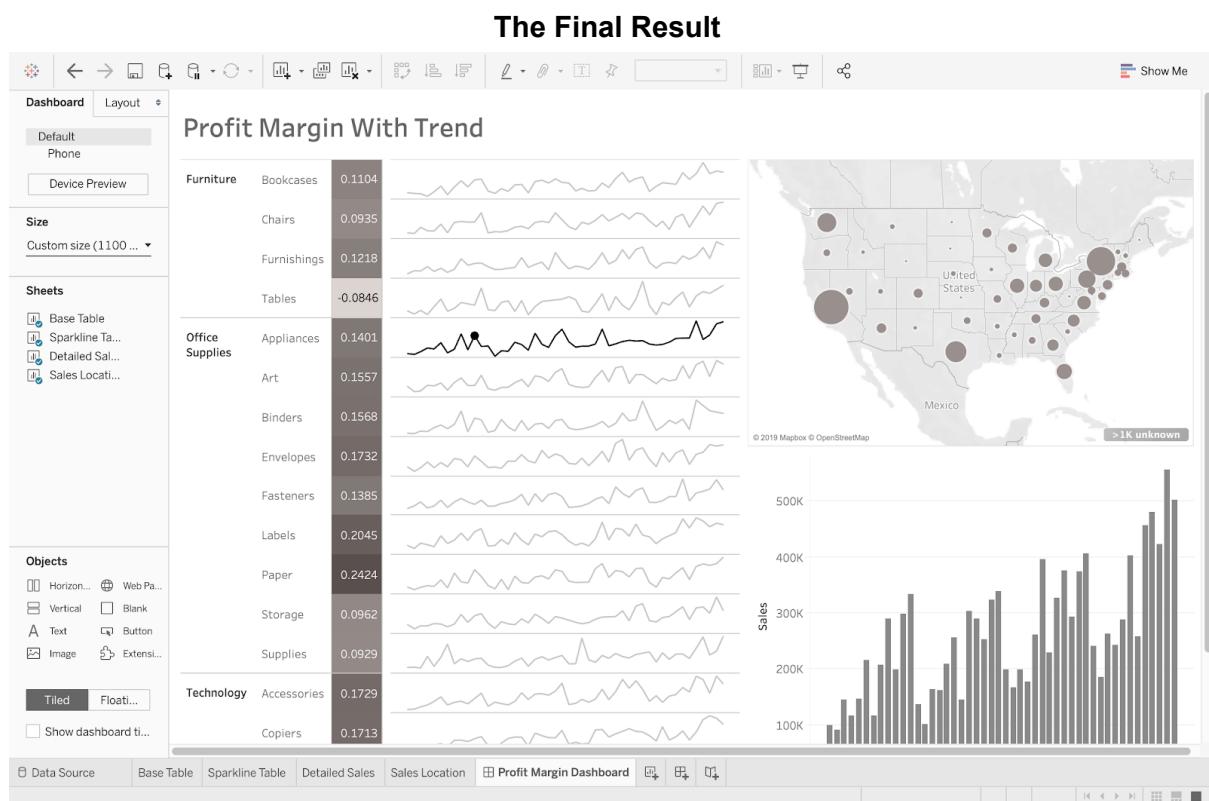


Tutorial C for the Case “Modern Retail Analytics: Data Visualization Using Tableau”

3. Create a Comprehensive Tableau Dashboard

A Dashboard can be defined as a collection of views, laid out to ensure efficient analyses and comparisons. In this example, you will analyze the profit margin for each subcategory using the Global Superstore dataset. To enhance the dashboard, you will supplement the profit margin table with sparklines, a bar chart, and a map - each allowing you to examine the data from a different angle.



3.1. The Base Table

Create a new sheet and drag both the Category and Subcategory dimensions to the Rows pane. Since the Global Superstore dataset does not include a profit margin column, you will need to create it. The formula is simply the sum of profit divided by the sum of sales. Once your new measure (Profit Margin) is created, drag it to both the Text mark and the Color mark. You may want to select the Square display instead of the default view, from the Marks drop-down menu. This will make the profit margin comparison clearer.

It is possible to select a different color palette by clicking on the Color mark and its *Edit Colors* option. Finally, you can hide the Field labels for both rows as well as the title of the sheet by right-clicking on them.

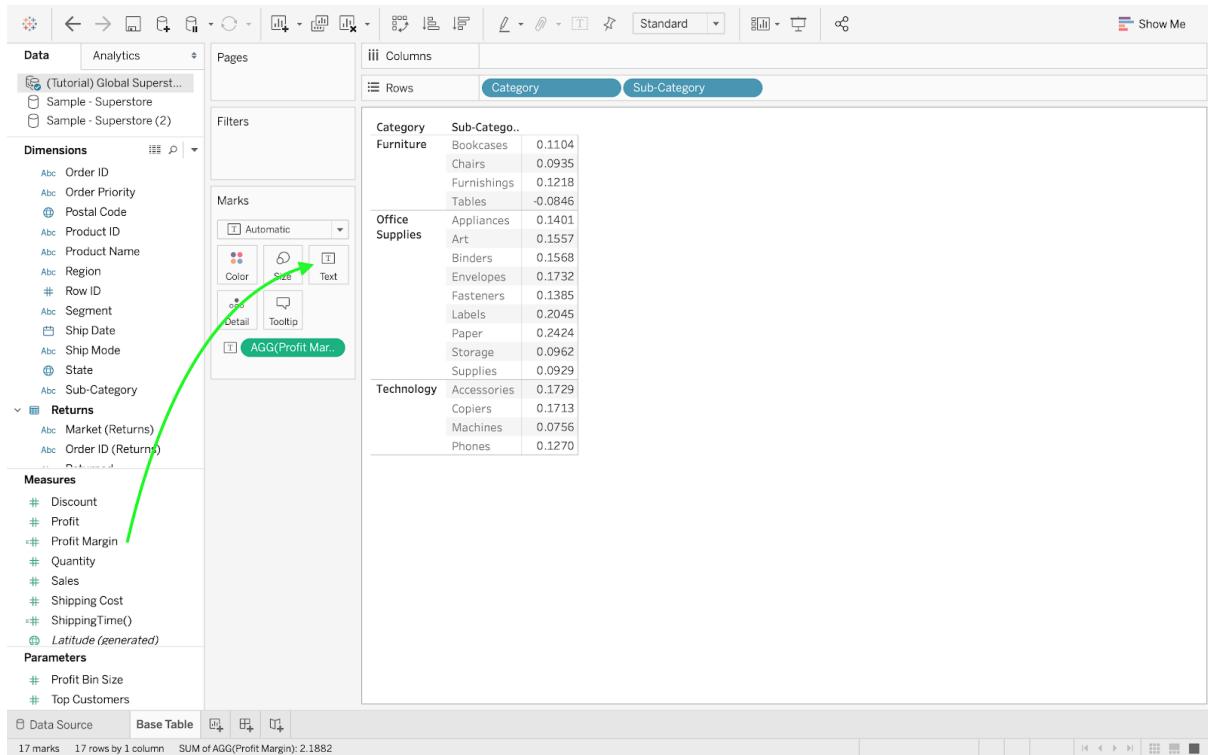
- Drag Category and Sub-Category to the Rows pane.

The screenshot shows the Tableau interface with the 'Rows' pane selected. In the 'Rows' pane, the fields 'Category' and 'Sub-Category' are highlighted with a green oval. The data view displays a hierarchical structure of categories and sub-categories from the 'Furniture', 'Office Supplies', and 'Technology' dimensions. The 'Furniture' dimension includes Bookcases, Chairs, Furnishings, and Tables. The 'Office Supplies' dimension includes Appliances, Art, Binders, Envelopes, Fasteners, Labels, Paper, Storage, and Supplies. The 'Technology' dimension includes Accessories, Copiers, Machines, and Phones. The 'Dimensions' shelf on the left lists various dimensions like Orders, Products, and Returns. The 'Measures' shelf lists Sales, Profit, and Discount. The 'Parameters' shelf lists Profit Bin Size and Top Customers. The bottom status bar indicates 17 marks and 17 rows by 1 column.

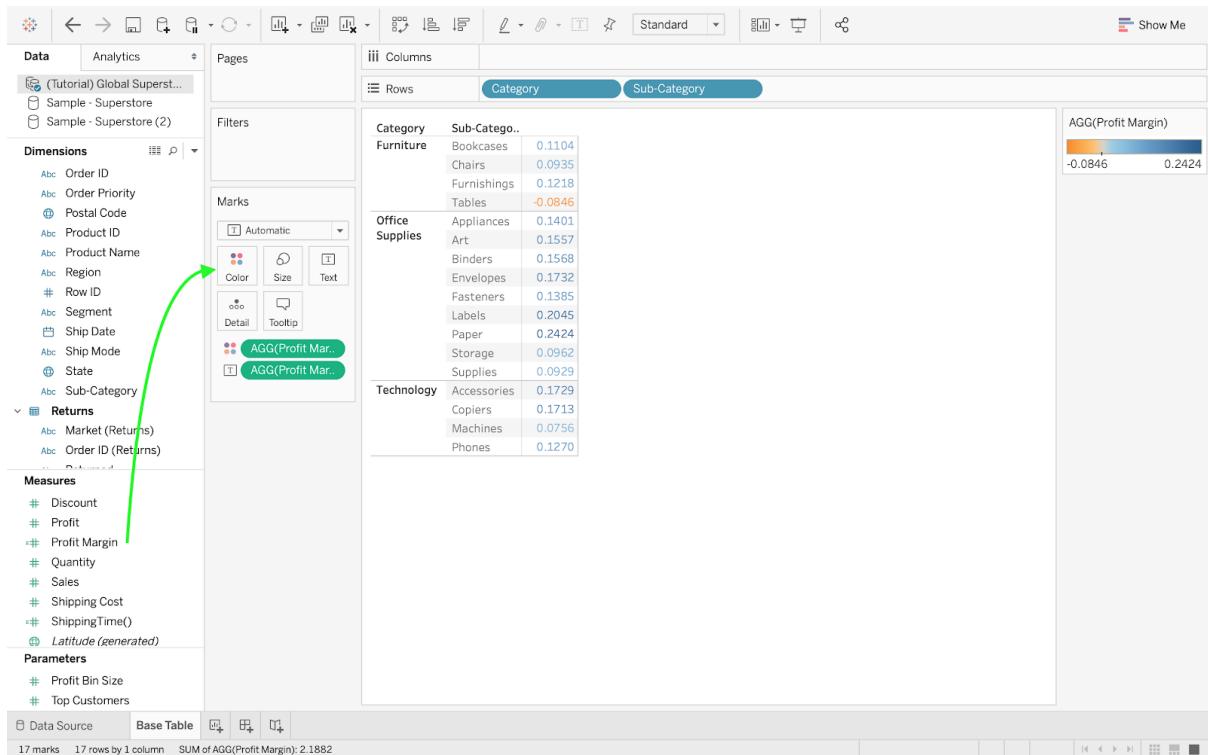
- Create a calculated field for the Profit Margin.

The screenshot shows the Tableau interface with a calculated field dialog open. The calculated field is named 'Profit Margin' and contains the formula $\text{SUM}([\text{Profit}]) / \text{SUM}([\text{Sales}])$. A tooltip for the 'SUM' function is displayed, stating: 'Returns the sum of all the values in the expression. SUM can be used with numeric fields only. Null values are ignored.' An example of the formula is shown as 'Example: SUM([Profit])'. The calculated field dialog also shows 'The calculation is valid.' and has 'Apply' and 'OK' buttons. The background shows the same Tableau interface as the previous screenshot, with the 'Rows' pane selected and the same data structure visible.

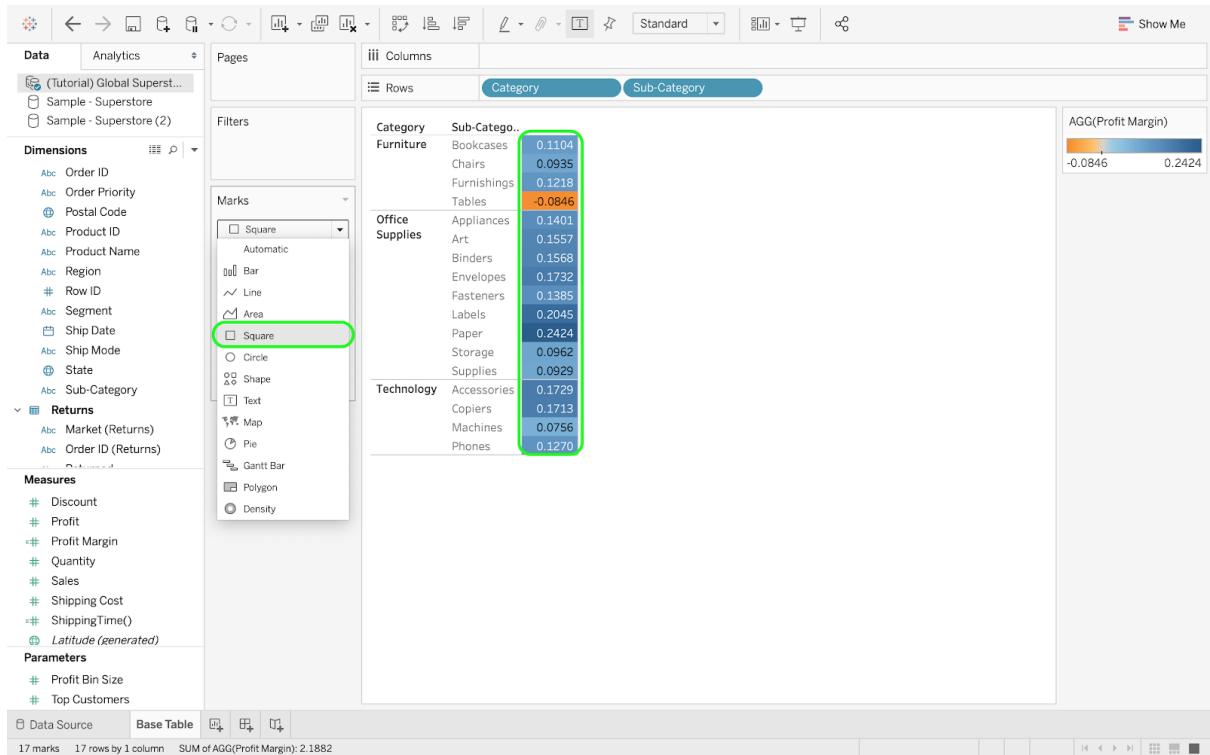
- Drag the Profit Margin measure to the Text mark.



