Calculating Equity Attribution to Understand a Fund's Performance
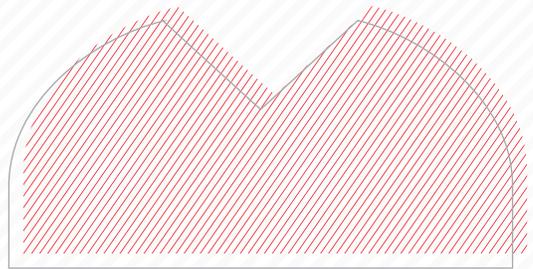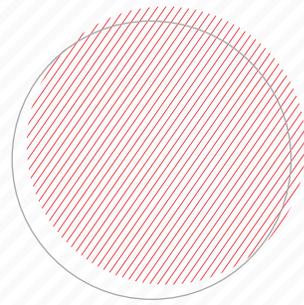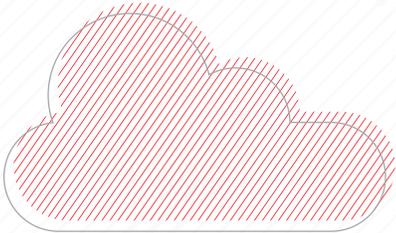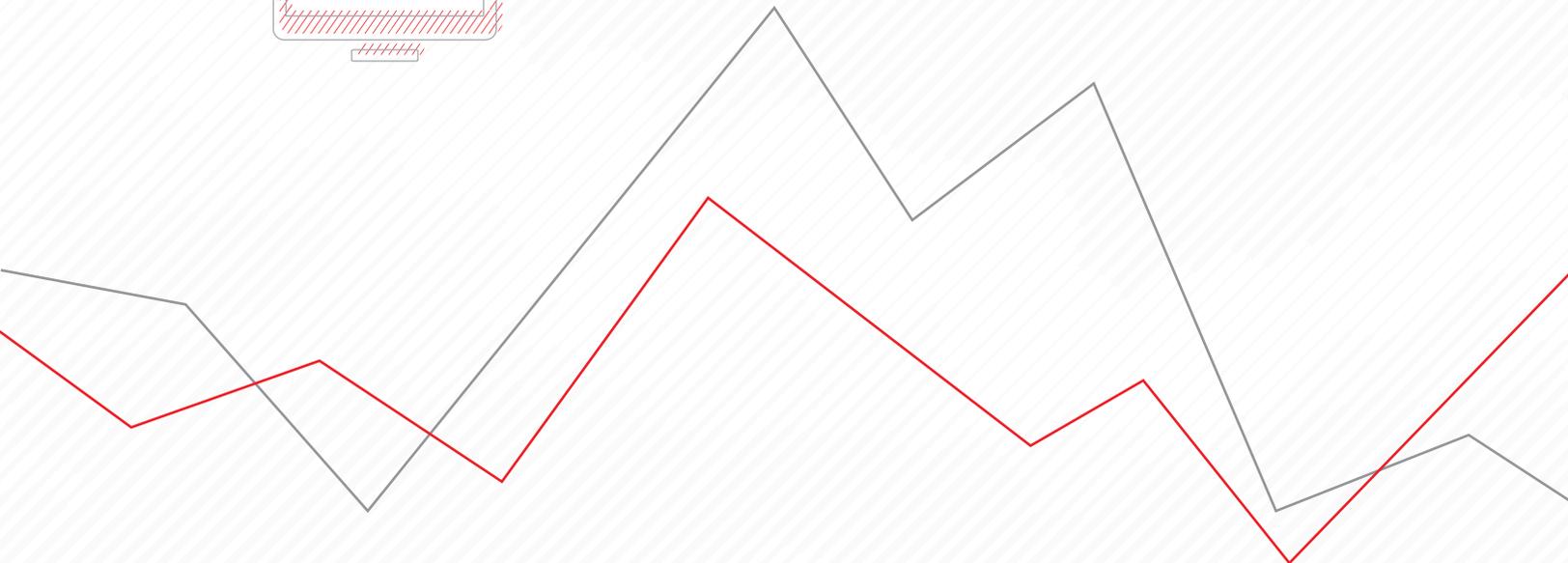
Onboarding Guide

MORNINGSTAR Direct

MORNINGSTAR

Contents

Calculating Equity Attribution to Understand a Fund's Performance

Overview

The Portfolio Analysis module in Morningstar Direct[SM] allows users to investigate a fund's portfolio by calculating single portfolio attribution of an equity fund. (This is also sometimes referred to as micro attribution.) Reviewing equity attribution for a fund involves calculating its Active Return value. Active Return is a combination of a manager's skill in stock selection and allocation of assets to a particular grouping, such as stock sectors.

