**Tutorial A for the Case "Modern Retail Analytics:
Data Visualization Using Tableau"**

1. License & Introduction to Tableau

This tutorial is intended to help students get familiar with the basic functions of Tableau. Upon completion, students will be able to master the main features of the data visualization software. The three tutorials (A, B, C) provide a step-by-step guide to getting started on the Global Superstore case study, answering business questions using Tableau, and ultimately creating a dashboard.

1.1. Get a Tableau License

Students can obtain a free Tableau license (check on Tableau's website or directly with your university)
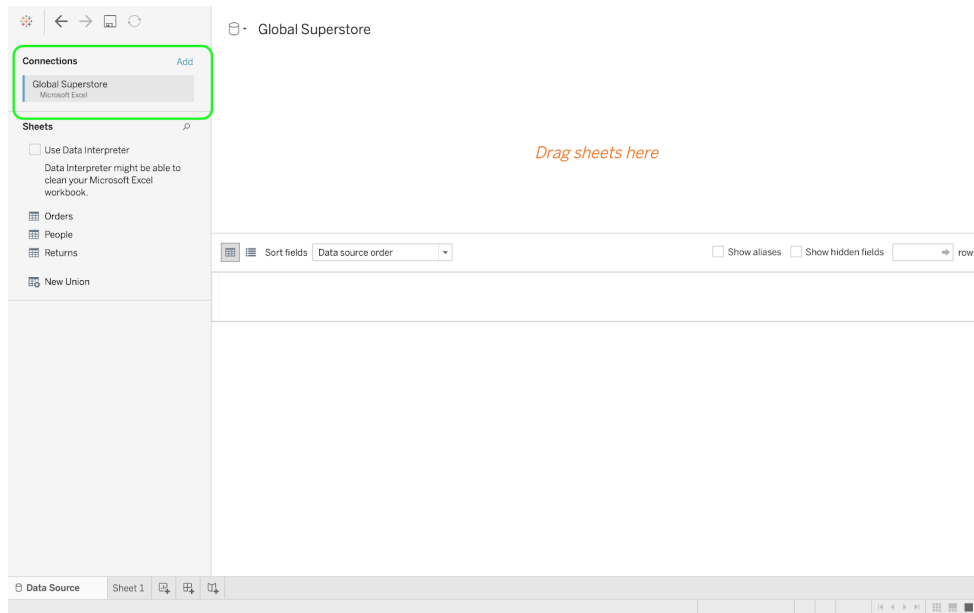
1.2. Connect the Dataset

Once students have access to Tableau Desktop, the first step is to connect Tableau to the GlobalSuperstore spreadsheet. One can do so by using the Connect tab (located on the left of the start page) and by selecting Microsoft Excel as a connector. Once the connection is made, a new worksheet will automatically open. The data source (in this case, GlobalSuperstore.xls) will be indicated and its different tabs will also appear.

- Connecting *GlobalSuperstore.xls* to Tableau.
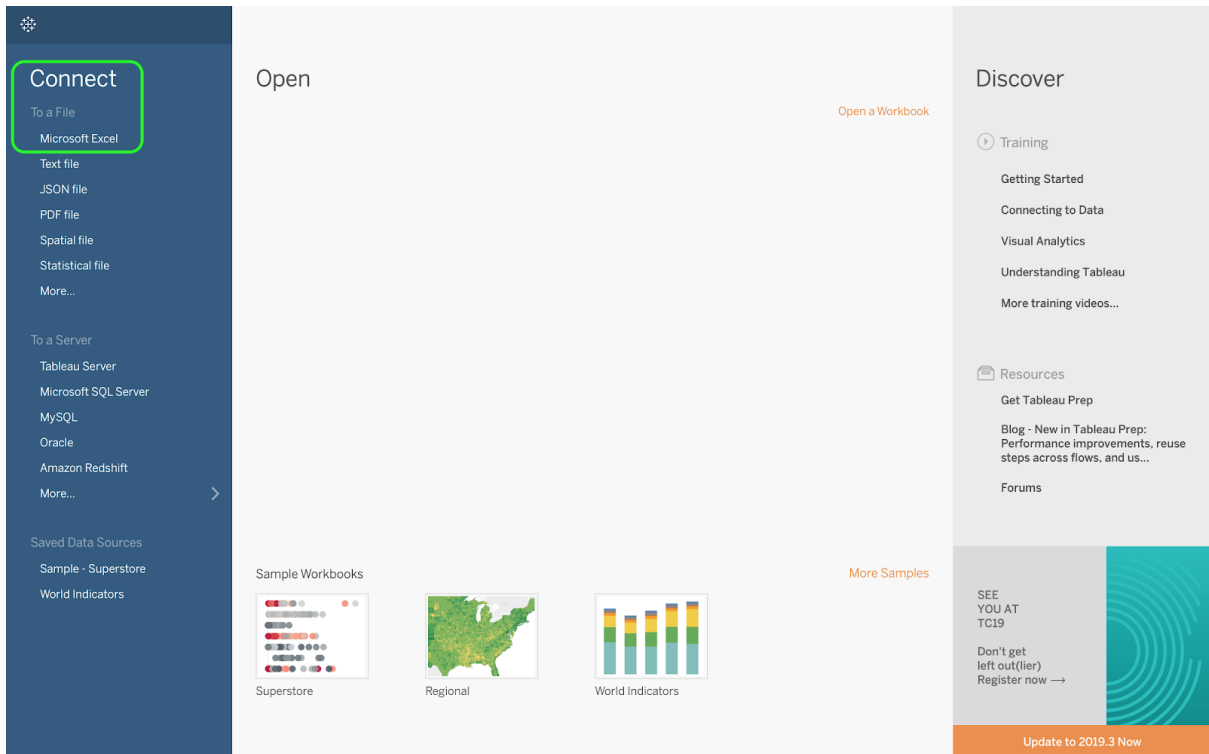
- The Data Source interface.

Below Connections, on the left tab, one can see the three sheets of data from the Global Superstore dataset (Orders, People, and Returns). Drag the Orders sheet on the upper-right pane. You then have the choice to either extract the data or to maintain a live connection with the original dataset. As GlobalSuperstore.xls is not a large file, you may want to choose extract: it gives you the added benefit of portability, as the data will be saved into Tableau (the original file won't be needed anymore). For heavier files that are too large to import into Tableau, a live connection in which Tableau queries the file as necessary is preferable.

- Extract the Orders sheet.
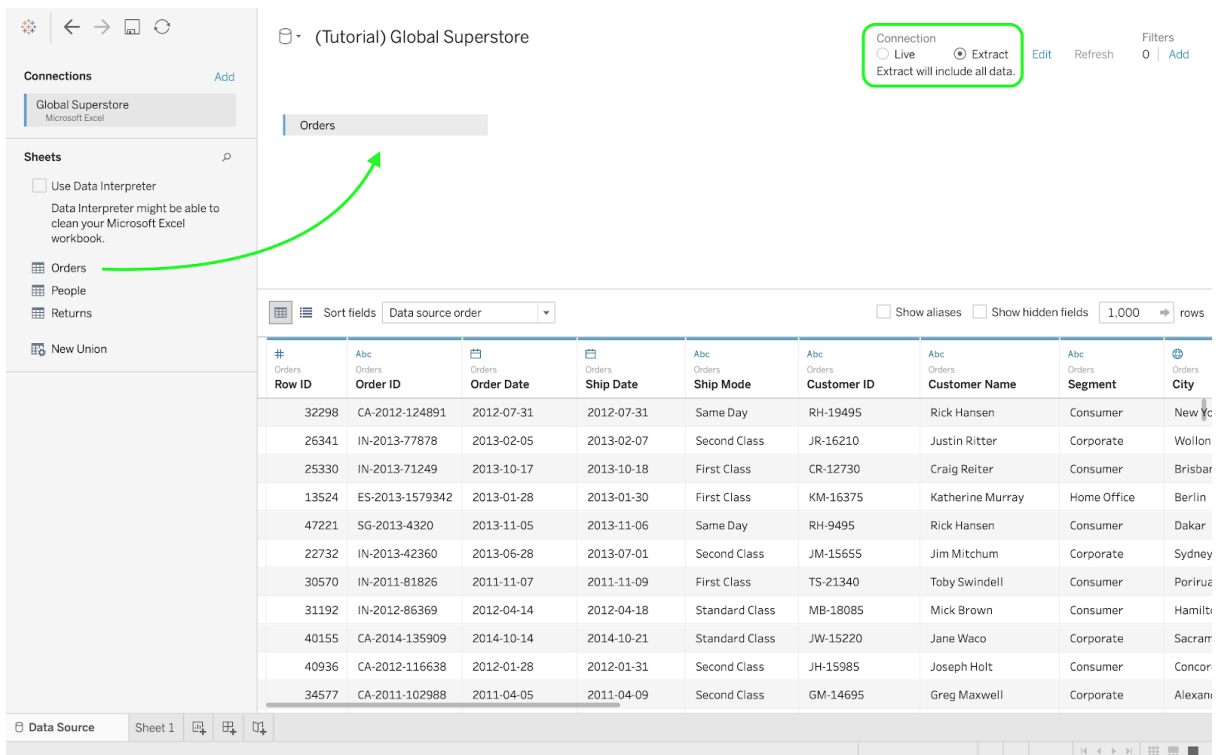
The bottom half of the interface presents a preview of the dataset; each column is labeled with a symbol, representing the type of data (e.g., number, date, string). You can then create your own calculated fields, perform splits, and most importantly, double check that Tableau has correctly identified the type of each column.

- Data preview.

We next discuss one of Tableau's most important operations: importing a second dataset and joining it to the first. For example, we can do this operation with the Returns sheet. Drag the Returns sheet and place it next to the Orders sheet. The default join clause created by Tableau (inner join) is not appropriate for this type of manipulation. Indeed, an inner join ties Orders and Returns on the basis that the dimension Market matches for both. However, the ideal joint clause for this situation is a Left Join (keeping Orders as the Data Source). Alter the Join clause by clicking on it, then Left Join both the Orders and Returns tables based on Order ID. A new table is created, populated with all values from Orders, as well as all matching values from Returns.

● Extract the Returns sheet.

● Change the Inner Join to a Left Join and select the joining column to be Order ID.

1.3.1 A First Look at Visualization: Order Priority & Ship Mode

You can now get started. Click on Sheet 1 at the bottom left of the screen to access Tableau's main interface. On the left side, you will find Dimensions and Measures, displayed in blue and green respectively. You can think of dimensions as qualitative data, usually containing qualitative and categorical information. The Global Superstore dataset includes several dimensions: some are pure text, such as Categories (Furniture, Technology, etc.), whereas others consist of date values, such as Order Date.

Measures, on the other hand, represent quantitative numerical data and can be aggregated based on a specific dimension. For instance, you could use the Measure called Profit and aggregate it based on the Dimension called Categories. Such an aggregation could be helpful in understanding which category is the most profitable.

- Dimensions and Measures.
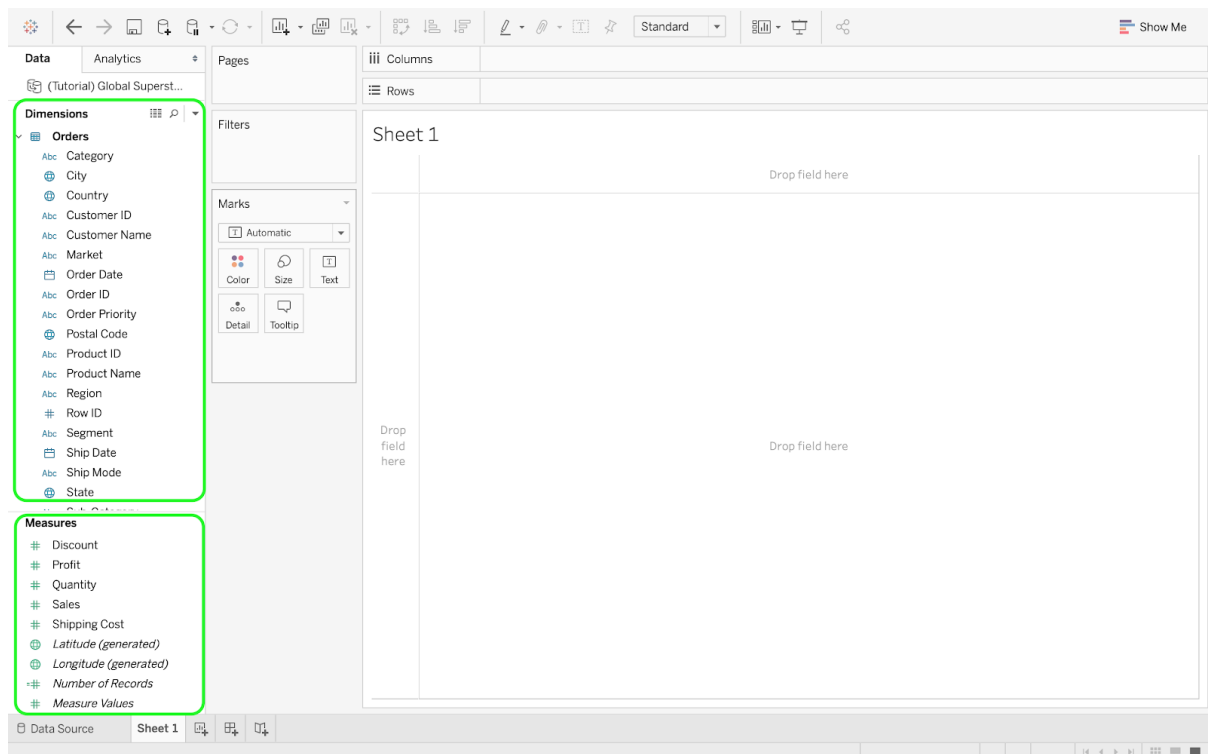
You can drag the Order Priority (from Dimensions) to the Columns pane. The column headers that represent the four dimensions of Order Priority (Critical, High, Medium, and Low) will then appear on the sheet. Continue by dragging Ship Mode to the Rows pane—a crosstab will appear. At this point, you can see that some of the cells are labeled as "Abc," whereas others are blank (see the figure below). "Abc" is a generic placeholder text used by Tableau. The blank cells mean that the focal combination is not present in the dataset. In this example, there are no records of Critical priority orders that are shipped in standard class. Similarly, all Low priority orders are shipped in standard class. The current information in the cells does not include any concrete numbers. To address this issue, you need to add a measure. Specifically, you can add the Number of Records, which is a measure automatically generated by Tableau, that counts the number of rows (i.e., the number of

