



## Interactive Dashboard Development for Financial Insights in the U.S. Banking Sector

Venkata Govind Neelapu | Data Visualization | 12/08/2024  
Veeranaga Siva Sankar Thota | Data Visualization | 12/08/2024  
Anil Varikuppala | Data Visualization | 12/08/2024

## Executive Summary

This project explores the creation of a series of interactive dashboards designed to provide key insights into the financial performance, risk factors, and geographical distribution of large commercial banks in the United States. Utilizing Tableau as the primary visualization tool and data sourced from the Federal Reserve, the project combines advanced data analytics with user-centric dashboard design to deliver actionable intelligence to stakeholders. These stakeholders, including regulators, bank executives, and analysts, benefit from clear visual representations of complex financial data. Each dashboard focuses on a specific area of analysis: financial trends over time, risk assessment, and branch distribution across regions. The project integrates features like dynamic filters, drill-down capabilities, and tooltips to enhance usability and interactivity, allowing users to explore trends, compare banks, and focus on specific regions or time periods. By simplifying complex datasets, these dashboards aim to support informed decision-making and strategic planning in the U.S. banking sector. This project leverages Tableau to design and implement a series of interactive dashboards for analyzing the financial performance, risk factors, and geographical insights of large commercial banks in the United States. Using publicly available data from the Federal Reserve, these dashboards aim to assist stakeholders such as regulators, bank executives, and analysts in making data-driven decisions. The dashboards offer visual representations of financial trends, risk analysis, and geographical insights with interactive features such as filters, tooltips, and drill-down capabilities.

- **Dashboard URL:** [Tableau Public Dashboard Link](#)
- 

## Project Goals and Objectives

The primary focus of this project is to deliver actionable insights into the U.S. banking sector by leveraging Tableau to create interactive dashboards. These dashboards are meticulously designed to analyze and visualize financial trends, identify potential risks, and assess the geographical presence of large commercial banks. The banking industry, being a critical component of the national economy, requires robust tools for informed decision-making, and this project addresses these needs by presenting complex datasets in an easily interpretable format.

### Business Context:

- The U.S. banking sector plays a pivotal role in the stability and growth of the economy. Accurate and timely analysis of financial health, risk management, and geographical market reach is essential for stakeholders such as regulators, bank executives, and analysts. By providing dynamic tools to visualize these aspects,

this project contributes to better governance, strategic planning, and market assessment within the banking sector.

#### **User Needs:**

- Comprehensive insights into financial trends over a multi-year period.
- Risk assessment tools to flag early warning indicators and manage uncertainties.
- Regional performance metrics to support expansion plans and market strategy.

#### **Key Objectives:**

1. Develop interactive dashboards that simplify complex financial metrics, such as consolidated assets, risk indicators, and branch distributions.
2. Enhance decision-making processes by allowing stakeholders to filter, drill down, and compare key performance metrics across different banks, locations, and timeframes.
3. Provide stakeholders with tools to analyze geographical market reach and regional trends in banking operations.

#### **Methodology:**

This project follows a structured methodology to ensure precision and usability:

- **Data Sourcing:** The financial dataset for large U.S. commercial banks was sourced directly from the Federal Reserve’s repository. This publicly available dataset provides key metrics such as consolidated assets, domestic and foreign branch distributions, and national rankings, forming the foundation of this project.
- **Data Cleaning and Transformation:** The raw dataset underwent rigorous cleaning and transformation. Tools like Microsoft Excel were used to remove irrelevant columns, handle missing values, and standardize formats. Calculated fields such as “Branch Ratio” (domestic to foreign branches), “Asset Growth %” (year-over-year changes in assets), and “Risk Level” (categorizing banks into high, moderate, and low risk) were created to enable in-depth analysis and visualization.
- **Visualization Goals and Mockups:** Before implementation, dashboard mockups were designed using Figma to align layout and functionality with user needs. These mockups guided the creation of dashboards in Tableau, ensuring seamless alignment between design and functionality.

