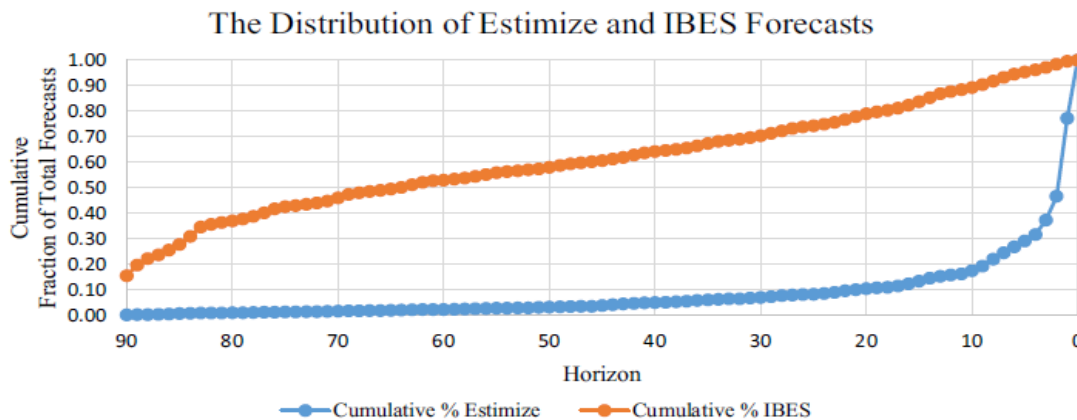
2. Data and Descriptive Statistics

2.3 Comparison of Estimize and IBES forecasts

We define forecast accuracy as the proportional mean absolute forecast error (PMAFE) measured as: $PMAFE_{i,j,t} = \left(AFE_{i,j,t} - \overline{AFE_{j,t}}\right) / AFE_{j,t}$

$AFE_{i,j,t}$: *the absolute forecast error for analyst i's forecast of firm j for quarter t earnings*

Horizon	Firm-Quarters	Estimize	IBES	Estimize − IBES	t (Estimize − IBES)
Panel A: Accuracy (average *PMAFE*)					
[30, 90]	959	0.21	0.11	0.10***	(2.74)
[10, 29]	1,006	0.00	−0.01	0.01	(0.29)
[5, 9]	808	−0.02	−0.07	0.05	(1.59)
[1, 4]	1,675	−0.09	−0.05	−0.04*	(−1.68)
[0]	159	−0.07	−0.15	0.08	(1.12)

- When the forecast horizon ranges from 90 to 30 days, Estimize *PMAFE* is significantly larger than IBES *PMAFE* (0.21 vs. 0.11), consistent with Estimize contributors being less accurate.
- At shorter horizons, there is no significant difference in the accuracy of Estimize and IBES forecasts.

2. Data and Descriptive Statistics

2.3 Comparison of Estimize and IBES forecasts

We measure forecast bias as: $BIAS_{i,j,t} = \dfrac{\left(Forecast_{i,j,t} - Actual_{j,t}\right)}{Price_{j,t-1}} * 100$

Horizon	Firm-Quarters	Estimize	IBES	Estimize − IBES	t (Estimize − IBES)
Panel B: Bias (forecast error scaled by price)					
[30, 90]	959	0.00	−0.08	0.08***	(9.12)
[10, 29]	1,006	−0.02	−0.08	0.06***	(6.33)
[5, 9]	808	−0.03	−0.09	0.07***	(9.11)
[1, 4]	1,675	−0.03	−0.08	0.06***	(9.00)
[0]	159	−0.03	−0.09	0.05***	(3.09)

- We find that both Estimize and IBES forecasts are relatively pessimistic (i.e., forecasts tend to be lower than actuals).
- However, IBES forecasts exhibit greater pessimism, consistent with sell-side analysts' incentives to issue easy-to-beat forecasts.

2. Data and Descriptive Statistics

2.3 Comparison of Estimize and IBES forecasts

We measure forecast bias as: $Boldness_{i,j,t} = \left| Forecast_{i,j,t} - \overline{Forecast_{j,t}} \right| / Forecast_{j,t}$

Horizon	Firm-Quarters	Estimize	IBES	Estimize − IBES	t (Estimize − IBES)
Panel C: Boldness (percent absolute deviation from consensus)					
[30, 90]	788	1.40	1.04	0.36***	(6.69)
[10, 29]	988	1.19	1.01	0.17***	(4.32)
[5, 9]	801	1.10	0.94	0.17***	(4.18)
[1, 4]	1,668	0.96	0.94	0.02	(0.78)
[0]	159	0.85	0.96	−0.11	(−1.32)

- We find that Estimize forecasts are generally bolder than IBES forecasts, consistent with the view that Estimize contributors have more diverse information sets and stronger forecasting incentives than the sell side.

