

July 2024



**Houlihan
Lokey**

Do We Have a Consensus? An Analysis of Analyst Estimates



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INTRODUCTION



Background

The primary job of Wall Street equity research analysts is to make stock recommendations, with **estimates** of company financial performance and future earnings as key inputs to such recommendations. Analysts generally tend to follow the larger market capitalization companies, but liquidity and institutional interest also play a role in the selection of research subjects.

Estimate Formation Process

Analysts create forecasted estimates based on a variety of available information. While financial analysts are expected to produce reasonably reliable forecasts of earnings, growth, and company performance, it is, obviously, impossible to predict the future.

Challenges that forecasters encounter include unpredictability (both macro and company-specific), data inaccuracy, and estimate bias or pressure. Therefore, analysts following the same company come to different conclusions even though they use the same public information.

Available Information

- Historical data
- Current projections
- Interaction with management
- Competitor analysis
- Current investor outlook
- Recent company news
- Status of the overall economy
- Industry trends and dynamics.

Why Are Estimates Valuable?

While consensus earnings estimates are flawed, they influence investors and serve as a gauge for determining a stock's valuation. Investors assess a company's stock performance based on its earnings power. To make a proper assessment, investors rely on analyst estimates of both current and next year's earnings per share (Earnings), along with insights into the company's future earning potential.

Analysts rely on management guidance and additional publicly available information to provide investors with a holistic perspective. Analysts' earnings growth estimates, along with any revisions to these estimates, are distributed by the financial press and are frequently cited as the reason behind major stock price changes.



Research Question

How Accurate Are Equity Research Analyst Estimates?

Scope of Work

This statistical investigation into the predictive power of equity research analyst estimates is intended to assess the overall accuracy of consensus estimates through weighted relative error averages. Conclusions are drawn based on the effect of various factors on overall estimate accuracy by segmenting the dataset into market sector, company size, number of analysts, and comparing to the predictive strength of historical compound annual growth rates.

Findings

- **Estimates decrease in accuracy from top to bottom line.**
 - Revenue estimates are more accurate than earnings estimates.
- **Longer forecast periods result in less accurate estimates.**
- **More publicly available data results in more accurate estimates.**
 - Accuracy increases with company size.
- **More analyst coverage leads to more accurate consensus estimates.**
- **Estimates are more predictive than historical growth models.**

Methods

Data Collection and Analysis Process

Data: Two data sets made of the companies in the Russell 3000 and the S&P 500.

Excluded Companies: Any company that had no estimates or disclosed actual financial results in the past 10 years from S&P Capital IQ.

Financial Metrics: Revenue and Earnings.

Data Coverage: Financial metrics include annual data from 2014 to 2023.

Estimate Forecast Periods: Forward 1-, 2-, 3-, 4-, and 5-year fiscal year (FY) estimates as of the last day of the previous calendar year.

Segmented Results: Market sector, company size by FY 2023 revenue, and number of analysts.

Accuracy Evaluation

The measure of accuracy used throughout this analysis is the mean relative absolute error (**% error**), which calculates the absolute value of the difference between the estimated and actual values, as a percentage of the actual metric. **Accuracy improves as % error decreases.**

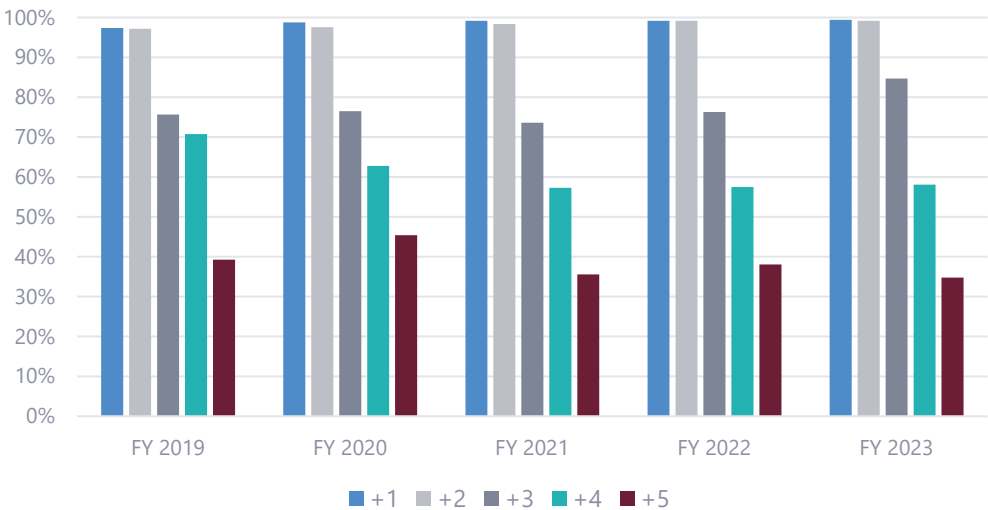
$$\% \text{ Error} = \left| \frac{\text{Estimate} - \text{Actual}}{\text{Actual}} \right| * 100\%$$

Weighting System

To calculate summary % error values, individual company % errors are weighted based on revenue size relative to the total of all included companies rather than taking an equally weighted average.

- Using revenue accounts for data variability (company size) while using a majority positive metric for inclusivity.

Revenue Estimates Data Availability: S&P 500

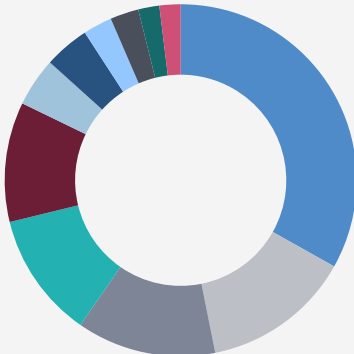
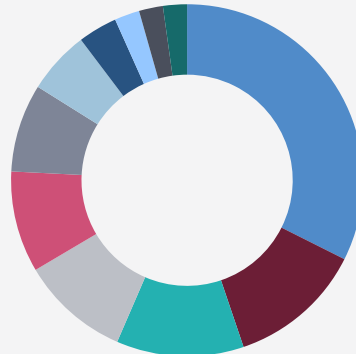


Sources: FTSE Russell and S&P Global.



Russell 3000 vs. S&P 500

(As of 7/2/24)

Russell 3000		S&P 500																																		
Description	<ul style="list-style-type: none">Introduced in 1984, the Russell 3000 tracks the performance of the largest 3,000 U.S. companies.	<ul style="list-style-type: none">Introduced in 1957, the S&P 500 comprises 500 of the largest companies listed on U.S. exchanges.																																		
Included Companies	<ul style="list-style-type: none">Includes small-, medium-, and large-cap securities.Represents ~97% of the investable U.S. equity market.	<ul style="list-style-type: none">Large-cap securities (>\$15 billion market cap).Represents ~80% of the investable U.S. equity market.																																		
Rebalancing	<ul style="list-style-type: none">Rebalanced annually in May.	<ul style="list-style-type: none">Rebalanced quarterly.																																		
Listing Requirements	<ul style="list-style-type: none">Listed on a U.S. exchange, including NYSE, NASDAQ, Cboe, NYSE American, or NYSE Arca.Structured as a corporation based in the U.S. with common stock.																																			
	<ul style="list-style-type: none">Total Market Cap: \$30 million or above.Public Float: 5% or above.Profitability: NO requirement.Closing price \$1 or above.	<ul style="list-style-type: none">Total Market Cap: \$15.8 billion or above.Public Float: 10% or above.Profitability: Positive earnings in 5 recent quarters.50% or more of revenue in U.S.250,000 or more shares traded in previous 6 months.																																		
Market Sector Weighting	<div><div></div><div><table><tr><td>33.2%</td><td>Information Technology</td><td>32.4%</td></tr><tr><td>13.7%</td><td>Consumer Discretionary</td><td>10.0%</td></tr><tr><td>12.8%</td><td>Industrials</td><td>8.1%</td></tr><tr><td>11.5%</td><td>Healthcare</td><td>11.7%</td></tr><tr><td>11.0%</td><td>Financials</td><td>12.4%</td></tr><tr><td>4.5%</td><td>Consumer Staples</td><td>5.8%</td></tr><tr><td>4.2%</td><td>Energy</td><td>3.6%</td></tr><tr><td>2.7%</td><td>Utilities</td><td>2.3%</td></tr><tr><td>2.6%</td><td>Real Estate</td><td>2.2%</td></tr><tr><td>1.9%</td><td>Materials</td><td>2.2%</td></tr><tr><td>1.9%</td><td>Communication Services</td><td>9.3%</td></tr></table></div><div></div></div>			33.2%	Information Technology	32.4%	13.7%	Consumer Discretionary	10.0%	12.8%	Industrials	8.1%	11.5%	Healthcare	11.7%	11.0%	Financials	12.4%	4.5%	Consumer Staples	5.8%	4.2%	Energy	3.6%	2.7%	Utilities	2.3%	2.6%	Real Estate	2.2%	1.9%	Materials	2.2%	1.9%	Communication Services	9.3%
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Index Averages <i>(Included Companies)</i>	<i>(Dollars in Billions)</i>																																			
	<table><tr><td>Market Cap</td><td>Net Income</td></tr><tr><td>\$21.2</td><td>\$0.7</td></tr><tr><td>Company Age</td><td># Analysts</td></tr><tr><td>55</td><td>10</td></tr></table>	Market Cap	Net Income	\$21.2	\$0.7	Company Age	# Analysts	55	10	<table><tr><td>Market Cap</td><td>Net Income</td></tr><tr><td>\$103.7</td><td>\$3.6</td></tr><tr><td>Company Age</td><td># Analysts</td></tr><tr><td>85</td><td>22</td></tr></table>	Market Cap	Net Income	\$103.7	\$3.6	Company Age	# Analysts	85	22																		
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Sources: FTSE Russell and S&P Global.

The background of the slide is a complex, abstract composition. It features a dark blue and black base with vibrant orange and red light flares in the upper left corner. Overlaid on this are various financial data visualizations: a candlestick chart with red and white bars, a line graph with a red trend line, and several dashed lines in red and white. Scattered throughout the scene are glowing green and blue binary digits (0s and 1s), some of which are slightly out of focus, creating a sense of depth and digital connectivity.

02 RESULTS

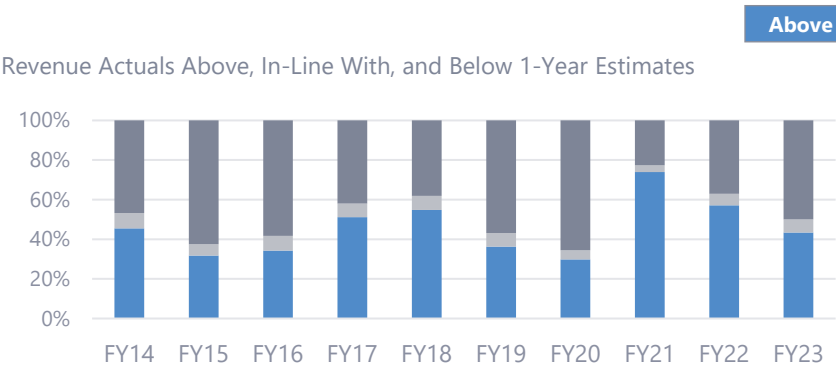
Overall Data

Overall Data

Revenue

Russell 3000

Overall, **43.4%** of the companies in the Russell 3000 have reported FY 2023 revenue above the consensus 1-year estimate, **6.6%** in-line with the estimate, and **50.0%** below the estimate. Over the past 10 years, 6.2% of estimates are in-line on average.⁽¹⁾



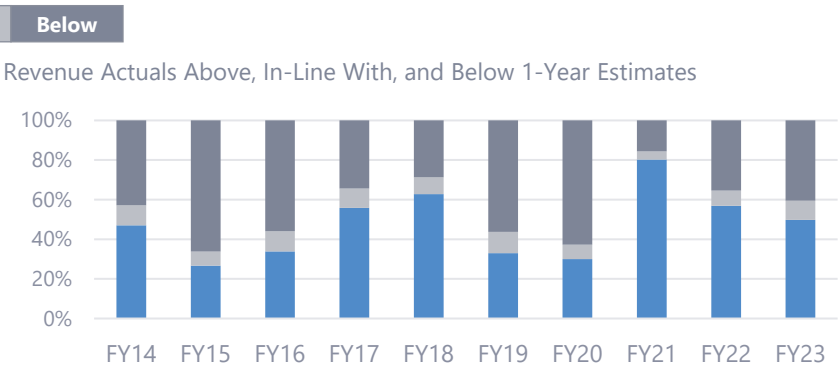
1-year analyst revenue estimates for FY 2023 have a weighted average % error of **6.7%**. The average 1-year weighted % error is **10.2%** over the past 5 years and **9.7%** for the past 10 years.

Estimates % Error

		FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Forecast Period	+1	8.2%	14.9%	11.7%	9.4%	6.7%
	+2	11.2%	19.9%	15.4%	16.8%	11.6%
	+3	14.1%	19.8%	17.8%	17.6%	14.4%
	+4	17.7%	18.9%	18.4%	17.6%	16.0%
	+5	22.0%	21.9%	20.4%	19.1%	15.8%

S&P 500

Overall, **49.8%** of the companies in the S&P 500 have reported FY 2023 revenue above the consensus 1-year estimate, **9.7%** in-line with the estimate, and **40.5%** below the estimate. Over the past 10 years, 8.5% of estimates are in-line on average.⁽¹⁾



1-year analyst revenue estimates for FY 2023 have a weighted average % error of **5.9%**. The average 1-year weighted % error is **9.5%** over the past 5 years and **9.1%** for the past 10 years.

Estimates % Error

		FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Forecast Period	+1	7.8%	14.5%	10.8%	8.7%	5.9%
	+2	10.6%	19.0%	14.1%	15.6%	10.4%
	+3	13.4%	19.1%	16.7%	16.6%	13.3%
	+4	16.6%	17.5%	17.1%	15.8%	15.1%
	+5	21.2%	20.3%	18.5%	17.9%	14.2%

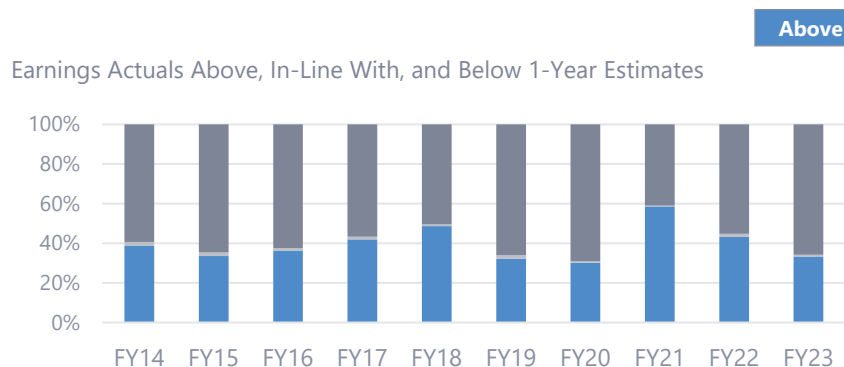
Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.
(1) In-line refers to an actual being within 0.5% of estimated value.

Overall Data

Earnings

Russell 3000

Overall, **33.3%** of the companies in the Russell 3000 have reported FY 2023 earnings above the consensus 1-year estimate, **0.8%** in-line with the estimate, and **65.9%** below the estimate, potentially an impact of increased interest rates. Over the past 10 years, 1.3% of estimates are in-line on average.⁽¹⁾



1-year analyst earnings estimates for FY 2023 have a weighted average % error of **74.7%**. The average 1-year weighted % error is **84.4%** over the past 5 years and **75.3%** for the past 10 years.