- **Implementation in Tableau:** The dashboards were implemented using Tableau's interactive tools. Data was connected directly from the cleaned Excel files, and calculated fields were applied for dynamic visualizations. Tableau's filtering and drill-down capabilities were leveraged to enhance interactivity.
  - **User Testing and Iteration:** After the dashboards were created, iterative testing was conducted to refine usability. Feedback was incorporated to ensure that dashboards meet the needs of stakeholders like regulators, analysts, and bank executives, with a focus on simplicity and clarity.
  - By adhering to this structured methodology, the project ensures that the final dashboards are accurate, user-friendly, and aligned with the objectives of delivering actionable insights to stakeholders in the banking sector.
- 

## Data Description

### a) Data Source Background:

- This dataset contains detailed financial information on large commercial banks in the U.S., sourced from the Federal Reserve. The data includes:
  - Total consolidated assets
  - Domestic and foreign assets
  - Branch counts
  - Risk indicators
  - National rankings
- **Data Format:** CSV
  - Scope:** Five years of quarterly data
  - Size:** Thousands of rows capturing multiple banks' financial and operational data over time.

## Data Preparation:

- **Downloading:** Data was downloaded directly from the Federal Reserve's public repository.
- **Cleaning:** Removed irrelevant columns, standardized missing values, and verified data integrity.
- **Modeling:** Created calculated fields for metrics such as risk indicators, asset growth, and branch ratios.
- **Transformation:** Aggregated data to ensure compatibility with Tableau visualization requirements.

Bank Name	Nat l Rank	Bank Id	Bank Location	Ch tr	Conso l. Assets (Mil \$)	Dome stic Assets (Mil \$)	Do m As %	Cu ml As %	Branc hes (Dom/ Fgn)	I B	%
JPMORGAN CHASE BK NA	1	852218	COLUMBUS, OH	NAT	3,510,536	2,646,296	75	16	4,886 / 32	Y	
BANK OF AMER NA	2	480228	CHARLOTTE, NC	NAT	2,550,584	2,412,440	95	27	3,736 / 23	Y	

## Dashboard Design

### a) Wireframes and Tools:

- **Wireframe Tools:** Figma was used to create mockups for the dashboard layouts.
- **Implementation Tool:** Tableau was used for dashboard development and interactivity.



## **b) Dashboard Details:**

### **1. Financial Trends Dashboard:**

The Financial Trends Dashboard is designed to provide comprehensive insights into the financial health of U.S. commercial banks over a five-year period. It employs multiple visualization techniques, including line charts for loan performance trends and area graphs to illustrate the distribution of domestic versus foreign assets. A total assets bar chart further complements these visualizations by showing bank-level summaries. Users can interact with the dashboard using dynamic filters for years and bank names, enabling them to drill down into specific time periods or institutions for detailed analysis. This layout ensures stakeholders can easily identify patterns in asset growth, evaluate changes in domestic and foreign asset ratios, and understand trends in financial performance at a glance.

- **Goal:** Provide insights into financial health trends over five years.
- **Layout:** Includes a line chart for loan performance trends, area graphs for domestic vs. foreign assets, and a filter for years and bank names.
- **Contents:**
  - Loan Performance Trends (line chart)
  - Domestic vs. Foreign Assets (area chart)
  - Total Assets by Bank (bar chart)

### **2. Risk Analysis Dashboard:**

The Risk Analysis Dashboard provides a comprehensive view of the financial risks associated with U.S. commercial banks, focusing on branch-related and asset-based risks. Its primary purpose is to help stakeholders quickly identify potential vulnerabilities, such as heightened branch risks or unstable asset growth. The dashboard plays a vital role in ensuring financial stability and providing early warnings for stakeholders like analysts and regulators.

- **Goal:** Highlight and visually represent key financial risk indicators to facilitate timely decision-making and risk mitigation.
- **Layout:** The dashboard integrates bar charts and dot plots to represent branch and asset risks effectively. Filters for year and bank name enhance interactivity, allowing users to customize their analyses.

- **Contents:**
  - **Branch Risk Indicators:** A stacked bar chart that visually compares domestic and foreign branch risks for various banks, color-coded to represent risk severity (e.g., high, moderate, or low).
  - **Asset Risk Indicator:** A dot plot that categorizes risks associated with consolidated assets, helping users compare asset vulnerabilities across banks.
  - **Filters:** Interactive filters for year and bank name allow a focused and tailored exploration of the data.

By utilizing conditional formatting and interactive visualizations, this dashboard enables users to quickly identify high-risk institutions and gain a deeper understanding of risk patterns. Hover tooltips provide additional context, while side-by-side comparisons highlight how banks perform on critical metrics. This dashboard exemplifies user-friendly design and best practices in risk visualization.

### 3. Geographical Insights Dashboard:

The Geographical Insights Dashboard provides a comprehensive view of branch distribution and asset allocation across different regions, focusing on the geographical reach and performance of U.S. commercial banks. Its primary purpose is to help stakeholders analyze regional dominance, identify areas for expansion, and understand market reach. This dashboard plays a vital role in supporting strategic planning and highlighting key trends in branch density and asset growth at both regional and national levels.