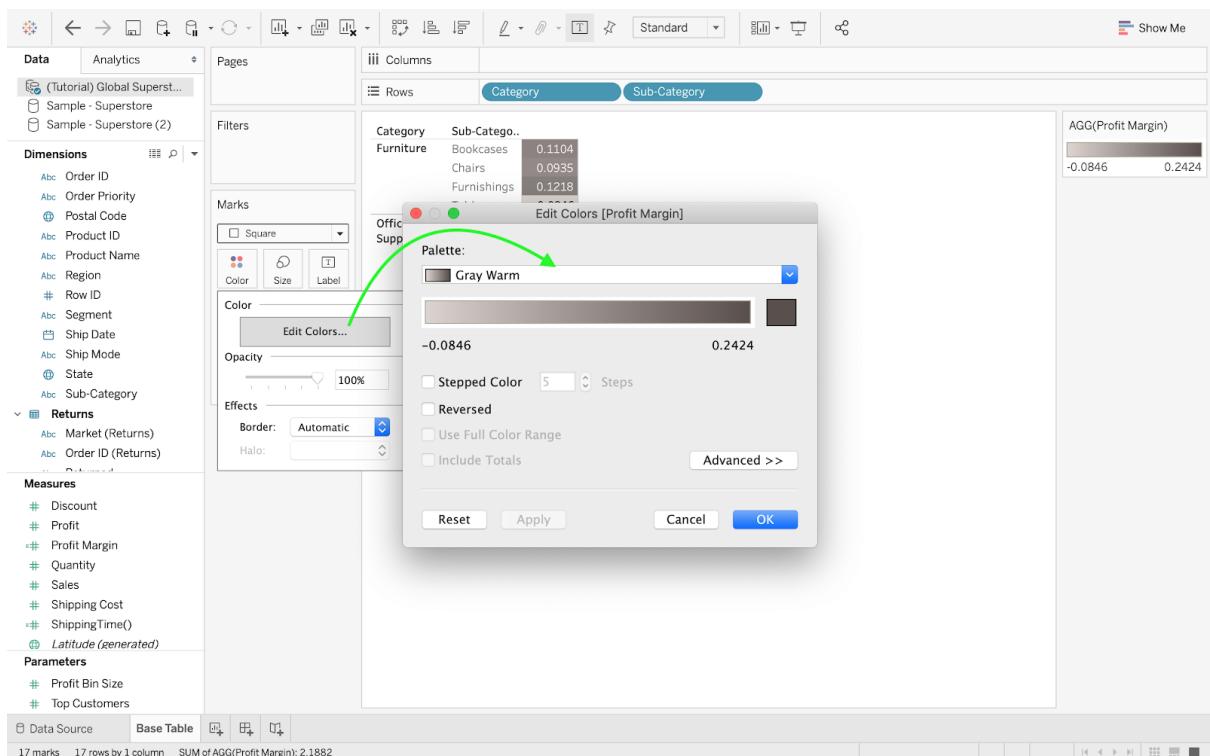
- Drag the profitMargin measure to the Color mark.



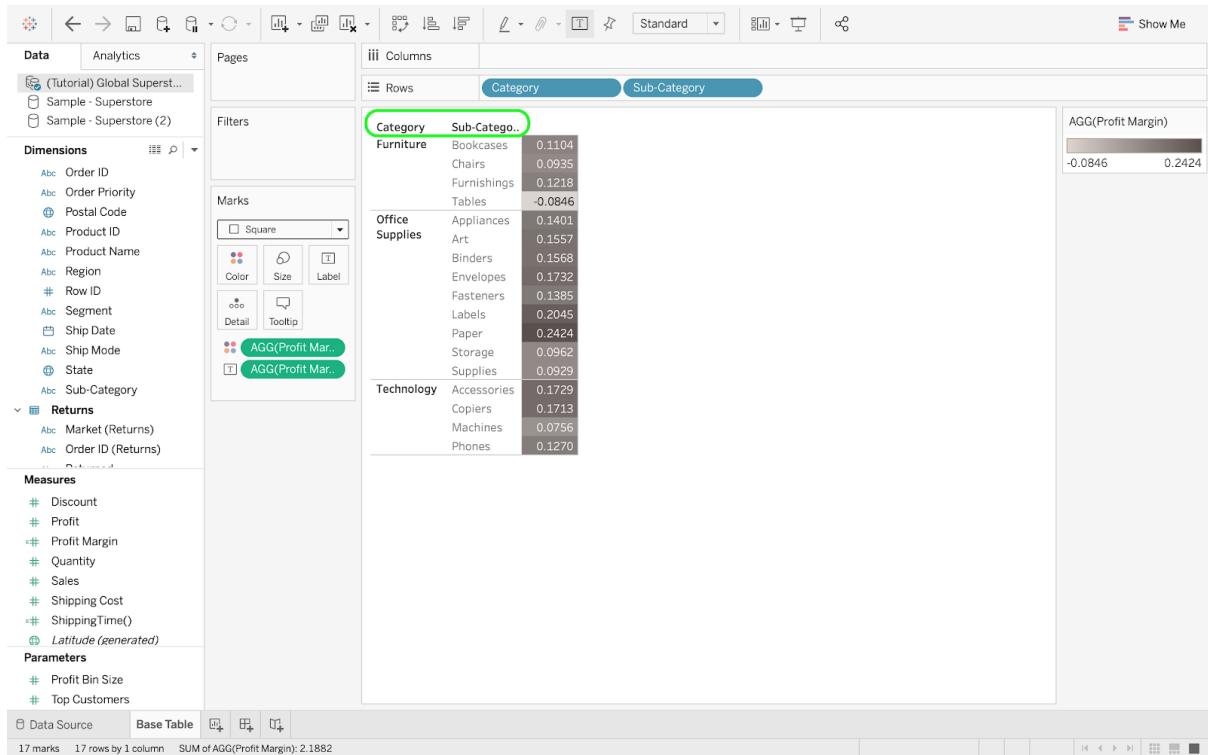
- Adopt the Square display (using the Marks drop-down menu).



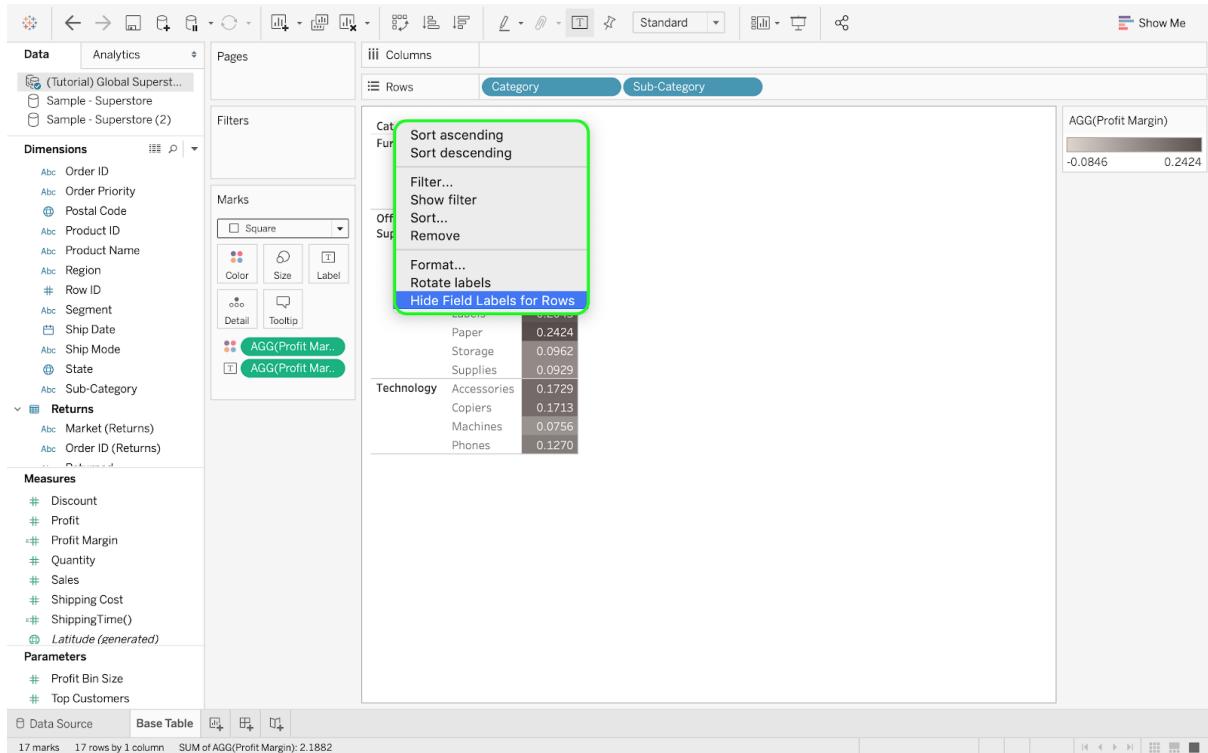
- You can select a different color palette.



- You can hide the Field labels for the rows (1/2).



- Hide the Field labels for the rows (2/2).

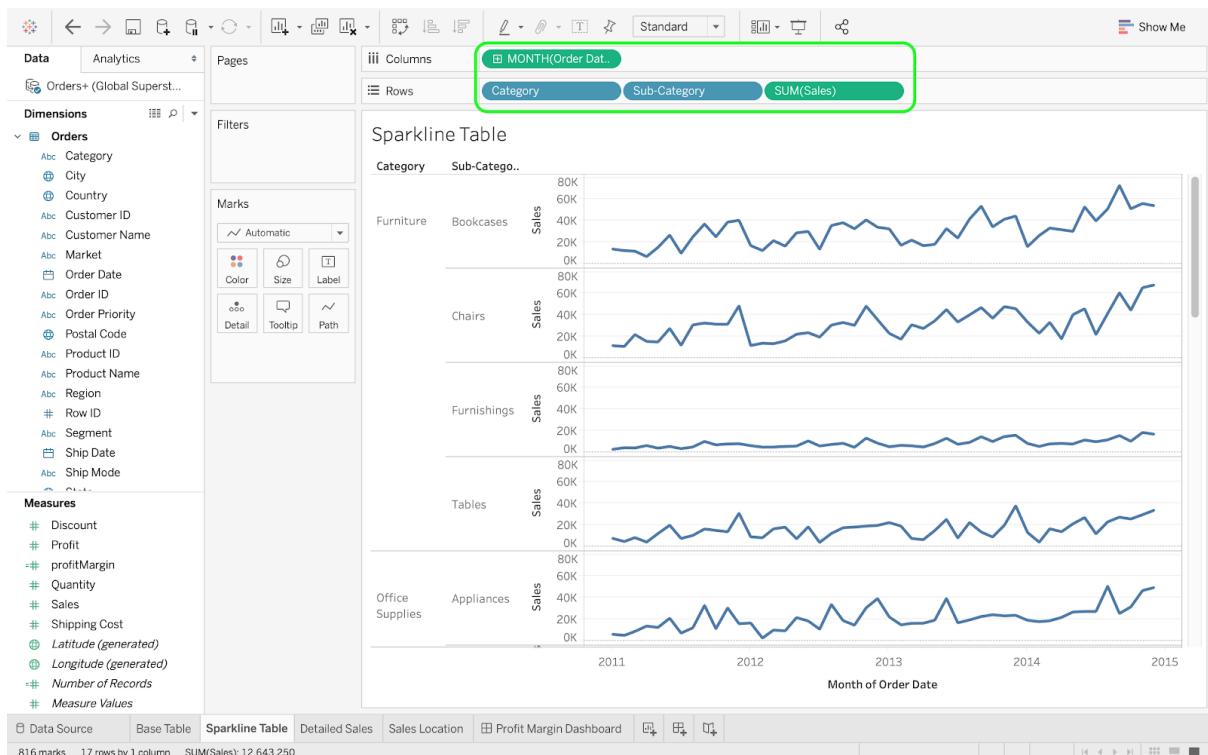


3.2. The Sparkline Table

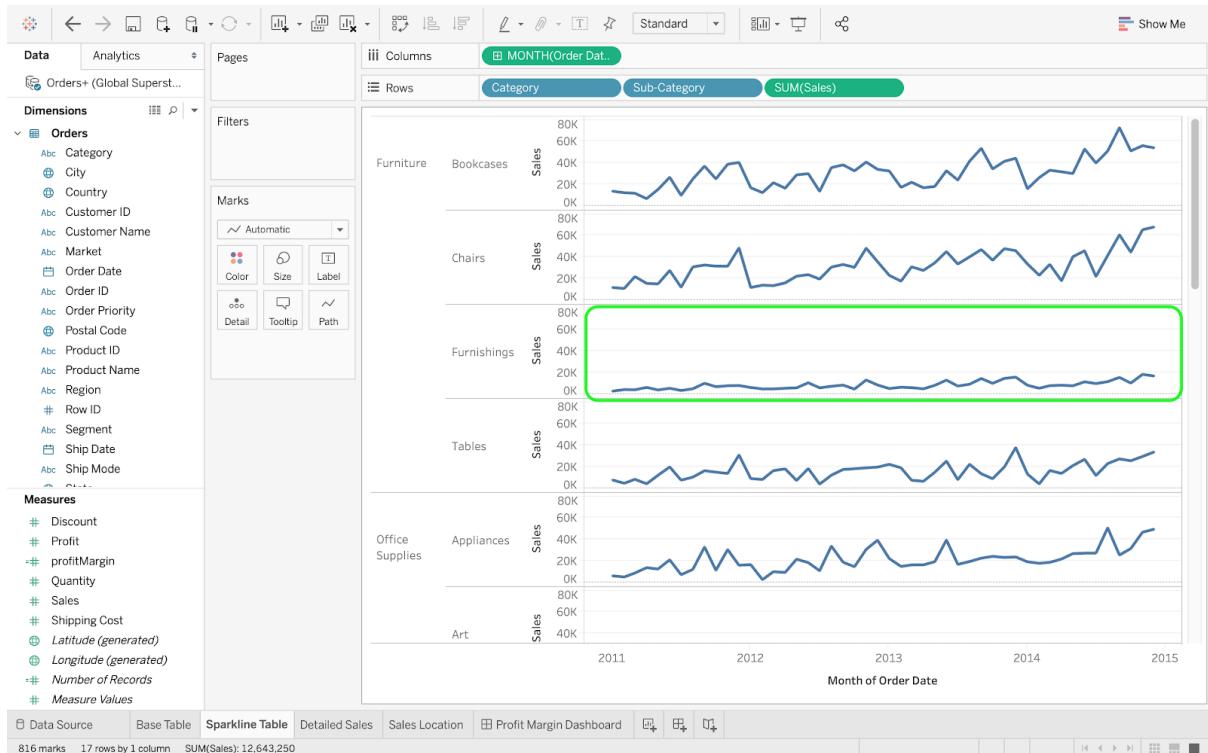
Create a second sheet (called, for example Sparkline Table). To create the desired chart, start by adding several dimensions and measures. Drag Order Date to the Columns pane and edit it so that every single month is displayed (e.g., March 2012, March 2013). For the Rows pane, drag Category, Sub-Category, and Sales. You will then notice that some sparklines are flatter than others (e.g., the Furnishings subcategory). To solve this problem, right-click on the y-axis and select the Independent axis option from the Edit Axis pop-up interface.