order items). The Number of Records can be found in the Measures pane (each measure is listed with a green #). Drag this measure to the Text mark, located in the Marks pane (see the figure below). This will replace the "Abc" placeholder text by the number of records for each combination. You can now compare the frequency of the different shipping modes across the different order priorities.
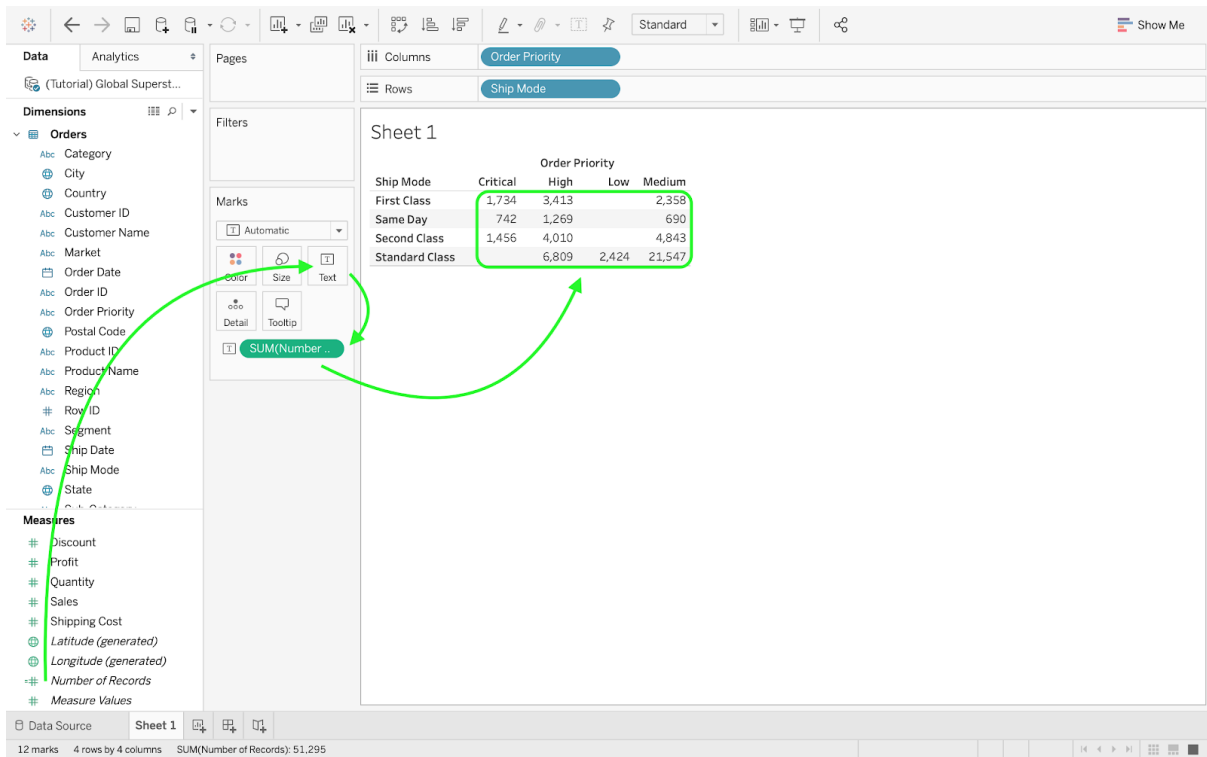
- Drag Order Priority to Columns.
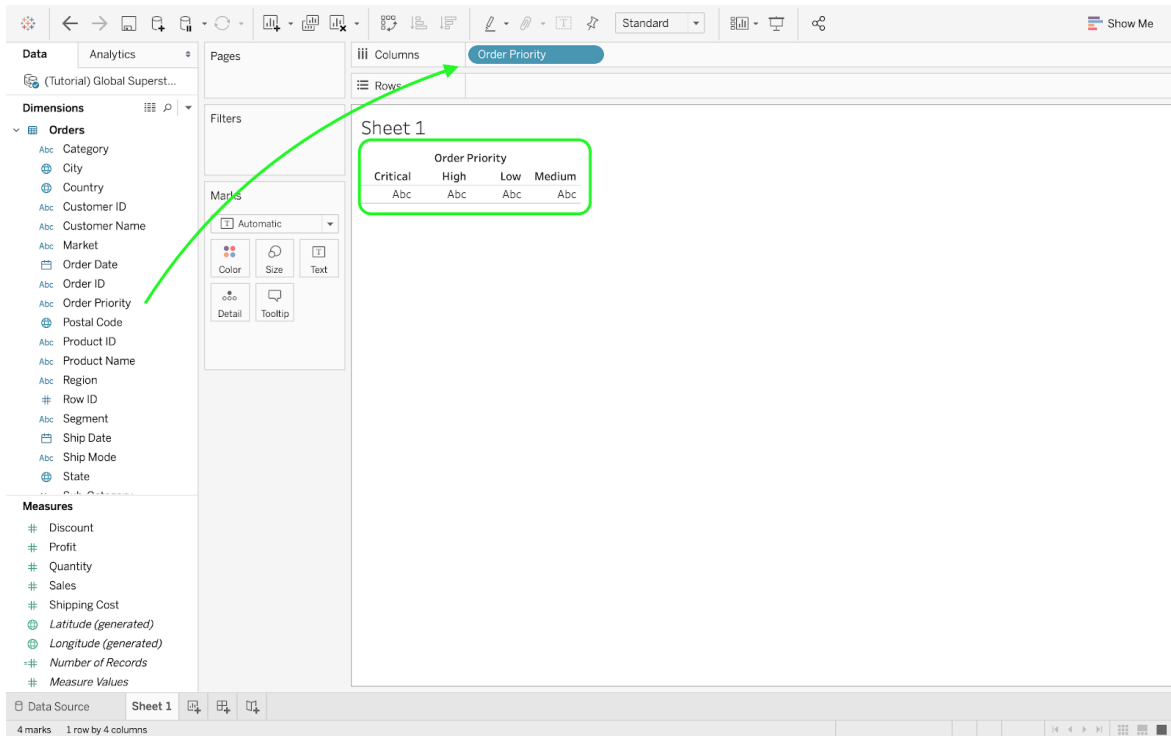

- Drag Ship Mode to Rows.
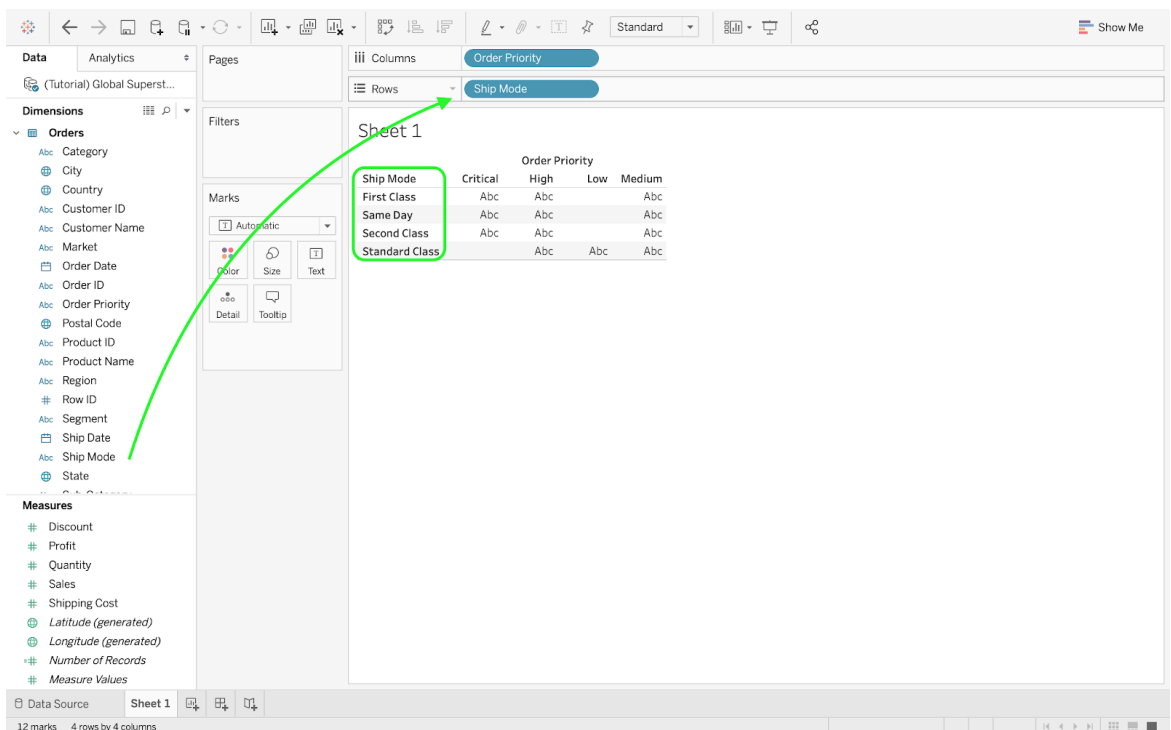
- Drag Number of Records to Text.

