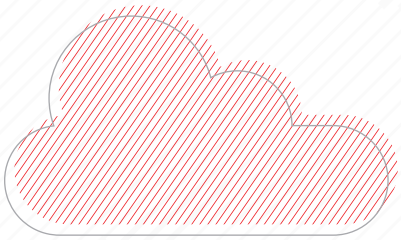
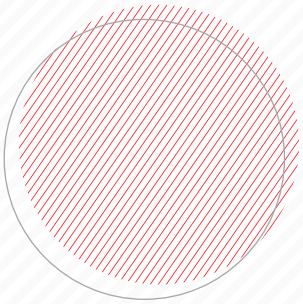
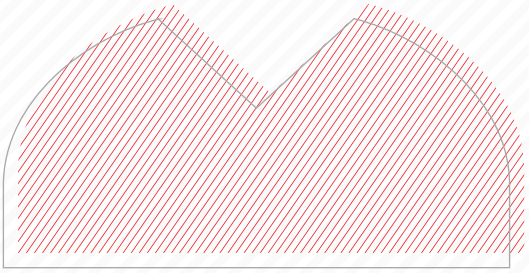
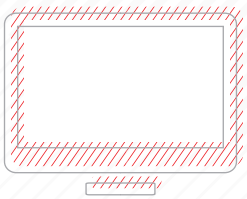
Working with the Scenario Analysis Worksheet

Morningstar Direct℠ Cloud Editions









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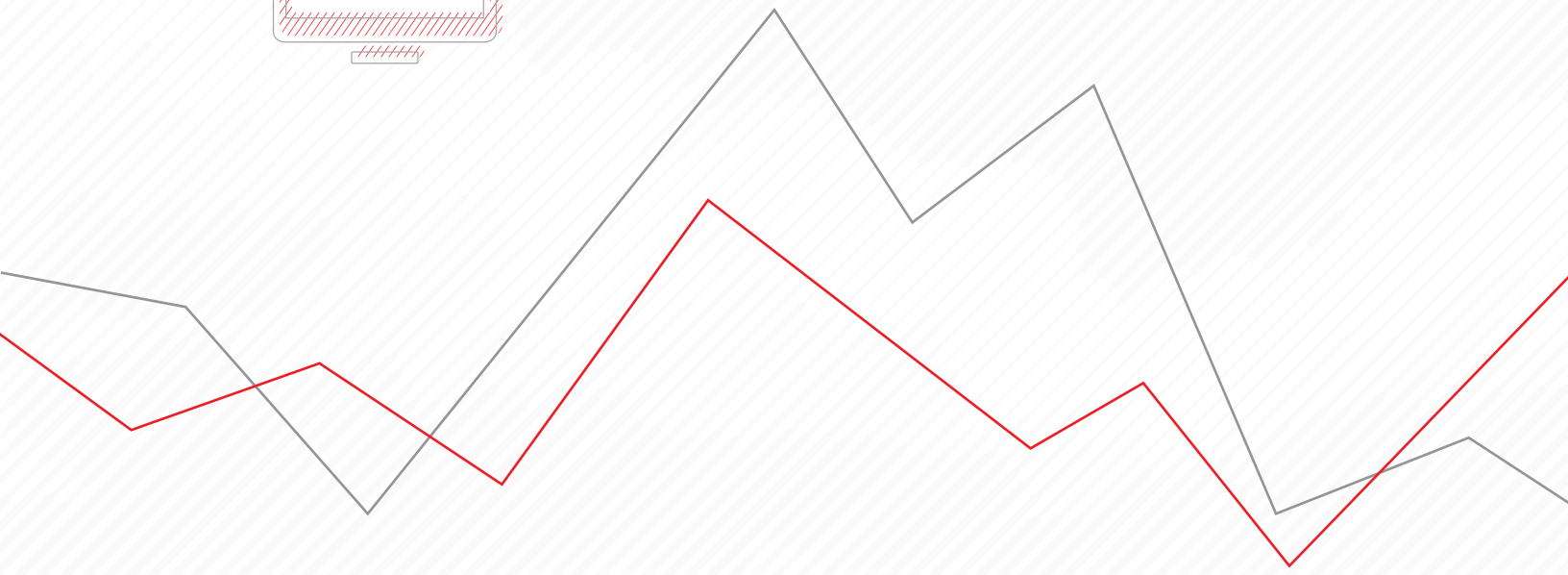


Contents

Working with the Scenario Analysis Worksheet

Overview

In either an Investment Workbook or Portfolio Workbook, the Scenario Analysis worksheet shows how one or more accounts, funds, or portfolios would perform if conditions from a past market event were to recur.

This section covers the following topics and exercises:

> ☞ Note: This exercise guide makes use of content you created in the Creating Screens guide. If you did not create the content as part of those exercises, use a list or screen you created.

What can I discover using the Scenario Analysis Worksheet?

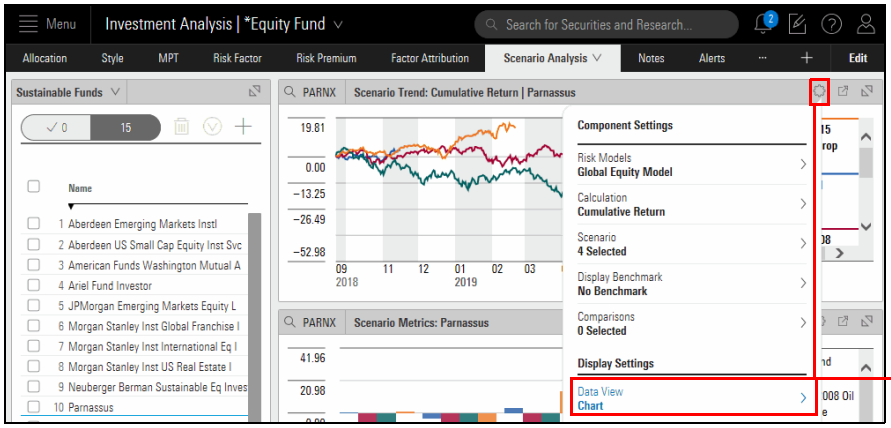
The Scenario Analysis worksheet shows how one or more accounts, funds, or portfolios would perform if conditions from a past market event were to recur. For example, in mid-2011, the U.S. Congress and the President faced off in a showdown over whether to increase the debt ceiling to continue borrowing to fund the government. The issue was resolved four months later, but the intervening dispute took a toll on equity and fixed income investments alike.

What would happen if the same risk premia were applied to a portfolio today, given its exposure to the 36 factors in the Morningstar Global Risk Model?

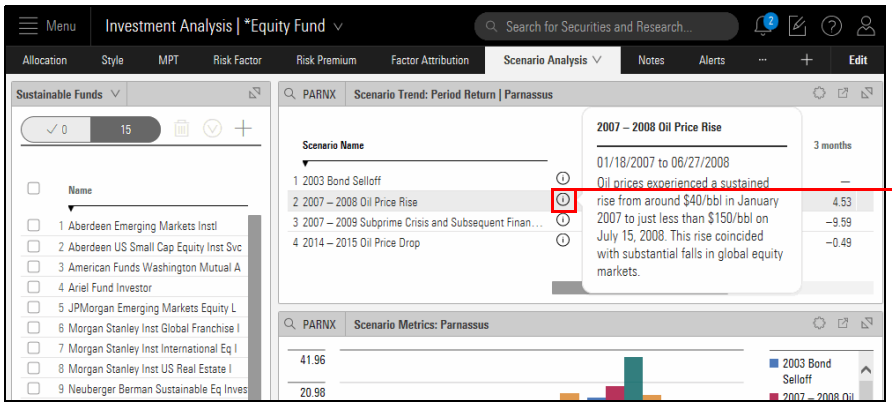
What scenarios are shown on the Scenario Analysis worksheet?

The Scenario Analysis worksheet shows four pre-defined scenarios by default, but several others are also available. Not all scenarios are shown at once, in order to make the components easier to read.

The following table describes the available pre-defined scenarios, but you can also see the description of a scenario by changing the Scenario Trend component's **Data View** setting to **Table** and **hovering the cursor** over the **information icon** for a scenario.



Start by converting this component to a table



Then hover the cursor over a scenario's information icon to see its description

Group Name	Scenario Name	Scenario Description
Global Macro	2003 Bond Selloff	In 2003, from June 12 to August 31, bond markets saw their largest sell-off since 1994. The U.S. dollar, Yen, and Euro yields all increased sharply. Ten-year U.S. Treasury yields increased from 3.11% on June 13 to over 4.40%, Japanese government bond yields rose 50 basis points, and bunds rose 70 basis points. Yields continued to rise at longer maturities until late August in Japan. Little direct impact was seen on equity markets during this time period, and the relative price of financial institutions did not move substantially as compared to the rest of the equity market.
	2007—2008 Oil Price Rise	From January 18, 2007 to June 2, 2008, oil prices experienced a sustained rise from around $40/bbl to just less than $150/bbl on July 15, 2008. This rise coincided with substantial falls in global equity markets.
	2007—2009 Subprime Crisis and subsequent Financial Crisis	This scenario follows the track of the subprime crisis and subsequent banking crisis and recession (October 2007—February 2009). In October 2007, Ben Bernanke delivered a speech suggesting that the banking system was healthy, but that the ultimate implications for financial markets were uncertain. Over the next year, approximately a million houses entered foreclosure. Credit markets froze through the successive bank failures worldwide. The S&P 500 fell 57% over this time period.
	2014—2015 Oil Price Drop	From June 2014 to January 15, 2015, the price of oil fell from around $115/bbl to below $70/bbl, after around five years of reasonably stable prices. Equity markets rose during this time.
US Focus	2006 Amaranth Hedge Fund Collapse	On September 18, 2006, the founder of the Amaranth Advisors hedge fund advised investors that the fund had lost 50% of their assets in the month-to-date, and a total of $6.6bn losses by the end of September. The fund essentially had a large losing bet on North American natural gas prices. Ultimately the collapse did not cause substantial systematic distress in financial markets as counterparties quickly stepped in to stabilize the natural gas market.
	2011 Debt Ceiling	The US Public Debt Acts impose a limit on the total borrowings of the U.S. government. In May 2011, the U.S. Congress delayed raising the debt ceiling for a time, which caused some speculation around the possibility of a default on the U.S. debt. The U.S. suffered its first credit rating downgrade from S&P on August 5, 2011, and both Moody's and Fitch moved to a negative outlook. The downgrade was associated with substantial falls in world equity market prices. But bond prices rose, and yields on 10-year Treasuries moved from 2.56% to 2.34% by the time the ceiling was raised at the end of September 2011.

Group Name	Scenario Name	Scenario Description
Emerging Markets	2004 Emerging Market Crisis	In May 2004, a substantial increase in U.S. Treasury long-term yields appeared to drive substantial increases in emerging market spreads, especially for the most risky credits. This caused large falls in many emerging market equity markets over a two-week period.
	2006 Emerging Market Selloff	In May and June 2006, emerging market equities suffered their worst decline since the 1998 Russian debt crisis, This correction occurred after strong increases in those markets in the earlier part of the year. Developed markets were less affected. The Nikkei-225 fell approximately 15%, the Eurofirst-300 just over 9%, and the S&P 500 by 6%.
European Markets	2010 Greek Crisis	In April 2010, after a series of scandals that revealed that Greek government debt statistics were unreliable, all major credit rating agencies downgraded Greek government debt to junk. On May 2, 2010, the IMF, European Commission, and European Central Bank provided an EUR 110B loan to cover repayments of Greek government debt, contingent on the implementation of austerity measures to reduce public spending and increase tax revenue. The measures triggered a general strike in Greece on May 5 and ongoing political instability. The outstanding Greek government debt was largely held by Greek and other European banks, and the crisis provoked a sell-off in European financial sector equities.

How are the scenario analysis values calculated?

The Scenario Analysis components use a fund's exposure to the 36 factors in the Morningstar Global Risk Model. In concert with the fund's constituents, the factors calculate the probable impact of past market events on a fund, should they re-occur in the future. Note the following:

- The Global Risk Model formula can be applied only to equity-based funds, and
- The Global Multi-Asset Risk Model formula can be applied to fixed-income funds and equity-based funds.

For each scenario calculation, the following inputs are used:

- a scenario generation date (for example, the current date)
- a scenario start date and end date (for example, the start and end dates of the 2003 bond sell-off event)
- a sequence of daily factor premia from the start date to the end date of the scenario, and
- the exposures for the current portfolio as of the scenario generation date.

From these inputs, a single time series of returns whose length is the time between the start date and the end date is produced, along with the following collection of time series descriptive statistics:

- returns
- standard deviation
- max drawdown
- alpha, and
- tracking error.

To calculate the time series return and other statistics, the following calculation is used:

1. Multiply the portfolio weights by the risk factor exposure matrix to produce 36 portfolio-level exposures.
2. For each day in the time series, multiply the 36 portfolio exposures by the 36 premia for that day, and total the result to calculate an expected portfolio return. Together, these construct a portfolio return series.

   ☞ Note: A return value is not calculated for weekends and global holidays (such as New Year's Day), but a return is calculated for other market holidays.

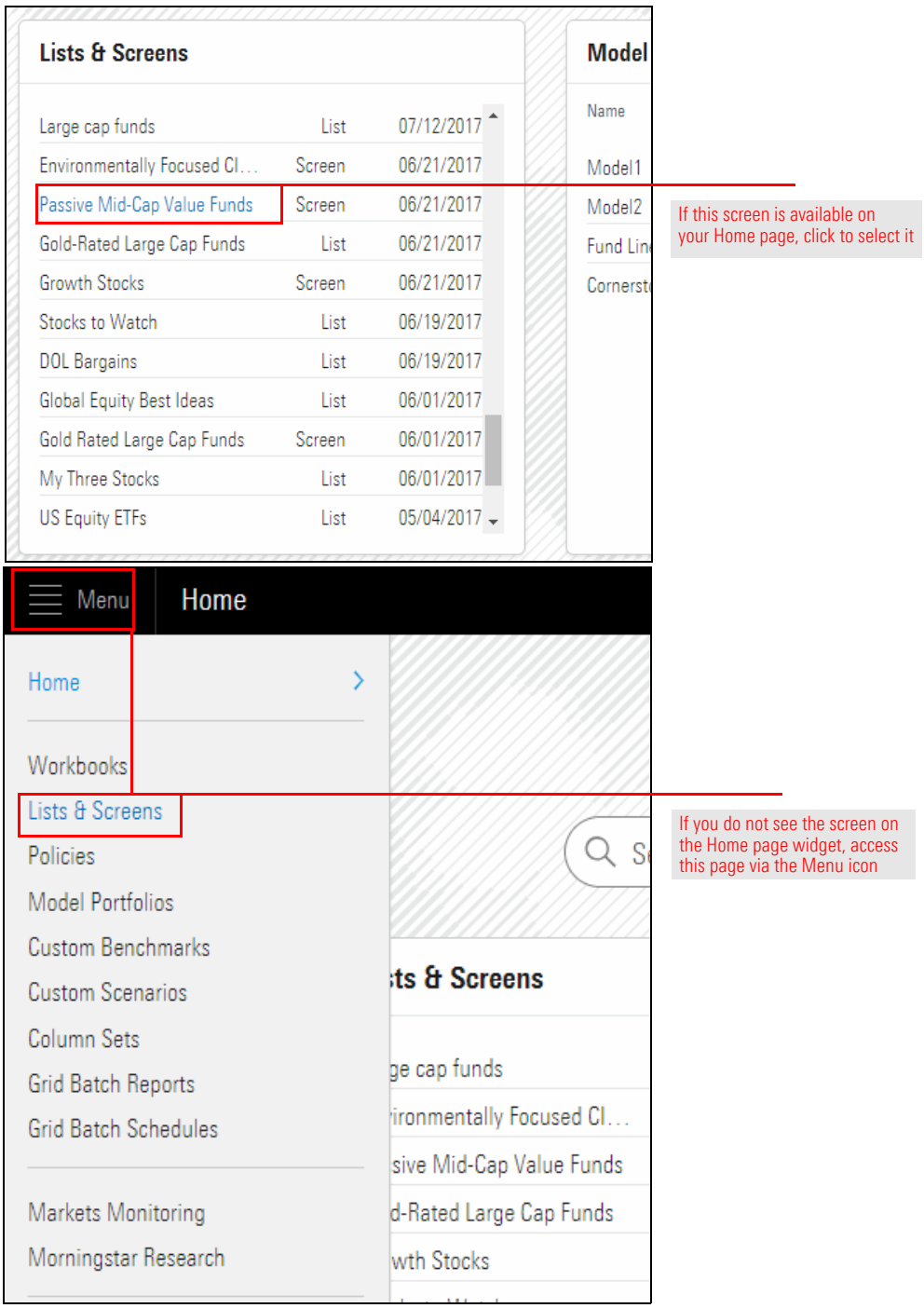
3. Calculate a variety of time series metrics (for example, max drawdown) for these various risk factor premia.