☞ Note: Single portfolio fixed-income attribution is not yet available in Morningstar Direct.

Calculating equity attribution values also requires comparing a fund's holdings to those of a benchmark, which is typically an index. Therefore, users need access to the index' holdings to calculate equity attribution values. If this access is not already set up for your account in the Content Catalog in Morningstar Direct, please contact your Customer Success Manager. Alternatively, users can select a Morningstar index as the attribution benchmark (because constituent holdings are automatically available for these), or a representative ETF. To learn more about the methodology used in this calculation, login to the web-based version of Morningstar Direct, then read this methodology paper.

The following exercises are offered:

This exercise shows users the procedure for creating an on-screen equity attribution report. This involves selecting the correct investment and benchmark, and entering a name for the report to make it easy to find later. Do the following:

Exercise 1: Create a new Equity Attribution report

1. In Morningstar Direct, click the **Portfolio Analysis** module.

2. The Equity Attribution section should be expanded. Click the **Single Portfolio** folder.

3. When the tutorial window opens, click **Close**. (To see it again the next time this module is selected, click **Yes**.)

4. From the toolbar, click **New**. The New Report dialog box opens.
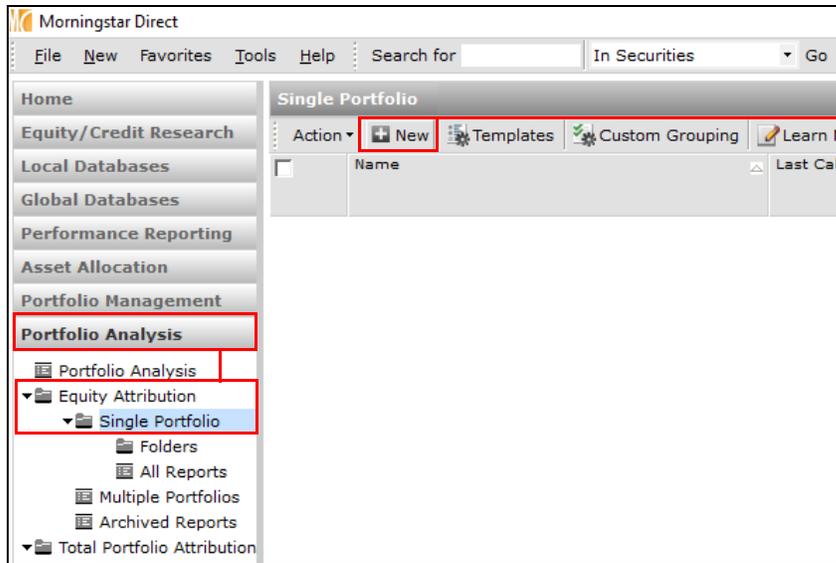
5. In the **Portfolio** field, type **POAGX**, then click the **PRIMECAP Odyssey Aggressive Growth** fund.
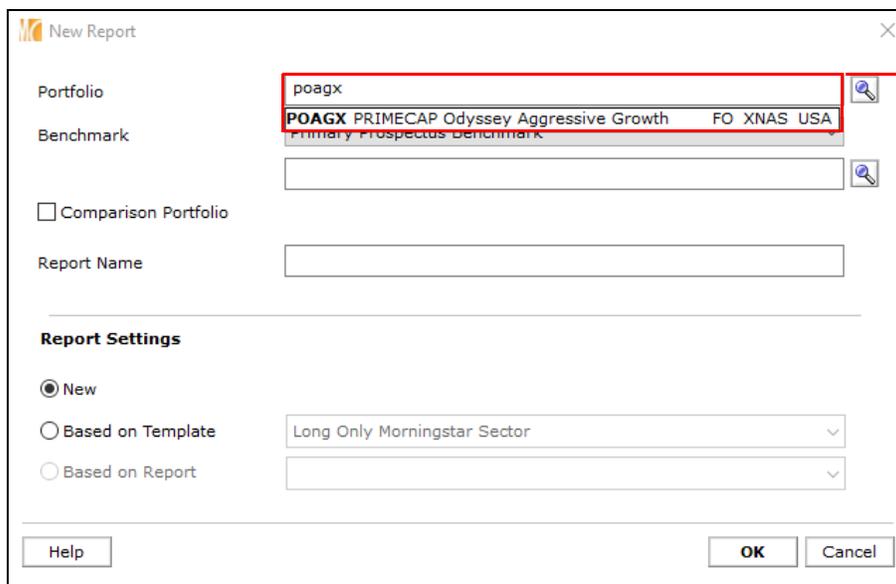
6. The Benchmark field selects the Primary Prospectus Benchmark by default, which in this instance is S&P 500 TR USD. If you do not have constituent rights to this index series, click the **Benchmark** drop-down field and select **ETF Index Proxy**.

