Week 4 Assignment (Individual) on Vintage Model application on CECL

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1. **Assignment Scope** Scope of the report is to elaborate about Vintage Method, steps executed with respect to our assignment, comparison between the the true loss rate with the predicted loss rate.

2. **Vintage Model Overview**

   Vintage analysis measures losses on the origination date and the historical performance of loans with similar risk characteristics. This works well with loans that follow patters that are similar and predicated for subsequent generations of loans (homogeneous). Moreover, this analysis requires segmentation and stratification of the loan portfolio, with the additional requirements that loans be stratified by origination period.

   As part of this assignment, we have incorporated the Vintage model to calculate the loss rate of single-family loans in 2007.

   Homogeneous: Single-family loans amortized and issued by Fannie Mae is relatively homogeneous considering the credit qualified borrower and the underlying asset of loans. Also, all are 30 yr fixed mortgage behaving in in similar patterns.

   Underwriting Standards: Its is assumed that this portfolio to be standards and confirm the secondary market standards.

3. **Vintage Model with respect to our Project**

   a. Time Window: There was financial crisis from 2008, we have selected the time-frame before the same. Hence our chosen time period is of 2001-2006 and we intent to compare for 2007-2008.

   b. Loss Rate: Quarterly Data has been downloaded and loss rate has been project for the year the loans originated from year 2001-2006.

   c. Q Factor: We have selected Unemployment as the macroeconomic variable here and used for Qualitative factor for projecting Loss Rate.

4. **Project Elements**

A. Estimate of Loss Rates

Each cell in the matrix has been populated(above diagonal) as per the python code. Formula for Loss rate will be given as below

LR[1][1] = 100(Total of Original Amount of the Default Loans originated in 2001 and defaulted in 2002)/ (Total Original Amount of non default loans originated in 2001)*

LR[1][1] represents the loan generated originated in 2001 and defaulted in yr 2002 and so on.

For the data, we have first the merged the individual quarters and then into year. Following columns were only used:-

- Origination Date

- Origination Amount

- Foreclosure Date

Loss Rates by Vintage						
	Y1	Y2	Y3	Y4	Y5	Y6
2001	0.00%	0.05%	0.13%	0.13%	0.08%	0.06%
2002	0.00%	0.05%	0.09%	0.08%	0.06%	
2003	0.00%	0.02%	0.05%	0.06%		
2004	0.00%	0.03%	0.07%			
2005	0.00%	0.03%				
2006	0.01%					
average loss	0.00%	0.04%	0.09%	0.09%	0.07%	0.06%
Q factor	0.03%	0.67%	1.60%	1.78%	1.44%	1.30%

B. Q Factor- Unemployment - Actual Projected

Q factor has been downloaded i.e. unemployment here for the time period in question. Please note here no projection has been done for Q factor as actual data was available from the sources.

Reasonable estimate of Q factor						
	Y1	Y2	Y3	Y4	Y5	Y6
2001	4.70%	5.80%	6.00%	5.50%	5.10%	4.60%
2002	5.80%	6%	5.50%	5.10%	4.60%	4.60%
2003	6%	5.50%	5.10%	4.60%	4.60%	5.80%
2004	5.50%	5.10%	4.60%	4.60%	5.80%	9.30%
2005	5.10%	4.60%	4.60%	5.80%	9.30%	9.60%
2006	4.60%	4.60%	5.80%	9.30%	9.60%	8.90%
average	5.28%	5.27%	5.27%	5.82%	6.50%	7.13%

C. Loss Rate Prediction

Based upon the Q factor, actual rates and Q-factor ratio loss rates has been projected as below.

Area below the diagonal has been highlighted and is the predicted loss rate.

