White Paper

FMS Financial Managers Society

The liquidity challenge—
Understanding sources of liquidity: a new old fashioned view

***By William J. McGuire, Ph.D., President and CEO, McGuire Performance Solutions, Inc*.**

Events of August 2007 and ensuing months have sent a shock wave though the financial sector. The widely touted "new model" of relying on wholesale borrowings as a primary liquidity source was briefly called into question, and there are still lingering doubts as to its reliability in times of system wide crisis. Given these events, financial managers are going back to liquidity basics, particularly to better understand the on-balance sheet sources of funds that are a key part of their institution's liquidity position.

Much of the "old fashioned" liquidity analysis is straight forward. But there is an element of uncertainty involved, as measures of some on-balance sheet liquidity sources are dependent on estimates of loan and deposit behaviors. The good news is that there are now ways to address those liquidity management and control needs. Improvements in the conceptual definition of on-balance sheet liquidity and behavior quantification advances mean that managers are empowered to more confidently rely on internally generated liquidity. This creates greater certainty that acts as a buffer against potentially unsettled wholesale funding markets. It can also enhance earnings in some cases.

This white paper offers insights into a new (but decidedly old fashioned) conceptual view of on-balance sheet liquidity sources. It also outlines a methodology for identifying, measuring, and monitoring asset and liability behaviors that influence liquidity and presents a simple case study example of the methodology's value in practice. The paper demonstrates that added understanding and control of on-balance sheet liquidity sources can partner with wholesale funding solutions to define a more cost-effective, and less exposed, liquidity solution.

A Conceptual Framework of On-Balance Sheet Liquidity: The New View

For the purposes of this paper, on-balance sheet liquidity sources are defined as arising from assets and liabilities that are a permanent part of the institution's business model. This includes investments (including cash), loans, deposits, and wholesale funding that is a long term component of the balance sheet (e.g. term FHLB advances held to hedge assets). There are sources and uses of liquidity on-balance sheet, and a time dimension is associated with the elements of each. As a general rule, the longer the time allowed, the more sources of liquidity, and the more controllable the uses of liquidity.

Exhibit 1 presents a schematic[1] of the "liquidity sources continuum" facing an institution.

In a true liquidity emergency, few but immediate liquidity sources are available. That time domain's resources can be strengthened by greater holdings of cash and highly liquid investments, but at a cost to margin. The advantage of wholesale funds-related liquidity sources is that they (in theory) expand reserves available in the immediate horizon at less cost. But as noted, recent events[2] have called their reliability into question and put more importance on using on-balance sheet sources of liquidity as the bedrock of minimizing potential exposures.

Exhibit 1

Sources of on-balance sheet Liquidity: General Time Domains

Immediate

Cash and sale of excess unpledged liquid investments
Scheduled short term investment portfolio maturities
Ongoing loan pay-offs from maturities and prepayments
Rollover CDs, core deposit retention, and natural deposit growth

Intermediate

Maturities and culling of high value (at par and above) instruments
Ongoing loan payoffs from maturities and prepayments
Increase rate sensitive deposit balances (CDs, high rate MMDA)
Scheduled increases in long term wholesale funding
Restrictions on new lending (to the extent possible) and investing

Longer Term

Sales of below market investments and loan sales
Ongoing loan payoffs from maturities and prepayments
Increase non-rate sensitive deposit balances (i.e. core deposits)
Sale/lease-back of fixed assets, sale of branches, etc.
Net earnings (if applicable)

Does this mean that already frayed margins are now under even greater pressure owing to the need to hold higher levels of immediately available liquidity? Perhaps, but this is not a foregone conclusion. Because loan and

[1] There is a similar time-related range for uses of liquidity, governed by management's ability to ration available funds. There is less uncertainty and more hands-on control in these activities than those on the sources side, though, and thus our focus here is on liquidity sources.

[2] As part of an MPS ALM Model Verification, the model's governance solution (ALCO), including the liquidity policy, is often reviewed. In instances known to MPS through client experience, contractually guaranteed lines of credit tested in August of 2007 failed to provide requested funds.

deposit behaviors are contributors in all time domains, most financial managers can universally augment their institution's liquidity by better understanding their on-balance sheet liquidity position. This requires identifying and quantifying embedded and expected sources of liquidity.

Embedded sources of on-balance sheet liquidity are contractually defined. Investment and loan maturities, investment calls, and CD maturities are examples of embedded liquidity. Barring loan credit issues, they are solid sources of funds under virtually any conditions. Industry standard liquidity measures normally capture these positions well, by reading the record level maturity data and reporting in the appropriate future time bucket.
Expected sources of on-balances sheet liquidity are not contractually defined. But they are such a normal part of the institution's business that they replicate within a narrow band of outcomes. As long as borrower and depositor behaviors remain consistent with prior experience, (which they should if the institution's fundamental value propositions are stable), they are reliable sources of liquidity. Industry standard liquidity measures normally do not capture these positions well, however, because quantified understanding of the underlying prepayment, supply, and retention behaviors is rare. These funds often go uncounted, or are at best, under-counted, in standard liquidity analyses.

Exhibit 2 (see page 4) presents embedded and expected liquidity[3] concepts for loans. The upper area lays out the general model. Embedded liquidity in a loan portfolio is defined by ongoing payments and stated contractual maturities. Expected liquidity comes from early loan payoffs, via partial or full prepayments. The schematic applies to many loan types, including both commercial and consumer types.

There are two special cases for loans. One is first mortgage 1-4 family loans. Expected liquidity arises mainly from partial and full prepayments. But there are also "echo effects" potentially attached to full first mortgage prepayments. Primarily these are the simultaneous prepayments of any second mortgage, HELOC, or other junior lien loans. But secondary echo effects can also occur, in the form of prepayments on credit card debt, auto loans, etc. These secondary effects are strongest when a first mortgage refinancing supplies borrowers with funds above the new first mortgage amount (i.e. in a cash out transaction). There is very strong recent empirical evidence of these effects, although it may be reduced now given current housing market conditions.

The second special case for loans applies to indeterminate maturity loan categories such as credit card and HELOC balances, lines of credit, and similar revolving instruments. A small degree of embedded liquidity may be defined by minimum required payments. There is also the potential for additional payoff,

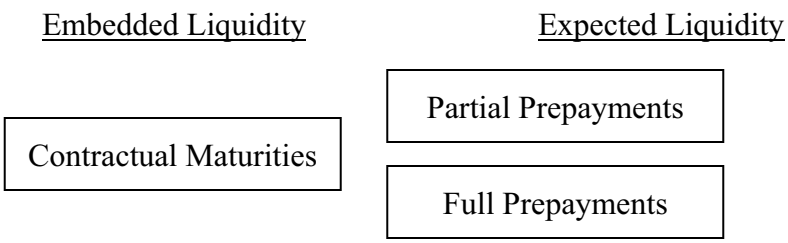
[3] In the current credit environment, default potential needs to be closely examined. Delinquencies also effect liquidity, as the delayed interest and principal payments reduce those sources of funds. While in total defaults and delinquencies rarely pose a major liquidity problem, be aware of their potential.

which is the primary expected liquidity[4] side of these loan types. Echo effects are also possible. Debt consolidation or windfall income, for example, can result in prepayment of all outstanding consumer debt. Such inter-related behaviors need to be anticipated.