- While only descriptive, our findings that Estimize forecasts are reasonably accurate, less biased, and generally bolder than IBES forecasts provide preliminary evidence that Estimize forecasts could be a useful supplementary source of information

3. Empirical Results

3.1.1 Predicting earnings :Combining Estimize and IBES Forecasts

We examine whether a consensus forecast that combines Estimize and IBES forecasts is more accurate than an IBES-only consensus:

$$PMAFE_{j,t} = \left(CFE_{j,t} - \overline{AFE_{j,t}}\right)/AFE_{j,t}$$

Horizon	Obs.	Estimize *PMAFE*	IBES *PMAFE*	Combined *PMAFE*	Combined – IBES	% (Combined < IBES)
−60	430	0.28***	−0.07***	−0.10***	−0.03**	57.44***
		(5.11)	(−2.91)	(−4.48)	(−2.22)	(2.82)
−30	941	0.16***	−0.07***	−0.11***	−0.04***	59.72***
		(5.07)	(−3.94)	(−7.55)	(−4.06)	(5.81)
−10	1,856	0.02	−0.13***	−0.18***	−0.05***	60.83***
		(0.79)	(−9.51)	(−18.51)	(−6.98)	(8.46)
−5	2,493	−0.03**	−0.13***	−0.20***	−0.06***	61.85***
		(−2.02)	(−11.89)	(−25.29)	(−8.62)	(10.57)
−1	4,568	−0.15***	−0.15***	−0.24***	−0.08***	63.86***
		(−15.02)	(−19.79)	(−45.57)	(−13.65)	(17.44)
0	5,002	−0.17***	−0.16***	−0.25***	−0.09***	64.05***
		(−18.37)	(−27.51)	(−56.85)	(−18.26)	(20.70)

- As the forecast horizon decreases, the benefits from combining Estimize and IBES forecasts increase.

3. Empirical Results

3.1.2 Predicting earnings: Combining Estimize and Statistical Forecasts

Given the well documented bias in sell-side forecasts, we compute the debiased IBES forecast($IBES^D_{i,j,t}$) of analyst i for firm j in quarter t as:

$$IBES^D_{i,j,t} = \widehat{\alpha_t} + \widehat{\beta_t} * IBES_{i,j,t}$$

$\widehat{\alpha_t}$ (0.02) and $\widehat{\beta_t}$ (1.02) are the estimated intercept and slope coefficient from a cross-sectional regression of actual quarterly earnings on IBES-forecasted earnings across all four quarters in year t – 1.

Panel A: Comparing Estimize and debiased IBES ($IBES^D$)

Horizon	Obs.	Estimize PMAFE	$IBES^D$ PMAFE	Combined PMAFE	Combined – $IBES^D$	% (Combined < $IBES^D$)
−60	430	0.23***	−0.10***	−0.12***	−0.01	54.65*
		(4.70)	(−4.70)	(−5.73)	(−1.04)	(1.94)
−30	941	0.14***	−0.11***	−0.15***	−0.04***	55.79***
		(4.77)	(−7.06)	(−11.72)	(−4.23)	(3.58)
−10	1,856	0.02	−0.16***	−0.20***	−0.05***	56.25***
		(0.82)	(−14.83)	(−24.61)	(−7.29)	(5.43)
−5	2,493	−0.03**	−0.16***	−0.21***	−0.05***	56.68***
		(−2.35)	(−18.31)	(−31.17)	(−8.73)	(6.73)
−1	4,568	−0.14***	−0.18***	−0.25***	−0.07***	59.02***
		(−13.99)	(−29.88)	(−55.02)	(−14.47)	(12.40)
0	5,002	−0.15***	−0.18***	−0.26***	−0.08***	58.74***
		(−16.59)	(−32.34)	(−60.46)	(−15.36)	(12.55)

- The results, reported in panel A , show that *Combined Consensus* continues to be significantly more accurate than *IBESD Consensus*.
- This result suggests that Estimize forecasts' lower bias is an important but incomplete explanation for their incremental usefulness.

