J.P.Morgan

Investor Guide to Agency CMOs

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Introduction

Structure Types

INTRODUCTION

1. An Overview of CMOs

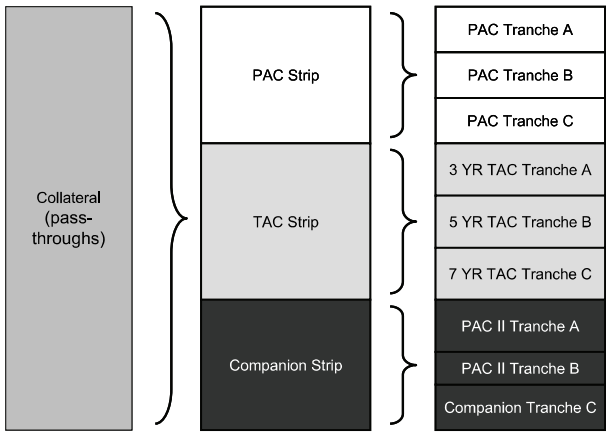
Collateralized Mortgage Obligations (CMOs)[1], have become one of the most successful products in U.S. fixed income market. Historically, pass-through investors are willing to take on prepayment uncertainty in exchange for higher yield to Treasuries. However, pass-throughs have a number of limitations. For some investors, the average life of a new pass-through is too long. For others, the duration is too short. For some, the prepayment risk is too great while others would welcome greater prepayment exposure. Some want more yield and others have sensitivity to the dollar price of the asset. Clearly, one size does not fit all. As a result, CMOs were developed to offer investors a wider range of duration and yield profile than is available from mortgage pass-through securities. CMOs allow investors to customize both the risks and rewards of owning mortgages backed securities. CMOs are securities or structures whose cash flow comes directly from a pool of mortgage related securities. Sometimes, CMOs with embedded leverage to prepayment are referred to as mortgage derivatives.

Fundamentally, pass-through securities provide a stream of cash flow based on principal and interest payment of the underlying mortgages. Pass-throughs can be pooled again to create collateral for more complex type of mortgage securities such as CMOs. The CMO structure, takes the principal and interest from a pool of assets—mortgage loans, mortgage pass-throughs, or even other CMOs—and allocates those cash flows to different CMO *classes or tranches* in a prescribed manner. Certain tranches would have higher priority of claim on monthly principal and interest over others. A group of tranches is also referred to as a *strip*. A strip can be further divided into different type of tranches customizing the average life and principal lockout period. Tranches based on a strip are restricted by the total cash flow allocated to that particular strip. (Figure 1)

CMO is effectively a technology that allows structurer to reorder the timing and size of cash flow from underlying collateral. For example, medium-duration collateral can be structured into a short-duration tranche and a long-duration tranche. As a result, each tranche/class can have characteristics in term of average life, yield, coupon and price different from the underlying mortgage pass-through securities. Each tranche is an individual security with its own CUSIP, maturity, coupon and other traditional features.

[1] Structured MBS also include Index Amortizing Notes or IANs, structures that use a pass-through or CMO as a reference security and derive IAN cash flows from those of the reference.

Figure 1: Example of an Agency CMO Structure



Source: JPMorgan, Bloomberg

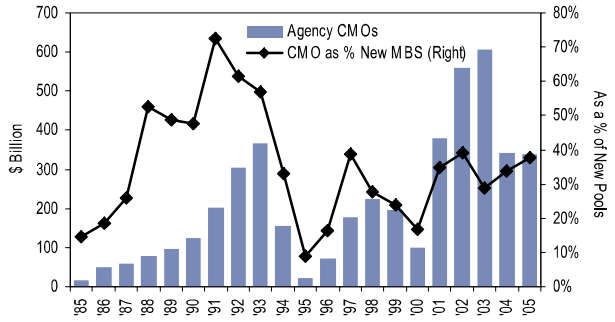
Cash flows can be allocated in many ways for CMO tranches. Typically, it is the top tranche that will receive principal payment first. Interest payment from the collateral is allocated on a *pro rata* basis to each class based on percentage of principal outstanding, unless specified otherwise by the CMO structure. Tranches currently receiving principal repayment is *active* or *currently paying*. Each CMO tranche has an estimated first payment date and an estimated last principal payment date. The period when investors receive interest-only payments before any principal payment is called *lockout period/window*.