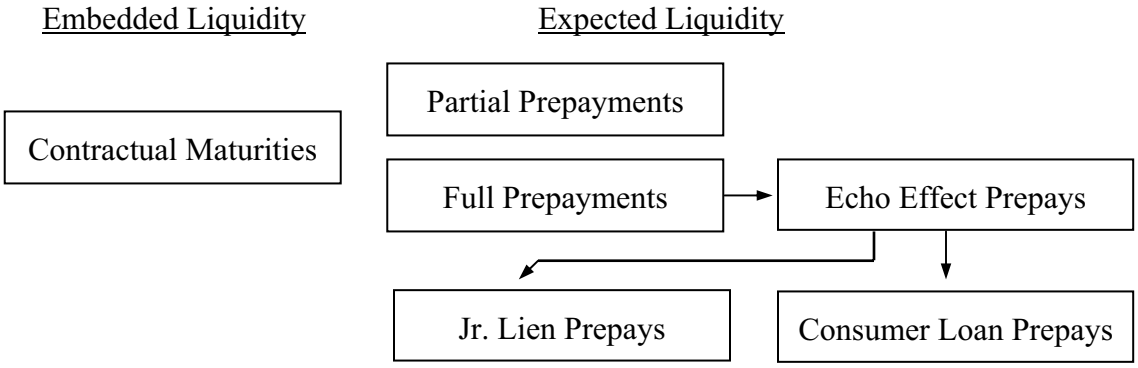
Exhibit 2

Embedded and Expected Liquidity Sources: Loans

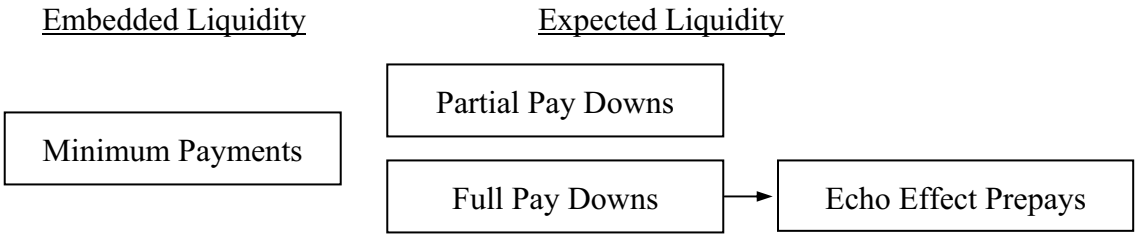
General Loan Model



1st Mortgage Model



Indeterminate Loan Model

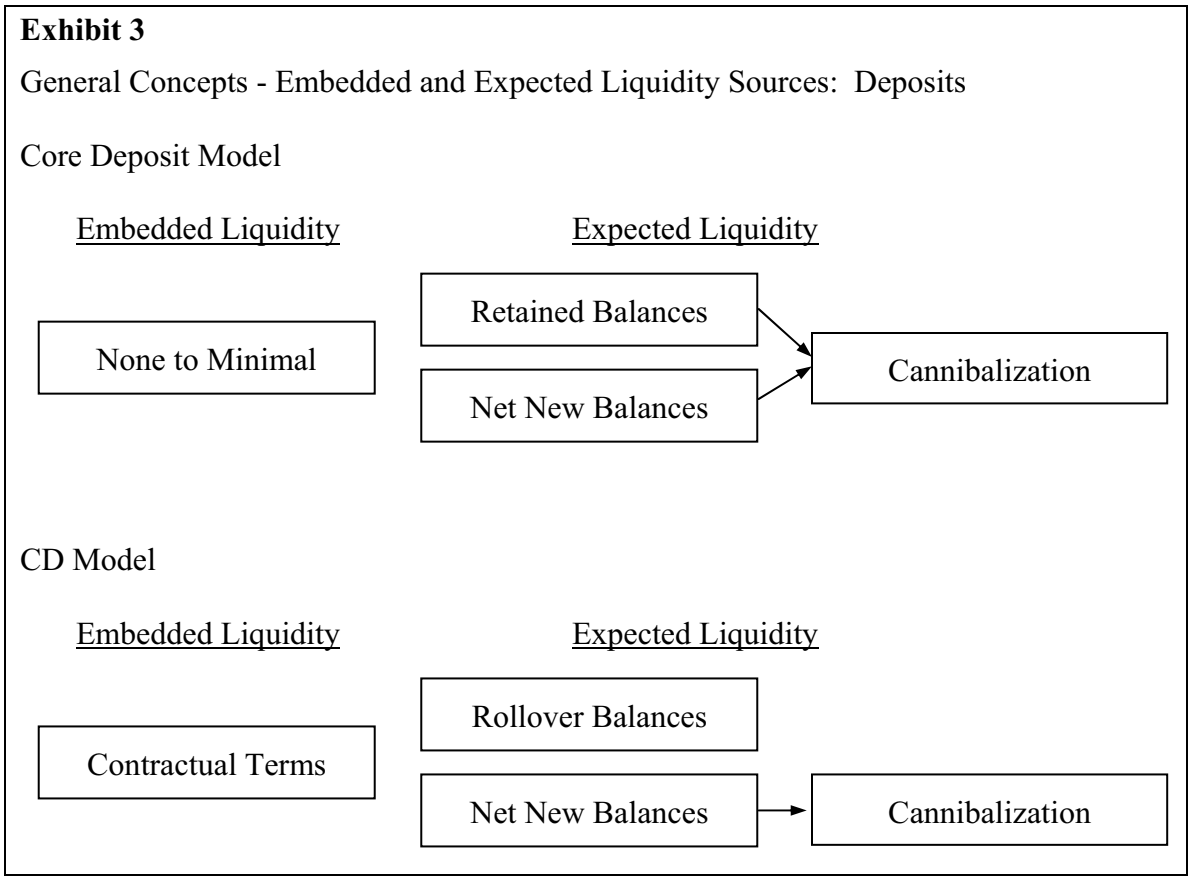


[4] These loan categories also represent a possible use of liquidity if balances are increased.

Deposits also have embedded and expected sources of liquidity. Exhibit 3 depicts the underlying concepts for core (indeterminate maturity) deposits and CDs. Before the consideration of those, however, the link between deposit liquidity and rates paid must be addressed. Deposit-related expected liquidity is partially dependent on the finance-related value proposition (i.e. the spread of deposit rate paid to a reference rate). This must be maintained within acceptable bounds for prior behaviors to replicate. The strongest examples are high rate paid MMDA, other premium priced core deposits, and CDs. These are rate sensitive funding sources that need to reprice in dynamic (especially rising) interest rate environments if their supply (i.e. liquidity) behaviors are to be maintained. Less affected by changing finance influences are checking and, by varying degrees, traditional savings and low rate MMDA categories. The point is important. Pricing decisions can create or destroy deposit liquidity through their impact on new balances, retention of existing balances, and roll over of existing CDs.

Exhibit 3

General Concepts - Embedded and Expected Liquidity Sources: Deposits



Arguably, core deposits have zero embedded liquidity since contract terms or convention make these funds available to depositors at any time. Net ACH transfer balances could be considered embedded liquidity, however, as on a short time horizon they are fixed by customer agreements. Measurement issues generally lead to this being ignored, however. That leaves 100% of core deposit balances in the expected liquidity camp. The majority of expected liquidity is

found in retained balances – funds brought forward in existing accounts from period to period. This may be augmented by new balances also. Retained and new balances need to be carefully defined and identified, though, as some funds may be simply redistributed from other core deposit and CD categories via cannibalization.

CD liquidity behaviors are normally considered set by the contractual maturities of the underlying deposit contracts. But recognize that newer type CDs may have unique terms. Callable CD, for example, will be a use of liquidity in declining interest rate environments[5] and early withdrawals could be an adverse liquidity influence if rates paid were to rise fast and far enough on longer term CD's. The expected liquidity associated with CDs arises from rollover and new balances, net of any cannibalization effects.

On-balance sheet liquidity is equal to embedded plus expected sources. As noted, poor awareness of expected liquidity magnitude often unduly limits the amount of it included in reported liquidity positions. This understates true levels of both total and incremental liquidity available, leading to unnecessary levels of stored liquidity and excessive lines of credit with wholesale sources.

The "margin leakage" caused by poorly estimated levels of expected liquidity sources can be corrected, however, adding resources to liquidity positions without resorting to high opportunity cost traditional answers. Expected liquidity can be accurately determined by quantifying recent borrower and depositor liquidity-related behaviors at high levels of precision, forecasting future behaviors, and monitoring outcomes over time.

The question, though, is how can financial managers make this happen cost-effectively in their institutions? The solution – quantify the past to understand the future – is explored below. The liquidity management result of the exercise is the equivalent of fog lifting from in front of a high powered automobile. The now clearer view of the road ahead supports higher performance without added risk.

Quantifying Expected Liquidity Sources – The Key to Success

Unfortunately, indications are for more fog than clear views ahead when it comes to on-balance sheet expected liquidity. Recent experience[6] with ALM model verifications clearly shows that liquidity related behavioral assumptions are a weak spot. Loan prepayment data and core deposit inputs are either missing or poorly specified and CD optionality inputs are normally missing or ignored. Since

[5] Presumably, in a liquidity emergency no callable CD's would be called. If such funds are held, check contractual terms to ensure that the call exercise is at the institution's discretion.

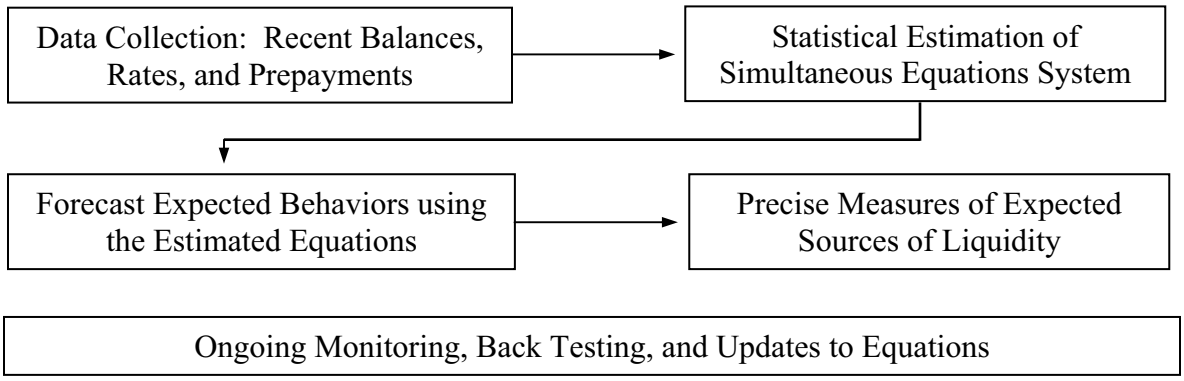
[6] Across 250+ ALM model verifications performed by MPS in 2006-2007, more than 20% of the models were ranked below average. The major failing was missing or inaccurate loan prepayment and deposit behavior specifications. Even models ranked as average (63%) generally had weak liquidity related behavior inputs (unsupported or generic).

ALM model inputs are typically used in liquidity models also, the situation is obvious.

Fortunately, solutions for quantifying the behaviors of expected liquidity sources exist. These range from simple mechanical calculations to statistical analyses that create high levels of confidence: Creating a solution is a four step process. First, historic data are assembled. Second, relevant balance sheet behaviors are quantified. Third, expected liquidity measures are forecast. Fourth, a program that monitors outcomes, proves out the accuracy of estimated liquidity behaviors, and maintains inputs over time is defined and implemented. Major elements of the process are identified in Exhibit 4 and discussed below. While an often serious commitment of time and resources is required, there is a high return on investment from quantifying expected liquidity.

