Working with the Asset Allocation Module in Morningstar DirectSM

The Asset Allocation module in Morningstar DirectSM allows users to determine how much of a portfolio to invest in cash, stocks, bonds, alternatives, and other asset classes. To keep users from having to repeat this process for every model portfolio or investment, the Asset Allocation module allows users to create a series of asset mixes to be reused in a variety of cases.

Additionally, the Asset Allocation module allows users to forecast potential outcomes for an asset mix, and model the risk associated with an asset class lineup. Finally, advisors can also use a Presentation Studio template embedded within the Asset Allocation module to create a meaningful report to analyze the asset class lineup.

This guide includes the following topics:

- Understanding Basic Information about Asset Allocation in Morningstar Direct (page 5)
- Constructing a Set of Asset Classes (page 7)
- Creating an Input File (page 12)
- Modifying the Case File (page 20)

Overview

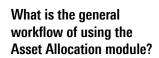
Understanding Basic Information about Asset Allocation in Morningstar Direct

This section explains some introductory concepts about asset allocation and the work that's done for this type of task in Morningstar Direct. The following sections are covered here:

- What is the general workflow of using the Asset Allocation module? on page 5, and
- ► How is the work of asset allocation done? on page 6.

Using the Asset Allocation module includes the following general tasks:

- Build a set of asset classes to be analyzed. This does not entail assigning a weight to these asset classes, but merely giving each asset class a name and associating it with a representative index. Also, users can elect to use a pre-built set of asset classes from Morningstar, rather than needing to construct one from scratch.
- Create an Input file, which consists of the asset class set selected, capital market assumptions (of risk and return) for those asset classes, the distribution model and return methodology being used, and constraints assigned to the asset classes. Users can design their own set of inputs, or use one included in Morningstar Direct.
- 3. Design the Case file for the analysis of the asset allocation. The Case file consists of the actual asset mix(es) being used, the Efficient Frontier, Forecasting information, and a series of workspaces (tabs), which in turn are composed of charts and tables.
 - Note: Users can also elect to generate a Presentation Studio report illustrating the asset allocation lineup designed in the Asset Allocation module.



												Input con
Inputs Optimize												
Untitled - Inp 🔻		Asset Classes		9	Estimates	T 🔁 🖷	1	orts Run Simu				
Active Input	Manage Input		Options	Currency	Estimates	Constraints Layou	t Run Rep	orts Run Simu	lation			
Input Workspace 🗙	Optimizer Worksp	ace 3 orecas	ting Workspace	de l								
nput Summary			20	E	Export 🗆 🗙	Correlations				🖾 🔝 Export	Edit 🗆 🗙	Case file la
sset Classes	Arithmetic Mean	Standard Deviation					 US Large Growth 	 US Large Value 	 US Small-Mid Growth 	 US Small-Mid Value 	Global Larg Cap	
US Large Growth	13.23204	18.89561										1
US Large Value	13.07773	16.15931				 US Large Growth 	1.00	0.90	0.89	0.80	0	
US Small-Mid Growth	12.57527	25.00369				 US Large Value 	0.90	1.00	0.87	0.90	0	
US Small-Mid Value	14.18607	19.64330				US Small-Mid Growth	0.89	0.87	1.00	0.93	0	
Global Large Cap	6.26030	17.30006				 US Small-Mid Value 	0.80	0.90	0.93	1.00	0	
Global Small-Mid Cap	6.78820	17.44792				 Global Large Cap 	0.84	0.87	0.78	0.75	1	
US Government Bond	5.12788	5.98176				 Global Small-Mid Cap 	0.83	0.85	0.79	0.76	0	
US Muni Bond	6.82712	7.01860				US Government Bond	0.05	0.03	-0.00	0.01	0	
US Other Bond	7.48274	5.61881				 US Muni Bond 	-0.02	-0.06	-0.09	-0.09	0	
• Cash	4.57951	1.08274				 US Other Bond 	-0.08	-0.09	-0.16	-0.13	0	
						* Cash	-0.07	-0.05	-0.06	-0.06	0	
Asset Class Statistics (Historical)				Edit 🗆 🗙							
 Untitled - Input File 					<u> </u>							
Asset Classes	Arithmetic Mean	Geometric Mean	Standard Deviation	CVaR Cutoff 5%	VaR Cutoff 5							
US Large Growth	10.67	8,64	20.14	40.51								
US Large Value	9.32	7.78	17.49	37.92								
 US Small-Mid Growth 	10.78	8.30	22.75	41.66								
US Small-Mid Value	10.24	8.46	19.92	30.48								
 Global Large Cap 	8.50	6.13	21.52	46.54								
 Global Small-Mid Cap 	11.01	8.25	23.54	48.21								
 US Government Bond 	5.03	4,86	5.96	8.47								
US Muni Bond	4.76	4.68	4.24	3.68			4				•	
	4.53	4.49	3.11	2.30			1.1					

Asset Allocation traditionally relies on two facets: Log-normal distributions to build assumptions of asset class risk and return, and mean-variance optimization to identify efficient asset mixes providing the greatest expected return for a given amount of expected risk – the series of portfolios known as the efficient frontier.

When developing asset-class assumptions, Morningstar Direct users have access to three distribution models:

- ► traditional log-normal distribution
- ► an enhanced version of log-normal known as the Johnson model, and
- ► the historical-data-based bootstrap method.

Log-Normal distribution, which is traditionally used for modeling asset classes, underestimates the chance of extreme events and it is considered thin-tailed. The Johnson distribution model has the ability to capture those extreme events by accounting for skewness and kurtosis, and it is considered fat-tailed.

Users can also use bootstrap historical data, applying these distribution models, to create asset class assumptions. (For the sake of simplicity, this document focuses on the Log-Normal model.)

Once asset allocation assumptions are established, users can run optimization to build efficient frontiers with various return and risk measures. After identifying optimal asset mixes, users can forecast the future performance of those asset mixes using Wealth and Return Percentiles, Wealth and Return Histograms, Target Wealth and Returns, and Probability of Loss. Users can apply inflation adjustment, cash flows, and rebalancing to forecasting for a more specific prediction of future returns and risk.

How is the work of asset allocation done?

This section shows users how to create a set of asset classes to be analyzed. The **Overview** following exercises are offered here:

- Customize an existing set of asset classes on page 7, and
- Create a custom set of asset classes on page 10.

The first step in using the Asset Allocation module is to select the asset classes to be used in an asset allocation lineup. Users can create a set of asset classes in one of the following ways:

- Use an existing asset class set and make whatever additions or deletions are needed, then save it with a unique name, or
- Manually add each asset class for an asset class set, and map it to a representative index or other benchmark.
 - Note: When creating an asset class set from scratch, users can also use a saved investment list of indexes or ETFs from Morningstar Direct for this purpose.

This exercise shows users how to modify an existing asset class set to create a new one. Although the Asset Allocation module is available in the desktop edition of Morningstar Direct, creating asset class sets is the only activity done here; the remaining asset allocation functionality is done in a browser window. The browser version of the Asset Allocation module also allows users to create asset class sets, so users are best to simply begin the work in the web-based edition of Morningstar Direct rather than in the desktop edition.

To create an asset class set from an existing asset class set, do the following:

- 1. Open a browser window, and go to http://direct.morningstar.com.
 - Note: When logging into the web-based version of Morningstar Direct, it's recommended to use Chrome in incognito mode. although Internet Explorer can also be used.

