FOCALPOINT
Consulting Group

Forecasting Tax Revenue at the
U.S. Department of the Treasury
with
FocalPoint TaxInsight

Leading the way in tax analytics

Accurate forecasting of tax revenues can help Federal and State Government Agencies to optimize budget execution, improve fiscal operations, and assist as part of an overall fraud detection strategy. FocalPoint Consulting Group has developed **FocalPoint TaxInsight™**, a tax revenue forecasting tool currently used by the U.S. Department of the Treasury (Treasury). FocalPoint's solution delivers highly accurate annual, monthly, and daily tax revenue forecasts that can provide benefits such as:

- **Improving fiscal planning**: Accurate forecasting supports financing planning and operations.

- **Assisting in capacity planning**: The granularity of the forecast enables it to support capacity planning for taxpayer services.

- **Supporting overall fraud detection**: Forecasts can provide visibility to unexpected spikes, which in some instances, can provide an early warning for potentially fraudulent activity.

Problem

The U.S. Treasury collects more than $3 trillion a year in tax payments through a range of revenue sources (e.g., corporate income taxes, individual income taxes, payroll taxes, excise taxes, unemployment, etc.). Treasury had a requirement for a forecasting tool to produce annual, monthly, weekly, and daily forecasts. The forecast supports various aspects of fiscal operations, capacity planning, and longer-term strategic fiscal planning.

Solution

FocalPoint Consulting Group designed and developed a machine learning forecasting model that uses a range of statistical and analytical methods to deliver annual, monthly, and daily forecasts of tax payments. As shown in the Exhibit 1, below, three modules comprise **FocalPoint TaxInsight**:

1. Data Input
2. Projection
3. Reporting

Data Input

The Data Input module uses the Agency's existing historical tax revenue data and economic data. Whenever such administrative data is used for statistical analysis, there may be challenges including:

- Accessibility: Technical or privacy challenges associated with record retrieval

- Relevance: Finding data elements best for forecasting objectives

- Accuracy: There may be coding errors that are not problematic for the dataset's programmatic purposes, but may be an issue for statistical analysis.

FocalPoint's data analytics team is leading the way in delivering tax revenue forecasting solutions to improve decision making and support operations within Federal and State Government Agencies.

Exhibit 1: Components of TaxInsight Tool
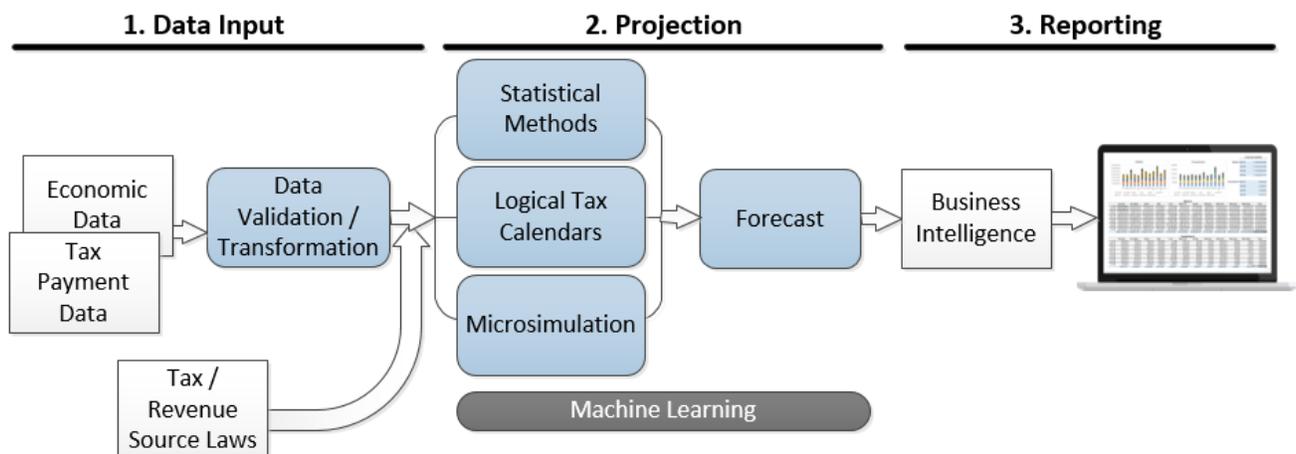
To address such challenges, we apply our expertise in data transformation and data validation of existing data.

The benefit: Existing data is made suitable for statistics-based forecasting, eliminating the need for creating a separate statistical dataset.

Projection

In order to improve accuracy (i.e., minimization of the predictive root mean square error), multiple methodologies are used. The approach we use is to pool the methodologies and assign weights.

FocalPoint TaxInsight's Projection module produces separate forecasts for each of the revenue sources. The tool's modular, flexible design can accommodate a range of revenue sources, such as sales and use taxes, utility taxes, cigarette taxes, and others.