Exhibit 4

Quantifying Expected Liquidity Sources: Steps to Success



Step 1: Assemble Historic Data

Institution specific data are required in most cases[7] because expected liquidity behaviors are dependent on the unique elements of each institution's experience. Data need to be collected by category, with categories defined at a granular enough level to recognize special behavior influences (e.g. consumer versus business, fixed and variable, MMDAs by tier, CDs by term, etc.). Loan categories, however, need to be high level enough to ensure that adequate levels of prepayment activity are regular recorded.

[7] As a general rule, the more generic the balance sheet category the less need for institution specific data and behavior estimates. For example, expected liquidity from prepayments on a portfolio of 1-4 family conforming 30 year fixed rate mortgages is likely well estimated using generic inputs. But portfolios of unique loans, and most deposit types, have institution specific behaviors and require that level of data.

The periodicity of the data should ideally match the horizon of the liquidity assessment it will be deployed in. System limitations usually limit the analysis to examining monthly information, however, and this is acceptable.

Examples of historic data collected for institution-specific expected liquidity analyses are useful to review in detail. Information gleaned from the data transcend just liquidity analysis applications, supporting ALM, marketing and other uses.

Prepayment data from contractual loans are presented in the upper section of Exhibit 5 (see Exhibit 5 on page 15). The right hand axis relates to the bars, which measure the total prepayments experienced in each month. The bars could also be presented as prepayment percentages by dividing the prepayment values by the overall category balances, a common practice. Prepayment values are created from files by category, which include every loan's rate, balance, origination date, and maturity date. A prepayment is identified if a loan drops out of the data prior to its listed maturity. If available, partial prepayments are included in the bars. However, such data are not often available for long times series.

The number of loans is graphed on the right axis for reference. Note that the spread of coupon rate to new volume rate could instead be displayed. This is most useful where prepayments are driven by finance influences. The data presented are typical for non-residential fixed rate commercial and consumer categories. There is little trend and prepayment values vary significantly over time. Real estate-related loan prepayments are more likely to have seasonal and interest rate related behaviors.

Indeterminate maturity loan retention information is depicted in the lower area of Exhibit 5 (see page 15). Remaining outstanding balances from a fixed pool of loans (open at the start of the time series) is shown. This is a strong test of retention across time. Period to period retention is also often analyzed. The decline in retention over time (runoff) is a source of expected liquidity and these data depict the historic record. The number of remaining loans is provided for context. The spread of coupon rate to new volume rate is often displayed instead. The more rapid early period runoff is a common phenomenon.

Exhibit 6 (see page 16) presents data displays for core deposits. The upper area lists total balances supplied (bars, on the left axis) and rate paid (on the right axis). Supply behavior shows a modest down trend with clear seasonality. The seasonal patterns are important as such variations in supply (liquidity) need to be properly factored into projections of expected liquidity. This is done by backing out seasonal or otherwise transient balances from available total balances when calculating expected liquidity.

The lower area in Exhibit 6 (see page 16) displays the historic record of existing balances retention. The data are again from a fixed pool of accounts open at the start of the time series. Period-to-period retention could also be analyzed. Runoff of existing balances can be separated from changes in total balances supplied and expected liquidity tracked that way. Many times, however, all-in total balances supplied are the forecast metric used as gains in those balances define a source of expected liquidity. The retention data are vital for another purpose, even in such a case. The stability of retention compared to history is an indication that the institution's underlying core deposit franchise is maintaining itself, a confidence-building insight with regards to expected liquidity.

Exhibit 7 (see page 17) presents parallel data for CDs. Gains in total balances supplied are a source of expected liquidity and hence the need for this data when analyzing CD's (shown in the upper area of the exhibit). Retained balances (for fixed pools of accounts defined at the start of the time series; period-to-period measures could also be used) are presented in the lower area of the exhibit to gain a sense longevity and, indirectly, rollover.

Expected liquidity from CDs can also be directly approached. Exhibit 8 (see page 18) presents two of the elements of expected liquidity for CDs. New volume balances are shown in the upper area and rollover data are illustrated in the lower area. With maturing balances information (which is readily found in system data) the incremental contributions to expected liquidity for CD's can be calculated. However, spiky data of the type shown is hard to quantify so an element of manual estimation is required if going this route.

Data describing CD option behaviors – calls, bump-up balances, and early withdrawals, is generally not available. Be aware of the possible outcomes potentially associated with CD options, however, and adjust estimated liquidity as needed.

Step 2: Quantify Expected Liquidity Behaviors

Once the data are collected, they must be analyzed to establish underlying behaviors. This can be done at simple mechanical levels, for example, averaging prepayments over time, computing an average decay rate for core deposits, or an average rollover percentage for CDs. Because expected liquidity behaviors are complex, simple solutions are often not adequate[8]. In such cases higher levels of analytical sophistication need to be applied. There are advanced methodologies that can cost-effectively create the forecast capabilities needed to define high precision measures of effective liquidity. While many more details apply than noted below, creating a precise analysis requires the following.

[8] Two key limitations characterize most simple solutions. One, they produce single point estimates that describe only the time period reviewed. Interest rate levels change across future uses, but the simple inputs do not. Two, simple inputs are the same in all forecasted time periods. This is not consistent with how many balance sheet behaviors operate (lags, for example, often limit outcomes in initial periods).

The estimation approach must be sophisticated because the drivers of expected liquidity are multidimensional. It must support the initial specification of a broad range of potential influences on liquidity related behaviors. This includes lags, trends, finance influence measures (e.g. spreads), seasonal and day of the week factors, special conditions (e.g. the 9/11 flight to safety), and any unique events in the historic record. Because of the potential complexity, the historic data must drive selection of the predictor variables in the estimated equation system. This creates an appropriately comprehensive[9] "n-factor, data driven" specification. Finally, the historic data need to be examined *simultaneously* across categories as many behaviors can be interdependent. For deposits, rates paid need to be examined concurrently also, due to the linkages between rates paid and balance behaviors noted above.

Step 3: Forecast Future Expected Liquidity Sources

Advanced expected liquidity behavior analyses create an equation system capable of forecasting all relevant behaviors – prepayments, total balances, retention, etc. Forecasts are at the category level and projections are specific to each future time period. Because the equation system adjusts to new inputs, forecasts in each new period reset to current interest rate conditions (e.g. in each new monthly liquidity analysis) and define unique behavior paths interactively across interest rate scenarios (e.g. for sensitivity testing). This is a key benefit compared to single "average type" inputs produced by very simple assessments which are the same in all interest rate environments.

Exhibit 9 (see page 19) presents examples of expected liquidity forecasts[10] of loan behaviors. The upper area displays estimated loan prepayments by period (data are annualized). Monthly values are entered as liquidity model inputs measuring expected liquidity. The forecasted values are more accurate than generic estimates and time specific. For example, the slight rise in prepayments over time in Base Case (a forecast with current interest rates constant) is from resetting to match current lower interest rates. The sensitivity of prepayment rates to changes in interest rate levels is shown for perspective.

The lower area in Exhibit 9 (see page 19) displays runoff from an existing portfolio of indeterminate maturity loans, a source of expected liquidity. Short term adjustments in runoff and interest rate sensitivities are illustrated in the projections.

Exhibit 10 (see page 20) illustrates forecasted expected liquidity behaviors for core deposits. In the upper area of the exhibit, total balances supplied are shown to be an expected net use of funds because of their decline over time. Retention

[9] Common linear regression approaches or four factor models do not adequately capture all significant influences, which explains their often limited predictive success.

[10] Seasonal and other transient effects are not depicted in the forecasts. These can be included, however.

is likewise forecast as diminishing, although not at precipitous levels. The data offer precise insights into future supply paths (as an expected liquidity input) and depict the category's long term franchise health.

Parallel presentations for CDs are shown in Exhibit 11 (see page 21). Here, however, expected liquidity is positive (a source of funds) via the projected growth in total balances supplied over time. Specific time paths and interest rate sensitivities are now known. Much of the favorable future expected liquidity from CDs is clearly from new volumes, though, as the retention forecasts show comparatively rapid runoff (implying low rollover percentages) going forward. This is typical of many CD portfolios.
As noted, forecast values can be directly input into liquidity models, accurately capturing expected liquidity contributions to overall available liquidity. Because the data are forecasts, some institutions conservatively limit inputs (e.g. assuming 10% less favorable behaviors). This is acceptable but not always necessary, as back testing often proves the forecast data to be correct as estimated (see below).

Step 4: Implement a Program to Ensure Continued Forecast Accuracy

As important as the forecasts is ongoing testing of their accuracy. Every month, actual category level outcomes need to be compared to the forecasted inputs used in liquidity analyses. A large adverse variance in any month may indicate a change in behavior. More likely such an outcome is due to seasonal or other one-time factors, but all large variances need to be investigated. Each quarter, back test over the prior three months and report the results in a simple memo. This documentation becomes part of the liquidity analysis work papers for that period. If significant variances occur, discuss these as a special topic in that period's ALCO meeting.