Exercise 1: Customize an existing set of asset classes

7

2. Hover the cursor over the menu, then select Asset Allocation. The module opens in a new tab.

Home EXPLORE Research	` 	M	RNINGSTA	₽ Direct [€]	
Markets	Q Searc	ch for Sec	curities and Resea	arch	
ANALYZE					
Lists & Screens	ists & Screens		⊠ Create ∨	Model Port	
Model Portfolios	ame	Туре	Last Modified	(i) There are r	
► Your Files	Iultiple Investments	List	02/19/2020	To create a nev	
Custom Data	nported List	List	02/15/2020	upper right-ha	
Import	S Small Value 5 Star Funds &	List	02/12/2020		
Notes	ustom Database	List	02/10/2020		
Alerts	Iorningstar Prospects	List	02/03/2020		
EXTEND	ustainable Landscape U.S. Fu	List	10/22/2019		
Excel Add-In	lodel Portfolio Holdings List	List	09/16/2019		Use the menu to select this option
Presentation Studio	loderate Aggressive	List	08/19/2019		select this option

3. On the toolbar above the grid view, click **Asset Class Setup**. The Asset Class Setup window opens.

\$ Input Files Case Files Investment Policies	Asset Class Setu	ip 🕂 New	Input 🕂 N	ew Case 🛛 🕂	New P	Click this button to a
Name	Distribution Model	Owner	Permission	Last Updated	Creat	a new asset class se
Five-Year	Log-Normal	Morningstar	Read Only	2013-06-14	201	
Johnson	Johnson	Morningstar	Read Only	2013-06-12	201	
Log-Normal	Log-Normal	Morningstar	Read Only	2013-06-20	201	
Log-Normal Constrained	Log-Normal	Morningstar	Read Only	2013-02-23	201	
Log-Normal with Real Estate	Log-Normal	Morningstar	Read Only	2013-02-23	201	
One-Year	Log-Normal	Morningstar	Read Only	2013-02-23	201	
Twenty-Year	Log-Normal	Morningstar	Read Only	2013-02-23	201	
Weighted Historical	Bootstrap Historical	Morningstar	Read Only	2013-02-23	201	

- 4. From the Asset Class Set drop-down field, select Sample US Expanded.
- 5. Check the **Select All box** to the left of the Asset Class column header. All asset classes should be selected.
- 6. Uncheck the box for Gold, as this asset class will not be included in the asset class set.
- 7. Click Save As > Asset Class Set. The Asset Class Set Name dialog box opens.

			Asset	Class Setup			\square ×
Asse	et Class Set						
San	nple US Expande	ed	*	Delete	Rename New Set	🖌 Investment List 👻	
	dd Delete	Save As 🔻					
A		Asset Class Set					Be sure the correct
<u>.</u>	Asset Class	Custom Database	y Index	Base Currency	Frequency	Historical Date Range	asset classes are
~	Non-US Equity		MSCI EAFE PR USD	US Dollar	Monthly	1970-01 to 2020-01	selected, then use Save As menu to
•	US Cash & Equ	ivalents	Citi Treasury Bill 3 Mon I	US Dollar	Monthly	1978-01 to 2020-01	select Asset Class
~	Non-US Gover	nment Bonds	Citi WGBI NonUSD USD	US Dollar	Monthly	1985-01 to 2020-01	
•	Real Estate		FTSE NAREIT All REITS T	I US Dollar	Monthly	1972-01 to 2020-01	
~	US Inflation		US BLS CPI All Urban NS	US Dollar	Monthly	1913-02 to 2020-01	
•	US Small Cap	Value	Russell 2000 Value TR U	US Dollar	Monthly	1979-01 to 2020-01	
~	US Large Cap	Value	Russell Top 200 Value T	US Dollar	Monthly	1986-01 to 2020-01	
•	US Large Cap	Growth	Russell Top 200 Growth	1 US Dollar	Monthly	1986-01 to 2020-01	
~	US Small Cap	Growth	Russell 2000 Growth TR	US Dollar	Monthly	1979-01 to 2020-01	
•	US Corporate	Bonds	Barclays US Corporate H	I US Dollar	Monthly	1983-07 to 2020-01	
~	US Governmer	nt Bonds	Barclays US Govt/Credit	US Dollar	Monthly	1973-01 to 2020-01	
	Gold		London Fix Gold PM PR U	US Dollar	Monthly	1968-05 to 2020-01	
	•						V b
						OK Can	ncel

- 8. Name the asset class set Custom US Expanded, then click OK.
- 9. On the Asset Class Setup window, click **OK** to close it.

To create a unique set of asset classes from scratch, do the following:

1. Click the **Asset Class Setup** button on the toolbar above the spreadsheet grid. The Asset Class Setup window opens.

Exercise 2: Create a custom set of asset classes

\$ Input Files Case Files Investment Policies	Asset Class Setu	ip 🕂 New	Input 🕂 🕂 N	ew Case 🛛 🕂	New P	
Name	Distribution Model	Owner	Permission	Last Updated	Creat	Click this button to add a new asset class set.
Five-Year	Log-Normal	Morningstar	Read Only	2013-06-14	201	
Johnson	Johnson	Morningstar	Read Only	2013-06-12	201	
Log-Normal	Log-Normal	Morningstar	Read Only	2013-06-20	201	
Log-Normal Constrained	Log-Normal	Morningstar	Read Only	2013-02-23	201	
Log-Normal with Real Estate	Log-Normal	Morningstar	Read Only	2013-02-23	201	
One-Year	Log-Normal	Morningstar	Read Only	2013-02-23	201	
Twenty-Year	Log-Normal	Morningstar	Read Only	2013-02-23	201	
Weighted Historical	Bootstrap Historical	Morningstar	Read Only	2013-02-23	201	

2. Click **New Set** > **Create**. The Asset Class Set Name dialog box opens.

Asset Class Set Sample US Consolidated Delete Rename New Set Investment List Add Delete Save As Get Firm-Level Group Asset Class Proxy Index Base Currency Historical Date Range US Equity Russell 3000 TR USD US Dollar Monthly 1979-01 to 2020-01	
Add Delete Save As	Select this control to create an
Add Delete Save As Get Firm-Level Group Asset Class Proxy Index Base Currency Frequency	
Asset Class Proxy Index Base Currency Frequency Historical Date Range	
	class set from
US Equity Russell 3000 TR USD US Dollar Monthly 1979-01 to 2020-01	
US Bonds Barclays US Agg Bond TF US Dollar Monthly 1976-01 to 2020-01	
US Cash Citi Treasury Bill 3 Mon U US Dollar Monthly 1978-01 to 2020-01	
Non-US Bonds Citi WGBI NonUSD USD US Dollar Monthly 1985-01 to 2020-01	
Non-US Equity MSCI EAFE PR USD US Dollar Monthly 1970-01 to 2020-01	

3. Enter the name My Custom Asset Class Set, then click OK.

4. Click Add. The Add Asset Class dialog box opens.

	As	set Class Setup				
Asset Class Set						
My Custom Asset Class Set	•	Delete Re	ename New Set	🗸 Investment List 🗸		
Add Delete Save As 🔻			1			Use this button to
Asset Class	Proxy Index	Base Currency	Frequency	Historical Date Range		add an asset class.
4					Þ	
				OK Ca	ncel	

5. For the **Asset Class Name** and **Proxy Index** fields, use the following table to populate the asset classes:

Pote: To select an index, click once on its name, then click OK to add the asset class.

Asset Class Name	Proxy Index
US Large Growth	Russell 1000 Growth TR USD
US Large Value	Russell 1000 Value TR USD
US Small-Mid Growth	Russell 2000 Growth TR USD
US Small-Mid Value	Russell 2000 Value TR USD
Global Large Cap	MSCI ACWI Ex USA Large NR USD
Global Small-Mid Cap	MSCI ACWI Ex USA Mid NR USD
US Government Bond	S&P US Treasury TIPS TR USD
US Muni Bond	BBgBarc Municipal TR USD
US Other Bond	BBgBarc US Agg Bond TR USD
Cash	FTSE Treasury Bill 3 Mon USD

- 6. Repeat steps 4-5 until all asset classes have been added.
- 7. When all of the asset classes have been added to the set, click **OK** to close the Asset Class Setup window.

Creating an Input File

With an Input file, users choose the settings by which a set of asset classes are constructed, including the time horizon an asset class set should be calculated from when determining expected risk and return values. Establishing these inputs the first step in analyzing and optimizing the allocation among the asset classes in the set.

Note: Updating the Input file also includes changing other variables, such as optimizing asset mixes for risk or return. This function is covered in later exercises.

An Input file contains the following information:

- ► Asset classes
- Expected return methodology
- Capital market assumptions
- Distribution models
- ► Constraints
- ► Currency settings, and
- ► Inflation series.

