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Bank Asset/Liability Management

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An Alternative View of Non-Maturity Deposit Modeling

Every asset/liability (A/L) manager knows that modeling non-maturity deposits is one of the most critical challenges faced when assessing overall balance sheet risk. The average U.S. bank is funded 48% with these types of funds, so the manner in which they are modeled has tremendous implications when estimating their value and their impact on interest rate risk (IRR) exposure measures.

Valuing non-maturity deposits is not a simple task, principally because they are not market traded. Without market comparison benchmarks, there is no agreement on the best way to model what essentially is an ambiguous balance behavior problem. Checking and savings deposits have no stated termination date, and allow the depositor to exercise continuous and unlimited options to increase or decrease their account balance at will. The exercising of options to change account balances often do not correlate to market conditions, but rather to the unique personal circumstances of each account holder. Herein lies the ambiguity of the modeling problem, and its potential unfavorable consequences when evaluating non-maturity deposits from a risk measurement perspective.

Modeling non-maturity deposits with too short an average life for any given asset maturity structure will indicate risk exposure to rising rates. Modeling them too long for the same asset structure will indicate an exposure to falling rates. The very name non-maturity screams modeling ambiguity. Yet a decision must be made for their inclusion in the risk modeling so the A/L manager can report to the A/L management committee (ALCO) the overall IRR exposure.

A review of deposit modeling literature indicates numerous approaches for their inclusion in economic value risk assessments. Valuing deposits requires three primary model ingredients: how much (volume), how long (maturity), and at what price (spread). Volume and spread are easy inputs as the amount of deposits and rates paid are givens. It's the runoff of today's non-maturity balances that is the troubling issue.

Most non-maturity modeling approaches dwell on hypothesizing some terminal assumption for these funds. As these deposits do not have a stated maturity, modeling them with fixed terminal dates or with an assumed decay rate (attrition assumption) allows the portfolio of deposits

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to runoff the books sometime in the future. The portfolio's cash flows can then be discounted to estimate their economic value.

How Long Are Non-Maturity Deposits? Carrying this approach one step further, several A/L consultants have suggested that reasonably precise measures of deposit attrition can be statistically derived through evaluating time-series of historic account behaviors. Such studies use regression-based methods to correlate various factors believed to influence depositors' account balance retention decisions. These studies have been used to justify funding longer asset maturities. However, the regulatory community is wary of long assumed deposit lives, believing they are being used to justify long-maturity asset portfolios that in reality are effectively being hedged through modeling assumptions.

While historic trends often repeat themselves, one does not know what parts, when, or in what form. Similarly, balance retention studies do provide insight in explaining past balance behavior. However, their validity for representing certainty of future behavior is dubious. They are simply more educated guesses, substantiated through documentation. Reality is that the lives of these deposits could be longer or shorter than the study's conclusions, and different from the assets they are funding. Average life assumptions of non-maturity deposits, however derived in a study, leave unavoidable model error in the assessment of IRR exposure.

So is there an approach to modeling non-maturity deposits that avoids the entire issue of having to guess at their average life? Maybe the answer to the question is to reformulate it by asking, "Why do non-maturity accounts have value in mitigating balance sheet risk?" The answer to this question opens up a different view of modeling non-maturity deposits.

What Gives Non-Maturity Deposits Value? Non-maturity deposits have value because they are usually one of the lowest cost sources of funds available to the bank. The depositor provides the funds at an advantageous rate because the bank gives the depositor ultimate flexibility to withdraw the funds or to add to account at any time, in any amount. While they don't have a stated termination, non-maturity deposit rates paid today provide a definable cost advantage relative to other funding sources available today. Replacing non-maturity deposits with more definable maturity sources of funds simply drives up the interest cost to the bank. For this reason, bankers are willing to assume maturity ambiguity and its corresponding contribution to risk measurement ambiguity.

The cost advantage of non-maturity deposits provides substantial wider profit margins relative to the assets they are funding, as long as the general level of market rates stays stable. The issue comes when market rates of interest rise. The bank eventually will have to raise rates paid on non-maturity deposits to retain them. No problem. Doing so avoids having to replace them with even more costly sources of funds. This by itself does not create interest rate risk. Margins don't suffer as long as the relative spread between the cost of non-maturity deposits and asset yields stays intact.

What causes IRR as rates rise is the possibility of not gaining a corresponding benefit of increases in the yields on the assets non-maturity deposits are funding. The bank still needs to fund the assets; the relevant question is at what cost? Therefore, when dealing with non-maturity deposits, basis risk—not maturity mismatches—creates risk. Further, the longer asset durations, the more time basis risk potentially can erode overall net interest margins.

