BACKTESTING: MEASURING THE **EFFECTIVENESS OF ALLL METHODOLOGIES**

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TABLE OF CONTENTS

INTRODUCTION

Given the increased <u>regulatory scrutiny over the allowance for loan and lease losses</u> (ALLL) in the past several years, regulators, auditors and senior management are all looking for additional ways to measure the effectiveness of the bank or credit union's ALLL methodology. The OCC's 2011 <u>Supervisory Guidance on Model Risk Management</u> specifically states, "Model risk should be managed like other types of risk," highlighting the criticality of some form of outcome analysis.

BACKTESTING:

Comparing actual results for a defined period to the results forecasted by a model for the same period in order to evaluate accuracy of the model's predictiveness.

The objective is to ensure the ALLL methodology is accurate in measuring the losses inherent in a bank's portfolio over the subsequent 12-month period. This time horizon may shift somewhat as the FASB's CECL proposal and the life of loan concept takes hold, but regardless of any forthcoming changes, the request for measuring the effectiveness of a methodology, or back testing ALLL models, will continue in some fashion.

Backtesting is an exercise that compares the actual outcome with model forecasts during a defined period, a period of time that was not used to develop the methodology. A good starting point for any measure of efficacy is backtesting a reserve methodology on the portfolio.

ALLL BACKTESTING AT **THE PORTFOLIO LEVEL**

On the simplest level, backtesting of the ALLL can be completed on global level, comparing the institution's ALLL to its realized losses over a period of time. An example is shown below:

ALLL History Comparison

This allows the financial institution to back-test the results of their allowance methodology against realized losses in the portfolio.

Period Ending	Calculated ALLL	Annualized Net Charge-offs	Percent Difference	Net Charge-offs YTD (Actual)	Net Charge-offs for the Quarter
6/30/2013	$10,523,871	$2,568,000	-75.60%	$1,284,000	$1,503,000
3/31/2013	$10,974,183	($876,000)	-107.98%	($219,000)	($219,000)
12/31/2012	$14,449,768	$10,366,000	-28.26%	$10,366,000	$1,525,000
9/30/2012	$16,336,095	$11,788,000	-27.84%	$8,841,000	$2,761,000
6/30/2012	$18,553,832	$12,160,000	-34.46%	$6,080,000	$1,437,000

In this example, the institution is looking at its ALLL and comparing that amount with annualized Net Charge-offs Year to Date, an approximation of the whole year's charge-offs. This comparison assesses the coverage of the ALLL relative to realized losses.

In this analysis, the institution should be asking:

1. How many years of losses can be estimated to be covered by any period-end allowance when examining the current period allowance as compared to Net Charge-offs Year to Date (annualized)?

In this specific example, the bank's calculated ALLL exceeds the realized net charge-offs consistently by at least 25 percent. In 2012, it would appear that,

overall, the bank had approximately 150 percent coverage of their realized losses based on the ALLL that was reported in each quarter.

2. Does the current period's Net Charge-offs Year to Date (annualized) exceed the prior period's allowance? If so, are there any factors that could have been identified that would have caused the ALLL to increase?

This takes Question 1 a little farther. If there are periods in which annualized net charge-offs exceed the prior period's allowance, then it is important to dig more into what reasons there were for charge-offs to increase and where it could have been identified in the ALLL. This requires a more in-depth review of specific FAS 5 (ASC 450-20) segments- specifically segment size and growth, loss rates and the qualitative and environmental factors.

3. Were there significant changes from one quarter to the next in the net charge-offs? If so, did the allowance increase accordingly? What were the factors that caused the increase in net charge-offs? If the ALLL did not increase, what factors could have been identified (that could be watched more closely in the future) to increase the ALLL accordingly?

This is similar to Question 2. Again, it requires a more in-depth review of the various FAS 5 segments to determine which segments had an increase in charge-offs that would ideally have led to an increase in required reserve.