7. In the **Report Name** field, type **PRIMECAP Odyssey Aggressive Growth Analysis**.

8. Under Report Settings, the New option should be selected. Click **OK**. The Settings dialog box opens. The Settings dialog box allows a user to decide, among other things, what time period the attribution analysis should cover, the portfolio breakdown, and the investment process.

This exercise shows users how to change certain settings on the report, including how to remove information that may not be needed for attribution analysis. This report uses an option for Two-Factor: Interaction in Selection Effect. This option focuses on one or multiple Weighting allocation decisions prior to Security Selection. The Weighting Effect is primary, then, and the Selection Effect is secondary. That is, the manager's choice to weight certain stock sectors has primacy over the decision to pick any stocks. The Interaction Effect itself is incorporated in the Selection Effect. For more information on the Investment Process, refer to this methodology paper. Do the following:

Exercise 2: Configure the settings for the report

1. Ensure the **Start Date** is set to **3 months ago**, and the **End Date** is **Last Quarter End**.

2. Set the **Display Frequency** to **Single**.

3. Ensure the **Calculation Frequency** is set to **Monthly**.

4. Confirm the **Grouping** option is set to **Morningstar Sector**.

5. Under the Calculation Options section confirm the **Investment Process** field is set to **Two-Factor: Interaction in Selection Effect**.

6. From the left navigation pane, click **View Settings**.

7. The View Settings page allows users to select each title on the left to decide what to display or hide in the report. Select **Attribution**, then **deselect** the following options in the Column Display area:

   ‣ **Rescaled Weights**, and
   ‣ **Contribution**.
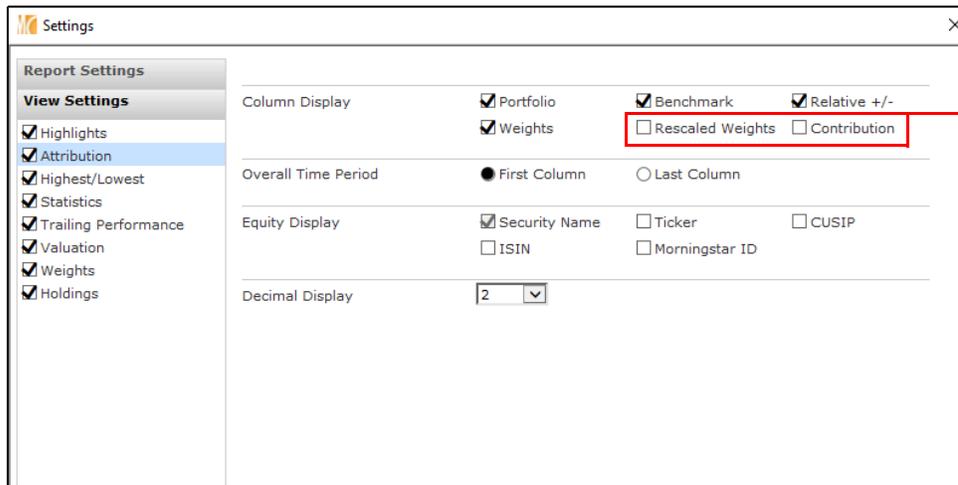
Users can select any page to the left in order to show, hide, or change values for data shown on each page of the report.

8. Click **OK**. The report calculates and opens in a new window. Once the calculation is complete, the Highlights page is automatically displayed. It shows an overall summary of the results. The pages to the left reflect the choices made on the View Settings page.