Exercise 1: Display just one scenario at a time

Although four pre-defined scenarios are depicted by default, you can isolate as many or as few as you want in the components on the Scenario Analysis worksheet. In this exercise, you will show just the 2003 Bond Selloff scenario. You will select a fund from the Passive Mid-Cap Value screen. (If you do not already have this screen, you can create it now. You can also use another list or screen containing fixed-income funds.)

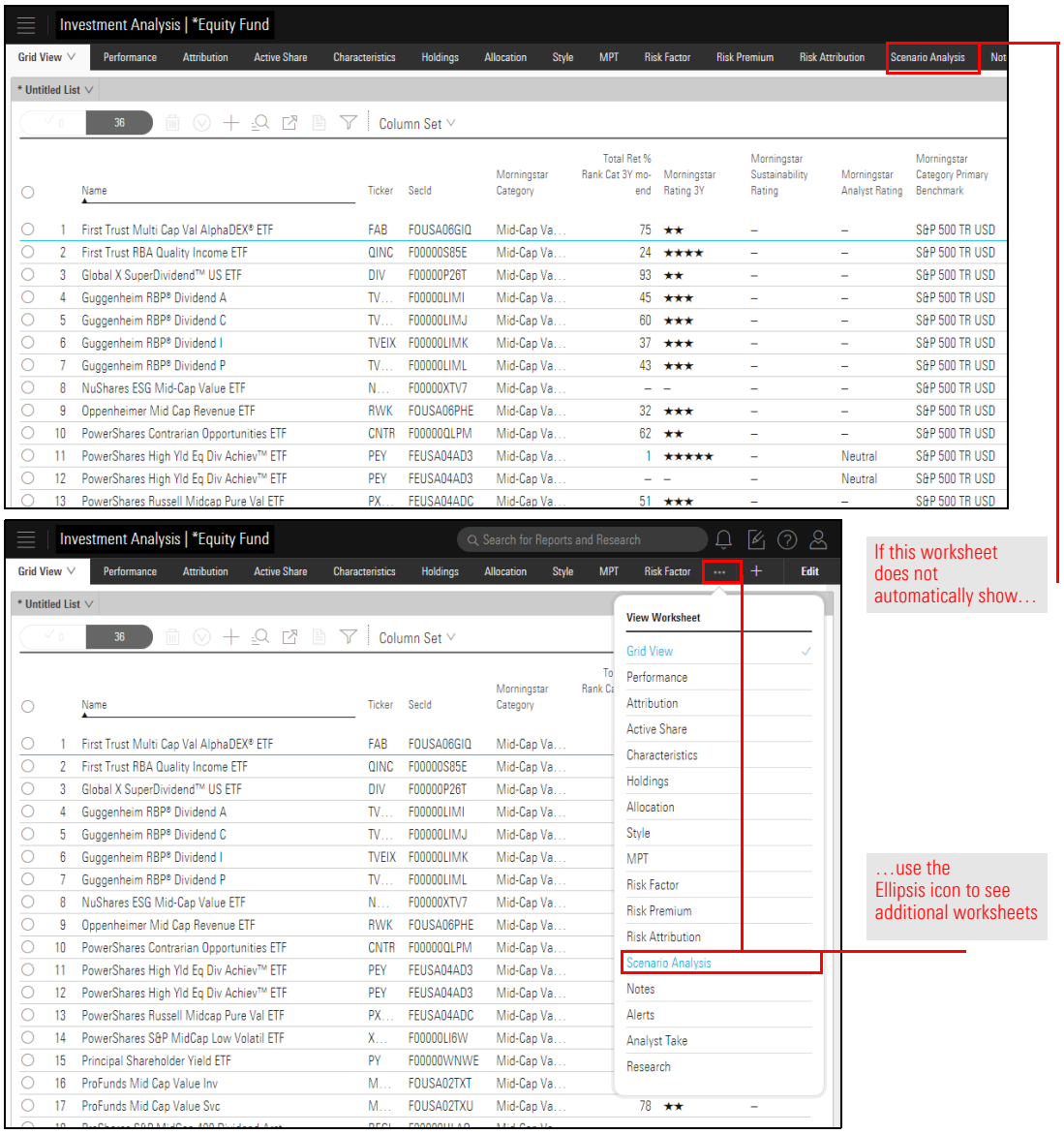
Do the following:

1. If the **Passive Mid-Cap Value** screen appears on the Home page for you, you can click it. Otherwise, **hover the mouse** over the **Menu** icon, then select **Lists & Screens**.



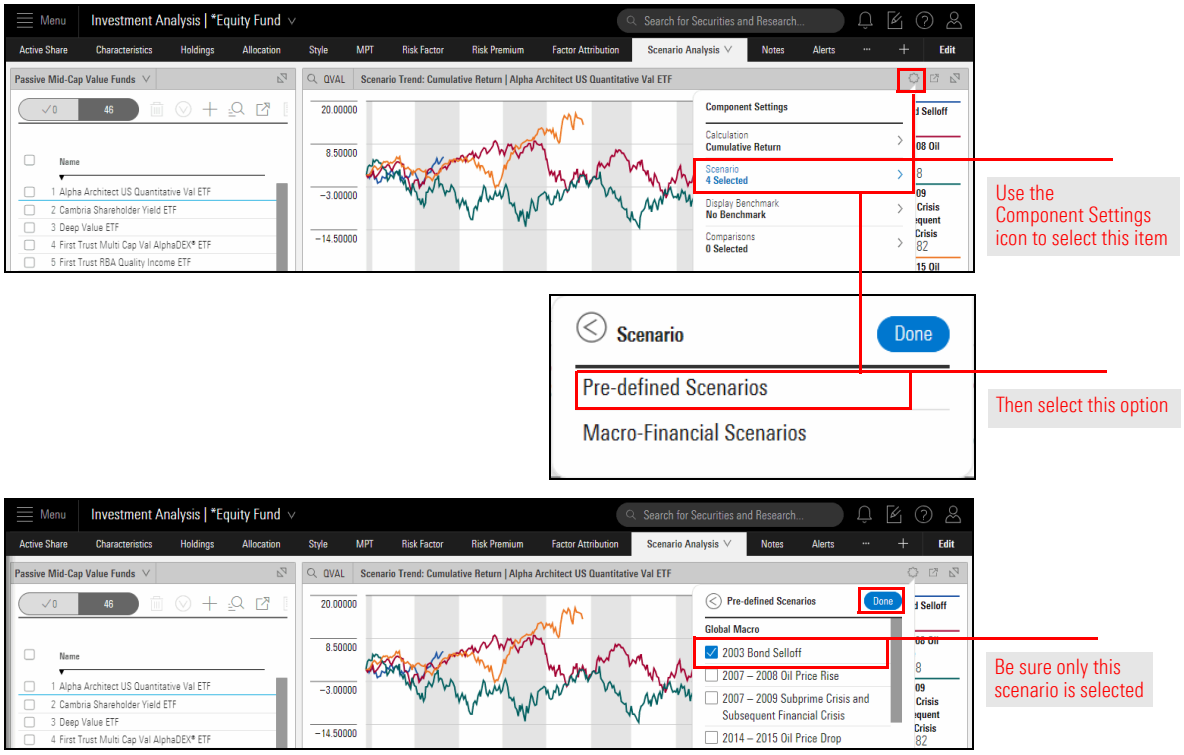
2. Click the **Passive Mid-Cap Value Funds** screen. (If you do not have this screen, use another list or screen containing equity-based funds.)
3. When prompted to select a workbook, click **Equity Fund**. The workbook opens.
4. Select the **Scenario Analysis** worksheet. This worksheet contains two components:
   - Scenario Trend, and
   - Scenario Metrics.

   ☞ Note: The components in a worksheet always reflect data for the selected item in the left-hand pane. For these exercises, you can leave the top item selected, so long as it displays data in the components on the Scenario Analysis worksheet.



5. In the Scenario Trend component at the top of the worksheet, click the **Component Settings** icon. The Component Settings menu opens.
6. Click **Scenario > Pre-defined Scenarios**, then **deselect** all except the 2003 Bond Selloff.

7. Click **Done**.



8. **Click away** from the Component Settings menu to close it.

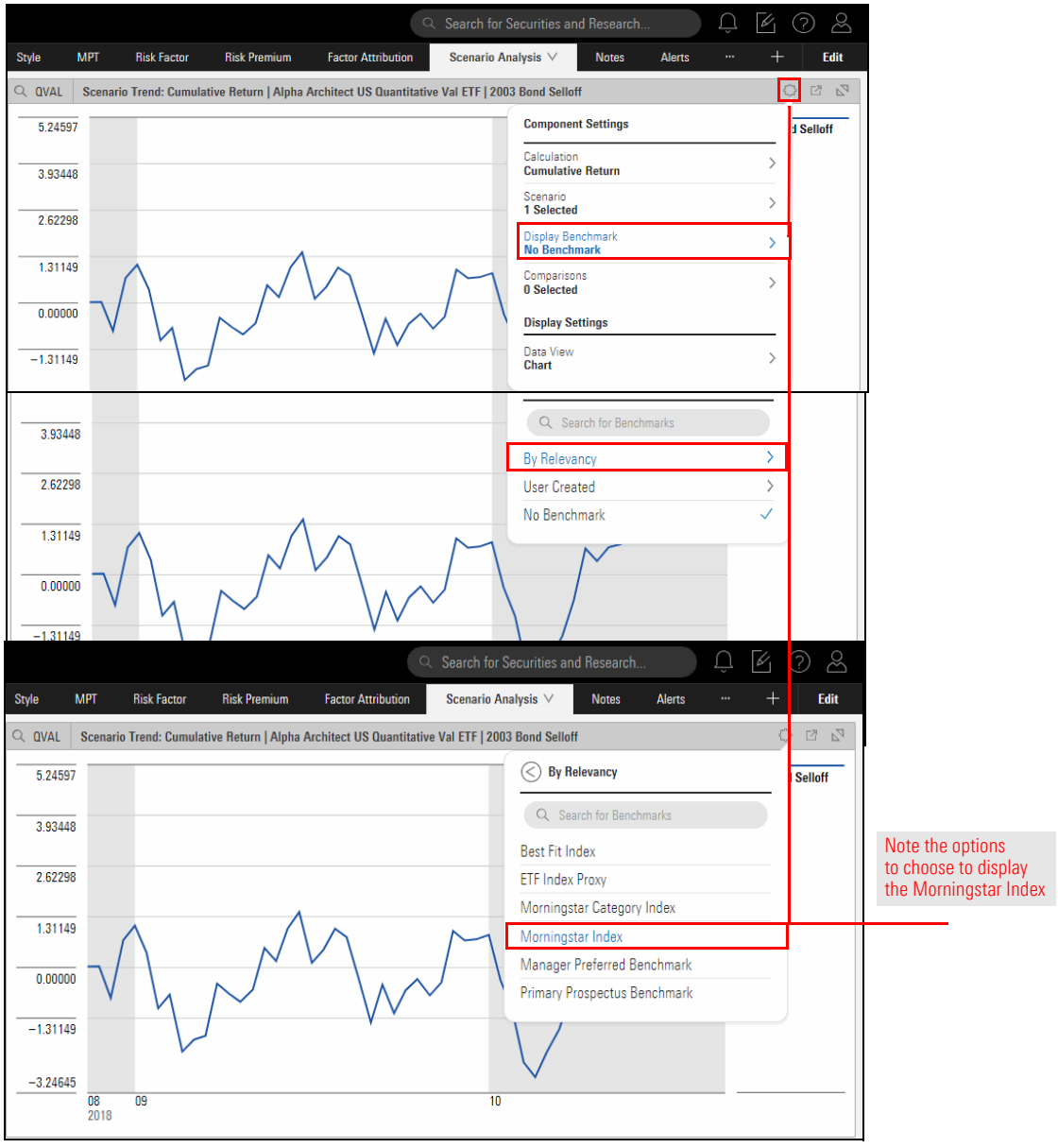
   ☞ Note: The Scenario Metrics component at the bottom of the Scenario Analysis worksheet is not affected by the change you made in the Scenario Trend component.

Exercise 2: Apply a benchmark to the Scenario Trends component

Isolating a single scenario makes the time series chart easier to read, but it is difficult to determine the quality of the fund's performance by this metric alone. To compare it to its Morningstar Index, do the following:

> ☞ Note: When a benchmark is used in the Scenario Trends component, only one scenario (the topmost selected scenario) at a time can be displayed.

1. In the Scenario Trends component at the top, click the **Component Settings** icon.
2. Click the **Display Benchmark** option, then select **By Relevancy** > **Morningstar Index**.



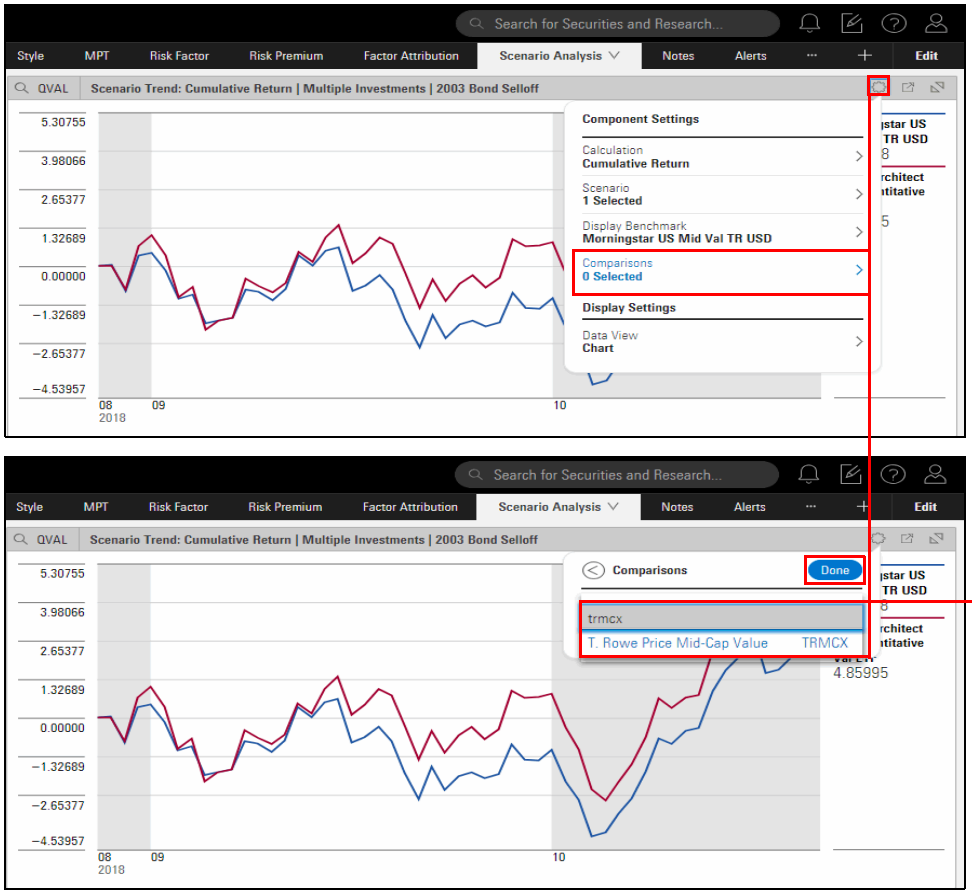
Note the options to choose to display the Morningstar Index

3. Click away from the Component Settings menu to close it. Would the fund outperform the benchmark if this scenario were to reoccur?