The upper area of Exhibit 12 (see page 22) presents an example of a summary early alert presentation. This tests retention forecasts[11] for selected core deposit categories against subsequent actual outcomes. In addition to the graphic, a color system in the table is used to increase communication content. Negative variances (forecast exceeds actual) of up to 0.075 are coded as green, i.e. acceptable. Negative variances above 0.075 and below 0.10 trip a yellow coding, indicating an acceptable but high level of mismatch. Negative variances of 0.10 or greater have a red identifier, alerting reviewers to an unacceptably high variance. Any desired coding convention can be applied.

Produce a formal back test of actual expected liquidity outcomes versus forecast values at least annually. This puts the longer term accuracy of the forecast data into proper perspective. Include a narrative describing the outcomes observed in the back test. Be sure to comment on how economic conditions, changes in

[11] Retention is measured in terms of retention ratios. These are the ratio of remaining balances divided by starting balances, for each category. The ratios remove the influence of balances from the comparisons.

interest rates, and deposit pricing may have contributed to observed outcomes. This report should be reviewed by ALCO and the Board as part of the institution's annual liquidity analysis review.

The lower area of Exhibit 12 (see page 22) shows an example of a long term, formal back test for an example consumer category (auto new). Actual prepayment outcomes are compared to the forecast inputs used in prior period expected liquidity analyses. In this case a close match-up is depicted, with seasonality well captured. A slight tendency for actual prepayments to outpace forecasted inputs is noted early in the period, however. This potential bias will need to be closely monitored.

If back testing proves out forecast accuracy, then the forecast data are considered to be adequate measures of expected liquidity and no further adjustments to liquidity inputs are necessary. Back testing is the true proof of forecast adequacy and it must be a part of any implementation of a quantitative approach to expected liquidity measurement.

An advantage of having an estimated equations system to forecast expected liquidity is that it can be employed to create specialized back tests. The most important of these is comparing actual behaviors to "retrocasted" forecasts for prior periods using the actual rates recorded in those periods. This tests forecast accuracy at a very fine level. Such back tests also identify when behaviors are changing. Since the special retrocasts are projections of average historic tendencies, and control for finance-related influences, the variance patterns show how the future is diverging from recent experience. Consistent variance patterns, under or over actuals, contain important trend information about expected liquidity sources.

As a final note, be aware that over time the accuracy of any forecast degrades. To keep expected liquidity inputs up to date, reforecast all behaviors at least annually based on a refresh of the estimated equations system using data through the most current period. Note that more frequent updates may be needed in unsettled times. Every three years, conduct a new study, based on more current data. This ensures that forecasted inputs are contemporaneous with current expected liquidity behaviors.

Return on Investment – Benefits from Quantifying Expected Liquidity Sources

Quantifying expected liquidity sources adds precision to liquidity analysis and creates a greater understanding of the balance sheet behaviors underlying liquidity flows. But the process requires a commitment of time and resources -- Does it have a positive return on investment? The answer, of course, will depend on the specifics of each institution's implementation. A quick case study will provide perspective.

Exhibit 13 (see page 23) is a constructed example demonstrating the effects of introducing quantified measures of expected liquidity compared to using generic assumptions. In the investment section, there is no change in outcomes since all liquidity is embedded (contractual). But for loans and deposits, there are differences in incremental available liquidity, sometimes of sizable amounts. The total of the differences is $6.68 million in "found" incremental on-balance sheet liquidity, which can be substituted for stored liquidity or lines of credit. If we assume that the newly identified liquidity replaces stored liquidity, and that a 200 bp average yield increase over fed funds can be attained by redeploying those funds into investments and loans, over $133,000 is created in annualized earnings potential. This is many times the cost of a typical advanced analysis solution described above.

The increase in available on-balance sheet liquidity illustrated in Exhibit 13 (see Exhibit 13 on page 23) derives from many small enhancements. In the commercial loans, current management generic inputs of prepayments are low. This is a common finding. Over-reliance on the effectiveness of early payoff penalties is widespread. The generic "20% per year" input for auto loans is also a bit too low, while its extension to Consumer Other loans (a typical simplification) results in an overstatement of expected prepayments.

The use of generic prepayment inputs (e.g. OTS data) for 1-4 Family Mortgages creates the biggest dollar difference, however. Local economic and housing market conditions, the shape of the yield curve, and other influences are understated by generic data and hence the strong variance. Second Mortgage loan and HELOC prepayments are also estimated to be too low by management. This mistake arises because the generic inputs do not recognize the "echo effect" linkages between first mortgage prepayments and those for junior lien loans. The HELOC variance is substantial (and a common finding).

On the deposit side there are also variances. Recently lower interest rates, with delayed deposit repricing owing to market conditions, are recognized by the quantified inputs through the estimated equations that define them. Thus core deposit retention and new balance gains are higher than those predicted by the generic inputs. So too for CDs, where both rollover and new balances are stronger in the quantified inputs.

Final Thoughts – Accurately Managing Liquidity Risk

Just prior to the World War I, Winston Churchill took a gamble that changed the course of history. As First Lord of the Admiralty, he converted the British navy from local coal to imported oil. The resulting gains in speed gave Britain's warships an advantage over Germany's. But the move was also risky, as Britain had no domestic oil production. To rectify the situation, the British scrambled worldwide to ensure supplies, as Churchill believed that "safety and certainty in oil lie in variety of supply, and variety alone."

The same can be said of financial institution liquidity. Relying on "imported" wholesale funds adds performance. But it can also be risky, as recent events prove. The value of "local" on-balance sheet liquidity, in all its embedded and expected variety, is thus vital. The best solution is to combine the two approaches, adding power to on-balance sheet liquidity by properly quantifying the behaviors of all sources of expected liquidity.

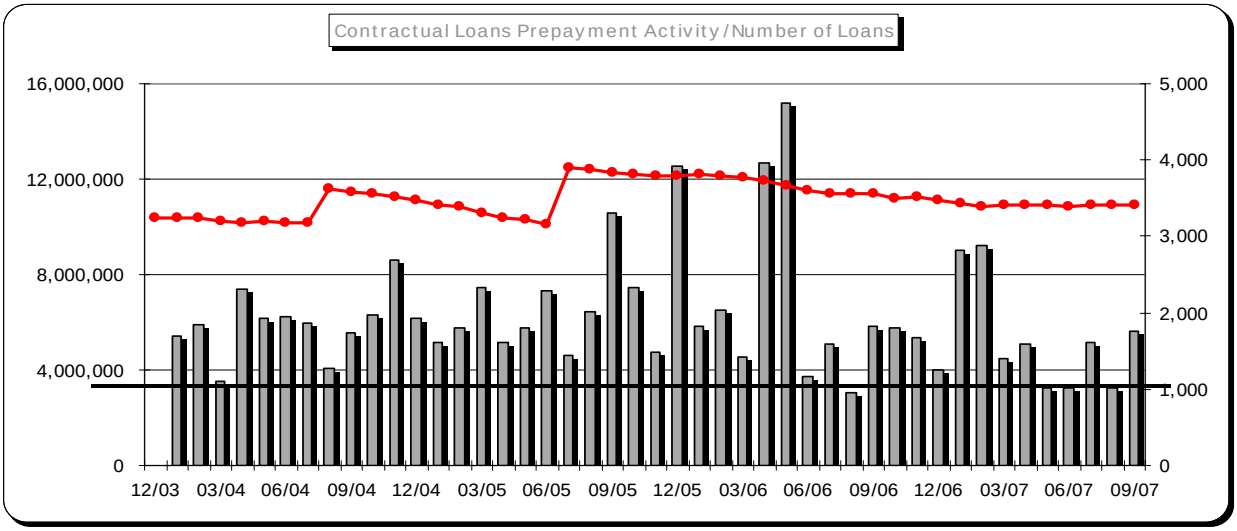
Fortunately, this is a rare example of where virtue has it rewards. The outcomes depicted in Exhibit 13 are just an example, and actual results will vary. But it is clear that many small increases in expected liquidity measurement precision end up creating meaningful gains in earnings potential. Not a bad outcome for just attending in a new way to old fashioned liquidity basics!

Published by:
Financial Managers Society, Inc.
100 W. Monroe, Suite 810
Chicago, IL 60603
312-578-1300
info@fmsinc.org
www.fmsinc.org

Exhibit 5

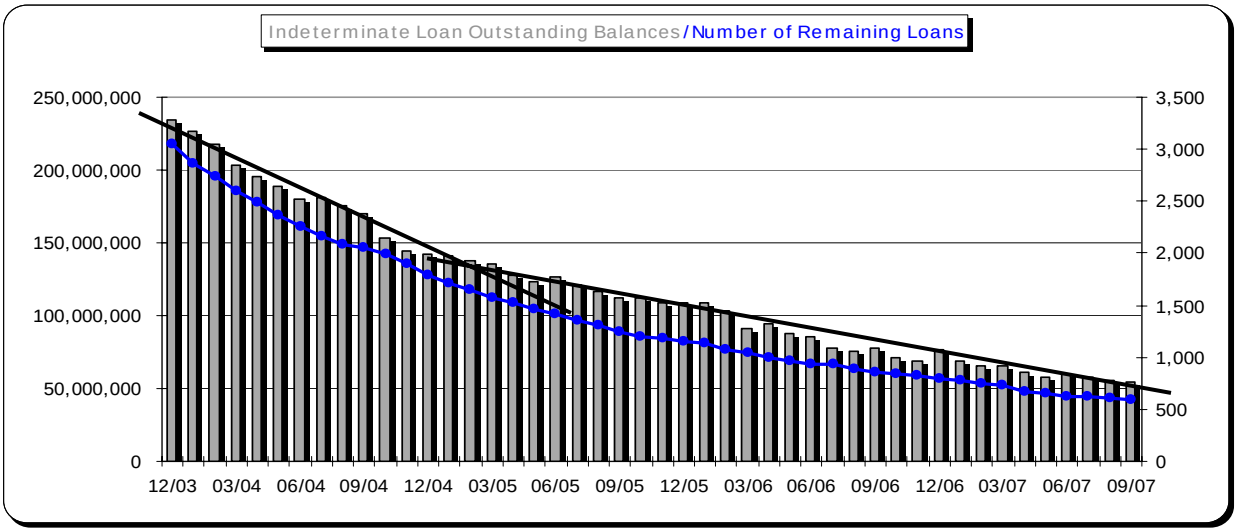
Sample Historic Data: Loans

Contractual Loans - Prepayment Data



Essentially no trend, but considerable variability across time. Data could be presented as the percent of outstanding balances prepaying also. Number of underlying loans is flat.

