

STATIC POOL ANALYSIS – USING COHORTS

FASB has several examples in the recent Exposure Draft on Credit Impairments, this white paper and several to follow will discuss in more detail how FASB is expressing their views on how to apply the loss methodologies with the new standard.

It is important to remember that two key parameters in today's standard have been eliminated. First, the "Probable" threshold is gone and second, any method used must either directly or indirectly include a forecasting model as part of the calculation. The examples discussed by FASB are expansions of currently used methodologies. These include roll forward methods, static pool and risk migration methodologies. However, with all of these methods FASB has added the caveat "updated for current conditions and reasonable and supportable forecasts that affect the collectability of the financial assets' remaining contractual cash flows".

Understanding Static Pools (Cohorts)

Smaller institutions generally do not directly utilize static pool methodology in calculating their allowance estimate under the current standard. Therefore, this whitepaper will also discuss some basic terms and fundamentals applicable to using static pools. This paper will use static pool and cohorts interchangeably within the discussion.

In order to start the discussion, we are adding an analogy that may help in understanding cohorts. Cohorts are probably best known in their use in medical studies. Below is an example of cohorts as used in medical studies. We have used the terms segment and classes (from allowance terminology) to replace the term group as used in medical studies.

- Cohort Study: Determine if exposure to smoking is associated with an individual developing lung cancer. The study would select a class of smokers and a class of non-smokers (two separate classes of smokers) The classes are furthered sub-classed in terms of other variables such as known health issues, economic status and other identifiable health factors so that the variable being assessed, smoking, can be isolated as to the cause of the lung cancer. The study would follow all of the subclasses for a period of time and record the incidence of lung cancer between the sub-classes.

Defining Static Pools (Cohorts)

Cohort, as defined in the context of lending, is a group of borrowers who have shared a particular event together during a particular time span. These events could be based on varying items such as:

- Underwriting practices over a period
- Loans by industry type (hotel, shopping center)
- Indirect loans by dealer
- Residential Real Estate loans by State or MSA
- Risk Ratings/FICO Scores

In this context a cohort could be defined as follows:

- All commercial construction loans originated (underwritten) by year or other defined period of time.
- All indirect auto loans originated by dealer by year and based on risk rating at December 31 each year.
- All commercial loans originated by year and by industry code and based on risk rating at December 31 each year.

Cohorts can also be made up of open or closed portfolios. These portfolios are defined as follows:

- Open Portfolio – A pool of loans that continues to evolve as a result of new loan originations and pay-downs on existing loans
- Closed Portfolio – A closed portfolio is one with fixed membership. Once the cohort is defined no new loans are added to the pool. Therefore, the pool only changes by payments and write-offs.
- Matured Portfolio - a pool of loans with all loans having reached maturity, and all cash flows associated with the particular pool are known.

Cohorts can also be based on membership defined by another common factor other than time based. For example in this context, it could be all loans issued by loan officer. The key is that the loans have a common factor that identifies the perspectives. In the case of lending it may be beneficial to consider what risk perspectives are best to determine the pool.

Common Terms Used With Static Pool (Cohort) Analysis

Generally statistics are derived from the pool of loans selected. When referring to weighted average, we are referring to the loan balance dollar weighted amount. Examples of statistics drawn from the data could be as follows:

- Weighted-Average Rate (Original and Current)
- Weighted-Average Internal Rate of Return (Original and Current)
- Weighted-Average LTV (Original and Current)
- Weighted-Average Risk Ratings (Original and Current)
- Weighted-Average FICO Scores (Original and Current)
- Weighted-Average Past Due Days (Original and Current)
- Weighted Average Maturity (Original and Current)
- Single Monthly Mortality is a measure of the monthly prepayment rate of a loan pool. Measured in dollars and percentage.
- Constant Prepayment Rate is the annualized measure of the prepayment. Measured in dollars and percentage.
- Default Proportion (write-offs) represents the part of prepayments resulting from defaults (write-offs). Measured in dollars and as percentage of default prepayments to total prepayments over the representative period.
- Loss Severity is the net loss of all defaulted loans after all funds from the sale of collateral or insurance proceeds are applied to the loan balance. Loss severity is computed by dividing the dollar net loss by the gross write-offs for the same time period.

Generally most cohort studies in lending are considered prospective cohort studies. This analysis is conceived and designed, using lending data to create and collect baseline exposure data on all loans, before any of the loans have developed any of the risk characteristics. The loans are then grouped and monitored into the future to track the related risk profiles. These statistics can be compared to other loan pool based on different origination periods.