TaxInsight's projection module consists of four components:

- Statistical methods for calculating trends. These include a set of statistical and algorithmic methods that extrapolate tax payments using the historical dataset to project trends in future periods. The statistical methods typically include a multiple

regression. In addition, the forecast equation will typically include ratios of historical monthly results to a set of moving average equations. Relationships between macroeconomic variables and revenue sources are also applied to develop the long-term forecast.

- Logical tax calendars that use rules-based forecasting to calculate daily tax payments. The logical tax calendars include detailed calculations for computing tax payments based on due dates and historical behavior of taxpayers. The calculations deal with a range of factors such as impact of tax payment due dates, lead / lag relationships, impact of holidays, and day-of-the-week patterns.

- Microsimulation or other off-model adjustments for recent or proposed modifications in the tax payment rules brought about by legislative or administrative changes.

- A supervised machine learning algorithm used to improve the accuracy of the forecast over time.

TaxInsight produces annual, monthly and daily forecasts. The tool has been in use at the U.S. Department of Treasury for over 18 months and has a track record of producing highly accurate forecasts.

Exhibit 2: Tax Insight User Interface
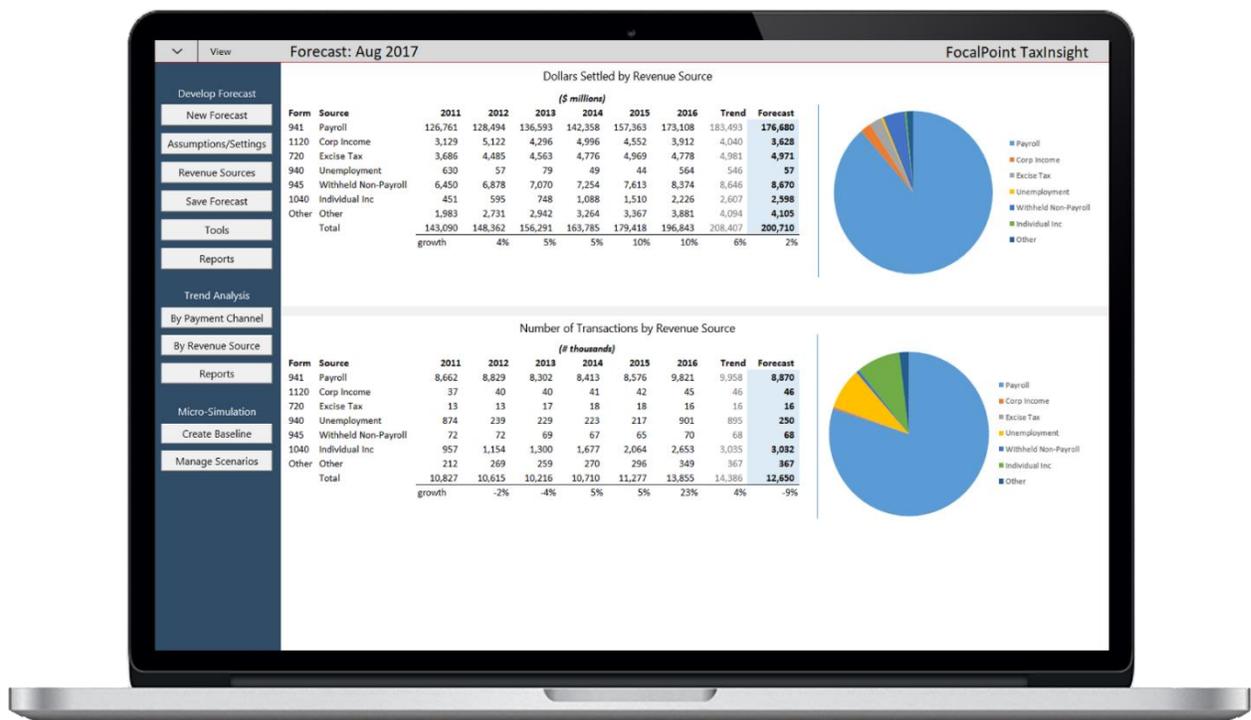
The benefits:

- *This level of accuracy can be beneficial to Agencies seeking to optimize budget execution, improve revenue collections operations, reduce financing costs, and assist as part of a broader fraud detection strategy.*

- *Forecasting tool is flexible and can be used to develop projections for various revenue sources including individual income tax, corporate income tax, sales and receipts tax, property tax, and other revenue sources.*

- *The granularity of the forecast supports various aspects of fiscal operations.*

Reporting

A range of automated reports and dashboards are available to provide both: different views of the forecasts and analysis of historical trends.

The benefit: Such reporting can be valuable in gaining insight to taxpayer behavior, anticipating cashflow, performing capacity planning, making operations more efficient and providing other benefits.

Approach for Developing a Forecast

As shown in Exhibit 3, FocalPoint Analysts work through a six-step process designed to produce a high quality, independent forecast.

- The first step is for our Analysts to obtain historical tax data from the Agency. Our Analysts work with the Agency to understand how the historical tax data is structured so the appropriate data can be retrieved.