3. Empirical Results

3.1.2 Predicting earnings: Combining Estimize and Statistical Forecasts

We next compute a characteristic forecast (CF) of earnings based on firm characteristics similar to So [2013].

Panel B: Comparing Estimize and characteristic forecasts (CF)

Horizon	Obs.	Estimize PMAFE	CF PMAFE	Combined PMAFE	Combined − Estimize	% (Combined < Estimize)
−60	382	0.33***	2.38***	1.02***	0.69***	42.41%***
		(5.79)	(14.32)	(11.57)	(7.48)	(−3.00)
−30	840	0.19***	2.51***	0.99***	0.80***	41.43%***
		(5.60)	(21.53)	(16.47)	(12.82)	(−5.04)
−10	1,701	0.02	2.42***	0.91***	0.88***	36.74%***
		(1.12)	(30.04)	(22.15)	(20.39)	(−11.34)
−5	2,297	−0.02	2.38***	0.87***	0.89***	37.01%***
		(−1.45)	(34.53)	(25.04)	(24.31)	(−12.90)
−1	4,255	−0.15***	2.25***	0.78***	0.92***	34.78%***
		(−14.26)	(45.61)	(31.46)	(35.67)	(−20.84)
0	4,668	−0.16***	2.19***	0.75***	0.91***	35.07%***
		(−16.89)	(47.11)	(31.14)	(37.19)	(−21.38)

>0   <50%

- We conclude that, at shorter horizons, where Estimize forecasts are more prevalent and enjoy a greater timing advantage over the statistical forecast, the incremental usefulness of CF is relatively small.
- Therefore, our remaining tests benchmark Estimize to IBES forecasts only.

3. Empirical Results

3.1.3 Predicting earnings: Determinants of the Incremental Usefulness of the Estimize Consensus

We standardize all variables to have a mean of 0 and a standard deviation of 1:
- Dependent variable: *the likelihood that the PMAFE of Combined Consensus is less than the PMAFE of IBES*

- Independent variable: *log (Estimize Contributors), log(IBES Contributors), Estimize Average Age, IBES Average Age*

- Control variable: *Size, BM, Turn, and Vol*

3. Empirical Results

3.1.3 Predicting earnings: Determinants of the Incremental Usefulness of the Estimize Consensus

	Logistic Regression Combined < IBES PMAFE		OLS Estimize–IBES PMAFE	
	(1)	(2)	(3)	(4)
Intercept			0.01	0.10***
			(0.35)	(4.36)
Estimize Age	0.91***	0.92**	0.07***	0.11***
	(−2.89)	(2.11)	(3.46)	(4.03)
IBES Age	1.26***	1.24***	−0.08***	−0.10***
	(6.44)	(4.53)	(−5.43)	(−3.71)
Log(*Estimize Contributors*)	1.13***	1.07	−0.14***	−0.11***
	(2.98)	(1.25)	(−7.47)	(−4.84)
Log(*IBES Contributors*)	0.96	0.94	0.12***	0.17***
	(−0.90)	(−1.07)	(6.31)	(5.39)
Horizon	1	5	1	5
Observations	4,264	2,312	4,264	2,312
Pseudo-R^2 (R^2)	2.21%	2.13%	4.54%	5.34%

- Specifications (1) (2) show that the benefits of crowdsourcing are likely increasing with the size of the crowd, decreasing with the age of forecasts.
- Specifications (3) (4) show that the relative value of Estimize is increasing with the number of Estimize contributors and declining with the number of IBES contributors.

3. Empirical Results

3.1.4 Predicting earnings: Combining Concurrent Estimize and IBES Forecasts

- We use horizon matched sample to control for these differences in order to examine another factor: new information in forecasting earnings.
- We regress Actual EPS on Estimize Consensus, IBES Consensus, or Combined Consensus and compare model fit.

	(1)	(2)	(3)
Intercept	−0.01	0.01	0.00
	(−0.48)	(0.77)	(−0.05)
Estimize Consensus	1.01***		
	(48.36)		
IBES Consensus		1.03***	
		(48.47)	
Combined Consensus			1.02***
			(47.10)
Observations	3,005	3,005	3,005
R-squared	97.41%	97.24%	97.66%

- A comparison of specifications 2 and 3 shows that Combined Consensus explains Actual EPS better than IBES Consensus does (97.66% vs 97.24%)
- Even after controlling for differences in timing and bias, Estimize forecasts are incrementally useful in predicting actual EPS.