Issues in Defining Pools

Generally cohorts are defined based on common risk characteristics within the segment, or class. This is similar to the segment class methodology applied today in the standards. Characteristics can include the following:

- Industry type
- Collateral type
- Loan term
- Loan to value
- Credit Risk
- Other factors commonly used to segment and class loans

Once a group is identified, the cohort is generally grouped by origination periods. This could be by year, quarter or semi-annual periods.

In the exposure draft, FASB used risk ratings as an additional part of the cohort definition in determining historical loss rates. Using risk ratings comes with additional dynamics when used to separate cohorts. By additionally adding risk

rating as a defining factor, the quality of the risk rating process becomes extremely important. Therefore, poorly designed or implemented risk rating practices will directly affect the effectiveness of the conclusions drawn from the analysis of the cohorts.

Some important issues to consider when using internally generated risk ratings as part of the cohort pools.

- Risk rating policies and process must be clearly defined with reasonable and constantly applied metrics
- Different pools may have different risk rating metrics
- Fewer specifically defined risk ratings may provide better functionality and variance between pools (for example, 1 through 5 risk ratings system may be better than 1 through 9)
- All loans should be risk rated
- Risk ratings must to be updated consistently

Some important advantages of cohort analysis are listed below:

- Reduces or Eliminates the effects of changes in portfolio growth
- Isolates changes in underwriting policies or processes
- Helps identify changes in economic or environmental conditions that have affected the portfolio
- Helps identify changes in collection policies and processes
- Improves forecasting ability
- Improves risk modeling accuracy
- Helps develop risk based pricing models

Static Pool Example – Closed Portfolio

The first example we will discuss is a prospective static pool based on commercial mortgage loans. We are using closed portfolios based on origination dates by year for the each pool of loans. The following information is about the pool of loans used in this example:

1. Commercial mortgage loan portfolio
2. 5 year average amortizing portfolio class
3. Closed Portfolio with pay-downs and write-offs.
4. Specifically, the entity forms static pools (cohorts) by grouping borrowers by Origination Date for each year. As a new year begins, all loans originated fall into a new pool for that year. The entity then follows the cohort from that point forward through the life of the assets within the cohort, such that membership in the cohort remains constant.
5. For each cohort, various data is accumulated and compared from each pool.
 - a. Weighted-Average Rate (Original and current)
 - b. Weighted-Average LTV (Original and Current)

- c. Weighted-Average Risk Ratings (Original and Current)
 - d. Weighted-Average FICO Scores (Original and Current)
 - e. Weighted-Average Past Due Days (Original and Current)
 - f. Weighted Average Maturity (Original and Current)
 - g. Single Monthly Mortality is a measure of the prepayment rate of a loan pool.
 - h. Constant Prepayment Rate
 - i. Default Proportion
 - j. Loss Severity
6. To develop its **current expected loss rate**, the entity reviews and analyzes the factors listed in 5 above for all pools (cohorts by year) to determine variations over time and events that may have affected the default proportion and loss severity of each cohort. These variations are documented and are used in determining current expected loss rate. The current expected loss rate is calculated by taking the default proportion adjusted for the loss severity. This factor is then adjusted for each cohort by adding or subtracting factors for changes in current conditions and reasonable and supportable forecasts based on the variations documented within each pool and the point in the loan life cycle the cohort is currently in. To measure the expected credit losses, the entity applies a current estimated loss-rate specific to the specific cohorts individually.

Cohorts measured in this fashion will typically follow a specific bell curve for default and loss severity measures. As a pool life cycle gets closer to being a matured pool, the estimated losses will become smaller. Eventually, the remaining losses will be more clearly identifiable and easier to estimate.

In the example table below, the “Static pool loss severity rate” is adjusted for “Changes in Current Conditions and Reasonable and Supportable Forecasts”. The additional factors were based on a review of the different cohorts and how the loans behaved over time. Specific anomalies were identified which either increased or decrease the additional factors for each pool individually.