- **Goal:** Analyze and visually represent branch distribution and asset allocation to support strategic decision-making and regional performance assessment.
- **Layout:** The dashboard integrates bar charts and line charts to represent branch distribution and asset growth effectively. Filters for location and year enhance interactivity, allowing users to customize their analyses.
- **Contents:**
  - **Branch Distribution by Location:** A bar chart that highlights the number of domestic and foreign branches for various locations, making it easy to compare geographical presence across regions.
  - **Asset Growth Trends:** A line chart that visualizes year-over-year changes in asset growth, helping stakeholders evaluate trends in financial performance.

- **Filters:** Interactive filters for location and year provide a focused and tailored exploration of regional data.

By leveraging interactive visualizations and clear layouts, this dashboard enables users to quickly identify areas of high or low activity and gain a deeper understanding of regional dynamics. Hover tooltips provide additional context, while customizable filters allow stakeholders to focus on specific regions and time periods. This dashboard exemplifies user-friendly design and best practices in geographical data visualization.

---

## Dashboard Application in Tableau

### a) Tableau Public Link:

[Tableau Public Dashboard Link](#)

### b) Data Source View:

Data source was connected directly to Tableau after preprocessing in Excel.

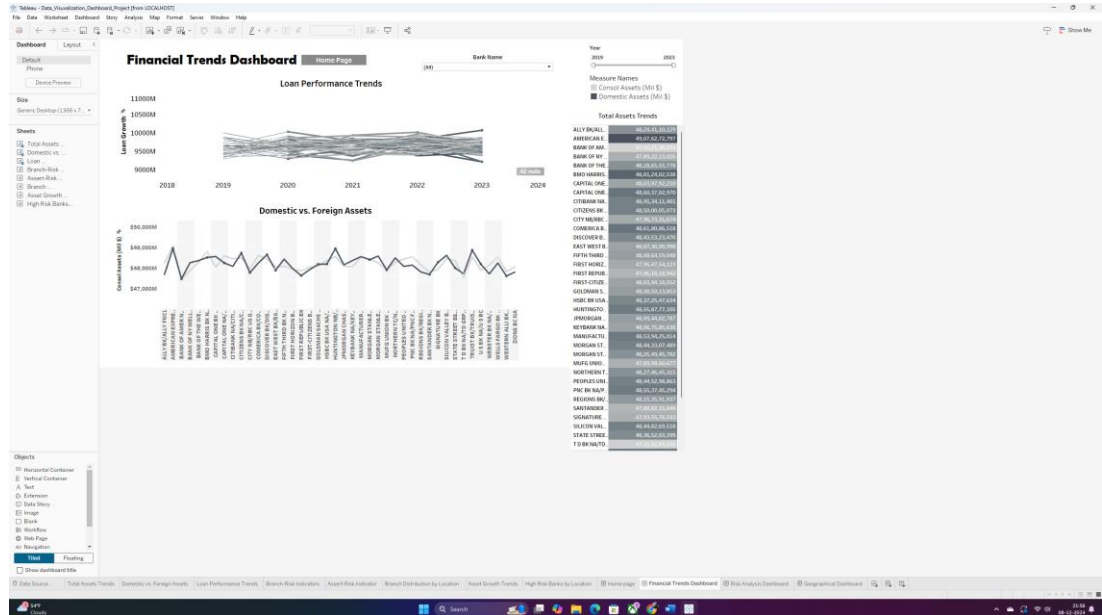
#### Tables

- ≡ Asc Assert Risk
- # Bank ID
- Asc Bank Location
- Asc Bank Name / Holding Co ...
- @ Bank Name / Holding Co ...
- ≡ Asc Brach Risk
- Asc Charter
- Asc IBF
- ≡ Asc Location Risk Level
- # Year
- Asc *Measure Names*
- ≡# Asset Growth Percentage
- ≡# Branch Ratio
- # Consol Assets (Mil \$)
- # Domestic Assets (Mil \$)
- # Domestic Branches
- # Foreign Branches
- ≡# High Risk Indicator !
- ≡# Loan Growth
- ≡ Asc Loan Growth Risk
- ≡# Low Risk
- # National Rank
- # Pct Cumulative Assets
- # Pct Domestic Assets
- ≡# Rank Low Risk Banks
- ≡ Asc Top 5 Low Risk Banks
- # *BANK\_DATA\_CLEANED\_...*
- # *Measure Values*



