Advanced Modeling for Deposit Performance

BY STEVE TURNER AND DON KUMKA

Progressive banks see crisis avoidance as but one benefit of a larger analytical push in deposit management, using advanced modeling for tangible performance improvements.

The financial management of deposit portfolios has come under a magnifying glass as part of a regulatory push for “stress testing,” which requires banks to demonstrate their ability to anticipate and endure various potential crisis scenarios. Modeling is essential to this exercise, entailing careful estimations of bank exposure to potential sudden market changes, such as with interest rates or liquidity.

But a rift in management philosophy has surfaced as banks have strengthened their stress testing diagnostics. On the one side are banks that separate compliance modeling from the traditional management processes of planning, resource allocation and forecasting. On the other side are banks intent on leveraging the insights gained from modeling by applying them to critical management processes.

In compartmentalizing regulatory diagnostics, some banking teams point to success with traditional techniques in setting deposit strategy. They don’t see the benefit of more integrated revisions; don’t want the expense and disruption; and don’t want to run the perceived risk of having their judgment supplanted by mathematical models.

Progressive players, by contrast, see crisis avoidance as but one benefit of a larger analytical push in deposit management. While mindful of the pains of setting a new foundation, they are pursuing a set of tangible performance improvements in customer targeting, product design and pricing, deposit valuation, and hedging interest rate risk.

Such payoffs hinge on a form of modeling that probes much more deeply into customer profiles and behaviors. This depends on: 1) distillations of historical customer behavioral information; 2) account-level modeling on characteristics that management can act upon (e.g., balance acquisition); and 3) integrating the effects of macroeconomic, market, and management actions into unified models.

Properly analyzed, this information permits a new level of quantitative precision in modeling portfolio and customer behaviors in a variety of scenarios. This improved decision context has its ultimate payoff when incorporated into key activities of various business units — a progression from diagnosing risk to driving results.

CALL TO ACTION

Pressures to improve scenario modeling began building in earnest in 2009 following the housing-driven market crash, when regulators required stress testing at 19 major financial institutions under the Supervisory Capital Assessment Program (SCAP).

Such tests have become a permanent fixture in the regulatory landscape, now expanded to include all banks with at least $10 billion of assets. Capital soundness is the common thread in programs such as the Fed’s Comprehensive Capital Analysis and Review (CCAR) and the legislatively-mandated Dodd-Frank Act Stress Test (DFAST). Assessments are based on
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Dealing with Complexity

Deposits are incredibly complex financial instruments which require extensive analysis to fully understand. Most bank deposits have huge amounts of optionality embedded in them. That is, deposits with indeterminate maturities can be withdrawn at any moment without penalty, even though they are critical to funding long-term assets held by the bank. Even time deposits can prove slippery, given their modest early withdrawal penalties that almost always have no relationship to economic value.

Thus with the gate left open, so to speak, deposits can shift for a multitude of reasons. They are more likely to move — and do move — for more reasons and more frequently than mortgages, the product most often cited for its optionality on bank balance sheets. Yet the data availability and analytical commitment for deposits significantly lag what is generally seen with mortgages.

There is much new ground to be gained in analytically-driven deposit management, given the wealth of additional information that is now available. Today, for example, banks are able to access and analyze account- or customer-level historical performance data on many of their own portfolios.

Banks are retaining information longer (partially the result of regulatory requirements), moreover, and stored information is more accessible thanks to technology advances. Also, external information from ratings services and securitization markets has become readily available at increasing levels of granularity for many portfolios.

Yet even with the increased availability of data, many banks are still looking narrowly at snapshots of portfolio profiles and acquisition dynamics focused on pricing. There is a bigger picture that needs to be understood. Deposits are affected by numerous influences which individually and collectively drive the total amount of deposits available in the market and a bank’s ability to capture and retain its fair share.

Advanced modeling is not just a matter of understanding more explicitly how the bank will be passively affected by market and customer dynamics. It is about learning to proactively improve outcomes by quantitatively refining the bank’s own posture and customer outreach. This strengthens management’s hand in dealing with complexity.

— Steve Turner and Don Kumka
environment of low interest rates and slow growth, when banks are flush with deposits? Probably not. However, time is running out to prepare for the next era of rising rates, and banks are entering this era with significant portfolio imbalances, including a superabundance of deposits.

As rates climb, banks expect net interest margins on these deposits to increase. However, some customers likely will switch to different types of higher-yielding accounts, offsetting some of the potential upside from rising rates.