3. Empirical Results

3.2 Market Earnings Expectation

- A superior measure of the market's expectation exhibits a stronger association with returns at the time the actual is announced: that is, a higher earnings response coefficient.

- We explore the role of the Estimize consensus in measuring the market's expectation by estimating the regression: $BHAR = \alpha + \beta * Consensus\ Error + \varepsilon$

$$BHAR = \prod_{t=-1}^{1} \left(1 + R_{j,t}\right) - \prod_{t=-1}^{1} \left(1 + R_{j,t}^{Size}\right)$$

3. Empirical Results

3.2 Market Earnings Expectation

	(1)	(2)	(3)	(4)	(5)
Intercept	0.25**	−0.26**	−0.16	0.00	0.55
	(2.05)	(−2.01)	(−1.22)	(0.02)	(1.30)
Estimize Consensus Error	2.14***			1.39***	1.07
	(11.53)			(5.35)	(1.53)
IBES Consensus Error		2.04***		0.98***	2.05***
		(11.44)		(4.06)	(3.25)
Combined Consensus Error			2.16***		
			(11.44)		
*Estimize Consensus Error * EC*					0.68**
					(2.25)
*IBES Consensus Error * EC*					−0.44*
					(−1.74)
*Estimize Consensus Error * IC*					−0.05
					(−0.18)
*IBES Consensus Error * IC*					−0.36
					(−1.46)
Log(*Estimize Contributors*) (*EC*)					−0.10
					(−0.70)
Log(*IBES Contributors*) (*IC*)					−0.20
					(−1.08)

- These results suggest that the Estimize and the IBES consensus forecasts are similarly accurate market expectation proxies, and that neither proxy subsumes the other.
- We find that the market reaction to Estimize(IBES) Consensus Error is increasing (decreasing) with the number of Estimize contributors, suggesting that the Estimize consensus is better aligned with the market's expectation when the Estimize contributor base is larger.

3. Empirical Results

3.2 Market Earnings Expectation

Market Reaction to Unexpected Earnings Proxy Variables by Number of Estimize Contributors
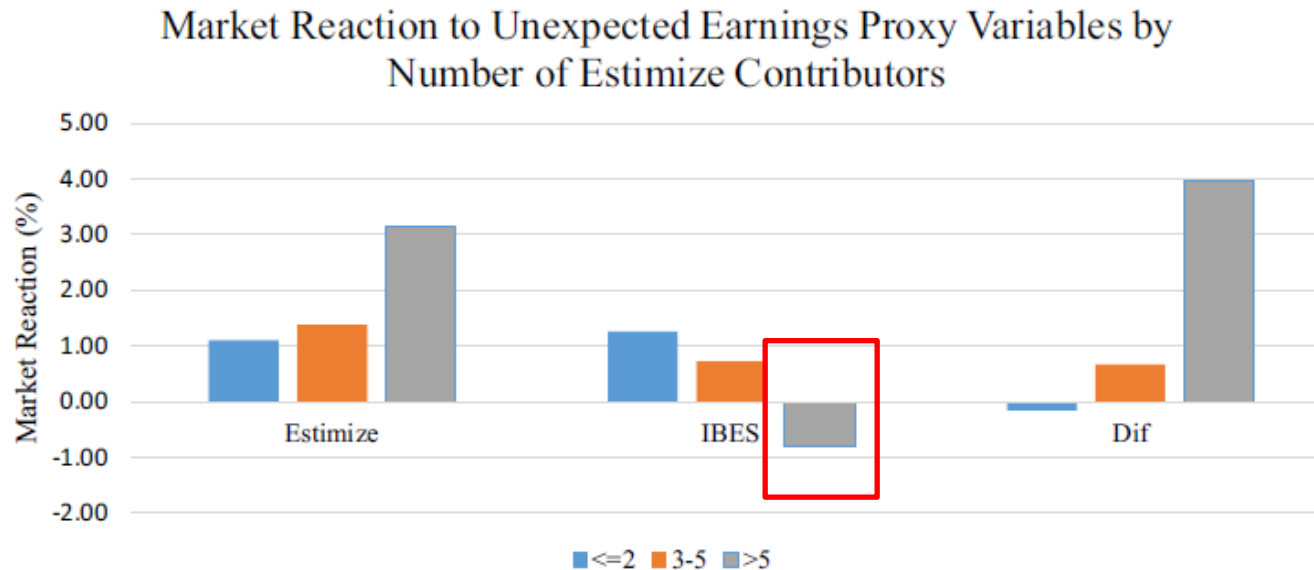
- When the number of Estimize contributors is greater than five, the Estimize consensus fully subsumes the IBES consensus as a proxy for the market's expectation.

