Z-CONCEPTS

CECL Management

In our last CECL article, *CECL: You're Going to Need a Better ALM Model*, we outlined the reasons the new CECL standard requires a good ALM model. As we showed, forecasting defaults over the life of the loan under an economic forecast is challenging but very doable with the right tools.

Because the new CECL standard is full of estimates, it now becomes very important to see the sensitivity of CECL to changes in input values. It is important to note as the bank moves from one reporting period to the next, the CECL ALLL will need to be re-estimated. This is because as a bank moves through time, the loan composition and economic outlook will also be changing, which will produce a new and different default forecasts.

But don't worry, CECL sensitivity and forward CECL are again ascertainable with a good ALM model.

CECL SENSITIVITY

Because the CECL ALLL estimation is so sensitive to its assumptions, and because we all know that forecasting is rarely correct, it's imperative to know how sensitive the CECL ALLL number is to changes in input values.

Figure 1 shows a table for a 30 year 5% fixed rate residential loan. Using our ZMdesk™ software, we calculated its price, weighted average life (WAL) and net life defaults or ALLL under different PD\LGD combinations and prepayment assumptions. The left table assumes 100% loss given default. The table on the right assumes 50%.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	30yr RESI							30yr RESI					
2	PD (100 LGD)	0.0	2.5	5.0	7.5	10.0		PD (50 LGD)	0.0	2.5	5.0	7.5	10.0
3	0 CPR							0 CPR					
4	Price	100.0	77.2	61.4	50.2	42.1		Price	100.0	89.1	81.6	76.2	72.2
5	WAL	18.7	14.3	11.3	9.1	7.5		WAL	18.7	14.3	11.3	9.1	7.5
6	Life Defaults	0.0	36.2	57.7	70.7	78.9		Life Defaults	0.0	18.1	28.8	35.4	39.4
7													
8	5 CPR							5 CPR					
9	Price	100.0	86.5	75.4	66.1	58.5		Price	100.0	93.4	88.0	83.5	79.7
10	WAL	7.7	6.8	6.0	5.4	4.8		WAL	7.7	6.8	6.0	5.4	4.8
11	Life Defaults	0.0	17.2	30.9	41.8	50.5		Life Defaults	0.0	8.6	15.5	20.9	25.3
12										0.5	0.5	0.5	0.5
13	10 CPR							10 CPR					
14	Price	100.0	90.1	81.5	73.9	67.2		Price	100.0	95.2	90.9	87.2	83.9
15	WAL	5.1	4.7	4.3	3.9	3.6		WAL	5.1	4.7	4.3	3.9	3.6
16	Life Defaults	0.0	11.8	21.9	30.6	38.1		Life Defaults	0.0	5.9	11.0	15.3	19.0

Fig.1: 30-year Fixed Rate Residential Loan

ZM FINANCIAL SYSTEMS

This first implication to note is how sensitive CECL ALLL is to the prepayment forecast. Notice for a PD\LGD of 2.5\100 the Life Net Defaults goes from 36.2 down to 17.2 down to 11.8 if the prepayments go from 0 to 5 to 10 CPR. Given that it might be tough for a bank to accurately estimate prepayment forecasts for all its different loan types, it would be wise for a bank to know how much their CECL ALLL will change under different prepayment forecasts.

Figure 1 also shows the linear relationship between default and a loan's average life. If a banker knows the WAL for a loan/cohort, then the ALLL is roughly:

*PD * LDG * WAL*

For example, the ALLL on a PD\LGD of 5.0\50 at 10 CPR is:

*5.0 * 50% * 4.3 (WAL at 10 CPR) = 10.8% estimated vs. 11.0% actual model output.*

Now, to get the ALLL amount, simply take 10.8%\11.0% times the loan balance.

Let's look and see how sensitive the ALLL is in different economic forecasts. In our previous article, we showed how the net defaults could be derived from the unemployment rate. Using linear regression, we showed:

*Net default rate = 0.08 + 0.462 * Unemployment rate*

This raises the question: how much would CECL ALLL be under different unemployment forecasts? Again, as we did previously, we'll borrow the unemployment forecast from the Dodd-Frank stress test. Figure 2 is the new 2017 unemployment forecast for a base case, adverse and severe scenarios. Because the Dodd-Frank stress test scenarios only go out 13 quarters, we will use the assumption that the last provided unemployment rate will stay flat through the remaining life of the loan. It would also seem reasonable that modelers could assume the unemployment rate reverts to its long-run average after the last provided quarterly forecast.

Dates	Base	Adverse	Severe
12/31/2016	4.7	4.7	4.7
3/31/2017	4.7	5.2	5.6
6/30/2017	4.6	5.8	6.9
9/30/2017	4.6	6.3	8.0
12/31/2017	4.5	6.8	8.9
3/31/2018	4.5	7.1	9.6
6/30/2018	4.5	7.3	9.8
9/30/2018	4.4	7.4	10.0
12/31/2018	4.4	7.3	9.9
3/31/2019	4.5	7.2	9.8
6/30/2019	4.6	7.1	9.6
9/30/2019	4.6	7.0	9.4
12/31/2019	4.7	6.9	9.1
3/31/2020	4.7	6.8	8.9

Fig. 2: 2017 Unemployment Forecast for Base Case, Adverse and Severe Scenarios

Now, let's run our loan from above at 10 CPR under these three scenarios to see how much the CECL ALLL changes (see Figure 3).