Accurately forecasting which customers (and how much of their balances) will shift will be critical in setting balance sheet strategy. Without a clear view of how depositors will respond to rising rates, banks are vulnerable to potentially severe mismatches in their asset/liability positions as account migration ramps up. Strategies to maximize net interest margins would be disrupted.

Second, the competition for deposits has changed, with new online entrants winning greater customer acceptance than in the past. Consumers are placing less value on extensive branch networks while steadily becoming more comfortable with online “direct banks,” and this trend is expected to accelerate.

While these direct banks currently have only a small sliver of total U.S. deposits, their posted rates enjoy high visibility, increasingly influencing the larger population of customers who are comparing rates in preparation to renew or shift an account. Compared with their brick-and-mortar competitors, moreover, direct banks are more dependent on deposits for balance sheet funding. Hence they are more likely to be market leaders in a rising rate environment, driving up deposit costs faster.

Third, evolving regulatory rules will shift the internal valuations that banks place on deposits, influencing the type of customers they will pursue. Under the Basel III international standards adopted by U.S. regulators, Liquidity Coverage Ratio (LCR) rules will prescribe how much of each type of deposit can be used for traditional bank funding, and how much must be set aside in a liquidity buffer of “safe” low-yielding securities.

As proposed, consumer relationship deposits will be allowed to be used almost entirely to fund loans. At the other end of the spectrum, corporate deposits will have almost no eligibility to fund loans, and balances will have to be deployed into low-yielding investment securities.

Banks will be making major revisions in deposit strategies and pricing in response to these regulatory changes, further challenging traditional decision tools and management practices.

All these factors — regulatory, competitive, macroeconomic and customer attitudinal — create a flux environment for deposit portfolios. A superior understanding of how management actions can drive outcomes will confer clear competitive advantages in this period of potentially rapid change.

Figure 1: Designing the Deposit Model

Regulatory stress testing assesses the availability of deposit funding, but additional benefits can be captured by quantifying how the bank’s situation and management actions influence share of market.

Source: Novantas, Inc.
**Insights from the Field**

There are four clear insights we have learned from our work in modeling deposits:

1) **Traditional quantitative tools are not capable of effectively modeling deposits.** A common modeling tool with deposit portfolios is linear regression analysis, a technique that reveals how changes in one or more “independent variables” either cause or relate to an outcome that is of interest to the analyst. Regression models commonly used for stress testing, for example, can show that certain market rate variables (e.g., BBB corporate bonds) are fairly strong predictors of deposit and account acquisition.

   The problem, however, is that such findings may not hold up in changing economic environments. Getting back to our example with corporate bonds, soaring inflation would sink values and lift yields. Plugged into a stress testing regression model calibrated in a more normal market, these high bond yields would presage exceptionally high account growth — at odds with what actually happens during inflationary periods.

   While the original regression model for account acquisition could be enriched by adding explanatory variables that are less affected by inflation, adding variables introduces its own set of problems. Explanatory variables often are related to one another, and such inter-correlations, if large enough, can compromise and destabilize the regression model, resulting in erratic predictions.

   The situation calls for a more sophisticated regression technique that goes beyond the typical construct used in regulatory stress testing. The partial least squares (PLS) regression method, for example, captures patterns in the correlation among explanatory variables, which are then equilibrated to maximize their unique and combined ability to explain the outcome, providing a more effective and durable predictive model. Although more complex, PLS models ultimately provide a more complete picture of account and balance acquisition than traditional regression models.

2) **Macroeconomic and market factors determine the overall level of deposits.** Macroeconomic and market factors determine the overall pool of deposits that customers have available for banks. These factors also determine the propensity of customers to place deposits in checking, savings, or time deposits. In practice, for example, low rates render time deposits unattractive and cause a build-up in liquid deposits. Slow economic activity lowers savings levels and decreases the growth in deposits.

   Such linkages are similar to what is seen with credit portfolios, where credit losses are driven by macro-factors that cause numerous bank portfolios to decay. However, statistical links between the environment and deposit portfolios are not as strong or universally applicable as those seen with credit portfolios. Amid a recession-driven slump in credit quality, for example, seldom does an individual bank improve while the rest of the industry is deteriorating. Yet neighboring banks can in fact see their deposit portfolios move in opposite directions, both in stable and stressed environments.

3) **Bank-specific factors are the most important drivers of deposit behaviors.** This is obvious when thinking about the role of interest rates in competition for new deposits. Basically, outbid the competition and more deposits will come through the door.