Value-at-risk exposure assessment of non-maturity deposits is a three-dimension measurement exercise; one of possible spread advantage erosion, one of timing mismatch and one of volume. By its very definition, non-maturity deposits do not allow the modeling of maturity timing mismatches with any degree of certainty. Within this view of IRR lies an alternative approach to model non-maturity deposits.

IRR resides not in matched balance sheet positions, but rather in the mismatched balance sheet positions. Matched maturity asset and liability positions pose minimal IRR exposure in both rising and falling rate markets. Unmatched positions create risk and the possibility of margin erosion. Unmatched positions can be created consciously, by purposely mismatching the funding of assets, or subconsciously, by assuming erroneous maturities for items that have maturity ambiguity. The prior condition creates real IRR exposure, while the latter is merely modeling risk that may or may not reflect true IRR exposure.

Mirroring Asset Runoff Profiles. Armed with this knowledge, one can avoid potential non-maturity deposit modeling error by mirroring their runoff to that of the assets they are funding. This removes the volume/maturity ambiguity from our three-dimension IRR measurement exercise, leaving basis risk as the sole factor in measuring IRR. The underlying assumption is that non-maturity deposits are fundable, and that they will be there as long as the bank is willing to pay a rate comparatively attractive to alternative rates the depositor could receive if they took their money elsewhere. This is a more defensible assumption for measuring IRR than those available through core deposit behavior studies. It avoids misstating deposit maturities by forcing the analysis to show only the risk created by how the funds are actually deployed.

Maturity still must be factored into quantifying IRR. How-

ever, it is the maturity of the assets the non-maturity deposits are funding, not a contrived best guess at the maturity of ambiguous deposits that should be used in IRR analysis. The funded asset runoff determines the maximum length of time the relative cost advantaged ambiguous deposits will affect margin and potential margin erosion. Once the funded assets are depleted, non-maturity deposits pose no rate risk under a straightforward assumption that the bank can use them to fund overnight investments, albeit with narrower spreads. Therefore, the runoff maturities of assets funded with non-maturity deposits provide the second and third dimension in our IRR exposure assessment, one void of maturity modeling error.

The three-dimensional area bound by the volume times maturities of assets being funded, times the relative cost spread advantage of non-maturity deposits (rate paid less replacement rate), discounted at the alternative funds replacement rates gives the economic value of the deposits unique to the way the bank uses these funds. The greater the area within the three boundaries translates into the greater economic premium the non-maturity deposits provide and, therefore, the greater their value. However, the longer the maturity dimension, the greater their value sensitivity to rate changes. The three key ingredients necessary for measuring economic value exposure relative to non-maturity deposits are now complete and defensible.

True Risk Profiling of Non-Maturity Deposits. Simulating asset runoffs, including the impact of prepayments under different rate scenarios, and then applying the resulting runoff profiles to non-maturity deposits allows for the quantification of explicit IRR. The economic value risk being quantified is the potential spread advantage erosion only for as long the existing assets are being funded. The longer the assets are funded with non-maturity deposits, the greater the deposit's potential value, but also the greater the risk that the spread advantage may dissipate during this time.

Economic value-at-risk exposures can be estimated by applying standard basis rate shocks to the existing spread advantage. This provides ALCO with a measure of the balance sheet's EV risk. The ALCO can then make the determination of the likelihood the prevailing spread advantage will exist for the life of the assets being funded. If the prevailing spread is historically wide, management should consider the likelihood the spread will revert to a more normal longer-term average. Management should further consider potential spread advantage widening as rates rise. Historically the spread between asset and deposit rates widen as market rates rise (spread decompression), albeit management will have to wait for the existing assets to reprice to realize this advantage. The results of this type of deposit modeling analysis provides ALCO with tangible and transparent information to determine if a potential narrowing in the spread advantage has unacceptable economic capital erosion consequences.

Analysis of non-maturity deposits model results can be used to justify many differing positions. Banks can legitimately increase non-maturity deposit premiums by widening the spread between the rate paid and alternative funding sources, or hypothetically by extending the non-maturity deposit assumption. Some banks may find greater or lesser premium value in the deposits depending on how they intend to utilize them. In this asset runoff mirroring deposit modeling approach, however, the maturity dimension is bound by how the deposits are actually deployed. Therefore, potential modeling error caused by assumption ambiguity is eliminated. This approach does not provide justification for long-maturity asset portfolios. For that, a historic core deposit study may be of value. But the asset maturities are what they are. How they are funded creates real IRR.

So what is the best way to include non-maturity deposits in A/L management risk exposure analysis? There are several yet, like any risk measurement approach, none are perfect. Nevertheless, the A/L manager needs to be able to view non-maturity deposits impact on risk measurement from several different assumption modeling perspectives. Justifying the booking on long assets may rest on one set of assumptions, while measuring risk explicitly should rest on a different view of non-maturity deposits.

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