	No Defaults	Base	Adverse	Severe
Life PD	0.00	2.23	3.21	4.16
Price	100.00	91.18	87.80	84.72
WAL	5.09	4.71	4.56	4.43
Life Defaults	0.00	10.54	14.58	18.26

Fig. 3: Loan Example Run Above at 10 CPR

Assuming the Base is the forecast the bank uses as the most likely scenario, the ALLL would be 10.54% of the loan balance. If the economy were to move more towards the Adverse scenario, the ALLL would need to be increased up to 14.6%.

CECL FORWARD

Not only is it important to know the sensitivity of CECL ALLL in the current period, it's also important to know the future values or forward values of CECL ALLL. This is because changes in CECL ALLL from period to period will impact future loan loss provisions.

The CECL ALLL next period may be quite different from the current period because future loan originations may be of higher or lower loan quality. Also, the economic climate will certainly be changing over time. Both of these will impact the new CECL ALLL calculation in the future periods. Any changes in the CECL ALLL from period to period will be adjusted by actual realized defaults and recoveries. The plug will be to loan loss provisions, which will impact the future net income as shown below.

Provision(1) = ALL(0) – Actual Losses + Actual Recoveries – ALL(1)

In order to get forward CECL ALLL and future provision estimations, it will be necessary for the bank to be able to age the existing loans and to forecast new business with its own default forecasts. Again, a good ALM model will be able to do this.

Now let's walk through an example of how this looks and what information this analysis will tell you. My existing loan account has a 10M balance with an average PD of 2.5, LGD of 100 and will prepay at 10 CPR as seen in Figure 1. My new loan origination will have a PD of 5.0, LGD of 100 and will prepay at 5 CPR. Here, my ALM strategy will be to reinvest into the new loans or generics so that my balance sheet stays flat (see Figure 4).

	12/31/2016			1/31/2017			2/28/2017			3/31/2017		
	Balance	Rem Defaults	Rate	Balance	Rem Defaults	Rate	Balance	Rem Defaults	Rate	Balance	Rem Defaults	Rate
Existing	10,000,000	1,178,520	11.79%	9,879,782	1,157,444	11.72%	9,760,481	1,136,621	11.65%	9,642,092	1,116,050	11.57%
Generics	-	-	-	120,218	37,150	30.90%	239,519	73,864	30.84%	357,908	110,146	30.78%
Total	10,000,000	1,178,520	11.79%	10,000,000	1,194,594	11.95%	10,000,000	1,210,485	12.10%	10,000,000	1,226,197	12.26%

Fig. 4: Example: New Loan Origination/Balance Sheet

Notice at time zero my CECL ALLL is $1.178M (or remaining defaults over the life of the loans) and is comprised 100% of my existing loans. The 11.8% can be found in Figure 1. Moving forward one month, my existing loans have paid down and defaulted down to a balance of $9.879M. Therefore, we need to originate $120,218 of new loans to keep a flat balance sheet. These new loans will have a PD/LGD of 5/100 and are forecasted to prepay at 5 CPR. Their net default rate, or ALLL, is 30.9, which can also be found in Figure 1. The new ALLL for the entire bank is now $1.195M, a combination of the net defaults on my remaining existing loans from 1/31/2017 forward and the new loans originated during January. Notice how my overall ALLL is now slightly higher than last month because I'm now originating loans that are riskier than my existing loans.

SUMMARY

Because CECL ALLL is based on forecasts, it is critical that those responsible for setting ALLL know the sensitivity of ALLL in the current and future periods. Just as regulators ask bankers to stress all facets of their balance sheets and income statements, this analysis cannot be done properly if you can't stress ALLL at the same time.

About the Author

As one of the co-founders of ZM Financial Systems (ZMFS), Frank "Butch" Miner is directly responsible for the management, growth and success of business operations, overseeing all day-to-day operations in addition to leading corporate strategic initiatives. Miner and ZMFS co-founder Dai Zhao had a vision: to develop, implement and support a truly integrated risk analytics product that could be used by multiple departments inside a financial institution yet run off the same analytic engine and database. Starting off on their own, Zhao's quantitative analytics and financial modeling experience, combined with Miner's portfolio management capital markets and risk management knowledge, led to the formation of ZM Financial Systems.

Prior to founding ZMFS, Miner served as Managing Director, IPS-Sendero; Senior Vice President, Pinehurst Analytics; and Portfolio Manager, Smith Breeden Associates. He received his B.S. in Finance from Florida Southern College, and his Masters in both Accounting and Finance from the University of Iowa, Henry B. Tippie College of Business.

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