

## OVERVIEW

Arius can display factors from external sources as a row on your exhibits. For example, these might include industry factors from sources such as NCCI, AM Best, or S&P Cap IQ Pro (formerly S&P Global Market Intelligence), or they could be the result of your own countrywide analysis that are being displayed on state analyses. External factors are loaded from a CSV file or an Excel workbook into Arius and mapped to the appropriate Arius segments, then can easily be refreshed when the source file is updated in the future.

In addition, Arius has the capability to automatically extrapolate or compress the tail factor of the external factors to match the number of development periods in the Arius project, as well as the option to interpolate factors to ensure these benchmarks share similar data structure properties to those of your Arius project.

1. Create an Excel or CSV file with rows of factors you want to display on your Arius exhibits.
2. In Arius, load your external factor file under **EXHIBIT OPTIONS | EXTERNAL FACTORS** and map the rows of factors to your Arius segments. (Arius can compress, interpolate, or extrapolate the factors from the external file to fit the structure of your Arius project, if needed.)

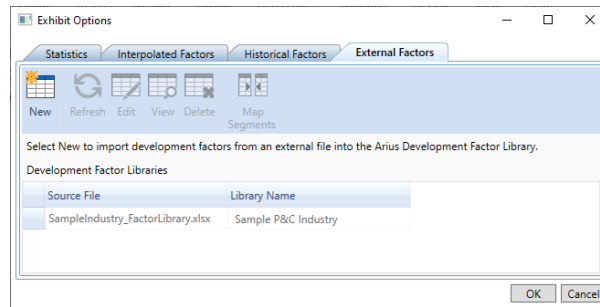
External factors will now appear on your exhibits below the statistics and historical selections rows with the row label you defined in the external factor file.

3. In subsequent analyses, you can either update the external factor file (structure and/or values) and refresh those factors in Arius, or simply have Arius interpolate/extrapolate to fit the new structure.

## DETAILED STEPS

1. Create a new external factor file. There are several ways to do this.
  - Use the demo Excel file as a template – **Open** Documents\Milliman\Arius\DemoFiles\SampleIndustry\_FactorLibrary.xlsx and **Save As** a new file name.
  - Use Arius SDF export as a template – **Open** an Arius file that has development factor selections (Documents\Milliman\Arius\DemoFiles\Arius Sample.apj is a fully populated demo file) and select **FILE | EXPORT SDFs**. Rename the resulting CSV file.
  - Use Arius SDF export as your production file – **Open** your Arius file that has development factor selections and select **FILE | EXPORT SDFs**. You can then use the factors exported from this Arius project as external factors in other Arius projects or as a template.
2. If working with a new template file, keep only the first row (headers) and delete or modify the remaining rows, populating them as follows:
  - **Library Name:** This is the first piece of a two-part label you will use for mapping factors from the external file to Arius segments and that will appear on your exhibit. Example: AMBest2019.
  - **Segment:** This is the second piece of a two-part label you will use for mapping factors from the external file to Arius segments and that will appear on your exhibit. The segment name may come directly from your factor source (e.g., S&P Cap IQ Pro Schedule P line of business name) or you may manually create it. The segment name in the external file does not need to match your Arius segment name.