   However, quantitative modeling can also identify the specifics of the rate-versus-volume relationship for these deposits. More broadly, quantitative modeling can capture and control for the effects of additional drivers, such as marketing spend, direct mail or even branch acquisition. When industry data is brought into the equation, moreover, the effect of strategic events, such as a large credit loss, can be quantified.

4) **Certain deposit behaviors are quite resilient over time.** Certain aspects of deposit behaviors are demonstrably consistent and virtually impervious to macroeconomic and market factors. Account attrition falls into this category. Once the trend has been diagnosed there is little remaining variance that can be attributed to macroeconomic or market dynamics.

   — Steve Turner and Don Kumka

**APPLIED MODELING**

To better control their own destiny, leaders are carefully studying how their own actions influence the level of deposits acquired and the types of customers attracted and retained. And they are overlaying on their portfolios scenarios of future interest rate movements and economic activity to see how their deposit portfolios will perform under these scenarios. With all of this information in hand, they are taking actions to build deposit portfolios that will perform well across many different scenarios (Figure 1: “Designing the Deposit Model”).

Beyond regulatory compliance, advanced modeling capabilities are being used in product pricing, not only for achieving the best combination of interest paid for new volume achieved, but for identifying customers that will contribute most to long-term profitability. Modeling insights are also being used to set design features for new products and services, specifically by identifying those combinations that are highly valued by target customers and will induce them to deepen their banking relationships.

In levering quantitative deposit management capabilities...
"While much attention has been paid to building models that can probe for downside risk, leading banks are going a step further, using these same models to explore ways to improve upside results in growing, stable environments."

developed in the course of regulatory compliance, progressive banks are investing in the analytic infrastructure needed to effectively capture and array historical data. They are also are investing in the modeling capabilities needed to correctly interpret, understand and fully exploit the information value of these data.

Specifically, these banks are:

Integrating data. The information used for stress testing and financial management must be consistent to ensure that compliance reporting and business management teams are working from the same foundation. In turn, new data warehouses are being developed to support stress test models and business management, using technologies that can better support the complexity of data requirements.

Expanding the models. While much attention has been paid to building models that can probe for downside risk, leading banks are going a step further, using these same models to explore ways to improve upside results in growing, stable environments. For the first time, progressive bank can develop deposit optimization models that balance growth, attributed income and long-term returns over a range of future scenarios.

Leveraging knowledge. Successful practitioners are organizing the bank so that expensive quantitative modeling talent can be leveraged across both regulatory compliance and businesses needs. In the best case, the integrated data used for stress testing and business management becomes the basis for a host of other applications that enhance decision-making and performance.

DRIVING RESULTS
Post crisis, increased attention is being paid to macroeconomic and market factors and how they interact with customer profiles and behaviors to determine the total pool of money that flows into deposits or, said differently, the total deposit opportunity for banks. However, a bank’s own actions are a major factor in determining how much of that pool of deposits it captures and keeps over time.

This gets to the question of model specifications, and what it actually takes to evaluate the interplay of market- and management-driven factors. In our experience, these models must:

• Be built on a sound qualitative viewpoint that depicts how various factors interact and affect deposits. As shown above, there are two major categories of drivers affecting deposit activity: factors that impact the size of the pool of deposits available to banks, and individual bank effectiveness in interacting with this pool.

• Be clearly specified with well-defined metrics for deposit behaviors. The strongest models will incorporate deposit behaviors at an account level and build portfolio segments based upon homogeneous deposit-related behaviors. Model specification must treat account and balance behaviors separately and independently assess the drivers of acquisition and retention.

• Simultaneously take into account multiple macroeconomic factors, often highly correlated, and measure their individual and combined effect on the total pool of deposits. Most modeling approaches force out highly-related variables, rendering the models over-sensitive to some factors while completely ignoring others.

• Directly incorporate the quantitative impact of management actions on deposits. Bank-specific variables and management actions should be formally included in the quantitative model, with the appropriate statistical rigor to ensure validity.

Taken together, better data and more advanced models should yield deeper insights into portfolio and customer behaviors, providing a new foundation for management decisions.

MAKING BETTER DECISIONS
While macroeconomic and market environments affect the total pool of available deposits, it is critically important to recognize that individual bank circumstances and actions are the most important drivers of deposit behaviors. Both in good times and bad, individual bank deposit portfolios often move in directions different than the macroeconomic environment would imply.

This makes a strong case for going beyond the risk modeling capabilities required by regulators. It is a matter of empowering management to make a set of quantitatively supported decisions that will proactively improve the stance of the bank.

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