This section offers the following exercises and information to help users learn how to modify these Input settings as part of the asset allocation work, and how to understand the layout of the Asset Allocation interface:

- Create an input file on page 13
- ► What does the Asset Allocation window show? on page 14
- ► What does the Input Workspace show by default? on page 14
- ► Set the time horizon for analysis on page 15
- ► Analyze the correlation among asset classes on page 18, and
- Save the Input file on page 19.

Overview

To create an input file, do the following:

Exercise 3: Create an input file

1. From the Asset Allocation page, on the toolbar above the grid view, click **New Input**. The Asset Class Selection dialog box opens.

Asset Allocation								
Equity/Credit Research	*	Input Files Case Files Investment Policies	Asset Class Setu	Jp 🕂 New	Input 🕂	Click this		
Local Databases		Name	Distribution Model	Owner	Permission			
Global Databases								
Performance Reporting		Five-Year	Log-Normal	Morningstar	Read Only			
Asset Allocation		Johnson	Johnson	Morningstar	Read Only			
Asset Allocation		Log-Normal	Log-Normal	Morningstar	Read Only			
		Log-Normal Constrained	Log-Normal	Morningstar	Read Only			
		Log-Normal with Real Estate	Log-Normal	Morningstar	Read Only			
		One-Year	Log-Normal	Morningstar	Read Only			
		Twenty-Year	Log-Normal	Morningstar	Read Only			
		Weighted Historical	Bootstrap Historical	Morningstar	Read Only			

 From the Select an Class Set drop-down field, select My Custom Asset Class Set. The asset class set is now displayed in the dialog box, and the Select Model field should be set to Log-Normal.

Asset Clas	ss Selection	
Asset Class Set	Select Model	
Select an asset class set 🔻	Log-Normal 🔻	
Select an asset class set		
Sample US Consolidated		
Sample US Expanded		-
Sample Europe	Base Currency	
- Sample UK		Choose the custom
Sample Japan		asset class set created
EnCorr Sample		in the previous exercise.
Custom US Expanded		
My Custom Asset Class Set		

- 3. Click **OK**. The Input Settings window opens.
 - ☞ Note: This window can also be used to add or delete asset classes from the asset class set.
- 4. Click **OK** to close the Input Settings window. A browser window opens, and the Inputs tab is selected, as well as the Input Workspace sub-tab.
- 5. If needed, **maximize** the new browser window.

What does the Asset

Allocation window show?

The Asset Allocation window is really three distinct elements working together. At the top, is a toolbar. The icons here change based on the tab selected at the top of the window. The majority of the window is taken up by the following areas:

- ► Inputs
- ► Optimizer, and
- ► Forecasting.

These tabs are meant to be used in this order when creating an asset allocation. When a user selects a tab, the corresponding toolbar is selected as well. The components on a tab can be expanded, and some allow users to toggle between seeing information in a table vs. a chart.

Finally, at the bottom of the window is a components panel. Users can drag-and-drop these items onto a tab at any time. The selections here vary based not on which tab at the top is active, but rather on the option selected from the associated menu in the bottom-left corner.

Three components show by default on the Input Workspace on the Input tab. Each is explained in the following table:

What does the Input Workspace show by default?

Component	Description
Input Summary	This component shows the average return and standard deviation for each asset class in the asset class set. The only action a user can take here is to export the data to Microsoft [®] Excel [®] .
Asset Class Statistics (Historical)	This component shows more detailed statistics for the asset classes in the set. The settings can be edited to control what is displayed here.
Correlations	This component shows users how closely correlated the returns are between different asset classes in the set. The less correlation between asset classes, the better. The more asset classes included in an asset class set, the more likely it will be that one or more are highly correlated with one another.

After new Inputs are created, the first step is to check the time horizon for the analysis. By default, historical values for risk and return are used for calculating these same estimates for the asset classes selected, but the values here can be changed.

Exercise 4: Set the time horizon for analysis

To update the estimated values for the asset class set, do the following:

1. From the Input toolbar, click **Estimates**. The Estimates window opens.

Inputs Optimize	r Forecasting						
Untitled - Inp 💌 Active Input	Manage Input	Asset Classes	✓	100 Currency	H. Estimates	Constraint	Start by clicking this icon.
Input Workspace ×	Optimizer Worksp	ace Forecas	ting Worksp	ace 🚽			
Input Summary					Export 🗆 🗙	Correla	
Asset Classes	Arithmetic Mean	Standard Deviation					
 US Large Growth 	13.23204	18.89561					
 US Large Value 	13.07773	16.15931				◆ US La	
 US Small-Mid Growth 	12.57527	25.00369				 US La 	
 US Small-Mid Value 	14.18607	19.64330				+ US Sn	
	6.26030	17,30006				 US Sn 	
 Global Large Cap 						 Globa 	
 Global Small-Mid Cap 	6.78820	17.44792				 Globa 	

2. From the Set-Up sub-tab on the Arithmetic Mean tab, expand the Historical section.

		Estima	tes			×	
Arithmetic Mean Sta	ndard Deviation	Correlation	Input	Summary			
Set-Up Baseline	Settings				_		
Asset Class	Building Block Equity	Building Block Fixed Income	САРМ	Black-Litterman	Historical	User Defined	Note the values being used to calculate estimated return
 US Large Growth 	0	0	0	0	۲	0	values for this asset class s
 US Large Value 	0	0	\bigcirc	\bigcirc	۲	0	
• US Small-Mid Growth	0	0	0	0	۲	0	
 US Small-Mid Value 	0	0	\bigcirc	0	۲	0	
 Global Large Cap 	0	0	0	0	۲	0	
Global Small-Mid Cap	0	0	\bigcirc	\bigcirc	۲	0	
• US Government Bond	0	0	0	0	۲	0	
•	0	0	0	-			
Building Block Equity							
Building Block Fixed Inc	ome						
► CAPM							Click this section to expan
▶ Black-Litterman							onek uns section to expan
Historical							

3. The Start Date for calculating the mean return for each asset class is listed; note that a number of different dates are present. The Input Summary tab on this window uses these time periods to calculate each asset class's arithmetic mean return. To run an analysis using a common time period (namely, the earliest common start date among the asset classes), click **Common Time Period**. then click **Apply**. The Start Date for each asset class updates to display the common start date.

			Estir	nates					×	
Arithmetic Mean Sta	ndard Devia	tion Co	orrelatio	n Inp	ut Sum	imary				
Set-Up Baseline	Settings									
US Small-Mid Growth	0		0	0		0	۲	0	A	
 US Small-Mid Value 	0		\bigcirc	0		\bigcirc	۲	0		
 Global Large Cap 	0		\bigcirc	0		0	۲	0		
Global Small-Mid Cap	0		\bigcirc	0		\bigcirc	۲	0		
• US Government Bond	0		\bigcirc	0		0	۲	0		
4	-		0	0		0		F		
Building Block Equity										
Building Block Fixed Inc	ome									
► CAPM										
Black-Litterman										
Historical										
Start Date	End Da	te		_					-	
				A	pply	Common	Time Period		Use these buttons to	apply
Asset Class	Return	Start Date		nd Date					a common start date	
OO OHIGH PHO OFOWER	Keturn 0.55155	Start Date		end Date	***				calculating the mean for all asset classes in	i the se
 US Small-Mid Value 	1.11163	1979-01		2020-01						
 Global Large Cap 	0.50730	1994-06		2020-01						
Global Small-Mid Cap	0.54881	1994-06		2020-01						
US Government Bond	0.41760	2002-01		2020-01						
					_			•	T	

4. Click the Standard Deviation tab.

- 5. Click **Common Time Period**. then click **Apply**. The Start Date for each asset class updates to display the common start date. The Start Date for each asset class updates to display the common start date.
 - Note: Do not click OK or close the Estimates window, as the next exercise still requires use of this resource.