To increase the readability of your dashboard, you can hide all unnecessary/duplicate texts. You can do so by hiding all headers and titles (right-clicking on them will display such an option). You can also change the color and the thickness of the sparklines by using the Color and Size marks. To remove the gridlines and column dividers, right-click on any sparkline and select the option Format. The most relevant formatting changes can be done using the Format Borders and the Format Lines sections.

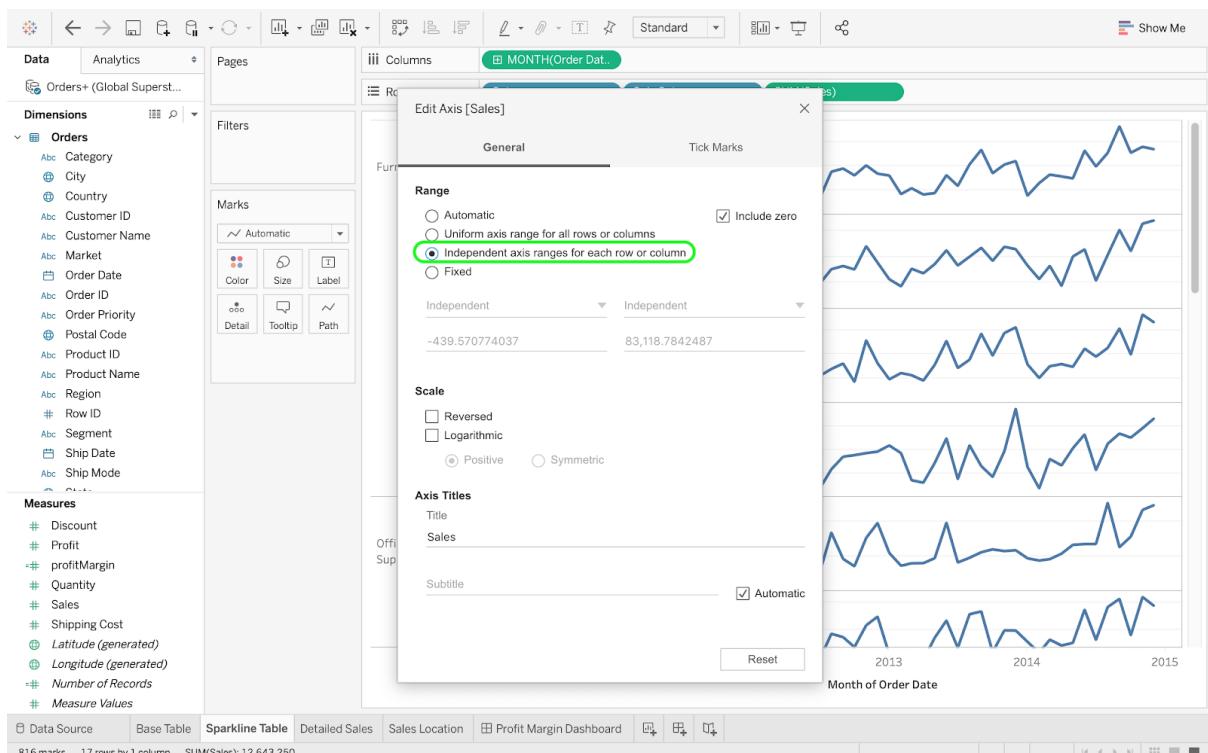
- Dimensions and measures.



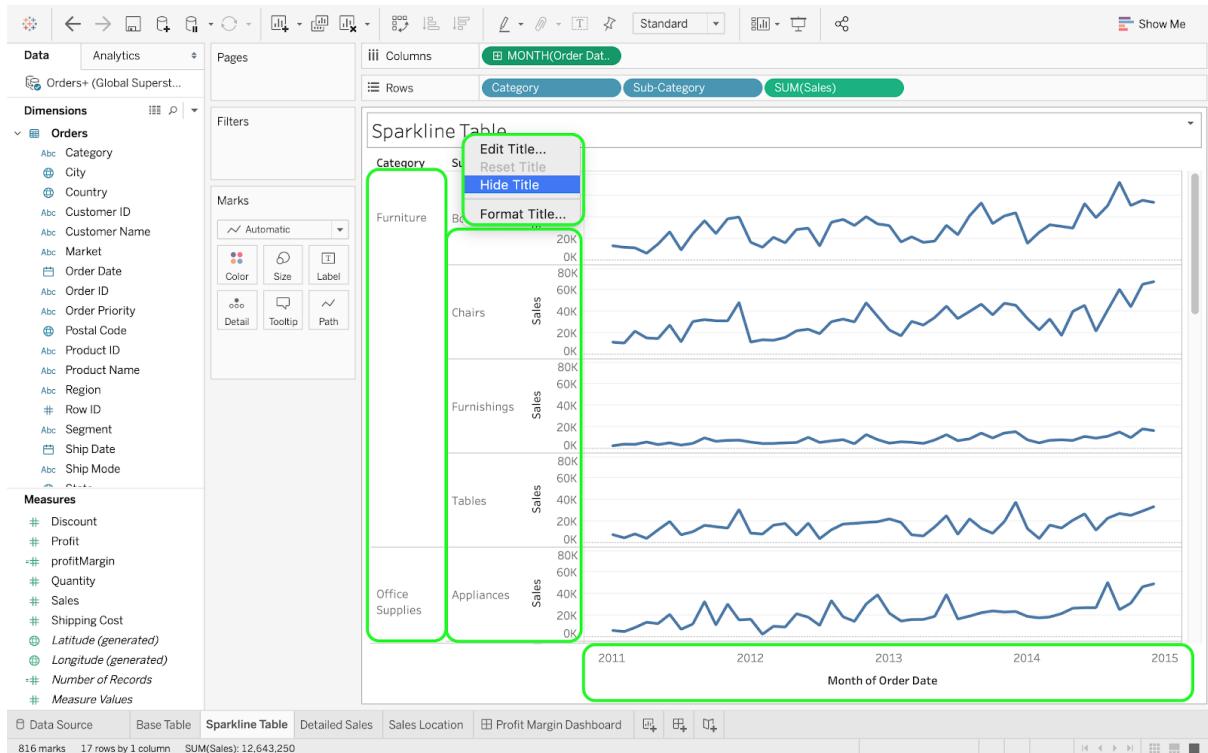
- Some sparklines are flat. There is a potential issue with the scale of the y-axis.



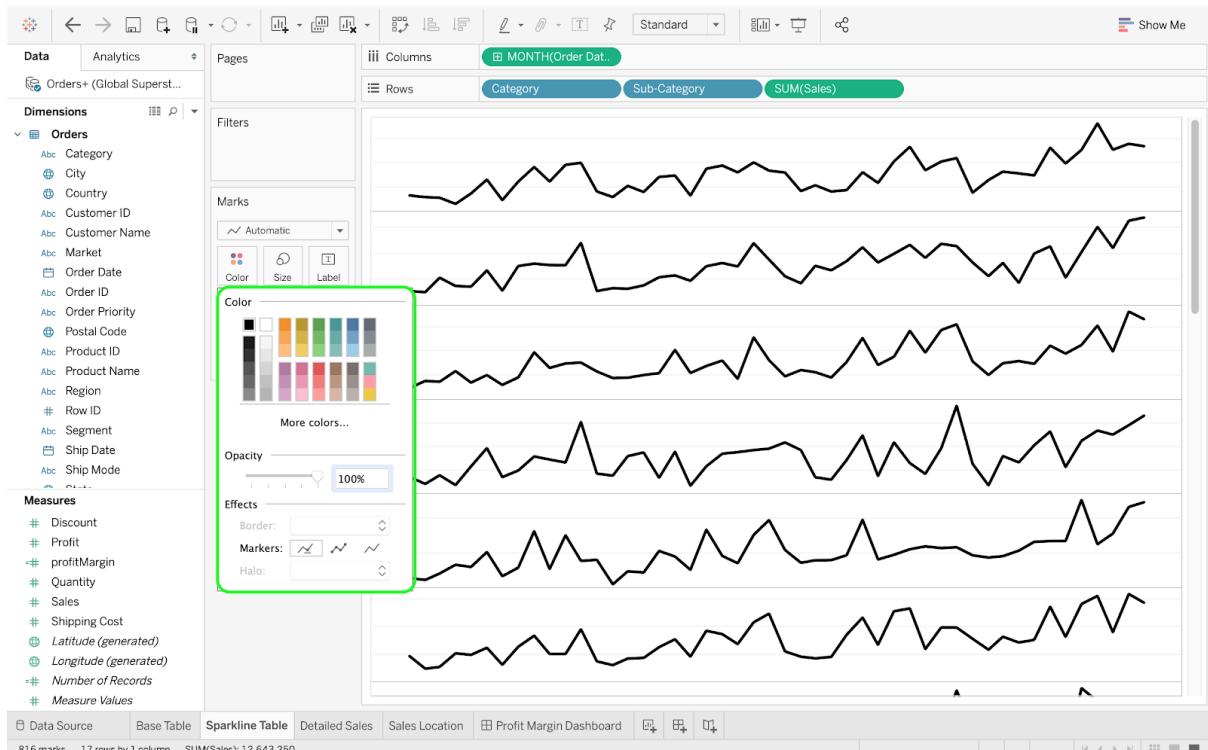
- Enable the independent axis option.



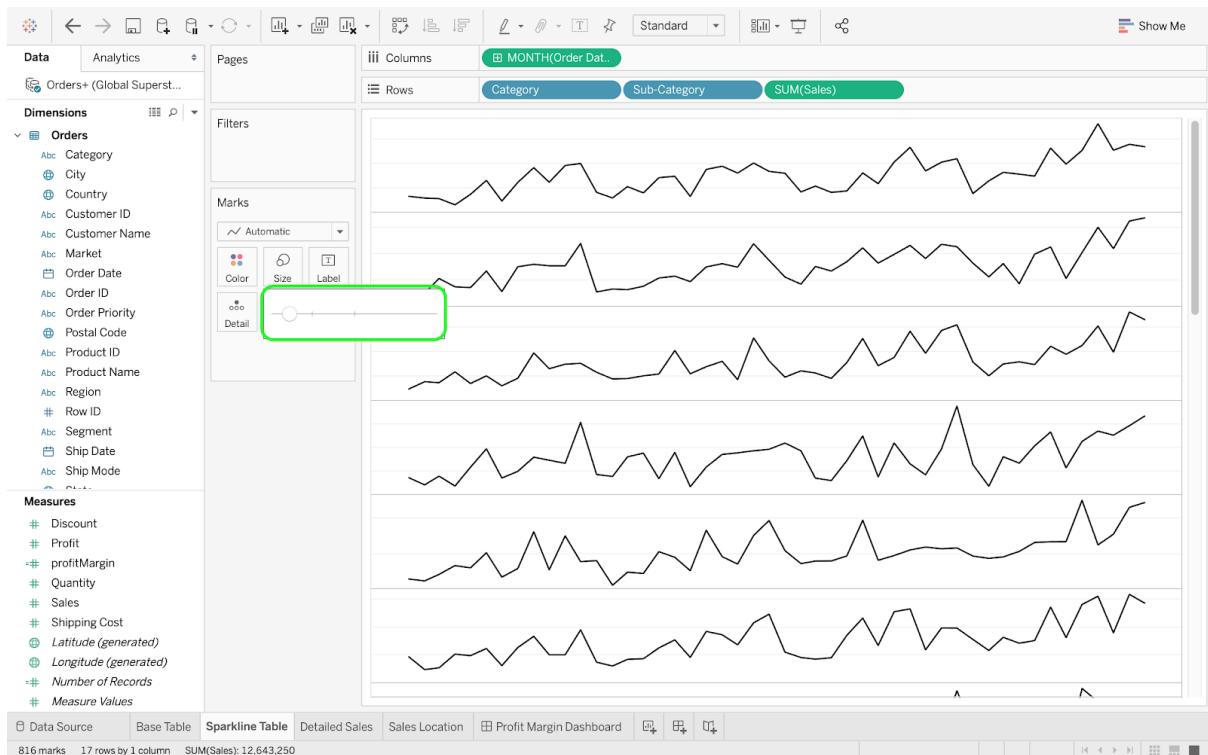
- Hide titles and headers.