December 31, 2012			
Cohorts by Year	Loan Balance of Pool	Current Expected Loss Rate	Total Allowance Estimate
2006	75,000,000.00	2.75%	2,062,500.00
2007	85,000,000.00	3.00%	2,550,000.00
2008	95,000,000.00	2.82%	2,679,000.00
2009	110,000,000.00	2.65%	2,915,000.00
2010	135,000,000.00	2.56%	3,456,000.00
2011	145,000,000.00	2.45%	3,552,500.00
2012	156,000,000.00	2.35%	3,666,000.00
	801,000,000.00	2.61%	20,881,000.00
Cohorts by Year	Static Pool Default & Loss Severity Rate	Changes in Current Conditions and Reasonable and Supportable Forecasts	Total Current Expected Loss Rate
2006	2.65%	0.10%	2.7500%
2007	2.35%	0.65%	3.0000%
2008	2.20%	0.62%	2.8200%
2009	2.00%	0.65%	2.6500%
2010	1.56%	1.00%	2.5600%
2011	1.25%	1.20%	2.4500%
2012	0.25%	2.10%	2.3500%

After reviewing this example, the apparent differences between the exposure draft and the current standard in this example are as follows:

- Forecasting future qualitative environmental and economic factor changes
- No Impaired loan calculation
- Current effects of changes in qualitative environmental and economic factor changes

Risk Rated Class Level Example: Similar to FASB's Example

The following is an expanded example using the same methodology used by FASB in their first illustration from the exposure draft. The following information is used in this example:

1. Commercial mortgage loan portfolio
2. 5 year average amortizing portfolio class
3. Open Portfolio with new originations and pay-downs, write-offs, and credit migration
4. The loan class is further sub-classed into static pools (cohorts) based on internal risk ratings from 1 to 7 where 1 is low risk (pass) and 7 is (loss).
5. Specifically, the entity forms static pools (cohorts) by grouping borrowers by risk rating at the beginning of each year. Each outstanding borrowing at the beginning of the period is assigned to a specific cohort. The entity then follows the cohort from that point forward through the life of the assets within the cohort.
6. For each cohort, a historical loss rate applicable to each risk rating is determined on the basis of the amortized cost amount written off because of credit loss realized over the entire contractual term of financial assets within that cohort as compared with the beginning amortized cost basis of assets within the cohort.
7. To develop its **current expected loss rate**, the entity updates this historical data to reflect changes in current conditions and reasonable and supportable forecasts that differ from historical experience. To measure the expected credit losses, the entity applies a current estimated loss-rate specific to that credit risk rating to the amortized cost basis of the assets in that rating category.

The chart below shows how the “Static Pool Historical Loss Rate” is combined with additional factors for “Changes in Current Conditions and Reasonable and Supportable Forecasts” to create a “Total Current Expected Loss Rate”. This rate is then applied to the loan balance to determine an estimate.

There are two important items to note in the example FASB uses. First, the concept of individually impaired loans does not exist. Therefore the loss allowances are applied across all risk types. Second, the additional factors consider various changes in risk and the associated forecasting of these risks into the future. Since FASB chose a 5-year period for the example, you may assume that the forecast period was 5 years. However, FASB does not address the period or the additional factors explicitly used in the example.

December 31, 2012			
Risk Rating	Loan Balance of Pool	Current Expected Loss Rate	Total Allowance Estimate
1	190,000,000.00	0.01%	19,000.00
2	265,000,000.00	0.07%	172,250.00
3	135,000,000.00	0.10%	135,000.00
4	89,000,000.00	1.25%	1,112,500.00
5	23,000,000.00	2.45%	563,500.00
6	19,000,000.00	8.00%	1,520,000.00
7	1,000,000.00	21.50%	215,000.00
	722,000,000.00		3,737,250.00
Risk Rating	Static Poll Historical Loss Rate	Changes in Current Conditions and Reasonable and Supportable Forecasts	Total Current Expected Loss Rate
1	0%	0.01%	0.0100%
2	0.02%	0.05%	0.0650%
3	0.03%	0.08%	0.1000%
4	0.50%	0.75%	1.2500%
5	1.30%	1.15%	2.4500%
6	5.75%	2.25%	8.0000%
7	15.75%	5.75%	21.5000%

In determining the allowance estimation for March 2013, FASB explains how the loan balances in the open portfolio are adjusted for originations, pay-downs, write-offs and credit migration.