			E	stimates					×
Arithmetic Mean	Standard	Deviation	Correl	ation II	nput Summa	агу			
Start Date		Ind Date							
					Apply	Com	mon Time P	eriod	
Asset Class		Standard Dev	viation		Start Date		End Date		
US Large Growth				4.83680	1979-01		2020-01		
US Large Value				4.14846	1979-01		2020-01		
US Small-Mid Gro	wth			6.40389	1979-01		2020-01		
US Small-Mid Valu	Je			4.98772	1979-01		2020-01		
Global Large Cap				4.69541	1994-06		2020-01		
Global Small-Mid	Сар			4.71388	1994-06		2020-01		
US Government B	ond			1.64819	2002-01		2020-01		
US Muni Bond				1.90520	1980-01		2020-01		
US Other Bond				1.51724	1976-01		2020-01		
Cash				0.29998	1978-01		2020-01		

When analyzing an asset class set, it is important to check the correlation among them, to ensure no overlap exists.

- 1. The Estimates window should still be open. Click the **Correlation** tab. A common time period should be applied to all asset classes.
- 2. A Condition Number displays in the top-right corner of the tab. This number should be below 20. Anything higher signifies too much overlap between asset classes. If the Condition Number is too high, consider closing this window to remove overlapping asset classes, or change representative indexes used for an asset class.

Exercise 5: Analyze the correlation among asset classes

							<
Arithmetic Mean Sta	ndard Deviatio		timates	Summary		>	
Start Date	End Date			_		lumber: 19.534	Note the Condition Number value
2002-01	2020-01		Calculate	2	Co	rrelation Test	
	 US Large Growth 	 US Large Value 	 US Small- Mid Growth 	 US Small- Mid Value 	 Global Large Cap 	 Global Small-Mid Cap 	
 US Large Growth 	1.00000	0.90455	0.88848	0.79980	0.83643	0.82500	
 US Large Value 	0.90455	1.00000	0.86623	0.90214	0.86501	0.84753	
 US Small-Mid Growt 	0.88848	0.86623	1.00000	0.93005	0.77534	0.78736	
 US Small-Mid Value 	0.79980	0.90214	0.93005	1.00000	0.75186	0.76373	
 Global Large Cap 	0.83643	0.86501	0.77534	0.75186	1.00000	0.98137	
 Global Small-Mid Ca 	0.82500	0.84753	0.78736	0.76373	0.98137	1.00000	
US Government Bor	0.04788	0.03176	-0.00356	0.00971	0.16116	0.19697	
 US Muni Bond 	-0.02256	-0.05738	-0.08727	-0.08657	0.03404	0.06772	
 US Other Bond 	-0.08262	-0.08618	-0.15861	-0.12761	0.02239	0.06125	
 Cash 	-0.06876	-0.04851	-0.06457	-0.06381	0.02831	0.01516	
	•					1	•

3. Click **OK** to close the Estimates window. The Input Summary and Asset Class Statistics (Historical) components on the Input Workspace recalculate.

Now that the Inputs have been updated, users will see in upcoming exercises how to modify the Case file. This includes, in part, picking and modifying the tables and charts appearing on the various tabs in the interface. Before doing that, however, it will be useful to save the Input file itself, so it can be reused with a variety of Case files. In other words, users can design multiple page layouts and plug in the same set of input assumptions. To save the Input file, do the following:

Exercise 6: Save the Input file

1. In the top-left corner of the Morningstar Asset Allocation window, click the **Settings** icon, then choose **Save Inputs As**. The Save Input File dialog box opens.

¢	Inputs Optimizer I	Forecasting				
	Tips Support	😴 ge Input	Asset Classes	✓ Options	(1) Currency	
	Save Case (unsaved) Save Inputs (unsaved) Save Case As	zer Worksp	ace Forecas	ting Workspa	ace	
	Save Inputs As	hetic Mean	Standard Deviation			Use the Settings icon
	Export	9.89446	15.92321			to select this option.
	Sign out	8.75702	15.68762			
+	US Small-Mid Growth	10.27908	21.51126			

- 2. Type My Custom Inputs, then click OK.
- 3. When the confirmation message opens, click **OK**. The name of the Input file appears in the Active Input drop-down field. This field allows users to flip between different Input files within the same Case file.

Inputs Optimize	r Forecasting								
My Custom Inputs Active Input	Manage Input	Asset Classes	✓ Options) Currency	Note the name of t saved Input file her				
Input Workspace × Optimizer Workspace Forecasting Workspace									
Input Summary									
Asset Classes	Arithmetic Mean	Standard Deviation							
 US Large Growth 	9.89446	15.92321							
 US Large Value 	8.75702	15.68762							
• US Small-Mid Growth	10.27908	21,51126							

Modifying the Case File

The Case file in the Asset Allocation module refers to more that just the layout of the charts and tables in the various workspaces. The following capabilities are also included as part of a Case file:

- The associated Inputs file(s)
- Asset mixes
- ► Optimization settings, and
- ► Forecasting settings, such as initial assets and cash flows.

This section offers the following exercises in support of learning how to work with a Case file:

- Optimize the asset allocation set on page 20
- ► Add and modify the Allocation Spectrum component on page 22
- ► Set constraints for an asset allocation on page 24
- ► Input an asset mix on page 25
- Create additional asset allocation mixes on page 27
- Evaluate the total risk for a set of asset classes on page 30
- Evaluate the active risk for a set of asset classes on page 32
- Save an asset mix as a custom benchmark on page 36
- ► Forecast returns for an asset mix on page 37, and
- ► Generate a report from the Asset Allocation module on page 41.

Having established the capital market assumptions and correlations among asset classes, the system can now build an Efficient Frontier using Mean-Variance Optimisation (MVO). Each frontier shows a series of 100 different asset mixes providing the greatest expected return (Y-axis) for a specified level of risk (X-axis).

Exercise 7: Optimize the asset allocation set

To run the simulation, do the following:

- 1. To access the Efficient Frontier, click the **Optimizer Workspace** tab.
- 2. From the toolbar, click **Optimization**. The Optimization Settings window opens.

Inputs Optimiz	er Forecastin	g				
My Custom Inputs 💌 Active Input	Wanage Input	Asset Classes	Optimization	Asset Mixes	Constrai	Click this icon to run the optimization process.
Input Workspace	Optimizer Work	space X Fore	ecasting Workspace	e		
Asset Mix Statistics (Simulated)					

- 3. To the right of Risk drop-down field, select the **Resample checkbox**.
 - Note: Resampling produces more diversified and robust portfolios on the Efficient Frontier, where the system recognizes that capital market assumptions are forecasts and not a "sure thing."

	Optimiz	zation Settings		×
Asset-Only Optimization	O Surplus Optimizat	tion		
Reward	Arithmetic Mean		Ŧ	
Risk	Standard Deviation		 -	🕑 Resample
Return Display Frequency	Annually	r		
Input File	My Custom Inputs		 -	
Select Assets		1		
Asset		Value		
US Large Growth		N/A		
US Large Value		N/A		
US Small-Mid Growth		N/A		
US Small-Mid Value		N/A		
Global Large Cap		N/A		
Global Small-Mid Cap		N/A		
US Government Bond		N/A		
US Muni Bond		N/A		
US Other Bond		N/A		
Cash		N/A		
Settings			ОК	Cancel

- 4. Click **OK**. The Efficient Frontier reloads on the screen.
- 5. From the toolbar, click **Run Simulation**.

Inputs Optimizer Forecasting	T		20.0000	1			1
my custom inputs	Classes Optimization	Asset Mixes Constra	and a second	Layout	Run Reports	43 Run Simulation	Click this icon to
Input Workspace Optimizer Workspace	× Forecasting Workspac	e 📲					update the page
Asset Mix Statistics (Simulated)		Edit	× Efficient Frontier				
			Active Frontier: My	Custom Inputs			
			12				
			11 -		_		
Click 'Run Simulation' to see results for this component			9				1
Circk Run Simulation to see results for this component			3-			/ '	
			Ę				
			Arithmetic Mean	/			
			tthme				
			₹	1			
Composition		💌 🔟 Edit		/•*			
			-				
			3				

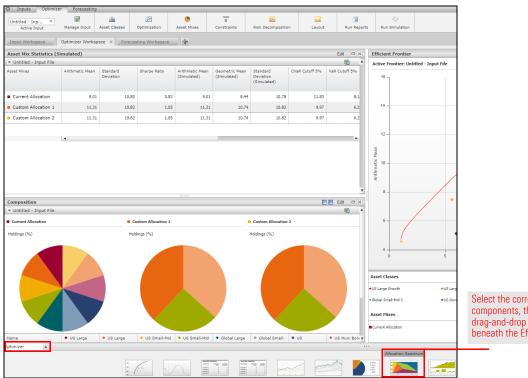
6. **Hover the cursor** over various points on the Efficient Frontier to see the corresponding asset mix for that location.