Indeterminate Loans –Outstanding Balances Data

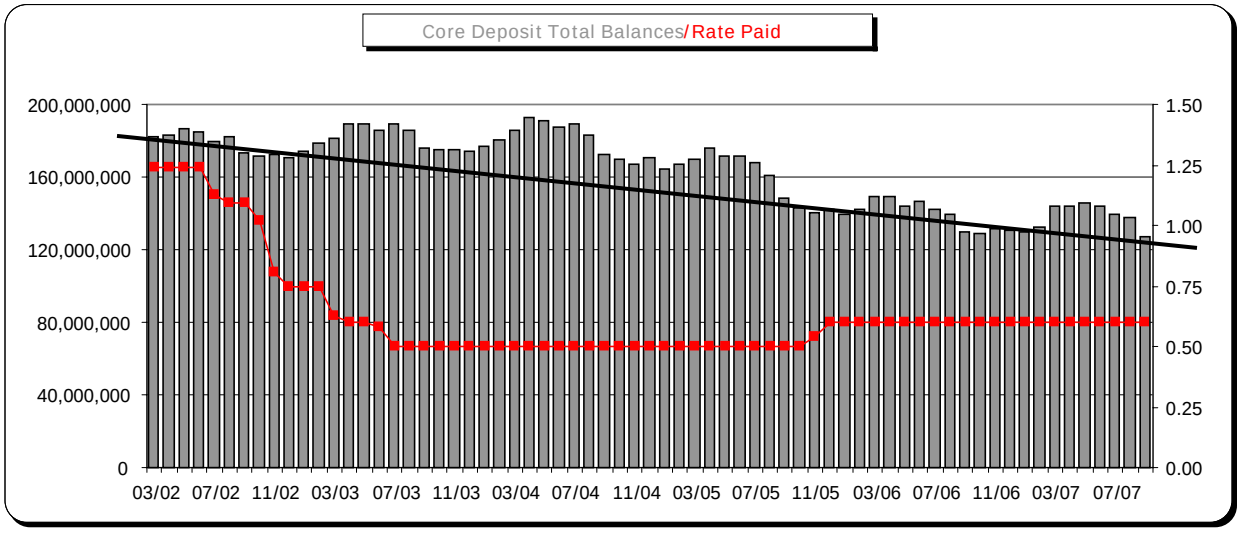


Retention of outstanding balances from fixed pools of loans defined as of 12/31/03 is non-linear and not strong. Possible seasonality. Number of loans declines, as expected.

Exhibit 6

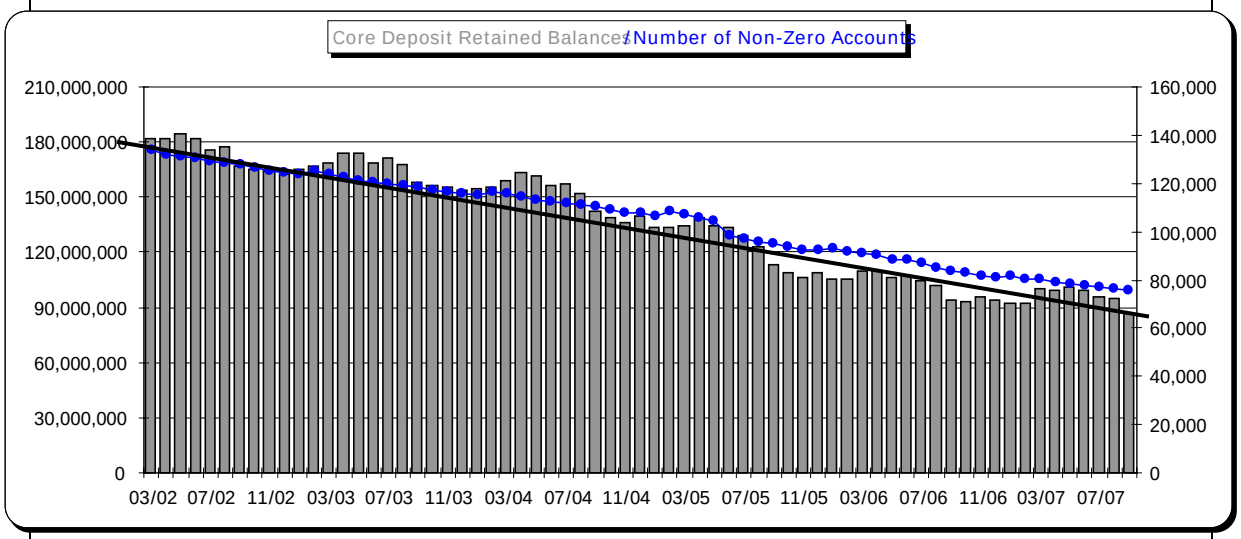
Sample Historic Data: Core Deposits

Supply of Funds/Short Term Liquidity Data



The overall trend in total balances supplied is down, an unfavorable liquidity behavior. Seasonality is also present, requiring special treatment of such balances when present.

Retention/Long Term Liquidity Data

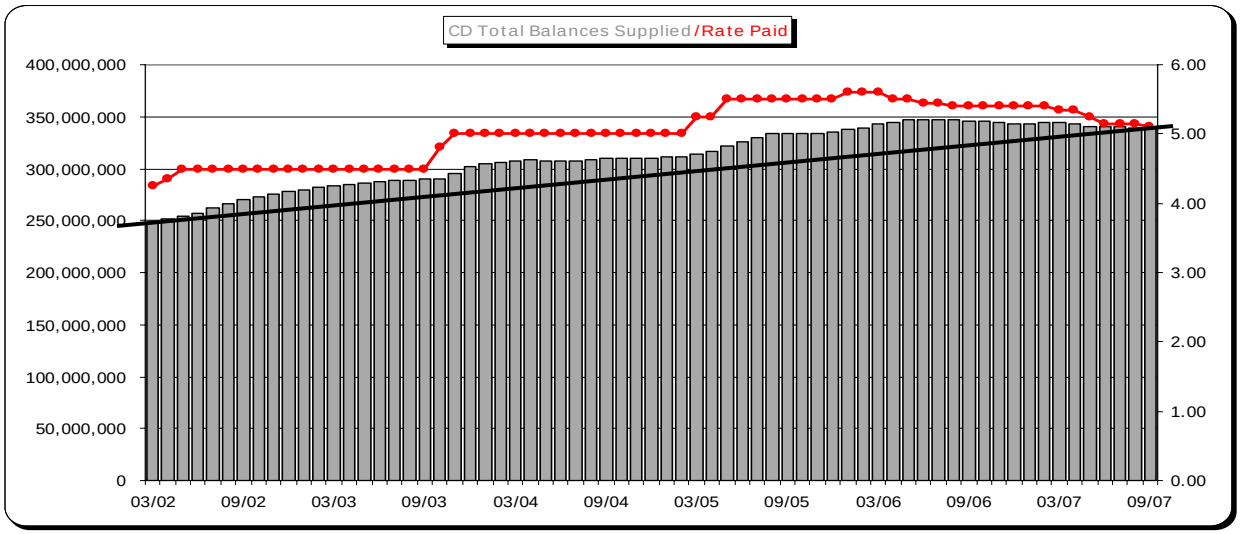


Retention of balances in fixed pools of accounts defined as of 03/31/02 is strong over a more than five year period. Number of accounts diminishes, as expected.