Exercise 3: Add a fund for comparison

The benchmark is a nice contrast to the fund in focus, but you can also select up to eight other funds for comparison. Do the following:

1. In the Scenario Trends component at the top, click the **Component Settings** icon. The Component Settings menu opens.
2. Click the **Comparisons** option.
3. In the **Search all Securities** field, type **TRMCX**, and click the name of the fund when it appears.
4. Click **Done**.



5. **Click away** from the Component Settings menu to close it. Did the fund in focus outperform the T. Rowe Price fund?

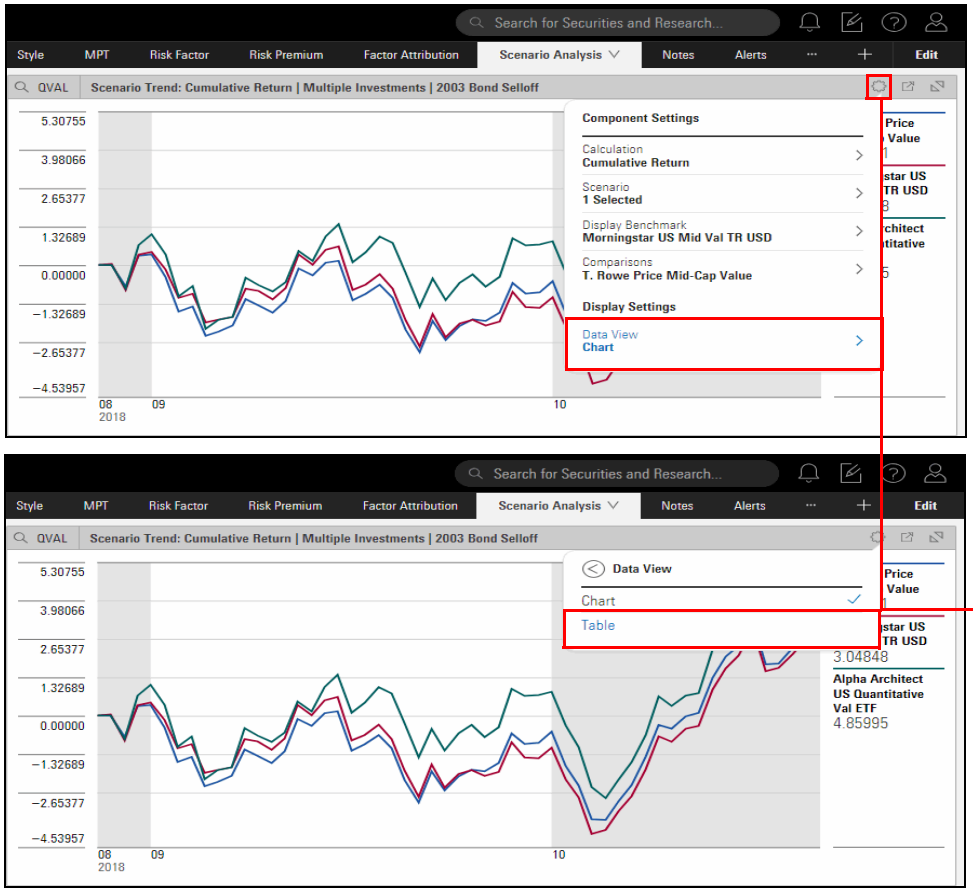
Exercise 4: Convert the chart to a table

You can move your mouse over the time series line in a chart to see the return values at any point in time, but seeing the data in a table might be easier than trying to find information for a specific time period within the scenario.

> ☞ Note: By default, the data shown in a chart reflects a calculation based on the cumulative return of an investment in the scenario. When you switch to displaying the information as a table, the default calculation switches to showing you period return for an investment.

To convert the chart to a table, do the following:

1. Click the **Component Settings** icon in the Scenario Trends component at the top. The Component Settings menu opens.
2. Click the **Data View** option, then select **Table**.



3. **Click away** from the Component Settings menu to close it. Note that for the 2003 Bond Selloff scenario, data appears only for the 1 week, 1 month, and 2 months data columns (because that is how long the bond selloff lasted). Other scenarios will show data in the table reflecting the duration of the scenario.

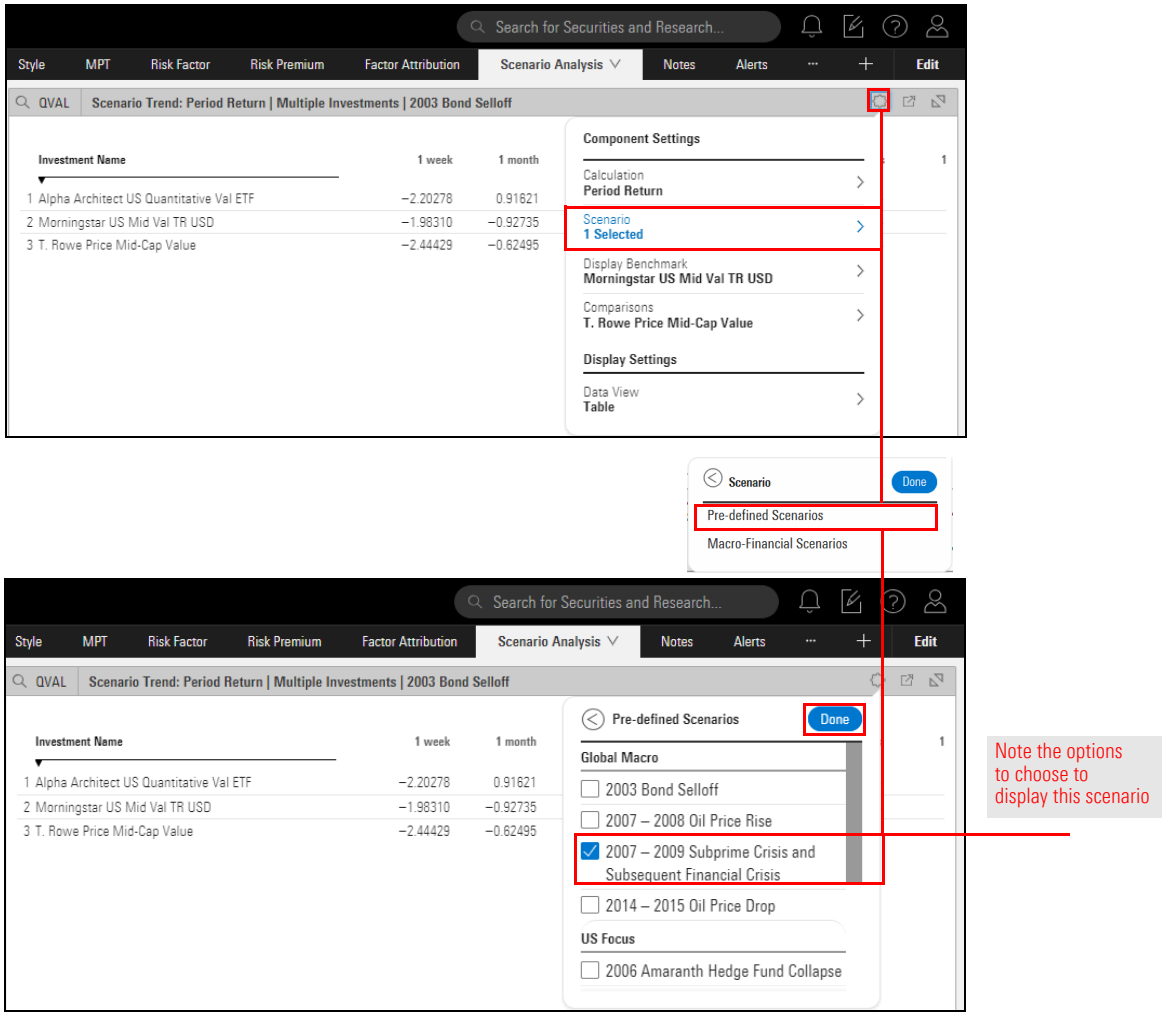
Exercise 5: Find the drawdown for a fund during a scenario

The default calculation setting for the Scenario Trend component shows you the cumulative return for a fund as a time series. You can instead opt to see either the return of $10K (that is, you can see what $10,000 invested at the beginning of the scenario becomes at the end of the scenario), a series of period returns, or the drawdown a fund experiences from peak to trough during a scenario.

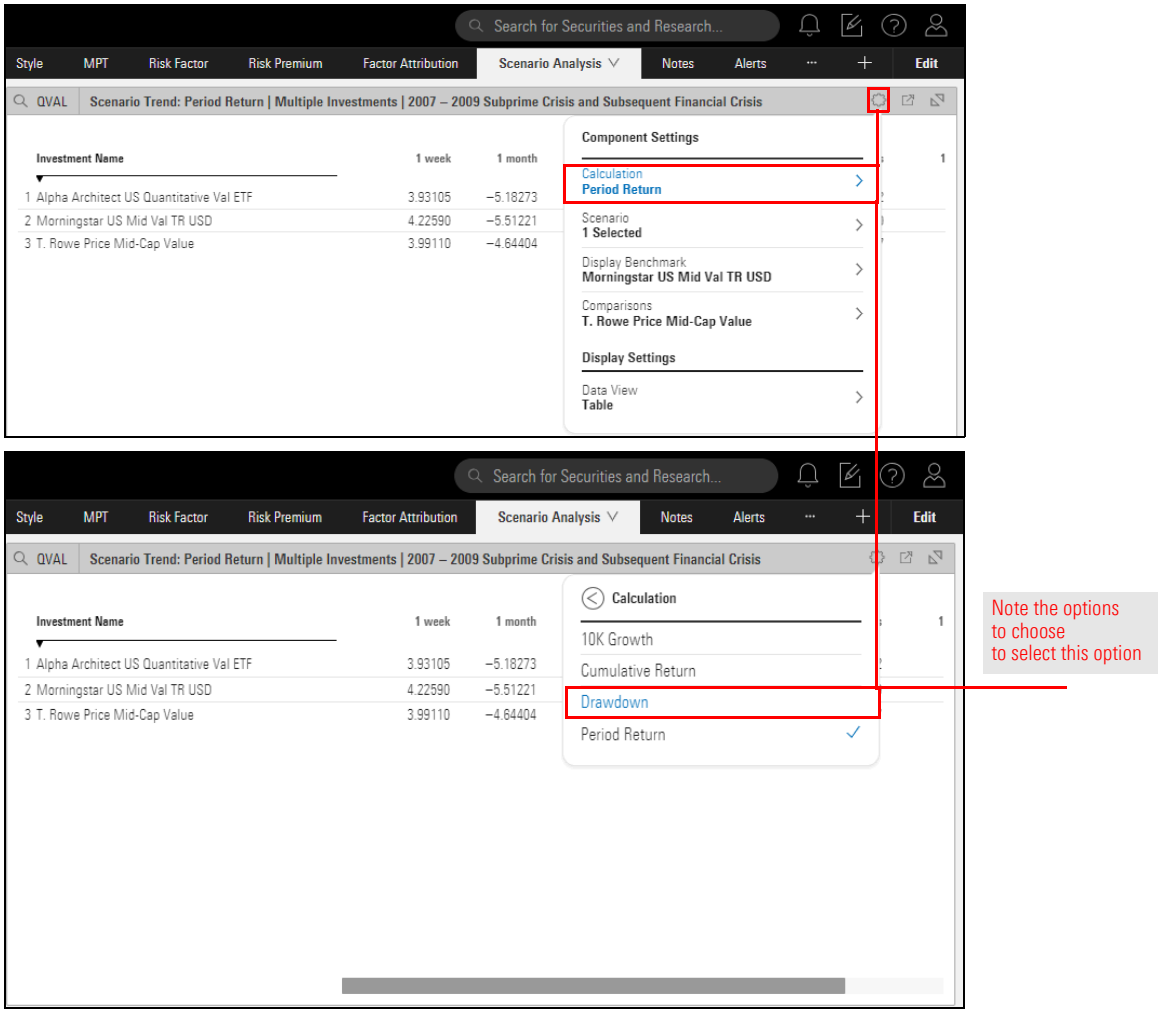
This exercise shows you how to display the drawdown value for the 2007–2009 Subprime crisis and subsequent Financial Crisis. The drawdown is calculated daily in table view, and encompasses over 500 market days in this scenario, so finding the final drawdown value is easier when the component displays a chart. (The table display is useful if you want to find the day the maximum drawdown was reached for a fund during a scenario, which is explored in the next exercise.)

To find the drawdown a fund suffered by the end of the 2007-2009 financial crisis, do the following:

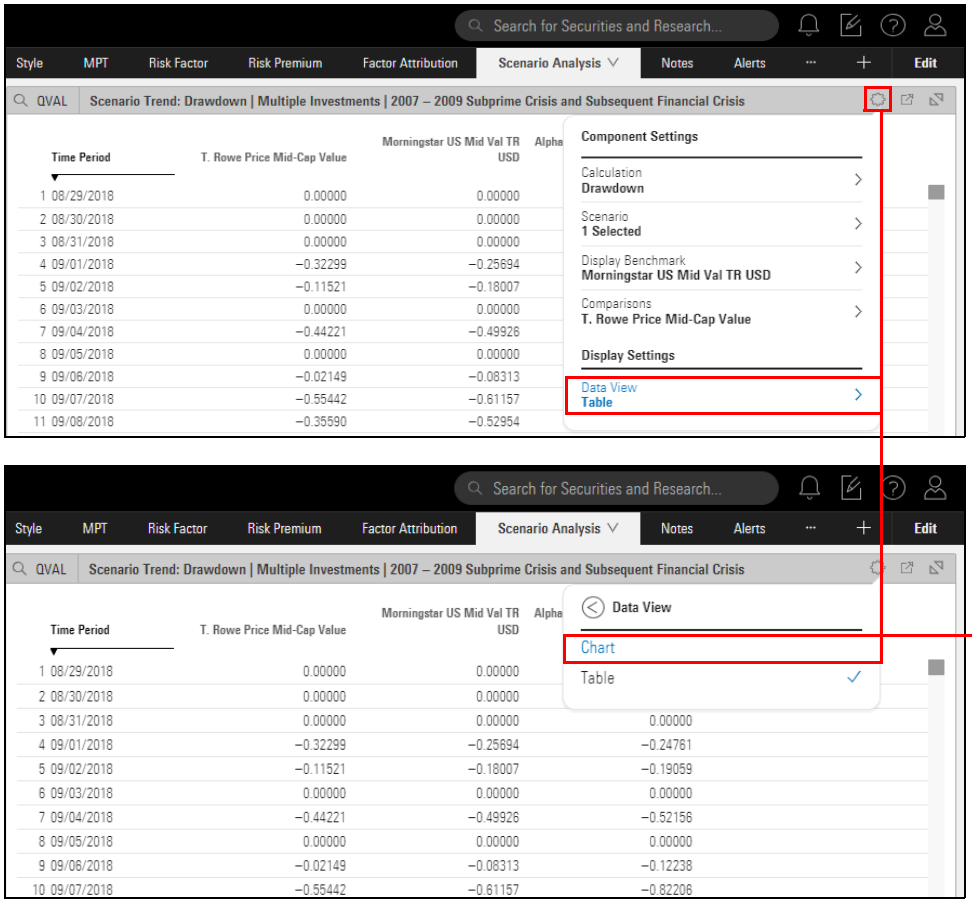
1. Click the **Component Settings** icon in the Scenario Trend component at the top. The Component Settings menu opens.
2. Click **Scenario > Pre-defined Scenarios**, then deselect the **2003 Bond Selloff**, and select the **2007–2009 Subprime Crisis and Subsequent Financial Crisis**.
3. Click **Done**.