The Allocation Spectrum component provides additional insight on the possible risk and return outcomes of the various asset allocation mixes available. Each color on the chart represents a different asset class. As with the Efficient Frontier chart, the Allocation Spectrum contains 100 different asset mixes, with the more conservative ones to the left, and the more aggressive ones to the right.

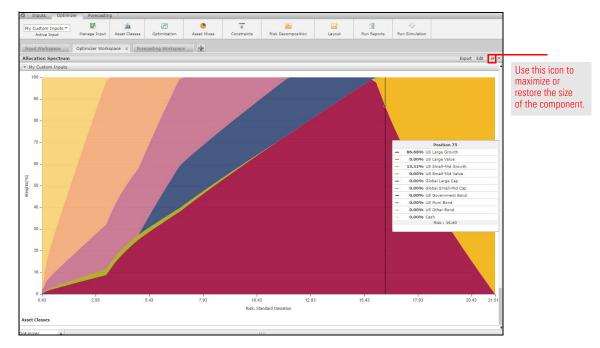
Exercise 8: Add and modify the Allocation Spectrum component

To include this component on the Optimizer Workspace, do the following:

- 1. From the **Components** menu in the bottom-left corner of the window, select the Optimizer components.
- 2. Click-and-drag the Allocation Spectrum component beneath the Efficient Frontier component.



Select the correct set of components, then drag-and-drop this chart beneath the Efficient Frontier. Click the Maximize icon in the component, then hover the cursor over it, to see the various asset allocations available. Note that as risk increases, the exposure to a number of asset classes is 0%.



- 4. Click the **Restore** icon to resize the component.
- 5. To save the change of including the Allocation Spectrum component on the Optimizer Workspace, click the **Settings** icon, then select **Save Case As**.

\$ Inputs Optimizer	Forecasting)			
Tips	W	nla	1	۲	
Support	ge Input	Asset Classes	Optimization	Asset Mi	
Save Case (unsaved)	zer Works	pace × Fore			
Save Inputs					
Save Case As	ed)				Use the Settings icor
Save Inputs As					to select this option.
Save Inputs As Export	netic Mean	Standard Deviation	Sharpe Ratio	Arithme (Simula	to select this option.
	— netic Mean		Sharpe Ratio		to select this option.

- 6. Name the Case file My Custom Case File, then click OK.
- 7. When the confirmation message opens, click **OK**.

Setting constraints can be not just a useful exercise when creating an asset mix, but also a necessary one, in order to ensure each asset class has a minimum representation in a client's asset allocation, as well as to keep an asset class from being overrepresented. However, be careful when setting constraints, because too narrow of a constraint will significantly shrink the Efficient Frontier, and leave that many fewer asset mixes from which to select.

Also, although constraints are being set within the context of working with a Case file, note that these are actually saved as part of the Input file so the latter will need to be saved at the end of the exercise.

To set constraints for an asset allocation set, do the following:

1. From the toolbar, click **Constraints**. The Constraint Settings window opens.

Dinputs Optimize	Forecasting						
My Custom Inputs 🔻 Active Input	Manage Input	Asset Classes	Optimization	Asset Mixes	Constraints	Risk De	Click this icc
Input Workspace	Optimizer Works	pace X Fore	casting Workspace	-			
Asset Mix Statistics (S	imulated)				Edit 🗆 🗙	Efficien	
 My Custom Inputs 					3	Active F	
Asset Mixes	Arithmetic Mean	Standard Deviation	Sharpe Ratio	Arithmetic Mean (Simulated)	Geometric N (Simulated)	Arithmetic Mear 1 - 2 - 6 1 - 1 - 1	
	4				•	Huy 1-	
						, in the second se	
					_	Asset Cla	

- 2. In the **Min Holding** column, type **5** for each row.
 - ☞ Note: Leave the Max Holding value as 100 for each row.

Cons	traint Settings		×	
Individual Group Relative				
Asset Class	Min Holding	Max Holding		The value must be
 US Large Growth 	5	100		entered in each row.
 US Large Value 	5	100		
 US Small-Mid Growth 	5	100		
 US Small-Mid Value 	5	100		
Global Large Cap	5	100		
 Global Small-Mid Cap 	5	100		
 US Government Bond 	5	100		
 US Muni Bond 	5	100		
 US Other Bond 	5	100		
 Cash 	5	100		
			ОК	

3. Click **OK**. The Efficient Frontier and the Allocation Spectrum charts update.

4. To save these constraints, click the Settings icon, then select Save Inputs.

¢.	Inputs Optimizer	Forecasting									
	Tips	V		1	•						
	Support	ge Input	Asset Classes	Optimization	Asset Mi						
7	Save Case	zer Works	ace X Fore	casting Workspace							
7	Save Inputs					Use the Settings i					
	Save Case As	ed)	ed)								
	Save Inputs As										
		netic Mean	Standard	Sharpe Ratio	Arithme						
	Export		Deviation		(Simula						
	Sign out										

When the Optimizer Workspace tab is selected, the Efficient Frontier component initially shows only the asset classes from the asset class set being used. The other two default components are blank; they do not populate until the asset mixes are entered. This exercise shows users how to enter an existing asset allocation, and then optimize it for risk and return.

Exercise 10: Input an asset mix

To input a client's existing asset mix, do the following:

- 1. Click the **Optimizer Workspace** tab.
- 2. From the toolbar on the Optimizer Workspace, click the **Asset Mixes** icon. The Asset Mixes dialog box opens.

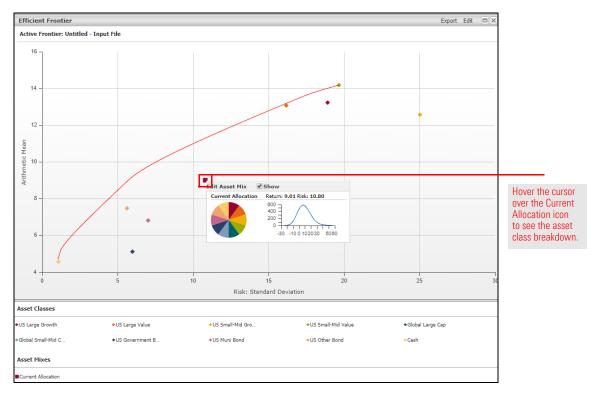
Inputs Optimize	r Forecasting	9				
Untitled - Inp 🔻	Manage Input	Asset Classes	Optimization	Asset Mixes) Constrai	This icon is not seen until the Optimizer Workspace tab is selected
Input Workspace	Optimizer Works	pace × Fore	casting Workspace	-		
Asset Mix Statistics (S	imulated)					
💌 Untitled - Input File						
Asset Mixes	Expected Surplus	Expected Surplus Ratio	Expected Funding Ratio	Surplus Standard Deviation	Arithme	

- 3. Click **Add**. A row is added to the dialog box.
- 4. In the Name field, type Current Allocation.

5. In each asset class field enter 10.

					Asset Mi	xes					□ ×	
Inpu	ut Files											
Unt	itled - Input File		*									
Tota Add		As ▼ Import fr										
_				1				1				1
	Name	US Small-Mid Value	Global Large Cap	Global Small- Mid Cap	US Government Bond	US Muni Bond	US Other Bond	Cash	Total	Show	Description	
	Current Allocation	10.00	10.00	10.00	10.00	10.00	10.00	10.00	100.00		Fixed Weights	Use the Add button to
												input the allocation
												to each asset class.
												1

6. Click **OK**. Note the location of the current allocation relative to the Efficient Frontier.



To create an additional asset mix, the following options are available:

- manually enter an asset allocation, as in the previous exercise
- click a spot on the Efficient Frontier, or
- search for an asset class mix that matches a value, such as a client's existing standard deviation or return.