With an Agency CMO, the principal and interest of collateral (Agency pass-throughs) are guaranteed by Fannie Mae, Freddie Mac, or Ginnie Mae. Investors are guaranteed timely payment of interest and principal regardless of collateral credit performance. The guarantee relieves the investor of any need to master the credit risk of the asset.

Because CMOs can tailor mortgage cash flows to the needs of a wide range of investors, the market has flourished since its inception in 1984. CMOs have become an important allocation in portfolios of banks, insurance companies, pension funds, money managers, and other investors, both domestic and international. Annual issuance has varied through the market's history, but CMOs have absorbed roughly a third of the available supply of Agency mortgage pass-throughs (Chart 1).

Popularity of mortgage derivatives can also be explained from an economic perspective. CMOs offer an efficient medium for investors to exchange unwanted risk embedded in pass-throughs with those who value these more, whether it's in the form of duration, convexity or volatility. Investor utility from the sum of parts (various

Chart 1: Agency CMO Issuance: Volume as a Share of New Pass-Throughs



Source: JPMorgan, Bloomberg

tranches) is greater than the utility from the whole (pass-through alone)

The sections that follow will lay out the structure of most common classes of CMO. For each structure, the guide covers these essentials:

- Key features
- Common uses
- Primary investors

2. The Process of Creating a CMO

Few markets match Agency CMOs in term of its flexibility to address specific portfolio needs. There are a wide variety of structures; collaterals are very liquid. Unlike corporate or government bonds, where issuers determine the timing of a bond issuance and features of securities, the features of an Agency CMO—timing, collateral and structure—are flexible and responsive to investor demands. Investors can make the trade-off between price, yield, duration variability, convexity, and liquidity.

Innovation in CMOs usually comes out of an ongoing dialogue between the structuring desk and the clients. Clients would indicate their risk preferences given current market conditions; the structuring desk would create a new class tailored specifically to meet that request. Multiple iterations are often necessary to structure a deal that appeals to clients and priced properly to market risk. The desk must constantly monitor bond price in the secondary market in order to ensure that new versions of a structure can be created at or below current market prices. A CMO desk also needs to estimate whether it can sell the leftover cash flows after structuring a class. After all, changing features in one class can affect other classes in the structure. If customizing one class impairs the pricing of others, then the structuring desk will need to adjust the pricing to compensate. A structuring desk must also monitor the price of pass-throughs. If the price of pass-through collateral rises or falls, then the economics of creating a new class may change dramatically. Good structurers often suggest alternative specifications that meet the client's needs more efficiently or at a lower price under prevailing market conditions.

For certain structures, a structuring desk can go back and forth with clients on features of an Agency CMO until a deadline set by Fannie Mae and Freddie Mac. The deadline is known as the *structure due-date*. It usually comes in the first 10-15 business days of the month. The desk may have priced and sold individual classes of the deal before the structured due date, but at this point all details are final.

Sometimes a dealer temporarily warehouses the collateral for an Agency CMO before the structure due-date, but the norm is for the dealer to buy pass-through collateral in the market after the deal closes. Dealer typically holds the collateral until the 30th day of the month, and then goes to Fannie Mae or Freddie Mac and exchanges the collateral for the CMO classes specified on the structure due date. Classes already sold then settle in clients' account; unsold classes go into dealer inventory.

Structures Types

3. Sequential Class (SEQ)

Summary

Key Features of Sequential-Pay Class	• Targeted average life and duration • Tighter principal windows than underlying pass-throughs collateral • Average life variability • Principal lockout for lower tranches • Principal window • Collateral
Common Uses	• Match the average life or duration of a liability • Manage yield curve exposure • Manage prepayment risk
Primary Investors	• Banks, thrifts and other depositories (Short-Term SEQ) • Money managers • Life insurance companies (Long-Term SEQ)