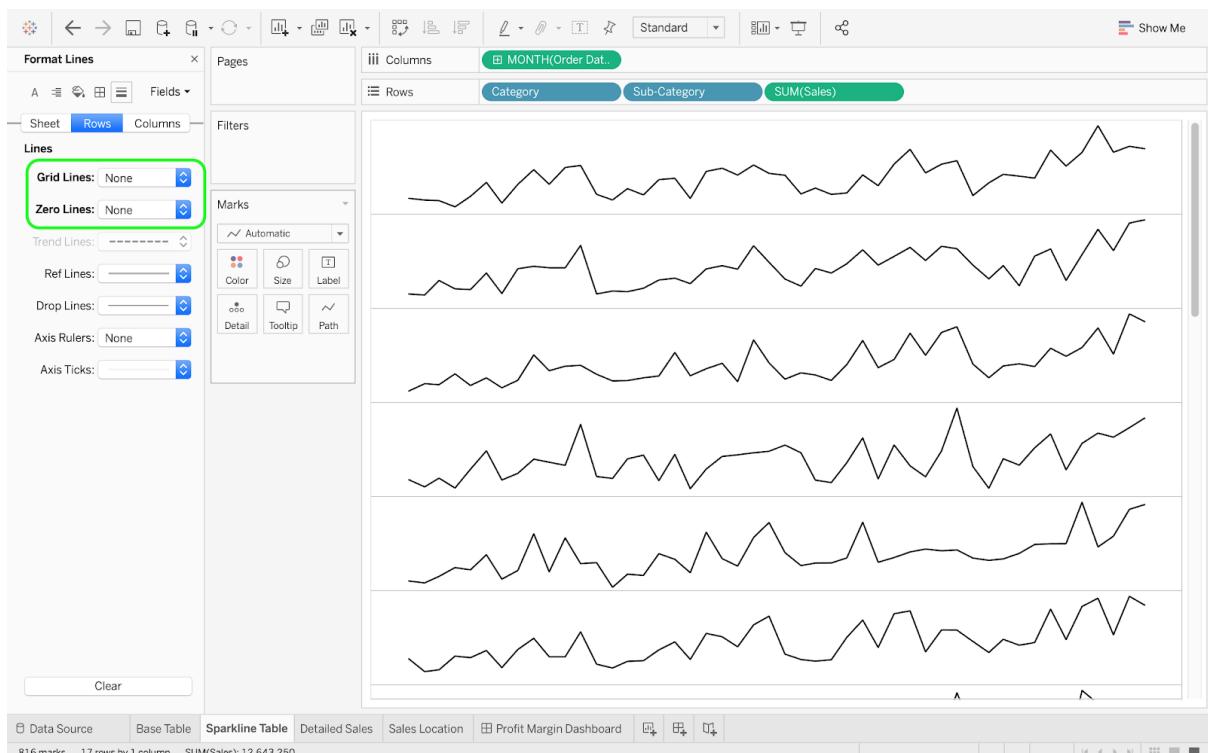
- Change the color of the sparklines by using the Color mark.



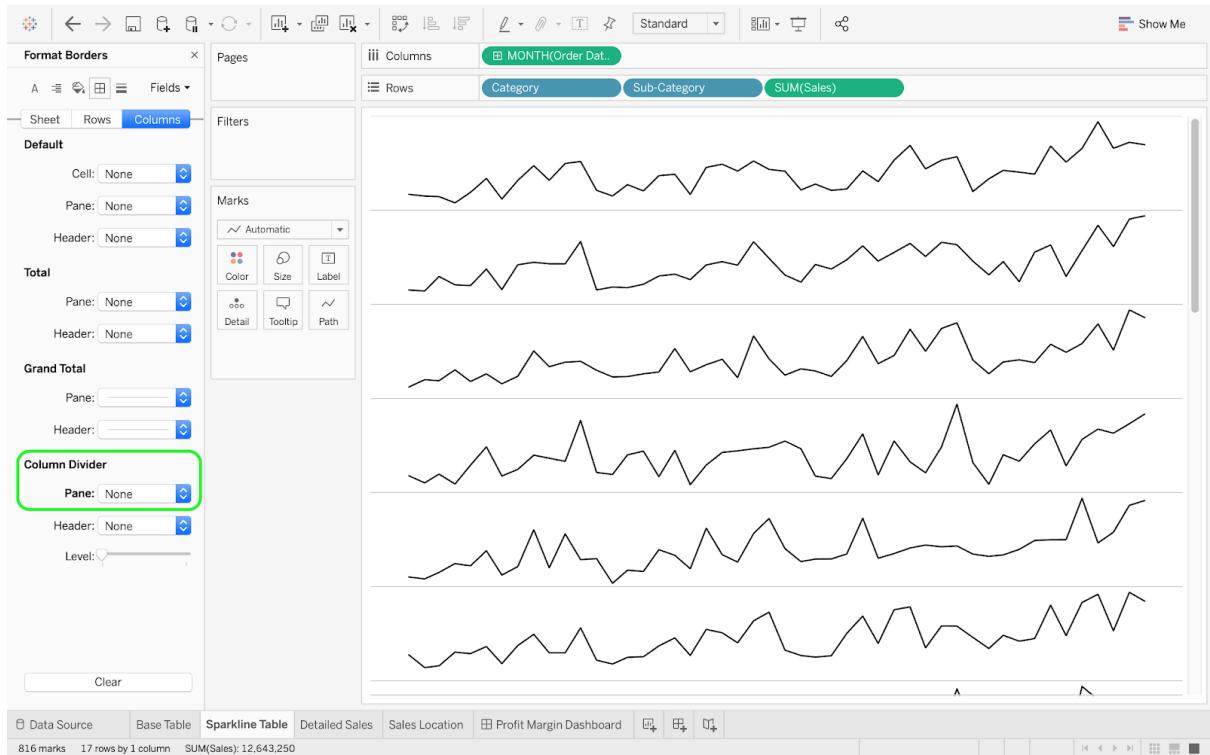
- Change the thickness of the sparklines by clicking on the Size mark.



- Remove both the Grid Lines and the Zero Lines.



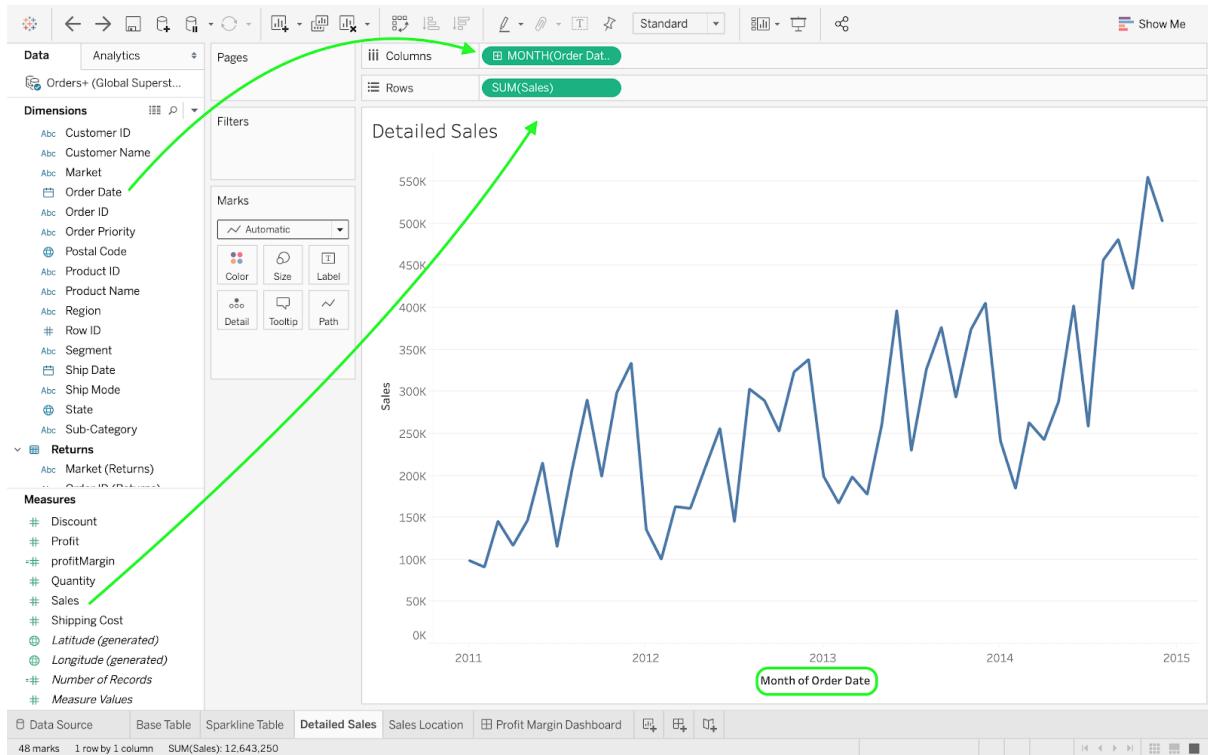
- Remove the Column Dividers.



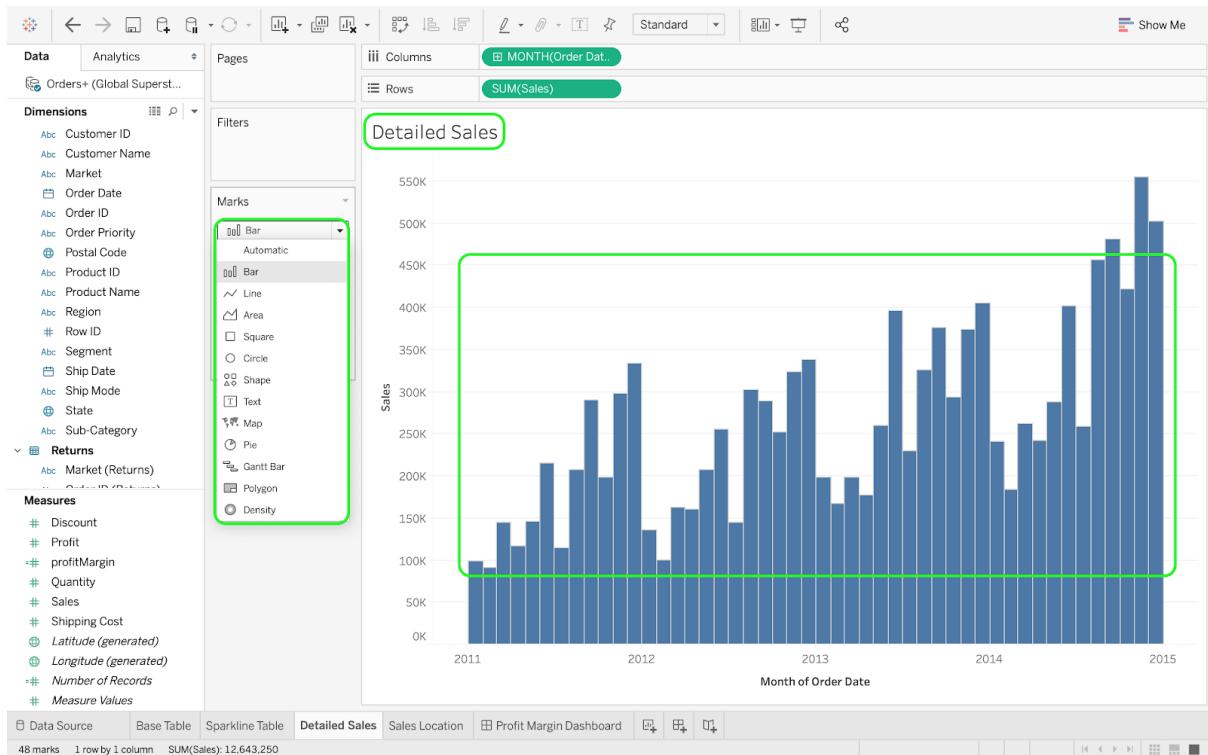
3.3. The Bar Chart

Create a third sheet for plotting a bar chart. Drag the Order Date dimension to the Columns pane and display the monthly data (for each year). Then, drag the Sales measure to the Rows pane to generate the chart. Since Tableau will automatically generate a line chart, you will need to change it to a bar chart by using the drop-down menu (located in the Marks pane). To enhance the clarity of the chart, you can hide the title, decrease the bar size (using the Marks pane), and select a color similar to the palette used in your previous sheets.

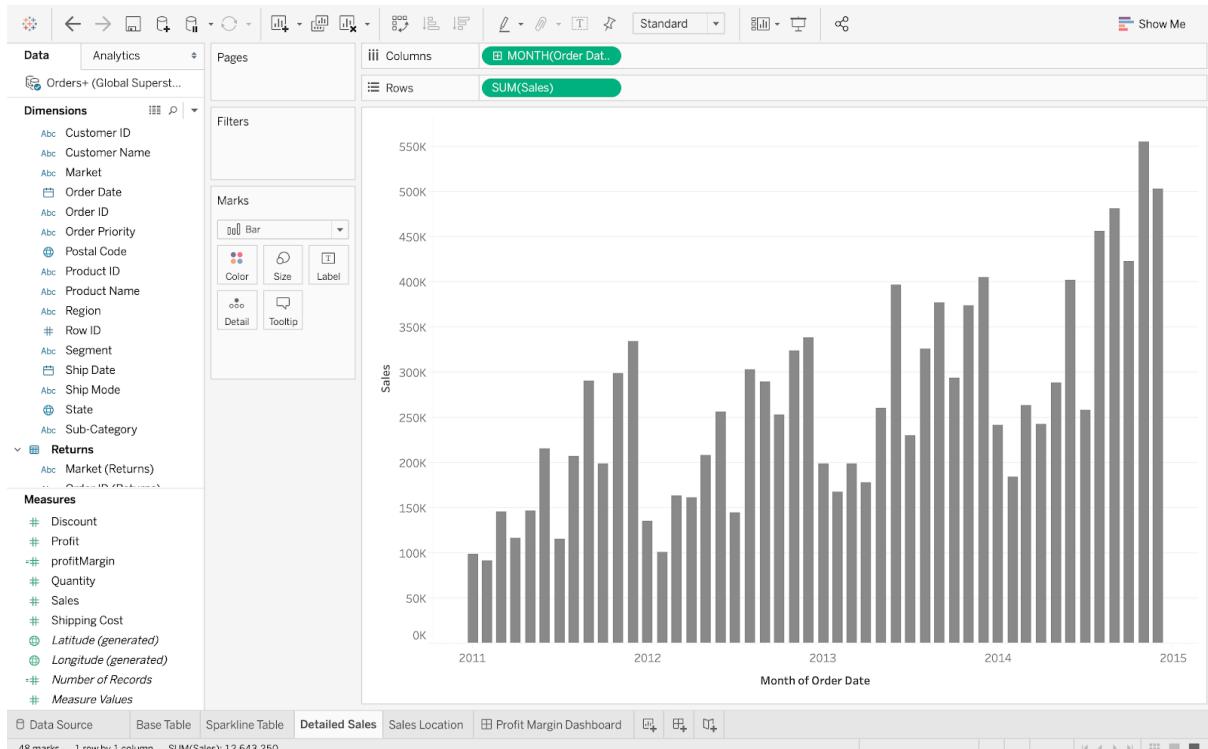
- Generate a chart with Order Date (Dimensions) and Sales (Measures).