3. Empirical Results

3.3 Facilitating Price Discovery

We examine the market reaction to Estimize consensus revisions. If Estimize forecasts contain information that is not already incorporated into prices, then upward (downward) revisions should be associated with positive (negative) abnormal returns.

- We define the independent variable: $\dfrac{Rev}{Price} = (Consensus_{j,t} - Consensus_{j,t-1})/Price_{prior\ quarter}$

	(1)	(2)	(3)
Intercept	0.04	−0.07	0.00
	(0.72)	(−1.03)	(0.07)
Estimize (Rev/Price)	0.15**		
	(2.31)		
Estimize Upward		0.19**	
		(2.32)	
Estimize Large Upward			0.26**
			(2.30)
Estimize Large Downward			−0.15
			(−1.40)

- We find that a one-standard-deviation increase in *Rev/Price* is associated with a 0.15% increase in two-day abnormal returns. And it is statistically and economically significant.

3. Empirical Results

3.3 Facilitating Price Discovery

Cumulative Abnormal Returns Around Estimize Consensus Revisions
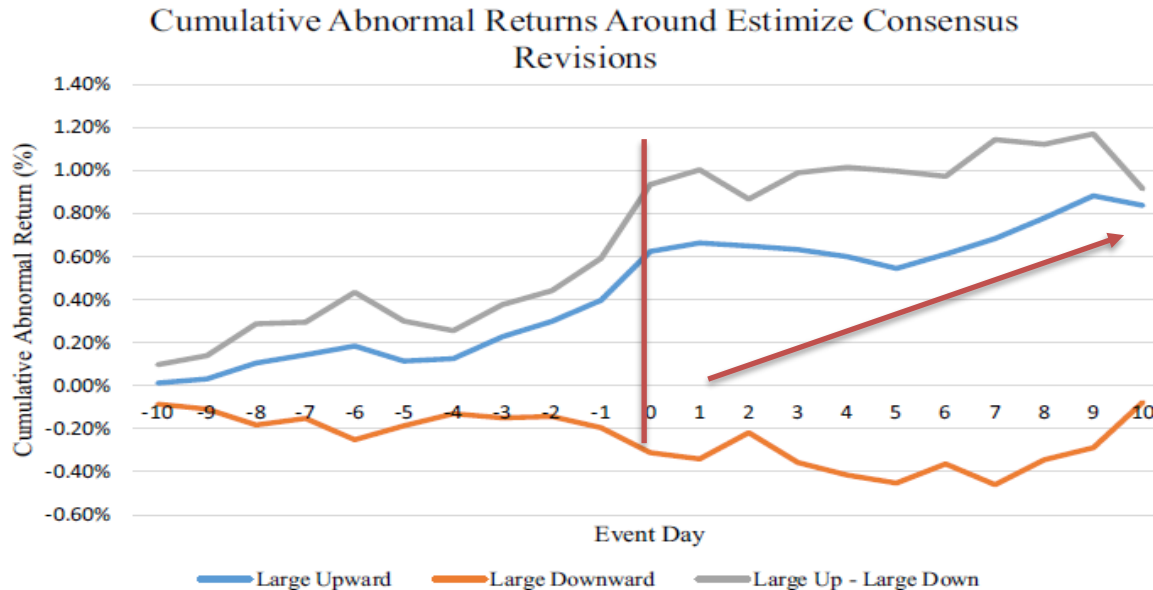
- We observe that *Large Upward* (*Large Downward*) revisions are preceded by positive (negative) abnormal returns, consistent with Estimize contributors revising their forecasts to incorporate the arrival of public information.

- We find no evidence that this return differential reverses over the subsequent 10 trading days which alleviate the overreacting concern.

4. Conclusion

- We find substantial accuracy benefits from combining IBES and Estimize forecasts at all horizons.

- Also, we find that the Estimize consensus is incrementally useful as a measure of the market's earnings expectation. The usefulness is increasing with the number of Estimize contributors.

- Finally, Estimize consensus revisions appear to induce a statistically and economically significant market reaction.

- We conclude that crowdsourced forecasts are incrementally useful in predicting earnings and measuring the market's expectation of earnings, and also improve price discovery.