Key Features

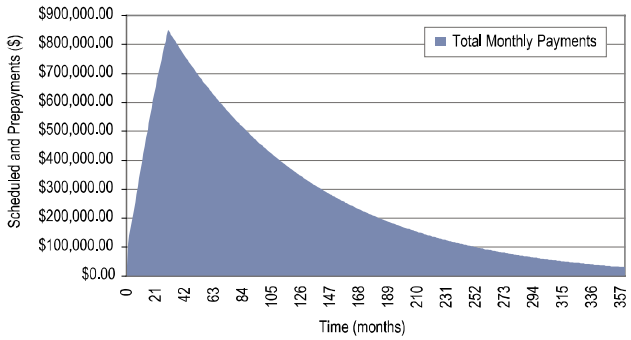
Sequential-pay classes, usually called Sequentials, were among the first and simplest CMO structures created. The name comes from the fact that principal of each tranches are paid off SEQUENTIALLY. Sequentials divide pass-through cash flows into multiple classes with different average lives. Collateral is time-tranched into front/short, intermediate and long average life tranches to accommodate WAL (Weighted Average Life) demands of different buyers. Both scheduled amortization and prepayments from the collateral go to the holder of the first tranche until that tranche pays down completely. Then, principal cash flow goes to the second tranche until it is paid off, etc. Interest payment is allocated pro-rata to principal outstanding.

This structure creates tranches/class with different average lives and durations. Tranches not receiving principal immediately are said to have *principal lockout*, and the period over which each class does receive principal is called its *principal window*.

For Sequentials, the underlying collateral prepayment performance is critical. Collateral determines each tranches' average lives and length of principal lockout and principal windows.

As an example, consider the cash flows from a $100-million pool of FNMA 7% 30-year pass-throughs. Unstructured, the pool offers investors a bond with an 8.8-year average life— assuming constant prepayment speed of 170 PSA (Charts 2 & 3). At different prepayment speeds, the average life will vary.

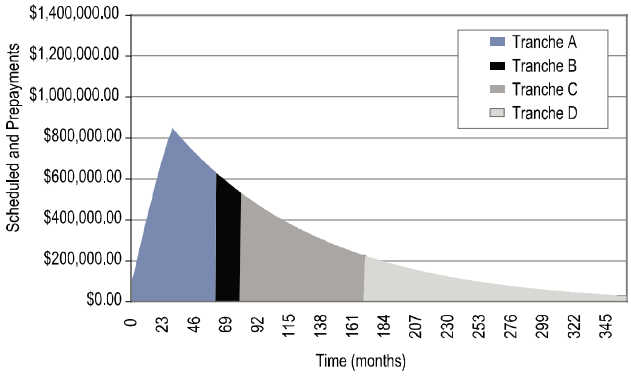
Chart 2: Monthly Payments of a Pass-Through



Source: JPMorgan

Chart 3: The Basic Sequential Structure, 170 PSA

Monthly Tranche Payments
$100,000,000 30 Year Sequential at 7.5% Coupon and 170 PSA



Source: JPMorgan

Table 1: An Example of a Sequential Pay Structure

Tranche	Size	Average Life (yrs)
A	$ 38,500,000	3.0
B	$ 10,000,000	6.0
C	$ 32,400,000	10.0
D	$ 19,100,000	20.0
Total	**$100,000,000**	**8.8**

*Structured at 170PSA

A CMO can split the pool into four Sequential tranches. In this hypothetical structure, tranche A receives the first $38.5 million of principal, whether through amortization or prepayment. Tranche B receives the next $10 million, and tranches C and D receive the balance sequentially. In practice, the number of tranches in a Sequential strip and each tranche's initial principal balances depend on the pass-through collateral, assumed prepayment speed and investor demand.

Because of the sequential principal payout, all but the first tranche in this example initially have principal

lockout and every tranche has different principal windows.

Although each tranche has an expected average life, the structure does not eliminate prepayment risk. If prepayments run faster than expected, every tranche's average live will shorten. And if prepayments come in slower, average live will extend. Sequential CMOs usually trade at a price and with a yield that reflects this prepayment risk. Sequentials are usually quoted on spread to US Treasuries, Swaps, Eurodollar (e.g. 140/C, 50/N, 19/E).

Common Uses

Investors have used Sequentials to match the duration of assets closer to their liabilities. Money managers can usually find a Sequential with an appropriate average life and window. The principal lockout feature provides some protection against spikes in prepayments because front tranches must be paid off first before an investor begins receiving excess principal payment.

Primary Investors

Sequentials have attracted a wide audience. Banks, thrifts and other depositories in particular like the average life and yield of short tranches. Money managers often invest in short or intermediate Sequentials as substitutes for pass-throughs. Insurance companies would buy the last class of sequential deals for their long duration and yield.