- Hide the title, change to a bar chart, and increase the space between the bars.



- A potential bar chart will look as follows:

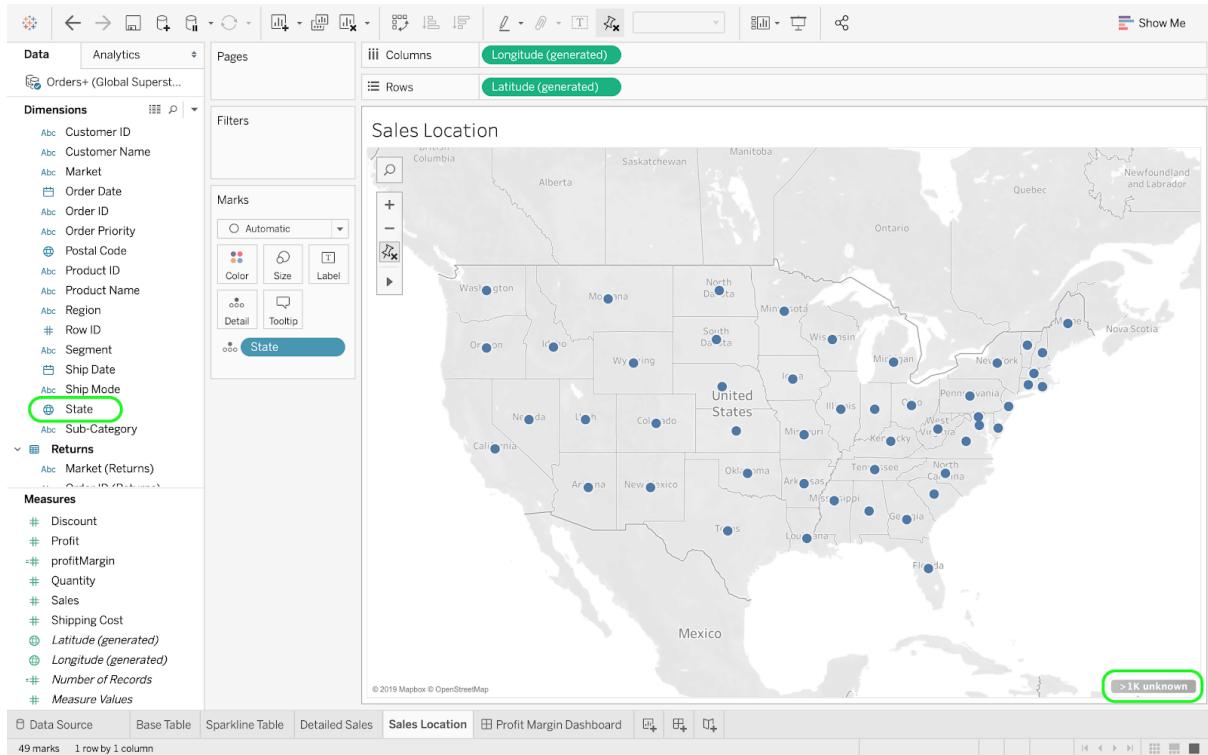


3.4. The Map

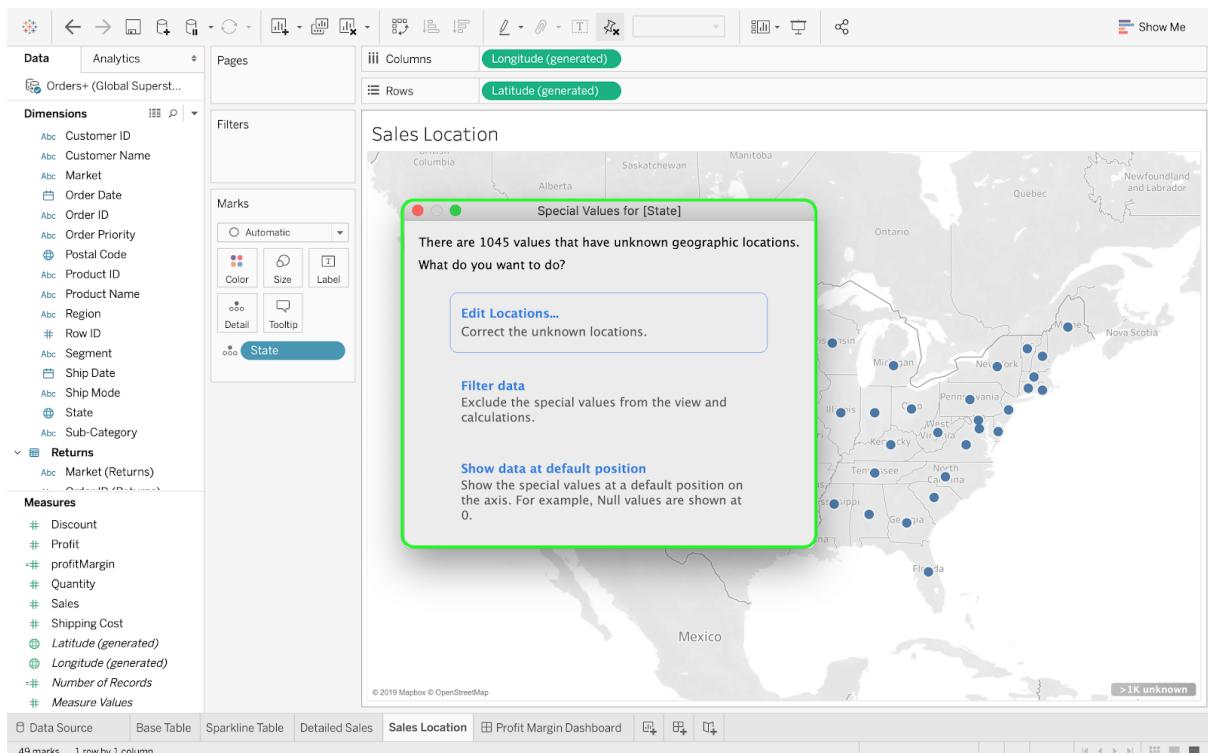
Your fourth sheet will present the volumes of sales for each U.S. state. First, double-click on the dimension State to generate a map. Depending on your computer, Tableau might exclusively show one focal country (e.g., Canada's provinces and territories), or all states found on the dataset, regardless of the country of origin. To display only U.S. states, click on the brown button at the bottom right of the main pane and select Edit Locations. From the Country/Region drop-down menu, select the option Fixed (with United States).

Unfortunately, all the blue dots on the map have the same size. Drag the measure Sales to to the Size mark to assign a different size to each blue dot (corresponding to a U.S. state) depending on the volume of sales. Finally, you can polish the map by hiding the title.

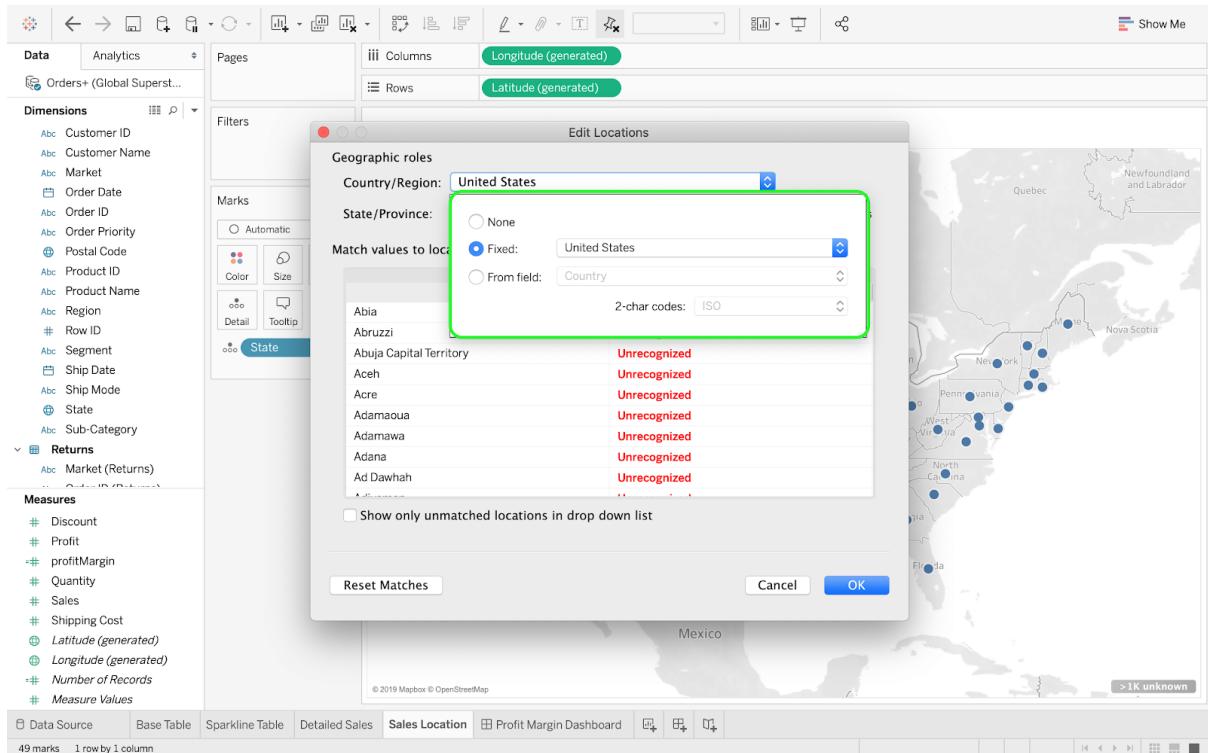
- Double-click on State (Dimensions) and click on the button at the bottom right (assuming that states from other countries than the U.S. appear).



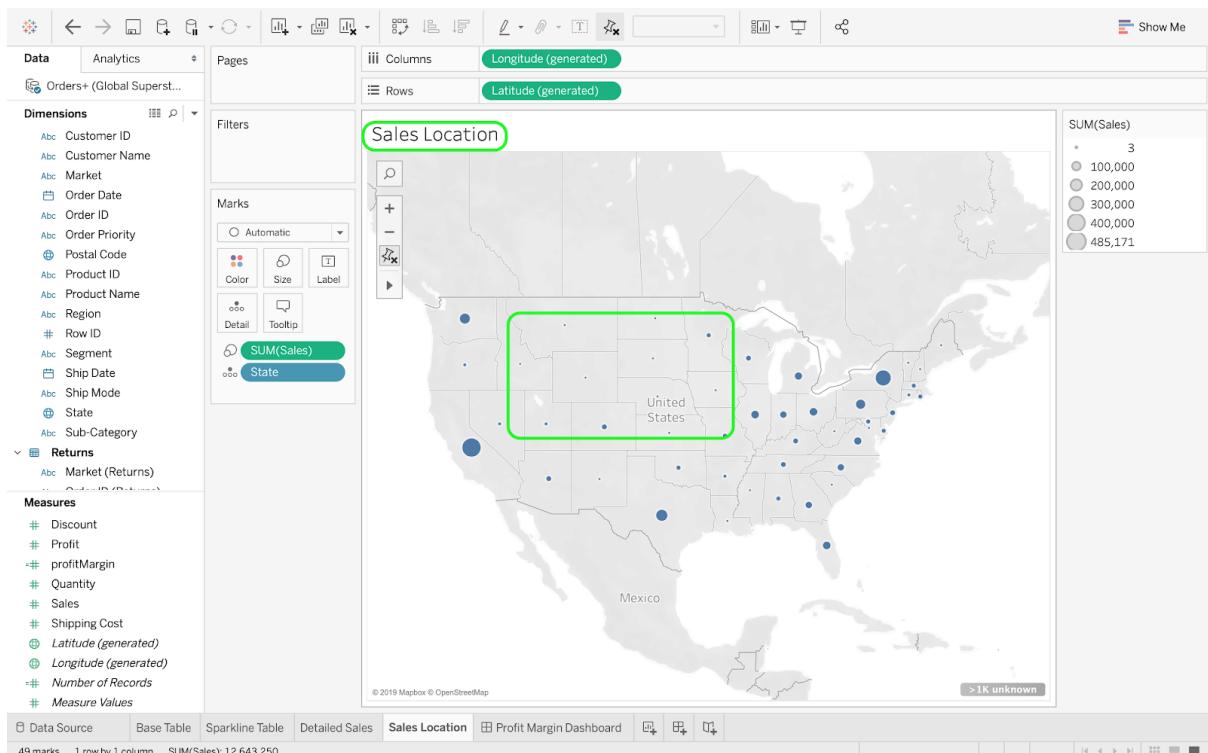
- Click on Edit Locations.