Commercial Mortgage Loans						
Open Pools	December 31, 2012					March 31, 2013
Risk Rating	Loan Balance of Pool	Originations	Pay-downs	Write-offs	Credit Migration	Loan Balance of Pool
1	190,000,000	5,600,000	(1,200,000)	-	(5,400,000)	189,000,000
2	265,000,000	-	(1,250,000)	(100,000)	1,350,000	265,000,000
3	135,000,000	-	(750,000)	-	2,750,000	137,000,000
4	89,000,000	-	(650,000)	(500,000)	(11,850,000)	76,000,000
5	23,000,000	-	(87,000)	(200,000)	2,287,000	25,000,000
6	19,000,000	-	(65,000)	(150,000)	7,215,000	26,000,000
7	1,000,000	-	-	(750,000)		250,000
	722,000,000	5,600,000	(4,002,000)	(1,700,000)	(3,648,000)	718,250,000

March 31, 2013			
Risk Rating	Loan Balance of Pool	Current Expected Loss Rate	Total Allowance Estimate
1	189,000,000.00	0.11%	207,900.00
2	265,000,000.00	0.17%	437,250.00
3	137,000,000.00	0.20%	274,000.00
4	76,000,000.00	1.35%	1,026,000.00
5	25,000,000.00	2.55%	637,500.00
6	26,000,000.00	8.10%	2,106,000.00
7	250,000.00	21.60%	54,000.00
	718,250,000.00		4,742,650.00
Risk Rating	Static Pool Historical loss Rate	Changes in Current Conditions and Reasonable and Supportable Forecasts	Total Current Expected Loss Rate
1	0%	0.1100%	0.1100%
2	0.02%	0.1500%	0.1650%
3	0.03%	0.1750%	0.2000%
4	0.50%	0.8500%	1.3500%

5	1.30%	1.2500%	2.5500%
6	5.75%	2.3500%	8.1000%
7	15.75%	5.8500%	21.6000%

The revised loss rates are then applied to the adjusted balances as shown below. The allowance estimate increased due to small changes the loss rates as well as changes in the migration of the loans to different risk pools.

As of June 30, 2012, the same methodology is applied to the adjusted balances.

Commercial Mortgage Loans						
Open Pools	March 31, 2013					June 30, 2013
Risk Rating	Loan Balance of Pool	Originations	Pay-downs	Write-offs	Credit Migration	Loan Balance of Pool
1	189,000,000	4,300,000	(1,250,000)	(5,000)	(5,545,000)	186,500,000
2	265,000,000	-	(2,750,000)	(25,000)	(7,225,000)	255,000,000
3	137,000,000	-	(765,000)	(16,250)	28,781,250	165,000,000
4	76,000,000	-	(645,000)	(375,000)	(9,980,000)	65,000,000
5	25,000,000	-	(95,000)	(200,000)	(9,705,000)	15,000,000
6	26,000,000	-	(73,500)	(150,000)	1,223,500	27,000,000
7	250,000	-	(50,000)	(200,000)	-	-
	718,250,000	4,300,000	(5,628,500)	(971,250)	(2,450,250)	713,500,000
June 30, 2013						
	Risk Rating	Loan Balance of Pool	Current Expected Loss Rate		Total Allowance Estimate	
	1	186,500,000.00	0.23%		428,950.00	
	2	255,000,000.00	0.22%		561,000.00	
	3	165,000,000.00	0.45%		734,250.00	
	4	65,000,000.00	1.62%		1,053,000.00	
	5	15,000,000.00	2.72%		408,000.00	
	6	27,000,000.00	9.12%		2,462,400.00	
	7	-	21.73%		-	
		713,500,000.00			5,647,600.00	

Risk Rating	Static Poll Historical loss Rate	Changes in Current Conditions and Reasonable and Supportable Forecasts	Total Current Expected Loss Rate
1	0%	0.1300%	0.2300%
2	0.05%	0.1700%	0.2200%
3	0.25%	0.1950%	0.4450%
4	0.75%	0.8700%	1.6200%
5	1.45%	1.2700%	2.7200%
6	6.75%	2.3700%	9.1200%
7	15.86%	5.8700%	21.7300%

The Solution – ACL Calculator

At ARCSys our vision is to provide the best, most flexible software which complies with regulatory guidance and GAAP. The ACL Calculator was developed as Software as a Service (SaaS) to effortlessly automate the entire allowance calculation process from applying **Static Pool, Risk Migration**, historical losses, qualitative and quantitative factors and preparing disclosures – rendering spreadsheets obsolete.



ACL Calculator handles Both Qualitative and Quantitative Factors based on multiple Variables:

- ARCSys allows users to segment and class loans using multiple variables
- Through ARCSys Data Warehouse you can perform **static pool and risk migration analysis** for any segment or class within seconds
- ARCSys allows users to apply qualitative and quantitative factors based on any variable within their system and third party variables such as Department of Labor information such as GDP and Unemployment Rates.
- Complete SFAS 114 (ASC 310-10) impairment measurement for discounted cash-flow analysis (including multiple payment streams) and Fair value analysis
- Detailed calculation and financial disclosure reports

Best of all, it is software developed by accountants for accountants!

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