4. Planned Amortization Class (PAC)

Summary

Key Features of a PAC Class	• PAC bands • Targeted average life and duration • Principal lockout • Principal window • Collateral
Common Uses	• Reduce portfolio prepayment risk • Match the average life or duration of a liability • Manage yield curve exposure
Primary Investors	• Money managers • Banks and other depositories • Life insurance companies

While Sequentials address investor interest in MBS with different average lives, some investors still find the duration variability unmanageable. To further reduce average life variability, structurers created *Planned Amortization Class* (PAC) and the *Companion/Support Class*.

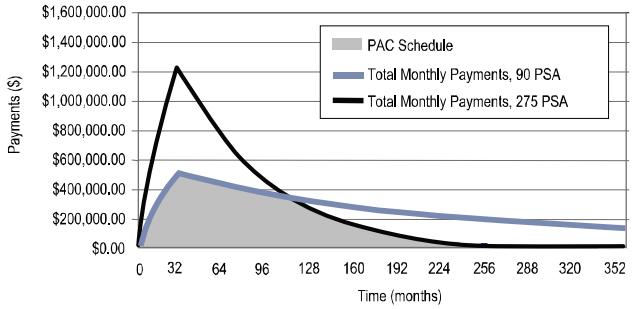
Collateral is separated into the PAC strip and the Companion/Support strip. Through this structure, PAC can keep its average lives stable over a range of prepayment rates at the expense of the Companion tranche. This structure effectively shifted undesired prepayment risk from the PACs to the Companions. Prepayment may rise or fall; PACs will still return principal on a predetermined schedule. PAC bonds not only fit more closely to an investor's liabilities from a duration stand point but also significantly reduce portfolio prepayment risk.

This structure has found a wide audience among investors willing to trade off some yield in return for a more predictable return of principal and consequently a more stable price profile than a comparable Sequential or pass-through.

Key Features

PACs return an investor's principal according to a specific schedule as long as prepayments stay within a specific range, which is often referred to as a *PAC collar* or *PAC band*. The schedule is created by taking the minimum of two amortization schedules—the lower and the upper band of the PAC collar (Chart 4). In the example, the security is designed such that it doesn't prepay faster than 275 PSA or slower than 90 PSA. Having the prepayment band gives PACs a much more defined and stable principal payment profile.

Chart 4: Creating a PAC Principal Repayment Schedule



Source: JPMorgan

Table 2: Average Lives of PAC Strip and Companion Strip at Varying Life Prepayment Speeds

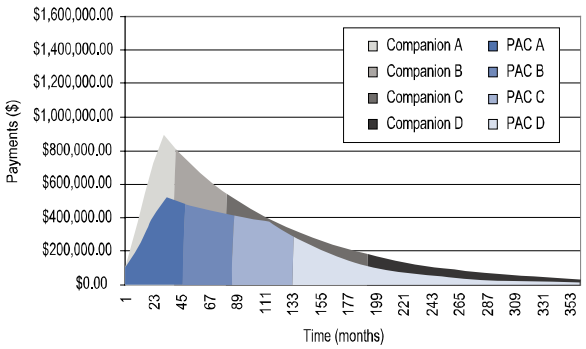
	50 PSA	125 PSA	175 PSA	225 PSA	350 PSA
PAC	8.5	7.7	7.7	7.7	6.7
Companion	21.9	15.3	10.0	6.2	3.1

Any principal inflow pays the PAC tranche up to its scheduled balance. If principal received in any month falls short of the amount needed to keep the PAC on schedule, additional principal in future months must go to the PAC until it returns to schedule. This is sometimes called a *catch-up feature*. Principal in excess of that needed to keep the PAC on schedule are absorbed by Companion tranche.

In Table 2, at speeds within the PAC collar (90-275 PSA), the average life of the PAC tranche remains constant at 7.7 years, while the average life of the Companion tranche fluctuates widely—for example, from 15.30 years at 125 PSA to 6.19 years at 225 PSA. *The Companion absorbs prepayment variability and provides stability to the PAC.* As prepayments rise, Companion tranche receives principal payments in excess of the amounts required to keep the PAC on schedule, thus shortening the Companion's average life. When prepayments fall, the Companion tranche receives less principal cash flow and its duration extends.