4. Click the **Calculation** option, then select **Drawdown**.



5. Click the **Data View** option, then select **Chart**.



Note the options to choose to select this option

6. **Click away** from the Component Settings menu to close it. What would the final value be for the fund in focus?

What would the value be at the end of the scenario?

What is the Global Multi-Asset Risk Model?

The Morningstar Global Multi-Asset Risk Model allows you to examine risk in multi-asset funds and portfolios (including fixed-income investments). It captures equity risk premiums across the global equity and fixed-income universe, and the interest-rate component of USD-, EUR-, GBP-, and CHF-denominated bonds in terms of the respective shift, twist, and curvature factors of the U.S., German, British, and Swiss government yield curves.

The Global Multi-Asset Risk Model includes the 36 risk factors from the Global Equity Risk Model.

To qualify for analysis with the Global Multi-Asset Risk Model, a fund or portfolio must meet the following requirements:

- Cannot be a fund-of-funds
- Must have a portfolio report date within the last six months
- Market capitalization > USD 1 million
- Liquidity > USD 10,000
- Region-size rank ≤ 500
- Sector-size rank ≤ 250
- Sector-region-size rank ≤ 50
- Sector-country-size rank ≤ 10, and
- United States-size rank ≤ 2,000.

  ☞ Note: ADRs are not eligible.

At this time, the following fixed-income funds are excluded from coverage:

- bonds denominated in currencies other than USD, EUR, GBP, and CHF
- callable bonds
- mortgage-backed securities, and
- interest derivatives.

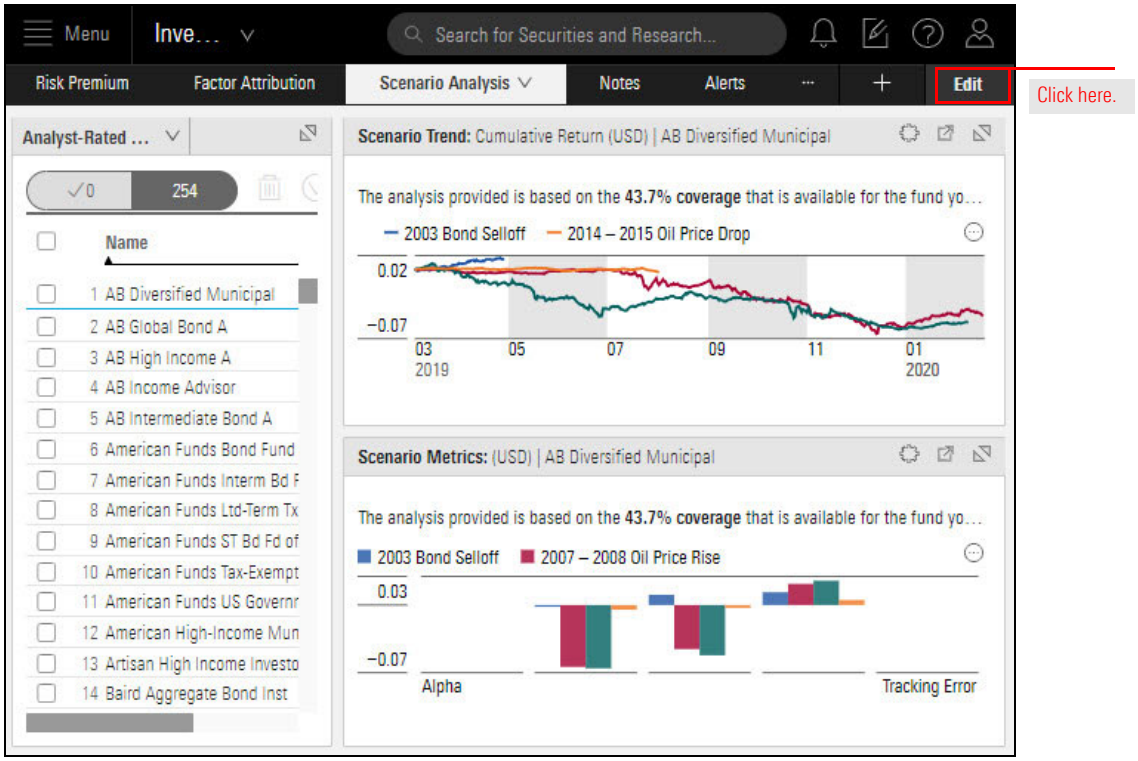
To learn more about the Morningstar Global Multi-Asset Risk Model, please read Morningstar Risk Model Methodology.

Exercise 6: Use the Global Multi-Asset Risk Model to compare fixed-income funds

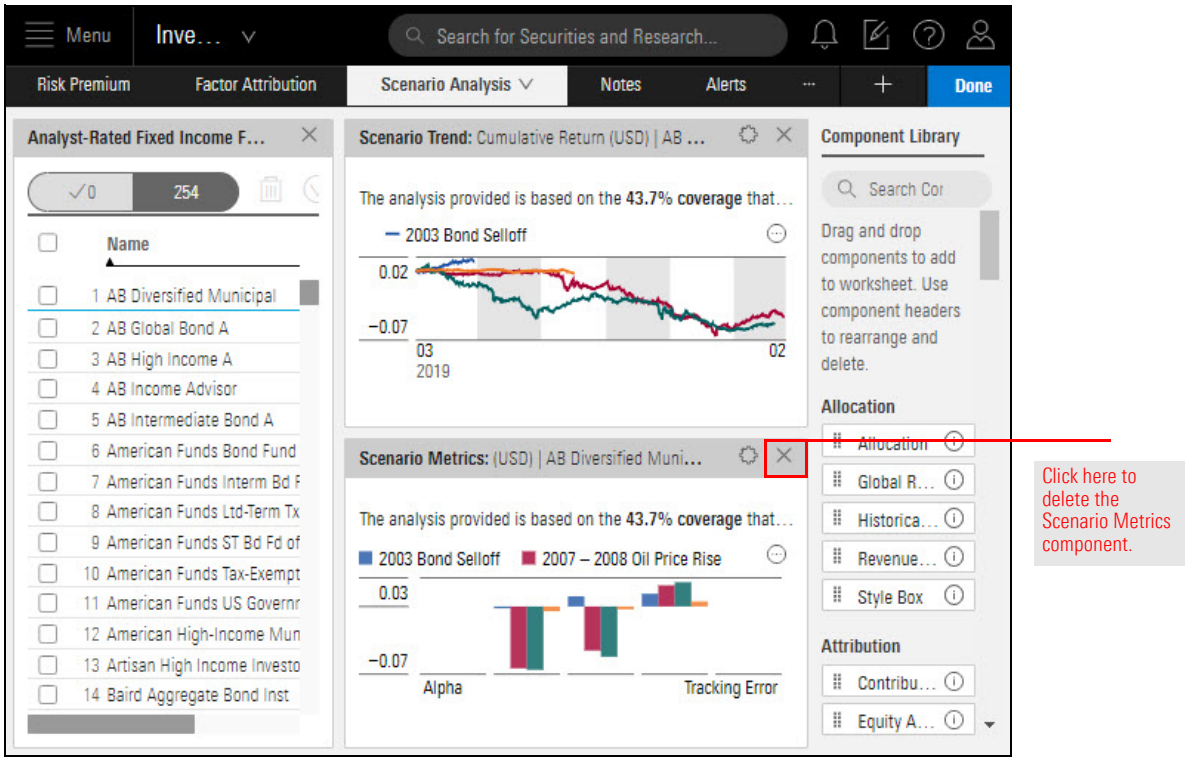
In this exercise, you will compare the results for two fixed-income funds under different scenarios. The Equity Fund workbook should still be open.

Do the following:

1. In the **Equity Fund** workbook, open the screen **Analyst-Rated Fixed-Income Funds**. If you do not have this screen, create it now.
2. Select the **Scenario Analysis** worksheet.
3. At the far-right of the worksheet tabs, click **Edit** to open the Component Library.

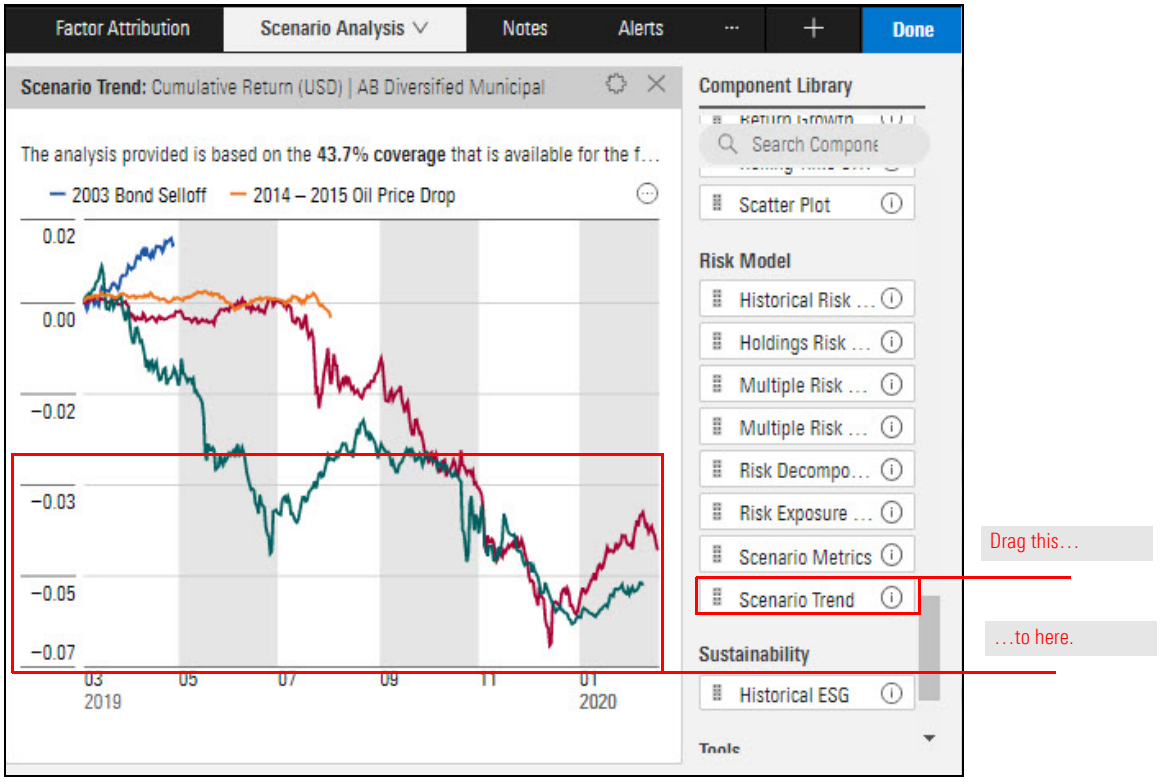


4. Delete the **Scenario Metrics** component.

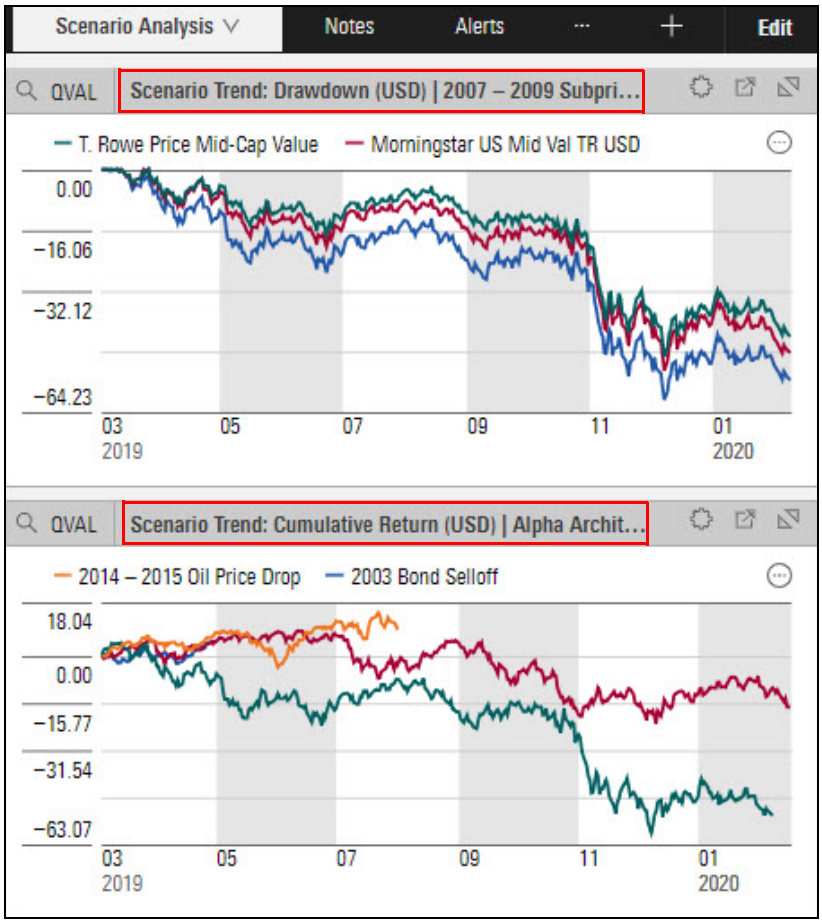


The Scenario Trend component now occupies the full component area.

5. In the Component Library, **drag** the **Scenario Trend** component to the component area, placing it at the **bottom of the component area**.