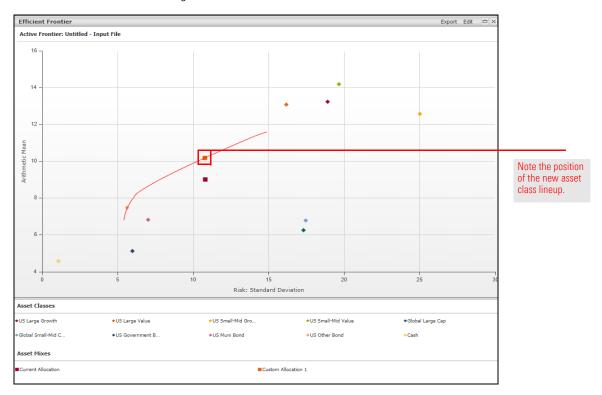
To create a new asset class on the Efficient Frontier component, do the following:

- 1. Position your mouse on the Efficient Frontier line, above the client's existing asset mix, as close to the center of it as possible, then **click once on the Efficient Frontier line**. The Asset Mixes dialog box opens.
- 2. In the Name field, type Custom Allocation 1.

Exercise 11: Create additional asset allocation mixes

					Asset Mi	xes					□ ×	
Input	t Files											
Untit	tled - Input File											
Total	: 2 Selected: 0											
Add	Delete Search Save	e As 🔻 Import	from 🔻									
	Name	US Large Growth	US Large Value	US Small-Mid Growth	US Small-Mid Value	Global Large Cap	Global Small- Mid Cap	US Government Bond	Total	Show	Description	
	Current Allocation	10.00	10.00	10.00	10.00	10.00	10.00	10.00	100.00	v	Fixed Weights	
	Custom Allocation 1	5.00	20.80	5.00	20.69	5.00	5.00	5.00	100.00	 Image: A start of the start of	Fixed Weights	Note the new
]]				
			1						•			and the name

3. Click **OK**. On the Efficient Frontier component, note the location of this new asset allocation relative to the client's original asset mix.



To select an asset mix based on an existing value in a current asset mix, do the following:

- 1. From the Asset Mix Statistics (Simulated) component, in the Current Allocation row, write down the **Standard Deviation value**.
- 2. Click the Asset Mixes icon. The Asset Mixes dialog box opens.

Inputs Optimizer	r Forecasting					
Untitled - Inp 🔻 Active Input	Manage Input	Asset Classes	Optimization	Asset Mixes	Constrai	
	Optimizer Works	bace X Fore	casting Workspace	4		
Asset Mix Statistics (Si Untitled - Input File	mulated)					
Asset Mixes	Arithmetic Mean	Standard Deviation	Sharpe Ratio	Arithmetic Mear (Simulated)	Geomet (Simula	vvnie down mis value
Current Allocation	9.01	10.	30 0.4	33 9.0	1	
Custom Allocation 1	11.31	10.	32 1.0	11.3	1	

3. Click the **Search** button. The Asset Mix Search dialog box opens.

				Asset Mi	xes	
Input Files						
Untitled - Input File		T				
Total: 2 Selected: 0						
Add Delete Search Save	As 🔻 Import	from 💌				Click this button to
Name	US Large Growth	US Large Value	US Small-Mid Growth	US Small-Mid Value	Global Large Cap	an asset mix based Standard Deviation recorded in step 1 a
Current Allocation	10.00	10.00	10.00	10.00	10.00	
Custom Allocation 1	5.00	20.80	5.00	20.69	5.00	

- 4. From the **Search for** drop-down field, select **Standard Deviation**.
- 5. In the **of** field, type the **Standard Deviation value** from step 1.
- 6. In the Name field, type **Custom Allocation 2**.

	Asset Mix Search
Search for One Asset Mix	Search for Multiple Asset Mixes
Search for of with reward of	Standard Deviation Resample 10.80 (risk) Arithmetic Mean The second second
Name	Custom Allocation 2 ✔ Do not adjust Asset Mix if Efficient Frontier changes µ

- 7. Click **OK** to close the Asset Mix Search dialog box.
- 8. Click **OK** to close the Asset Mix dialog box. The new asset allocation lineup appears in the three components on the workspace.

The next two exercises teach users how to make use of the Risk Decomposition table. Risk decomposition refers to breaking down the distribution of risk in an asset allocation lineup. From which asset classes does the most or least risk come from? How can an asset allocation lineup be altered in order to increase or decrease overall risk?

Risk decomposition gives users the ability to identify how the risk portion of a specific Asset Mix breaks down and how it can change if the allocation to each asset class is altered. Risk decomposition includes the following components:

- ► What asset classes contribute to the overall standard deviation (Total Risk), and
- ► What asset classes contribute to the overall tracking error (Active Risk).

To evaluate the total risk decomposition for an asset class set, the Risk Decomposition table must be added to the Optimizer Workspace. Do the following:

1. From the toolbar in the Optimizer Workspace, click the **Risk Decomposition** icon. The Risk Decomposition dialog box opens.

Inputs Optimizer	r Forecasting						_	
Untitled - Inp 🔻	Manage Input	Asset Classes	Optimization	Asset Mixes	Constraints	E Risk Decompositio	n	Click this icon to begin the risk comparison.
Input Workspace								
Asset Mix Statistics (Si	mulated)							
Untitled - Input File								
Asset Mixes	Arithmetic Mean	Standard Deviation	Sharpe Ratio	Arithmetic Mean (Simulated)	Geometric Mean (Simulated)	Standard Deviation (Simulated)	CVaR C	
Current Allocation	9.01	10.8	0.83	9.0:	L 8.4	4 10.78		
Custom Allocation 1	10.18	10.7	7 0.95	10.19	9.6	2 10.76		
Custom Allocation 2	10.18	10.7	7 0.95	10.19	9.6	2 10.76		
	•							

- 2. The Benchmark (Optional) field can be left as "None." A benchmark is not needed when calculating total risk, but is needed when calculating active risk. Click **OK**.
- 3. The components menu in the bottom-left corner of the screen should show the **Optimizer** components.
- 4. Click-and-drag the Risk Decomposition component beneath the Efficient Frontier component.



- 5. Click the Maximize icon in the component.
- 6. Collapse the Client Current Allocation asset mix.

Exercise 12: Evaluate the total risk for a set of asset classes

- 7. Note the values in the Percentage Contribution to Asset Mix SD column. Which asset class has the largest value here? How does it compare to the value in the Percentage Contribution to Asset Mix Return? Is the amount of risk being taken being compensated with return, or no? If not, consider reallocating weights among the asset classes.
- 8. Expand the Custom Allocation 2 asset mix.

	ge Input Asset Clas	sses Optimizat	ion Asset Mix	ces Constrain	nts Risk Dec	composition
Input Workspace Optimi	zer Workspace 🗙	Forecasting Worl	kspace 🚽			
isk Decomposition						
sset Mix, Asset Class	Asset Mix Weight	Contribution to Asset Mix SD	Percentage Contribution to Asset Mix SD	Marginal Contribution to Asset Mix SD	Asset Mix Return	Percentage Contribution to Asset Mix Return
 Current Allocation 	100.00	10.35	100.00		7.19	100.00
Custom Allocation 1	100.00	10.47	100.00		7.76	100.00
Custom Allocation 2	100.00	10.36	100.00		7.72	100.00
 US Large Growth 	38.07	5.89	56.86	15.48	9.89	48.77
 US Large Value 	5.00	0.73	7.06	14.63	8.76	5.67
 US Small-Mid Growth 	5.00	0.98	9.45	19.59	10.28	6.66
 US Small-Mid Value 	5.00	0.87	8.38	17.36	9.94	6.44
 Global Large Cap 	5.00	0.81	7.77	16.11	7.44	4.81
 Global Small-Mid Cap 	5.00	0.84	8.13	16.86	9.67	6.26
 US Government Bond 	17.04	0.20	1.94	1.18	5.13	11.31
 US Muni Bond 	9.90	0.03	0.33	0.35	4.85	6.22
 US Other Bond 	5.00	0.01	0.08	0.17	4.64	3.00
 Cash 	5.00	-0.00	-0.01	-0.02	1.33	0.86

Compare each asset class' contribution to risk to its contribution to return.