9. Look at the Attribution Total row. Is the value under the Active Return column positive or negative? How did both the Morningstar Sector Weighting % total and the Selection % total contribute to this result?

Note the summary values here.

In this exercise, two levels of data are available on the Attribution page of the report: Level 1 is the Sector breakdown, and Level 2 is the Security breakdown. Which sectors and holdings were the best and worst for this fund during this time period? This exercise shows users how to explore this page of the report to uncover this attribution information. Do the following:

Exercise 3: Evaluate the attribution report values

1. Select the **Attribution** page.

2. **Double-click** the **Active Return** column header twice to sort this column in descending order. The sector with the best Active Return (after combining both the sector and weighting columns) is at the top.

Double-click this column header twice to sort the data in the correct order.

3. Click the **arrow** to the left of the top sector to expand it. The stock in this sector contributing the best return relative to the index is shown at the top. What was its return over the past quarter? Does this stock stand out in driving the Selection Effect for this sector, or do other stocks also contribute significantly?

Click the arrow to the left of a sector's name to expand it.

4. Click the **arrow** to the left of the top sector to collapse it.

5. **Double-click** the **Active Return** column header to sort it in ascending order.

6. **Expand** the stock sector now at the top. Which holding here has the largest negative Selection Effect due to under performance? Do any stocks in this sector offer a positive return relative to the index for the time period?

When calculating Equity Attribution, it is possible to exclude a security from the report to see the effect on the Active Return value over the time period had the fund manager not invested in that security. Use the following table to compare these values for the current settings seen versus those seen after removing the worst-performing stock from the worst-performing sector in this exercise:

Exercise 4: Exclude a security from analysis

Statistic	Original Value	Value after Exclusion
Active Return Total		
Worst-Performing Sector		
Morningstar Sector Weighting %		
Selection % Effect		

To exclude an underlying position for a fund, do the following:

1. Take note of the stock sector to which the worst-performing stock belongs.

2. From the toolbar, click **Settings** > **Report Settings**. The Settings dialog box opens.
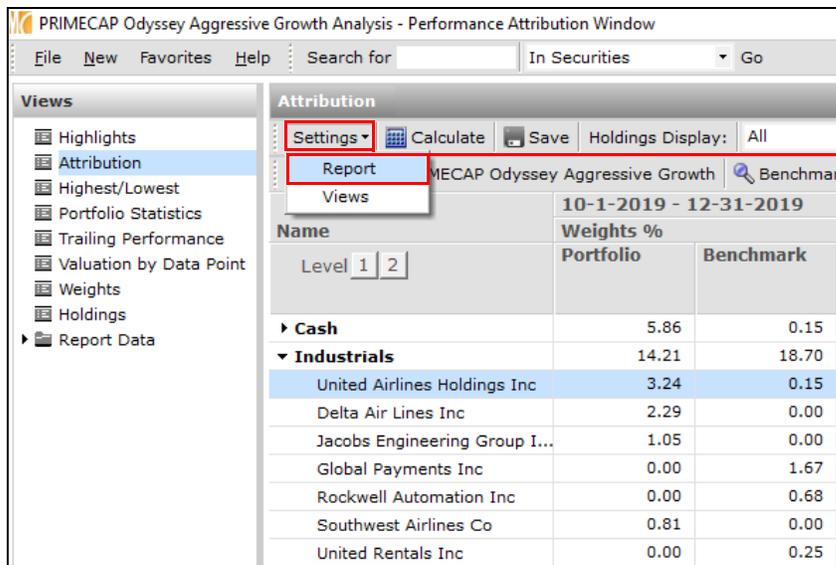
Select this option to exclude a security from the report.

3. Click the **icon** next to the **Exclusions** field. The Exclusions dialog box opens.

Click this icon to select stocks to exclude.

4. **Expand** the worst-performing sector, then select the **stock** with the worst performance noted earlier.

5. Click **Exclude**, then click **OK**.

Once a stock is excluded, it no longer appears in the Available Data area.

6. Click **OK** again to return to the attribution report, which automatically calculates.

7. Select the **Attribution** page, then fill out the Value after Exclusion column in the table on page 11 with the new data.

☞ Note: The report displays a section for any bonds or stocks missing performance, and "other" securities which are not taken into account in the Equity Attribution report. It also now includes the Excluded section, where users can see any excluded securities.

Note the new values and order of sectors with just one stock excluded.