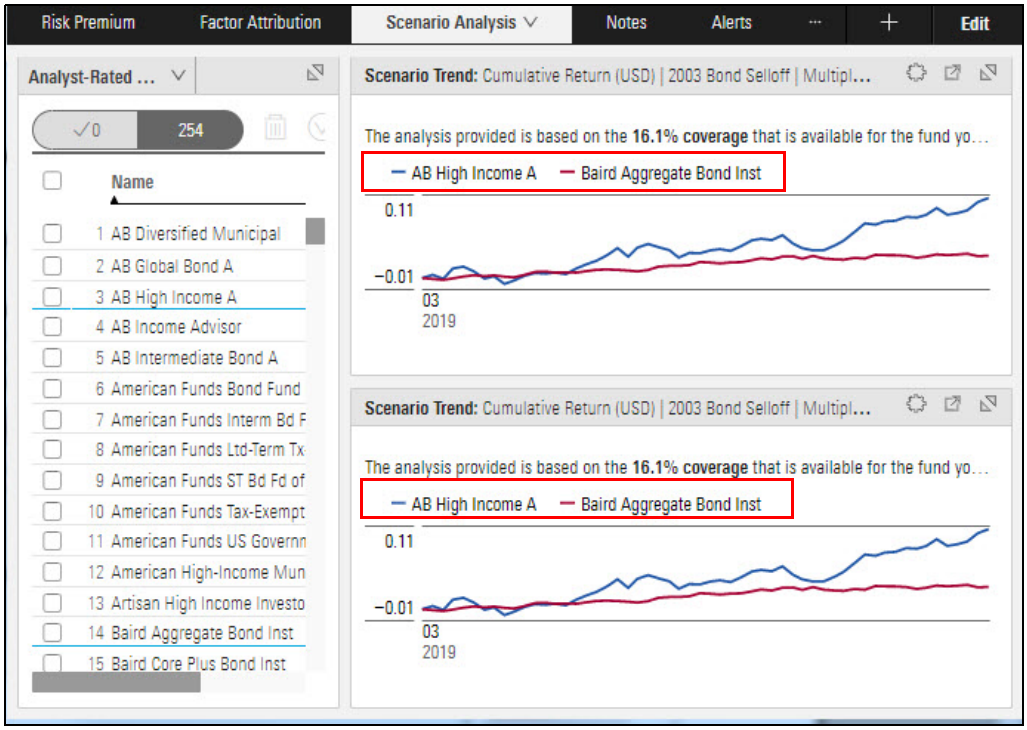
6. At the far-right of the worksheet tabs, click **Done** to close the Component Library.
7. You now have two instances of the Scenario Trend component, both displaying the same data.



Note the highlighted selections.

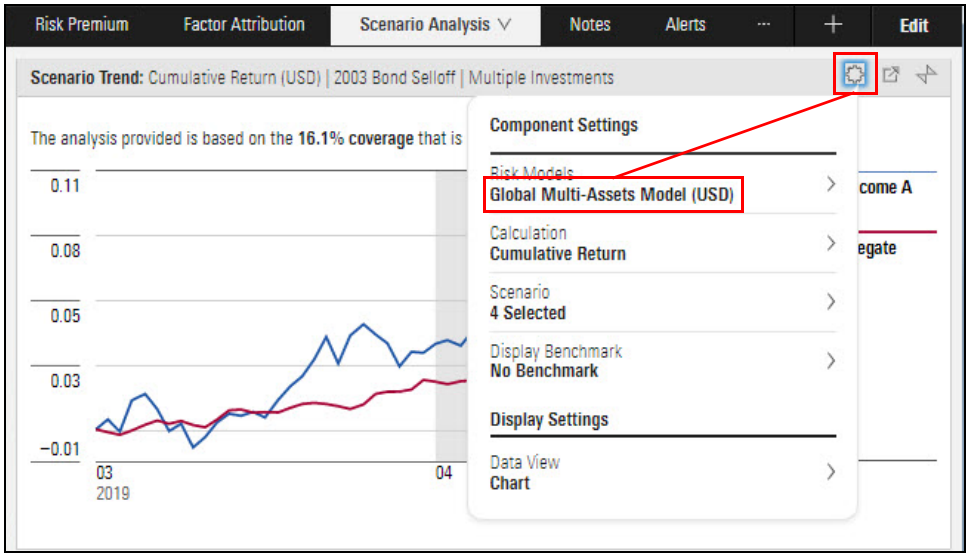
8. In the Grid, to **select two funds** you want to compare, **click one** and <**CTRL**>-**click the other**. Now two funds are selected and each component displays a line for each fund.

   ☞ Note: At the top of each component, the text "The analysis provided in based on the XX.X% coverage that is available for the fund you are viewing" refers to the fund you selected first.



Note the highlighted selections.

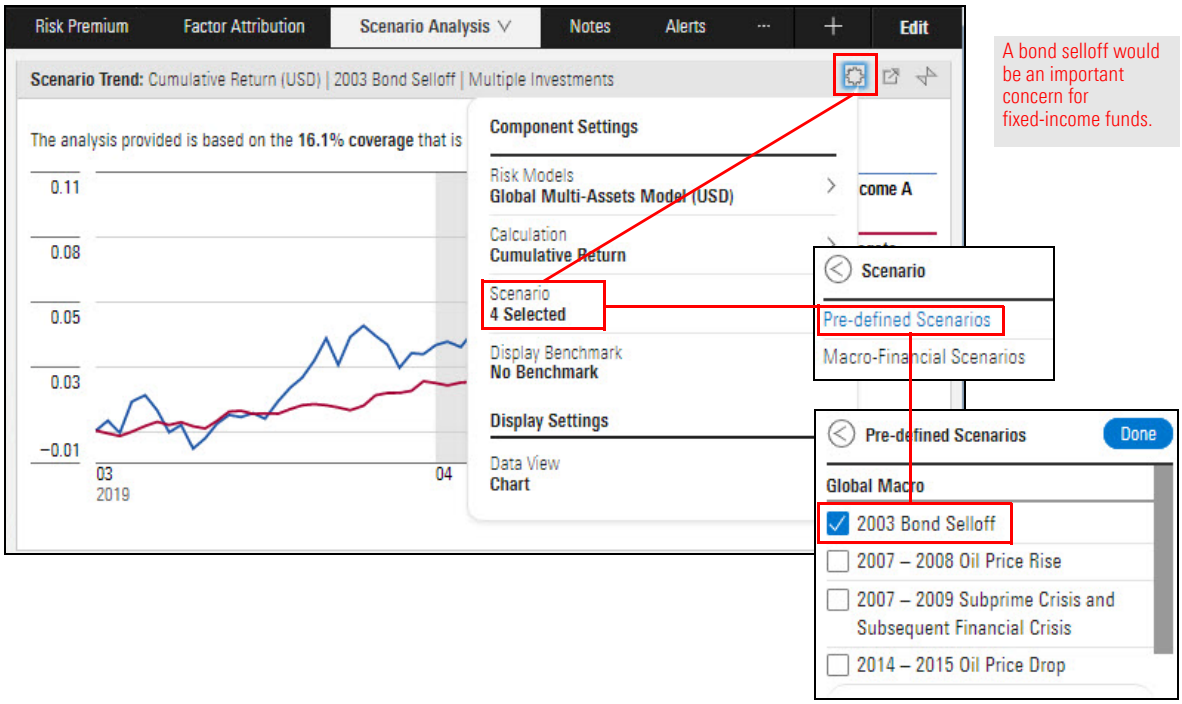
9. In the top component, click the **Component Settings** icon. The Component Settings menu opens. **Note** that the **Risk Models** selection is **Global Multi-Assets Model**.



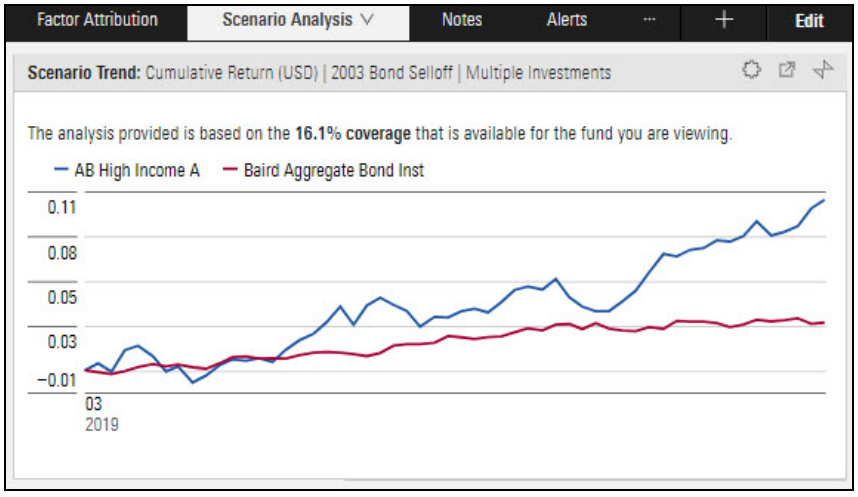
When you opened a list of fixed-income funds, one of them was automatically selected. And because it's a fixed-income fund, the Risk Model changed to the Global Multi-Asset Model.

10. From the **Component Settings** menu, select **Scenario** > **Pre-defined Scenarios**. **Clear** the checkboxes for the following:
    - **2007–2008 Oil Price Rise**
    - **2007–2009 Subprime Crisis and Subsequent Financial Crisis**, and
    - **2014–2015 Oil Price Drop**.

    Make sure **2003 Bond Selloff** is still selected.

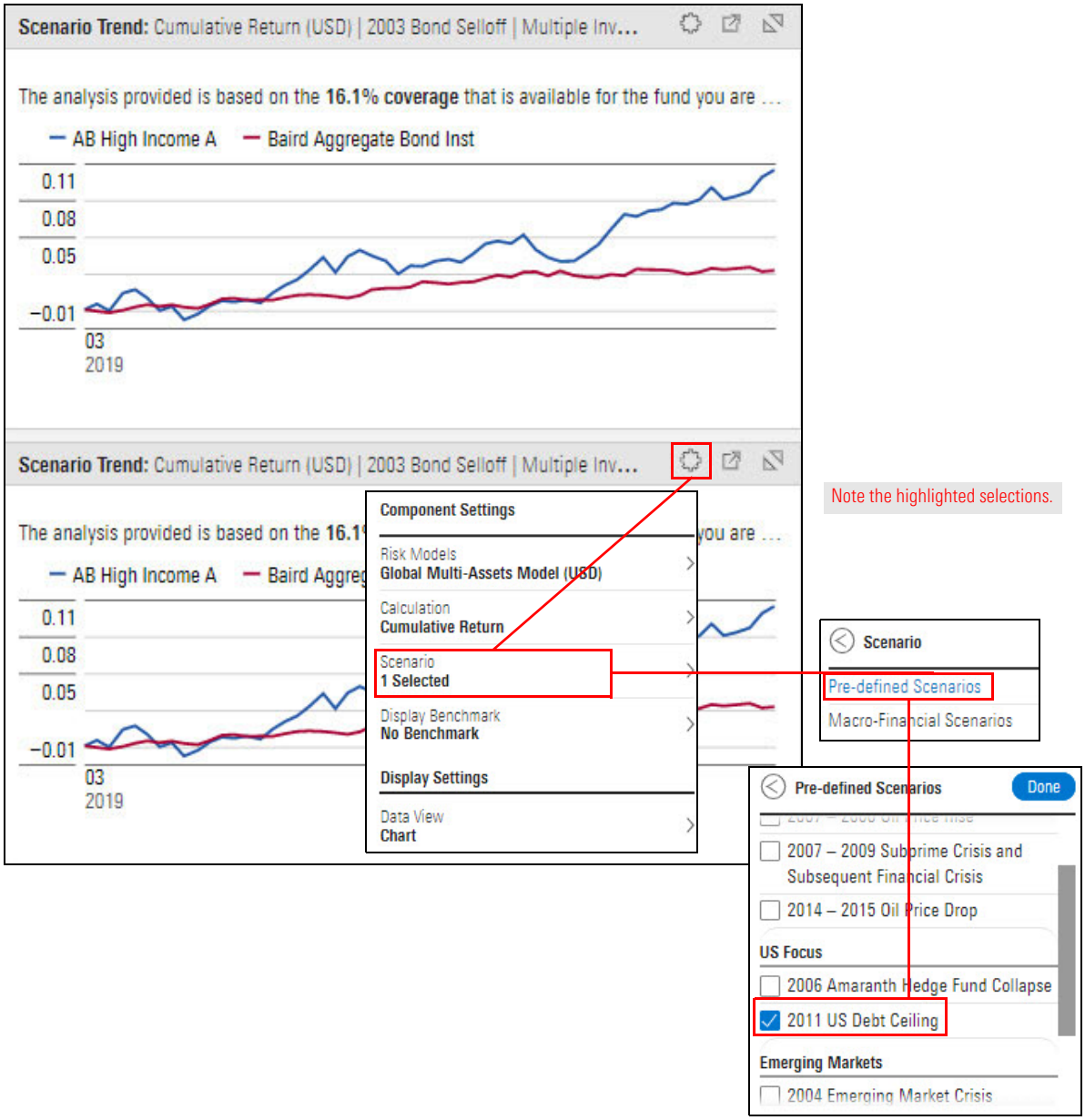


11. Click **Done**, then **Click away** from the Component Settings menu to close it.

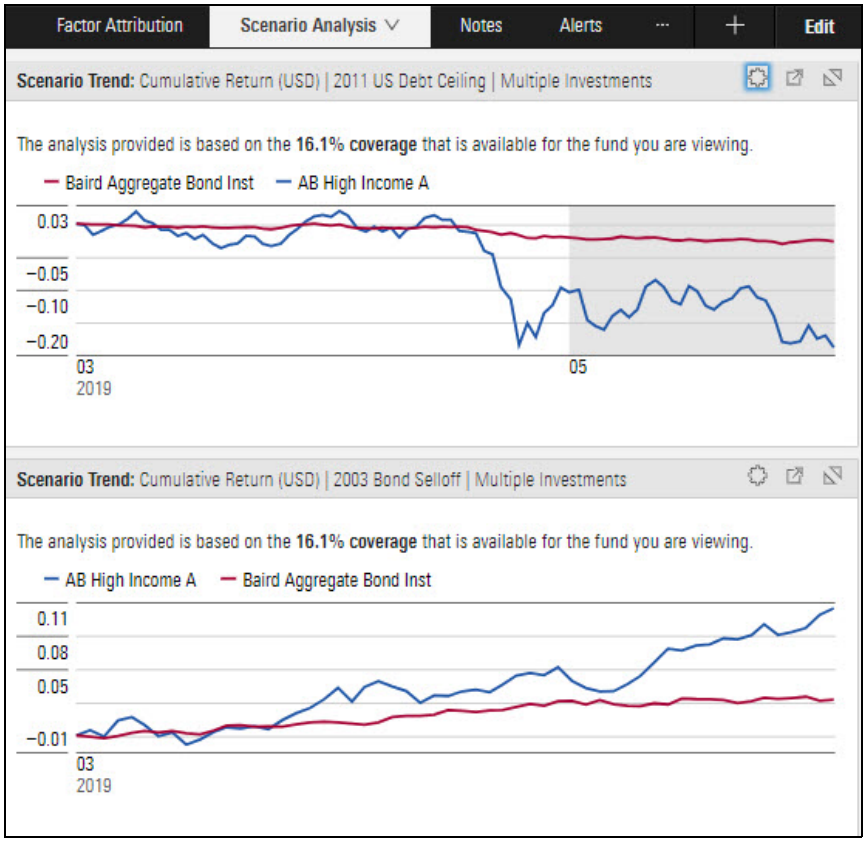


Which of the two selected funds would do better if a substantial bond selloff were to occur?

12. In the bottom Scenario Trend component, click the **Component Settings** icon, then select **Scenario** > **Pre-defined Scenarios**. Clear the checkboxes on **all scenarios**, then select **2011 US Debt Ceiling**.



13. **Click away** from the Component Settings menu to close it.