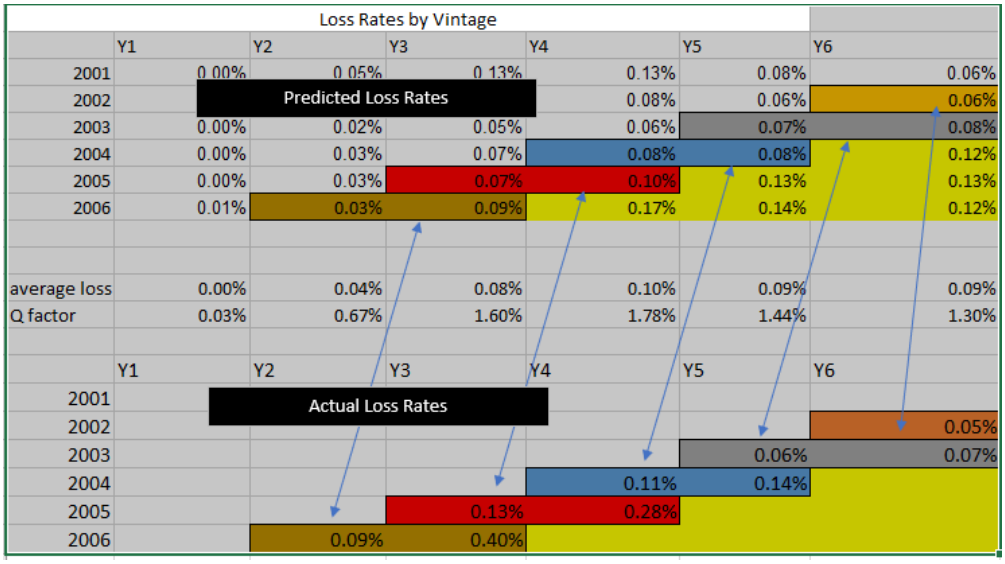
Loss Rates by Vintage						
	Y1	Y2	Y3	Y4	Y5	Y6
2001	0.00%	0.05%	0.13%	0.13%	0.08%	0.06%
2002	0.00%	0.05%	0.09%	0.08%	0.06%	0.06%
2003	0.00%	0.02%	0.05%	0.06%	0.07%	0.08%
2004	0.00%	0.03%	0.07%	0.08%	0.08%	0.12%
2005	0.00%	0.03%	0.07%	0.10%	0.13%	0.13%
2006	0.01%	0.03%	0.09%	0.17%	0.14%	0.12%
average loss	0.00%	0.04%	0.08%	0.10%	0.09%	0.09%
Q factor	0.03%	0.67%	1.60%	1.78%	1.44%	1.30%

D. Comparison of Predicted Loss Rate with True Loss Rate

In order to compare our projection with actual loss rate, we have taken up the two more years data which are from 2007 and 2008 into our dataset and repeated the same procedure.

	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8
2001							0.04%	0.03%
2002						0.05%	0.05%	
2003					0.06%	0.07%		
2004				0.11%	0.14%			
2005			0.13%	0.28%				
2006		0.09%	0.40%					

Further on comparing it appears data estimation is not accurate as there are differences between loss rate and estimated loss rate. The reason can be attributed to Q factor which is not sufficient enough to predict the real market trend. Due to large dependencies on on both microeconomics and macroeconomics factors, it is hard to exactly predict the future potential loss rate.



	Y1	Y2	Y3	Y4	Y5	Y6
2001	0.00%	0.05%	0.13%	0.13%	0.08%	0.06%
2002				0.08%	0.06%	0.06%
2003	0.00%	0.02%	0.05%	0.06%	0.07%	0.08%
2004	0.00%	0.03%	0.07%	0.08%	0.08%	0.12%
2005	0.00%	0.03%	0.07%	0.10%	0.13%	0.13%
2006	0.01%	0.03%	0.09%	0.17%	0.14%	0.12%
average loss	0.00%	0.04%	0.08%	0.10%	0.09%	0.09%
Q factor	0.03%	0.67%	1.60%	1.78%	1.44%	1.30%

	Y1	Y2	Y3	Y4	Y5	Y6
2001						
2002						0.05%
2003					0.06%	0.07%
2004				0.11%	0.14%	
2005			0.13%	0.28%		
2006		0.09%	0.40%			