DEEPER INVESTIGATION OF **SPECIFIC PORTFOLIO SEGMENTS**

On the specific portfolio segments, first, it is important to determine answers to several questions from period to period:

- Which segments had an increase in the FAS 5 reserve?
- How much of the increase is due to changes in volume of that portfolio?
- How much is due to change in loss rate?

An example report to analyze this is below:

Figure 2

Segment	9/30/2013 Loan Balances	6/30/2013 Loan Balances	Variance	9/30/2013 Reserve	9/30/2013 adj. Reserve %	6/30/2013 Reserve	6/30/2013 adj. Reserve %	Variance	Rate Effect on Reserve	Volume Effect on Reserve	Total Change in Reserve
Commercial	$800,000,000	$850,000,000	($50,000,000)	$4,480,000	0.56%	$4,760,000	0.56%	($280,000)	$0	($280,000)	($280,000)
CRE	$1,500,000,000	$1,450,000,000	$50,000,000	$11,250,000	0.75%	$11,165,000	0.77%	$85,000	($300,000)	$385,000	$85,000
Construction	$85,200,000	$90,000,000	($4,800,000)	$451,560	0.53%	$513,000	0.57%	($61,440)	($34,080)	($27,360)	($61,440)
Consumer	$320,000,000	$318,000,000	$2,000,000	$4,576,000	1.43%	$4,611,000	1.45%	($35,000)	($64,000)	$29,000	($35,000)
Residential RE	$325,000,000	$320,000,000	$5,000,000	$2,535,000	0.78%	$3,072,000	0.96%	($537,000)	($585,000)	$48,000	($537,000)

The above example analyzes the change in balance as compared to the change in loss rates from one quarter to the next and analyzes the impact on the reserve. In this example, we see a significant effect on the reserve from the change in loss rate for Residential Real Estate and Commercial Real Estate, with an additional significant change caused by a change in balance for the Commercial and Commercial Real Estate portfolios.

After identifying that some of the reserve change is due to loss rate changes, the institution must then analyze how much of the effect is due to a change in the historical loss rate rather than the applied qualitative and environmental factors.

When looking at the historical loss rate component, the institution must examine the timing of charge-offs that rolled out of the loss rate as compared to charge-offs that entered in with the most recent quarter. These changes can be anticipated and/ or projected, so it is important to examine this closely ahead of time.

Figure 3

Period End Date	Total Loan Balance	Number of Loans	Charge-offs	Recoveries
9/30/2013	$27,910,134	92	$0	$74,720
6/30/2013	$31,444,754	93	$373,582	$19,444
3/31/2013	$33,356,878	97	$121,231	$230,355
12/31/2012	$31,456,980	101	$854,718	$25,274
9/30/2012	$33,694,068	107	$1,137,013	$4,623

In the case above, if the institution is using a 4-quarter loss rate through 9/30/2013, then its loss rate would drop significantly from 6.79 percent in 2Q13 to 3.22 percent in 3Q13, since the quarter (3Q12) that is dropping off had significantly more charge-offs than the new quarter being included (3Q13).

If the institution is utilizing migration analysis, then it is important to compare the numerator and denominator of the loss rate for each segment and sub-segment; it may indicate that deterioration of a portfolio led to a higher rate in one sub-segment than in another. For example, if the loss rate is now higher for substandard, this is either because

1. In the source historical period, the volume of substandard loans is lower or

2. The level of charge-offs attributable to substandard loans is now higher.

These types of differences can be discovered by a report similar to below.