You should not limit yourself to the number of records. Assume for example that you are interested in the profits. You can then drag the Profit measure to the text mark and see the sum of profits appear below the number of records. You may also want to look at specific statistics of the profits, such as average, median, maximum, and minimum. For this example, open the drag-down menu and set the Measure to Average. You can then drag the Average of Profits to the Color Mark and see how the table evolves. Adding filters can also be done by dragging dimensions or measures to Filters. You also have the option to focus on specific markets (e.g., U.S. and EU) by only selecting those markets when you design your filter.
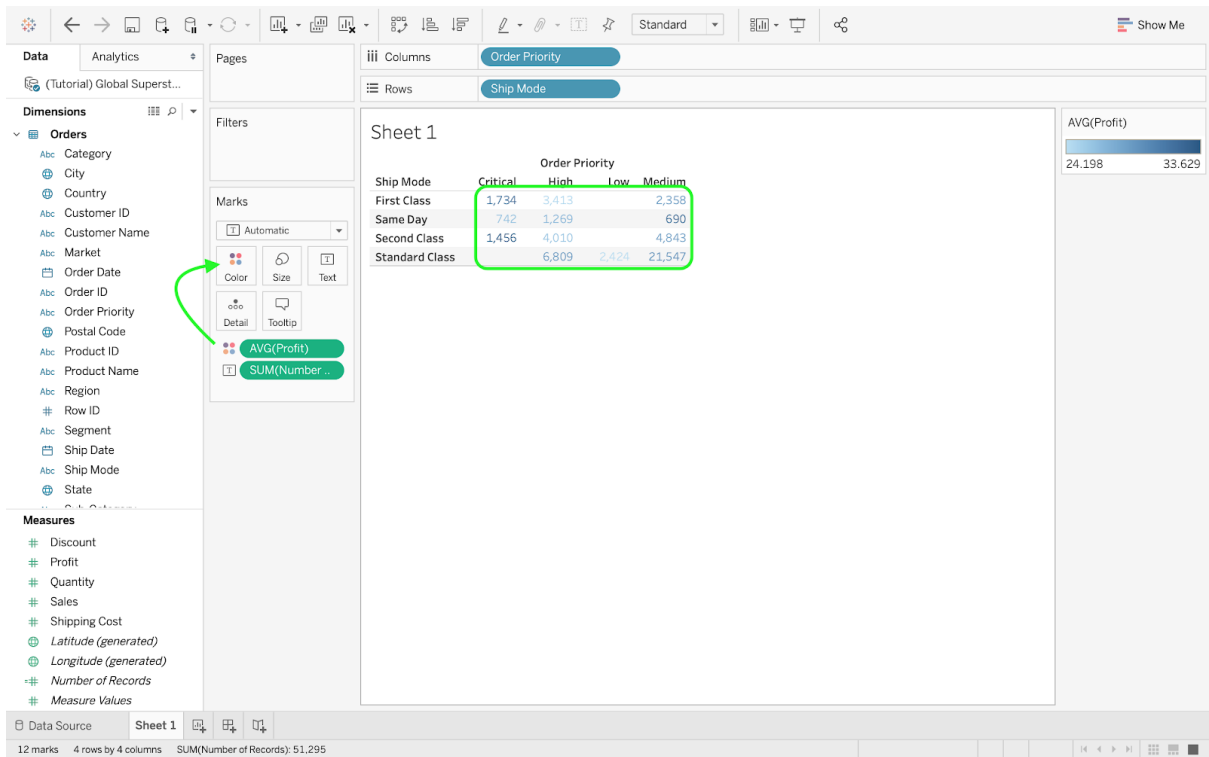
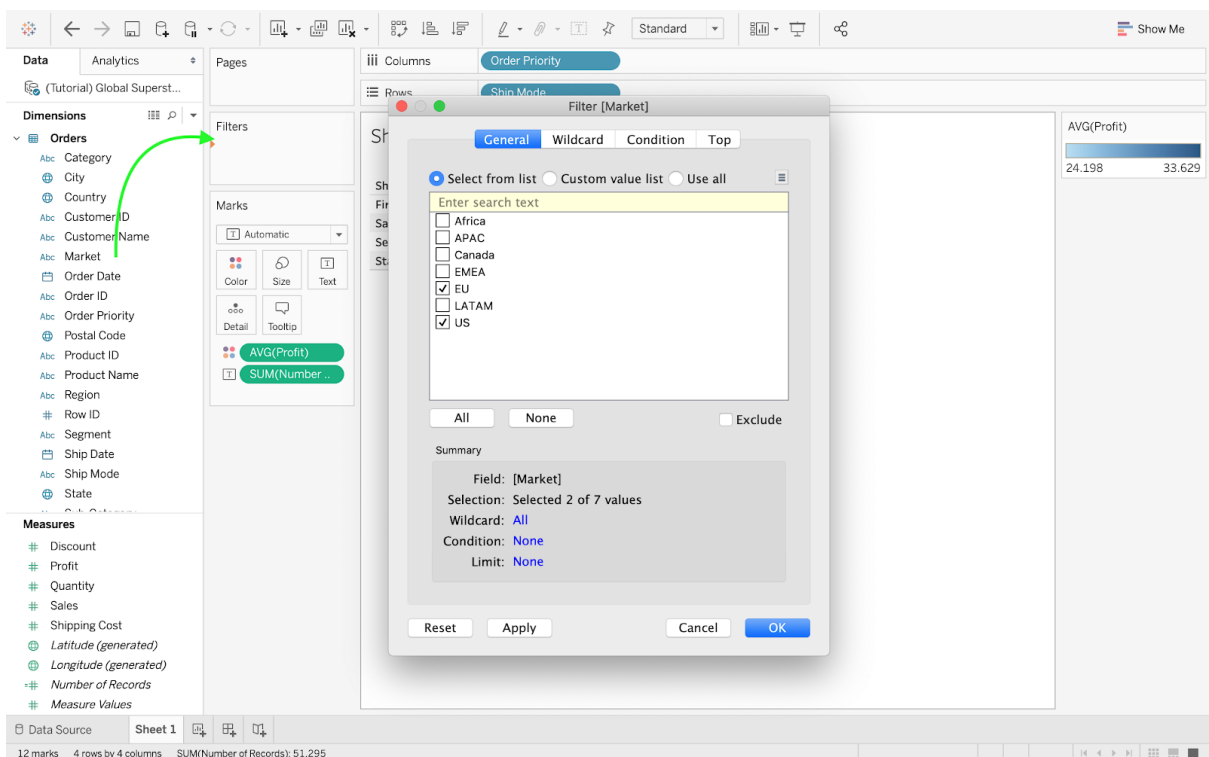- Profits as a text mark.
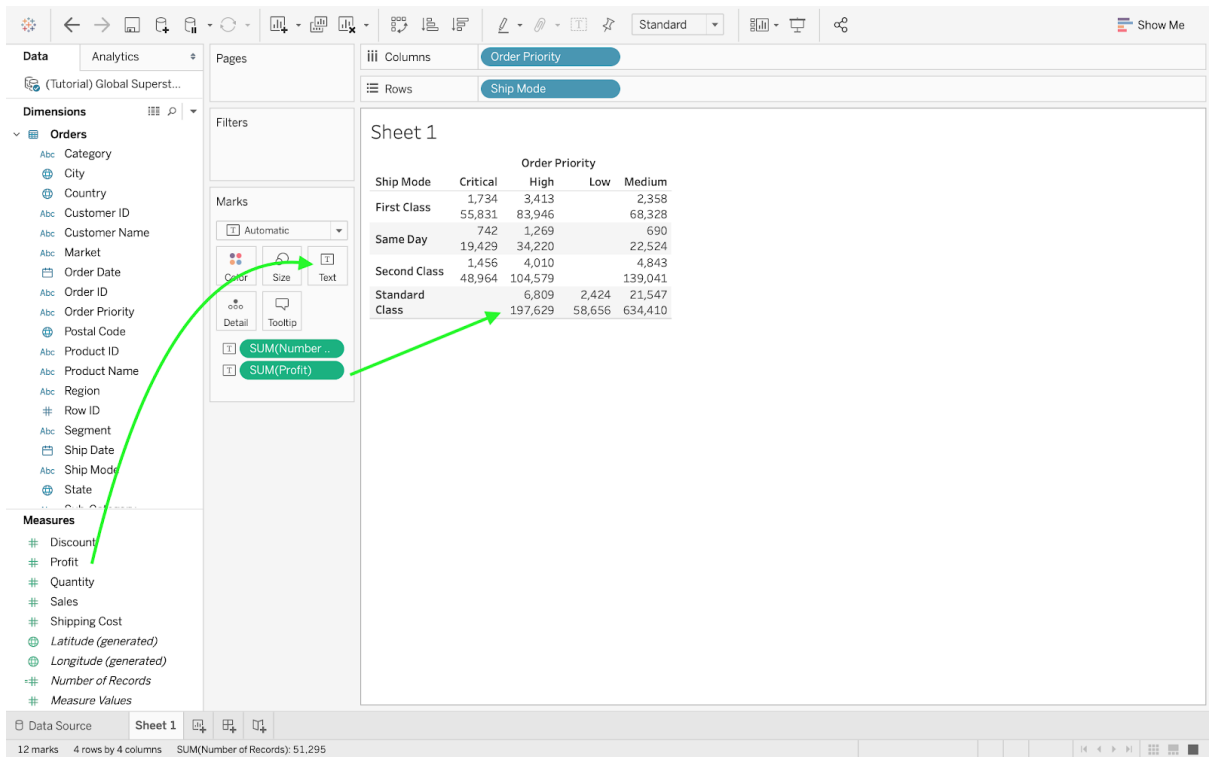
- Average Profit as a text mark.
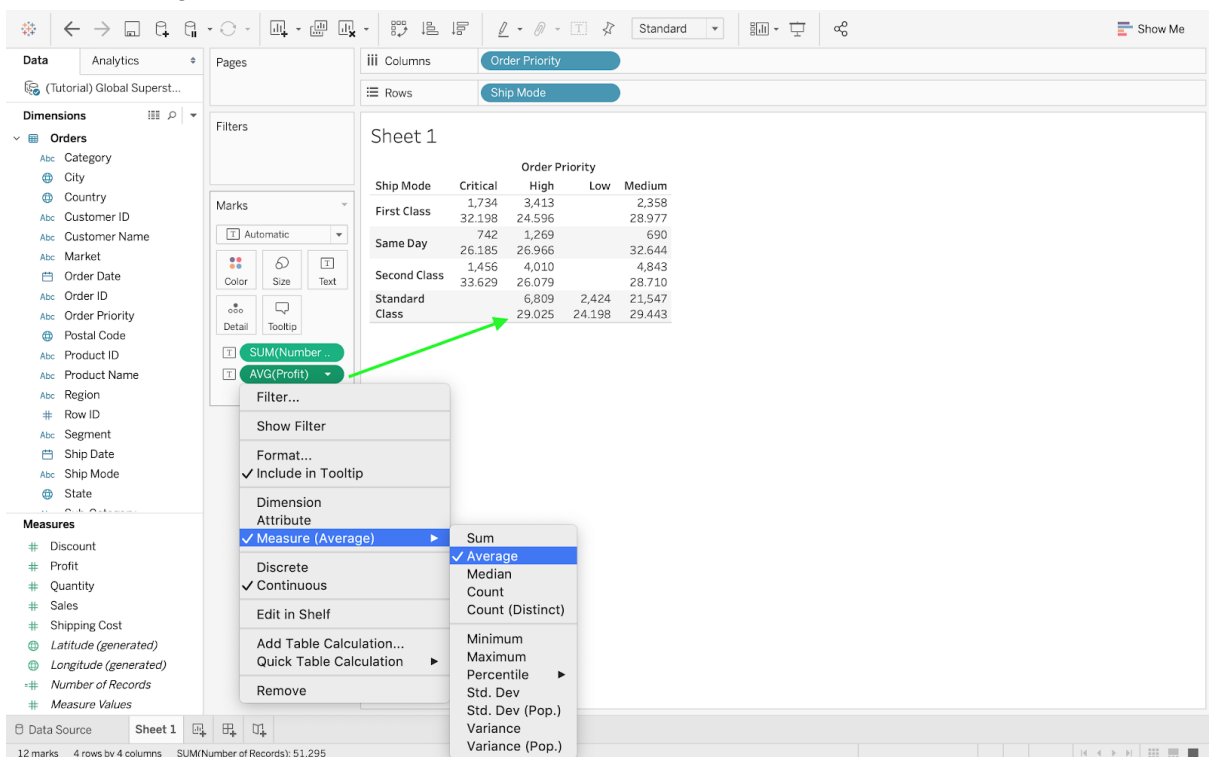
- Average Profit as a color mark.


- Market as a filter (U.S. and EU).

1.3.2 A Second Look at Visualization: Market & Sales

On a new sheet, drag the dimension Market to the Columns pane. Drag also the Sales measure but drop it in the Rows pane. Tableau will automatically generate a bar chart, where

you can easily spot the markets with the highest sales. For example, Asia Pacific seems to drive more sales than Canada. While the Bar Chart format has been selected by Tableau, you can choose to visualize the data differently. For example by opening the drop-down menu in the Marks pane, you can select Area instead of Bars. To further refine your Area chart, you can add colors (and add another dimension at the same time). For instance, drag the dimension Segment and drop it in the Color mark; you will get a better understanding of which segment accounts for the most sales in the different markets. By adding a dimension such as Order Date to Pages (located above the Filters pane), you can add a chronological aspect to your visualization.

