

MODELING CMO CASH FLOWS

Introduction

Since 1983, when Freddie Mac structured the first Collateralized Mortgage Obligation (CMO), A/L Managers strive to appropriately model CMO cash flows.

Some CMO structures are designed to provide the investor with some degree of prepayment protection. To accommodate this, criteria such as principal redemption suspension and lockout periods are used. When interest rates move and collateral prepayments change, these criteria can suddenly come into play and dramatically change the cash flow schedule.

As a specific example, some PAC CMOs have a protected prepayment speed range called bands. If the underlying collateral prepays within the specified band, the same principal redemption schedule is generally followed. If however, collateral prepay speeds move outside the band, the cash flow schedule can change greatly. If prepayments accelerate to the point that the band protection disappears, the PAC CMO is then referred to as a “busted PAC”.

This concept of controlling CMO cash flows suggests that CMO cash flows are largely driven by criteria that define the structure itself. These criteria can cause principal and interest payments to the bondholders to be different from the principal and interest payments received from the underlying collateral payments.

As a result, modeling most CMO cash flows to be like a loan or a pass-through MBS would be inappropriate.

Model Process Review

First, it is important to determine what interest rate simulation assumptions are used in your model. For example, assuming a changing rate scenario and using static rate CMO cash flows would not be ideal. Please see Exhibits 1 & 2 for examples of common interest rate assumptions used by many A/L Managers.

In interest rate risk simulations, it is not enough to simply apply a collateral prepay speed to each rate scenario simulation. Remember, there are criteria that govern the cash flow schedule. Many mid-range A/L models cannot handle these criteria and thus, the

resultant cash flows are probably flawed. In this case, CMO cash flows must be manually provided in the form of an override to the model.

EXHIBIT 1. Base Case Interest Rate Assumption

What base case interest rate assumption is used in your modeling process? Some popular examples of base case interest rate assumptions follow:

1. Flat Rate

All market rates remain fixed at the current market rate and never change throughout the forecasting periods.

2. Most Likely

All market rates move following a rate forecast. Rate forecasts can be provided by market analysts or generated internally.

3. Implied Forward

The preferred methodology for Value at Risk analysis, it uses exponential notation to forecast future rates off the current rate curve (usually Treasury or Swap curve).

EXHIBIT 2. Interest Rate Scenarios

Once a base case interest rate assumption is selected, “Stress Test” rate scenarios can be built off the base case scenario. Some popular examples of rate scenarios follow:

1. Parallel upward and downward rate shocks.

All market rates move instantaneously and equally up or down in specific increments. Often seen in 100, 200, and 300 basis point movements from current rates.

2. Parallel upward and downward rate ramps.

All market rates move evenly over a specified period of time up or down in specific increments. Often seen in 100, 200, and 300 basis point movements from current rates. Generally, the movement is evenly incremental and takes 6 or 12 months to fully achieve.

3. Yield curve twists or inversions.

A more advanced methodology where short-term rates move differently than long-term rates. For example, the 3 month Treasury Bill rate moves 100 basis points and the 30 year Treasury Note rate only moves 10 basis points.

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Shopping for CMO Cash Flows

As a solution, many firms such as Bloomberg, CMS BondEdge and Intex offer scenario dependent cash flows on a fee or subscription basis. When evaluating these services, it is important to consider the following:

1. Can they provide cash flows for all your bonds?
 - a. Sequential CMOs
 - b. PAC and TAC CMOs
 - c. Other Fixed CMO Structures
 - d. Variable Rate CMOs
 - e. Non-Agency/Whole Loan CMOs
2. Can they provide cash flows that are appropriate for your simulation?
 - a. Flat Rate Forecast
 - b. Changing Rate Forecast
 - c. Implied Forward Forecast
 - d. Rate Shock Scenarios
 - e. Rate Ramp Scenarios
 - f. Yield Curve Twists and Inversions
3. Can they provide cash flows in an appropriate time frame?
 - a. Timeliness
 - b. Cash flows match reporting period

When comparing CMO cash flow providers, don't forget about other costs such as adding future bonds to your subscription, equipment upgrades and private network access or high-speed internet connections needed to retrieve the cash flows.

Alternatives for Bloomberg Users

For those who have access, Bloomberg provides cash flow information for most mortgage-based products. Base case scenario input can be obtained by using the "CFT" function. This process has several limitations. First, the cash flows are on a single bond basis. If you hold several bonds in your portfolio, you must add the cash flows together to get aggregate cash flows for the entire portfolio or model each security individually. In addition, the "CFT" screen generally assumes a flat or static prepay speed. This is fine if you use a flat interest rate scenario for your base case. But, if you use a rate forecast or implied forward rates, the prepay speeds should be dynamic. Also, the cash flows have to be manually typed into a model. And, a new "CFT" table must be run for each rate scenario.

Advanced Bloomberg users can use the bulk API function (open Bloomberg) to pull individual CMO cash flows into a Microsoft Excel spreadsheet. A major limitation is that the cash flow results use a base case Bloomberg median prepay speed, and that prepay speed cannot be adjusted to calculate cash flows for different rate scenarios.

As an answer, Bloomberg provides a "PRSK" function that can be used to generate a cash flow report for an entire bond portfolio. A custom scenario set can be defined to create multiple cash flow results, each for different interest rate simulations. More specifically, each scenario could represent parallel shifts and use a flat or implied forward interest rate scenario. Further, the results could be directed to a report on the screen or dumped to an Excel spreadsheet that may make it easier to "cut and paste" into most A/L models. The "PRSK" function is limited in that there must be scenario dependent prepay speed assumptions already loaded in Bloomberg. Otherwise, the CMO will not be analyzed. This limitation excludes virtually all non-Agency CMOs.

Conclusion

Prepay speeds affect CMO cash flows. But, criteria governing the overall structure also play a role. When using CMO cash flows, make sure they apply to your specific interest rate assumptions.

Like many A/L model components, CMO cash flows are simply assumptions. These, like any assumption, may be different than actual performance in real live interest rate scenarios.

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