- We then go through the process of data validation to ensure data extraction was done properly and to identify outliers.

- Our Analysts then develop an understanding of the tax payment rules and due dates in order to update the forecasting model to accommodate each of the Agency's specific revenue sources.

- The TaxInsight forecasting tool is then run to develop a preliminary forecast.

- Our team then reviews the forecast results and associated statistics. We also take into consideration macroeconomic factors and make adjustments as needed.

- The forecast is then finalized and reports that provide annual, monthly, and daily forecast along with information regarding historical trends are generated.

The benefit: This approach reduces the time the Agency needs to devote to the preparation of the forecast.

Exhibit 3: Process for Implementing TaxInsight
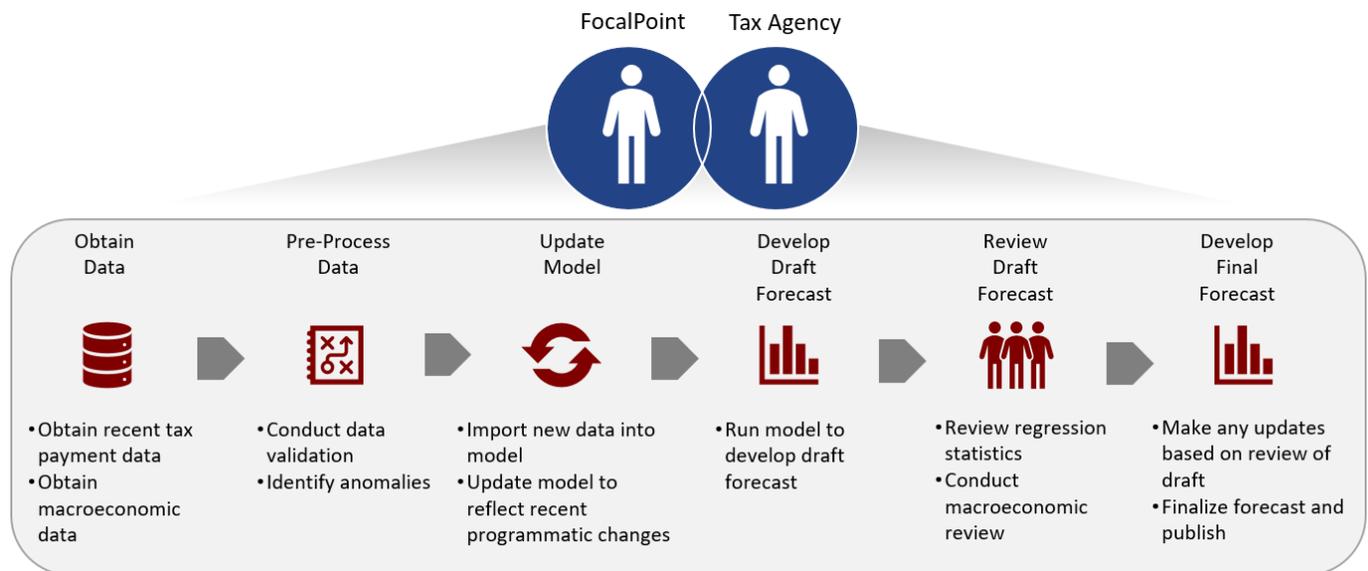
Summary

FocalPoint TaxInsight is an effective solution for developing high-quality, independent tax revenue forecasts. The tool has been in use at the U.S. Department of Treasury for over 18 months and has a track record of producing highly accurate forecasts. Some of the benefits are summarized in the table below.

Features	Benefits
■ The data input module uses existing historical tax revenue data and economic data.	■ Existing data is made suitable for statistics-based forecasting, eliminating the need for creating a separate statistical dataset.
■ The forecasting tool has a flexible modular design.	■ Forecasting tool is flexible and can be used to develop projections for various revenue sources including individual income tax, corporate income tax, sales and receipts tax, property tax, and other revenue sources.
■ The forecasting tool has a track record of producing highly accurate forecasts.	■ This level of accuracy can be beneficial to Agencies seeking to optimize budget execution, improve revenue collections operations, reduce financing costs, and assist as part of a broader fraud detection strategy.
■ The forecasting tool produces annual, monthly and daily forecasts.	■ The granularity of the forecast supports various aspects of fiscal operations
■ A range of reporting on historical results and forecasts that provide insights for making decisions and provide an early warning regarding changes that may require action.	■ Such reporting can be valuable in gaining insight to taxpayer behavior, anticipating cashflow, performing capacity planning, making operations more efficient and providing other benefits.
■ FocalPoint analysts work through a six-step process designed to produce a high quality, independent forecast.	■ This approach has the benefit of reducing the time the Agency needs to devote to the preparation of a high-quality forecast.

About FocalPoint

FocalPoint Consulting Group is a Washington DC-based management and technology consulting firm serving the government and private sectors. We are a rapidly growing firm focusing on Data Analytics, Financial Crimes Investigations, and Business Process Improvement. Our clients include leading organizations in both the public and private sectors.

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