Estimates % Error

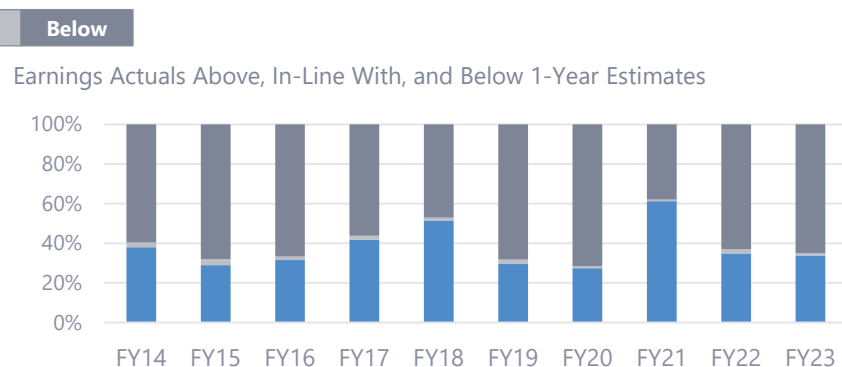
Forecast Period		FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
	+1	72.3%	122.1%	58.1%	94.6%	74.7%
	+2	69.3%	134.2%	75.0%	105.1%	91.5%
	+3	78.4%	131.9%	84.7%	121.6%	85.8%
	+4	74.4%	114.0%	69.4%	141.2%	88.8%
	+5	72.9%	111.5%	66.1%	125.3%	74.1%

Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.

(1) In-line refers to an actual being within 0.5% of estimated value.

S&P 500

Overall, **33.7%** of the companies in the S&P 500 have reported FY 2023 earnings above the consensus 1-year estimate, **1.2%** in-line with the estimate, and **65.0%** below the estimate, potentially an impact of increased interest rates. Over the past 10 years, 2.2% of estimates are in-line on average.⁽¹⁾



1-year analyst earnings estimates for FY 2023 have a weighted average % error of **61.4%**. The average 1-year weighted % error is **77.2%** over the past 5 years and **69.2%** for the past 10 years.

Estimates % Error

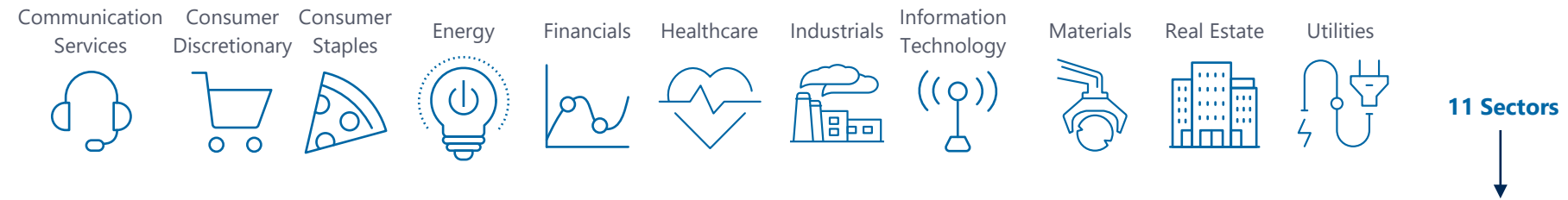
Forecast Period		FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
	+1	62.8%	115.9%	48.9%	97.2%	61.4%
	+2	58.7%	130.9%	63.3%	108.0%	77.8%
	+3	63.3%	119.6%	67.5%	116.5%	73.0%
	+4	68.7%	107.8%	61.8%	146.8%	83.7%
	+5	71.2%	130.6%	65.7%	167.6%	80.8%

The background of the slide is a complex, abstract composition. It features a dark blue and black base with vibrant orange and red light flares in the upper left corner. Overlaid on this are various financial data visualizations: a candlestick chart with red and white bars, a line graph with a red trend line, and several dashed lines in red and white. Scattered throughout the scene are glowing green and blue binary digits (0s and 1s), some of which are slightly out of focus, creating a sense of depth and digital connectivity.

02 RESULTS

Market Sector

Market Sectors



- The Global Industry Classification Standard (GICS) is an industry analysis framework that helps investors understand the key business activities of companies around the world. MSCI and S&P Dow Jones Indices developed this classification standard to provide investors with consistent and exhaustive industry definitions.

Overview of Analysis by Market Sectors

- In the following analysis, the overall data sets are segmented by the 11 market sectors.
- As of June 21, 2024, 8 of the 11 sectors reported year-over-year earnings growth, led by the communication services, healthcare, information technology, and energy sectors. On the other hand, 3 sectors reported a year-over-year decline in earnings, led by the materials sector.
- The information technology sector had the highest percentage of companies reporting FY 2023 earnings above estimates with 88%, while the real estate sector had the lowest percentage at 55%.
- The healthcare (+3.1%) sector reported the largest positive difference between actual **revenues** and estimated revenues for FY 2023.
- The energy (+10.7%) sector reported the largest positive difference between actual **earnings** and estimated earnings for FY 2023.

Largest Companies by FY 2023 Revenue

(Dollars in Billions)

- | | |
|----------------------------------------------------------------|--------------------------------------------------------------|
| • Walmart Inc. (\$611) <i>Consumer Staples</i> | • UnitedHealth Group (\$372) <i>Healthcare</i> |
| • Amazon.com Inc. (\$575) <i>Consumer Discretionary</i> | • CVS Health Corporation (\$357) <i>Healthcare</i> |
| • Berkshire Hathaway Inc. (\$402) <i>Financials</i> | • Exxon Mobil Corporation (\$338) <i>Energy</i> |
| • Apple Inc. (\$383) <i>Information Technology</i> | • Alphabet Inc. (\$307) <i>Communication Services</i> |

Sources: FactSet and MSCI.

Market Sectors

Revenue

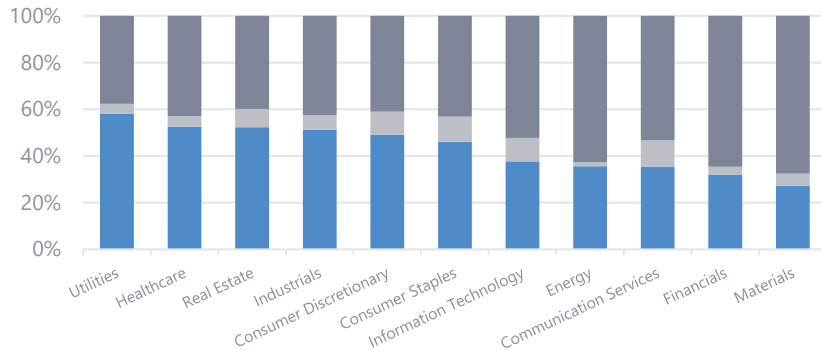
Russell 3000

S&P 500

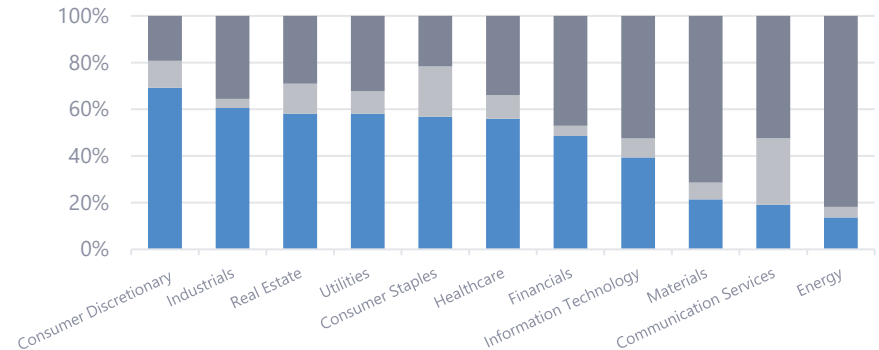
- Within the S&P 500, companies in the consumer discretionary sector were most likely to outperform analyst revenue estimations in FY 2023. The consumer staples and communications services sectors have the highest percentage of in-line results for both the Russell 3000 and the S&P 500.

Above In-Line Below

Revenue Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



Revenue Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



- In FY 2023, the communication services sector had the lowest average % error of **3.7%** from the Russell 3000 and **2.5%** from the S&P 500. The energy sector had the highest % error with 12.6% and 11.9%, respectively.
- The most predictable sectors this decade were consumer staples and healthcare, whereas the least predictable were energy and materials. While the energy sector has historically been highly unpredictable with a 10-year average of ~30%, the FY 2023 % error is closer to other market sectors.

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Communication Services	7.2%	8.4%	12.5%	9.7%	3.7%
Consumer Discretionary	8.0%	8.9%	8.9%	6.7%	6.4%
Consumer Staples	3.9%	4.1%	5.4%	4.3%	3.0%
Energy	28.6%	30.2%	27.5%	31.5%	12.6%
Financials	11.2%	11.6%	14.6%	7.5%	11.5%
Healthcare	4.9%	5.4%	6.8%	4.3%	5.1%
Industrials	10.9%	12.7%	11.8%	9.2%	6.8%
Information Technology	7.7%	6.5%	10.3%	5.2%	5.0%
Materials	15.5%	15.4%	19.3%	10.0%	8.7%
Real Estate	12.5%	14.6%	19.1%	14.8%	9.2%
Utilities	12.8%	13.6%	15.6%	18.1%	9.0%

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Communication Services	6.3%	7.6%	11.6%	8.8%	2.5%
Consumer Discretionary	8.0%	8.7%	7.8%	6.6%	6.3%
Consumer Staples	3.3%	3.5%	5.1%	3.7%	2.8%
Energy	29.1%	30.3%	27.4%	29.9%	11.9%
Financials	9.2%	9.9%	12.1%	6.1%	8.8%
Healthcare	4.7%	5.1%	6.2%	4.0%	5.1%
Industrials	11.0%	12.9%	11.0%	8.7%	6.4%
Information Technology	6.9%	6.0%	10.2%	4.3%	4.4%
Materials	17.3%	17.6%	21.3%	10.4%	8.5%
Real Estate	9.1%	7.9%	10.4%	6.9%	4.7%
Utilities	12.6%	13.4%	15.3%	18.3%	8.0%

Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.

(1) In-line refers to an actual being within 0.5% of estimated value.

Market Sectors (cont.)

Revenue

Russell 3000

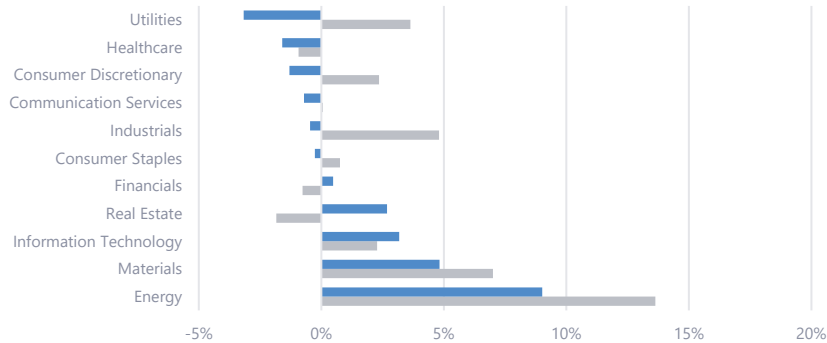
S&P 500

- Looking at % error by market sector on a **non-absolute basis**, companies in the energy and materials sectors have the highest positive % error both in FY 2023 and the 10-year average, suggesting analysts are consistently overestimating revenue actuals within these sectors.

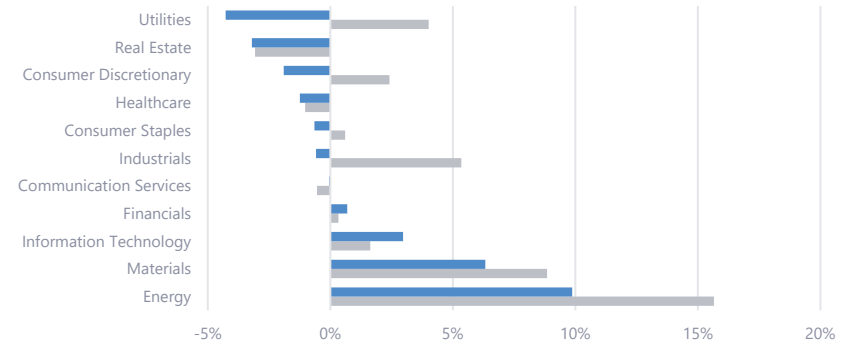
FY 2023

10 Yr Avg

Revenue Weighted Average % Error by Market Sector



Revenue Weighted Average % Error by Market Sector



- For both indices, the communication services and financials sectors had the smallest % errors over the past 10 years, making them the most predictable on average. For FY 2023, the communications services sector had a % error of only **-0.7%** for the Russell 3000 and **-0.1%** for the S&P 500.
- While the industrials sector has the third worst non-absolute 10-year average % error, FY 2023 estimates in this sector were very accurate for both indices. The volatile energy sector also had relatively improved FY 2023 estimate accuracy compared to the 10-year average.

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Communication Services	0.1%	0.9%	-5.8%	3.6%	-0.7%
Consumer Discretionary	2.4%	2.0%	-2.3%	1.8%	-1.3%
Consumer Staples	0.8%	-0.7%	-3.6%	-3.2%	-0.3%
Energy	13.6%	5.5%	-27.2%	-31.3%	9.0%
Financials	-0.8%	-0.7%	-12.5%	0.3%	0.5%
Healthcare	-0.9%	-1.7%	-4.6%	-0.5%	-1.6%
Industrials	4.8%	4.7%	-3.6%	-1.3%	-0.5%
Information Technology	2.3%	0.6%	-6.5%	-0.9%	3.2%
Materials	7.0%	3.6%	-15.3%	-6.9%	4.8%
Real Estate	-1.8%	-0.5%	-11.6%	-3.3%	2.7%
Utilities	3.6%	1.2%	-0.3%	-11.1%	-3.2%

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Communication Services	-0.5%	1.2%	-5.4%	4.6%	-0.1%
Consumer Discretionary	2.4%	2.2%	0.1%	2.3%	-1.9%
Consumer Staples	0.6%	-0.9%	-3.7%	-3.3%	-0.6%
Energy	15.7%	6.9%	-27.4%	-29.8%	9.9%
Financials	0.3%	-0.1%	-11.1%	-0.3%	0.7%
Healthcare	-1.0%	-1.7%	-4.6%	-0.5%	-1.2%
Industrials	5.3%	5.7%	-2.9%	-0.2%	-0.6%
Information Technology	1.6%	0.2%	-7.4%	-1.4%	3.0%
Materials	8.8%	5.9%	-15.8%	-7.0%	6.3%
Real Estate	-3.1%	-2.7%	-9.1%	-5.9%	-3.2%
Utilities	4.0%	1.5%	0.5%	-10.7%	-4.3%

Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.