Just like a sequential strip, a PAC strip can be divided into additional tranches with different average lives (Chart 5). The purpose of further tranching the PAC is to provide effective prepayment lockout. Scheduled amortization and prepayments allocated to the strip go to each PAC tranche sequentially until all tranches are retired. Monthly interest payments from the pool are apportioned to the tranches based on outstanding principal. In the example below, the 5-year PAC (A) enjoys no lockout. The 7-year PAC (B) is locked out by

Chart 5: PAC and Companion Tranche Payments at 175 PSA



Source: JPMorgan

the 5-year PAC. *The longer the lockout, the greater prepayment stability for a tranche.*

Finally, it's important to remember that the effective prepayment protection of the collar on a PAC does not stay constant and changes as actual prepayments unfold. Changes to the PAC collar fall into three categories:

- *Speeds Above the PAC Collar.* At prepayment speeds above the upper band of the PAC collar, the Companion tranche in the structure pays off very quickly. Without Companion tranche's principal cushion, the effective upper band drifts down because the structure loses its ability to keep the PAC on schedule at the original upper PAC band. The drop in total outstanding principal also lowers monthly principal flow that comes from amortization and consequently weakens the structure's ability to keep the PAC on schedule at the original lower PAC band. The lower band drifts up. *Overall, the PAC collar narrows from both the upper and lower direction.* In the extreme, if the Companion tranche is 100% paid off, the PAC structure breaks and the investor is left with a cash flow almost identical to a Sequential.

- *Speeds within the PAC Collar.* At prepayment speeds close to the upper band of the PAC collar, the Companion class pays off at a relatively fast rate. The upper band stays in place since enough support principal remains to pay the PAC and divert any extra monthly principal to the Companion tranche. However, the lower PAC band drifts up. Less and less principal remains to provide the amortization required for the PAC to stay on schedule at slower speeds. At speeds close to the lower band of the PAC collar, the deal has relatively more principal outstanding. This helps keeping the PAC on schedule at speeds above the original upper band and below the original lower band. *In this case, the PAC collar widens from both directions.*

- *Speeds Below the PAC Collar.* At prepayment speeds below the lower band, the amount of principal outstanding is larger than projected; any PAC currently due to receive principal falls behind schedule. The upper band drifts higher because more Companion tranche remains to absorb excess prepayments. The behavior of the lower band depends on whether the PAC tranche is currently due to receive principal. PAC currently due to receive principal would fall behind schedule. The lower band drifts higher because the deal needs to prepay faster for the PAC to catch up to its schedule. For PACs currently locked out from receiving principal, however, the lower band drifts down. This widening of the collar for locked out PACs reflects the greater amount of support bonds available to protect against both fast and slow prepayments.

Common Uses

PACs add prepayment protection to a portfolio since principal gets returned according to schedule as long as Companion tranches remain outstanding. PACs have many of the same uses as Sequentials but often work better for portfolios that need more predictable principal return. PACs usually have more stability than pass-throughs or Sequentials. The trade-off is a lower yield. To compensate, PACs also have more convexity and a tendency to roll down the yield curve better.

Primary Investors

PACs are attractive to many investors but get particular attention from money managers. PACs' relative stability can make the structure a good substitute for U.S. Treasuries, Agencies and corporate bonds. And PACs allow money managers to take positions on the yield curve more efficiently than pass-throughs or Sequentials. Money managers typically buy 7-year papers. Banks and thrifts use PACs periodically to add prepayment protection, usually focusing on 5-year and shorter classes. The 10 and 20-year PACs often go to insurance companies.

5. Targeted Amortization Class (TAC)

Summary

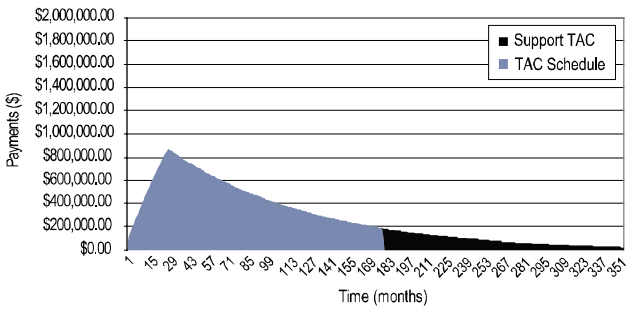
Key Features of TAC Class	• TAC speed • Targeted average life • Principal lockout • Principal window • Collateral
Common Uses	• Reduce MBS call risk • Match the average life or duration of a liability • Maintain portfolio yield
Primary Investors	• Banks and other depositories • Life insurance companies

Targeted Amortization Class or TAC provides a compromise between lower yielding PACs and Sequentials with higher prepayment risk. It delivers protection against faster prepayments only. This feature gives the TAC more negative convexity than a PAC because the TAC extends more as interest rates rise. Because it has less protection than a comparable PAC, a TAC typically trades at a higher yield. TACs have attracted investors that want to give up extension protection in return for higher yield.

