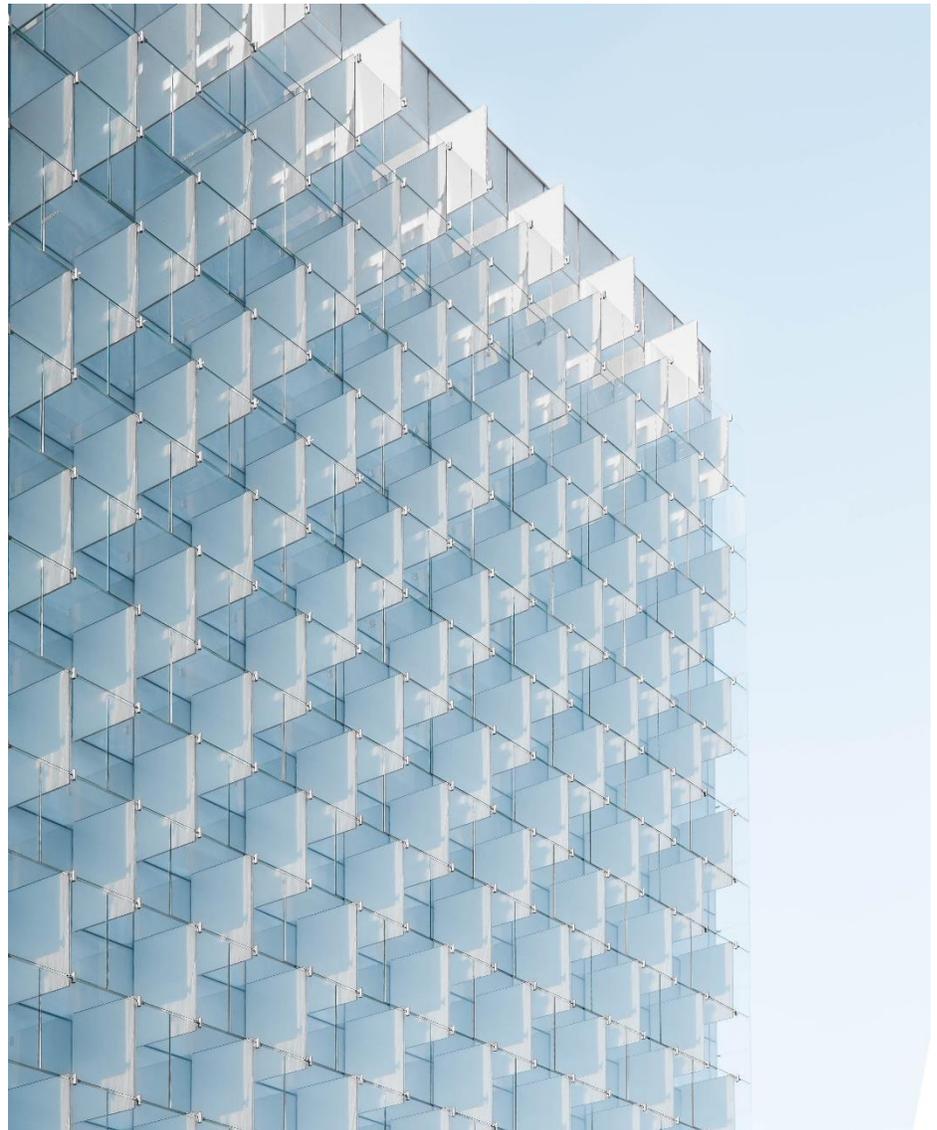




VOR SCENARIO BUILDER OBTAINING BUSINESS INSIGHT FROM SCENARIOS

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What is Scenario Analysis?

In recent years the usage of scenarios in the financial world has been prevalent, due to major stress testing regulations such as Comprehensive Capital Adequacy and Review (CCAR) and Dodd-Frank Act Stress Testing (DFAST) and recent updates to allowance methodologies (e.g., IFRS 9, CECL). However, forward thinking financial institutions do not limit their usage of scenarios to satisfy regulations only. These institutions use scenarios for strategic planning such as:

- Identifying macroeconomic environments which lead to revenue losses from a lucrative product line drying up
- Estimating financial losses incurred on a portfolio of loans due to climate change

Simply stated: scenario analysis is used to help a company prepare for an uncertain future. It seeks to identify how economic, environmental, political, and technological change can impact areas of a company's business. From this insight companies can formulate plans which can be executed, should the scenarios ever be realized.

Scenario analysis can be distilled into the steps outlined in Table 1:

Table 1 - Scenario analysis steps

Step #	Action
1	Identify a specific area of interest for evaluation.
2	Determine the factors that are most relevant in that area of interest.
3	Build two or more scenarios.
4	Use the scenarios in analysis and review results.

Each scenario analysis step is critical and requires thoughtful discussion and analysis. However, one of the most complex steps involved is Step 3—building the scenarios.

Example

Consider a US bank interested in using scenario analysis for strategic planning. The following are the actions it may take for the steps outline in Table 1:

1. The bank determines it is interested in understanding how a changing macroeconomic environment may impact the revenue portion of the income statement.
2. After discussion among subject matter experts, the bank decides that three macroeconomic variables best capture the changing economic environment for their portfolio:
 - GDP
 - Consumer Price Index
 - Unemployment rate
3. The bank decides to build three scenarios, capturing different behavior of these macroeconomic variables. The scenarios are:
 - **Scenario 1** – A baseline scenario. This captures the most likely economic behavior over the next three years.
 - **Scenario 2** – A stagflation scenario. This one is based on historical values of the change in GDP, Consumer Price Index, and Unemployment from the early 1970s to late 1970s. The bank decides to scale to recent values to avoid extreme shifts.
 - **Scenario 3** – A recession scenario. In this scenario, the bank decides GDP growth slows for 2 quarters, becomes negative for 2 quarters, then gradually improves. The bank also decides to double the unemployment rate, from the current period value, to a peak value in the 6th quarter.
4. After the scenarios have been built the bank delivers them to the appropriate business units who then use the scenarios in their models to predict revenues under the different macroeconomic environments.