Choose between years, quarters, and months as well as several other options by clicking on the drop-down menu associated with the dimension you dragged to the Pages pane. You will quickly notice that for some options, such as quarters, Tableau provides multiple ways to visualize your data. For instance, you may opt to browse through each quarter available in the dataset (e.g., 2011's Q1, Q2, Q3 & Q4; 2012's Q1, Q2, Q3 & Q4) or you can select an aggregated view (i.e., "Q1" would combine the Q1 data across all years).
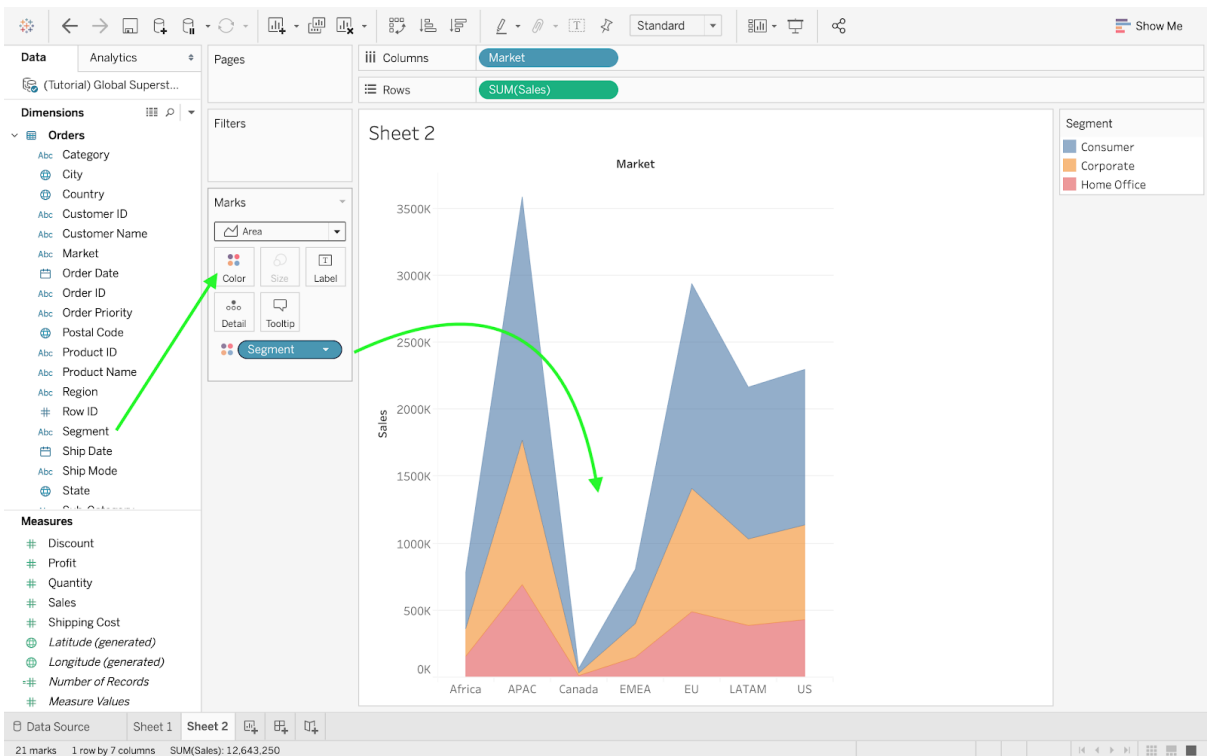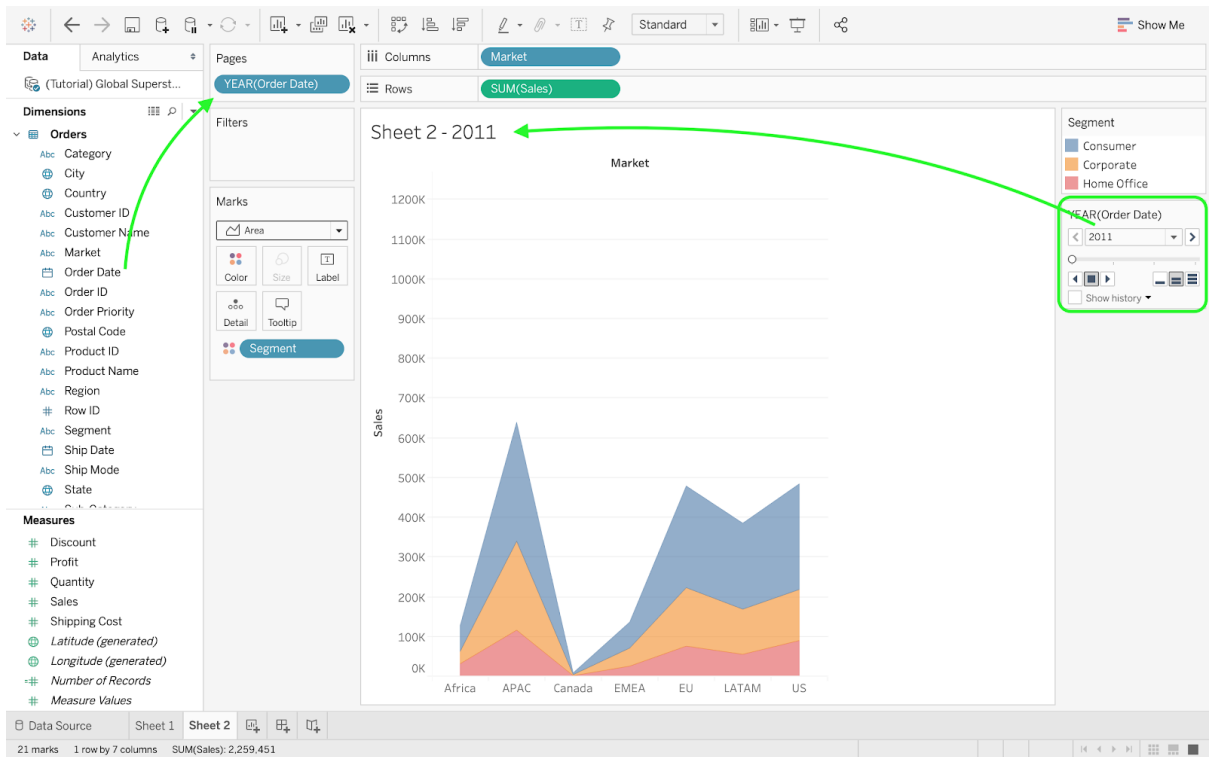
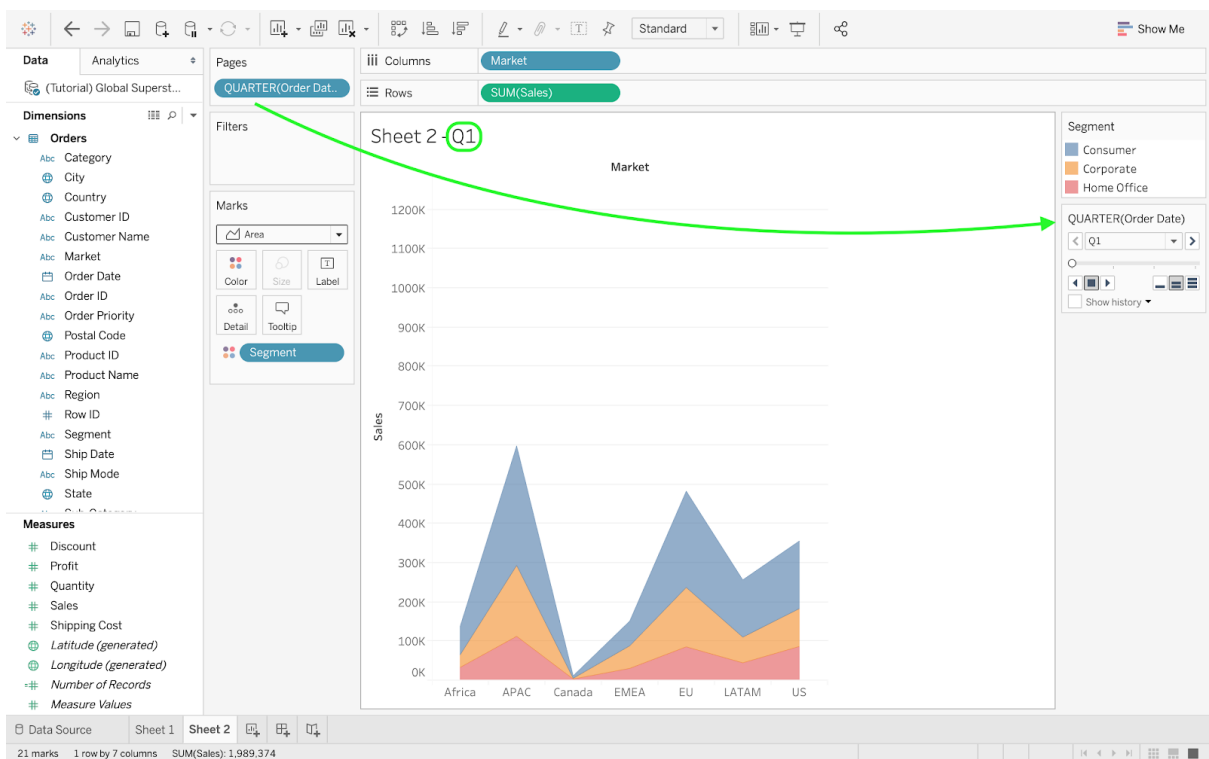- Drag Market (Dimension) and Sales (Measures).
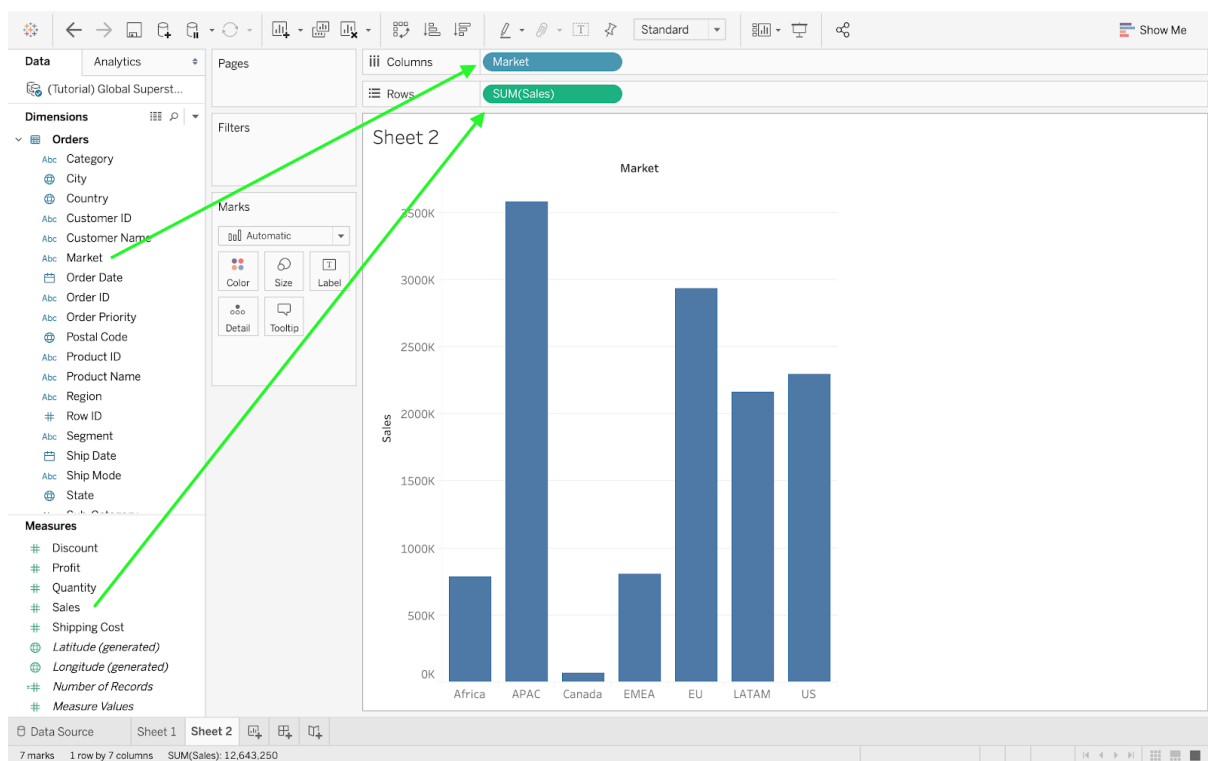
- Switch to an Area chart.
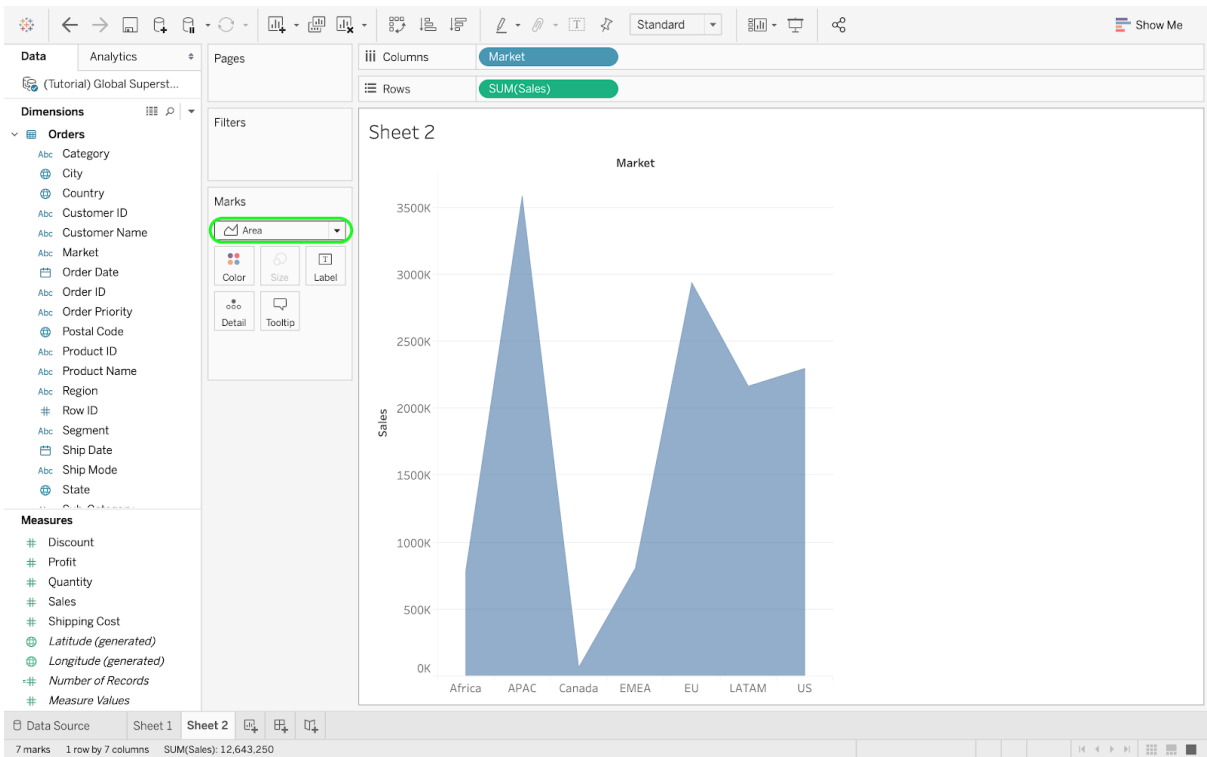
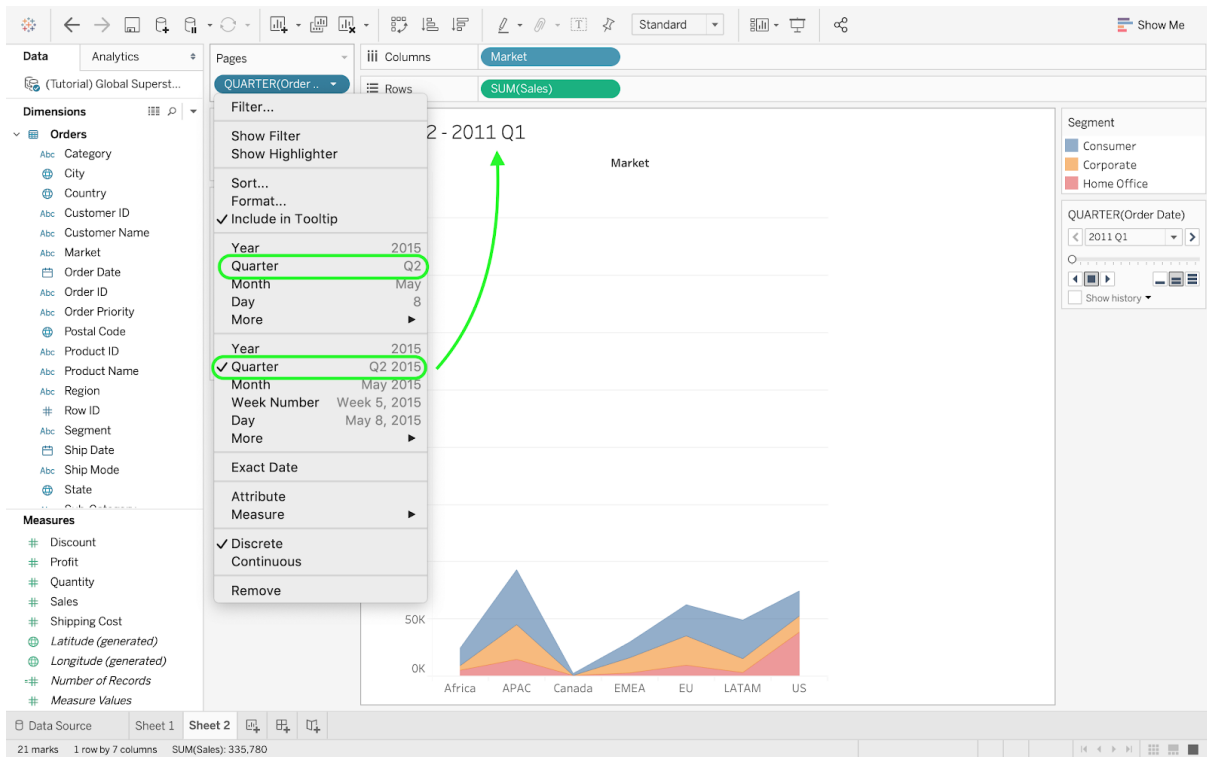- Drag Segment to the Color Mark.

- ● Drag Order Date to Pages.


- ● Switch from Years to Quarter.

● Switch from Aggregated Quarters to Quarter per year (e.g., Q1 vs. Q1 2015).