Market Sectors

Earnings

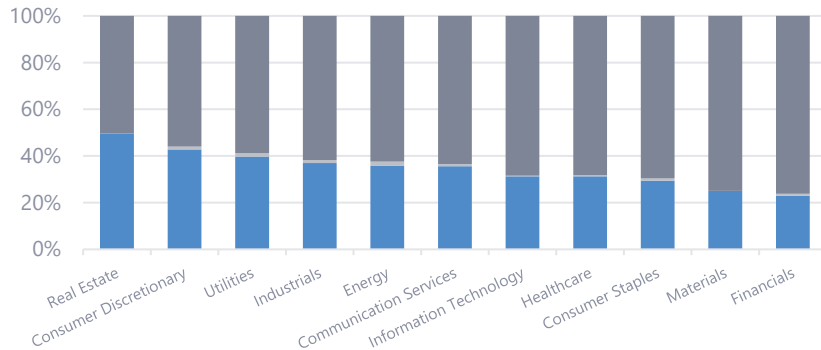
Russell 3000

S&P 500

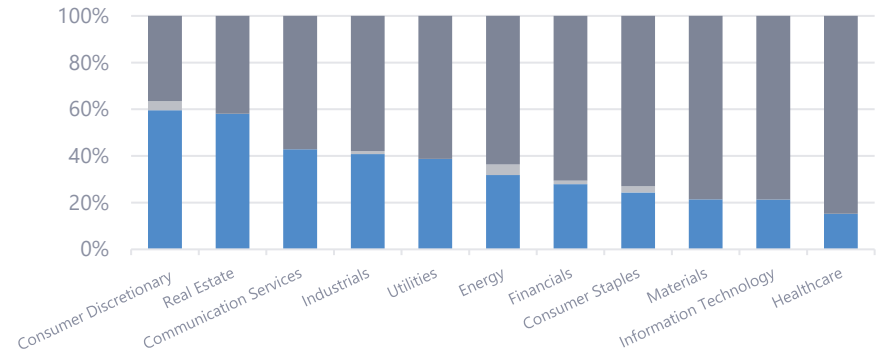
- Companies in the consumer discretionary and real estate sectors were the most likely to outperform analyst earnings estimations in FY 2023. For both indices, almost all sectors' actuals come in below estimates, suggesting analysts are forecasting earnings too optimistically regardless of sector.

Above In-Line Below

Earnings Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



Earnings Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



- In FY 2023, the energy sector had the lowest earnings % error of **33.6%** for the S&P 500. The energy sector historically has the worst earnings accuracy of all sectors for both indices, with the only 10-year average % error above 100%.
- The most predictable sectors this decade have been consumer staples and communication services, whereas the least predictable were energy and healthcare. Consumer discretionary had one of the lowest % errors for FY 2023, whereas its FY 2022 was heavily swayed by Amazon's earnings % error.

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Communication Services	58.9%	70.6%	47.2%	90.8%	56.6%
Consumer Discretionary	84.2%	108.0%	60.9%	271.4%	49.7%
Consumer Staples	51.1%	70.4%	45.3%	33.6%	65.6%
Energy	125.8%	122.0%	129.8%	64.7%	59.3%
Financials	69.4%	78.0%	57.8%	69.6%	88.8%
Healthcare	94.8%	76.2%	62.3%	92.5%	94.5%
Industrials	77.0%	100.8%	57.8%	63.4%	93.0%
Information Technology	70.2%	74.6%	49.2%	64.0%	70.1%
Materials	88.5%	92.0%	79.6%	69.9%	105.9%
Real Estate	80.2%	104.8%	70.9%	102.0%	171.4%
Utilities	69.0%	76.8%	53.8%	52.5%	71.8%

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Communication Services	50.6%	60.5%	32.8%	85.1%	42.7%
Consumer Discretionary	87.0%	113.0%	45.1%	367.4%	34.7%
Consumer Staples	43.5%	59.5%	24.6%	25.9%	50.8%
Energy	119.1%	113.7%	115.5%	61.3%	33.6%
Financials	66.2%	76.3%	54.6%	63.5%	88.8%
Healthcare	87.1%	72.3%	63.0%	94.6%	95.4%
Industrials	64.9%	84.4%	43.8%	36.2%	61.6%
Information Technology	53.6%	53.7%	29.8%	54.1%	43.4%
Materials	76.5%	77.2%	58.2%	53.7%	108.1%
Real Estate	51.6%	62.9%	46.3%	46.8%	56.2%
Utilities	72.9%	81.1%	57.6%	54.4%	74.8%

Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.

(1) In-line refers to an actual being within 0.5% of estimated value.

Market Sectors (cont.)

Earnings

Russell 3000

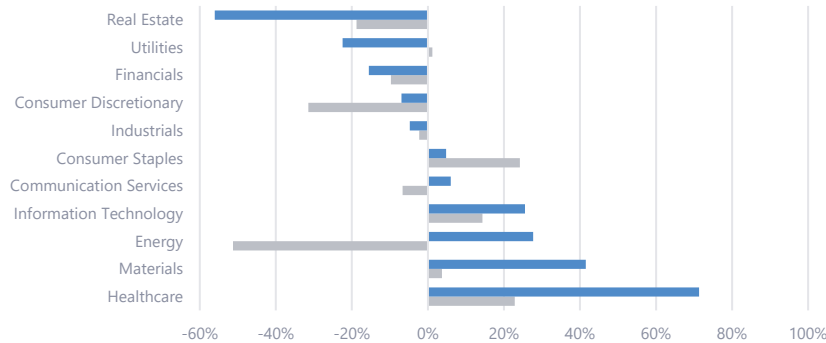
S&P 500

- Looking at % error by market sector on a **non-absolute basis**, companies in the healthcare and materials sectors have the highest positive % error both in FY 2023, suggesting analysts overestimated earnings actuals within these sectors.

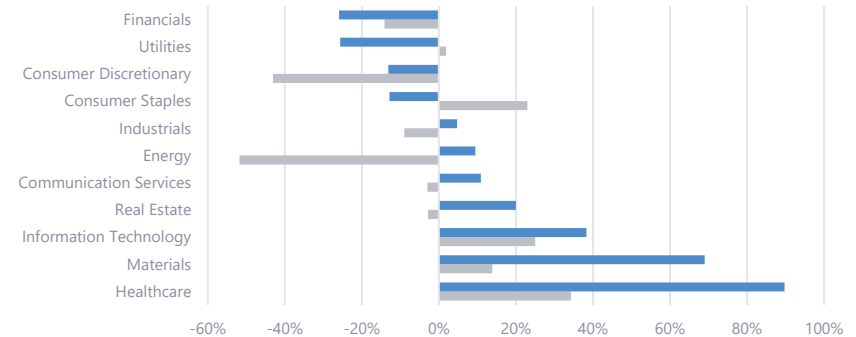
FY 2023

10 Yr Avg

Earnings Weighted Average % Error by Market Sector



Earnings Weighted Average % Error by Market Sector



- In FY 2023, companies in the real estate sector were greatly underestimated in the Russell 3000 and were relatively overestimated in the S&P 500. The utilities sector has been volatile in recent years but has the most accurate 10-year average of all sectors for both the Russell 3000 and S&P 500.
- While the weighted average % error for the energy sector was the largest positive value for revenue estimates, the opposite is true for earnings. The 10-year average % error is the largest negative among sectors, suggesting analysts overestimate energy companies' revenues and underestimate earnings.

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Communication Services	-6.7%	-17.6%	-17.8%	3.5%	6.0%
Consumer Discretionary	-31.4%	-64.0%	-11.8%	-237.4%	-7.0%
Consumer Staples	24.2%	36.7%	28.7%	14.7%	4.8%
Energy	-51.3%	-56.2%	-121.0%	-58.9%	27.7%
Financials	-9.7%	-17.6%	-32.2%	-22.3%	-15.5%
Healthcare	22.8%	30.4%	7.8%	45.6%	71.3%
Industrials	-2.3%	-6.6%	-16.2%	10.9%	-4.8%
Information Technology	14.3%	8.9%	-7.4%	27.1%	25.5%
Materials	3.7%	-2.5%	-19.7%	-23.6%	41.5%
Real Estate	-18.8%	-29.5%	-40.9%	-12.3%	-56.1%
Utilities	1.2%	-2.0%	-12.9%	12.4%	-22.4%

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Communication Services	-3.0%	-13.6%	-16.1%	12.5%	10.9%
Consumer Discretionary	-43.1%	-86.0%	-10.8%	-355.1%	-13.1%
Consumer Staples	23.0%	32.0%	12.6%	11.3%	-12.8%
Energy	-51.8%	-55.8%	-112.8%	-61.3%	9.5%
Financials	-14.1%	-22.0%	-33.5%	-23.0%	-25.9%
Healthcare	34.3%	40.5%	13.4%	51.4%	89.7%
Industrials	-9.0%	-13.9%	-22.2%	1.1%	4.7%
Information Technology	25.0%	25.9%	-6.4%	41.2%	38.3%
Materials	13.9%	18.5%	-8.8%	-6.8%	69.0%
Real Estate	-2.8%	-5.4%	-20.8%	6.6%	20.0%
Utilities	1.9%	-1.4%	-14.4%	20.0%	-25.6%

Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.

Market Sectors

Summary

Findings

Estimates Decrease in Accuracy From Top to Bottom Line

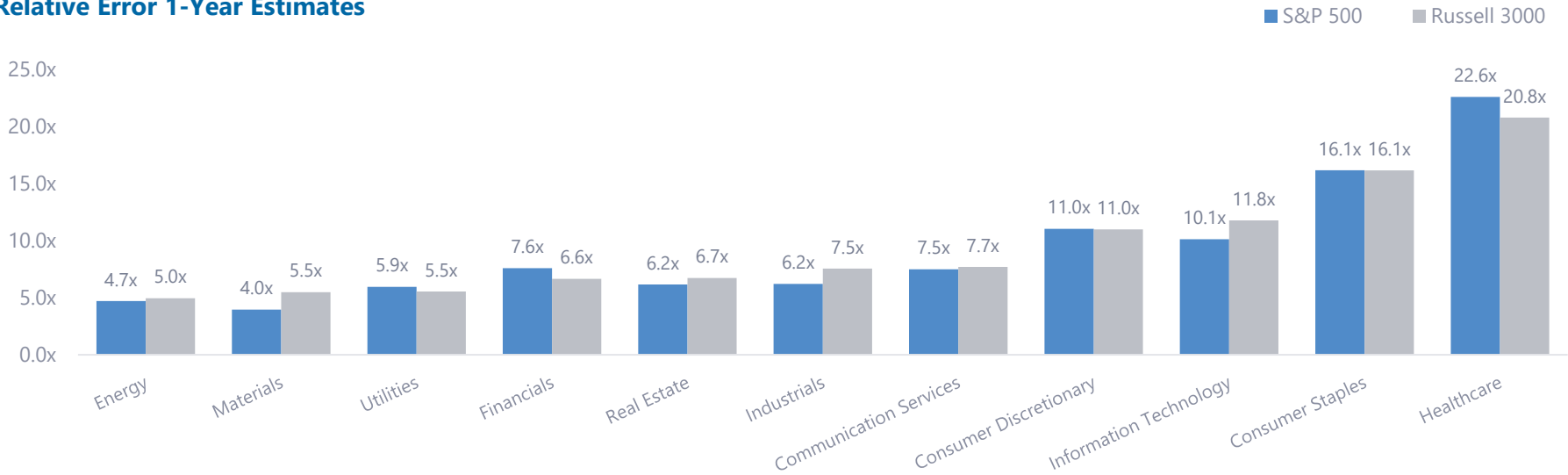
- Averaging the past 8 years, the overall Russell 3000 1-year % error increased from 9.76% for revenue to 84.05% for earnings, representing an 8.6x worse % error.
- The % error figures are slightly more accurate for the overall S&P 500 than the Russell 3000 for 1-, 2-, and 3-year estimates but represent similar relative errors from revenue to earnings.

Longer Forecast Periods Result in Less Accurate Estimates

- For both the Russell 3000 and the S&P 500, as the forecast period grows, the overall % error increases.

	8-Year Average % Error		
	1-Year	2-Year	3-Year
Russell 3000			
Revenue	9.76%	15.17%	19.37%
Earnings	84.05%	92.04%	92.57%
Relative Error	8.6x	6.1x	4.8x
S&P 500			
Revenue	9.33%	14.53%	18.20%
Earnings	73.67%	82.47%	83.98%
Relative Error	7.9x	5.7x	4.6x

Relative Error 1-Year Estimates



(1) Refer to pages 36 and 37 for additional % error breakdown in the Appendix.

The background of the slide is a complex, abstract composition. It features a dark blue and black base with vibrant orange and red light flares in the upper left corner. Overlaid on this are various financial and digital motifs: a candlestick chart with red and white bars, a line graph with a red trend line, and several glowing green and blue binary digits (0s and 1s) scattered across the lower half. Dashed white lines, including a prominent diagonal one, intersect the scene, adding a sense of structure and depth.

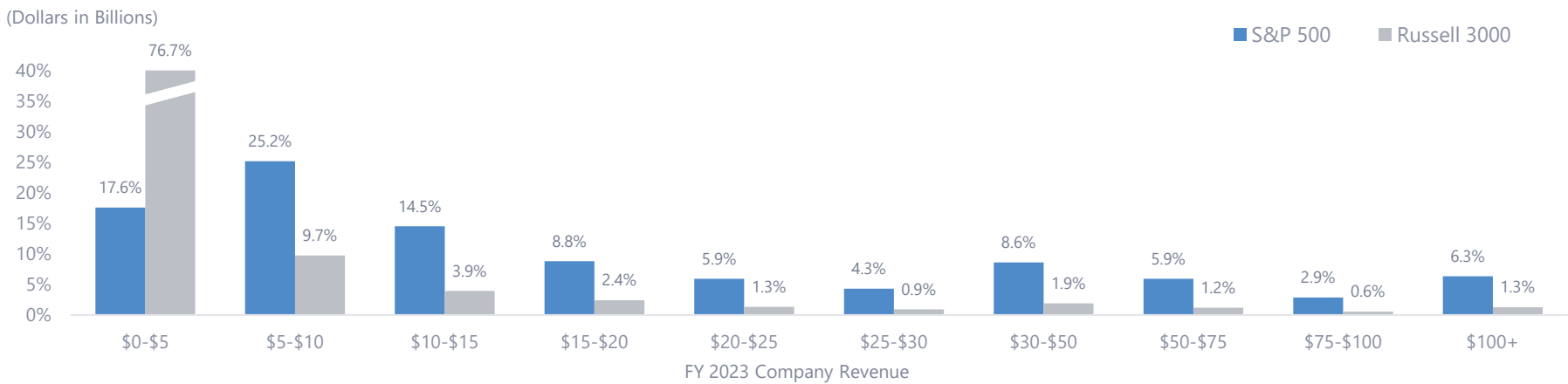
02 RESULTS

Company Size

Company Size

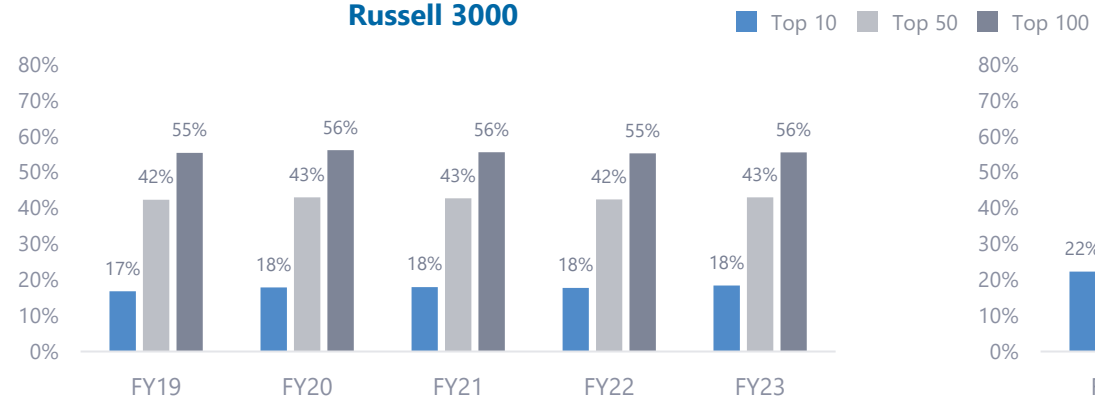
Company Revenue Breakdown by Index

- The S&P 500 has more stringent listing requirements than the Russell 3000, including a market capitalization requirement of ~\$16 billion vs. \$30 million. The average company in the S&P 500 had FY 2023 revenue of \$32.2 billion, compared to \$7.6 billion for the Russell 3000.