8. To include the worst-performing stock again in the attribution report, from the toolbar, click **Settings** > **Report Settings**. The Settings dialog box opens.

9. Click the **icon** next to the **Exclusions** field. The Exclusions dialog box opens.

10. In the Select Exclusions area, select the **stock**, then click **Include**.
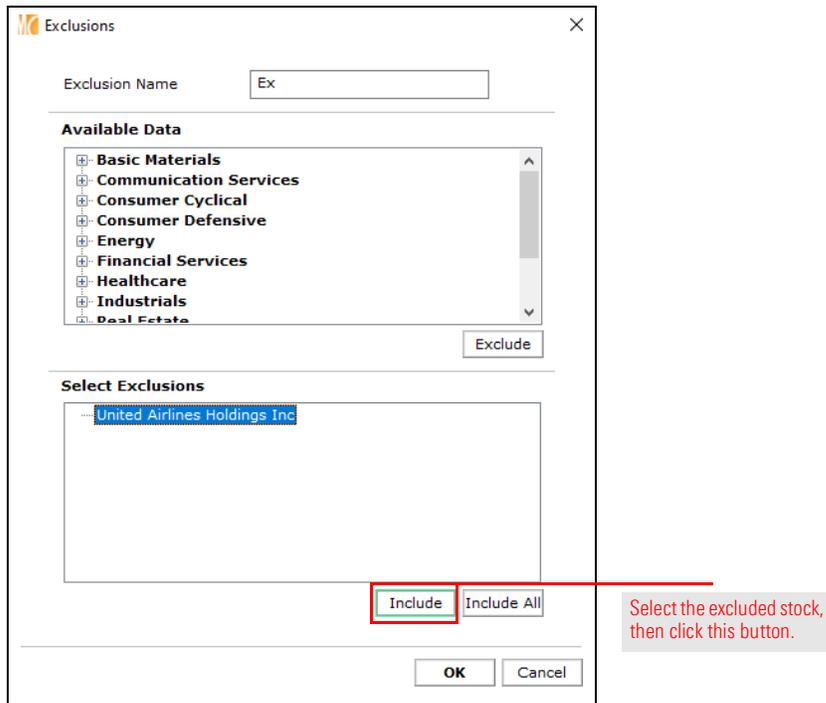
11. Click **OK** to close the dialog box, then click **OK** again to recalculate the report.

The Reported Total value seen on the report is the actual return of the investment reported to Morningstar. For a mutual fund, this is the NAV return. For an index, it is the actual return of the index. This differs from the Attribution Total which is the weighted average returns of the underlying stocks calculated using the beginning of the period weight assuming a buy-and-hold approach. In other words, the Attribution Total is a hypothetical return. This hypothetical return is gross of fees and expenses.

Exercise 5: Explore other important information on the report

Note the discrepancy that can exist between these two values.

To be consistent with how index returns are calculated, the hypothetical return currently assumes dividend reinvestment on the ex-date, when in reality some portfolios may receive dividends in cash. The hypothetical return also excludes any securities shown below the Attribution Total row.

The Residual value is the difference between the Reported Total row and the Attribution Total row after accounting for a fund's Expense Ratio. This Residual value is a standard industry term, but it can often be confused with "Interaction," which is the third factor when conducting three-factor attribution analysis.

The Highest/Lowest page displays fundamental data for those securities with the highest and lowest weights in the portfolio. Note that the information on this page is a weighted average of each stock's position, while the weights on the Attribution page are as of the end of the time period being shown on the report.

Exercise 6: Find the largest positions by weight in the fund

To see which holding had the largest average weight and determine if it had a positive or negative impact on the fund, do the following:

1. Select the **Highest/Lowest** page.

2. **Expand** the **10 Highest** section. The holdings are automatically sorted by the Portfolio Weighting % column.

Select the correct page, then note the holding at the top of this section.

3. Select the **Attribution** page. Expand the appropriate sector to find the largest stock.

   ☞ Note: If it is not apparent which stock sector the largest holding belongs to, return to the **Highest/Lowest** page, **expand** the **Highest** section, then **double-click** the **name** of the largest stock to open the Morningstar Report for that holding in a browser. **Scroll** to the bottom of the Morningstar Report to see its Sector classification.