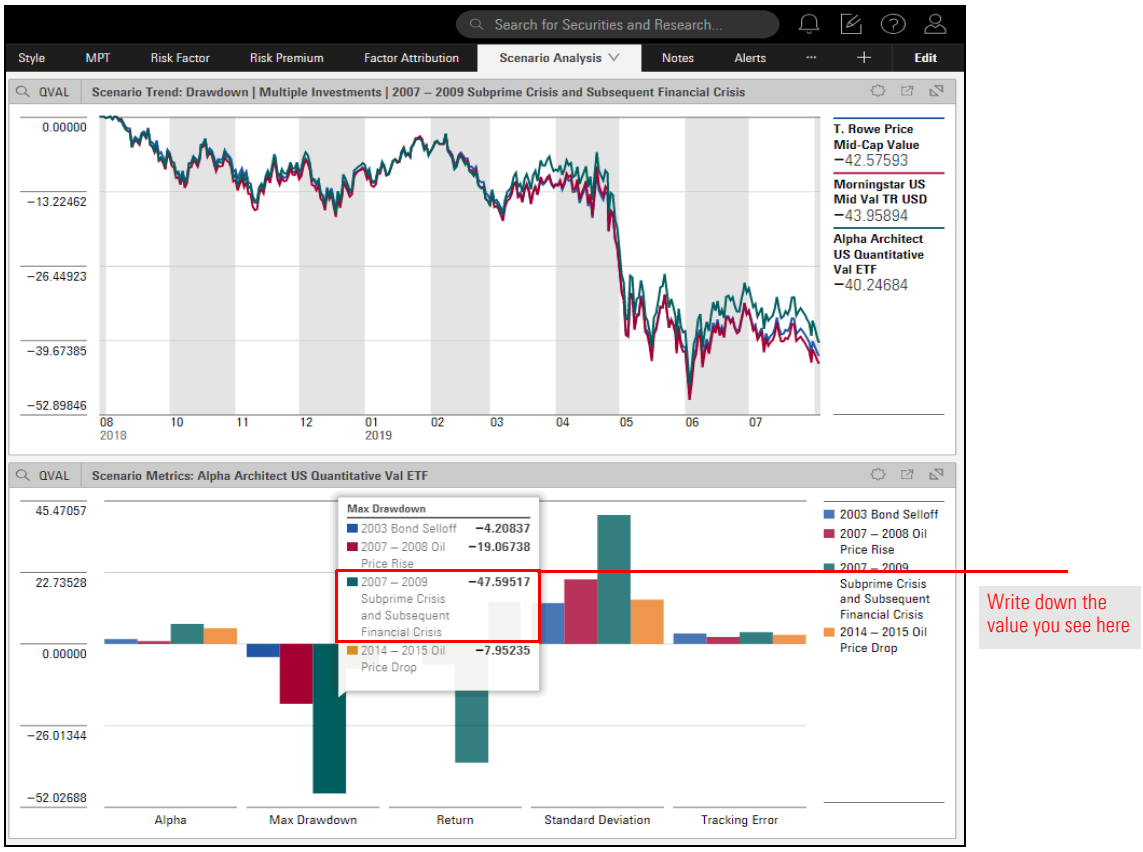
Your results will not match these.

Which of the two selected funds would do better if the United States were to experience a similar debt ceiling crisis?

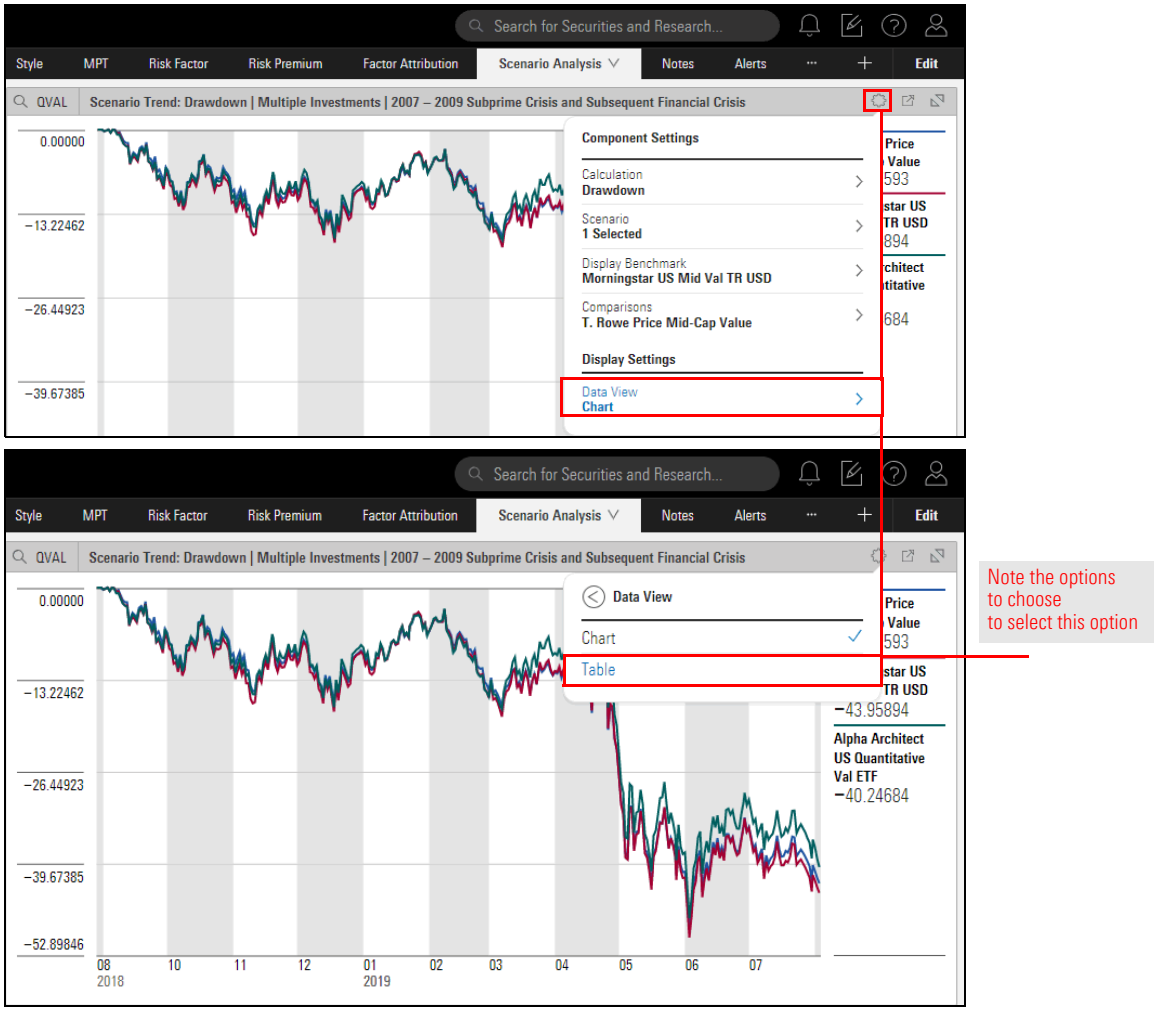
Exercise 7: Find the day the maximum drawdown would be reached in a scenario

The Scenario Metrics component (at the bottom of the Scenario Analysis worksheet) contains several metrics reflecting values of the fund in focus for the scenario(s) selected. One of these metrics is Max Drawdown. You can move your mouse over the bars in the Scenario Metrics component to see the value for each one. To find the day the maximum drawdown would be reached if the 2007–2009 Subprime Crisis and Subsequent Financial Crisis would be repeated for the fund in focus, do the following:

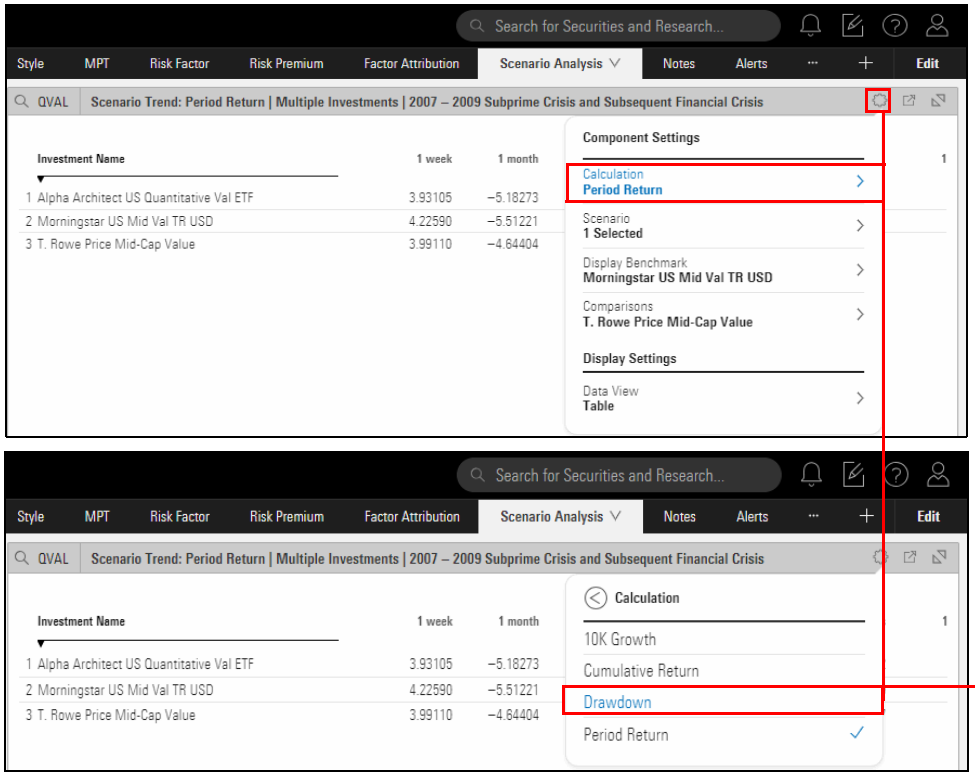
1. In the Scenario Metrics component (at the bottom of the worksheet), move your mouse over the **Max Drawdown** bar, then write down the number you see for the 2007—2009 Subprime Crisis and Subsequent Financial Crisis.



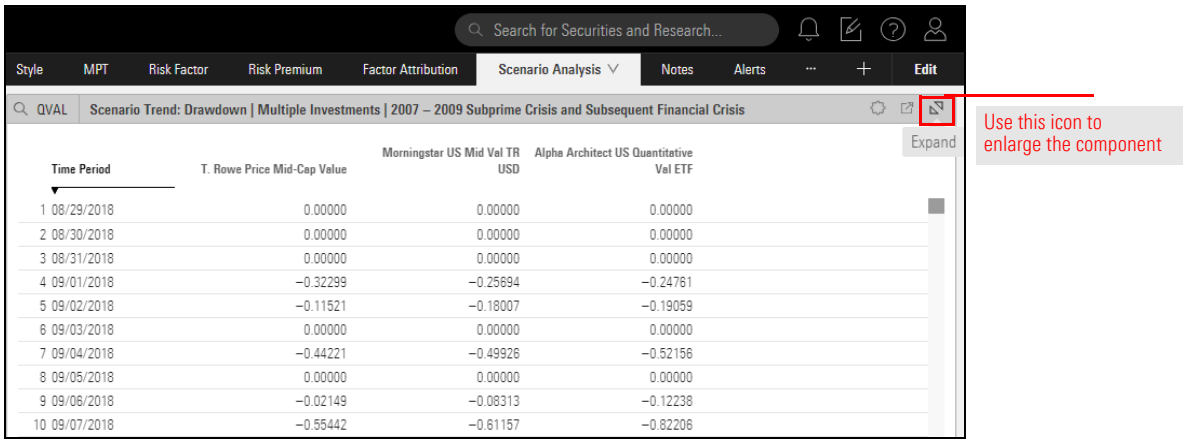
2. In the Scenario Trends component (at the top of the worksheet), use the **Components Setting** icon to switch the **Data View** to **Table**.



3. The component should still be set to display Drawdown. If not, click the **Calculation** option and select **Drawdown**.



4. Click away from the Component Settings menu to close it.
5. In the Scenario Trends component, click the **Expand** icon. The component is resized to fill the available space in the worksheet.



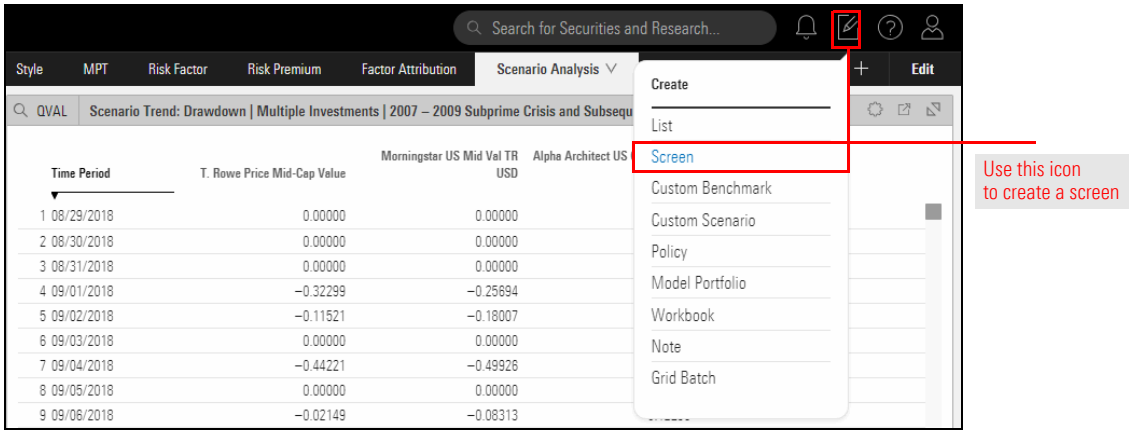
6. **Scroll down** in the table until you find the date with the drawdown value that matches the value you wrote down in step 1.
7. Click the **Collapse** icon. The component is resized to take up only half of the worksheet.

Exercise 8: Create a screen to find emerging markets funds

Some scenarios are better suited to particular types of investments. In this exercise, you will use a screen to find emerging markets funds and see what impact the two scenarios related to those investments would have on them were the scenarios to reoccur. Do the following:

1. From the header, click **Create**…**Screen**. The Screener window opens.

   ☞ Note: When you are prompted to save the Workbook, click **Don't Save**.