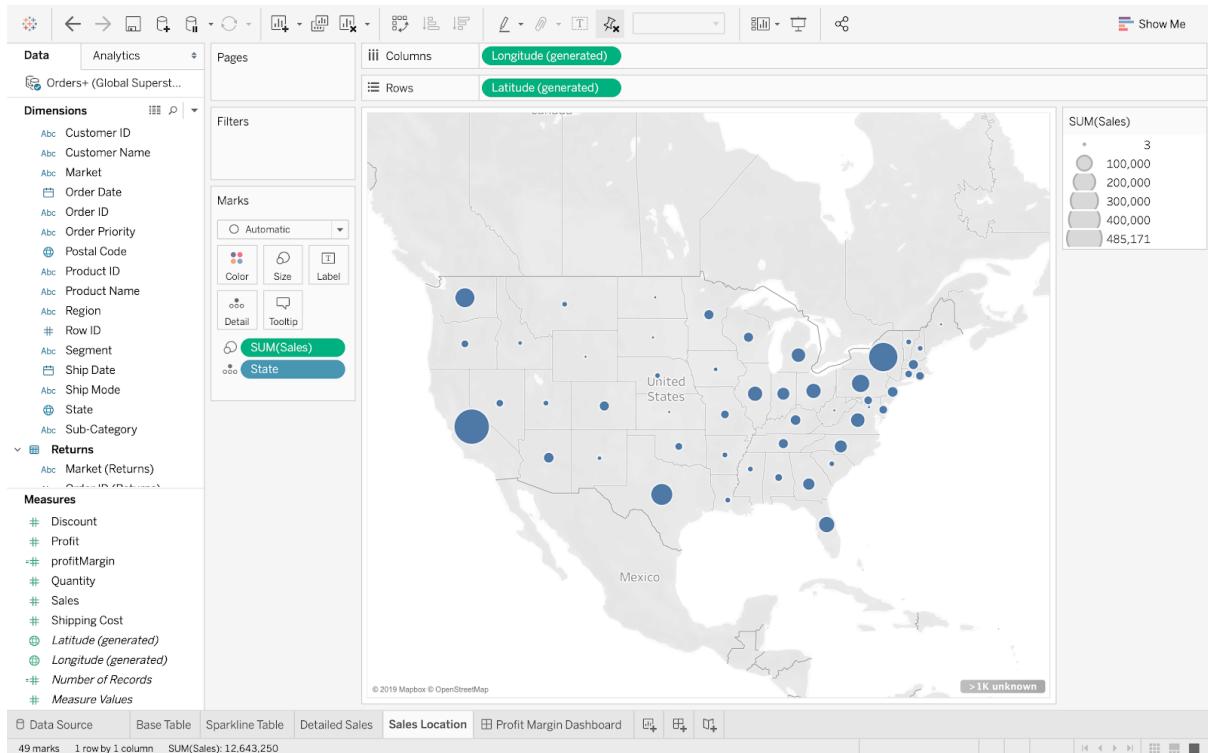
- From the drop-down menu, select the option Fixed (with United States).



- Drag the measure Sales to the Size mark to increase the size of the blue dots and hide the title of the map.



- The final map could potentially look as follows:



3.5. The Dashboard

The first step in designing a Tableau dashboard is to create a dashboard sheet (see the icon tab with the four quadrants at the bottom). Clicking on this icon will generate a blank dashboard, which you can fill in by dragging the four sheets you previously created. You can follow the layout outlined below or create your own. You may want to remove the legends from both Sales Location and Detailed Sales sheets, as they occupy a large amount of space. In the same vein, you may want to hide the titles from each graph.

If the graph displayed in the Detailed Sales sheet is hard to read in your dashboard, you can change the bar size in the original Detailed Sales sheet. Any changes you make on the original graph will instantly be reflected on the dashboard.

To align each subcategory with the right sparkline in your dashboard, right-click on your Base Table graph and select the option Entire View under the Fit menu. Add a title by dragging a text object (located at the bottom left) to the dashboard. You can then finalize all the relevant formatting decisions (e.g., make sure that your text box does not take too much space in the dashboard).

- Drag the sheets to the dashboard and hide the legends.

The screenshot shows a Tableau dashboard with four cards:

- Base Table:** A data grid showing profit margins for various categories like Furniture, Office Supplies, and Technology.
- Sparkline Table:** A series of sparkline charts showing trends over time for different product categories.
- Sales Location:** A map of North America showing sales locations with varying sizes of bubbles.
- Detailed Sales:** A histogram showing sales volume by month.

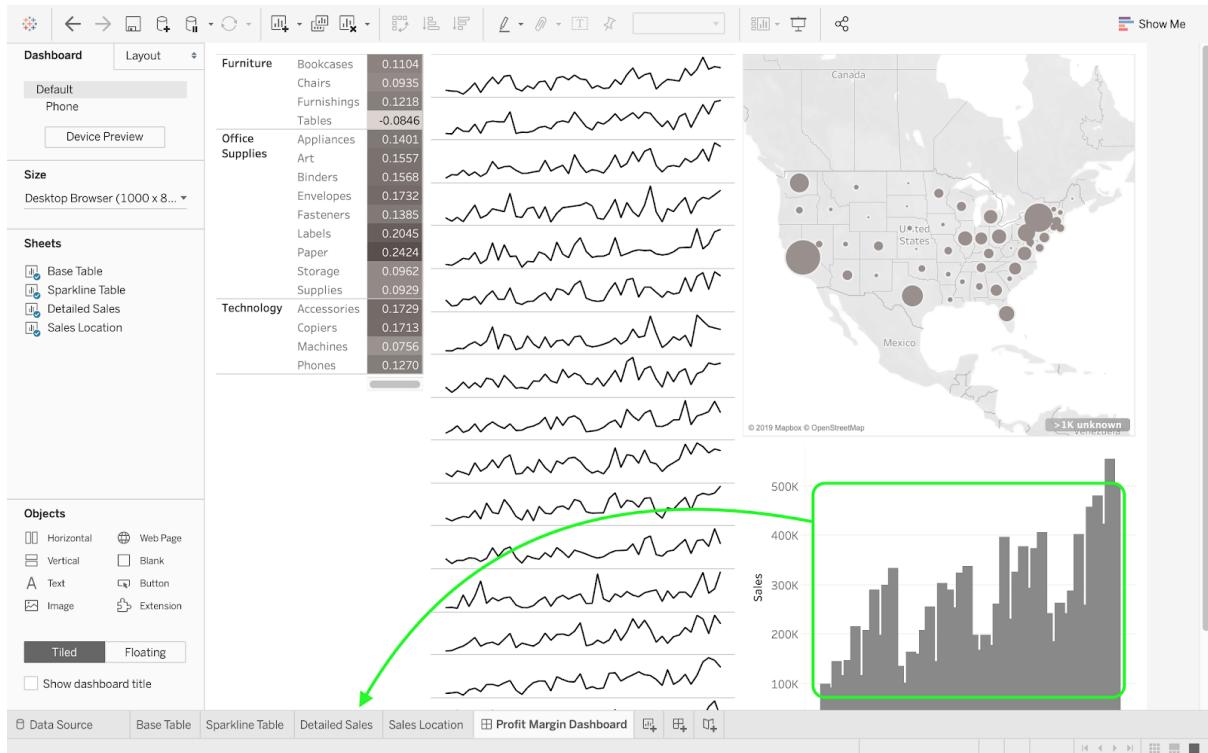
The 'Sales Location' card is highlighted with a green border and has a green arrow pointing to the top of the dashboard, indicating it has been moved from the 'Sheets' pane to the dashboard area.

- Hide the titles.

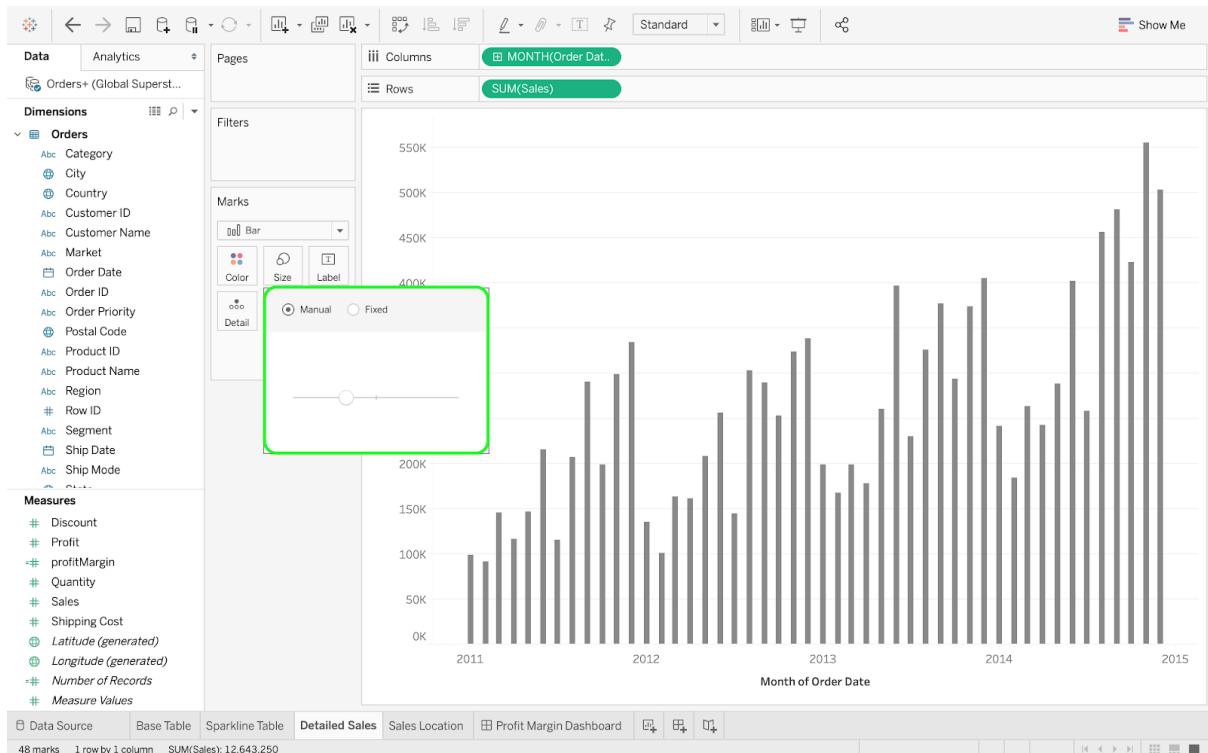
The screenshot shows the same Tableau dashboard as above, but with the following changes:

- The titles for all four cards ('Base Table', 'Sparkline Table', 'Sales Location', 'Detailed Sales') are now hidden, represented by green circles around the card titles.
- The cards are arranged in a single row on the dashboard.

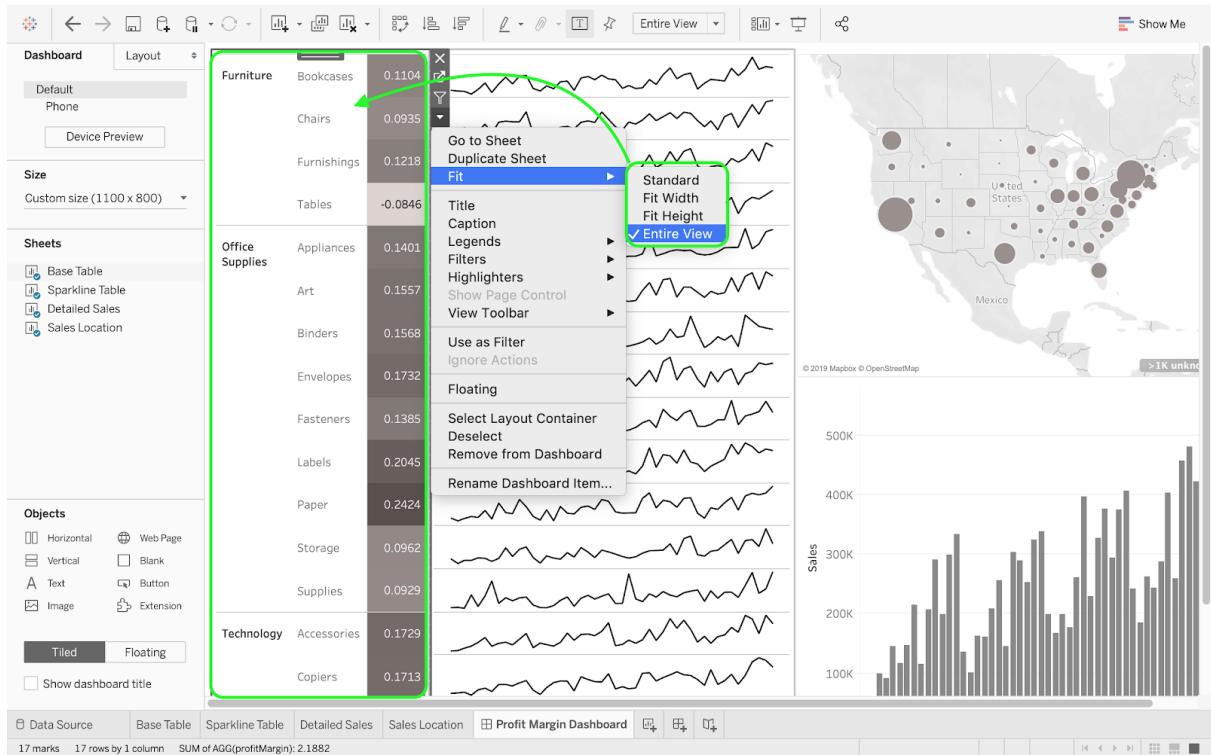
- Change the bar size directly in the original sheet (1/2).