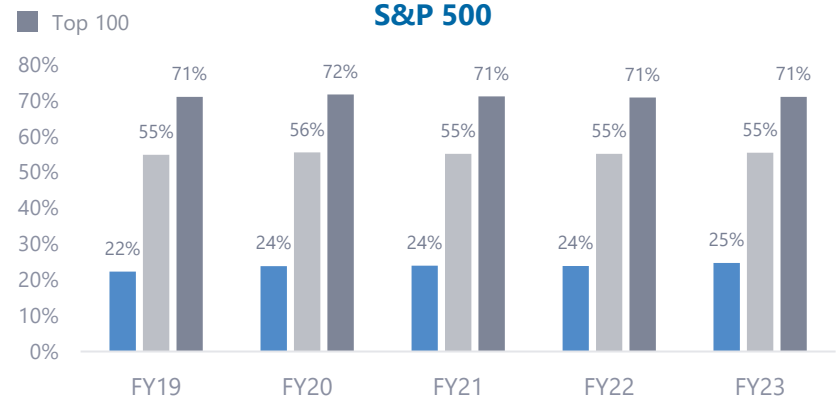


- In FY 2023, the **top 10** largest companies accounted for **18%** of total revenue in the Russell 3000 and **25%** of the S&P 500, while only making up **0.3%** and **2.0%** of the total number of companies. The top 50 companies by revenue made up 43% and 55% of total revenues, and the top 100 made up 56% and 71% of total revenues for the two indices. These percentages have remained flat over time.

Russell 3000



S&P 500



Source: S&P Global.

Company Size

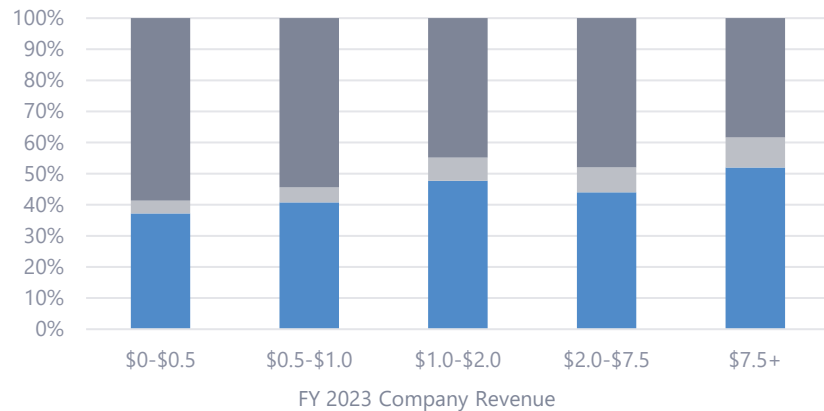
Revenue

Russell 3000

Above In-Line Below

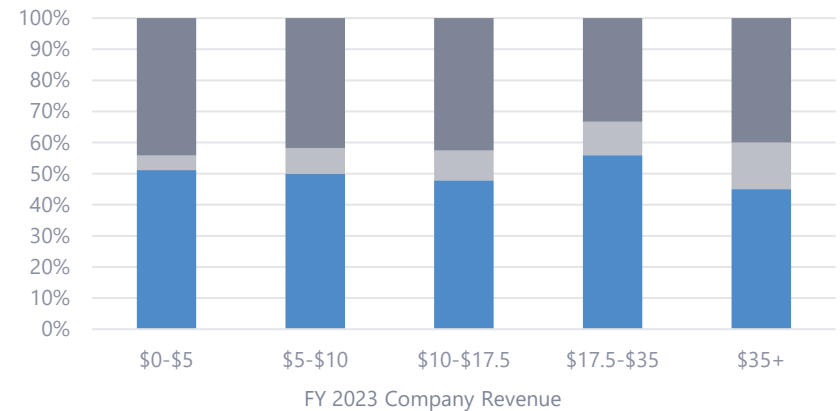
(Dollars in Billions)

Revenue Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



S&P 500

Revenue Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



- For the Russell 3000, as company revenue size increases, the percentage of companies with FY 2023 actuals falling above and in-line with 1-year analyst estimates increases, suggesting that analysts are less likely to overestimate a company's revenue as the company grows.
- For the S&P 500, as company revenue size increases, only the percentage of companies with FY 2023 actuals falling in-line with 1-year analyst estimates increases, while companies above or below analysts' estimates are unpredictable.
- As companies get larger by revenue size, the revenue % error typically gets smaller for both the Russell 3000 and S&P 500. The companies in the largest quintile of revenue size have the smallest average % error for FY 2023 with **6.0%** and **5.0%**, for the Russell 3000 and S&P 500, respectively.

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
\$0-\$0.5	17.6%	20.1%	18.5%	14.9%	20.8%
\$0.5-\$1.0	15.3%	16.7%	16.0%	12.6%	13.5%
\$1.0-\$2.0	13.5%	15.1%	15.8%	14.4%	9.5%
\$2.0-\$7.5	12.5%	13.6%	14.5%	11.1%	10.1%
\$7.5+	9.0%	9.3%	11.1%	9.0%	6.0%

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
\$0-\$5	14.6%	16.3%	18.4%	11.0%	10.7%
\$5-\$10	12.9%	13.8%	13.1%	10.2%	10.9%
\$10-\$17.5	10.7%	11.9%	11.6%	9.4%	7.4%
\$17.5-\$35	9.8%	9.1%	10.6%	9.4%	6.9%
\$35+	8.0%	8.6%	10.3%	8.4%	5.0%

Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.

(1) In-line refers to an actual being within 0.5% of estimated value.

Company Size

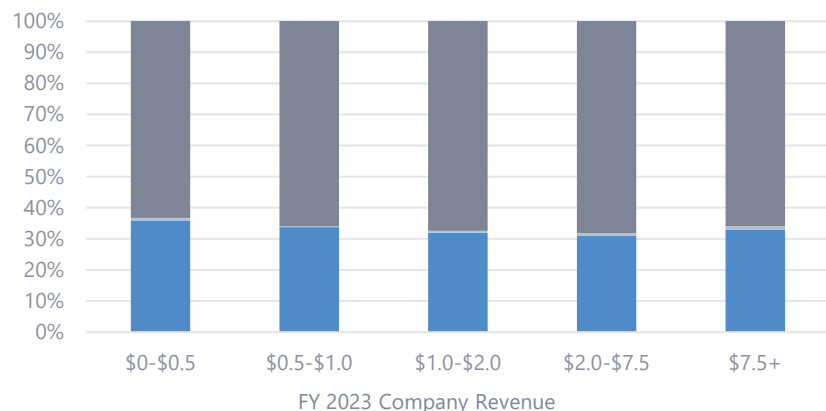
Earnings

Russell 3000

Above In-Line Below

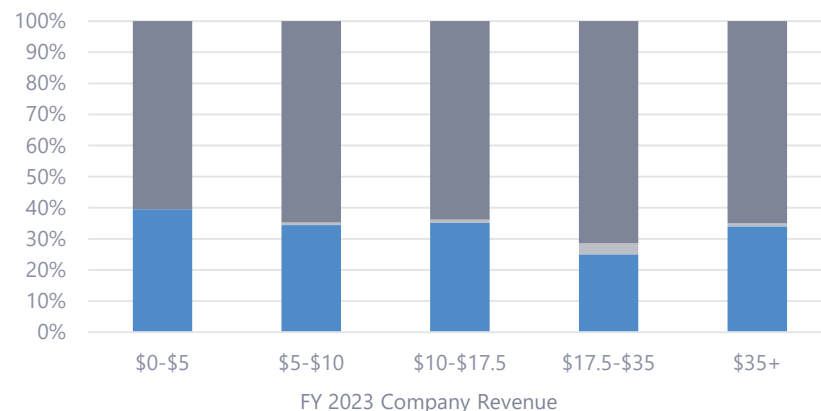
(Dollars in Billions)

Earnings Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



S&P 500

Earnings Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



- The smallest companies by revenue size in both the Russell 3000 and S&P 500 have the highest percentage of FY 2023 actuals falling above 1-year analyst estimates. Compared to revenues, earnings actuals are more likely to be below estimated values irrespective of the company size.
- Overall, 33.3% of companies in the Russell 3000 and 33.7% in the S&P 500 have FY 2023 earnings actuals above estimates.
- There is no clear impact of company revenue size on overall averages of % error for the S&P 500, while the Russell 3000 clearly indicates that larger companies have better estimate accuracy. The S&P 500 has a lower 10-year average % error across all company sizes than the Russell 3000.

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
\$0-\$0.5	123.1%	145.5%	139.4%	129.5%	166.9%
\$0.5-\$1.0	117.2%	139.9%	132.7%	115.8%	178.5%
\$1.0-\$2.0	111.6%	127.9%	95.4%	146.2%	144.2%
\$2.0-\$7.5	89.6%	102.9%	97.3%	90.2%	112.2%
\$7.5+	73.0%	81.5%	53.3%	95.3%	67.8%

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
\$0-\$5	66.3%	65.0%	41.7%	62.4%	71.3%
\$5-\$10	69.7%	68.6%	64.5%	49.5%	55.3%
\$10-\$17.5	65.8%	70.7%	68.1%	64.2%	64.5%
\$17.5-\$35	61.6%	66.9%	54.6%	42.5%	64.8%
\$35+	70.9%	81.5%	44.3%	117.2%	60.7%

Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.

(1) In-line refers to an actual being within 0.5% of estimated value.

Company Size

Summary

Findings

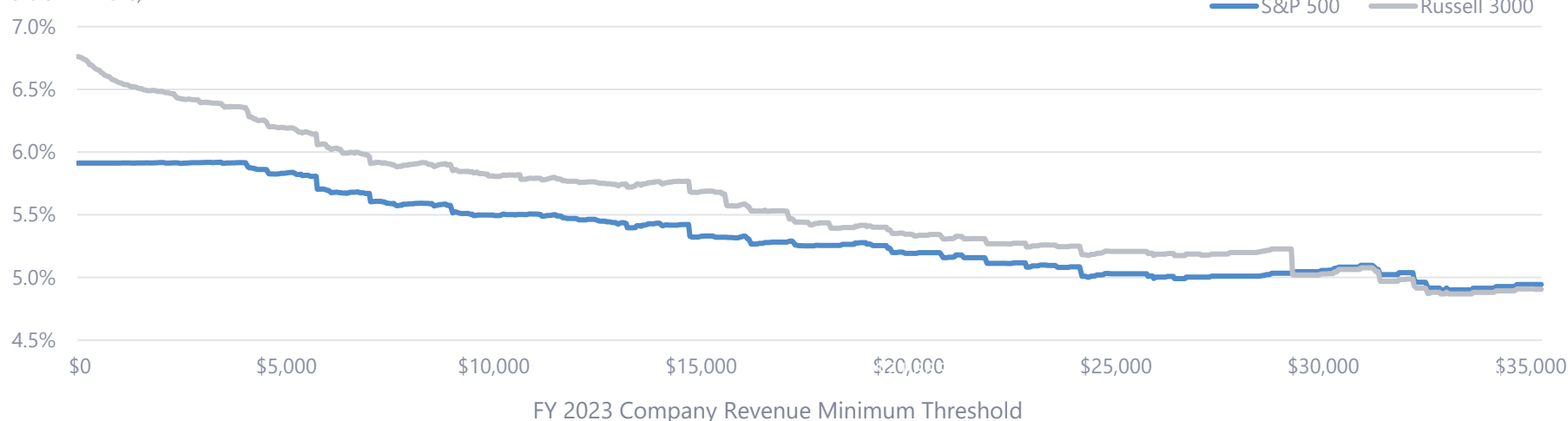
More Data Results in More Accurate Estimates

- As company size increases, revenue % error decreases for both the Russell 3000 and the S&P 500.
- The average earnings % errors over the past 8 years for the Russell 3000 1-, 2-, and 3-year estimates all decrease as the company revenue size increases, while this is not the case for the S&P 500.⁽¹⁾
- As shown below, for both the Russell 3000 and the S&P 500, the weighted average % error for FY 2023 revenue decreases as the minimum value of FY 2023 revenue of companies included in the analysis increases. This suggests analysts' estimates of companies with higher revenues are more accurate.

	8-Year Average % Error		
	1-Year	2-Year	3-Year
Russell 3000			
Revenue	14.35%	22.41%	33.67%
Earnings	111.70%	124.53%	161.51%
Relative Error	7.8x	5.6x	4.8x
S&P 500			
Revenue	11.62%	17.64%	21.87%
Earnings	70.32%	79.40%	89.07%
Relative Error	6.1x	4.5x	4.1x

Average Revenue % Error vs. FY 2023 Company Revenue Minimum Threshold

(Dollars in Billions)



(1) Refer to pages 38 and 39 for additional % error breakdown in the Appendix.

The background is a dark blue and black abstract composition. It features several overlapping elements: a red candlestick chart on the left, a red line graph at the bottom, and various glowing binary digits (0s and 1s) in shades of cyan and blue. Dashed white lines, including a prominent diagonal one, crisscross the background. A solid blue rectangular box is positioned in the upper right quadrant, containing the page number and title.

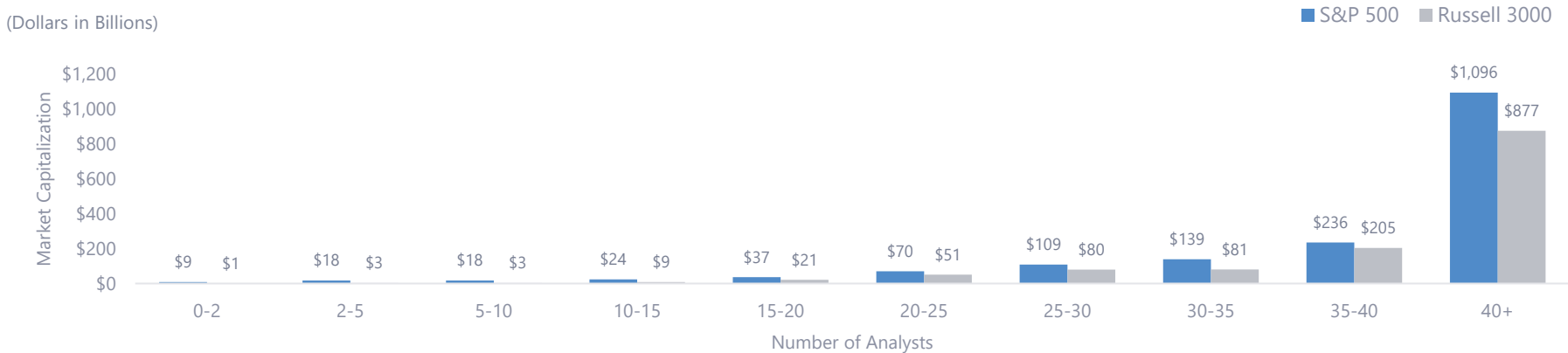
02 RESULTS

Number of Analysts

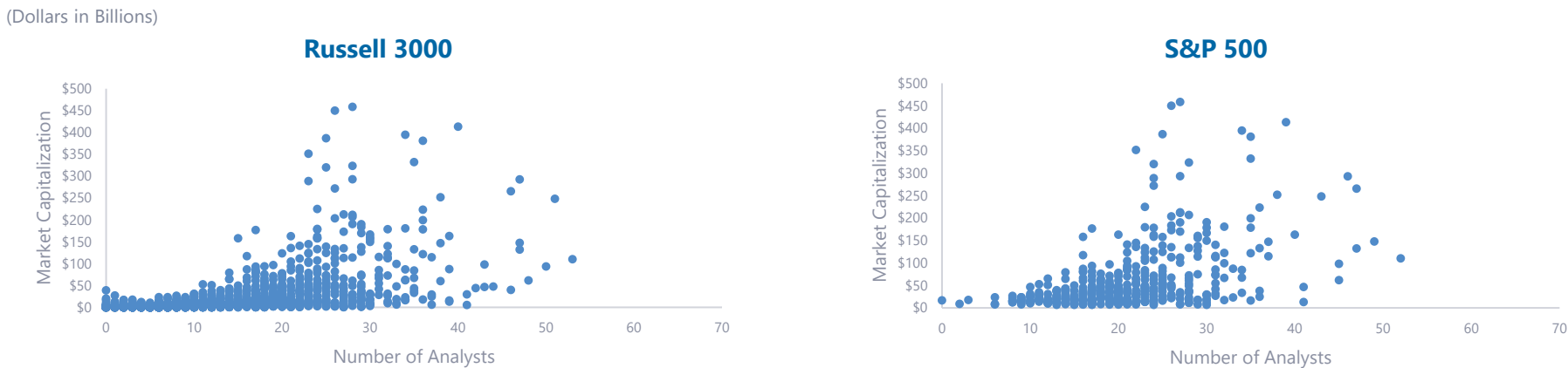
Number of Analysts

Company Analyst Coverage Breakdown by Index

- Several factors contribute to the companies a Wall Street analyst firm decides to cover. These include institutional interest, liquidity, prominent industry players, depth of the relationship with the firm, perceived valuation, and the future upside potential. Typically, analysts tend to follow companies with larger market capitalizations.



