Portfolio Acquisition Model

The portfolio acquisition model is essentially a decision-making tool used to produce a bid that investors will make on an existing portfolio of loans. In this case, the loans are Home Equity Lines Of Credit (HELOC) (or 'second mortgage' because they are secured by the borrowers property, as is the 'first mortgage') typically with a maximum term of 15 years, with interest-only payments terminating in a final bullet payment. Borrowing is allowed up to the credit limit at any time at a variable rate tied to prime–can be fixed or floating–partial principal repayments are allowed, but not scheduled.

Prior to modeling, the portfolio will have been carved up into reasonably homogeneous pieces–which the present relatively simple model might be expected to represent fairly well. As part of this 'risk screening', the charge-off rates are estimated from the credit quality (and other characteristics) of the loans in the portfolio. How well this is done will affect the results produced by the model–this process will not be examined here.

Also prior to modeling, the loan portfolio will have been examined. This is used to decide whether the modeling assumptions and parameter estimates that are being used are reasonable. The model is then used to assess the sensitivity of the loan portfolio to changes in these modeling assumptions–teaser rates, charge-off rates, prepayment rates, etc.

Specifically, this model calculates the Net Present Value of the portfolio of loans ("NPV", in this case the value above the hurdle rate and funding costs) and Internal Rate of Return ("IRR") from a stream of expected monthly cashflows Ci, generated by the portfolio of loans.

This is a portfolio-level model–there is no information about the structure of the individual loans. The only structural information from the portfolio that is used in the

model is: B: the total outstanding balance, **:** the number of active accounts, and various assumptions about setup costs, servicing fees, etc.

The prepayment model, which determines what percentage of the loans will prepay and close monthly. At present the model is static–there is no prepayment dependence on possible future changes in interest rates.

The repayment (pr partial prepayment) model, which estimates the rate at which loans are partially repayed (but not closed). At present this is fixed as a percentage of the currently outstanding balance.

The charged-off account model, which estimates the number of loans that will default each month. The loan portfolio should have already been assessed, which is where Charge-off rates are established.

The portfolio is modeled over a 10 year (120 month) horizon, despite the fact that some loans are renewable, and some have a longer or shorter lifespan. With the current model assumptions there is very little of the portfolio left after this time though, and such factors are likely absorbed into parameter uncertainties.

What follows is a brief overview of how the model generates expected cashflows from a portfolio. Throughout we are tracking:

Bi**:** the total outstanding balance at the end of month i,
Ni**:** the number of active accounts at the end of month i,
Ai**:** the average account balance during month i.

Note that these definitions mean that, for example, B0 is the input total outstanding balance.

The model assumes a schedule of annual charge-off rates through the 10 year life of the model, and the monthly charge-off rates determined from these as:

$$\text{ChargeOffRate}_i = \frac{1}{12} \times \text{Annual Chargeoff Rate}$$

where the annual rate is that appropriate for the year in which month i lies.

The number of charged-off accounts each month is a fixed number based on this schedule and the initial number of outstanding loans:

ChargeOffNumberi = ChargeOffRatei × N0,

and the $ amount charged-off each month is then a fixed number based on this schedule and the initial number of outstanding loans (recall A0 = B0/N0 is the average initial loan amount):

ChargeOffAmounti = ChargeOffRatei × A0.

Closed accounts are similarly determined by a schedule of annual CPRs:

$$\text{SMM}_i = \frac{1}{12} \times \text{CPR}$$

where the CPR is that which is appropriate for the given year.

This notation may be misleading since for a flat prepayment rate on a mortgage pool one would normally have:

$$1 - \text{CPR} = (1 - \text{SMM})^{12},$$

in a given year, and since the input CPRs are relatively large, there is a material difference.

The number of closed accounts in month i is then a fraction of the number of outstanding accounts at the end of the previous month:

$$\text{ClosedAmount}_i = \text{SMM}_i \times N_{i-1},$$

and the amount my multiplication by the average balance at the end of the previous month:

$$\text{ClosedAmount}_i = \text{SMM}_i \times N_{i-1} \times A_{i-1}.$$

In the final month, all outstanding loans are assumed to be paid in full, which is treated as a prepayment in the model. Due to prior prepayments, there are typically very few open accounts left at this point.

The repayment rate is specified as a fixed annualized rate, and the repayed amount in month i is given by:

$$\text{Repayments}_i = \frac{1}{12} \times \text{AnnualRepaymentRate} \times (B_{i-1} - \text{ClosedAmount}_i),$$

where the current assumption is: AnnualRepaymentRate ~ 2%.

Note that repayments do not result in a change in the number of accounts.

Reference:
https://finpricing.com/lib/EqSpread.html