Figure 4

Commercial RE

Classification	9/2011 Pool Balance	Recoveries	Net-Charge Offs	Charge-Off Ratio 9/2013	6/2011 Pool Balance	Net Charge-Offs	Charge Off Ratio 6/2013	Variance Ratio	Variance Balance	Variance Net Charge Offs
Pass	350,000	89	979	0.2798%	335,000	1,730	0.5164%	-0.2366%	15,000	(751)
Special Mention	14,000	0	197	1.4071%	17,000	197	1.1588%	0.2483%	(3,000)	0
Substandard	40,250	632	4,623	11.4858%	37,800	3,878	10.2584%	1.2273%	2,450	745
Doubtful	5,000	0	1,000	20.0000%	4,000	1,000	25.0000%	-5.0000%	1,000	0
TOTALS	409,250	721	6,799	1.6614%	393,800	6,804	1.7279%	-0.0665%	15,450	(5)

In the example above using an 8-quarter migration period starting in 9/2011 and 6/2011 for measuring loss rates in 2Q13 and 3Q13, the loss rate for Pass Rated loans in the CRE portfolio has decreased fairly significantly, as it appears some charge-offs dropped out of the migration period used during this time period. The Special Mention has a slight increase in loss ratio applied for the CRE portfolio, due to a smaller Special Mention portfolio in the denominator of the loss rate for 3Q2013 (using 9/2011).

If these ratios were plugged into a table similar to Figure 2 shown earlier, the bank could then carry this forward to see the effect on the Reserve for this portfolio segment.

When looking at the qualitative factor aspect, a bank should look closely at the change in qualitative factors over time and compare the direction of change to the direction of change of any applicable metrics for that specific factor. Identification of key drivers and directional consistency are important in measuring the effectiveness of a bank's qualitative and environmental factor methodology.

An example of a plan to measure changes in Q factors is shown below:

Figure 5

1a1. 1-4 family residential construction…	11/30/2013	10/31/2013	9/30/2013	8/31/2013	7/31/2013	6/30/2013
Changes in international, national, regional, and …	0.05	0.05	0.05	0.05	0.05	0.05
Changes in lending policies and procedures, includ…	0.01	0.01	0.01	0.01	0.01	0.01
Changes in the experience, depth, and ability of l…	0.01	0.01	0.01	0.01	0.01	0.01
Changes in the nature and volume of the portfolio …	0.05	0.05	0.05	0.05	0.05	0.05
Changes in the quality of the organization's loan …	0.05	0.05	0.05	0.05	0.05	0.05
Changes in the value of underlying collateral for …	0.09	0.09	0.09	0.09	0.09	0.09
Changes in the volume and severity of past due loa…	0.05	0.05	0.05	0.05	0.05	0.09
The effect of other external factors (ie competiti…	0.00	0.00	0.00	0.00	0.00	0.00
The existence and effect of any concentrations of …	0.05	0.05	0.05	0.05	0.05	0.09
Totals	**0.36**	**0.36**	**0.36**	**0.36**	**0.36**	**0.44**
1a2. Other construction loans and all la…	**11/30/2013**	**10/31/2013**	**9/30/2013**	**8/31/2013**	**7/31/2013**	**6/30/2013**
Changes in international, national, regional, and …	0.05	0.05	0.05	0.05	0.05	0.05
Changes in lending policies and procedures, includ…	0.01	0.01	0.01	0.01	0.01	0.01
Changes in the experience, depth, and ability of l…	0.01	0.01	0.01	0.01	0.01	0.01
Changes in the nature and volume of the portfolio …	0.05	0.05	0.05	0.05	0.05	0.05
Changes in the quality of the organization's loan …	0.05	0.05	0.05	0.05	0.05	0.05
Changes in the value of underlying collateral for …	0.09	0.09	0.09	0.09	0.09	0.09
Changes in the volume and severity of past due loa…	0.05	0.05	0.05	0.05	0.05	0.09
The effect of other external factors (ie competiti…	0.00	0.00	0.00	0.00	0.00	0.00
The existence and effect of any concentrations of …	0.05	0.05	0.05	0.05	0.05	0.09
Totals	**0.36**	**0.36**	**0.36**	**0.36**	**0.36**	**0.44**

Also, backtesting of the realized charge-offs as compared to the adjusted historical loss rate should be completed. This would require looking at an adjusted historical loss rate at a set point in time and then examining the amount of net charge-offs over the subsequent 12 months.

