# IRR Modeling: Art vs. Science

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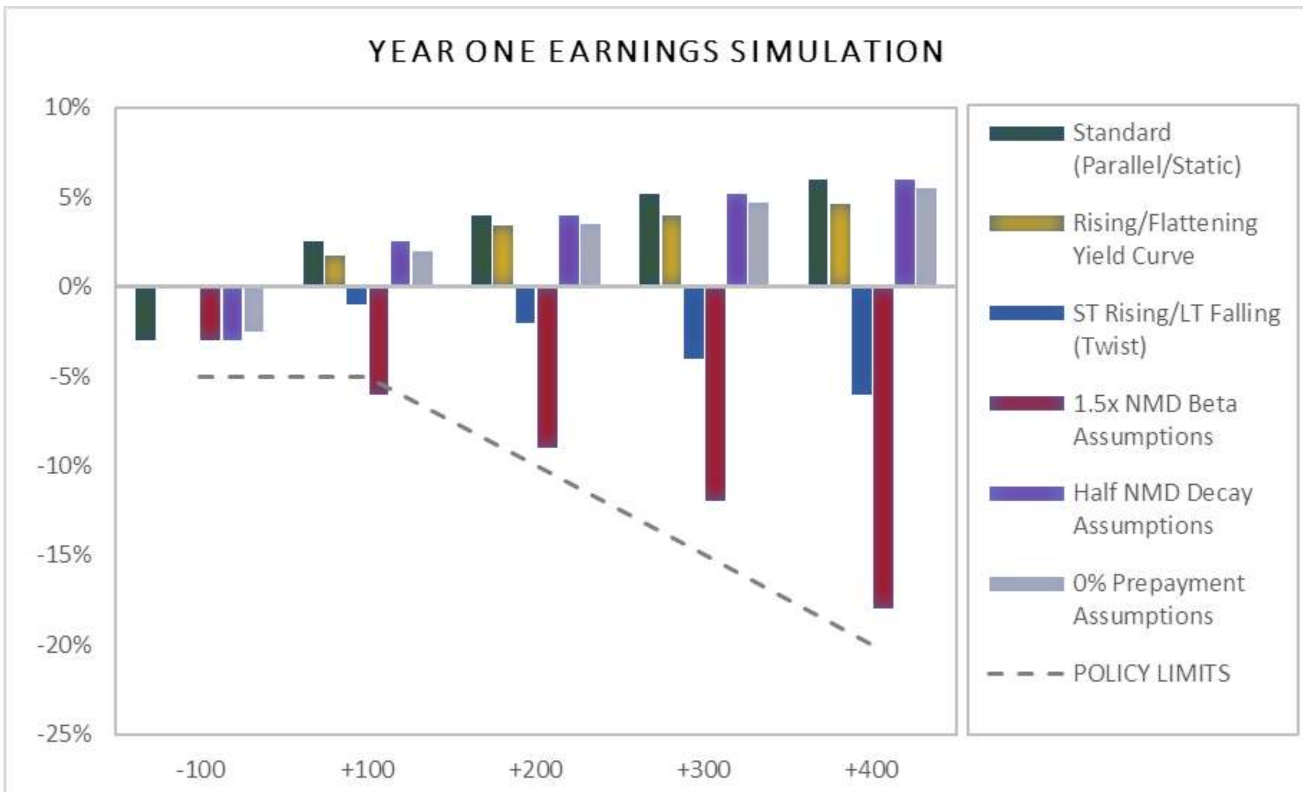
Interest rate risk (IRR) measurements are typically based on a set of assumptions and scenarios that represent a single projection. Given an almost infinite range of outcomes, it is nearly impossible that an institution will guess both the exact course of interest rates and the resulting financial impact. Standard IRR modeling simply estimates the magnitude of earnings and capital at risk over a range of rising and falling rate shifts. So, how much is science and how much is art?

Certainly, there is some established science (and math) involved in IRR modeling. The software and mechanics of most models function as intended. Load them with data and user-defined assumptions and they will calculate earnings and capital at risk. Many institutions also use advanced statistical techniques and historical analysis to support key model assumptions. Still, assuming all the science and math is executed flawlessly, we cannot predict the future.

Science transitions to art when model administrators recognize the low likelihood of matching IRR measurements to actual future events, especially during periods of volatility. The best we can do is capture a range of exposures, but this can be challenging due to all the moving parts. Yield curves can move up, move down, steepen, flatten, and twist. Balance sheet cash flows and pricing relationships can change unpredictably. The art of IRR modeling lies in capturing all relevant inputs and communicating such a vast amount of output.

Standard IRR measurements generally include static parallel earnings simulations and economic value calculations. These measurements are important for monitoring risk trends over multiple periods and they are effectively required by regulators. Standard IRR measurements are most often used for setting policy risk limits, which is appropriate and limits redundant monitoring. They also provide a consistent benchmark for additional IRR measurements, such as nonparallel yield curve shifts, assumption sensitivity testing, and dynamic balance sheet modeling.

Additional IRR measurements need to be run periodically to capture a wider range of possible outcomes. If an institution has identified significant nonparallel exposure to a flattening yield curve, for example, that should be measured more frequently and possibly assigned a policy limit. Sensitivity testing should be conducted using a range of key model assumptions that reflect possible adverse customer behavior, such as 1.5x betas, ½ decay terms, 0% prepayment speeds, etc. Sensitivity testing is typically conducted on a single assumption category at a time to isolate its impact on model output. Often, standard IRR measurements may indicate a benefit in a certain rate scenario, but model output with slightly tweaked assumptions will indicate exposure. Nonparallel yield curve shifts and sensitivity testing are required by regulatory guidance and the frequency depends on an institution's risk profile. Dynamic balance sheet modeling may be appropriate if the institution anticipates meaningful changes to the size or structure of its balance sheet. New products and initiatives should always be modeled prior to implementation. The result of all of this modeling is a tremendous amount of model output. Rather than presenting reams of detailed reports for each additional IRR measurement, charts and graphs can be used to summarize and compare model output (see example below).




More advanced IRR modeling includes projections with multiple rate shifts over a period of time. During the budget process, for example, an institution might evaluate several different interest rate scenarios, such as the consensus median, high, and low rate change paths. Or, an institution might evaluate the impact of various internal rate projections. While standard IRR measurements typically estimate exposure using an instantaneous and prolonged shock, more advanced IRR modeling projects expected financial results for any given rate path. This is an important distinction and institutions should be careful not to draw performance conclusions from their standard IRR measurements.  If the FOMC votes to increase the Fed Funds rate 100bp over four meetings during a year, that rate path may be much different than a model's +100bp instantaneous and prolonged shock.  In addition, actual financial performance will also depend on changes in longer-term rate indexes and pricing spreads.

Even with a comprehensive and concise reporting program (a true work of art!), IRR modeling will never capture all possible outcomes.  The strongest IRR programs are designed to capture a range of exposures and expected financial performance and lead to discussion about the level and sources of risk.  Institutions should plan strategies for expected rate conditions and prepare strategies for unexpected rate shocks.  Discussion in terms of actual balance sheet positions and business activity should reinforce or challenge the reasonableness of model assumptions and output.  Drawing on historical experience and pricing relationships can provide a good starting point for discussion; however, comparable rate environments may be accompanied by much different economic and industry conditions.  Additional risks may need to be included in the modeling process and the IRR program should ultimately be incorporated into a broader enterprise risk management program.  Risk management is not an exact science, but a masterpiece presentation can lead to much more engaged, creative, and informed strategic planning.