4. Look at its **Selection % value**. Did the largest holding offer a positive or negative value for the fund?

The Portfolio Statistics page compares the overall valuation results of the portfolio to its benchmark. Both Historical and Latest Data are available. To find the median price-to-earnings ratio for the fund, do the following:

1. Select the **Portfolio Statistics** page.

2. Expand the **P/E - Daily** section.

3. Find the **Median** value for the latest portfolio, and compare it to the benchmark. Are the holdings of the fund cheaper or more expensive than those in the benchmark?

Exercise 7: Find the median price-to-earnings ratio for the fund's portfolio

The Trailing Performance page displays the performance of various time periods by the chosen grouping and security levels. To see which holding had the best performance in the quarter being examined on the report and what its weight in the portfolio is, do the following:

Exercise 8: Find the holding with the best quarter-to-date performance

1. Select the **Trailing Performance** page.

2. Click the **Level 2** button to expand all sectors.

3. **Double-click** the **Quarter-to-Date Portfolio Return %** column header to sort the column in descending order.

4. **Scroll down** to find the stock with the best return in this column, and take note of the sector to which it belongs.

5. Select the **Attribution** page.

6. **Expand** the **sector** to which the stock belongs.

7. What was the stock's **weight** in the portfolio?

The Valuation by Data Point page displays the portfolio's valuation results by the chosen grouping and security levels. Both Historical and Latest Data are available. To see which stock sector has the lowest price-to-book value, do the following:

Exercise 9: Find the sector with the lowest price-to-book value

1. Select the **Valuation by Data Point** page.

2. Click the **Level 1** button.

3. Under the P/B - Daily section, double-click the column header for the **most recent time period**.

4. Which sector had the lowest price-to-book value at the end of the time period, and which had the highest?

Calculating Equity Attribution to Understand a Fund's Performance

The Weights page compares the weights of the portfolio versus the benchmark by the chosen grouping and security levels. To easily see where the portfolio differs most from the benchmark in this regard, do the following:

1. Select the **Weights** page.

2. **Double-click** the **+/-** column header for the most recent time period twice to sort it in descending order.

Exercise 10: Find the sectors with the biggest deviations by weight from the benchmark

3. Which sector is most **overweight** for the fund compared to the benchmark (it has the highest positive number)?

4. **Expand** that sector to see its holdings.

5. **Double-click** the **Portfolio** column header for the **most recent time period** to sort the weights in descending order.

6. How many of the top 10 holdings for the fund in this sector are not even present in the benchmark's portfolio?

The Holdings page displays the shares, market value, market capitalization, and weightings broken down by the grouping and security levels. Both Historical and Latest Data are available. To find the number of shares owned of the largest stock position and its return in the current year to date, do the following:

1. Refer to for the largest stock by weight in the portfolio.

2. Select the **Holdings** page.

3. **Expand** the **sector** for the largest stock by weight.

Look for the values in the highlighted cells.

4. Find the stock, then look at the number of **Shares** owned.

5. What is its value in the **Total Ret YTD (Daily)** column?

Exercise 11: Find the number of shares owned and YTD return of the largest stock

The Report Data folder offers pages for Attribution Holdings Data, Excluded Equities, and Missing Performance. The Attribution Holdings page displays whether the data for the portfolio is using actual or inferred returns, based on when a fund last submitted a portfolio to Morningstar and the start date for the report. For example, if the start date for the equity attribution report is 09/30/2019, and the fund last submitted a portfolio on 08/31/2019, then the holdings on the report would be inferred from that date.

To see whether a report is using actual or inferred data, do the following:

1. **Expand** the **Report Data** folder.

2. Select the **Attribution Holdings Data** page.

3. Look at the **Holdings Data** column. Is the value here Actual, or Inferred?

Exercise 12: Determine whether the data on the report reflects actual or inferred holdings

Note the value of this cell.

The Equity Attribution report also offers users a ready-made PDF report, which can be used to communicate the results of an analysis.