- ~50% of companies in the Russell 3000 have between 5 and 15 analysts covering their performance, whereas ~50% of companies in the S&P 500 have between 12 and 22 analysts. The number of unique analysts who cover the companies in both the Russell 3000 and the S&P 500 typically **increases** as total market capitalization increases.



Source: Investopedia.

Number of Analysts

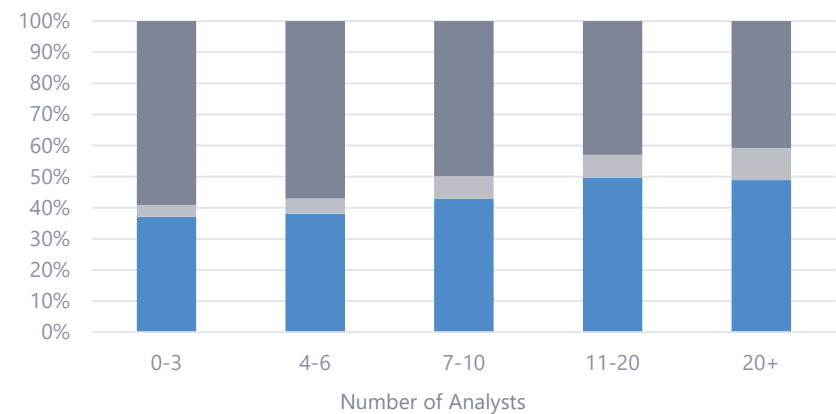
Revenue

Russell 3000

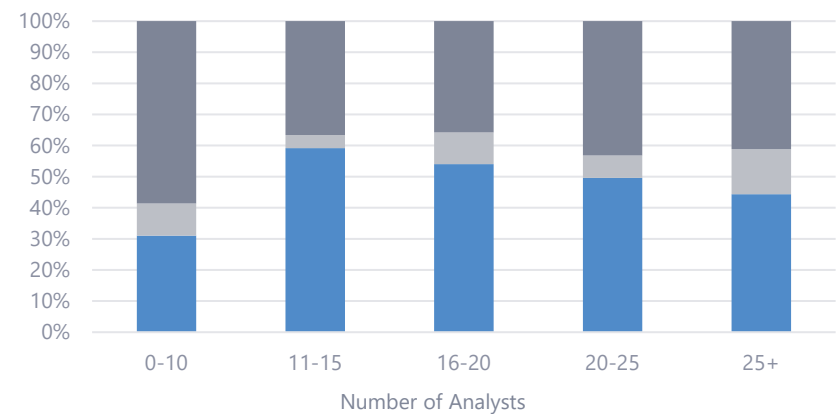


S&P 500

Revenue Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



Revenue Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



- For the Russell 3000, as the number of analysts covering a company increases, the percentage of companies with FY 2023 revenue actuals falling in-line with 1-year analyst estimates increases, suggesting more estimates lead to more accurate results. Companies in the S&P 500 do not follow this trend.
- In FY 2023, for the largest number of analysts, the Russell 3000 and the S&P 500 had **10.3%** and **14.5%** of actuals fall in-line with estimates, respectively.
- As more analysts cover companies in the Russell 3000, the revenue % error typically gets smaller. In FY 2023, there was a constant decrease in % error as the number of analysts increases. For the S&P 500, there is no clear trend in FY 2023 with number of analysts and % error, but over the 10-year average, companies with the smallest number of analysts have the lowest % error, followed closely by the largest number of analysts.

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Between 0-3	15.3%	15.5%	17.8%	14.0%	10.7%
Between 4-6	10.3%	10.9%	12.7%	10.0%	10.1%
Between 7-10	10.9%	12.0%	14.9%	11.4%	7.9%
Between 11-20	10.8%	11.5%	13.4%	10.9%	6.9%
Greater Than 20	8.5%	8.8%	10.0%	8.0%	6.0%

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Between 0-10	6.3%	7.9%	9.1%	6.5%	6.6%
Between 11-15	10.0%	9.6%	10.0%	9.2%	7.9%
Between 16-20	11.3%	12.5%	15.4%	11.9%	5.2%
Between 21-25	11.5%	13.0%	12.1%	8.2%	8.8%
Greater Than 25	7.2%	7.1%	9.1%	7.6%	4.6%

Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.
(1) In-line refers to an actual being within 0.5% of estimated value.

Number of Analysts

Earnings

Russell 3000

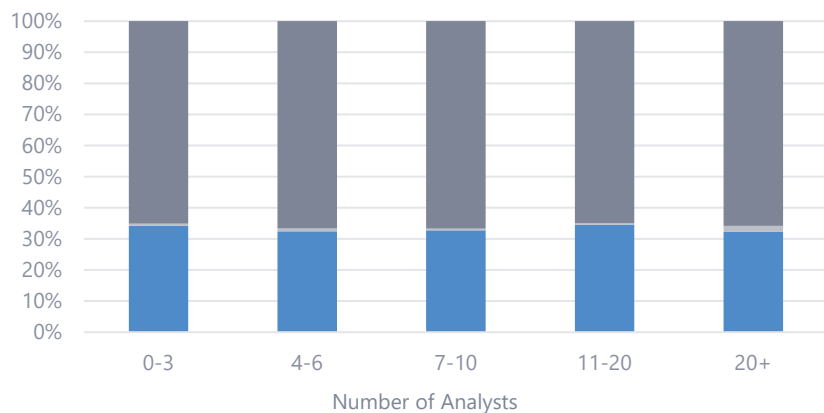
Above

In-Line

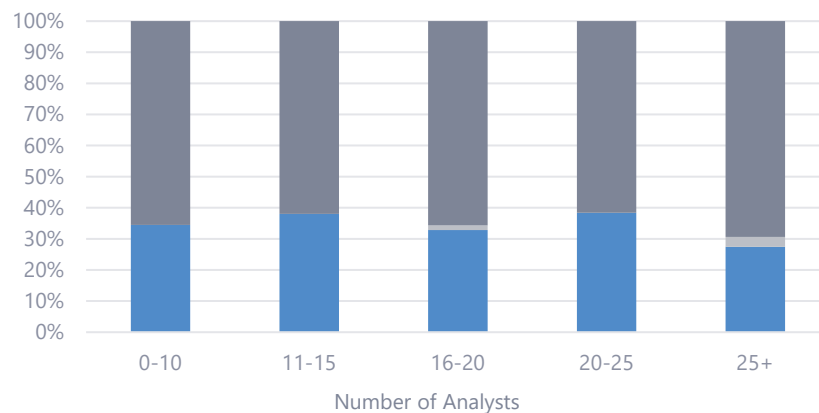
Below

S&P 500

Earnings Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



Earnings Actuals Above, In-Line With, and Below 1-Year Estimates FY 2023⁽¹⁾



- There is no clear trend between the number of analysts and the proportion of companies with FY 2023 in-line earnings actuals for the Russell 3000. For the S&P 500, the largest number of analysts has the highest proportion of actuals falling in-line with 3.2% and below with 69.4%.
- Compared to revenues, earnings actuals are more likely to be below estimated values irrespective of the number of analysts.
- While there is no comprehensive trend between number of analysts and % error, for both the Russell 3000 and the S&P 500, the companies with the largest number of analysts have the lowest 10-year average % error and the companies with the smallest number of analysts have the highest 10-year average % error.

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Between 0-3	109.0%	100.2%	82.6%	70.4%	101.9%
Between 4-6	95.9%	111.4%	109.7%	104.1%	129.2%
Between 7-10	101.9%	121.7%	99.2%	97.1%	126.0%
Between 11-20	86.5%	96.5%	74.8%	85.4%	97.4%
Greater Than 20	65.9%	73.8%	42.6%	103.0%	55.2%

1-Year Estimates % Error	10 Yr Avg	5 Yr Avg	FY 2021	FY 2022	FY 2023
Between 0-10	95.9%	95.4%	68.2%	71.5%	92.3%
Between 11-15	73.7%	89.3%	76.5%	34.1%	88.8%
Between 16-20	75.6%	85.0%	60.7%	96.2%	87.5%
Between 21-25	81.9%	87.1%	54.5%	62.8%	72.6%
Greater Than 25	57.1%	67.1%	35.6%	122.2%	41.1%

Note: % error charts are colored by quintiles, with darker shades representing lower % error quintiles.

(1) In-line refers to an actual being within 0.5% of estimated value.



Number of Analysts

Summary

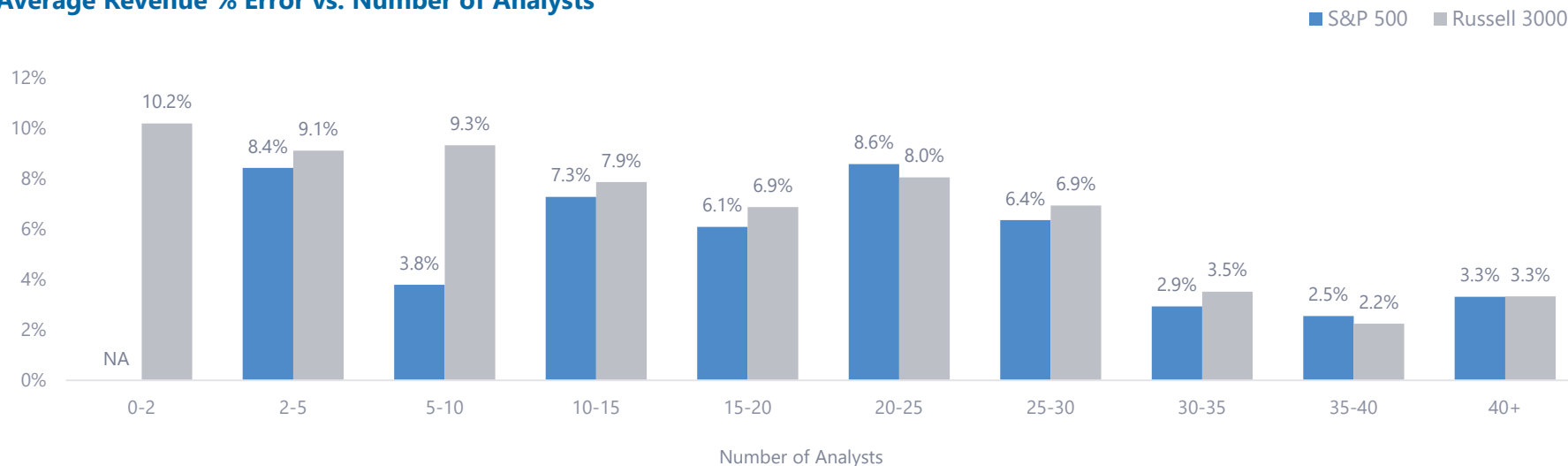
Findings

More Analyst Coverage Leads to More Accurate Consensus Estimates

- As the number of analysts providing estimates increases, % error generally decreases for both revenue and earnings for companies in the Russell 3000, but not the S&P 500.
- For the S&P 500, the largest number of analysts has the highest percentage of companies with actuals in-line with estimates.
- For both the Russell 3000 and the S&P 500, the largest number of analysts bucket has the most accurate % error for FY 2023 for both revenue and earnings.

	8-Year Average % Error		
	1-Year	2-Year	3-Year
Russell 3000			
Revenue	12.81%	18.96%	25.66%
Earnings	109.17%	119.06%	134.75%
Relative Error	8.5x	6.3x	5.3x
S&P 500			
Revenue	9.38%	14.36%	17.63%
Earnings	79.10%	87.94%	90.92%
Relative Error	8.4x	6.1x	5.2x

Average Revenue % Error vs. Number of Analysts



(1) Refer to pages 40 and 41 for additional % error breakdown in the Appendix.

The background of the slide is a dark blue and black abstract composition. It features several overlapping elements: a red candlestick chart on the left side, a blue line graph with a dashed red trendline extending from the bottom left towards the center, and various glowing binary digits (0s and 1s) in light blue and white scattered across the right side. A bright orange light source is visible in the top left corner, creating a lens flare effect.

02 RESULTS

Estimates vs. Historical Data

Estimates vs. Historical Data

Overall Data

Comparison of % Error

- The compound annual growth rate (CAGR) is the annualized average growth rate of an investment over a specified period assuming returns are reinvested. The CAGR represents a smoothed return, ignoring any volatile years between the initial and final values.
- Analysts sometimes use a CAGR prediction model, which applies a historical CAGR to the present year's value to estimate next year's value. See below for various time horizons of historical CAGRs applied to FY 2022 actuals to predict FY 2023 values. Generally, the more years included in the CAGR formula, the better the overall prediction accuracy.
- Comparing weighted average % error derived from analyst estimates to the weighted average % error from various historical CAGR models for the Russell 3000 and the S&P 500 shows that 1-year and 2-year analyst forecasts are superior to CAGR models of all time frames for revenue, but earnings analyst estimates fall short of CAGR models.