1.3.3 A Third Look at Visualization: Sales & Order Date

On a new sheet, drag the dimension Order Date to the Columns pane and the measure Sales to the Rows pane. A line will appear, showing the trend in Global Superstore's sales as a function of the year. By clicking on the drag-down menu on the Order Date dimension, you can select Quarter. Notice that there are two versions of Quarter: the first is labeled as Quarter Q2, whereas the second is Quarter Q2 2015. The two line charts below show the difference between these two versions: the former depicts the sum of sales per quarter throughout the years, whereas the latter is more detailed - allowing to follow the sales for each individual quarter.
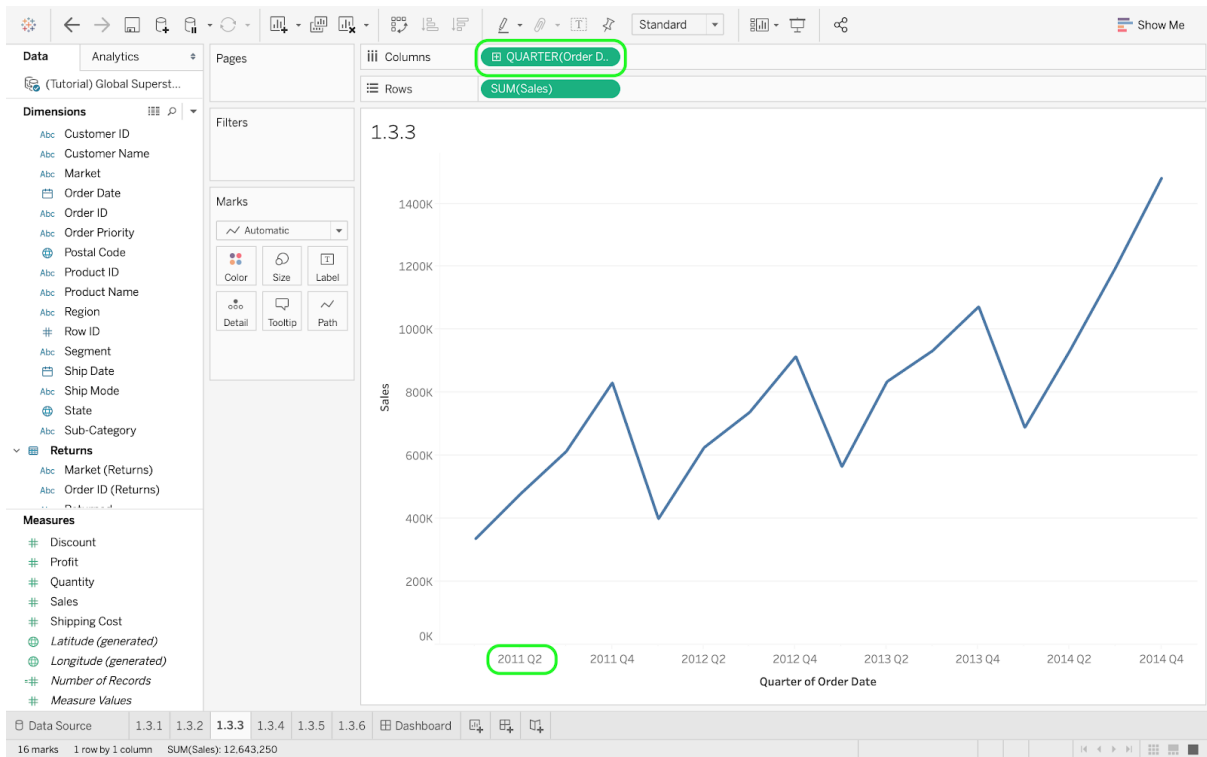
- Order Date & Sales.
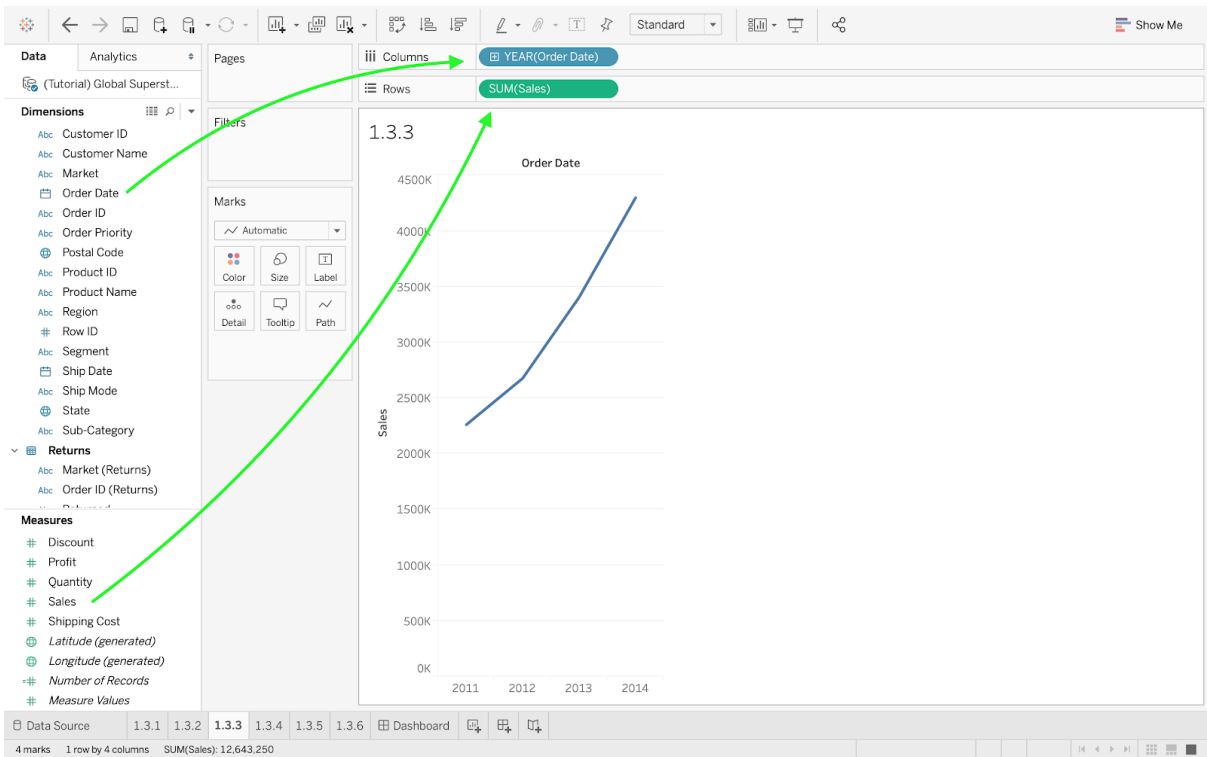


- Order Date by Aggregated Quarter.
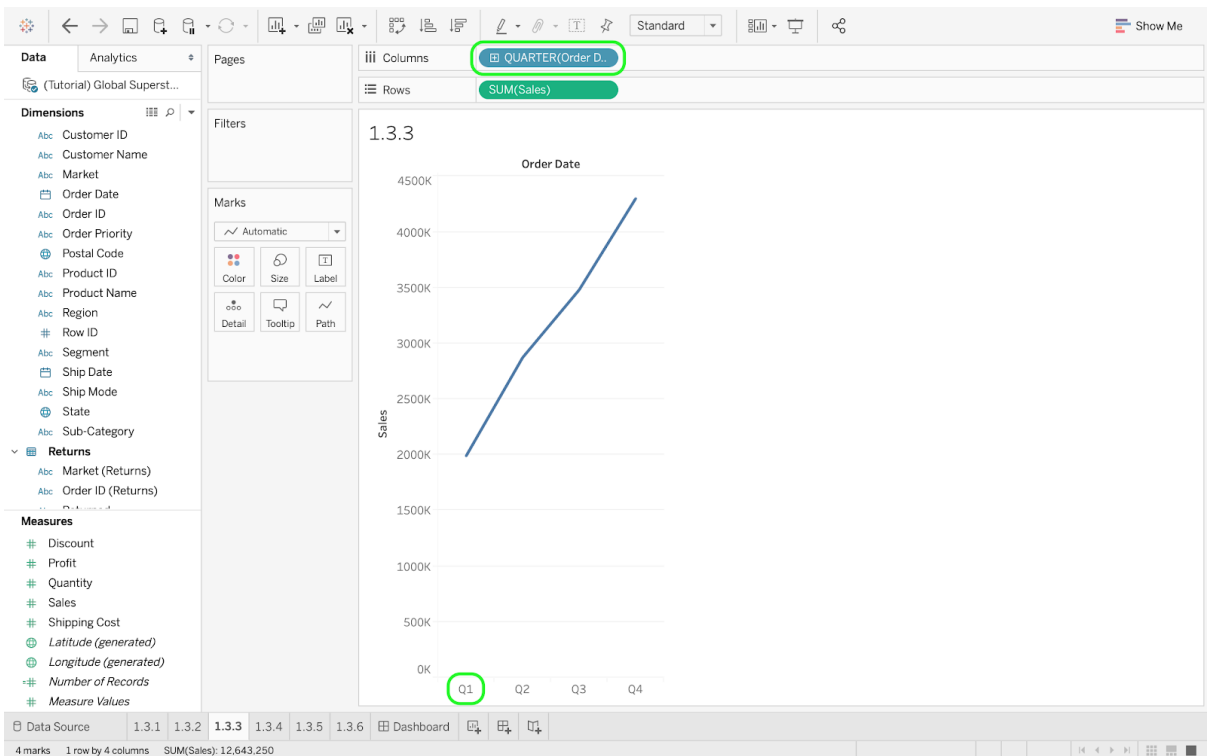
● Order Date by Quarter.

1.3.4 A Fourth Look at Visualization: Map

On a new sheet, double-click on the dimension Country. It will automatically generate the measures Longitude and Latitude in the Columns and Rows panes respectively. A map will subsequently appear. The blue dots correspond to the countries where Global Superstore have customers. To make the map more meaningful, you can drag a measure such as Sales in the different marks. The following screenshots showcase the sales represented by either (i) color (darker hues correspond to higher values) or (ii) dot size. Note that a legend will appear on the right, making it easier to understand the different maps. In this case, the legend is directly linked to (SUM) Sales, which was previously dragged to the Marks pane.
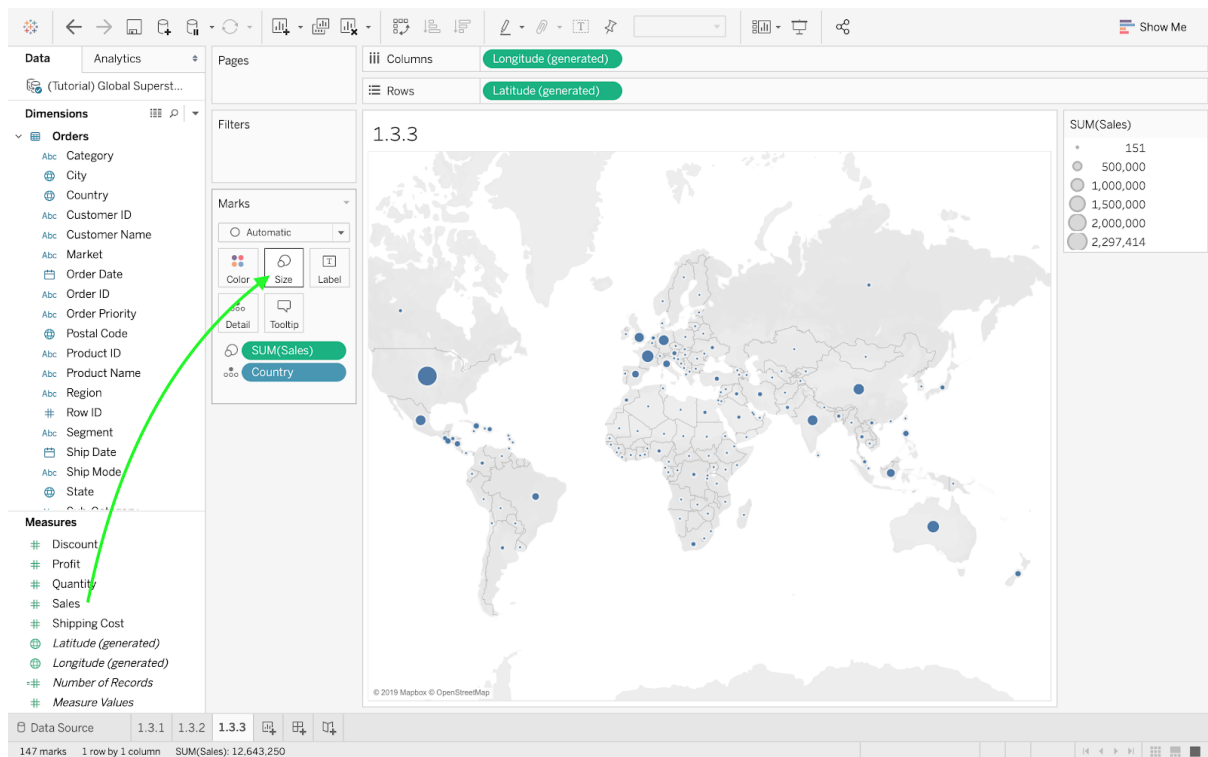
● Double-click on Country (Dimensions) and generate a map.
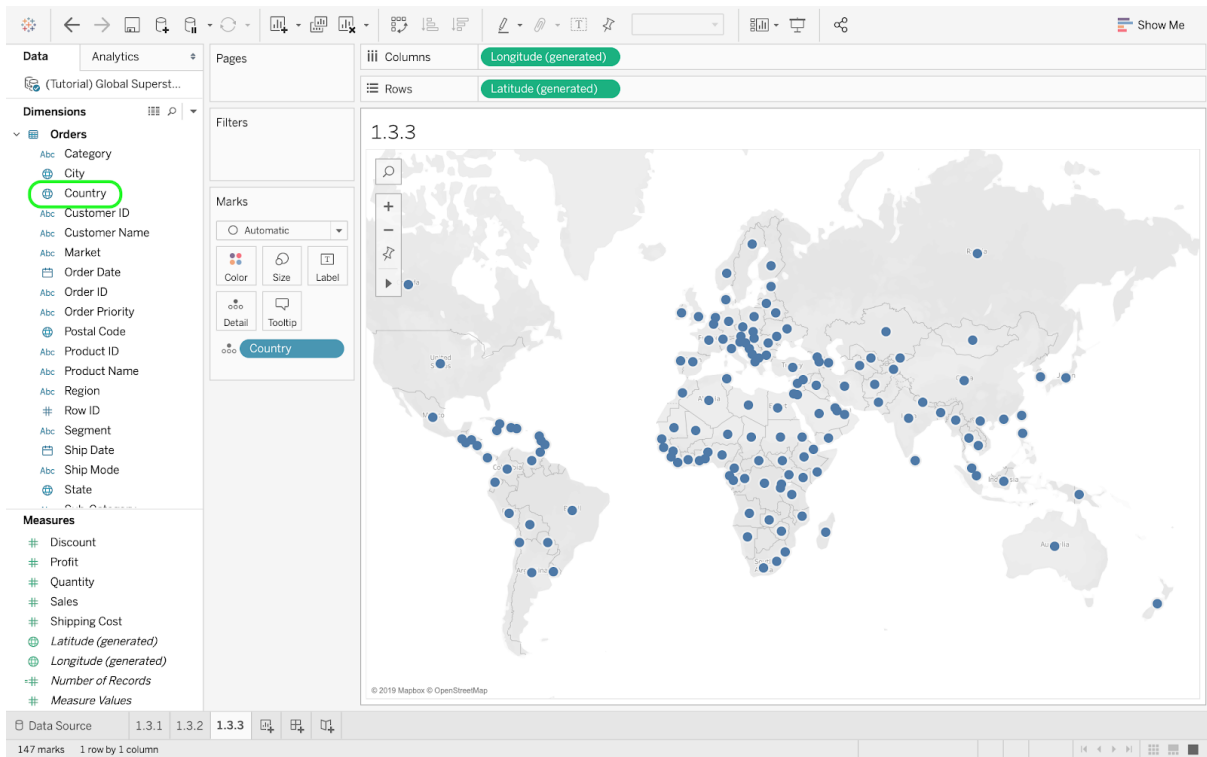
● Drag a measure such as Sales to the Color mark.
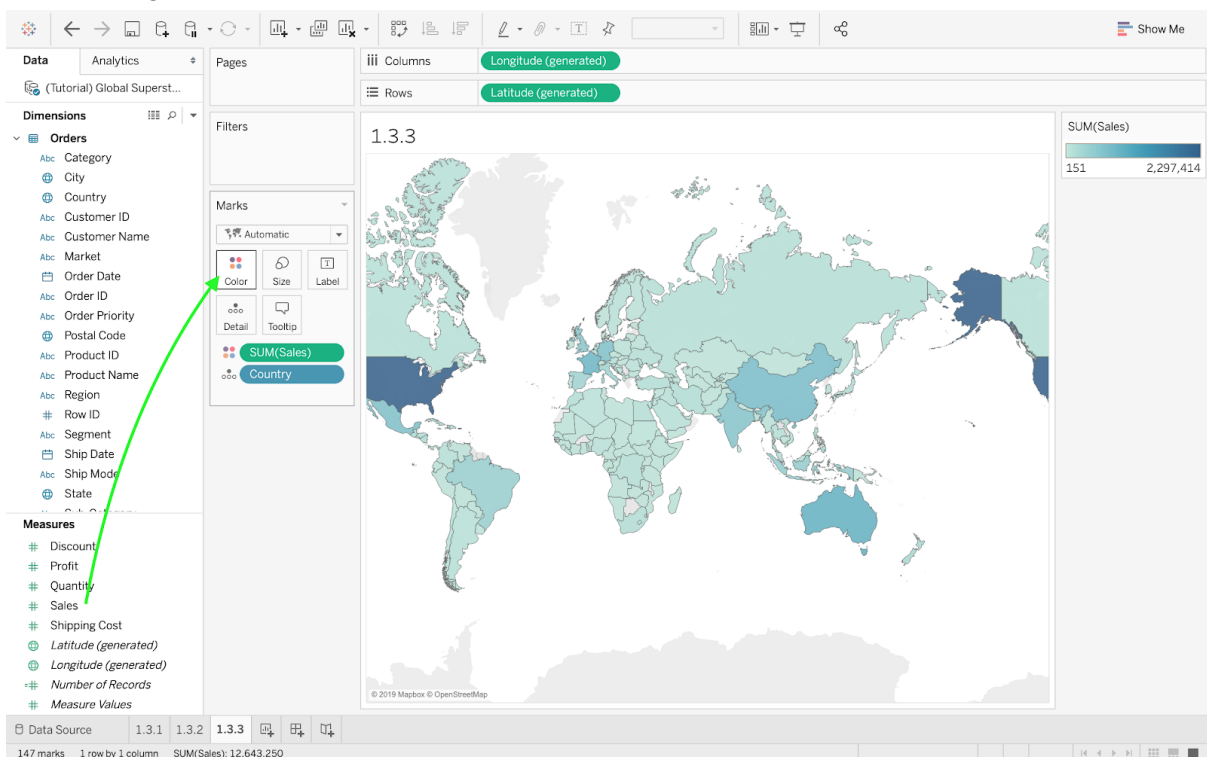
- Perhaps you prefer the Size option.

