AIFC - Forecasting & Budgeting with AI

Masterclass by Glenn Hopper

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**Bio:**

Glenn Hopper is an author, speaker, and lecturer on the intersection of artificial intelligence and corporate finance. His best-selling book, Deep Finance: Corporate Finance in the Information Age, explores how technology is reshaping financial processes.

Glenn is the Head of AI Research and Development at Eventus Advisory Group, where he spearheads the creation of AI-powered solutions tailored to the finance and accounting industries.

With more than two decades of experience as a CFO in private equity-backed companies, Glenn has led initiatives in finance automation, M&A, and operational efficiency.

In addition to his professional work, Glenn is an instructor at Duke University's Executive Education program, the Corporate Finance Institute, AICPA/CIMA, and LinkedIn Learning, where he teaches financial leaders how to leverage AI in their strategic planning – making advanced AI concepts accessible to finance professionals worldwide.

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## Masterclass Agenda

### Introduction (10 minutes)

**Welcome & Objectives**

**Brief overview of the session's goals**

* Develop a Baseline Forecast
* Conduct Scenario Analysis
* Provide Strategic Recommendations

**Overview of GlobalTech Case Study**

* Quick recap of GlobalTech’s financial position and objectives as outlined in the case study.

### Part 1: Developing a Baseline Forecast (25 minutes)

**Historical Data Review (5 minutes)**

* Walkthrough of the historical financial data from 2022 to 2024.
* Highlight key trends, seasonality, and anomalies that may impact the forecast.

**SARIMA Model Introduction (5 minutes)**

* Brief explanation of the SARIMA model and why it’s chosen for forecasting.

**Hands-On Forecasting (15 minutes)**

* Instructor-Led Forecast Development:
* Step-by-step creation of a baseline forecast for key financial metrics.
* Attendees can follow along and perform the task simultaneously.

**Discuss Simplifications**

Note this model is simplified for teaching purposes. Show examples (Revenue by Product Line and New Market Expansion Budgeting)

### Part 2: Conducting Scenario Analysis (30 minutes)

**Introduction to Scenario Analysis (5 minutes)**

* Explanation of the purpose and value of scenario analysis in financial forecasting.

**Scenario Analysis Example (10 minutes)**

Instructor Demonstration:

* Show how to modify the baseline forecast based on a sample scenario (e.g., Economic Downturn).

**Breakout Rooms: Student Activity (15 minutes)**

Group Task:

* Breakout groups to work on one of the other scenarios (Supply Chain Disruptions, Market Expansion, Interest Rate Hikes).
* Co-instructors assist groups in applying the scenario to their baseline forecasts.

### Part 3: Strategic Recommendations & Group Discussion (20 minutes)

**Reconvene and Share Results (10 minutes)**

* Each group shares the results of their scenario analysis.
* Compare and discuss the different impacts each scenario had on the baseline forecast.

**Strategic Recommendations (10 minutes)**

* Discuss how generative AI can assist in providing strategic recommendations based on the analysis.
* Share actionable insights and suggest areas for further review.

### Conclusion & Q&A (5 minutes)

**Summary of Key Takeaways**

* Reinforce the importance of forecasting, scenario analysis, and strategic recommendations in financial planning.

**Open Floor for Questions**

* Address any questions from students and provide clarification where needed.

### Closing Remarks (5 minutes)

* Recap Session: Quick review of what was covered.
* Next Steps: Brief overview of upcoming related sessions.



# Forecasting Financial Performance at GlobalTech Manufacturing Inc.

## Overview

GlobalTech Manufacturing Inc. is a global leader in the production of high-quality consumer electronics and home appliances. With a strong global presence and extensive manufacturing operations across North America, Europe, and Asia, the company is focused on maintaining its competitive edge in a dynamic market. As part of our strategic planning, this case study outlines the approach to developing a comprehensive financial forecast for the upcoming year and conducting scenario analysis to evaluate potential risks and opportunities.