Exhibit 7

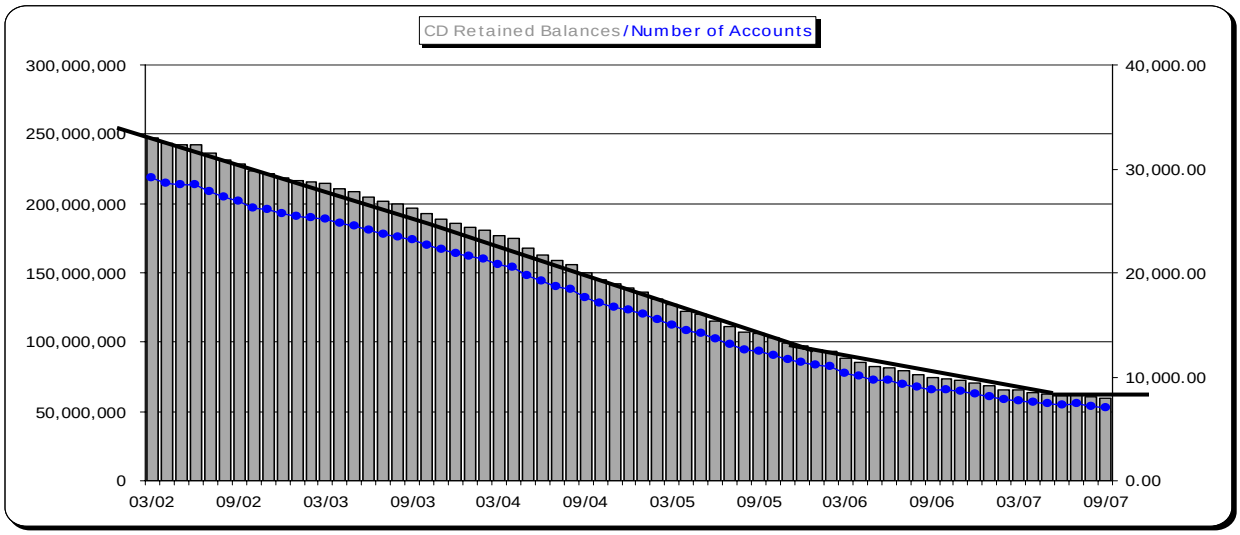
Sample Historic Data: CD's

Supply of Funds/Total Balances Supplied Data



These are all-in total balances (existing CD's, roll over balances, and new balances). The liquidity behavior is favorable (historically a source of funds). Seasonality is evident.

Supply of Funds/Retained Balances Data

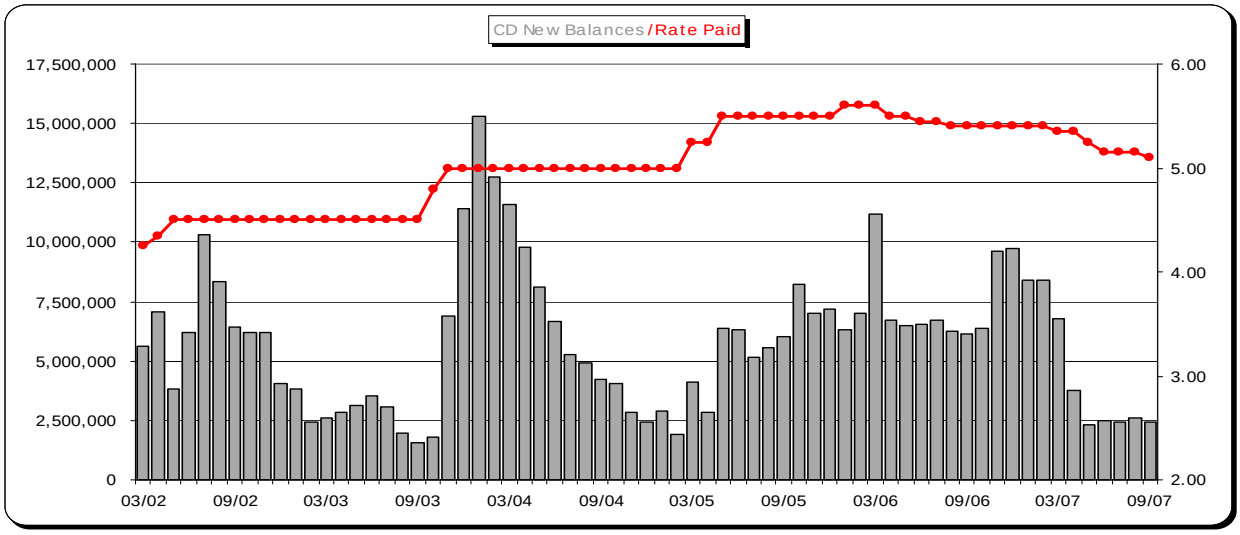


These are retained balances from a fixed pool of accounts open at the start of the time series. Reduction in retention are significant, implying limited rollover for this group.

Exhibit 8

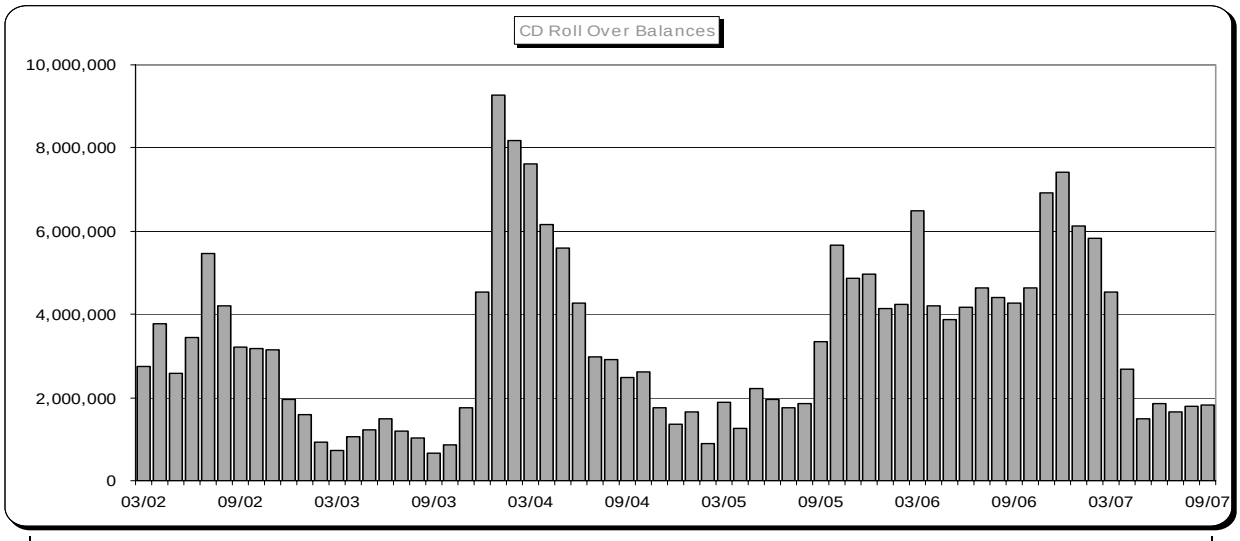
Sample Historic Data: CD's

Supply of Funds/New Volume Data



New balances only. Minimal trend and no discernable seasonality. The spiky data are typical of CD's, which are often characterized by promotional pricing.

Supply of Funds/Rollover Data

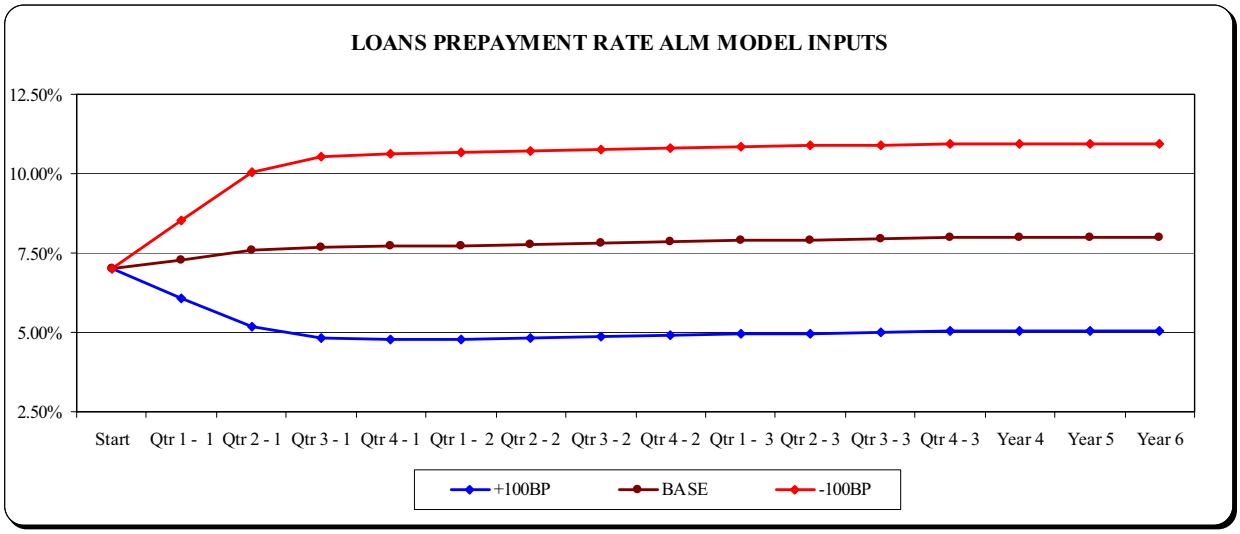


Rollover balances from existing CD's only. Spiky volumes are interdependent with maturing balances. Data could also be presented as the percent of underlying balances.