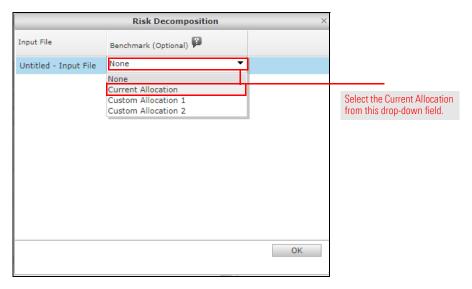
In order to calculate the active risk (tracking error) for an asset class set, another asset mix is needed to serve as the benchmark from which deviation is measured. To calculate the active risk for an asset class mix, do the following:

Exercise 13: Evaluate the active risk for a set of asset classes

1. From the toolbar in the Optimizer Workspace, click the **Risk Decomposition** icon. The Risk Decomposition dialog box opens.

Inputs Optimize	r Forecasting				_			
Untitled - Inp 🔻	Manage Input	Asset Classes	Optimization	Asset Mixes	1 Constraints	E Risk Decompositio	m	Click this icon to the risk comparis
Input Workspace	Optimizer Works	bace X Foreca	sting Workspace	÷				
Asset Mix Statistics (Si	imulated)							
 Untitled - Input File 								
Asset Mixes	Arithmetic Mean	Standard Deviation	Sharpe Ratio	Arithmetic Mean (Simulated)	Geometric Mean (Simulated)	Standard Deviation (Simulated)	CVaR C	
 Current Allocation 	9.01	10.80	0.83	9.01	8.44	10.78		
Custom Allocation 1	10.18	10.77	0.95	10.19	9.62	10.76		
Custom Allocation 2	10.18	10.77	0.95	10.19	9.62	10.76		
	•							

2. From the **Benchmark (Optional)** drop-down field, select **Current Allocation**.



- 3. Click **OK**. The Risk Decomposition table refreshes and additional columns appear in the table. The table can be customized to remove some data columns from view.
- 4. Collapse the Client Current Allocation asset mix.

5. In the Risk Decomposition component, click **Edit** > **Settings**. The Settings dialog box opens.

\$	Inputs Optimizer For	ecasting											
M	Custom Inputs -	ille	2	•	*				1	-9			
	Active Input Manage	Input Asset Clas	ises Optimizati	on Asset Mb	ces Constrai	nts Risk Der	composition	Layout	Run Reports	Run Simulation			
In	put Workspace Optimize	r Workspace X	Forecasting Work	space 👘									
Ris	k Decomposition										Export	Edit 8	
Assi	et Mix, Asset Class	Asset Mix Weight	Contribution to Asset Mix SD	Percentage Contribution to Asset Mix SD	Marginal Contribution to Asset Mix SD	Benchmark Weight	Contribution to Benchmark SD	Percentage Contribution to Benchmark SD	Marginal Contribution to Benchmark SD	Active Weight	Contribution to Active Risk	Percent Contribu Active P	Click this button to change the columns
۲	Current Allocation	100.00	10.35	100.00		100.00	10.35	100.00	NaN	0.00			showing in the table
۲	Custom Allocation 1	100.00	10.47	100.00		100.00	10.35	100.00	NaN	0.00	1.94		
ė	Custom Allocation 2	100.00	10.36	100.00		100.00	10.35	100.00	NaN	0.00	1.91		
	US Large Growth	38.07	5.89	56.86	15.48	10.00	1.47	14.23	14.72	28.07	1.20		
	 US Large Value 	5.00	0.73	7.06	14.63	10.00	1.48	14.34	14.84	-5.00	0.05		
	• US Small-Mid Growth	5.00	0.98	9.45	19.59	10.00	1.99	19.22	19.89	-5.00	0.07		
	 US Small-Mid Value 	5.00	0.87	8.38	17.36	10.00	1.84	17.75	18.37	-5.00	0.27		
	 Global Large Cap 	5.00	0.81	7.77	16.11	10.00	1.66	16.06	16.62	-5.00	0.13		
	 A clobal constraint with con- 	5.00	0.04	0.12	10.00	10.00	1.75	16.03	17.00	5.00	0.17		

6. Expand the Columns section.

- 7. Hide the following standard-deviation related data points by **deselecting** the following columns:
 - Contribution to Asset Mix SD
 - Percentage Contribution to Asset Mix SD
 - Marginal Contribution to Asset Mix SD
 - Contribution to Benchmark SD
 - Percentage Contribution to Benchmark SD, and
 - Marginal Contribution to Benchmark SD.

Settings X	
Display +	
Columns	
 Asset Mix Weight 	
Contribution to Asset Mix SD	
Percentage Contribution to Asset Mix SD	
Marginal Contribution to Asset Mit SD	
 Benchmark Weight 	
Contribution to Benchmark SD	
Percentage Contribution to Benchmark SD	
 Marginal Contribution to Benchmark SD 	
 Active Weight 	
 Contribution to Active Risk 	
Percentage Contribution to Active Risk	
Marginal Contribution to Active Risk	
Asset Mix Return	
Percentage Contribution to Asset Mix Return	

Take note of which columns have been hidden.

- 8. Close the Settings dialog box.
- 9. Consider the following questions:
 - ► What is the overall Contribution to Active Risk for the asset mix?
 - ► Which asset class has the highest Marginal Contribution to Active Risk?
 - Which has the lowest Marginal Contribution to Active Risk? Consider moving weight from asset classes with the highest Marginal Risk to the those with the lowest value in that column.

My	Active Inputs ▼ Manage		ises Optimizat	ion Asset Mix	kes Constrai		emposition	
In	put Workspace Optimize	r Workspace 🗙	Forecasting Worl	kspace 🗗				
Ris	k Decomposition							
Asse	et Mix, Asset Class	Asset Mix Weight	Benchmark Weight	Active Weight	Contribution to Active Risk	Percentage Contribution to Active Risk	Marginal Contribution to Active Risk	Take note of th asset classes w
Ŧ	 Current Allocation 	100.00	100.00	0.00				the highest and
ŧ	Custom Allocation 1	100.00	100.00	0.00	1.94	100.00		lowest values h
-	Custom Allocation 2	100.00	100.00	0.00	1.91	100.00		
	• US Large Growth	38.07	10.00	28.07	1.20	62.85	4.27	
	 US Large Value 	5.00	10.00	-5.00	0.05	2.62	-1.00	
	• US Small-Mid Growth	5.00	10.00	-5.00	0.07	3.71	-1.42	
	 US Small-Mid Value 	5.00	10.00	-5.00	0.27	13.94	-5.32	
	 Global Large Cap 	5.00	10.00	-5.00	0.13	6.95	-2.65	
	 Global Small-Mid Cap 	5.00	10.00	-5.00	0.17	8.69	-3.32	
	• US Government Bond	17.04	10.00	7.04	0.03	1.51	0.41	
	 US Muni Bond 	9.90	10.00	-0.10	-0.00	-0.02	0.31	
	• US Other Bond	5.00	10.00	-5.00	-0.01	-0.38	0.14	
	 Cash 	5.00	10.00	-5.00	0.00	0.11	-0.04	

10. Click the **Restore** icon to resize the component.

To save an asset allocation as a custom benchmark, do the following:

1. From the toolbar on the Optimizer Workspace, click the **Asset Mixes** icon. The Asset Mixes dialog box opens.

Exercise 14: Save an asset mix as a custom benchmark

- 2. Check the **box** to the left of **Custom Allocation 2**.
- 3. Click the **Save As** button, then select **Save as Custom Benchmark**. The Save as Custom Benchmark dialog box opens.

						Asset Mi	xes				
Inpu	ut Files										
Unt	titled - Input File			*							
Tota	al: 3 Selected: 1										
Add	Delete Search	Save As 🔻	Import fr	rom 🔻							
	Name	Save as Cus	tom Bench	mark	US Small-Mid	US Small-Mid	Global Large	Use this command to save the			
		Add to Exist	ing Custon	n Benchmark	Growth	h Value	rowth Value	owth Value Cap	rowth Value Cap		selected asset mix as a custom
	Querrat Alleration		10.00	40.00	40.00	10.00	10.00	benchmark in Morningstar Direct			
	Current Allocation		10.00	10.00	10.00	10.00	10.00				
	Custom Allocation 1	4	5.00	20.80	5.00	20.69	5.00				
v	Custom Allocation 2		5.00	20.80	5.00	20.69	5.00				
		1					1				
		A		(4 4	(4	(

- 4. Change the Portfolio Date field at the top to the most recent month-end date.
- 5. Check the **box** to the left of **Custom Allocation 2**.
- 6. Click **Apply**. The Portfolio Date in the Apply to area changes to match that in the Setting area.