## c) Dashboard Details:

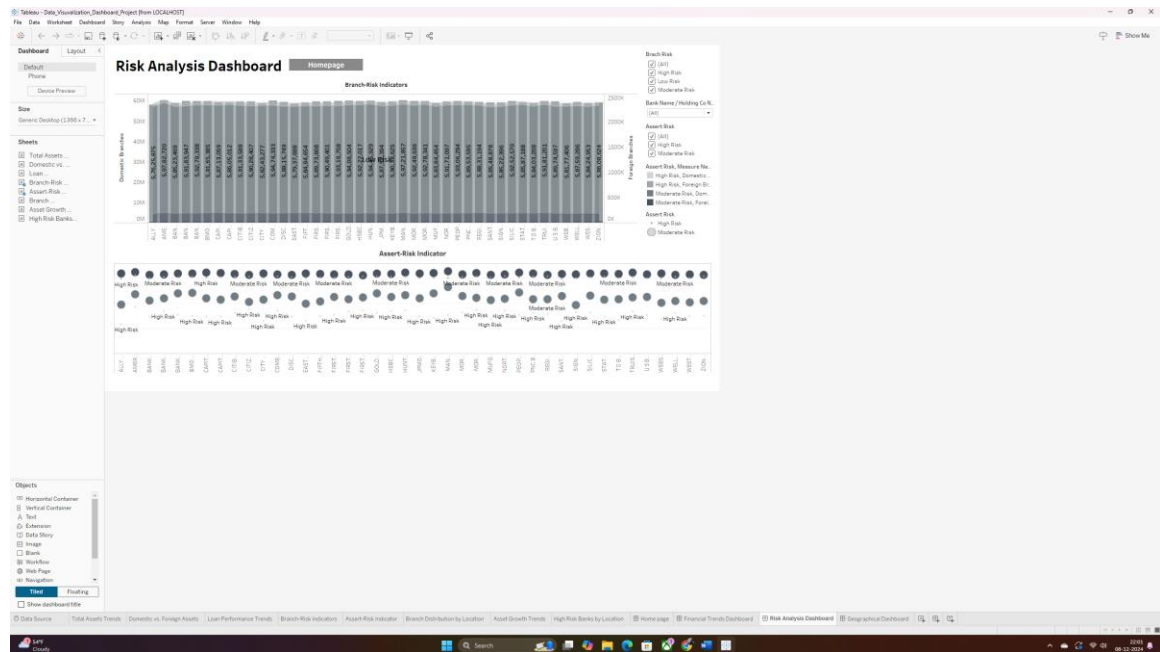
### 1. Financial Trends Dashboard:



## Operations:

The **Financial Trends Dashboard** provides a detailed analysis of key financial metrics for U.S. commercial banks. The dashboard integrates a preprocessed dataset containing consolidated assets, domestic vs. foreign asset ratios, and loan growth trends. It features a line chart to illustrate loan performance trends over multiple years, highlighting growth patterns among banks. An area chart compares domestic and foreign assets, offering a clear visualization of asset allocation. Additionally, a bar chart displays total asset trends, ranking banks based on their financial performance. Interactive filters for year and bank name allow users to customize their analysis, while dynamic tooltips offer detailed data insights without overcrowding the visualizations. These features collectively enable stakeholders to explore financial health, identify growth trends, and compare performance across institutions seamlessly.