Figure 6

Portfolio Segment	Loss Rate as of 9/2012	Balance as of 9/2012	Reserve as of 9/2012	12 month charge-offs through 9/2013	ALLL coverage
C & I	1.50%	$10,000,000	$150,000	$100,000	1.50
CRE	1.25%	$5,000,000	$62,500	$70,000	0.89
Construction	0.75%	$3,000,000	$22,500	$20,000	1.13
Consumer	0.55%	$7,000,000	$38,500	$30,000	1.28
HELOC	0.45%	$4,000,000	$18,000	$10,000	1.80

In the example above, consider if the adjusted historical loss rate (After Q Factors) for the C&I portfolio is 1.50 percent as of 9/2012, necessitating a reserve of $150,000, based on a $10,000,000 total balance. Over the 12 months, there are $100,000 in net charge-offs for this portfolio segment.

Similar to the questions we asked on the global level, questions the bank should ask include:

1. To what degree did the ALLL cover the net charge-offs over the subsequent 12 months? In this case, there was 150 percent coverage.

2. Did the current period's (annualized) or the subsequent 12 months' charge-offs exceed the ALLL? If so, what may have been missed in this

factors that could have helped in identifying a change in the qualitative factors that would have allowed adequate coverage of the ensuing charge-offs. In the example above, the CRE portfolio has inadequate coverage at 0.89, so this would necessitate further investigation as to what aspect of the portfolio may have been missed in the qualitative factor analysis.

CONCLUSION

While CECL will certainly be changing certain aspects of ALLL methodology, much of the sample backtests described in this whitepaper will continue to be applicable. The main change may be in the time horizon considered. For example, in the last example, the institution may use a longer time horizon than 12 months, in light of the "life of loan" concept.

There are multiple ways to analyze backtesting even further than described in these examples, but these examples can provide a good starting point. The importance of backtesting is growing as a useful way to defend a bank's ALLL methodology and the various assumptions that are employed in implementing the methodology. Many banks and credit unions still do not employ a backtesting plan within their ALLL methodology, so banks that do proactively employ backtesting are ahead of their peers in the eyes of examiners.

ABOUT **SAGEWORKS & THE AUTHOR**

Sageworks (www.sageworks.com) is a financial information company working with financial institutions, accountants and private-company executives across North America to collect and interpret financial information. Thousands of bankers rely on Sageworks' credit risk management solutions to streamline credit analysis, risk rating, portfolio stress testing, loan administration and ALLL calculation. Sageworks is also an industry thought leader, regularly publishing whitepapers and hosting webinars on topics important to bankers.

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Mike received his MBA from the University of North Carolina at Chapel Hill and his bachelor's degree from Yale University. Mike has been a featured speaker for audiences of both financial institutions and regulatory agencies on matters pertaining to the banking industry.

ADDITIONAL **RESOURCES**

"e-Book: The Complete Guide to the ALLL," *Sageworks.*

> http://web.sageworks.com/complete-guide-ALLL-reserves/

Bayer, Ed and Regan Camp, "Qualitative Risk Factors: How to Add Objectivity to an Otherwise Subjective Task," *Sageworks.*

> http://web.sageworks.com/qualitative-risk-factors/

Lubansky, Mike, "Challenges in the Estimation of the ALLL," *Sageworks.*

> http://web.sageworks.com/alll-challenges-whitepaper/

Camp, Regan, "How to Calculate Your FAS 5 Reserves," *Sageworks.*

> http://web.sageworks.com/calculate-fas-5-asc-450-20-reserves/

Morris, Garrett, "Compiling the Best Data for the Reserve Calculation" *Sageworks.*

> http://web.sageworks.com/best-data-for-reserve-calculations/

ALLL Forum for Bankers, *LinkedIn.*

> http://www.linkedin.com/groups?gid=4844399

"ALLL 101: Infographic on Calculating a Bank's Reserves," *Sageworks*

> http://www.sageworks.com/blog/post/2013/02/18/ALLL-101-Calculating-a-banks-reserves.aspx