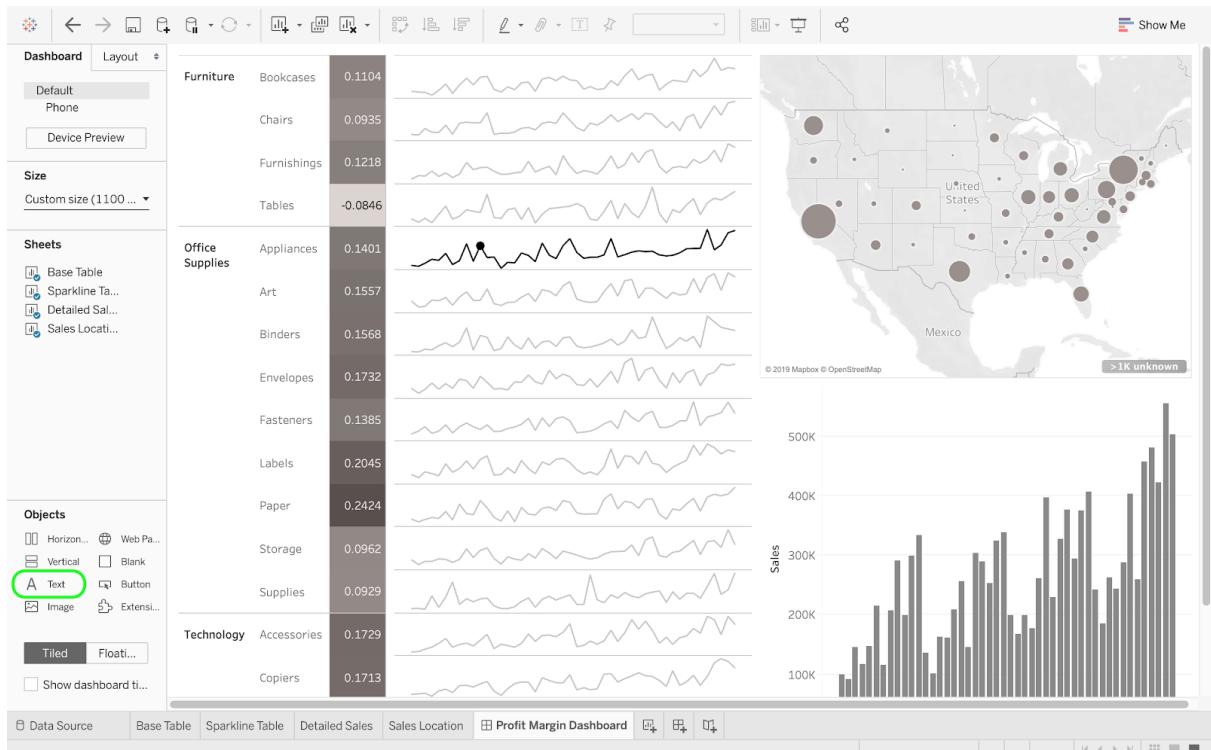
- Change the bar size directly in the original sheet (2/2).



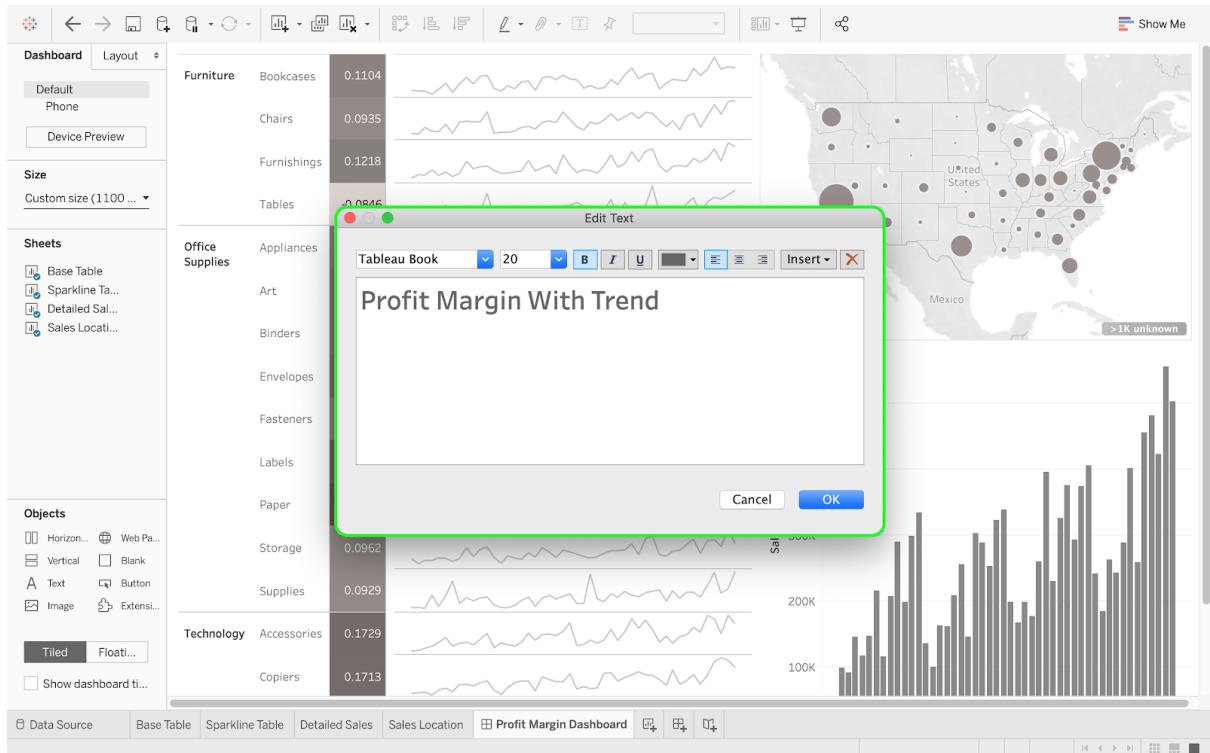
- Select the option Entire View under the Fit menu.



- Add a title by dragging a Text object to your dashboard.

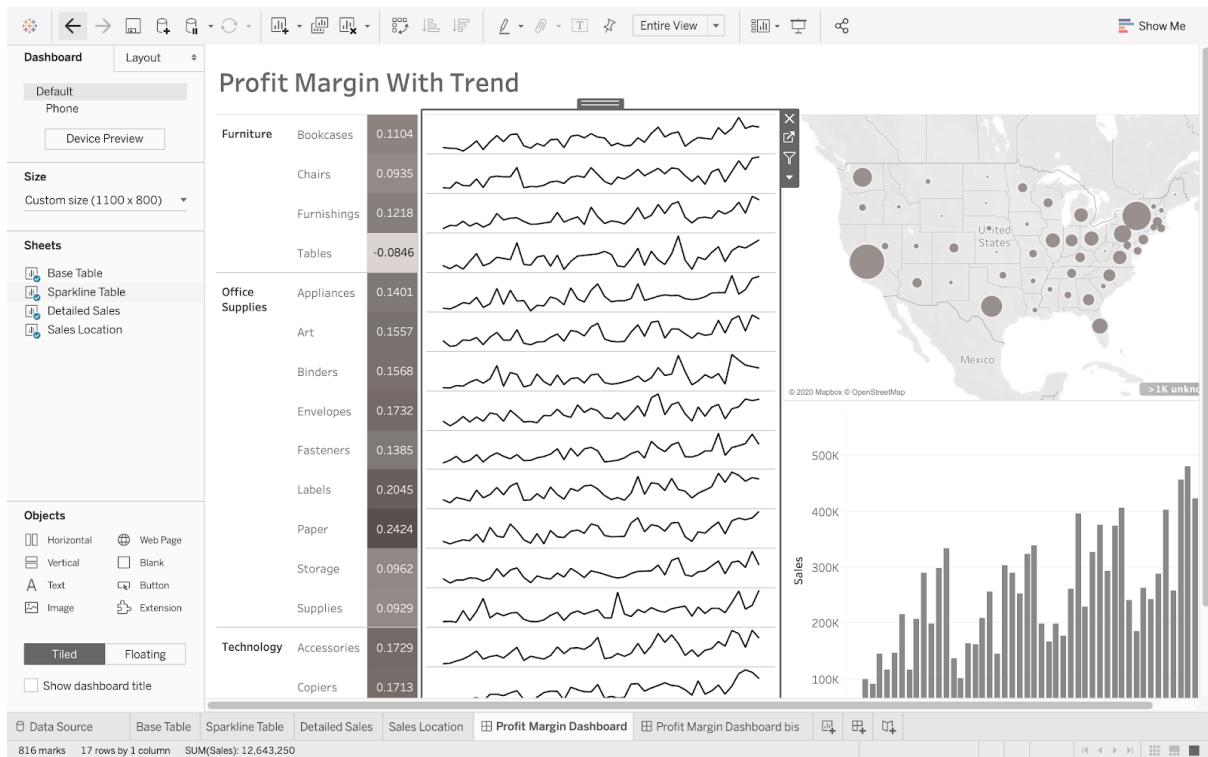


- Give your dashboard a relevant title.

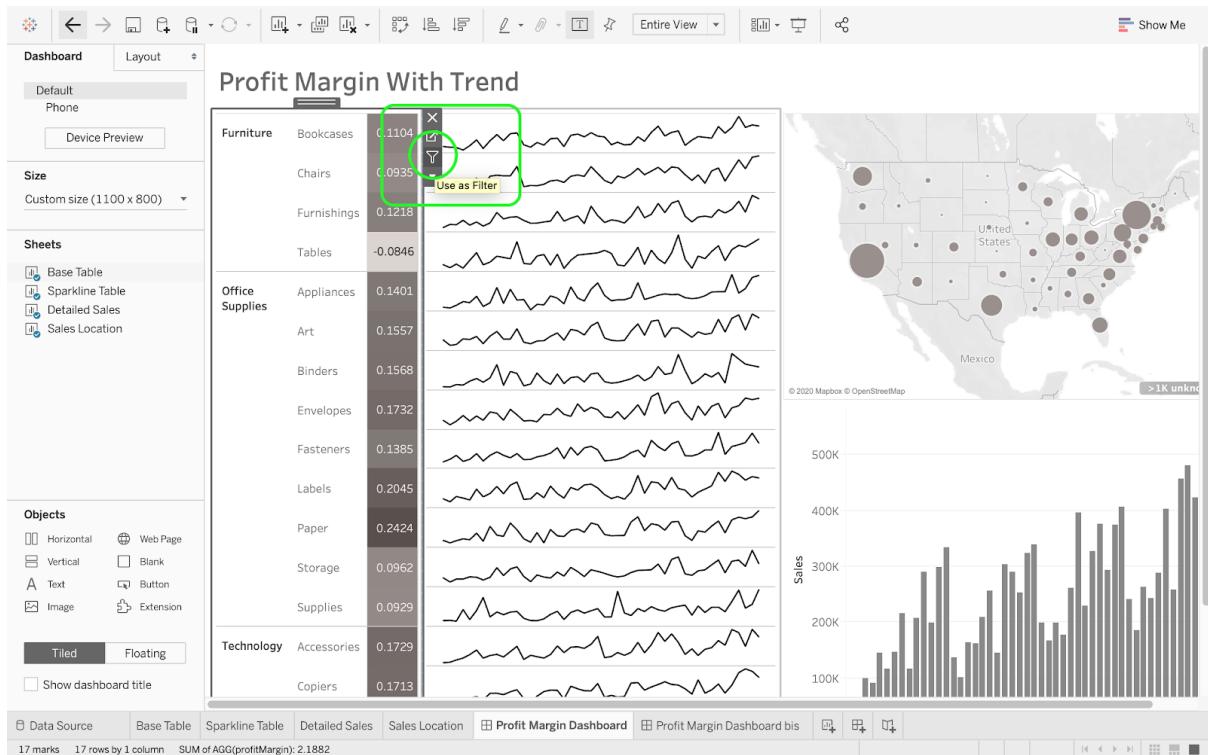


A dashboard is a great tool due to the interconnectivity between the different tables and graphs displayed on the same sheet. For instance, you could use your Base Table as a filter for the dashboard (a filter will restrict the data to a specific sub-sample and will affect all the charts displayed on the dashboard). To do so, you can click on your table and on the filter icon located at the top right. You can then click on a specific category (or subcategory) to choose the desired subsample of the data for all the graphs displayed on your dashboard. For example, if you click on the Furniture category, you will see that only four sparklines appear (since four out of the 17 subcategories belong to the Furniture category). The bubbles in the Sales Location chart (i.e., the map) and the bars in the Detailed Sales plot will also be updated accordingly (only displaying the data from the Furniture category).

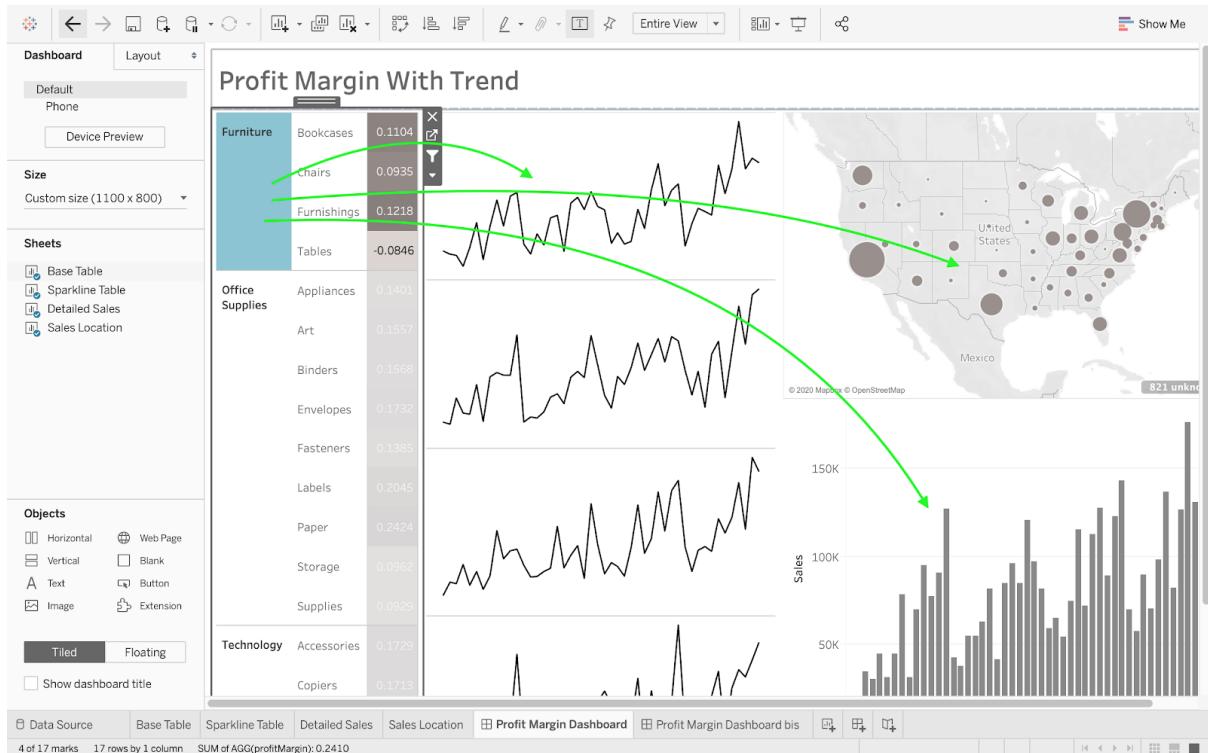
- Your dashboard without filters.