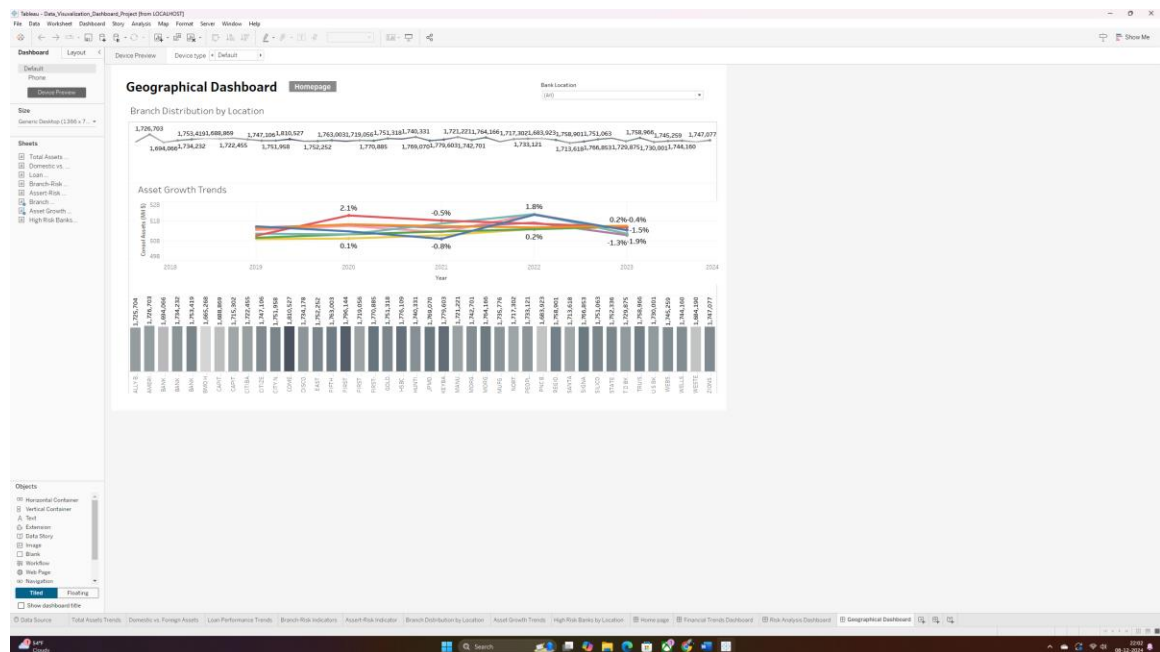
## 2. Risk Analysis Dashboard:



### Operations:

The Risk Analysis Dashboard provides a visual representation of financial risks for U.S. commercial banks by focusing on branch-related and asset-based risks. The operations performed include creating a stacked bar chart for "Branch Risk Indicators" that compares domestic and foreign branches, categorized by risk levels such as high, moderate, and low risk. Additionally, a dot plot for "Asset Risk Indicators" was developed to highlight asset-related vulnerabilities for various banks. Filters for branch risk levels, asset risk levels, and bank names were implemented to allow users to customize their analysis. Conditional formatting was applied to visually differentiate risk severity, and tooltips were added for additional context. This dashboard enables stakeholders to identify high-risk banks, compare risks across institutions, and explore detailed metrics interactively.

### 3. Geographical Insights Dashboard:



#### Operations:

The **Geographical Insights Dashboard** analyzes branch distribution and regional performance of U.S. commercial banks. Operations performed include the creation of a **bar chart** to display branch distribution by location, highlighting domestic and foreign branch counts for each bank. A **line chart** was implemented to show asset growth trends over time, allowing stakeholders to observe regional financial performance trends year-over-year. Interactive filters for **Bank Location** and **Year** were added to enable customized exploration of data. Dynamic tooltips provide additional insights into domestic and foreign branch counts. This dashboard supports strategic planning by helping users identify regional dominance and opportunities for market expansion.

## Conclusion

This project provided a valuable learning experience, enhancing our skills in using Tableau to create interactive and user-friendly dashboards. Through this process, we developed a deeper understanding of the financial stability and performance of U.S. commercial banks, learning how to extract meaningful insights from complex datasets. One of the key challenges was managing large datasets with numerous metrics, which required meticulous preprocessing and data cleaning to ensure accuracy and relevance. Another challenge was designing dashboards that were both visually appealing and easy to navigate, striking a balance between presenting detailed information and maintaining simplicity for users. Reflecting on this journey, we realized the critical role of data visualization in making complex financial data accessible and actionable. Effective dashboards, like the ones created in this project, enable stakeholders to make informed decisions by transforming raw data into clear, impactful insights. Overall, this project reinforced the value of combining technical proficiency with thoughtful design to deliver practical solutions in data analysis and visualization.

---

## Appendix

### Tools and Technologies Used

**Tableau:** For creating and publishing interactive dashboards to visualize financial trends, risk analysis, and geographical insights.

**Microsoft Excel:** Utilized for data preprocessing, cleaning, and creating calculated fields to ensure data readiness for visualization.

**Figma:** Employed to design wireframes and mockups, ensuring a user-friendly and structured layout for the dashboards.

**Federal Reserve Dataset:** The primary data source used to analyze and derive insights on the financial performance and risk factors of U.S. commercial banks.

## References

**Federal Reserve Data:** Accessed for comprehensive financial datasets related to large U.S. commercial banks. [Federal Reserve Data](#)

**Tableau Public:** Used for publishing dashboards to enable public access and sharing. [Tableau Public](#)

---