	Save as Custom Benchmark							
Set	ting							
Base	e Currency	Portfolio Date						
US	Dollar 👻	01/31/2020 📖				-		
Арр	ly to							
	Asset Mix	Base Currency	P	Portfolio Date				
	Custom Allocation 2	US Dollar	(02/16/2020				
						It is only after Apply is clicked that the		
						is clicked that the two highlighted		
						dates will match.		
					Apply			
					Арріу	<u> </u>		
					OK Cancel			
				-				

- 7. Click **OK** to close the Save as Custom Benchmark dialog box.
- 8. When the confirmation message opens, click OK.
- 9. Click **OK** to close the Asset Mixes dialog box.

The Forecasting Workspace shows potential investment outcomes if a client were to put money into an asset allocation lineup. Four components are included by default here. Several settings can be updated in these components, including toggling between graphs and tables, changing the initial investment amounts, and deciding whether to map an accumulation scenario or a draw-down scenario.

A wide variety of options is available when forecasting outcomes in the Asset Allocation module. For example, users can project what would happen if a client made regular contributions to an asset allocation, what would happen for someone in retirement who needed annual income, or a combination of contributions and withdrawals. This exercise shows users how to forecast the outcomes for a retirement withdrawal scenario, and then review what that cash flow will actually look like.

To use the Forecasting feature, do the following:

- 1. Click the Forecasting Workspace.
- 2. From the Forecasting toolbar, click the **Forecasting** icon. The Forecasting Settings window opens.

🍄 Inputs Optimi	zer Forecasting					
Untitled - Inp 🔻 Active Input	Manage Input	Asset Mixes	Forecasting	Layout	E Run Re	This icon is not available unless The Forecasting tab is selected
Input Workspace	Optimizer Works	pace Forec	asting Workspace	×		
Wealth Percentiles						
 Untitled - Input File 						
Current Allocation		• C	Custom Allocation 1			
20.0			20.0			
15.0			15.0			
10.0 -			10.0 -			
		2				

Exercise 15: Forecast returns for an asset mix

3. On the Basic tab, the Initial Assets field is set to \$1. Because this exercise covers a decumulation scenario, change the **Initial Assets** field to **1000000**.

Forecasting Settings	
Basic Display Cash Flows Time Varying Mix	
Initial Date Back History Simulations 2020 Image: Don't Show ▼ 2000	
Initial Assets Display Currency 1000000 US Dollar T	Update this field to a value of one million.
Data Frequency Forecasting Frequency Return Display Frequency Monthly Annually Annually	
Rebalancing Always Rebalance	
Use random seed Inflation adjust 👔	

- 4. Click the **Display** tab.
- 5. The scenario should project out 30 years in the future, which is not an option by default. For the **Project Year** area, click in the input field, type **30**, then click **ADD**.

Forecasting Settings	×	
Basic Display Cash Flows Time Varying Mix		
Percentiles		
95 50 5	ADD	
Project Year		
5 10 20	30 ADD REMOVE	Note the value to enter in this field, and the button to click.
Target Return		
0 8 15	ADD REMOVE	
Target Value		
8		

6. Click the **Cash Flows** tab.

7. Click Add. The Add Cash Flow dialog box opens.

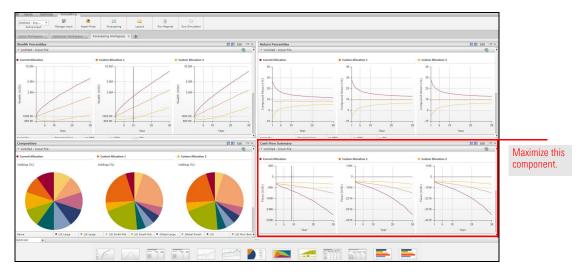
Forecasting	Settings ×	
Basic Display Cash Flows Time Varying	Mix	
Add Edit Delete		Click this button to add the details
Start Date End Date Type	n Time Amount Minimum Description Periods or Percent Amount	around the cash flow for the scenario.

- 8. In the Start Date field, enter 2021
- 9. In the **End Date** field, scroll right and enter **2050**.
- 10. From the **Type** drop-down field, select % of most recent value.
- 11. In the Percent field, type -5.
 - ☞ Note: The value here needs to be negative, to correctly calculate the withdrawal amount.
- 12. In the Description field, type Retirement Drawdown.

Add Cash Flow	Add Cash Flow ×						
Start Date End Date							
Type Per % of most recent value -5	rcent	Note the values for					
Set Absolute Minimum Monetary Amount	2	the highlighted areas.					
Description							
Retirement Drawdown							
	OK Cancel						

- 13. Click **OK** to close the Add Cash Flow dialog box.
- 14. Click **OK** to close the Forecasting Settings window.

15. In the Cash Flow Summary component, click the **Maximize** icon. This component is described in the next section.



The Cash Flow Summary component shows how much money a client will potentially be able to withdraw on an annual basis if they adhere to the asset allocation over time. Note the following important points about this component:

- ► For each year, three possible outcomes are shown. The 95th percentile is the best possible outcome; only a 5% chance exists of this happening. The 5th percentile is the bear-market scenario. There's a 95% chance the client will have at least this much money in a particular year. The 50th percentile represents the midpoint of outcomes for any one year. Half of the outcomes were worse than this value, and half were better.
- Focus on the asset allocation being recommended, and compare it to the client's current asset allocation. For instance, what is the 5th Percentile value in year 30 for the Current Allocation vs. Custom Allocation 2?
- ► Move the cursor over each graph to see the outflow values for any particular year.

What does the Cash Flow Summary component show? To generate a report using a Presentation Studio template directly from the Asset Allocation module, do the following:

 From the toolbar, click the **Run Reports** icon. The Run Report dialog box opens. The Template drop-down field should show the Asset Allocation Analysis (Morningstar Template). Exercise 16: Generate a report from the Asset Allocation module

Inputs Optimiz	er Forecasting]					
Untitled - Inp 💌 Active Input	Manage Input	Asset Mixes	Forecasting	Layout	🗐 Run Reports	Run Sin	Click this icon to generate a report.
Input Workspace	Optimizer Works	pace Forec	asting Workspace	×			
Cash Flow Summary							
Untitled - Input File							
Untitled - Input File Current Allocation						Custom	
	1					Custom (
Current Allocation							
Current Allocation							
Current Allocation							
Current Allocation							
Current Allocation							

- 2. Check the box to the left of Current Allocation and Custom Allocation 2.
- 3. In the File Name field, type Recommended Asset Allocation.
- 4. Click **Run Report**. The dialog box closes, and a clock icon appears on the Run Report icon on the toolbar as the report is being processed.

	Run Report	×	
Setup report settings and click " F	Run Report " to generate repo	rt.	
Please ensure the template you cl Otherwise, portions of your report To change a report template, plea	t may be blank or may show du	plicate data.	
Template Asset Allocation Ar	nalysis (Morningstar Template)	•	
Asset Mix	Input File	Distribution Model	
Current Allocation	Untitled - Input File	Log-Normal	
Custom Allocation 1	Untitled - Input File	Log-Normal	
Custom Allocation 2	Untitled - Input File	Log-Normal	
File Name Untitled			
			Select both asset mix then click this buttor
		Run Report	

5. When the report is ready, the Run Report icon shows a green check mark. To see the report, click the **Run Report** icon. The Run Report dialog box opens.



6. Click the **Report Complete:** link. The report will either be downloaded, or open in a new window, depending on the user's browser settings.

Run Report ×	
Report complete: Untitled	Click this link to see the report
Completed on 15:31 02/17/2020	Click this link to see the report.
Run New Report Close	

7. Click **Close** to close the Run Report dialog box.