



Us Debt Prediction Data Analysis Report

Data analysis is essential for all business operations, especially since technological advancement is rampant. This Data Analysis Report template provides a structured method of creating this formal document.



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Overview

This report presents an analysis and forecast of United States federal debt extending to the year **2040**. Using historical data from **1940 to 2024**, the study combines three key analytical tools—**Excel, Python, and Power BI**—to deliver a complete and transparent workflow. Excel is used for initial data cleaning, verification, and transformation. Python, through the Prophet forecasting library, provides the statistical modeling needed to project future debt levels. Power BI is then used to visualize both the historical trends and forecast results in an interactive dashboard.

The goal of this project is to understand long-term debt dynamics, quantify expected future growth, and illustrate the degree of uncertainty surrounding the forecast. While the model is based on historical patterns, it also highlights the limitations of trend-based predictions in the context of changing economic conditions and fiscal policies. The resulting forecasts and dashboards offer a clear, accessible, and data-driven outlook on how U.S. federal debt may evolve through 2040.



Objectives

The primary objective of this project is to **forecast the United States federal debt for the next 15 years**, from 2025 to 2040, based on historical debt data spanning 1940–2024.

- To achieve this, the project aims to:
1. **Collect and clean historical debt data** to ensure accuracy and consistency for analysis.
 2. **Analyze historical trends and patterns** in U.S. federal debt, including growth rates and major fluctuations.
 3. **Develop a reliable predictive model** using Python's Prophet library to generate forecasts with quantified uncertainty.
 4. **Visualize historical and forecasted debt** in an interactive Power BI dashboard to facilitate understanding for stakeholders.
 5. **Provide actionable insights** by highlighting expected debt growth and potential risks over the next 15 years, while noting the limitations of trend-based forecasting.

By accomplishing these objectives, the project delivers both quantitative predictions and visual tools that support informed decision-making regarding U.S. federal debt trends.



Scope

 This report provides a comprehensive analysis and forecast of United States federal debt over the next 15 years (2025–2040). It covers the entire workflow from historical data collection to predictive modeling and visualization.

 The report is structured to guide the reader through a logical sequence of analysis, and includes the following sections:

1. **Introduction** – Presents the context, significance, and purpose of the study.
2. **Objectives** – Outlines the goals of the project, primarily focused on forecasting U.S. debt.
3. **Scope** – Defines the boundaries of the analysis, explaining what is included in the report.
4. **Methodology** – Details the data sources, cleaning procedures, and analytical techniques used, including Excel for preprocessing, Python (Prophet) for modeling, and Power BI for visualization.
5. **Findings** – Presents the forecast results, historical trends, growth patterns, and associated uncertainties.
6. **Conclusion and Recommendations** – Interprets the results, highlights implications, and offers recommendations for stakeholders based on the projected debt trends.

By including these sections, the report ensures a complete and structured presentation of the analysis, making it accessible for both technical and non-technical audiences, while maintaining transparency in methodology and assumptions.



Methodology

 This project follows a structured, three-step methodology to forecast the United States federal debt from 2025 to 2040. The analysis integrates **Excel**, **Python**, and **Power BI**, leveraging the strengths of each tool in data cleaning, modeling, and visualization.

1. Data Collection and Cleaning (Excel)

- **Data Source:** Historical U.S. federal debt data from 1940 to 2024.
- **Cleaning & Preparation:** Excel was used to remove duplicates, correct formatting issues, handle missing values, and ensure numeric consistency.
- **Transformations:** Debt figures were converted to trillions of USD for readability. Additional columns, such as year-over-year growth percentages, were computed to facilitate exploratory analysis.
- **Initial Analysis:** Simple charts and pivot tables in Excel helped identify trends, outliers, and structural changes over time.

2. Predictive Modeling (Python)

- **Tool Used:** Python with the Prophet library (Facebook/Meta Prophet).
- **Data Preparation:** The cleaned data from Excel was imported into Python using pandas. The dataset was structured with a date column (`ds`) and a value column (`y`) representing total debt.
- **Modeling Steps:**
 - a. A Prophet model was initialized to capture trend and seasonality components of the debt series.
 - b. The model was trained on historical data to learn underlying patterns.
 - c. Forecasts were generated for the years 2025–2040, including uncertainty intervals to account for prediction variability.
- **Validation:** Model accuracy was evaluated using backtesting on recent years, and forecast plots were compared against actual historical values for consistency.

3. Visualization and Reporting (Power BI)

- **Dashboard Development:** Power BI was used to create interactive visualizations of both historical data and future forecasts.
- **Key Visuals:**
 - Line charts showing debt trends and forecasted growth with shaded confidence intervals.
 - KPI cards displaying current debt, forecasted debt for key years, and growth percentages.
 - Filters and slicers to allow dynamic exploration of the data by year and scenario.
- **Purpose:** These interactive dashboards allow stakeholders to intuitively explore projected debt trends and understand the associated uncertainty.