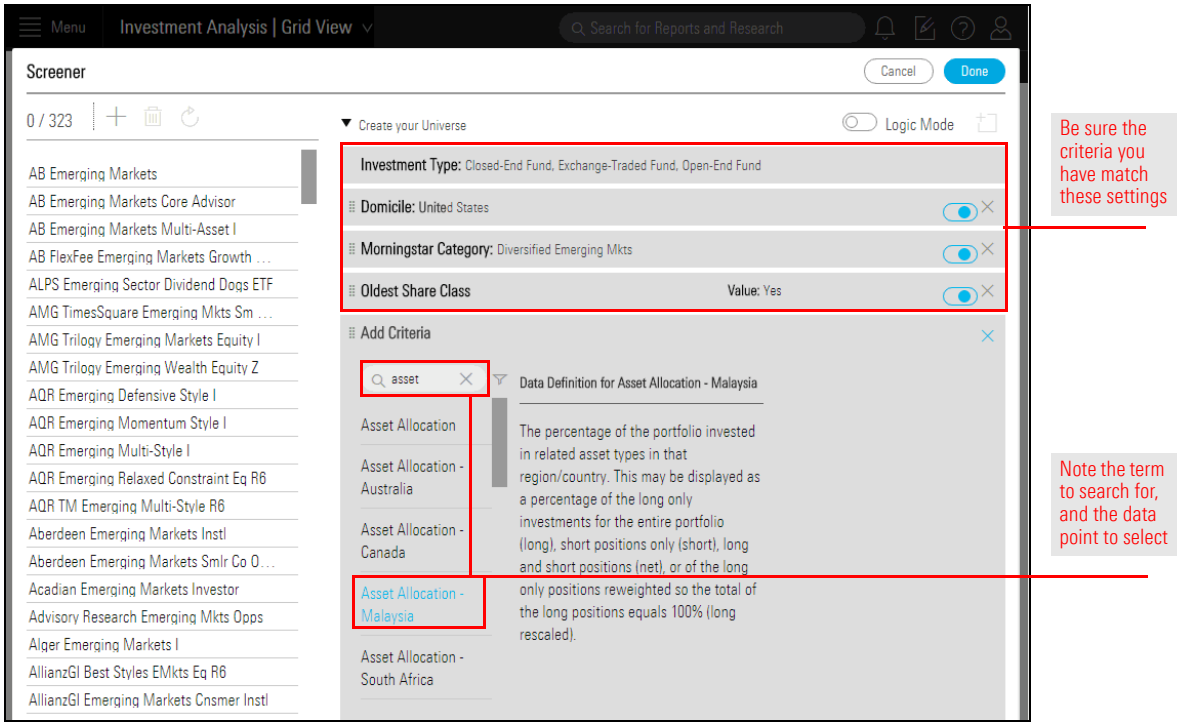


2. Select the following Investment Type options:
   - **Closed- End Fund**
   - **Exchange-Traded Fund**, and
   - **Open-End Fund**.
3. Click **OK**.
4. In the Add Criteria area, search for and select **Domicile**, then choose **United States**. (To see the option for United States, you can either filter for "United States," or move through the available pages of options until you see it.)
5. Click **OK**.
6. In the Add Criteria area, search for and select **Morningstar Category**.

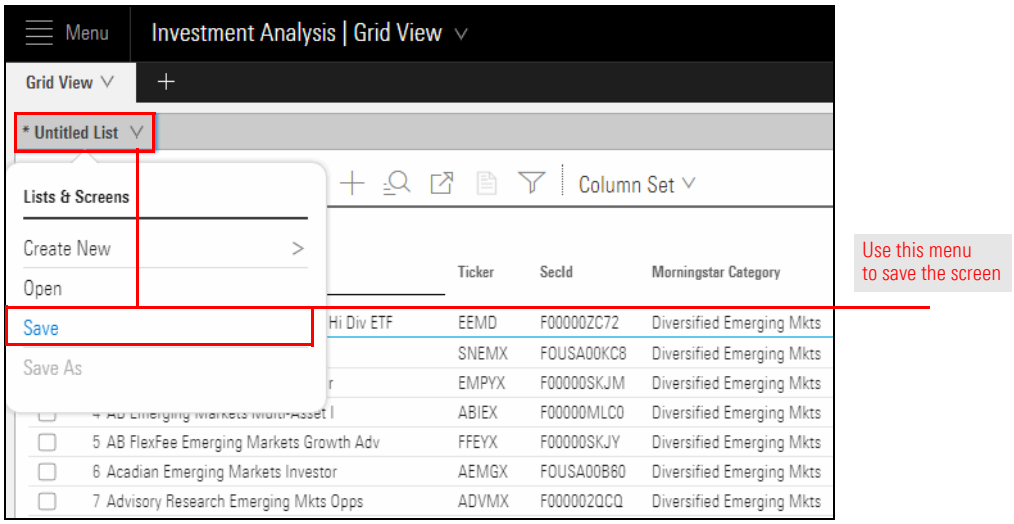
   ☞ Note: Remember, you can find this data point by searching for the word **peer**.

7. Select the **Diversified Emerging Mkts** category.
8. Click **OK**.
9. In the Add Criteria area, search for and select **Oldest Share Class**. The option for **Yes** should be selected.
10. Click **OK**.

11. In the Add Criteria area, search for and select **Asset Allocation - Malaysia**.



12. Select **Regional Equity**.
13. Leave the Operator as Greater than or Equal to, and enter **50** as the Value.
14. Click **OK**.
15. Click **Done**.
16. Save the screen as **Emerging Markets**.



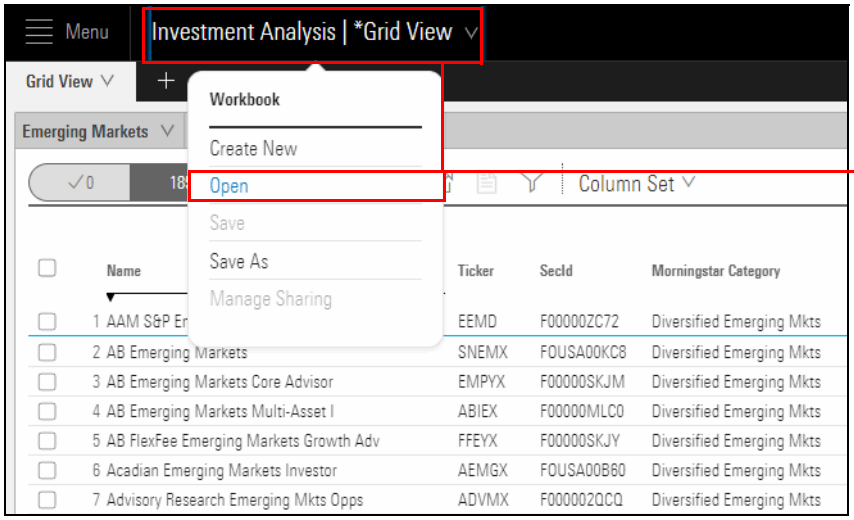
Exercise 9: Evaluating the potential impact of two scenarios on emerging markets funds

Now that you have found emerging markets funds, you can use the Scenario Analysis worksheet to evaluate them. In this exercise, you will include two scenarios in both components on the Scenario Analysis worksheet, and display two metrics (Alpha and Max Drawdown) in the Scenario Metrics component. Max Drawdown allows you to see the actual loss for each fund in the scenario, while Alpha shows you whether the manager added any value in spite of the loss.

Do the following:

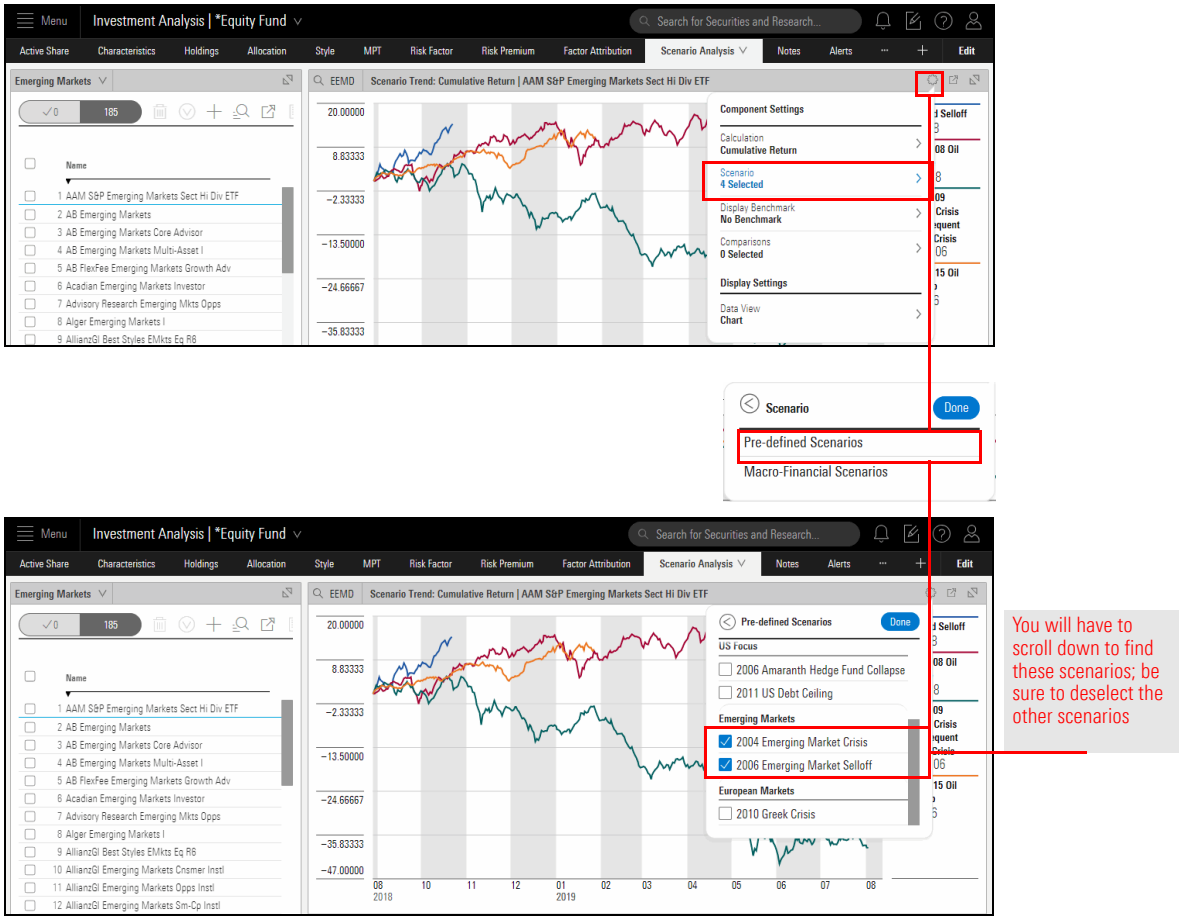
1. Use the **Workbook** menu at the top of the window to open the **Equity Fund** workbook.

   ☞ Note: When prompted to save the workbook, click **Don't save**.



2. Open the **Emerging Markets** screen you just saved.
3. Select the **Scenario Analysis** worksheet. You will make changes to both components on this worksheet.

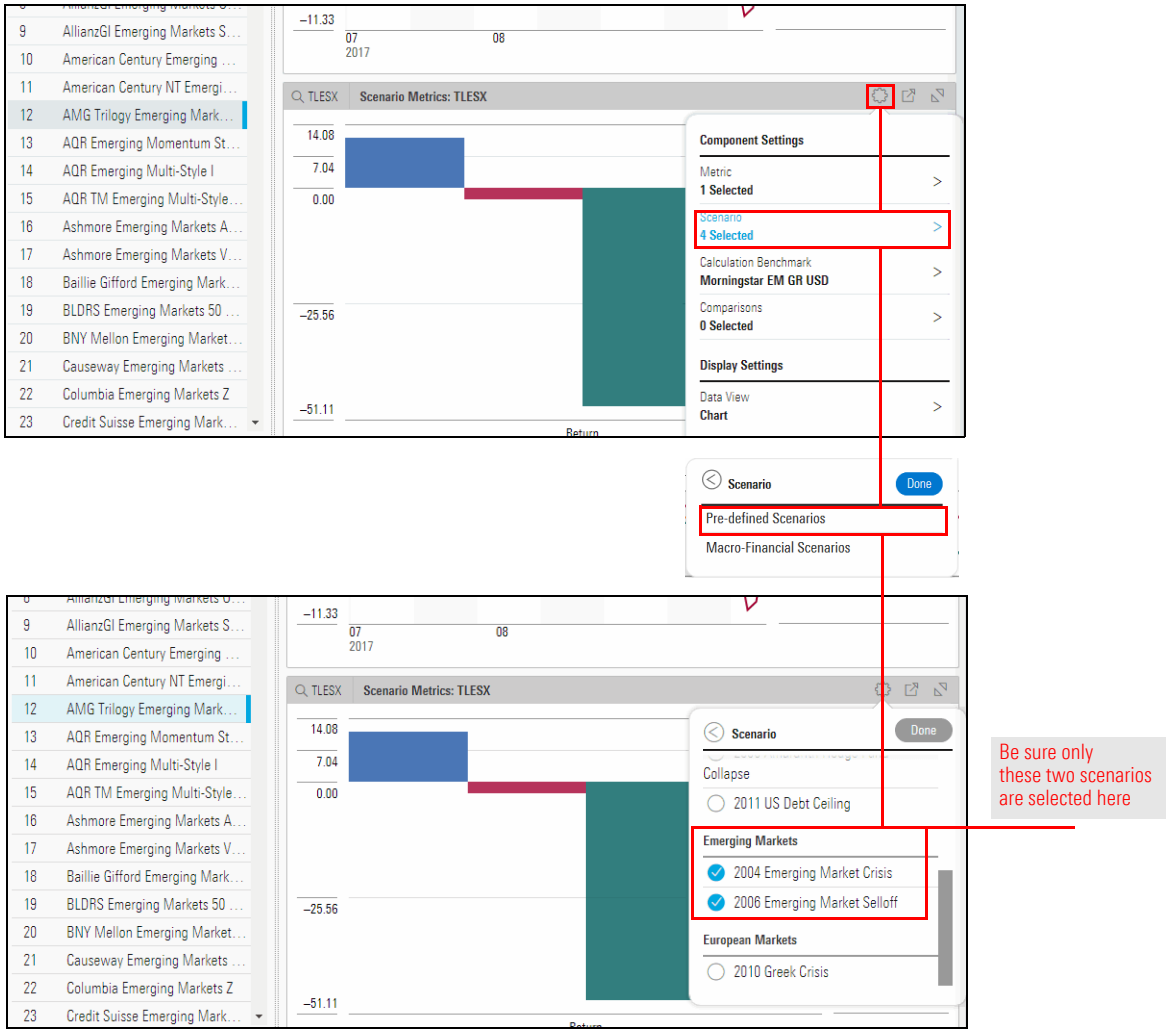
4. Use the **Components Settings** icon in the Scenario Trends component (at the top of the worksheet) to display only the **2004 Emerging Markets Crisis** and the **2006 Emerging Markets Selloff**.



You will have to scroll down to find these scenarios; be sure to deselect the other scenarios

5. Click **Done**.
6. **Click away** from the Component Settings menu to close it.

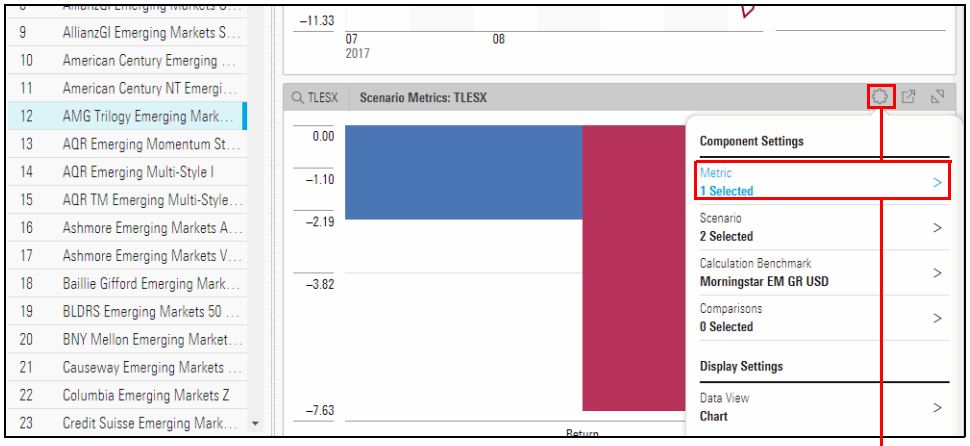
7. In the Scenario Metrics component (at the bottom of the worksheet), use the **Components Settings** icon to display only the **2004 Emerging Markets Crisis** and the **2006 Emerging Markets Selloff**.