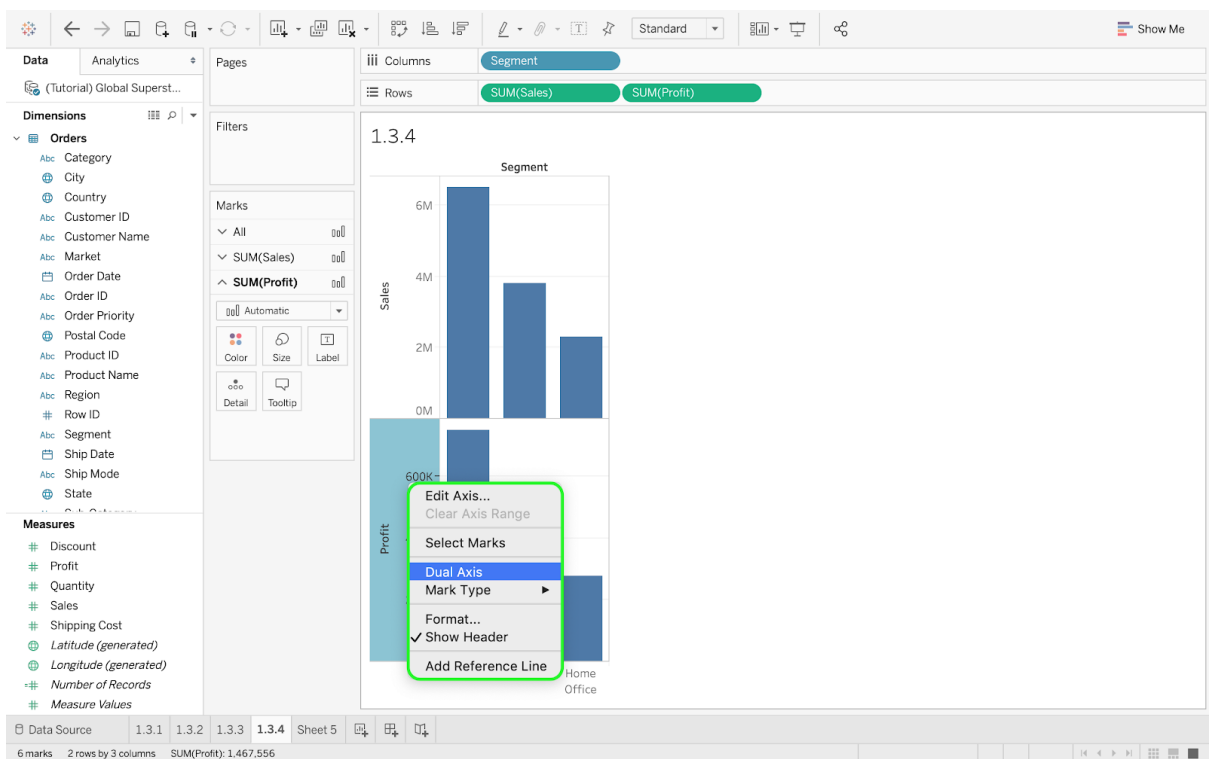### 1.3.5 A Fifth Look at Visualization: Bar Charts

In a new sheet, drag the Segments dimension to the Columns pane and drag both Sales and Profit to the Rows pane. It will create two bar charts. These bar charts show how the sales (and profits) are split between three different segments (Consumer, Corporate, and Home Office). To display the data on a dual axis (instead of two separate charts), you can right-click on Profit and select the Dual-Axis view. This will allow you to easily compare several measures. After selecting the Dual-Axis view, you will notice that the bars disappeared and were automatically replaced by circles. To revert back to a bar chart, you can select the bar option in the drop-down menu located in the Marks pane (you need to select this option for both measures).

At this point, you may want to improve the format of the chart. Specifically, to fully exploit the Dual-Axis view, you can click on the dimension Measure Names (located at the end of the list) and drag it next to Segment in the Columns pane. Then, the sum of sales and the sum of profits for each segment will now be displayed side by side. If you want to separate the sales from the profits, you can do so by swapping the order of the dimensions in the Dimensions pane.
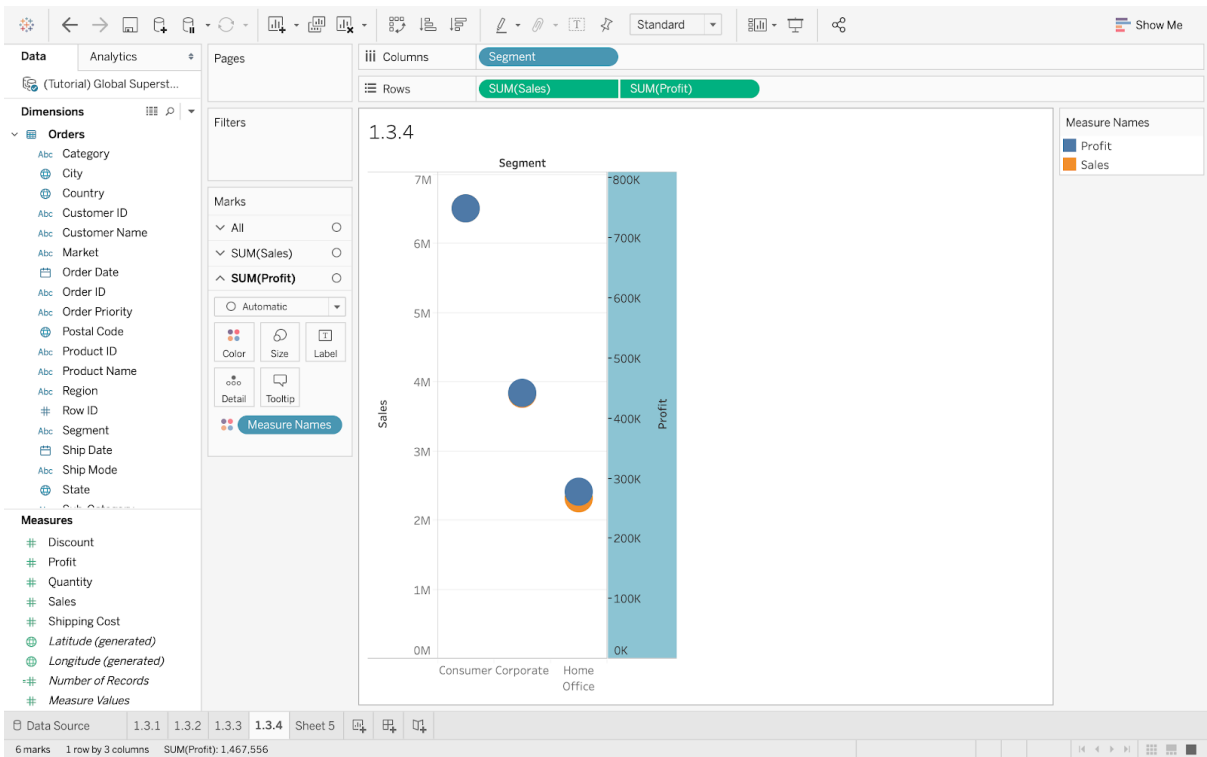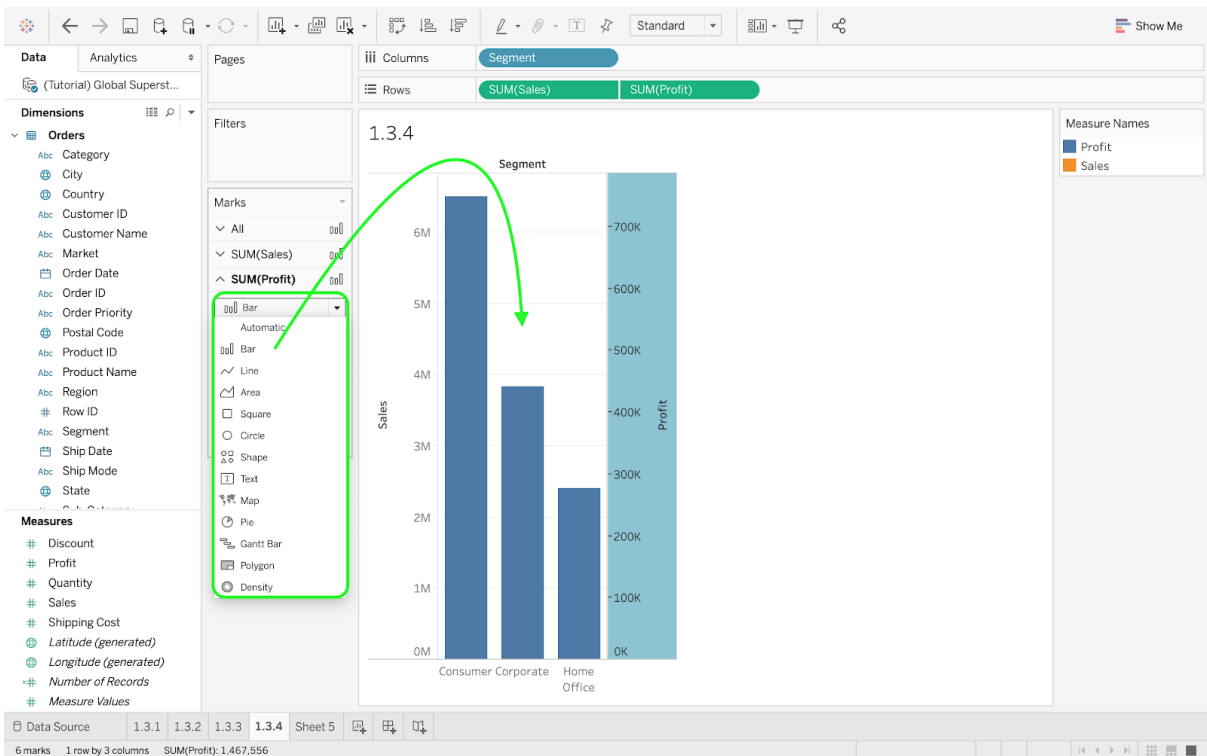
- One Dimension, two Measures.
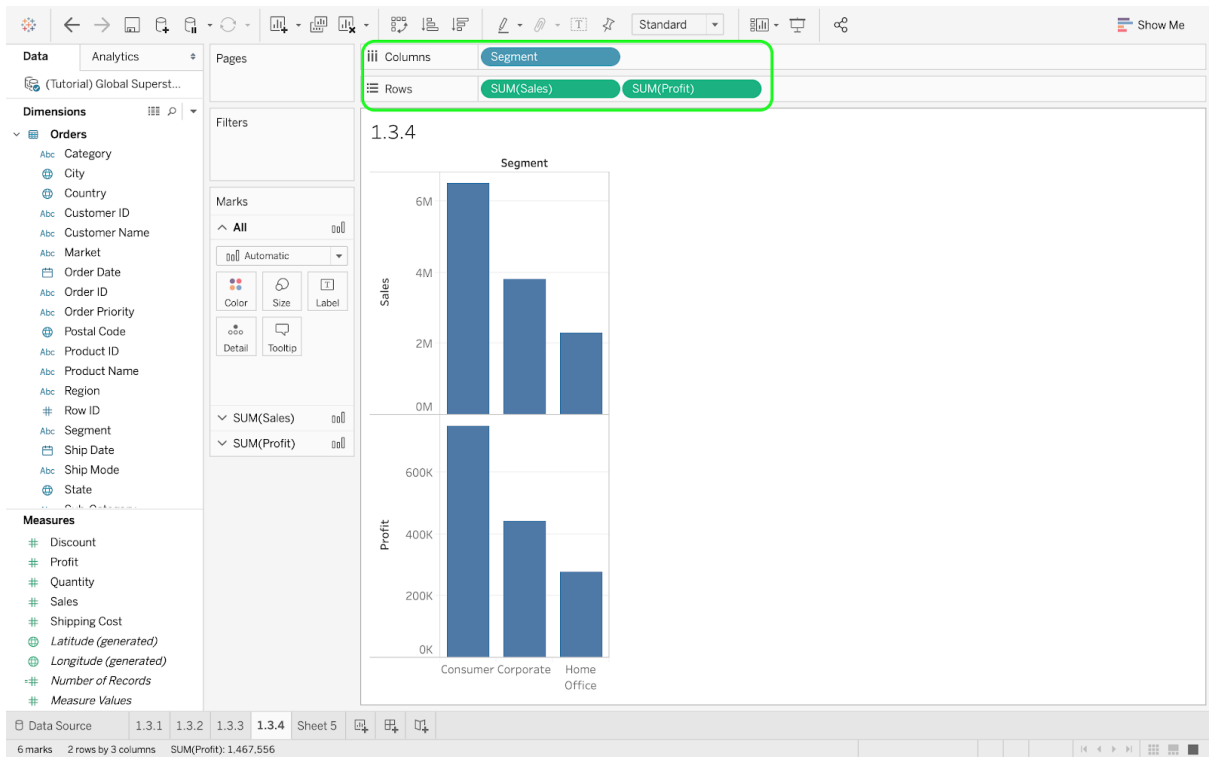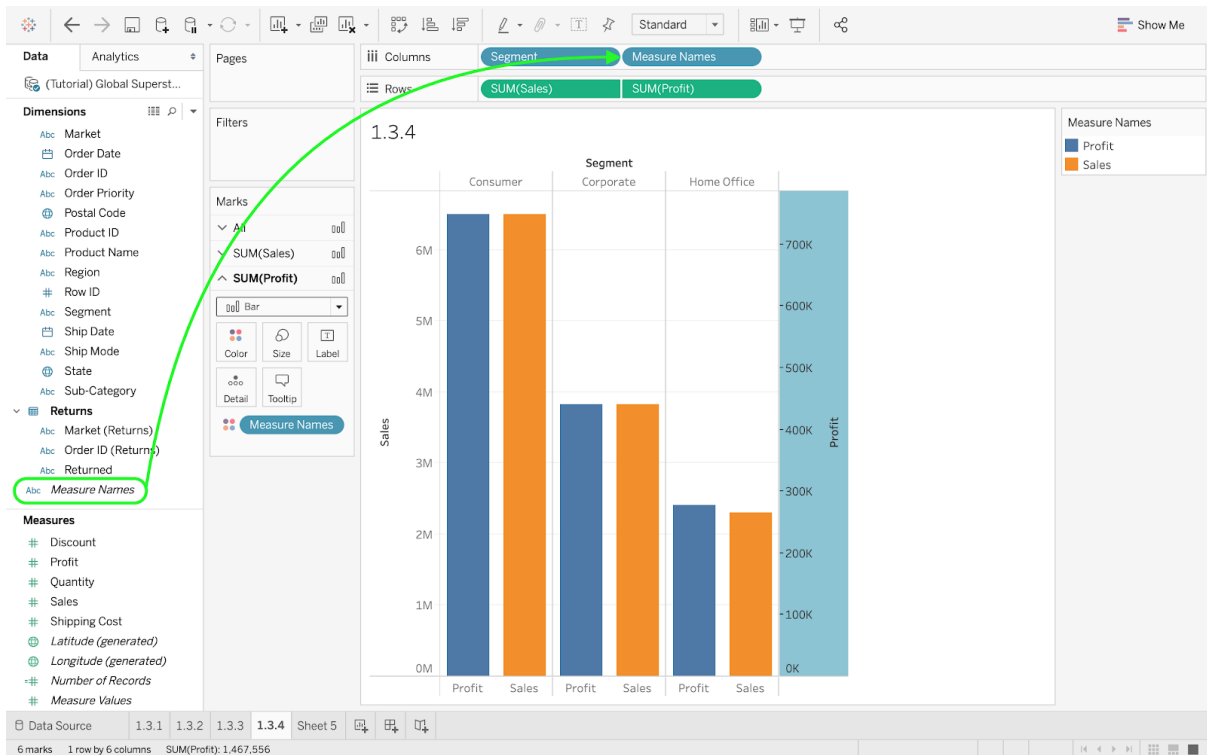