## Objective

The objectives of this case study are as follows:

1. **Develop a Baseline Forecast**: Utilize historical financial data from 2022 through 2024 to create a one-year forecast for key financial metrics.
2. **Conduct Scenario Analysis**: Evaluate the impact of various potential business scenarios on the baseline forecast to assess risks and opportunities.
3. **Provide Strategic Recommendations**: Offer actionable insights and recommendations based on the forecast and scenario analysis to support GlobalTech's strategic planning.

## Historical Data Overview

The historical data for this analysis spans from January 2022 to December 2024 and includes key financial metrics:

* **Revenue**
* **COGS (Cost of Goods Sold)**
* **Operating Expenses**
* **Net Income**

This data provides the foundation for developing the forecast and conducting scenario analysis.

## Proposed Approach

### Step 1: Data Analysis and Preparation

* **Data Review**: The first step involves thoroughly reviewing the historical data to ensure accuracy and completeness. This includes identifying any anomalies, trends, or seasonal patterns that must be accounted for in the forecasting model.
* **Trend and Seasonality Identification**: We will analyze the data to identify trends and seasonality, which are critical for creating an accurate forecast.

### Step 2: Baseline Forecast Using SARIMA

* **Model Selection**: SARIMA (Seasonal Autoregressive Integrated Moving Average) will be used to create a baseline forecast. This model is ideal for data with both trend and seasonal components.
* **Parameter Estimation**: We will determine the optimal SARIMA model parameters (p, d, q, P, D, Q, m) using criteria like AIC (Akaike Information Criterion) and BIC (Bayesian Information Criterion).
* **Forecast Generation**: After finalizing the model, we will generate a one-year forecast (January 2025 to December 2025) for each financial metric.
* **Model Evaluation**: Verify the reliability of the model and ensure outputs make sense.

### Step 3: Scenario Analysis

To ensure the robustness of the forecast, scenario analysis will be conducted by considering various potential changes in business conditions:

1. **Scenario 1: Economic Downturn**
	* **Assumption**: A global economic slowdown results in a 10% reduction in consumer demand.
	* **Expected Impact**: Revenue decreases, leading to reduced profitability.
2. **Scenario 2: Supply Chain Disruptions (Story only)**
	* **Assumption**: Disruptions in the supply chain increase COGS by 15%.
	* **Expected Impact**: Higher COGS will compress gross margins, impacting overall profitability.
3. **Scenario 3: Market Expansion**
	* **Assumption**: Expansion into new markets leads to a 20% increase in revenue, accompanied by a proportional increase in operating expenses.
	* **Expected Impact**: Potential for higher revenue growth, but with increased operating costs.
4. **Scenario 4: Interest Rate Hikes (Story Only)**
	* **Assumption**: A rise in global interest rates increases interest expense by 25%.
	* **Expected Impact**: Higher interest costs will reduce earnings before tax (EBT) and net income.

### Step 4: Evaluation and Reporting

* **Model Evaluation**: After generating the forecast and conducting scenario analysis, the accuracy and robustness of the model will be evaluated using metrics such as MAE (Mean Absolute Error) and RMSE (Root Mean Squared Error).
* **Scenario Impact Analysis**: The baseline forecast will be compared with the scenario-adjusted forecasts to understand how different scenarios might impact financial performance.
* **Reporting and Recommendations**: The final report will compile findings from the forecast and scenario analysis, including strategic recommendations for management.

## Expected Challenges

1. **Data Complexity**: The financial data covers multiple years and includes significant seasonality and trends. Capturing these nuances in the SARIMA model will be essential for producing reliable forecasts.
2. **Scenario Uncertainty**: The scenarios modeled are based on hypothetical assumptions. Ensuring these assumptions are reasonable and reflective of potential real-world conditions is crucial.
3. **Model Sensitivity**: SARIMA models are sensitive to parameter selection. Balancing model complexity with predictive accuracy will require careful consideration.

## Conclusion

This case study outlines the approach to forecasting financial performance at GlobalTech Manufacturing Inc. Using SARIMA for baseline forecasting and conducting scenario analysis will provide valuable insights into potential risks and opportunities. The results will support GlobalTech's strategic decision-making and help ensure the company remains competitive and resilient in a rapidly changing market.

Exercises:

1st one – Try model based on data individually.