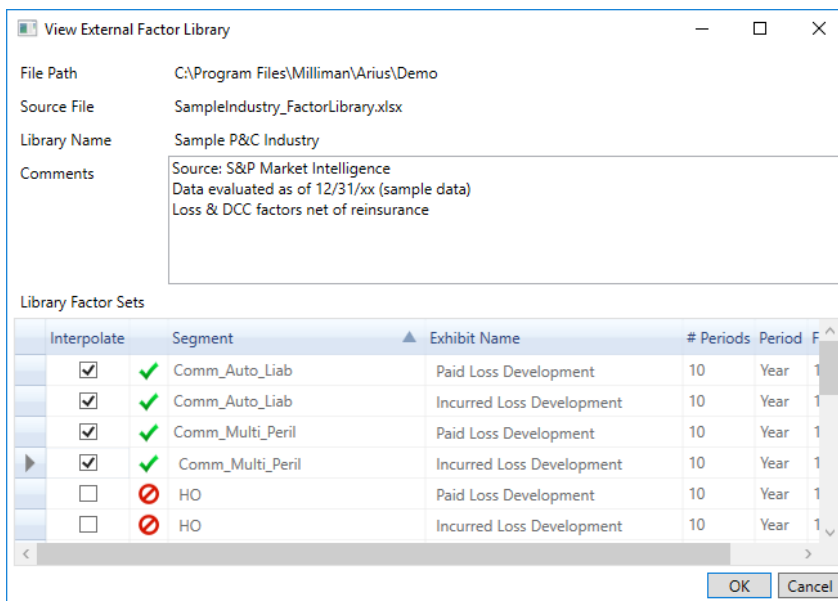
- TIP: You can map numerous external factor Library Name/Segment combinations to a single Arius segment. You can also map one Library Name/Segment external factor row to multiple Arius segments.
  - **Exhibit Name:** Enter the name of the exhibit in Arius where you want these factors to appear. The name must exactly match the exhibit name in Arius and is case sensitive.  
Example: Paid Loss Development
  - **Number Periods:** Enter the number of development periods in your factor set. The system will assume the last factor is your tail factor.
    - If the **Number Periods** in your external file is greater than the number of development periods in your Arius project (in PROJECT SETTINGS | DATA STRUCTURE), Arius will automatically compress the tail factor.
    - If the **Number Periods** in your external file is less than the number of development periods in your Arius project, Arius will automatically extrapolate the tail factor.
  - **Period Length:** This describes your development periods and is case sensitive. Valid and required entries are **Year**, **Half Year**, **Quarter**, or **Month**.
    - If the **Period Length** in your factor set is of greater duration than the **Length of Development Period** in your Arius project (e.g., you want to use annual external factors in an Arius project that has quarterly development periods), you have the option to interpolate these values for display on your Arius exhibits (e.g., from yearly to quarterly factors).
    - If the **Period Length** in your factor set is of less duration than the **Length of Development Period** in your Arius project, you have the option to compress these values for display on your exhibit (e.g., from quarterly to 12-month).
  - **First Period:** This is the first development age in months.
    - If the **First Period** in your factor set is different from the **First Development Age** in your Arius project (in PROJECT SETTINGS | DATA STRUCTURE), you have the option to interpolate these values for display on your Arius exhibits (e.g., from 12, 24, 36... factors to 9, 21, 33 factors).
  - **1, 2, 3, ... , number periods:** Enter the appropriate factor for each period as designated in the respective column heading (1, 2, 3, etc.). The factors should be entered as incremental age-to-age values.
3. Add the external factors to your Arius project:
- Open your Arius project and go to EXHIBIT OPTIONS | EXTERNAL FACTORS.
  - Click **New** then **Browse** to your external factors file and click **OPEN**.
  - Enter optional comments describing your source file, noting the date and time the factors were loaded or any other documenting information, then click **OK**.
  - You should see the **Source File** and **Library Name** displayed in the External Factors dialog.





4. Select the factor sets that you would like to interpolate.

- Click on the arrow to the left of a **Source File** to select the file, then click **View**.

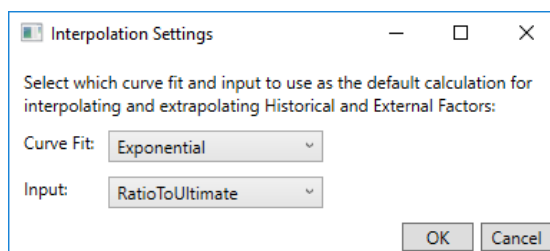
Check the box to the left of any library factor sets that are currently incompatible with your Arius project structure that you would like interpolated to the current project structure.



Note

You will see a  beside any factor set where the **Period Length** or **First Period** from your External Factor file does not match that of the Arius project settings. Once you select to interpolate these factor sets, you will see a  in the Interpolate column indicating this factor set is now compatible and can be displayed.