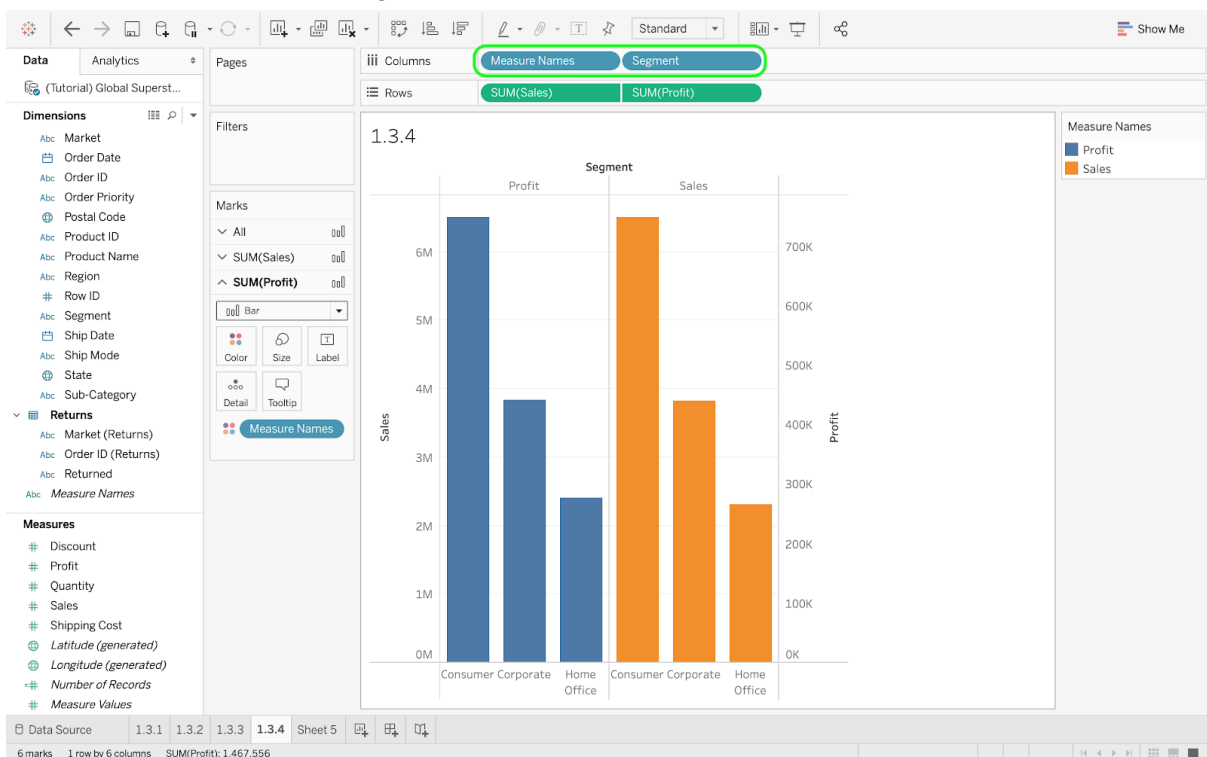- Select the Dual Axis option.

● A Dual Axis with a circle chart.

● Switch from Circle (default) to Bar.

● Add Measure Names to the Columns pane.

● Swap the order of Segment and Measure Names for an alternative visualization.

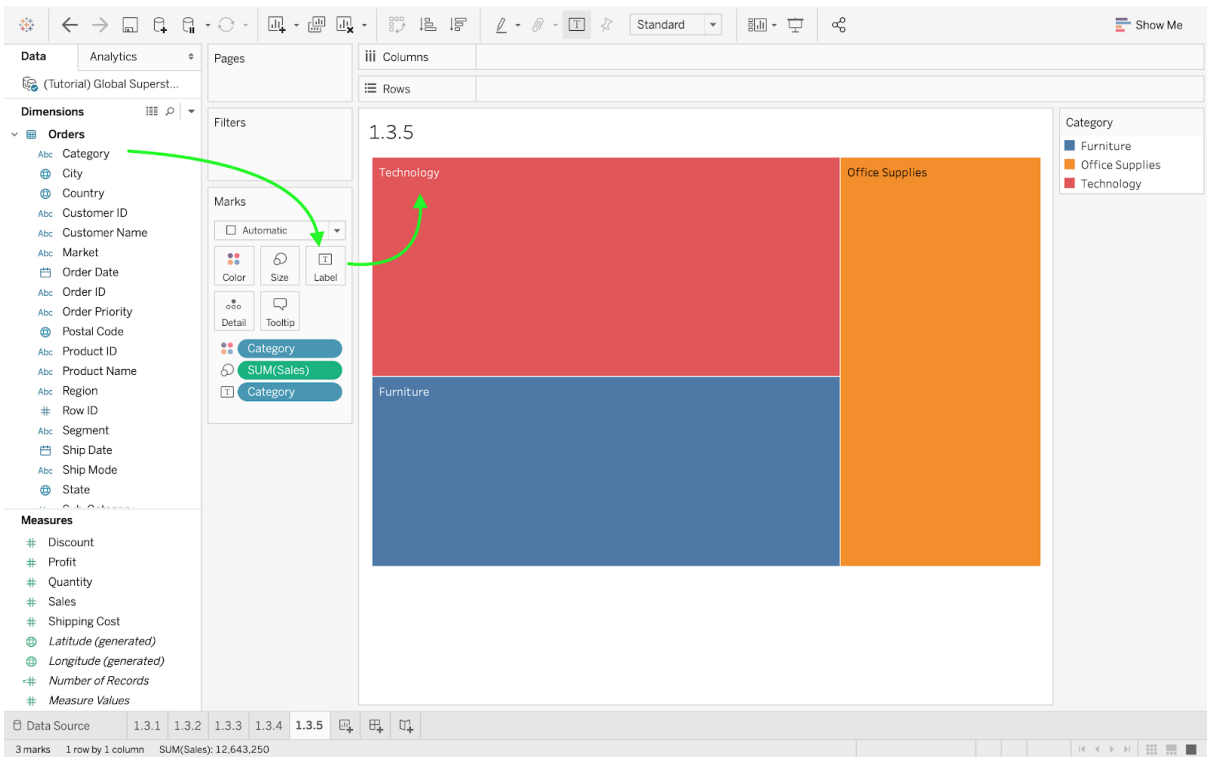### 1.3.6 A Sixth Look at Visualization: Packed Bubbles Chart

We next discuss how to create a visualization called a packed bubble chart. Start by dragging a dimension (e.g., Category) to the Color mark and a measure (e.g., Sales) to the

Size mark. It will generate a "blocky" square chart. You may complement this chart by dragging the Category dimension to the Label mark. Next you can also drag the Sub-Category dimension to the Label mark to further break down the square chart based on the different sub-categories. At this point, you will be able to quickly assess which sub-category generates the most sales by inspecting the areas of the rectangles. Finally, you can opt for a packed bubble chart (see figure below) by using the drop-down menu located in the Marks pane.
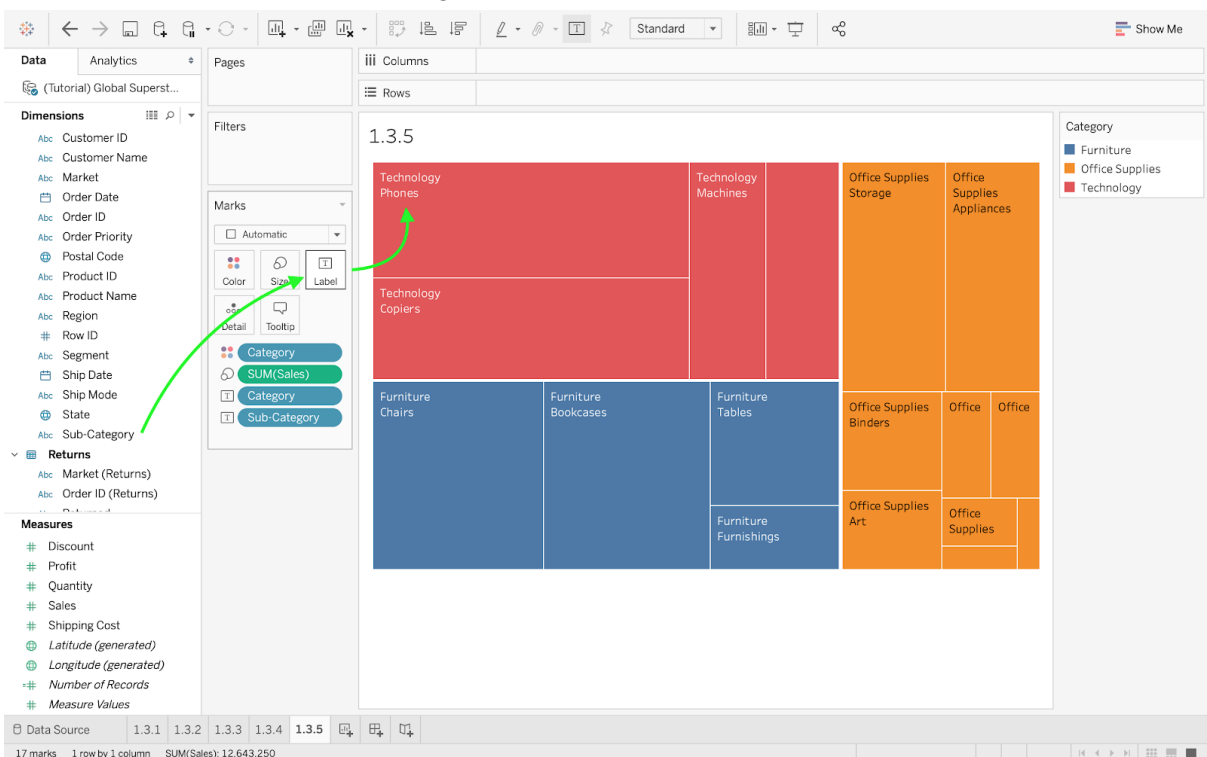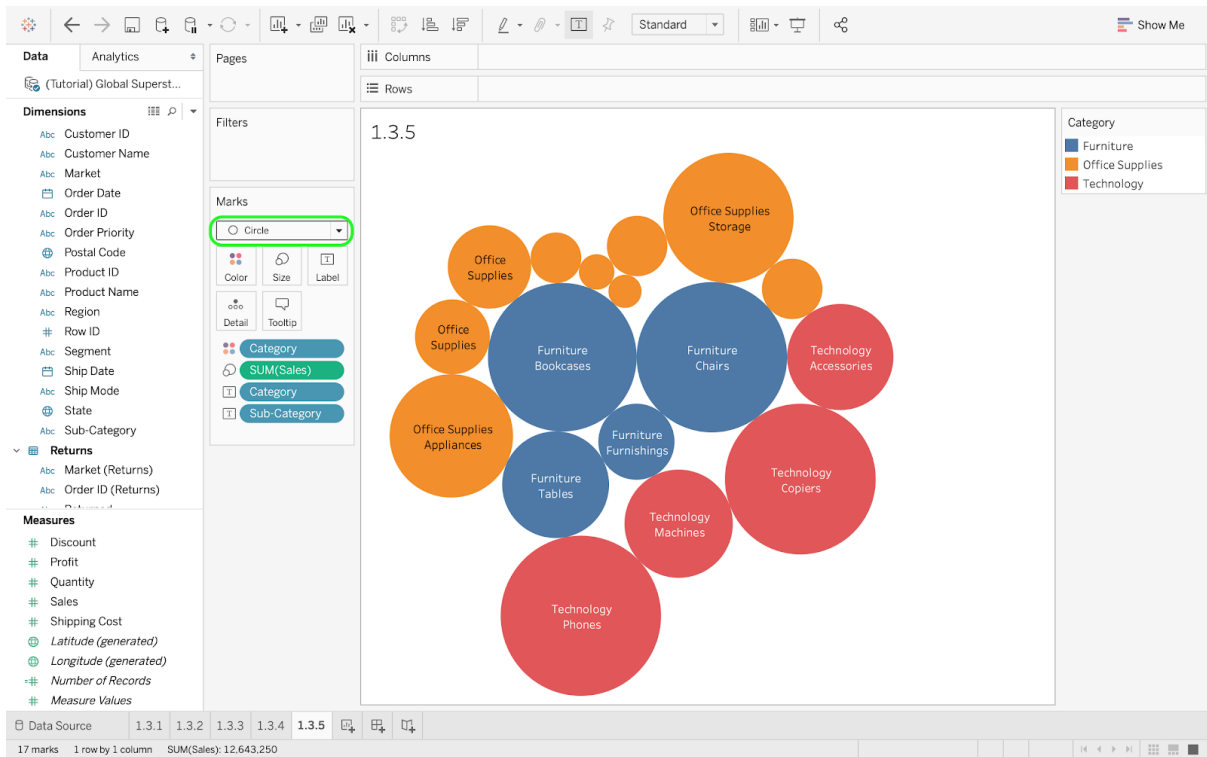
- Category and Sales, yet no columns and no rows.
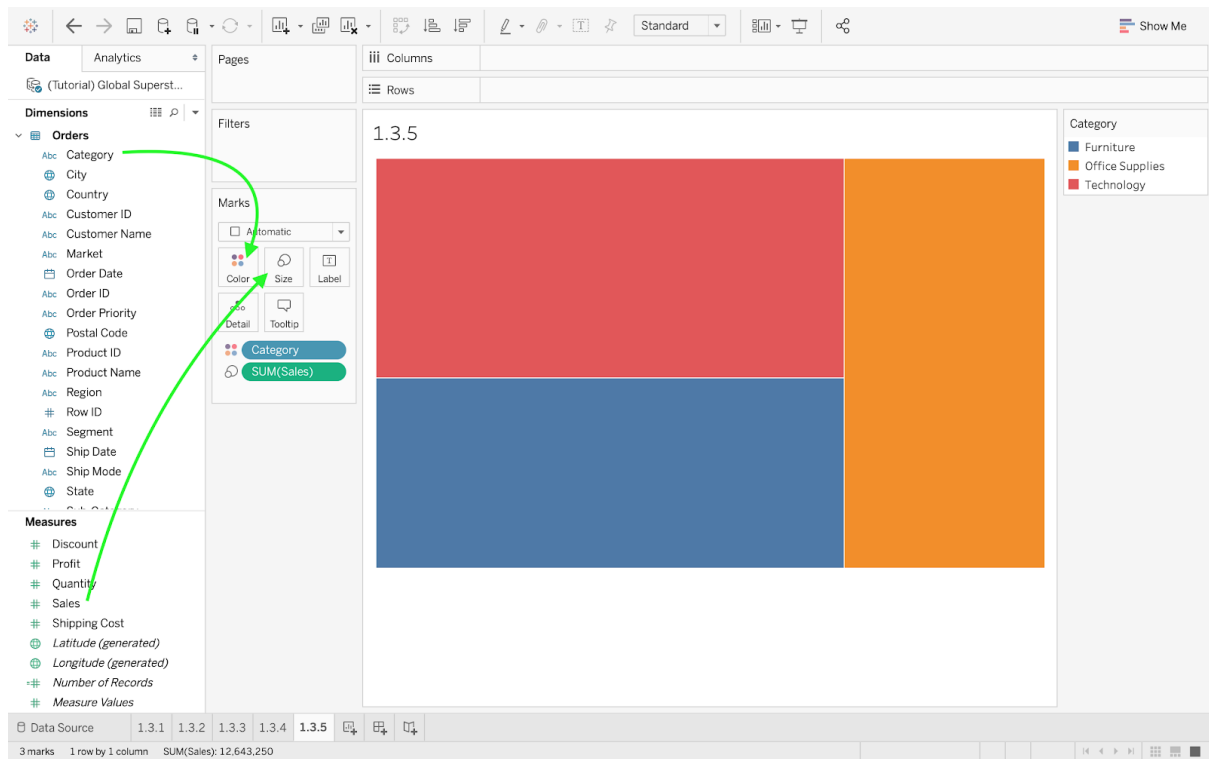
● Add labels for the categories.