2nd one – Breakout rooms (Show what to do for one scenario and then have them do the other) Generate scenarios based on what was shown. Discuss together if you want to do supply chain disruption, you can use this, but come up with for yourself.

## Recommended Prompts

### Section 1: Data Analysis and Preparation

**Prompt:**

* Attach the historical income statement, and prompt:
* "Review the historical financial data from January 2022 to December 2024. Identify any trends, seasonal patterns, or anomalies in the data for Revenue, COGS, Operating Expenses, and Net Income. Ensure the data is clean and ready for time series analysis."

### Section 2: Baseline Forecast Using SARIMA

**Prompts:**

* "Use SARIMA to create a one-year revenue forecast for the period from January 2025 to December 2025. Start by identifying the optimal SARIMA parameters (p, d, q, P, D, Q, m) for revenue. Generate the baseline forecast using these parameters."
* “Add the remaining budget items based on the following rules:
	+ COGS: As percentage of revenue based on last six months reported.
	+ Operating Expenses: As percentage of revenue based on last six months reported.
	+ EBIT: Revenue – COGS – Operating Expenses
	+ Interest Expense – Linear regression continuation of trend from historical data.
	+ EBT: EBIT – Interest Expense
	+ Tax Expense: Use historical percentage of EBT
	+ Net Income: EBT – Tax Expense”
* “Visualize the results combined with historical data. Note any issues with the forecast where the trend varies from historical.”

### Section 3: Scenario Analysis

**Prompt:**

* "Conduct scenario analysis on the one-year forecast for GlobalTech Manufacturing Inc. Evaluate the impact of the following scenarios on the baseline forecast:
	1. Economic Downturn: Assume a 10% reduction in Revenue.
	2. Supply Chain Disruptions: Assume a 15% increase in COGS.
	3. Market Expansion: Assume a 20% increase in Revenue with a proportional increase in Operating Expenses.
	4. Interest Rate Hikes: Assume a 25% increase in Interest Expense. For each scenario, adjust the baseline forecast accordingly and compare the results with the original forecast."

### Section 4: Evaluation and Reporting

**Prompt:**

* "Evaluate the accuracy and robustness of the baseline forecast and scenario-adjusted forecasts using metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE). Provide a detailed report comparing the baseline forecast with each scenario, including strategic recommendations based on the analysis."

### Section 5: Strategic Recommendations

**Prompt:**

* "Based on the results of the scenario analysis, provide strategic recommendations for GlobalTech Manufacturing Inc. Consider potential risks and opportunities identified during the analysis and suggest actions the company can take to ensure financial stability and growth."

### Section 6: Advanced Usage

The budgeting process was reduced to very simple terms for this exercise. In real world FP&A, budgeting is much more detailed. However, the lessons learned from this exercise can be applied to forecasting in actual scenarios. The key is to get more granular and take the assumptions you would use in your standard budgeting process and use generative AI to assist. Below are two examples of how you might use generative AI for your actual budgeting process.

### Product Line Analysis

In our simplified model, we had revenue collapsed to a single line. Most companies obviously have multiple revenue lines. To take a more detailed approach to revenue budgeting, start by breaking down GlobalTech Manufacturing Inc.'s total revenue into three key product lines: Consumer Electronics (CE), Home Appliances (HA), and Smart Home Devices (SHD), each with distinct characteristics and growth drivers (e.g. unit price and volume metrics).

Use historical data to allocate revenue to each product line and apply specific growth rates and seasonality factors to create a one-year revenue forecast. To account for potential market fluctuations, conduct scenario analysis by developing base, optimistic, and pessimistic cases for each product line. This approach will provide a comprehensive understanding of how varying market conditions could impact the company's overall financial performance, enabling more informed strategic planning.

### New Market Expansion Detail

In real-world budgeting, we would not budget out a market expansion just by adding percentages to revenue and expenses. A more realistic approach would be to develop a detailed mini P&L for GlobalTech Manufacturing Inc.'s market expansion into a new market by estimating revenue growth, COGS, and a breakdown of operating expenses, including salaries, marketing, rent, logistics, and administrative costs to produce a comprehensive monthly P&L for 2025, reflecting the financial impact of the new market on GlobalTech's overall performance.