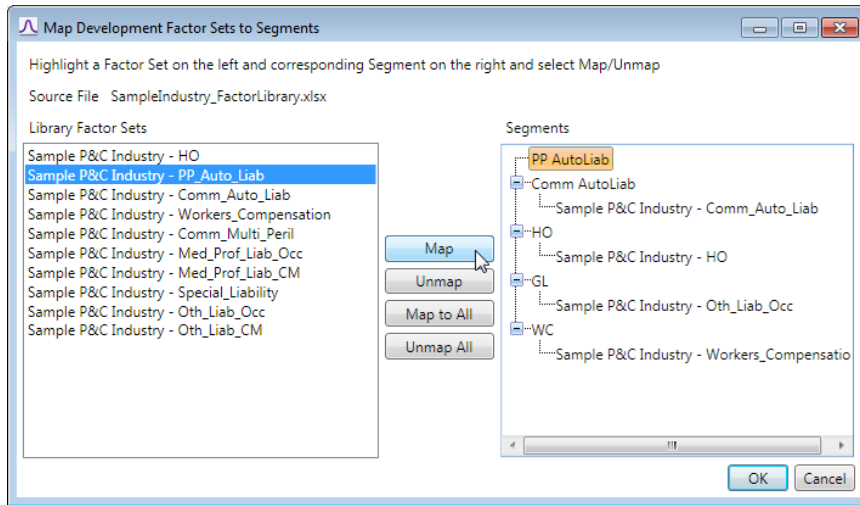
- Move to the EXHIBIT OPTIONS | INTERPOLATED FACTORS tab where you will find the **Set Default** button to select which interpolation curve fit (e.g., Linear, Exponential, Weibull, or Inverse Power) and input (Cumulative factors or Ratio to Ultimates) to use in the interpolation algorithms for interpolating Historical and External Factor libraries.



Note

Arius defaults to an Exponential curve fit using Ratio to Ultimate as input when no selection is made.

- For more information on the details behind the interpolation calculations, refer to the *Interpolation and Extrapolation* document found under **HELP | USER DOCUMENTATION** in Arius.
5. Select which factor sets to display on your exhibit by mapping the external factors to your segments in Arius.
- On the **EXHIBIT OPTIONS | EXTERNAL FACTORS** tab, click on the arrow to the left of the Source File to select the file, then click **Map Segments**.
  - The dialog window shown below opens where you will map the external **Library Factor Sets** shown in the list on the left to the Arius **Segments** shown in the list to the right.



**Note**

You can map numerous Library Factor Sets to a single Arius segment. You can also map one external factor set row to multiple Arius segments.

- Select one or more factor sets on the left and select a segment name in the Arius file on the right and click **Map**.
  - Repeat this until you have mapped all factors from the left window that you wish to display on your Arius exhibits. When you are done click **OK**.
6. Review the external factors in your exhibits.
- In Arius, open the exhibits named in your external factor file. You will see the new external factors listed on your exhibit, below statistics and prior selections.
  - Note that external factors can be Set as Default, similar to statistics, historical factors, and tail factor cells/rows.
7. Once external factors have been loaded, you can **View/Edit/Refresh** using the appropriate button from **EXHIBIT OPTIONS | EXTERNAL FACTORS**.
- **VIEW** will provide a list of the factors you have loaded into the Arius file, including those that were not mapped. You will see ✓ beside the factors that can be displayed on exhibits in this Arius project file and ✗ beside the factors that cannot be displayed in the Arius exhibits in this Arius project file (due to the structure, for example).
  - **EDIT** will provide you the opportunity to update comments, browse to use a different source with similar mappings, or modify factors in the same source.

New rows in the external factor file will need to be mapped in Arius for those new factors to appear on your Arius exhibit. While Arius will remember previous mappings, the software cannot infer a new mapping.

- **REFRESH** will reload the same source file using the saved mappings.