● Add labels for the subcategories.

● Switch to a Packed Bubbles view.

1.3.7 A Seventh Look at Visualization: Dashboards

Instead of adding a new sheet, you can select the option "add a dashboard" at the bottom tab. This effective way of visualizing data can combine a combination of several sheets. From the Sheets pane on the left side, select both sheets created in Steps 1.3.3 and 1.3.4 and drag them to the center, one on top of the other. Next, you can use a great function of Tableau that defines one of the sheets to be a filter for the dashboard. Select the Sales Map and click on the Use as Filter button, located at the top right of the sheet. Once this option is selected, you can click on any country. At this time, the chart will evolve as you hop from one country to another. If you go back to the separated sheets, you will see that the data has been filtered, so that it focuses on the country that was selected on your dashboard (e.g., the chart for the Sum of Sales per Quarter of Order Date).
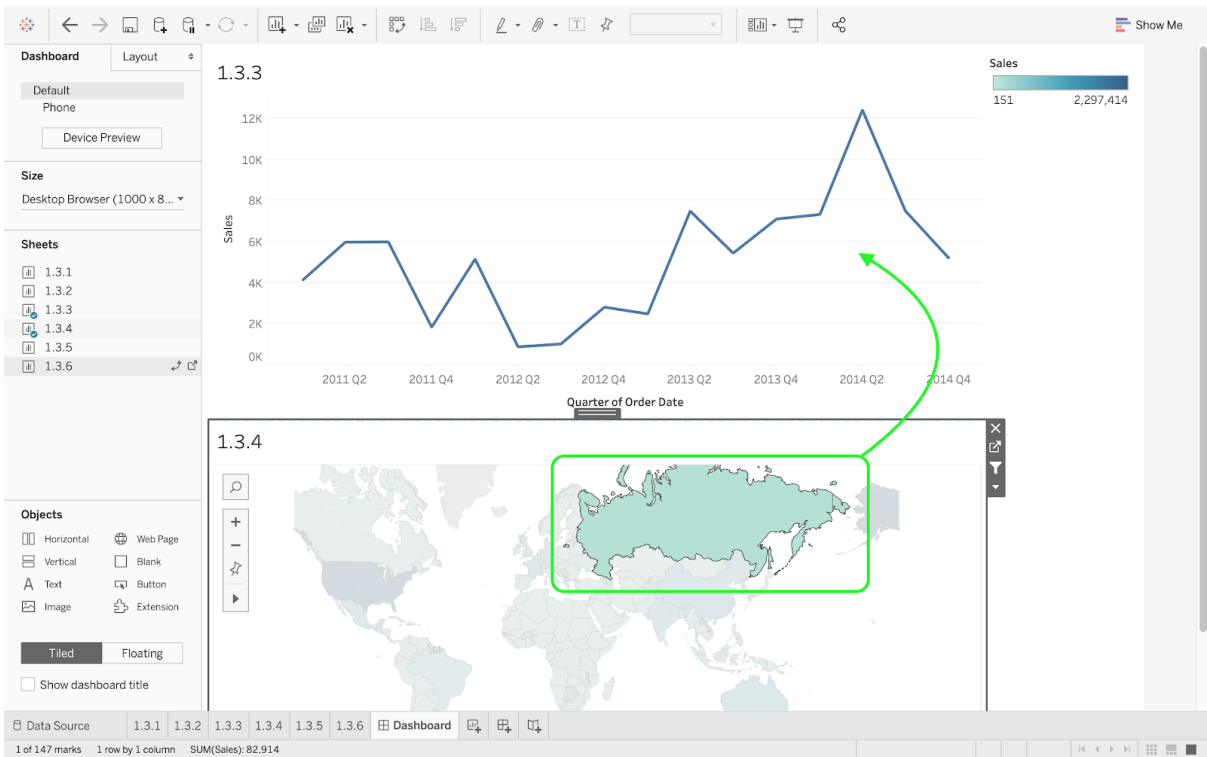
- Create a Dashboard with the sheets from Steps 1.3.3 and 1.3.4.
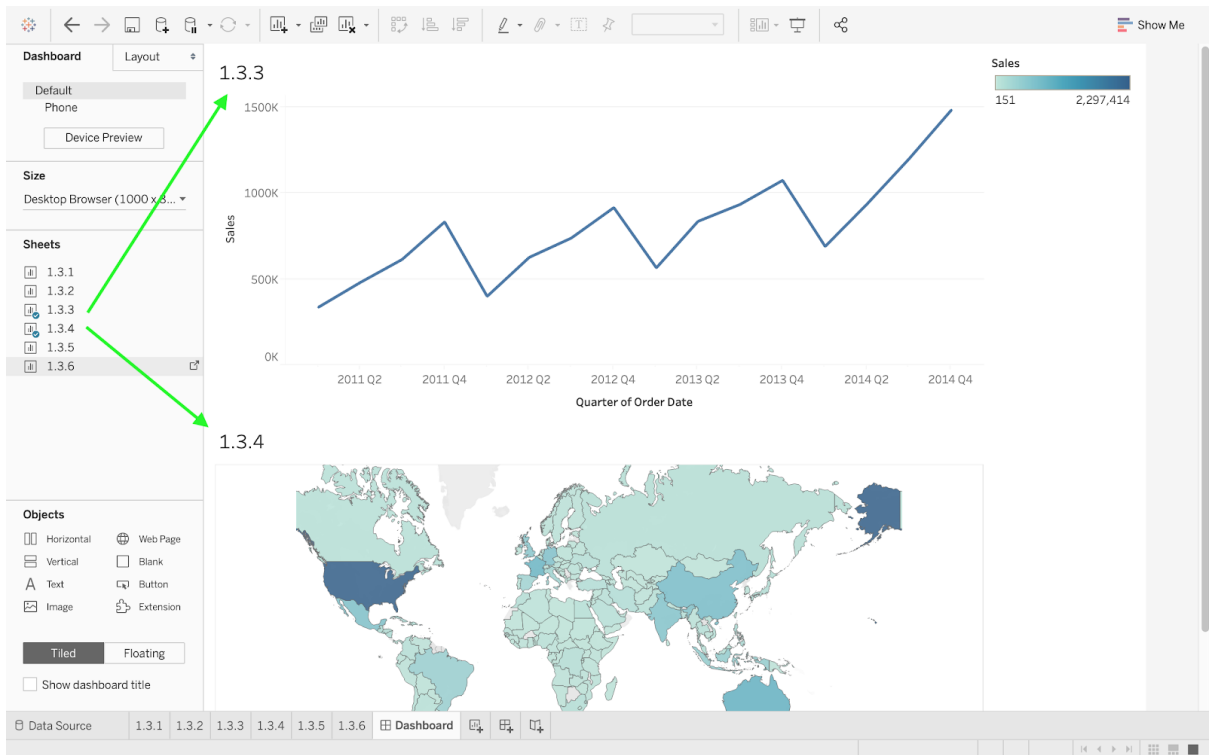
- Click on Use as Filter.
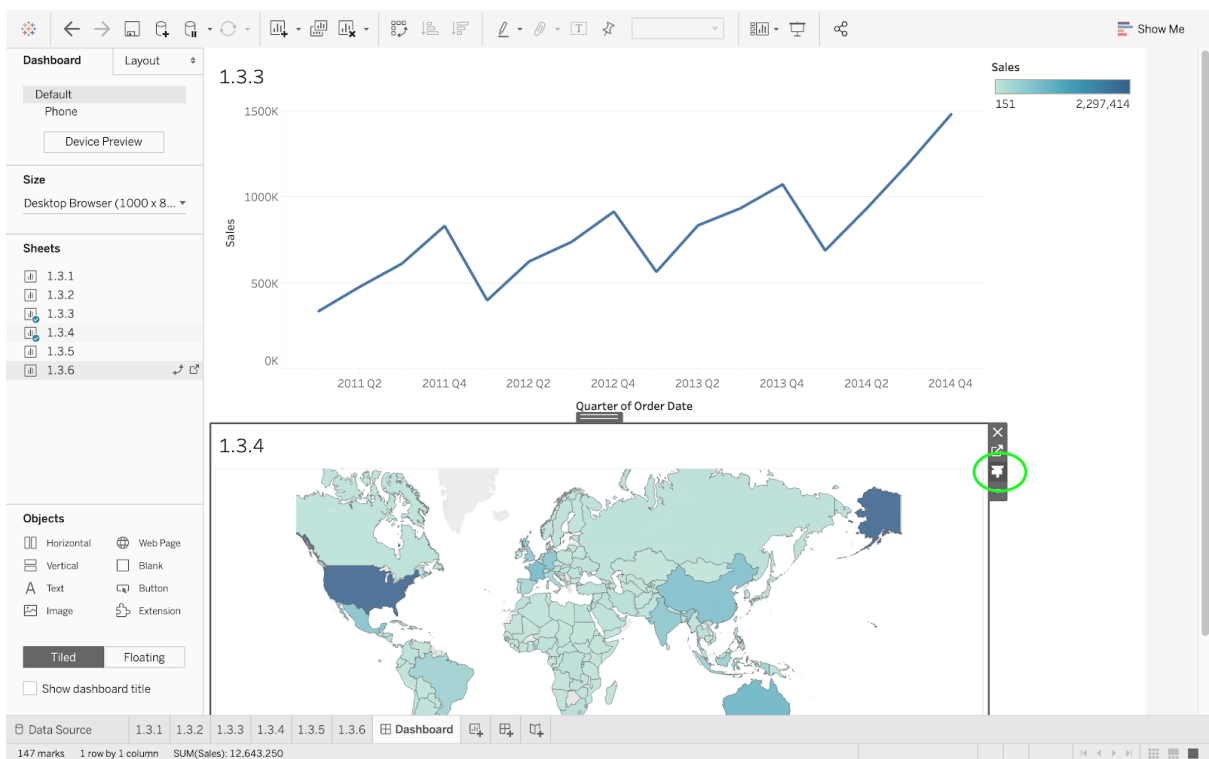
- Try your new filter by selecting a country.

- The filter has also been applied to your original sheets.