- Use your Base Table as a filter.

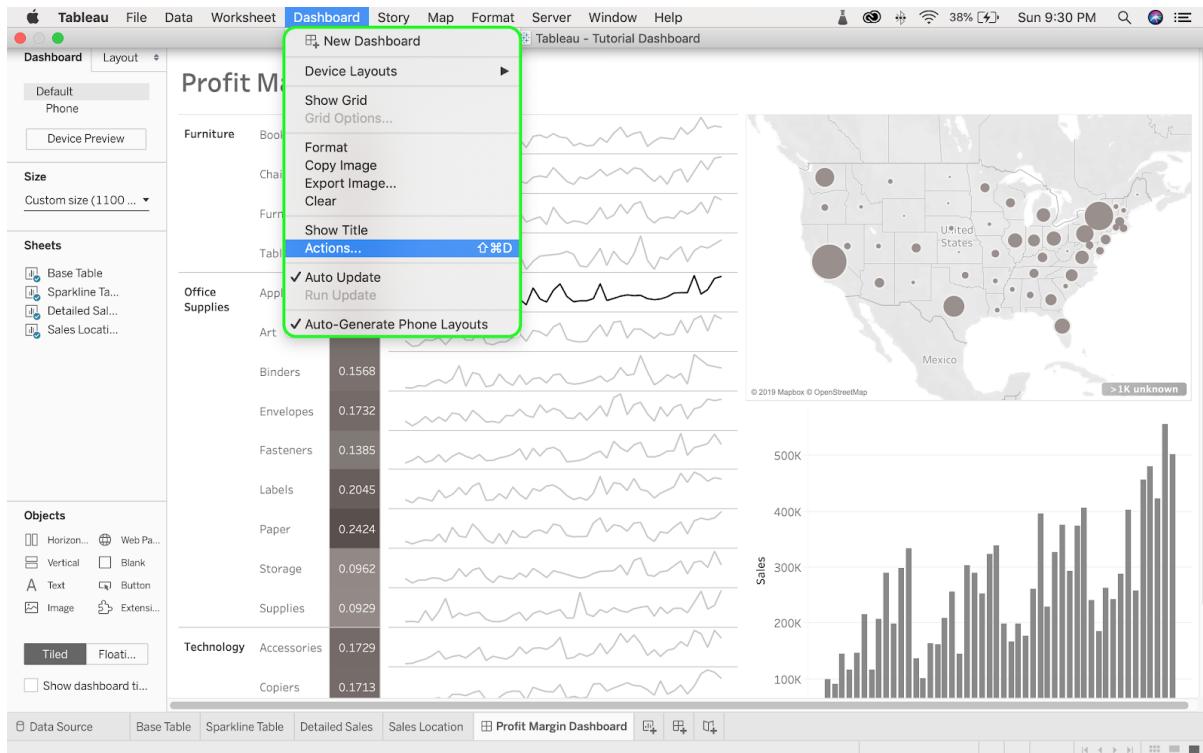


- Select the Furniture category. All three other tables will update accordingly.

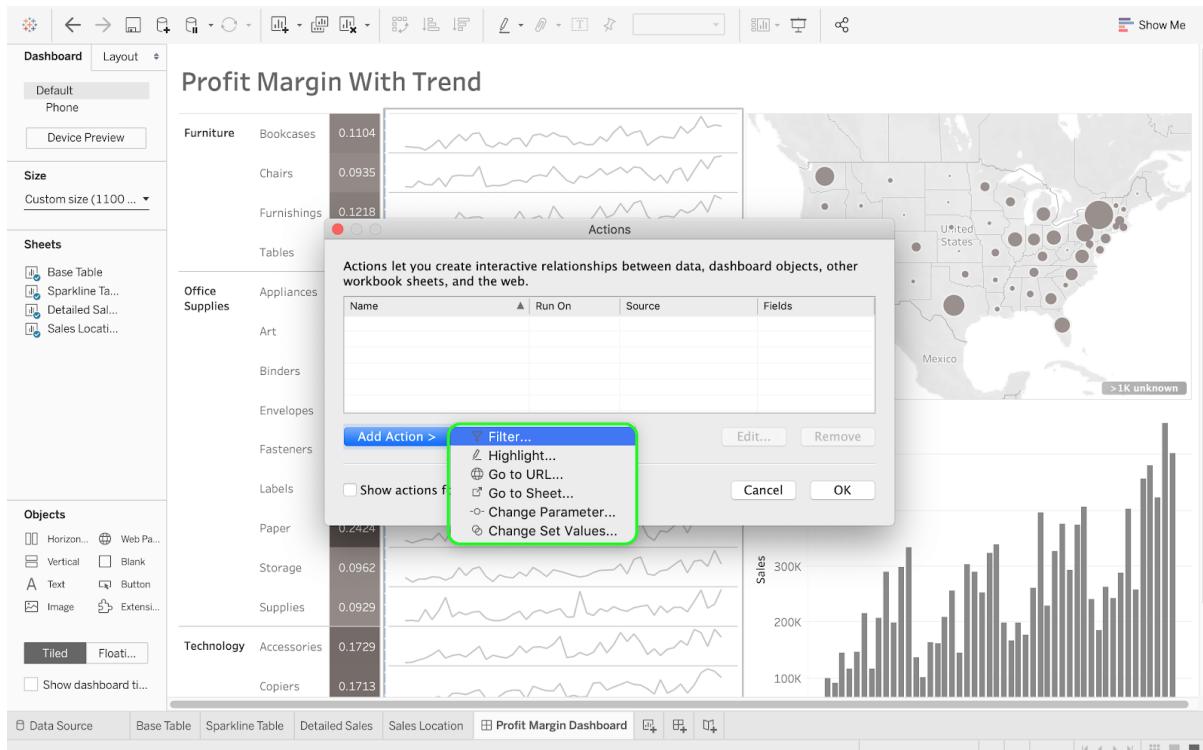


It may be useful to require that only specific charts are affected by the filter (as opposed to all the charts). To specify which graph(s) will be affected by your new filter, you can use Tableau's Actions, which can be found on the Dashboard tab at the top of the window (see the figure below). Once you add a filter action, you will need to design your filter. For example, you can select your Base Table as the source sheet (i.e., the sheet from which you specify the subsample of data) and pick Sales Location and Detailed Sales as target sheets (i.e., the sheets that will be affected by your chosen subsample). Since we did not select the Sparkline table as a target sheet, the data displayed in the Sparkline table will not be affected by the filter and will remain as is. In most cases, you may want to select the "show all values" option.

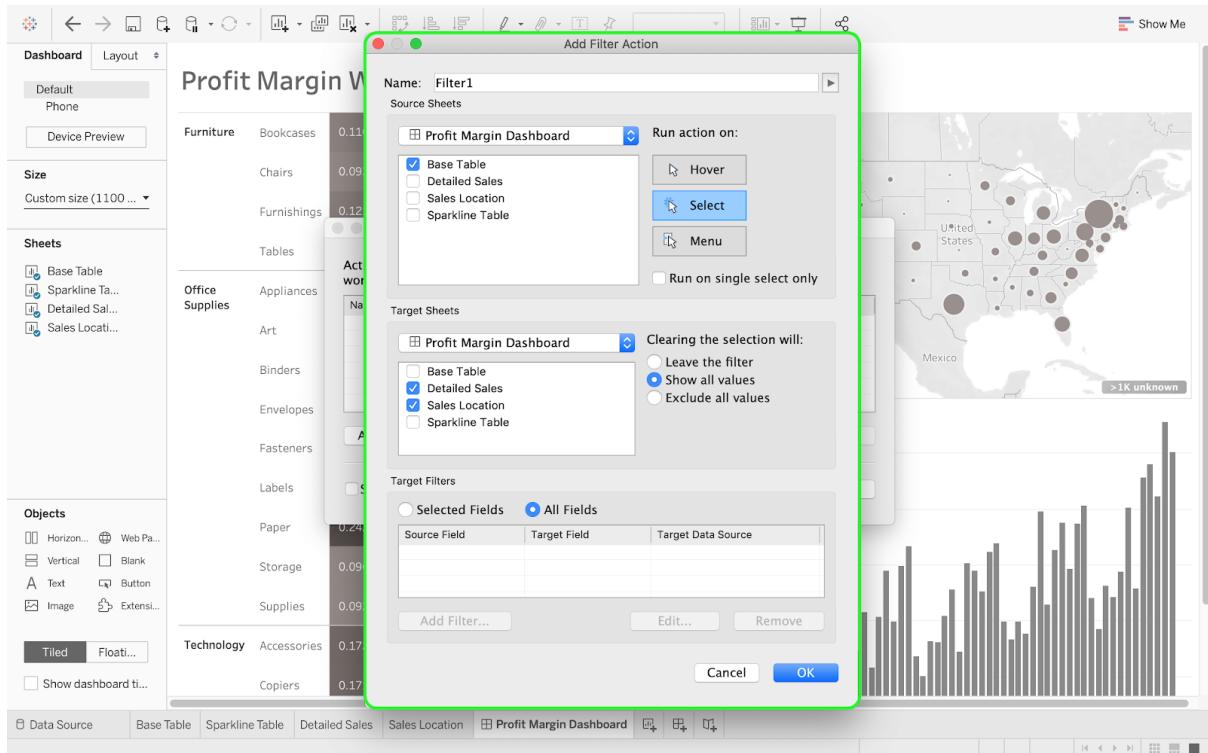
- Create an action.



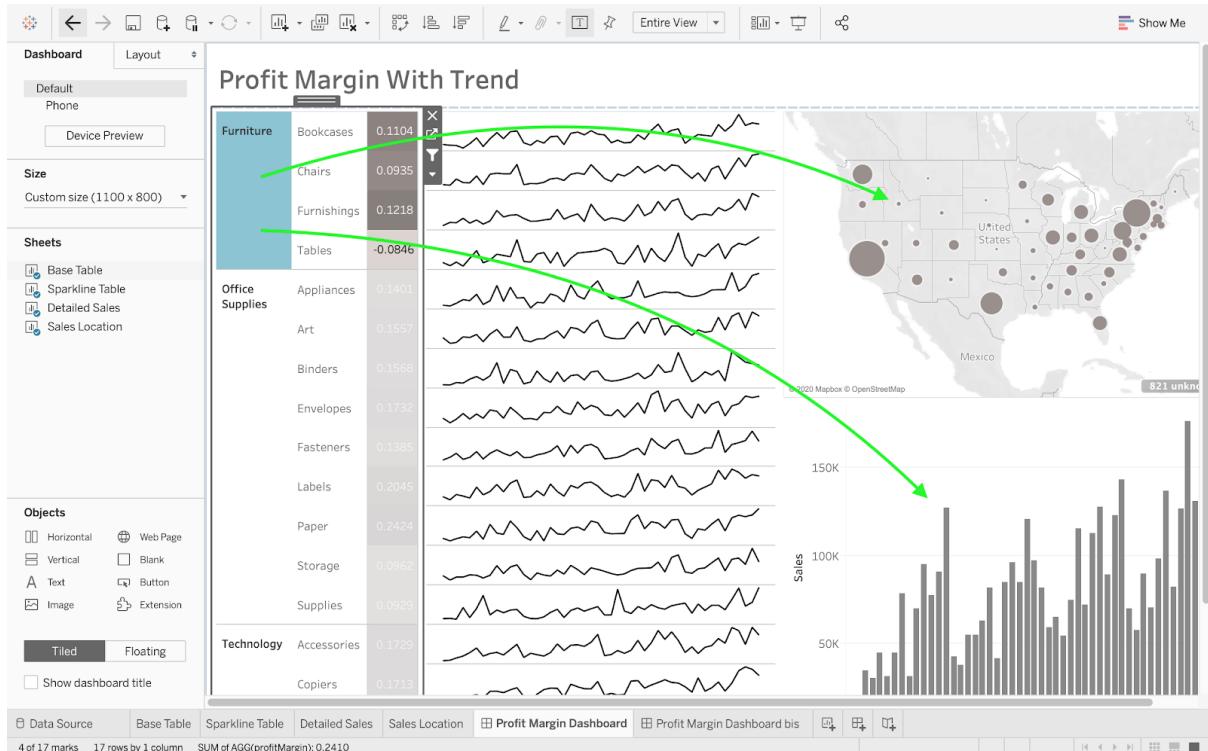
- Design your action (filter).



- Select the right source sheet and target sheets.



- Clicking on a subcategory will now only affect your map and your bar chart.



Another example can be to restrict your sample to a specific time period. For instance, you can use the Detailed Sales chart as a filter by clicking on the Use as Filter icon (see the figure below). At this point, you can manually select the specific time periods you are interested in. For example, you can decide to focus on the first quarter (January to March)

for 2013. In this case, this selection will affect all the data displayed on the Base Table, the Sparkline Table, and the Sales Location Table (all three are considered by default as target sheets).

- Use your Detailed Sales chart as a filter to focus on the data from a specific time period.