	FY 2023 CAGR Model Estimate				FY 2023 Analyst Estimates		
	8-Year	5-Year	3-Year	1-Year	+1 Year	+2 Years	+3 Years
Russell 3000							
Revenue	13.68%	16.61%	19.74%	23.50%	7.33%	12.49%	14.76%
Earnings	84.51%	93.76%	96.17%	127.98%	130.64%	161.63%	144.95%
S&P 500							
Revenue	12.01%	14.57%	17.77%	20.01%	6.27%	10.81%	13.62%
Earnings	73.17%	80.64%	86.82%	111.48%	97.57%	118.31%	110.37%



Estimates vs. Historical Data

Market Sectors

Most Accurate of Market Sector

Most Accurate of Methodology

Russell 3000

	FY 2023 CAGR Model				FY 2023 Analyst Estimates		
	8-Year	5-Year	3-Year	1-Year	+1 Year	+2 Years	+3 Years
Revenue % Error							
Communication Services	9.8%	10.6%	11.5%	10.0%	3.7%	14.0%	12.1%
Consumer Discretionary	11.6%	12.0%	13.0%	18.7%	6.4%	10.2%	13.3%
Consumer Staples	5.1%	6.2%	7.0%	9.3%	3.0%	5.8%	11.4%
Energy	33.7%	45.6%	52.9%	93.9%	12.6%	19.2%	26.8%
Financials	11.6%	14.3%	15.6%	19.1%	11.5%	15.3%	14.9%
Healthcare	9.8%	14.8%	23.9%	11.2%	5.1%	8.4%	11.9%
Industrials	11.5%	12.0%	14.4%	16.3%	6.8%	12.0%	15.8%
Information Technology	14.8%	16.2%	18.2%	20.0%	5.0%	10.8%	13.3%
Materials	17.0%	24.1%	28.7%	27.9%	8.7%	12.7%	15.4%
Real Estate	17.6%	33.5%	35.2%	38.5%	9.2%	22.1%	27.1%
Utilities	12.7%	15.6%	19.3%	24.1%	9.0%	13.5%	12.4%
Earnings % Error							
Communication Services	46.9%	46.4%	44.6%	68.1%	56.6%	77.8%	78.9%
Consumer Discretionary	70.7%	53.0%	58.5%	69.6%	49.7%	66.9%	68.1%
Consumer Staples	71.5%	77.4%	83.4%	102.1%	65.6%	74.5%	69.4%
Energy	75.6%	88.6%	134.4%	422.9%	59.3%	52.4%	71.5%
Financials	55.3%	57.6%	64.1%	63.5%	88.8%	105.6%	52.8%
Healthcare	92.6%	91.6%	89.3%	39.2%	94.5%	106.1%	97.7%
Industrials	68.6%	79.6%	91.2%	87.7%	93.0%	113.3%	103.4%
Information Technology	51.6%	62.6%	67.1%	86.4%	70.1%	92.7%	98.3%
Materials	111.5%	200.0%	104.2%	145.8%	105.9%	157.9%	107.5%
Real Estate	75.8%	101.4%	99.6%	149.2%	171.4%	205.0%	173.6%
Utilities	83.8%	45.1%	60.7%	85.5%	71.8%	83.7%	98.1%

Russell 3000 Takeaways

- 1-year analyst FY 2023 revenue estimates are always more accurate than any CAGR prediction models across all market sectors.
- The 8-year CAGR prediction was the most accurate of the CAGR models across all market sectors for revenue, while there is more volatility in the leading CAGR model time frame for earnings.

S&P 500

	FY 2023 CAGR Model				FY 2023 Analyst Estimates		
	8-Year	5-Year	3-Year	1-Year	+1 Year	+2 Years	+3 Years
Revenue % Error							
Communication Services	9.1%	8.6%	8.8%	8.9%	2.5%	13.2%	11.3%
Consumer Discretionary	10.7%	10.8%	11.1%	15.5%	6.3%	8.6%	12.3%
Consumer Staples	4.7%	5.3%	6.2%	7.9%	2.8%	5.1%	9.9%
Energy	27.5%	40.3%	46.1%	81.4%	11.9%	18.0%	25.5%
Financials	8.0%	8.4%	9.2%	11.4%	8.8%	11.7%	13.6%
Healthcare	10.5%	15.9%	26.6%	11.1%	5.1%	8.1%	10.5%
Industrials	11.7%	11.8%	14.1%	15.5%	6.4%	11.3%	15.2%
Information Technology	14.9%	16.0%	17.8%	17.2%	4.4%	10.7%	12.9%
Materials	16.1%	24.6%	27.2%	28.4%	8.5%	11.5%	16.1%
Real Estate	10.0%	8.7%	9.2%	11.6%	4.7%	9.0%	17.1%
Utilities	12.9%	15.6%	19.6%	23.4%	8.0%	13.8%	12.2%
Earnings % Error							
Communication Services	35.1%	37.4%	39.3%	58.9%	42.7%	68.1%	73.7%
Consumer Discretionary	51.4%	19.4%	22.2%	37.0%	34.7%	37.8%	37.8%
Consumer Staples	61.6%	64.6%	77.9%	82.0%	50.8%	66.3%	63.1%
Energy	64.2%	78.7%	129.3%	439.8%	33.6%	42.8%	59.2%
Financials	54.0%	46.4%	58.1%	42.6%	88.8%	105.5%	53.3%
Healthcare	104.7%	100.6%	101.5%	35.3%	95.4%	106.8%	102.1%
Industrials	53.5%	60.4%	87.6%	57.6%	61.6%	79.0%	78.6%
Information Technology	55.5%	69.8%	69.5%	60.6%	43.4%	73.5%	82.9%
Materials	102.5%	238.5%	76.1%	166.2%	108.1%	160.2%	109.9%
Real Estate	68.9%	79.5%	69.1%	77.1%	56.2%	76.0%	97.1%
Utilities	85.9%	45.4%	61.5%	78.6%	74.8%	88.1%	105.0%

S&P 500 Takeaways

- 1-year analyst revenue estimates are always more accurate than the 2-year or 3-year analyst estimates and are more accurate than any CAGR prediction model in 10 of the 11 sectors.
- Some form of CAGR model prediction is more accurate than the most accurate analyst estimate for 7 of 11 sectors for earning.

Estimates vs. Historical Data

Company Size

Most Accurate of Size Bucket
Most Accurate of Methodology

Russell 3000

	FY 2023 CAGR Model				FY 2023 Analyst Estimates		
	8-Year	5-Year	3-Year	1-Year	+1 Year	+2 Years	+3 Years
Revenue % Error							
FY2023 Revenue \$0-\$0.5	16.0%	22.5%	27.9%	35.9%	20.8%	32.0%	44.5%
FY2023 Revenue \$0.5-\$1.0	18.5%	22.8%	30.0%	25.1%	13.5%	23.2%	25.4%
FY2023 Revenue \$1.0-\$2.0	16.7%	19.8%	23.9%	28.6%	9.5%	17.0%	27.6%
FY2023 Revenue \$2.0-\$7.5	13.4%	16.0%	18.8%	23.2%	10.1%	16.3%	19.3%
FY2023 Revenue \$7.5+	12.9%	16.2%	19.5%	23.2%	6.0%	10.5%	13.5%
Earnings % Error							
FY2023 Revenue \$0-\$0.5	62.2%	77.7%	84.0%	124.2%	166.9%	206.0%	207.3%
FY2023 Revenue \$0.5-\$1.0	60.8%	78.1%	98.0%	112.7%	178.5%	189.4%	218.4%
FY2023 Revenue \$1.0-\$2.0	70.8%	80.6%	98.4%	132.3%	144.2%	146.3%	146.8%
FY2023 Revenue \$2.0-\$7.5	76.6%	90.6%	90.1%	117.3%	112.2%	131.9%	113.8%
FY2023 Revenue \$7.5+	70.3%	73.9%	77.8%	108.0%	67.8%	83.8%	79.3%

Russell 3000 Takeaways

- The 1-year analyst estimates and 8-year CAGR model predictions are the most accurate for both revenue and earnings for the Russell 3000.
- The leading analyst estimates are more accurate than the leading CAGR prediction models for the 4 largest company size buckets for revenues, but only the largest company size bucket for earnings.
- The earnings analyst estimates for the 4 smallest company size buckets are significantly higher than the leading CAGR model predictions.

Findings

Estimates Are More Predictive Than Historical Growth Models

- 1-year analyst estimates are more accurate than the leading CAGR model prediction overall for both the Russell 3000 and the S&P 500 for revenue estimates, but not for earnings estimates.
- For both the Russell 3000 and the S&P 500, 1-year analyst estimates are more accurate than CAGR model predictions for the largest company size bucket for both revenue and earnings.

S&P 500

	FY 2023 CAGR Model				FY 2023 Analyst Estimates		
	8-Year	5-Year	3-Year	1-Year	+1 Year	+2 Years	+3 Years
Revenue % Error							
FY2023 Revenue \$0-\$5	11.2%	11.3%	12.5%	18.1%	10.7%	15.1%	16.9%
FY2023 Revenue \$5-\$10	10.3%	11.4%	13.2%	20.4%	10.9%	13.5%	18.4%
FY2023 Revenue \$10-\$17.5	13.1%	14.6%	16.9%	21.7%	7.4%	12.6%	18.1%
FY2023 Revenue \$17.5-\$35	15.4%	21.1%	34.0%	24.1%	6.9%	10.0%	12.8%
FY2023 Revenue \$35+	11.0%	13.4%	14.8%	18.9%	5.0%	9.8%	12.4%
Earnings % Error							
FY2023 Revenue \$0-\$5	69.8%	50.0%	73.6%	85.8%	71.3%	96.4%	110.2%
FY2023 Revenue \$5-\$10	45.6%	52.9%	55.0%	69.9%	55.3%	67.9%	75.1%
FY2023 Revenue \$10-\$17.5	61.2%	65.0%	53.0%	89.1%	64.5%	79.7%	81.2%
FY2023 Revenue \$17.5-\$35	70.9%	85.5%	83.5%	80.6%	64.8%	82.7%	116.2%
FY2023 Revenue \$35+	65.3%	65.1%	75.6%	102.4%	60.7%	77.1%	63.8%

S&P 500 Takeaways

- 1-year analyst estimates are more accurate than 2-year and 3-year estimates for both revenue and earnings for the S&P 500.
- The leading analyst estimates are more accurate than the leading CAGR prediction models for 4 of the 5 company size buckets for revenues, but only the 2 largest company size buckets for earnings.
- 1-year analyst estimates for the S&P 500 are all more accurate than their respective % error for the Russell 3000.

The background is a complex digital composition. It features a dark blue base with various glowing elements. In the upper left, there are warm, orange and yellow light flares. Overlaid on the scene are several semi-transparent financial charts, including a candlestick chart with red and white bars and a line graph with a red trend line. Scattered throughout are glowing green and blue binary digits (0s and 1s). A prominent blue rectangular box is positioned in the upper right, containing the text '03 CONCLUSION'.

03 CONCLUSION

Conclusion

Addressing Findings

Throughout this analysis, weighted average % errors have been significantly smaller for revenue analyst estimations than for earnings estimates. This highlights how **estimates decrease in accuracy from top to bottom line**.

Similarly, as the forecast period of analyst estimates grows from 1 year forward to 5 years, the overall weighted average % error increases for both the Russell 3000 and S&P 500 indices. Therefore, **longer forecast periods result in less accurate estimates**.

By segmenting the overall datasets into smaller company size buckets by FY 2023 revenue for both indices, the larger revenue size buckets displayed more accurate analyst estimate results. This indicates that larger companies **(more data) result in more accurate estimates**.

The companies with the highest number of covering analysts have the lowest % errors for revenues, which suggests **more analyst coverage leads to more accurate consensus estimates**.

Analyst estimates are more accurate than historical growth models. Analysts use a variety of additional information in the creation of their forecasts, and therefore, their estimates predict future performance better than a company's historical CAGR model.

Potential Bias Interpretation

- Analyst estimates can be flawed for several reasons and are updated continuously to react to and reflect the impact of real-world events. This analysis focused on forward estimates for 1–5 years made at calendar year-end and therefore does not accurately show the full impact of events such as the COVID-19 pandemic in 2020 or the rising interest rates over the past several years, which lowers analyst accuracy.
- Another potential flaw in analyst estimates is the possibility of herding behavior, where analysts release estimates similar to those previously announced by other analysts, even if their information points to a different conclusion.



The background is a dark blue and black abstract composition. It features several overlapping elements: a red candlestick chart on the left, a blue line graph with a dashed red trendline, and various glowing binary digits (0s and 1s) in cyan and blue. A bright orange light source is visible in the top left corner, creating a lens flare effect. A solid blue rectangular box is positioned in the upper right quadrant, containing the text '04 APPENDIX'.

04 APPENDIX

Market Sectors

Revenue

For each fiscal year from 2016 to 2023, weighted average % error calculations are shown by market sector for 1-year, 2-year, and 3-year analyst estimates for revenue. Additionally, the 8-year average is shown, which is calculated from 2016 to 2023.

Russell 3000: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

Market Sector	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
Communication Services	8.0%	11.5%	13.1%	6.7%	14.5%	17.0%	6.5%	10.3%	16.2%	4.3%	10.2%	14.8%	12.1%	13.2%	10.9%	12.5%	15.1%	15.7%	9.7%	13.5%	14.8%	3.7%	14.0%	12.1%	7.93%	12.80%	14.34%
Consumer Discretionary	6.1%	11.7%	13.4%	6.5%	9.4%	14.2%	6.9%	10.2%	13.1%	5.4%	8.3%	13.3%	17.0%	18.7%	19.9%	8.9%	20.8%	22.0%	6.7%	13.8%	17.3%	6.4%	10.2%	13.3%	7.99%	12.88%	15.82%
Consumer Staples	3.0%	11.6%	13.4%	2.0%	5.7%	12.6%	2.3%	3.4%	5.2%	3.5%	5.2%	5.8%	4.4%	5.2%	7.3%	5.4%	8.4%	8.0%	4.3%	11.1%	9.2%	3.0%	5.8%	11.4%	3.50%	7.04%	9.12%
Energy	36.3%	96.0%	126.3%	19.9%	24.1%	85.6%	10.5%	13.9%	28.1%	20.7%	17.5%	32.1%	58.7%	87.1%	65.1%	27.5%	13.7%	24.6%	31.5%	44.5%	35.5%	12.6%	19.2%	26.8%	27.22%	39.48%	53.02%
Financials	11.2%	15.3%	20.1%	11.0%	12.2%	19.1%	8.1%	10.0%	16.7%	9.2%	10.1%	16.3%	15.3%	18.5%	23.8%	14.6%	15.0%	24.0%	7.5%	10.7%	18.2%	11.5%	15.3%	14.9%	11.04%	13.39%	19.13%
Healthcare	3.3%	11.5%	16.3%	3.4%	7.2%	13.6%	4.1%	7.4%	9.7%	4.2%	11.7%	13.2%	6.5%	9.2%	15.6%	6.8%	11.4%	12.4%	4.3%	10.6%	15.3%	5.1%	8.4%	11.9%	4.72%	9.68%	13.49%
Industrials	7.4%	19.1%	22.5%	7.3%	11.1%	21.7%	9.8%	14.1%	14.9%	11.5%	13.4%	17.9%	24.1%	31.3%	27.8%	11.8%	23.5%	30.3%	9.2%	17.5%	20.1%	6.8%	12.0%	15.8%	10.98%	17.73%	21.38%
Information Technology	8.7%	17.7%	21.3%	6.0%	13.1%	18.1%	4.8%	13.2%	15.7%	6.3%	10.1%	14.6%	6.0%	10.5%	12.0%	10.3%	13.3%	14.4%	5.2%	14.4%	18.1%	5.0%	10.8%	13.3%	6.52%	12.89%	15.96%
Materials	12.2%	33.5%	44.0%	16.7%	20.9%	45.1%	19.6%	20.3%	21.8%	24.3%	26.6%	26.4%	14.8%	39.8%	43.3%	19.3%	18.8%	32.1%	10.0%	24.9%	23.6%	8.7%	12.7%	15.4%	15.69%	24.68%	31.47%
Real Estate	9.5%	17.1%	27.4%	9.3%	15.7%	21.7%	9.5%	12.3%	20.4%	7.1%	13.5%	13.3%	22.8%	22.9%	16.6%	19.1%	23.4%	17.6%	14.8%	25.0%	22.7%	9.2%	22.1%	27.1%	12.66%	19.01%	20.84%
Utilities	15.9%	20.4%	15.6%	9.8%	17.1%	20.6%	10.5%	12.6%	22.6%	6.9%	11.8%	11.0%	18.4%	14.7%	21.7%	15.6%	17.2%	14.7%	18.1%	20.4%	15.5%	9.0%	13.5%	12.4%	13.02%	15.95%	16.77%
Weighted Average	9.2%	19.7%	25.1%	8.0%	12.1%	22.1%	7.6%	11.2%	15.4%	8.5%	11.8%	15.9%	16.2%	21.5%	22.3%	12.3%	16.5%	20.4%	8.8%	16.0%	18.6%	7.4%	12.5%	15.2%	9.76%	15.17%	19.37%