Exhibit 9

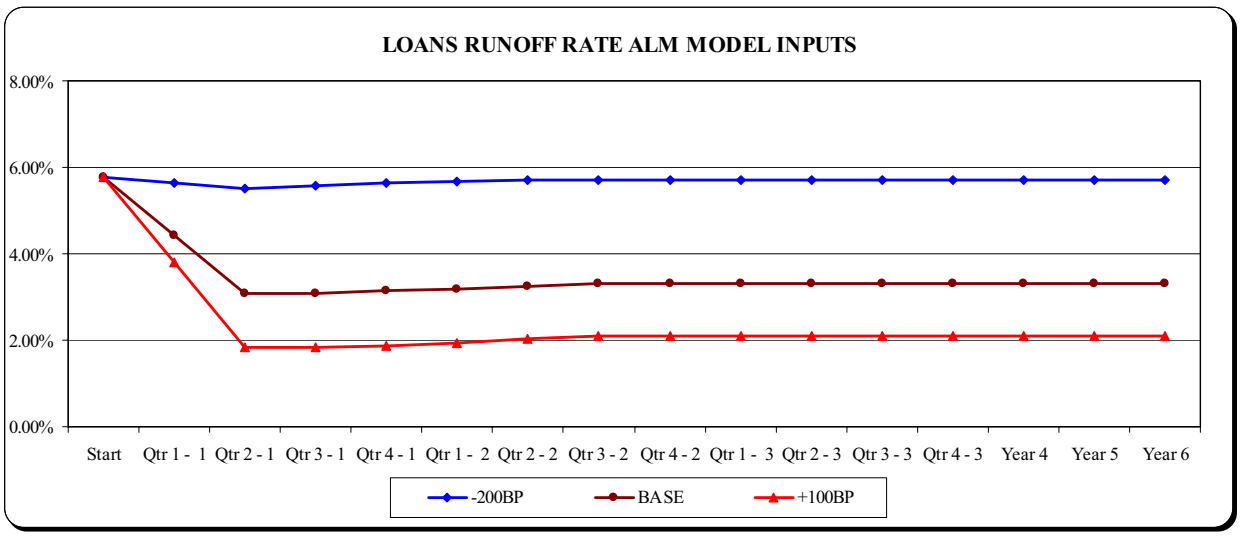
Sample Forecast Data: Loan Prepayments and Outstanding Balances

Contractual Loans/Loan Prepayment Data



Monthly prepayment rate forecast data have been converted into liquidity model format. Base Case holds current interest rates constant; other scenarios are rate shocks.

Indeterminate Loans/Outstanding Balance Runoff Data

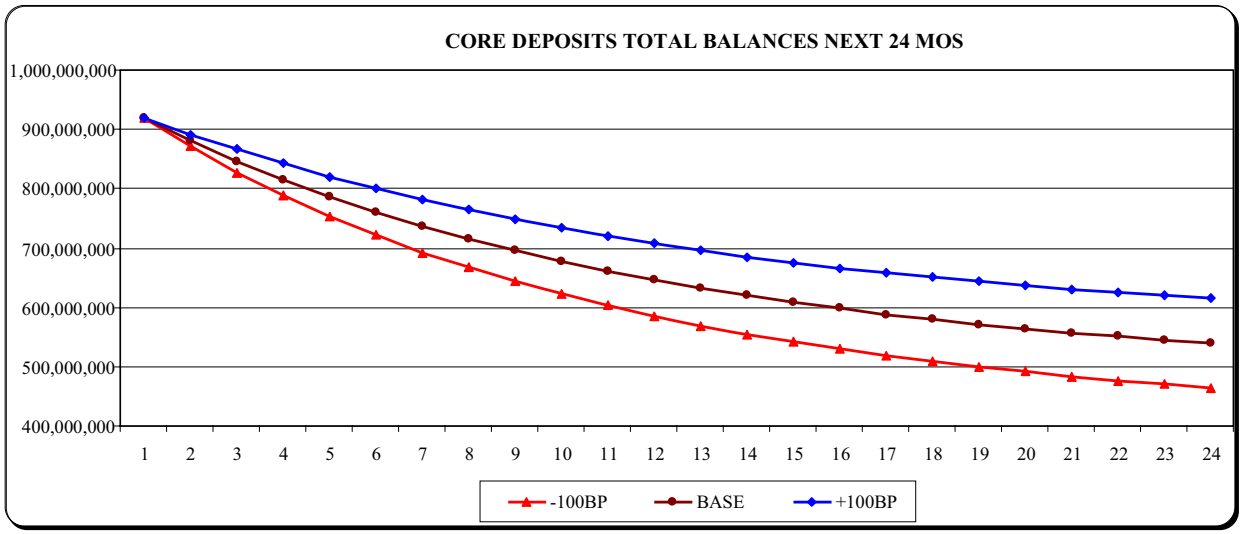


These values approximate for all current balances outstanding. Positive runoff is a source of expected liquidity. Note the Base Case realignment into current interest rate levels.

Exhibit 10

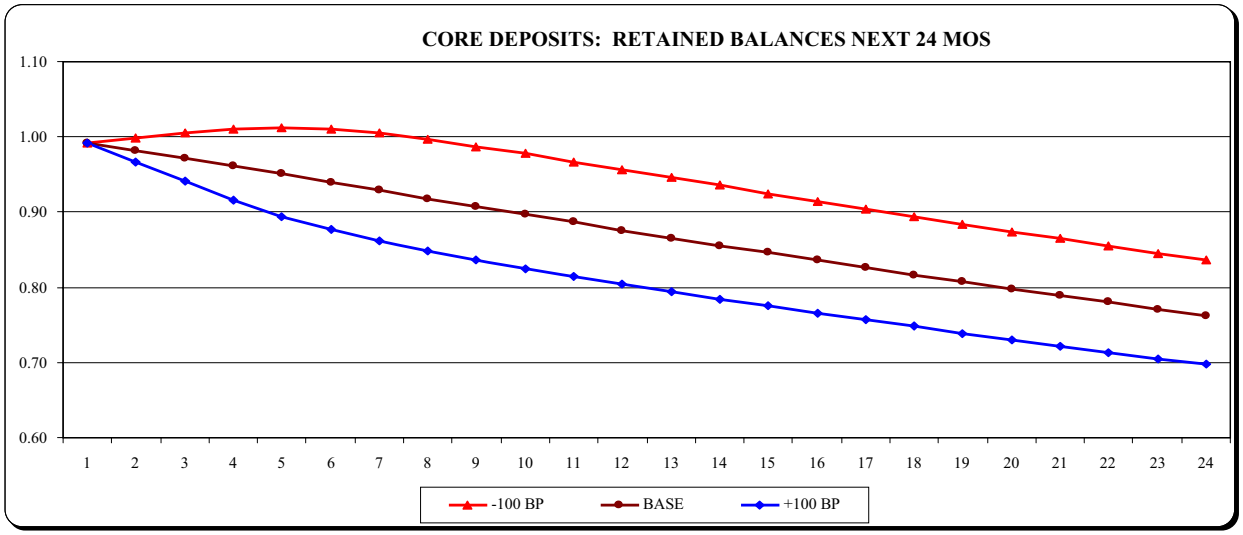
Sample Forecast Data: Core Deposits

Supply of Funds/Total Balances Supplied Data



Total balances supplied are projected to decline over time, an adverse expected liquidity outcome (a use of funds). Run down magnitudes are time dependent, however.

Supply of Funds/Retained Balances Data

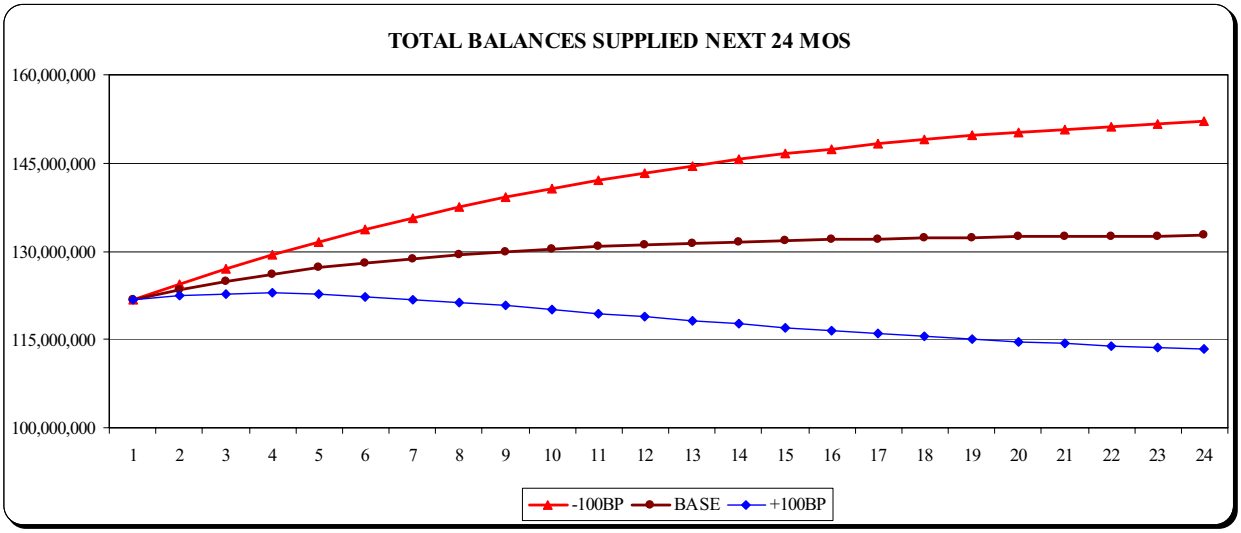


These are retained balances from a fixed pool of accounts open at the start of the time series. Long term liquidity is down but slowly, reflecting a high franchise quality.