Scenario Building: Flexibility Required

The scenario build process is one of discussion and refinement. There are many questions that require answers before starting on the scenario building exercise. Among the more important ones are:

1. **How many scenarios should be built?** This question has to do with the number of scenarios that should be created. Typically, there is a base case scenario—the scenario that is the most probable given the state of the world today. In addition to this one, how many others should be created? Should all the scenarios be negative (e.g., variations on a declining economy) or should some be positive (e.g., continued strong growth in foreseeable future)?
2. **Which variables should be included within each scenario?** This question has to do with determining which variables should exist within a given scenario. In the stagflation example (see sidebar), the bank may also be interested in understanding how interest rates (for interest income models) and home prices (for non-interest income models) change. Including these would result in a scenario that contains six macroeconomic factors: GDP, consumer price index, unemployment, a short-term interest rate, a long-term interest rate, and the Case-Schiller Index.
3. **Should forecasted values adhere to historical relationships?** This question has to do with whether to maintain historical relationships between time series. While the act of scenario generation is to create possible futures, there is no requirement that these futures should be constrained to past behavior. After all, the economy changes, technology disrupts, political climates shift. In

fact, some of the more insightful scenarios are those where past relationships have broken down or no longer exist. For example, could there ever be a situation where a house price index could have an extended decrease during economic growth? What might cause this?

Given the above questions, it is clear there is a need for flexibility when building scenarios. How else can a company benefit from a process that requires creativity, a willingness to go against conventional wisdom, an openness to extremes, teamwork, and contrarian voices?

VOR Scenario Builder

FRG has created a solution to facilitate scenario development. It allows for easy, customizable, scenario development while ensuring baseline relationships amongst the variables of interest that are influenced by historical behavior. Using a combination of the past relationships between time series, along with the ability to modify forecasted values, the product can produce any scenario the user wants.

How does it work? At its core, VOR Scenario Builder executes an algorithm that has been calibrated to multiple time series to capture the behavior of those times series throughout history. It then outputs a forecasted scenario based on the recent values and historical behavior (Step 1 in Figure 1). At this point the user has the option to modify, through a user-interface, the forecasted time series (Step 2 in Figure 1, the top two series).

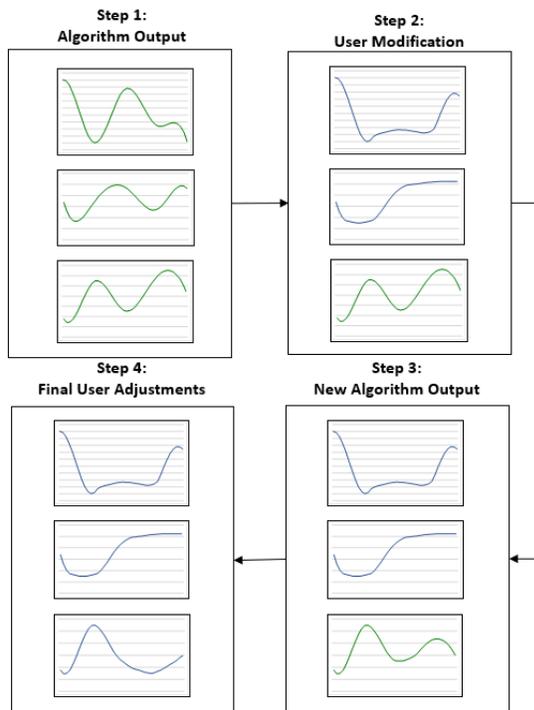


Figure 1 – VOR Scenario Builder steps

Next, the algorithm can be rerun to use the modified time series to update the behavior of the remaining variables in the scenario that have not been modified (Step 3 in Figure 1, the bottom time series has been updated to reflect the new values of the top two variables). After reviewing the scenarios and making final adjustments to any of the time series (Step 4 in Figure 1, bottom time series has been slightly altered), the user will be able to download them into an Excel workbook.

The VOR Scenario Builder solution also offers other functionality to facilitate scenario building:

- I. Obtain custom-built algorithms based on any group of time series
 - a. This solution is not limited to macroeconomic data. Any time series

variables can be passed through the algorithm to create scenarios of interest for the business. If a model for a collection of time series is not present it can be built for the user.

2. Flexible data sourcing
 - a. Access time series data sourced from government entities or individually load data by the business
3. Storage of scenarios
 - a. Name, store, and retrieve scenarios for reuse
4. Smooth forecasted values
 - a. The user has the option to smooth forecasted time series (e.g., to mitigate extreme changes) or keep the outputted values as they are

The VOR Scenario Builder was created to help companies efficiently move through the scenario analysis process while maintaining flexibility in the creation of scenarios. Any macroeconomic environment that the user can imagine can be created. From there, the scenarios can be distributed to subject matter experts, modelers, or business analysts to assess the impact the scenario has on the business.

By streamlining the creation of the scenarios, a company can use scenario analysis more often. Using scenarios should not only be considered for satisfying regulatory requirements. Scenario analysis can help guide businesses in decision making, prepare them for taking advantage of new opportunities, and equip them to handle economic downturns.

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