S&P 500: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

Market Sector	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
Communication Services	6.7%	9.3%	11.4%	5.2%	12.5%	14.8%	5.8%	8.8%	14.4%	3.2%	9.0%	13.1%	12.0%	11.8%	8.7%	11.6%	15.1%	14.7%	8.8%	12.1%	14.1%	2.5%	13.2%	11.3%	6.98%	11.48%	12.84%
Consumer Discretionary	6.0%	11.0%	11.7%	6.2%	8.2%	12.1%	7.1%	9.6%	12.1%	5.0%	6.9%	12.2%	18.0%	19.2%	19.8%	7.8%	21.3%	21.3%	6.6%	11.6%	18.0%	6.3%	8.6%	12.3%	7.87%	12.04%	14.94%
Consumer Staples	2.6%	11.1%	12.7%	1.6%	5.1%	12.1%	1.8%	2.9%	4.7%	2.7%	4.0%	4.8%	3.4%	4.0%	5.5%	5.1%	7.9%	6.8%	3.7%	10.1%	8.1%	2.8%	5.1%	9.9%	2.96%	6.28%	8.07%
Energy	38.6%	96.8%	121.7%	21.2%	23.8%	81.0%	8.9%	12.2%	22.4%	21.8%	17.1%	34.0%	60.3%	90.3%	65.9%	27.4%	10.4%	22.4%	29.9%	43.2%	31.9%	11.9%	18.0%	25.5%	27.51%	38.99%	50.59%
Financials	9.8%	14.4%	18.5%	7.9%	11.5%	18.1%	6.9%	8.3%	15.8%	7.5%	8.3%	12.5%	15.0%	17.9%	19.5%	12.1%	10.9%	19.9%	6.1%	9.1%	15.0%	8.8%	11.7%	13.6%	9.27%	11.50%	16.61%
Healthcare	3.1%	12.0%	17.3%	2.9%	6.8%	13.8%	3.9%	7.1%	9.6%	3.9%	12.7%	14.1%	6.3%	8.9%	16.4%	6.2%	11.1%	11.7%	4.0%	9.7%	14.8%	5.1%	8.1%	10.5%	4.42%	9.54%	13.52%
Industrials	6.8%	17.5%	20.0%	7.4%	10.2%	20.6%	10.9%	15.0%	14.4%	12.3%	13.6%	18.5%	26.1%	32.5%	28.2%	11.0%	25.0%	30.5%	8.7%	16.4%	19.6%	6.4%	11.3%	15.2%	11.20%	17.69%	20.88%
Information Technology	7.5%	15.7%	18.3%	5.2%	11.9%	16.5%	4.1%	11.5%	13.1%	5.9%	9.4%	13.5%	5.1%	8.8%	10.8%	10.2%	12.9%	13.8%	4.3%	14.6%	18.5%	4.4%	10.7%	12.9%	5.84%	11.96%	14.67%
Materials	10.1%	33.2%	39.6%	19.6%	25.3%	48.3%	26.6%	22.3%	23.6%	33.9%	35.8%	32.8%	13.9%	49.5%	56.6%	21.3%	17.6%	41.1%	10.4%	26.0%	21.9%	8.5%	11.5%	16.1%	18.04%	27.63%	35.01%
Real Estate	10.6%	17.7%	28.8%	8.9%	16.5%	23.5%	9.7%	13.4%	21.4%	5.9%	13.0%	9.6%	11.6%	11.8%	9.4%	10.4%	12.0%	7.9%	6.9%	16.0%	8.9%	4.7%	9.0%	17.1%	8.59%	13.67%	15.85%
Utilities	15.1%	19.2%	15.0%	10.3%	16.7%	19.4%	10.6%	13.0%	23.6%	6.4%	12.0%	10.8%	18.7%	14.2%	22.6%	15.3%	17.8%	14.2%	18.3%	20.1%	14.2%	8.0%	13.8%	12.2%	12.85%	15.83%	16.49%
Weighted Average	8.8%	19.2%	23.4%	7.6%	12.0%	21.5%	8.0%	10.9%	14.8%	8.8%	11.9%	15.0%	15.8%	21.2%	21.7%	11.3%	15.3%	18.9%	8.2%	15.1%	16.6%	6.2%	10.5%	13.7%	9.33%	14.53%	18.20%

Market Sectors

Earnings

For each fiscal year from 2016 to 2023, weighted average % error calculations are shown by market sector for 1-year, 2-year, and 3-year analyst estimates for earnings. Additionally, the 8-year average is shown. which is calculated from 2016 to 2023.

Russell 3000: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

Market Sector	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
Communication Services	33.0%	31.2%	53.3%	74.7%	67.6%	70.4%	27.7%	35.7%	36.0%	28.4%	28.7%	31.8%	130.0%	138.2%	114.2%	47.2%	75.2%	77.5%	90.8%	101.6%	123.7%	56.6%	77.8%	78.9%	61.03%	69.50%	73.23%
Consumer Discretionary	33.6%	37.2%	43.3%	69.8%	80.2%	81.1%	58.3%	64.3%	70.4%	45.8%	58.8%	48.6%	112.1%	118.0%	127.9%	60.9%	87.4%	83.1%	271.4%	314.4%	330.5%	49.7%	66.9%	68.1%	87.69%	103.42%	106.63%
Consumer Staples	18.8%	32.1%	37.6%	44.3%	51.9%	44.5%	37.1%	35.7%	32.4%	79.3%	83.5%	82.3%	128.3%	149.0%	151.6%	45.3%	55.5%	72.7%	33.6%	35.0%	38.8%	65.6%	74.5%	69.4%	56.53%	64.65%	66.16%
Energy	357.3%	198.3%	231.1%	58.2%	78.1%	163.3%	53.5%	65.7%	60.1%	136.2%	104.6%	145.4%	220.2%	240.4%	241.0%	129.8%	134.9%	115.4%	64.7%	86.4%	66.0%	59.3%	52.4%	71.5%	134.90%	120.11%	136.72%
Financials	87.7%	99.2%	93.1%	70.5%	55.7%	74.4%	38.8%	40.5%	38.3%	40.1%	40.8%	37.4%	133.7%	153.1%	75.1%	57.8%	52.0%	54.9%	69.6%	69.9%	42.0%	88.8%	105.6%	52.8%	73.39%	77.11%	58.50%
Healthcare	49.7%	50.4%	50.7%	148.0%	154.7%	154.5%	204.7%	217.1%	248.2%	42.9%	43.2%	47.3%	88.9%	88.8%	88.2%	62.3%	64.5%	67.7%	92.5%	86.8%	87.0%	94.5%	106.1%	97.7%	97.94%	101.45%	105.16%
Industrials	50.7%	69.7%	73.2%	64.6%	74.4%	93.1%	43.7%	49.3%	56.8%	151.3%	135.3%	155.1%	138.4%	133.4%	124.0%	57.8%	114.2%	137.9%	63.4%	73.8%	105.9%	93.0%	113.3%	103.4%	82.87%	95.45%	106.19%
Information Technology	58.6%	92.9%	89.8%	103.1%	106.2%	96.1%	79.5%	83.7%	90.4%	81.4%	66.3%	55.9%	108.3%	133.9%	139.7%	49.2%	61.9%	76.0%	64.0%	72.6%	84.7%	70.1%	92.7%	98.3%	76.77%	88.77%	91.36%
Materials	92.1%	124.2%	111.3%	80.3%	108.9%	168.7%	55.4%	47.8%	65.6%	95.5%	95.4%	97.1%	108.9%	160.9%	147.0%	79.6%	64.2%	60.9%	69.9%	69.1%	64.8%	105.9%	157.9%	107.5%	85.95%	103.54%	102.86%
Real Estate	63.4%	64.8%	97.4%	46.3%	64.3%	70.0%	46.8%	54.9%	59.8%	82.9%	106.8%	75.7%	97.0%	98.0%	142.0%	70.9%	84.5%	62.5%	102.0%	100.8%	90.7%	171.4%	205.0%	173.6%	85.09%	97.39%	96.46%
Utilities	50.9%	56.5%	47.6%	69.5%	76.1%	77.5%	71.9%	52.3%	55.8%	33.9%	37.4%	36.0%	172.1%	173.6%	169.4%	53.8%	56.7%	58.4%	52.5%	56.3%	77.3%	71.8%	83.7%	98.1%	72.07%	74.09%	77.53%
Weighted Average	71.7%	75.9%	79.4%	84.2%	89.1%	101.2%	77.2%	82.1%	90.4%	73.6%	71.2%	72.1%	122.7%	133.8%	120.9%	62.0%	76.4%	80.7%	95.8%	104.1%	106.9%	85.2%	103.6%	88.8%	84.05%	92.04%	92.57%

S&P 500: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

Market Sector	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
Communication Services	28.2%	27.8%	50.9%	68.7%	67.8%	69.9%	18.8%	27.2%	26.8%	20.0%	19.3%	24.2%	121.7%	128.8%	101.9%	32.8%	62.1%	64.9%	85.1%	89.7%	119.7%	42.7%	68.1%	73.7%	52.25%	61.34%	66.49%
Consumer Discretionary	30.5%	31.7%	41.8%	65.5%	71.8%	69.3%	33.6%	33.5%	41.9%	22.9%	31.7%	25.2%	94.8%	98.0%	117.1%	45.1%	60.2%	51.4%	367.4%	415.0%	394.5%	34.7%	37.8%	37.8%	86.81%	97.47%	97.36%
Consumer Staples	13.9%	25.6%	34.1%	42.0%	49.4%	40.9%	28.4%	30.2%	27.4%	74.9%	75.3%	75.9%	121.5%	146.3%	143.7%	24.6%	36.5%	42.4%	25.9%	25.0%	26.3%	50.8%	66.3%	63.1%	47.73%	56.84%	56.73%
Energy	374.9%	183.3%	222.8%	48.2%	67.9%	159.6%	43.1%	50.8%	53.7%	139.9%	105.8%	140.0%	218.0%	259.2%	246.9%	115.5%	118.3%	109.3%	61.3%	81.6%	63.9%	33.6%	42.8%	59.2%	129.30%	113.70%	131.92%
Financials	93.1%	104.5%	94.9%	56.8%	56.3%	65.5%	31.2%	33.6%	22.2%	34.7%	37.8%	33.0%	139.9%	161.5%	71.6%	54.6%	44.5%	42.9%	63.5%	67.7%	23.2%	88.8%	105.5%	53.3%	70.31%	76.43%	50.80%
Healthcare	49.1%	48.6%	48.8%	146.7%	147.5%	155.6%	241.4%	256.5%	290.5%	29.8%	27.7%	32.4%	78.6%	81.1%	80.1%	63.0%	65.7%	69.2%	94.6%	90.5%	92.9%	95.4%	106.8%	102.1%	99.82%	103.05%	108.96%
Industrials	37.2%	51.8%	56.3%	64.7%	73.3%	95.7%	32.1%	37.5%	45.8%	171.7%	147.1%	165.6%	108.8%	123.5%	116.4%	43.8%	117.1%	144.1%	36.2%	46.8%	91.7%	61.6%	79.0%	78.6%	69.50%	84.52%	99.29%
Information Technology	48.3%	85.7%	82.8%	89.5%	92.4%	89.6%	67.0%	68.1%	72.8%	38.7%	39.7%	43.4%	102.2%	118.7%	117.4%	29.8%	36.6%	38.8%	54.1%	65.2%	81.4%	43.4%	73.5%	82.9%	59.14%	72.48%	76.13%
Materials	78.2%	88.3%	82.2%	68.3%	91.8%	145.8%	38.3%	36.2%	47.2%	67.9%	68.4%	95.8%	98.2%	142.8%	143.6%	58.2%	54.4%	64.4%	53.7%	67.0%	54.2%	108.1%	160.2%	109.9%	71.37%	88.64%	92.88%
Real Estate	47.3%	59.4%	86.4%	32.7%	48.3%	62.8%	28.1%	41.7%	48.1%	98.0%	123.1%	25.2%	67.1%	67.9%	133.0%	46.3%	58.3%	33.8%	46.8%	64.1%	63.6%	56.2%	76.0%	97.1%	52.81%	67.36%	68.74%
Utilities	55.1%	60.0%	49.3%	71.9%	77.1%	81.1%	79.2%	56.6%	58.6%	30.6%	32.3%	32.3%	188.1%	188.6%	184.8%	57.6%	60.4%	61.6%	54.4%	59.3%	83.3%	74.8%	88.1%	105.0%	76.44%	77.81%	82.00%
Weighted Average	64.4%	66.9%	71.1%	73.2%	79.7%	92.7%	64.9%	68.2%	74.6%	67.7%	65.3%	65.0%	115.4%	130.1%	120.1%	49.2%	65.1%	68.2%	89.9%	101.4%	103.6%	64.7%	83.0%	76.5%	73.67%	82.47%	83.98%

Company Size

Revenue

For each fiscal year from 2016 to 2023, weighted average % error calculations are shown by company size buckets for 1-year, 2-year, and 3-year analyst estimates for revenue. Additionally, the 8-year average is shown, which is calculated from 2016 to 2023.

Russell 3000: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

FY 2023 Revenue	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
\$0-\$0.5	14.2%	28.1%	48.6%	13.1%	21.4%	45.8%	15.6%	22.1%	43.0%	14.5%	20.6%	36.4%	31.6%	43.2%	67.3%	18.5%	30.9%	55.0%	14.9%	23.5%	41.4%	20.8%	32.0%	44.5%	17.90%	27.74%	47.74%
\$0.5-\$1.0	14.3%	28.9%	32.9%	10.4%	19.2%	26.0%	11.4%	17.0%	29.4%	12.9%	18.1%	26.2%	28.6%	37.1%	47.5%	16.0%	27.4%	41.6%	12.6%	21.3%	31.9%	13.5%	23.2%	25.4%	14.98%	24.01%	32.60%
\$1.0-\$2.0	11.8%	24.2%	32.3%	10.8%	18.1%	36.2%	10.9%	15.5%	24.3%	9.6%	14.5%	18.3%	26.1%	33.2%	39.0%	15.8%	28.0%	40.0%	14.4%	22.6%	29.6%	9.5%	17.0%	27.6%	13.61%	21.63%	30.91%
\$2.0-\$7.5	12.1%	23.7%	31.4%	10.6%	16.0%	28.3%	9.9%	14.9%	20.5%	10.8%	14.9%	20.0%	21.7%	27.2%	29.3%	14.5%	22.3%	26.3%	11.1%	19.3%	24.2%	10.1%	16.3%	19.3%	12.61%	19.32%	24.92%
\$7.5+	8.2%	19.5%	21.5%	6.9%	10.6%	19.5%	6.5%	9.5%	12.3%	7.6%	10.4%	13.1%	13.0%	17.8%	17.8%	11.1%	13.8%	16.2%	9.0%	16.3%	16.6%	6.0%	10.5%	13.5%	8.54%	13.53%	16.30%
Weighted Average	12.6%	25.6%	36.9%	11.0%	18.0%	34.4%	11.9%	17.1%	29.3%	11.9%	16.8%	25.9%	25.9%	34.3%	46.3%	15.8%	25.5%	38.8%	12.6%	20.9%	30.2%	13.1%	21.3%	28.1%	14.35%	22.41%	33.67%

S&P 500: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

FY 2023 Revenue	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
\$0-\$5	15.3%	21.6%	20.5%	12.1%	17.6%	22.3%	9.7%	14.2%	21.6%	9.2%	13.2%	17.3%	32.4%	37.5%	43.4%	18.4%	38.9%	46.5%	11.0%	18.7%	26.1%	10.7%	15.1%	16.9%	14.84%	22.11%	26.82%
\$5-\$10	11.7%	26.1%	32.5%	9.2%	16.8%	28.2%	12.5%	14.1%	21.4%	12.8%	16.5%	17.7%	22.1%	26.9%	27.8%	13.1%	17.7%	18.6%	10.2%	17.6%	23.9%	10.9%	13.5%	18.4%	12.80%	18.66%	23.55%
\$10-\$17.5	9.6%	21.2%	23.8%	9.3%	14.3%	23.5%	6.2%	10.3%	14.7%	11.8%	14.7%	15.0%	19.4%	30.6%	35.2%	11.6%	15.2%	26.7%	9.4%	16.7%	18.6%	7.4%	12.6%	18.1%	10.58%	16.94%	21.94%
\$17.5-\$35	11.4%	20.6%	24.9%	9.0%	13.7%	23.9%	13.5%	17.2%	21.8%	7.1%	10.1%	15.1%	11.6%	15.4%	15.7%	10.6%	17.2%	18.1%	9.4%	16.4%	16.3%	6.9%	10.0%	12.8%	9.92%	15.07%	18.58%
\$35+	6.9%	18.2%	19.5%	5.5%	8.7%	17.3%	4.7%	7.3%	8.7%	6.7%	9.4%	12.3%	12.5%	16.2%	15.5%	10.3%	12.1%	14.1%	8.4%	15.0%	15.7%	5.0%	9.8%	12.4%	7.50%	12.09%	14.43%
Weighted Average	11.9%	21.9%	24.0%	9.5%	15.0%	23.3%	9.3%	12.7%	18.1%	9.8%	13.2%	15.8%	21.9%	27.6%	30.4%	13.2%	21.3%	26.0%	9.7%	16.9%	20.3%	8.3%	12.2%	15.9%	11.62%	17.64%	21.87%

Company Size

Earnings

For each fiscal year from 2016 to 2023, weighted average % error calculations are shown by company size buckets for 1-year, 2-year, and 3-year analyst estimates for earnings. Additionally, the 8-year average is shown, which is calculated from 2016 to 2023.