Exhibit 11

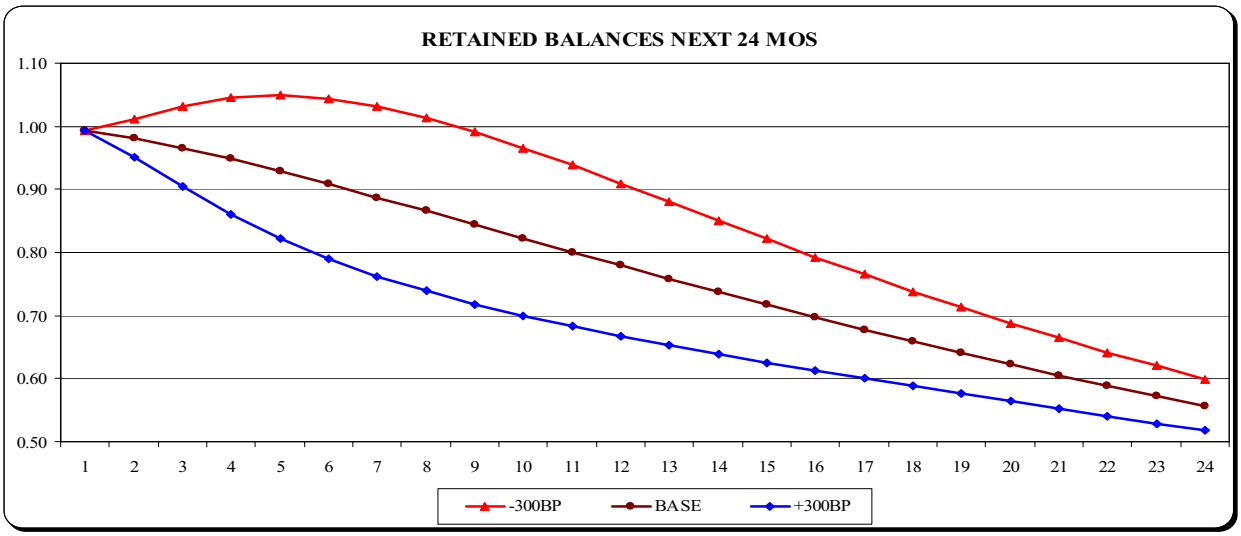
Sample Forecast Data: CD's

Supply of Funds/Total Balances Supplied Data



These are all-in total balances, including pre-maturity date CD's, rollover balances, and newly opened CD's. The expected liquidity path shown is favorable (a source of funds).

Supply of Funds/Retained Balances Data

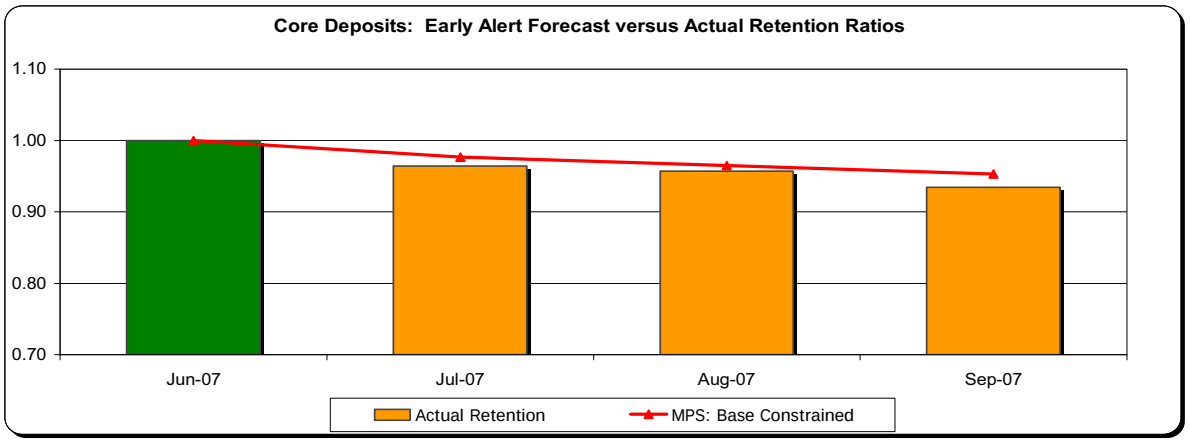


These are retained balances from a fixed pool of accounts open at the start of the time series. Long term liquidity, expressed in average life, is relatively limited.

Exhibit 12

Sample Back Test Examples

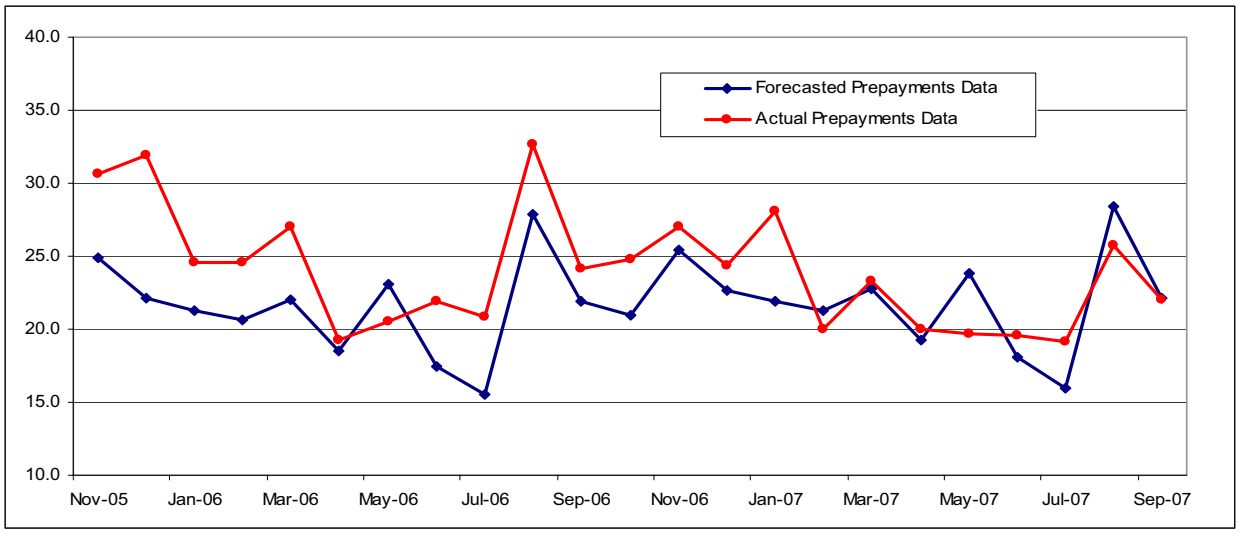
Quarterly Early Alert Advisory



Actual and Forecasted Retention Ratio Variances

MPS Base Case Forecast-Constraine	Act Jul 07	Act - Fcst	Act Aug 07	Act - Fcst	Act Sep 07	Act - Fcst	
IB CHECKING	0.9729	(0.0130)	0.9649	0.0146	0.9621	0.0936	
SAVINGS	0.9837	(0.0174)	0.9695	(0.0116)	0.9569	(0.0783)	Caution
LOW TIER MMDA	0.9768	0.0218	0.9544	0.0267	0.9328	0.0182	
HIGH TIERMMDA	0.9859	0.0146	0.9723	0.0068	0.9584	0.0092	
OVERALL	**0.9767**	**(0.0125)**	**0.9646**	**(0.0077)**	**0.9532**	**(0.0190)**	

Projected values are adequately close to actual values in all cases except Savings.



Forecasted values are close to actuals despite seasonality. Monitor mismatch early on.

Exhibit 13

Example: Incremental On-Balance Sheet Sources of Liquidity Analysis (Selected Categories)

	Contractual Embedded Liquidity	Generic Expected Liquidity	Generic Available Liquidity	Quantified Expected Liquidity	Quantified Available Liquidity	Difference
Investments						
Maturities	22,000	0	22,000		22,000	
In the Money Calls	10,000	0	10,000		10,000	
Investments: All	**32,000**	**0**	**32,000**		**32,000**	
Loans						
Comm RE - Fxd	23,863	1,491	25,354	1,641	25,504	149
Comm Other - Fxd	13,072	817	13,889	1,226	14,298	409
Cons Auto New - Fxd	8,751	1,827	10,578	2,188	10,939	361
Cons Other - Fxd	2,875	539	3,414	449	3,324	(90)
1-4 Fam Mrtg - Fxd	62,823	7,853	70,676	9,031	71,854	1,178
Second Mrtg - Fxd	6,655	1,248	7,903	1,539	8,194	291
HELOC - Fxd	18,497	3,468	21,965	4,624	23,121	1,156
Loans: All	**136,536**	**17,243**	**153,779**	**20,697**	**157,233**	**3,454**
Core Deposits						
DDA and NOW	0	2,349	2,349	2,525	2,525	176
Savings/Low Rate MMDA	0	(1,266)	(1,266)	(1,298)	(1,298)	(32)
High Rate MMDA	0	11,380	11,380	11,921	11,921	541
Core Deposits: All	**0**	**12,463**	**12,463**	**13,148**	**13,148**	**685**
CD's						
Rollover	0	113,456	113,456	114,307	114,307	851
New Balances	0	14,166	14,166	14,662	14,662	496
CD's: All	**0**	**127,622**	**127,622**	**128,969**	**128,969**	**2,541**

Notes: Data are in thousands
Comm RE - Fxd includes two negotiated large early payoffs
Core deposit values include incremental retention and new volumes