To generate this report, do the following:

1. From the toolbar, click **Summary PDF**. The Summary PDF dialog box opens on screen.
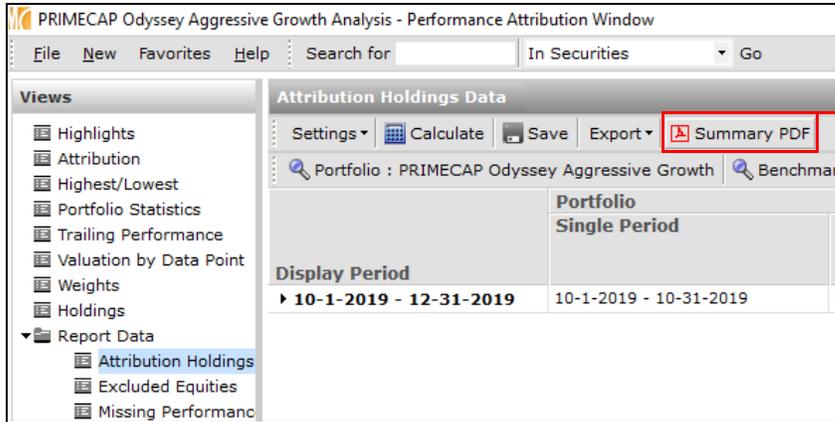
Use this icon to generate the report.

2. Select the **Include Cover Page** checkbox.

3. Change the **Report Title** to **PRIMECAP Odyssey Aggressive Growth Fund**.

4. Change the Subtitle to **Equity Attribution Analysis**.

5. Select all additional options, including **Holdings** and **Disclosure**.
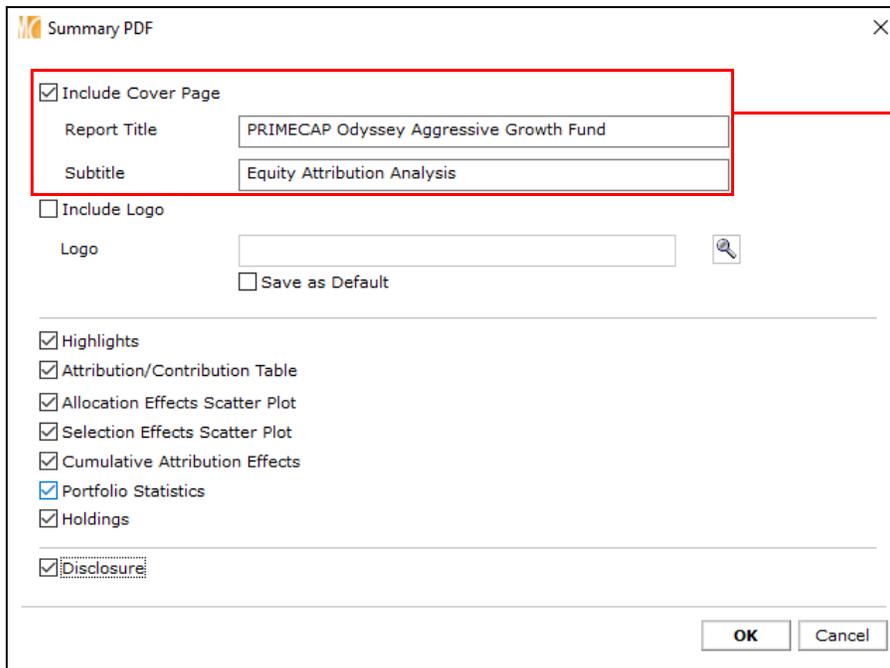
Note the values entered here.

6. Click **OK** to generate the report. The following table describes various parts of this report.

Page	Description
Highlights	
	The chart at the top of the page visualizes the portfolio weights and return relative to the benchmark, the contribution to the return, as well as the Allocation Effect, Selection Effect and Active Return over the chosen time period.
	The table at the bottom of the page displays the top five contributors and bottom five detractors, the top and bottom 15 contributing stocks, as well as the top 10 portfolio and benchmark holdings.
	☞ Note: Contribution is merely a stock's weight multiplied by its return. Unlike Attribution, it does not take into account whether a security is also held by an index.
Attribution/Contribution	
	This page provides a summary of the same data seen in the Attribution view of the Equity Attribution report in Morningstar Direct.

Page	Description
Attribution Allocation Effects	
	This page visualizes the out-performance and under-performance as well as the over-weighting and under-weighting of the selected portfolio breakdown by grouping (stock sectors, in this instance) against the benchmark. The best allocation is on sectors that out-performed and were over-weighteded (top right corner), or that were under-weighted and under-performed (bottom left corner). The worst allocation is on sectors that out-performed but were under-weighted (bottom right corner), or that under-performed and were over-weighted (top left corner).
Attribution Security Selection Effects	
	This page visualizes the same information as in the previous page, but with the top and bottom 15 stocks, rather than the grouping (sectors).
Cumulative Attribution Effects	
	This page visualizes the Allocation and Selection effects, as well as the Active Return.