Russell 3000: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

FY 2023 Revenue	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
\$0-\$0.5	104.1%	112.7%	152.6%	113.4%	124.4%	234.5%	96.9%	127.2%	246.3%	130.9%	146.3%	192.6%	160.7%	166.3%	247.6%	139.4%	145.4%	212.3%	129.5%	140.8%	234.9%	166.9%	206.0%	207.3%	130.21%	146.14%	216.02%
\$0.5-\$1.0	108.5%	119.5%	134.7%	82.8%	110.2%	128.6%	98.2%	98.8%	159.7%	115.2%	135.3%	201.8%	157.1%	197.0%	249.0%	132.7%	156.5%	234.4%	115.8%	107.6%	186.0%	178.5%	189.4%	218.4%	123.60%	139.29%	189.10%
\$1.0-\$2.0	107.8%	136.2%	169.4%	86.4%	102.1%	113.0%	83.7%	94.5%	136.6%	115.1%	131.1%	182.8%	138.5%	146.6%	133.5%	95.4%	101.6%	155.9%	146.2%	137.0%	165.2%	144.2%	146.3%	146.8%	114.67%	124.42%	150.40%
\$2.0-\$7.5	76.0%	94.4%	104.9%	88.4%	99.0%	120.9%	88.6%	90.2%	104.7%	92.8%	97.2%	90.3%	121.8%	126.2%	133.0%	97.3%	116.8%	119.4%	90.2%	107.1%	107.2%	112.2%	131.9%	113.8%	95.91%	107.83%	111.79%
\$7.5+	64.9%	62.4%	65.7%	77.7%	82.2%	94.2%	67.1%	72.6%	84.5%	67.8%	62.6%	67.2%	123.1%	136.0%	125.3%	53.3%	68.4%	75.4%	95.3%	105.5%	115.4%	67.8%	83.8%	79.3%	77.12%	84.18%	88.38%
Weighted Average	93.7%	105.7%	130.0%	95.3%	108.1%	159.9%	89.0%	103.0%	166.0%	109.5%	120.3%	152.9%	144.2%	155.5%	192.4%	109.8%	122.6%	166.4%	115.0%	121.7%	168.5%	135.6%	157.0%	156.6%	111.70%	124.53%	161.51%

S&P 500: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

FY 2023 Revenue	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
\$0-\$5	85.9%	81.5%	109.9%	70.4%	65.9%	92.5%	72.5%	77.5%	84.1%	55.4%	59.1%	72.8%	94.1%	86.8%	107.4%	41.7%	68.5%	67.7%	62.4%	63.3%	75.3%	71.3%	96.4%	110.2%	69.22%	74.87%	89.98%
\$5-\$10	72.0%	85.9%	97.8%	88.0%	108.6%	141.2%	72.7%	76.5%	66.5%	54.8%	61.1%	46.5%	119.2%	128.3%	136.7%	64.5%	67.2%	75.4%	49.5%	54.7%	59.1%	55.3%	67.9%	75.1%	71.98%	81.29%	87.29%
\$10-\$17.5	63.8%	95.7%	87.5%	47.0%	46.4%	63.0%	72.3%	78.1%	94.7%	52.5%	61.4%	71.2%	104.5%	126.6%	157.4%	68.1%	92.6%	94.8%	64.2%	72.1%	77.6%	64.5%	79.7%	81.2%	67.11%	81.58%	90.93%
\$17.5-\$35	39.9%	55.7%	71.5%	105.6%	124.4%	145.4%	49.5%	52.4%	59.9%	63.6%	62.5%	62.0%	109.0%	128.6%	133.2%	54.6%	80.3%	114.5%	42.5%	45.9%	65.1%	64.8%	82.7%	116.2%	66.17%	79.07%	95.98%
\$35+	71.5%	56.1%	59.3%	69.8%	73.1%	81.3%	68.0%	72.4%	86.4%	65.3%	57.2%	63.5%	119.9%	134.7%	111.2%	44.3%	55.3%	54.3%	117.2%	130.7%	136.0%	60.7%	77.1%	63.8%	77.07%	82.06%	81.97%
Weighted Average	72.1%	78.5%	92.0%	74.4%	80.4%	103.2%	68.9%	73.4%	79.7%	57.5%	60.2%	63.8%	107.6%	116.3%	127.0%	54.5%	72.6%	80.2%	66.4%	72.6%	81.7%	62.6%	79.7%	87.3%	70.32%	79.40%	89.07%

Number of Analysts

Revenue

For each fiscal year from 2016 to 2023, weighted average % error calculations are shown by number of covering analysts buckets for 1-year, 2-year, and 3-year analyst estimates for revenue. Additionally, the 8-year average is shown, which is calculated from 2016 to 2023.

Russell 3000: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

Number of Analysts	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
0-3	12.8%	22.9%	48.6%	19.2%	20.6%	39.4%	14.1%	18.7%	30.3%	12.9%	17.6%	26.4%	22.1%	30.5%	34.1%	17.8%	19.7%	25.2%	14.0%	23.2%	21.1%	10.7%	16.3%	21.9%	15.44%	21.19%	30.88%
4-6	8.2%	22.7%	24.0%	7.2%	10.0%	22.8%	7.0%	10.8%	23.3%	8.5%	9.1%	16.4%	13.3%	16.8%	18.8%	12.7%	14.2%	20.1%	10.0%	17.7%	22.9%	10.1%	16.3%	18.4%	9.62%	14.69%	20.84%
7-10	10.3%	20.2%	28.8%	10.4%	17.4%	26.4%	7.4%	11.5%	16.5%	9.1%	12.7%	16.7%	16.6%	22.3%	26.6%	14.9%	18.7%	21.7%	11.4%	21.9%	21.9%	7.9%	15.0%	21.0%	11.01%	17.45%	22.47%
11-20	9.9%	20.9%	21.4%	7.3%	12.3%	21.6%	8.8%	12.5%	15.9%	10.2%	13.1%	16.2%	16.2%	22.4%	22.5%	13.4%	16.4%	21.6%	10.9%	18.8%	19.2%	6.9%	12.4%	16.3%	10.45%	16.09%	19.35%
20+	8.2%	19.8%	22.5%	6.9%	10.6%	19.7%	5.8%	8.7%	11.5%	6.5%	9.7%	12.4%	13.7%	17.8%	17.6%	10.0%	14.5%	15.7%	8.0%	14.8%	16.5%	6.0%	10.3%	12.9%	8.13%	13.27%	16.10%
Weighted Average	13.3%	26.7%	42.9%	15.1%	18.9%	35.4%	11.3%	15.8%	25.1%	10.9%	14.3%	20.6%	18.2%	24.6%	27.0%	14.8%	17.6%	22.3%	11.5%	20.4%	21.4%	8.8%	14.8%	19.0%	12.81%	18.96%	25.66%

S&P 500: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

Number of Analysts	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
0-10	3.1%	8.8%	21.2%	7.2%	11.3%	23.3%	4.2%	6.0%	13.5%	6.4%	7.1%	14.2%	10.9%	13.4%	24.2%	9.1%	6.4%	10.8%	6.5%	13.8%	9.1%	6.6%	11.6%	14.0%	6.75%	9.79%	16.30%
0-10	9.8%	19.0%	12.9%	7.8%	12.0%	16.3%	11.0%	14.5%	20.5%	8.9%	13.3%	14.6%	11.8%	13.9%	19.8%	10.0%	13.7%	13.1%	9.2%	18.4%	22.7%	7.9%	10.9%	13.8%	9.54%	14.47%	16.69%
16-20	10.1%	21.3%	20.3%	7.0%	12.4%	23.0%	9.0%	11.4%	14.3%	11.5%	13.3%	17.0%	18.4%	26.1%	23.4%	15.4%	16.8%	27.7%	11.9%	18.8%	17.9%	5.2%	11.2%	15.7%	11.07%	16.40%	19.92%
21-25	8.5%	24.1%	25.7%	8.4%	10.2%	18.9%	7.7%	9.5%	12.6%	10.8%	10.7%	12.6%	24.9%	32.8%	30.5%	12.1%	19.5%	21.6%	8.2%	15.1%	17.7%	8.8%	10.7%	15.0%	11.19%	16.57%	19.32%
25+	8.1%	17.7%	20.9%	6.0%	10.4%	19.3%	4.4%	8.1%	10.6%	4.5%	9.1%	12.0%	9.6%	12.3%	13.4%	9.1%	12.0%	12.8%	7.6%	14.1%	15.2%	4.6%	9.8%	11.7%	6.73%	11.68%	14.50%
Weighted Average	8.5%	19.3%	20.7%	7.2%	11.3%	20.3%	7.4%	10.1%	14.1%	8.8%	11.2%	14.3%	16.1%	21.3%	22.2%	11.6%	14.8%	18.7%	9.2%	16.4%	17.3%	6.3%	10.6%	14.0%	9.38%	14.36%	17.63%

Number of Analysts

Earnings

For each fiscal year from 2016 to 2023, weighted average % error calculations are by number of covering analysts buckets for 1-year, 2-year, and 3-year analyst estimates for earnings. Additionally, the 8-year average is shown, which is calculated from 2016 to 2023.

Russell 3000: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

Number of Analysts	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
0-3	99.4%	107.9%	123.4%	184.1%	98.4%	182.6%	114.6%	147.3%	189.5%	106.6%	104.4%	71.6%	139.7%	166.0%	206.3%	82.6%	117.4%	107.9%	70.4%	93.2%	104.9%	101.9%	111.5%	111.1%	112.39%	118.24%	137.16%
4-6	84.7%	112.0%	113.6%	81.9%	82.7%	79.1%	94.5%	95.1%	131.3%	103.0%	113.0%	160.5%	111.1%	111.7%	110.1%	109.7%	99.3%	212.5%	104.1%	117.0%	106.6%	129.2%	150.3%	162.2%	102.27%	110.15%	134.49%
7-10	66.2%	94.1%	97.7%	118.1%	138.5%	104.2%	77.6%	94.6%	123.8%	97.0%	109.6%	105.0%	189.4%	210.4%	286.9%	99.2%	108.9%	104.7%	97.1%	110.5%	119.5%	126.0%	157.6%	148.2%	108.83%	128.02%	136.25%
11-20	77.2%	89.3%	84.6%	69.9%	78.6%	85.6%	70.3%	76.0%	98.5%	67.2%	62.9%	71.4%	157.6%	164.5%	161.3%	74.8%	95.4%	113.9%	85.4%	86.7%	99.0%	97.4%	112.5%	119.7%	87.47%	95.71%	104.25%
20+	60.8%	53.2%	63.9%	76.7%	84.5%	103.5%	66.5%	69.7%	79.0%	70.9%	66.0%	68.7%	97.2%	111.5%	100.2%	42.6%	57.6%	60.7%	103.0%	116.7%	123.4%	55.2%	70.5%	63.8%	71.63%	78.70%	82.89%
Weighted Average	104.4%	119.9%	129.5%	151.2%	114.0%	154.3%	103.6%	122.2%	158.3%	97.8%	99.3%	98.3%	149.1%	164.7%	189.3%	89.4%	104.1%	131.6%	93.6%	106.6%	112.6%	108.8%	127.9%	129.4%	109.17%	119.06%	134.75%

S&P 500: 1-Year, 2-Year, 3-Year Estimates for FY 2016 to FY 2023

Number of Analysts	FY 2016			FY 2017			FY 2018			FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			8-Year Average		
0-10	76.7%	79.6%	62.2%	142.1%	203.0%	112.2%	96.6%	114.3%	178.9%	83.1%	85.9%	89.2%	162.1%	157.6%	188.6%	68.2%	70.3%	46.0%	71.5%	74.6%	34.4%	92.3%	105.0%	75.5%	99.07%	111.28%	98.39%
0-10	53.4%	61.1%	57.0%	59.1%	56.8%	58.9%	63.4%	52.0%	73.8%	46.7%	44.5%	36.3%	200.6%	211.6%	135.9%	76.5%	83.2%	94.1%	34.1%	41.8%	58.2%	88.8%	109.0%	144.1%	77.83%	82.51%	82.29%
16-20	87.3%	99.2%	86.9%	56.6%	62.9%	78.0%	60.9%	70.8%	88.0%	42.2%	39.9%	55.3%	138.2%	153.2%	159.6%	60.7%	88.7%	100.7%	96.2%	97.6%	102.3%	87.5%	109.2%	116.1%	78.71%	90.19%	98.38%
21-25	41.2%	55.4%	55.7%	132.3%	139.9%	159.0%	123.2%	125.3%	148.4%	102.7%	86.8%	90.4%	143.1%	169.5%	172.5%	54.5%	93.0%	96.2%	62.8%	63.1%	89.6%	72.6%	87.4%	56.5%	91.54%	102.55%	108.55%
25+	70.5%	50.1%	66.2%	49.1%	56.6%	74.1%	30.6%	34.3%	33.2%	58.2%	57.0%	58.3%	78.1%	91.7%	75.9%	35.6%	38.7%	43.0%	122.2%	143.1%	139.4%	41.1%	56.6%	61.2%	60.68%	66.03%	68.92%
Weighted Average	68.2%	71.0%	68.7%	82.2%	95.3%	94.6%	73.2%	77.3%	98.3%	62.5%	58.3%	62.9%	138.3%	153.1%	142.2%	57.0%	75.2%	80.2%	82.9%	90.1%	96.3%	70.9%	88.5%	87.8%	79.10%	87.94%	90.92%

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