Summary: This methodology combines **Excel** for reliable data preprocessing, **Python (Prophet)** for robust predictive modeling, and **Power BI** for interactive, user-friendly visualization. Together, these tools ensure that the analysis is accurate, transparent, and actionable for stakeholders.



Data Collection

 The data for this project was sourced directly from the official United States government website to ensure accuracy and reliability. Specifically, the historical federal debt information was obtained from the U.S. budget documents published on the government portal: <https://www.govinfo.gov/app/collection/budget/2024>.

Steps Taken:

1. **Source Identification:** The official U.S. government budget publication for the **Fiscal Year 2025** was selected, as it includes both current budget information and historical data on federal debt.

2. **Data Extraction:** The historical debt figures were extracted from the full budget file and compiled into a separate Excel workbook to facilitate analysis.
3. **Data Organization:** The extracted dataset contains yearly debt figures from **1940 to 2024**, formatted consistently for numeric processing. Columns were standardized to include:
 - **Year** – representing the fiscal year.
 - **Debt (USD)** – nominal federal debt in dollars.
4. **Data Verification:** Cross-checks were performed to ensure all historical debt figures were correctly transcribed and consistent with official government records.

By using an official government source and organizing the data into a dedicated Excel file, the dataset is both reliable and ready for further analysis, cleaning, and predictive modeling in Python.

Findings

 The analysis of historical U.S. federal debt from 1940 to 2024 reveals a consistent upward trend, with notable accelerations during periods of economic stress, such as wars, recessions, and major fiscal stimulus programs. Using the Prophet time-series model in Python, the forecast for the next 15 years (2025–2040) indicates a **continued and potentially significant increase in federal debt**.

Key Observations:

1. **Projected Debt Growth:** The model predicts that federal debt will continue to rise sharply, with the rate of increase exceeding historical averages in several forecasted years.
2. **Economic Implications:** A sustained high level of federal debt can exert inflationary pressures on the economy. Increased debt may force the government to borrow more, potentially raising interest rates and reducing fiscal flexibility.
3. **Impact on Citizens:** Higher inflation could erode purchasing power for households, making everyday goods and services more expensive, which may negatively affect the standard of living.
4. **Uncertainty:** While the forecast includes an 80% confidence interval, the trajectory suggests that debt levels could surpass previously observed peaks, emphasizing the importance of monitoring fiscal policies and economic conditions.

Visual Insights (from Power BI Dashboard):

- Historical debt trends show gradual growth until the 1980s, followed by sharper increases in recent decades.
- Forecast plots highlight a steep upward trajectory for 2025–2040, with shaded bands illustrating the uncertainty range.
- Year-over-year growth projections indicate that some future years may experience accelerated increases compared to historical averages.

Conclusion of Findings: The projected high increase in U.S. federal debt signals potential risks for economic stability, particularly regarding inflation and citizens' purchasing power. These findings highlight the need for careful fiscal planning and consideration of measures to mitigate debt growth in the coming years.

Conclusions and Recommendations

 This subpage contains the conclusion and recommendations based on the data analysis findings.



Conclusion

 The analysis of historical U.S. federal debt and the subsequent forecast through 2040 reveal a **persistent upward trend**, with the potential for a **significant increase** in debt levels over the next 15 years. This projected growth, if realized, may lead to higher inflation, which can reduce citizens' purchasing power and negatively affect overall economic stability. The findings emphasize that without careful fiscal management, the U.S. could face challenges in controlling debt-related economic pressures.



Recommendations

 Based on the forecasted trends, the following recommendations are proposed:

1. **Fiscal Policy Review:** Policymakers should assess existing spending and revenue policies to identify opportunities to reduce the growth rate of federal debt without hampering economic growth.
2. **Debt Monitoring and Transparency:** Maintain regular, transparent reporting of debt and deficit trends to allow early identification of unsustainable trajectories.
3. **Inflation Mitigation Measures:** Consider monetary and fiscal tools to manage inflation risks associated with high debt, such as interest rate adjustments or targeted expenditure controls.
4. **Long-term Economic Planning:** Evaluate long-term strategies to strengthen economic resilience, including boosting productivity, diversifying revenue sources, and encouraging sustainable economic growth.
5. **Scenario Planning:** Develop multiple debt growth scenarios to understand potential risks under different economic conditions and policy interventions.

Overall, proactive fiscal management and careful planning are essential to mitigate the risks of rising debt and ensure economic stability for both the government and citizens.