Page	Description
Portfolio Statistics	

Portfolio Statistics as of 12/31/2019
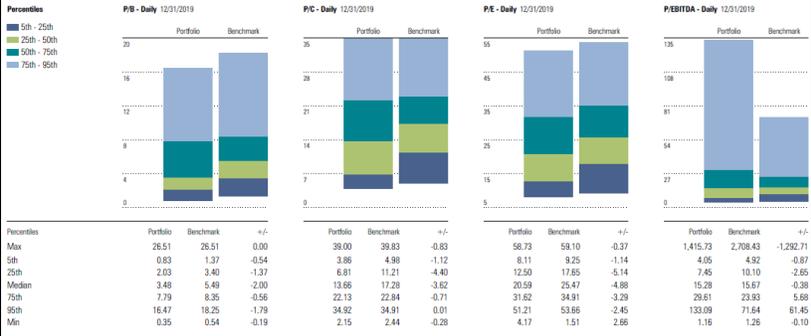
Percentiles
■ 5th - 25th
■ 25th - 50th
■ 50th - 75th
■ 75th - 95th

Percentiles	P/B - Daily Portfolio	P/B Benchmark	P/B +/-	P/C - Daily Portfolio	P/C Benchmark	P/C +/-	P/E - Daily Portfolio	P/E Benchmark	P/E +/-	P/EBITDA - Daily Portfolio	P/EBITDA Benchmark	P/EBITDA +/-
Max	26.51	26.51	0.00	39.00	39.83	-0.83	58.73	59.10	-0.37	1,415.73	2,708.43	-1,292.71
5th	0.83	1.37	-0.54	3.86	4.98	-1.12	8.11	9.25	-1.14	4.05	4.92	-0.87
25th	2.03	3.40	-1.37	6.81	11.21	-4.40	12.50	17.65	-5.14	7.45	10.10	-2.65
Median	3.48	5.49	-2.00	13.66	17.28	-3.62	20.59	25.47	-4.88	15.28	15.67	-0.38
75th	7.79	8.35	-0.56	22.13	22.84	-0.71	31.62	34.91	-3.29	29.61	23.93	5.68
95th	16.47	18.25	-1.79	34.92	34.91	0.01	51.21	53.66	-2.45	133.09	71.64	61.45
Min	0.35	0.54	-0.19	2.15	2.44	-0.28	4.17	1.51	2.66	1.16	1.26	-0.10
Asset Coverage	92.96	84.44	8.52	62.66	78.78	-16.12	53.06	74.02	-20.95	72.92	89.72	-16.79
Average	5.61	6.87	-1.26	15.80	17.85	-2.06	23.81	27.45	-3.64	43.69	34.50	9.19
Geometric Average	3.79	5.25	-1.46	12.37	15.51	-3.14	19.86	24.08	-4.21	16.47	16.35	0.12
Harmonic Average	2.52	3.86	-1.35	9.42	12.85	-3.43	16.42	20.08	-3.66	9.76	11.93	-2.17
Standard Deviation	5.19	5.17	0.02	10.36	8.62	1.74	14.24	13.21	1.03	142.84	160.82	-17.98
Weighted Average	6.69	8.64	-1.95	15.82	20.45	-4.63	21.82	31.72	-9.89	32.93	44.62	-11.69
Weighted Geometric Average	4.51	6.90	-2.40	11.64	18.82	-7.19	17.94	28.94	-10.99	16.62	20.86	-4.24
Weighted Harmonic Average	3.06	5.38	-2.32	8.41	16.67	-8.26	15.07	25.68	-10.61	10.31	16.32	-6.01
Weighted Median	3.48	5.49	-2.00	13.66	17.28	-3.62	20.59	25.47	-4.88	15.28	15.67	-0.38
Weighted Standard Deviation	5.94	5.84	0.09	11.45	7.48	3.97	14.32	12.83	1.50	77.02	201.44	-124.42

	Description
	The chart and table on this page and the next depict data for the equity holdings of the portfolio. For the chart, consider the spread of each metric for the fund compared to the benchmark, as well as the relative weighting between the quartiles. What opportunity or potential risk does this represent for the fund?