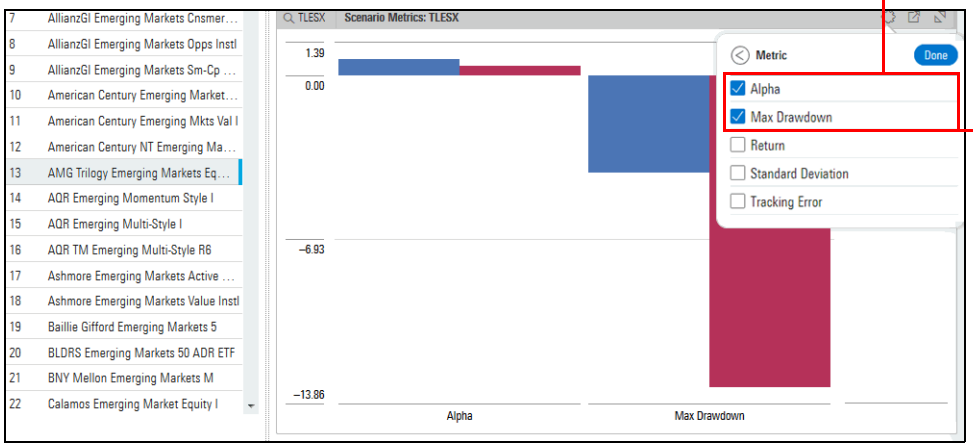


8. Click **Done**.

9. In the Scenario Metrics component at the bottom of the worksheet, use the **Components Settings** icon to change the **Metric** to show **Alpha** and **Max Drawdown**.

10. Click **Done**.





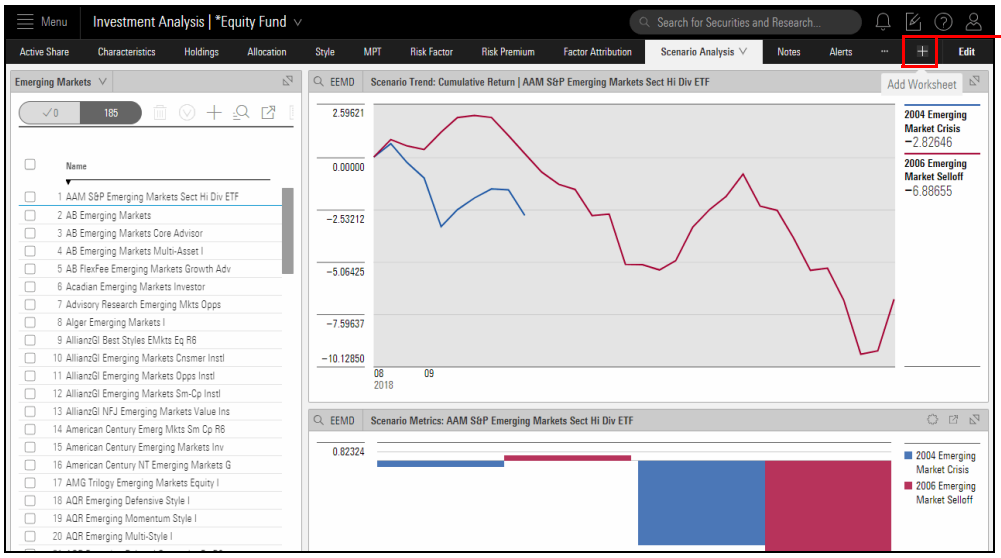
11. Click away from the Component Settings menu to close it.
12. Click the **name** of different investments in the Grid View component to see how they would be impacted by these two events. Which managers add Alpha even in a scenario where the fund loses money?

Exercise 10: Create a custom worksheet

Important information about a fund can be gleaned by combining the Scenario Trend component with the Risk Exposure Snapshot component (found by default on the Risk Factor worksheet in the Equity Fund Template workbook). This arrangement allows you to see not only what the returns for a fund would be in a scenario, but also how the portfolio's particular exposures to different factors explain the results.

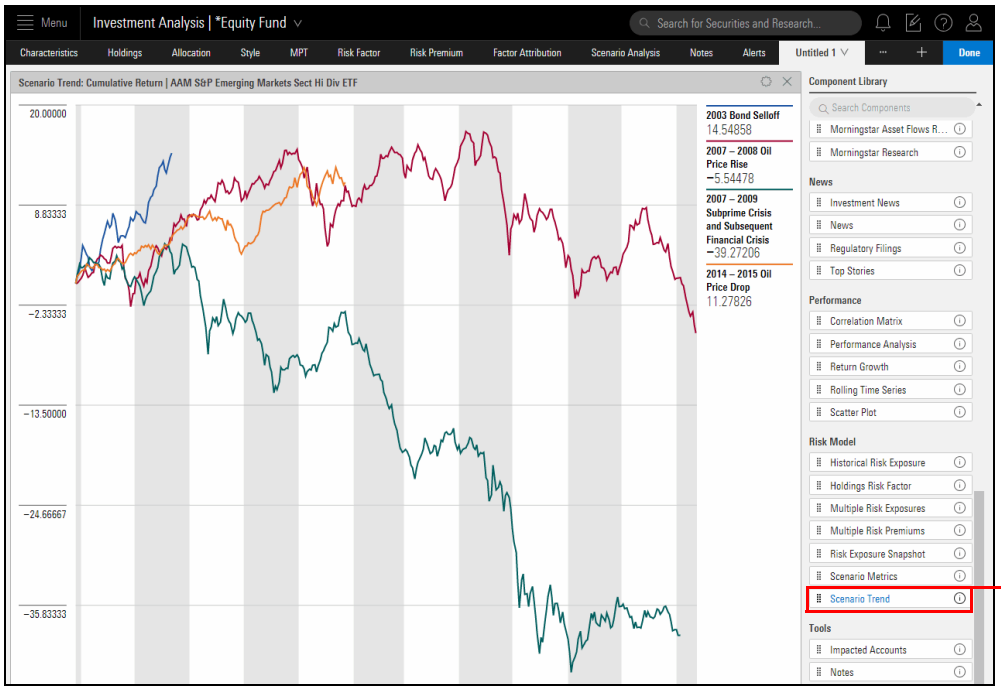
To create a custom worksheet displaying these two components, do the following:

1. The Equity Fund workbook should still be open. Click the **Add Worksheet** icon.



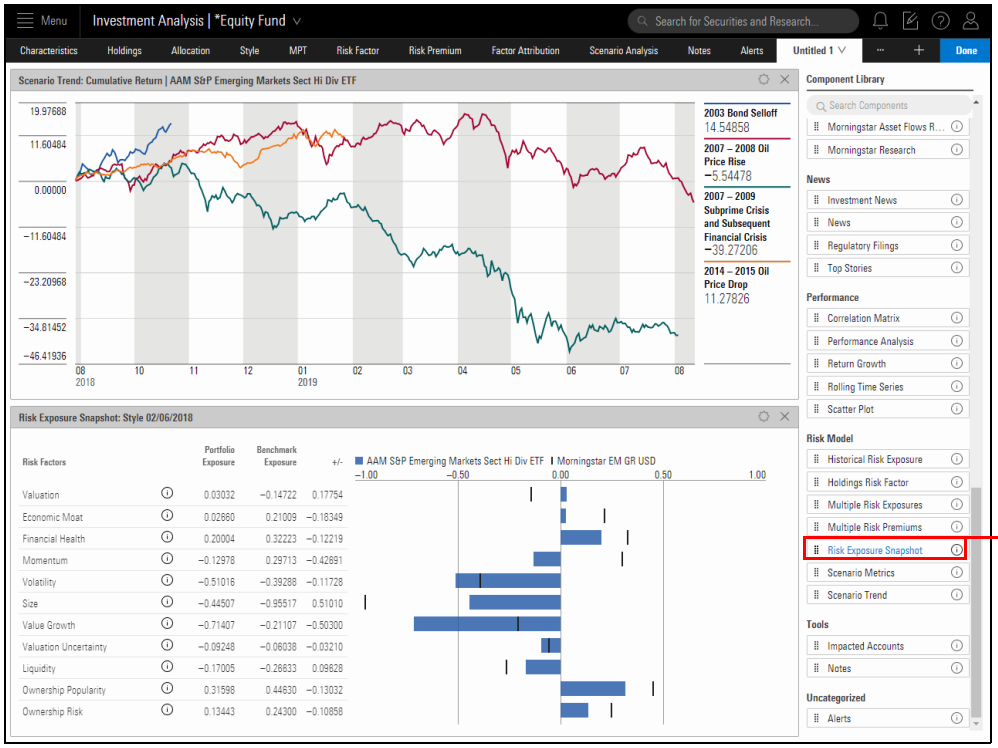
Use this icon to add a worksheet to the workbook

2. From the Edit Components panel, scroll down to the **Risk Model** section, then drag-and-drop the **Scenario Trend** component onto the worksheet.



Drag-and-drop this component onto the worksheet

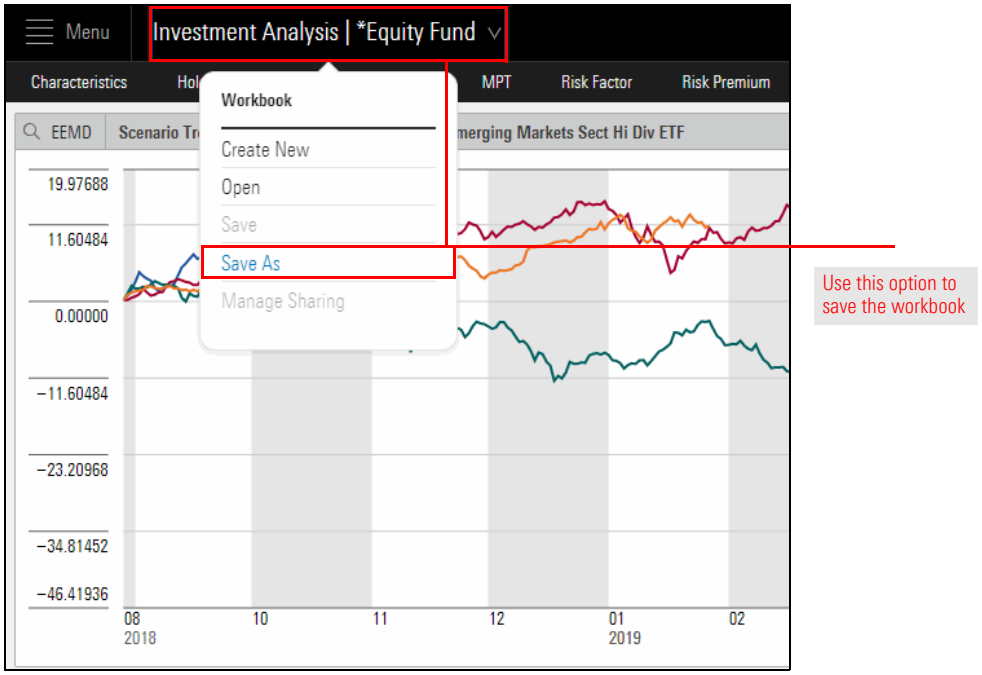
3. From the Edit Components panel, drag-and-drop the **Risk Exposure Snapshot** component beneath the Scenario Trends component.



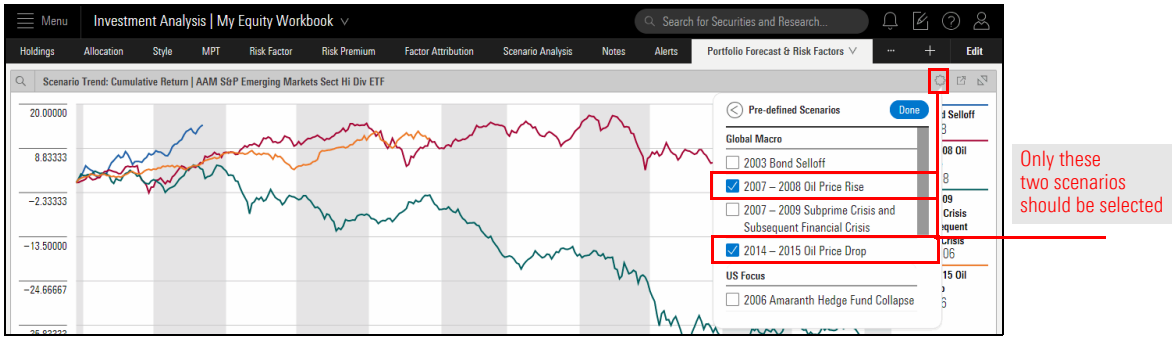
4. Click **Done**.
5. Click the **worksheet tab**, and select **Rename**.

6. Name the worksheet **Portfolio Forecast & Risk Factors**, then click **Save**.

7. To save the custom worksheet you created, from the **workbook menu**, select **Save As**.

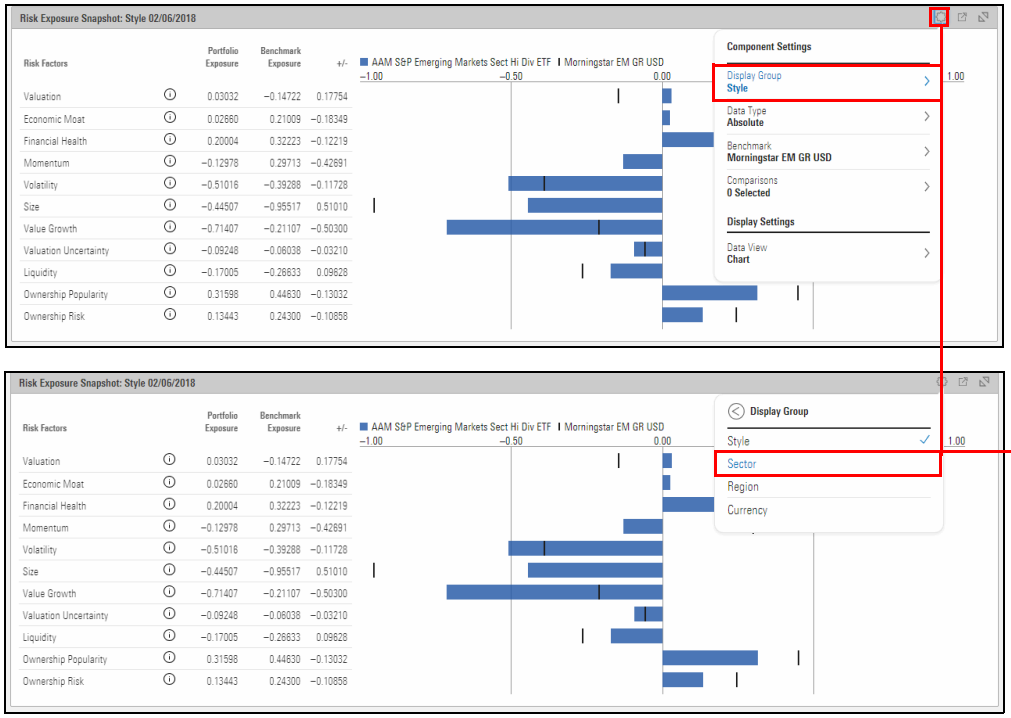


8. Name the workbook **My Equity Workbook**, then click **Save**.
9. In the Scenario Trend component, use the **Component Settings** icon to display only the **Oil Price Drop** and **Oil Price Rise** scenarios.



10. Click away from the Component Settings menu to close it.

11. In the Risk Exposure Snapshot component, use the **Component Settings** icon to change the **Display Group** from Style to **Sector**.



12. Click away from the Component Settings menu to close it.
13. Click the **name** of different funds in the focus panel, to see how their exposure to different sectors (particularly the Energy sector) impacts their performance in the Scenario Trend component at the top of the worksheet.