Key Features

Like PACs, TACs repay principal according to a schedule. Unlike PACs, however, the TAC redemption schedule is created from a single prepayment speed rather than the minimum of two speeds. For example, the TAC speed is 175 PSA and is expected to have a predefined principal schedule (Chart 6). If prepayment speeds exceed the one used to define the TAC schedule, excess principal goes to the Companion class. If prepayment speeds fall below the speed used, both the TAC and the Companion tranches extend, receiving less principal payment.

Chart 6: Principal Repayment of an $85,000,000 TAC Bond and a $15,000,000 Companion Structure
Principal Cash Flows at 175 PSA



Source: JPMorgan

Just like Sequentials and PACs, TACs can be further divided into tranches with different average lives. Each TAC tranche pays down fully before the next tranche gets any principal. Monthly interest payments from the underlying collateral are apportioned to each class based on outstanding balance.

As with PACs, the cash flows in a TAC depend on the path of interest rates and the prepayments over the life of the security. A few scenarios are worth mentioning:

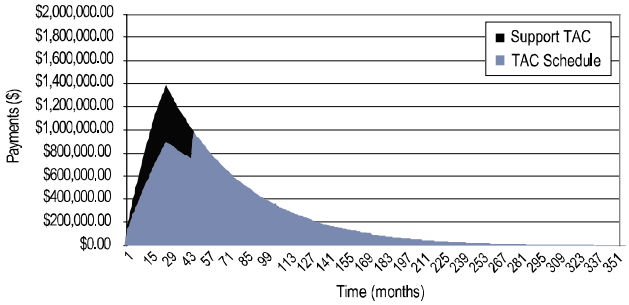
- *Speeds Below the TAC Speed.* At speeds below the TAC speed, both the TAC and Companion tranches extend. Companion tranches are structured to receive payments only after the TAC schedule is satisfied. At sustained slow speed, more supports remain outstanding than projected at the original TAC prepayment speed. The TAC may actually develop a narrow collar—like a PAC—where speeds above the TAC speed still allow the structure to remain on schedule. (Table 3)

Table 3: Weighted-Average Lives of TAC Tranches at Varying Prepayment Speeds

PSA:	TAC A (3yr)	TAC B (5yr)	TAC C (7yr)	TAC D (10yr)
170	1.97	4.40	7.46	12.23
175	*1.94*	*4.32*	*7.30*	11.96
200	*1.94*	*4.32*	*7.30*	12.16
250	*1.94*	*4.32*	*7.30*	13.07
300	*1.94*	4.21	6.71	12.80
350	*1.94*	4.32	7.30	13.07
400	1.90	3.49	5.31	9.98
450	1.85	3.23	4.83	8.97
500	1.79	3.02	4.44	8.13

*Shaded background highlights constant average lives as prepayment rates increase (left panel).

Chart 7: TAC and Companion Tranche Principal Payments at 300 PSA
Principal Cash Flows at 300 PSA



Source: JPMorgan

- *Speeds Well Above the TAC Speed.* With sustained fast prepayments, the Companion tranche supporting the TACs pay off completely and the TACs receive unbuffered principal just like Sequential class. In this situation, the TAC structure breaks and begins to receive principal much earlier than scheduled (Chart 7). The TACs' weighted average life shortens.

- *Speeds Moderately Above the TAC Speed.* With prepayments only moderately faster than the pricing speed, the Companion tranches help maintaining the schedules of shorter TACs by absorbing excess cash flows. However, TACs with longer average life have less call protection because the Companion tranche provide less principal cushion with time. Therefore, shorter TACs have a wider prepayment protection band compared to longer TACs. In the example above, TAC A will have call protection up to speed of 350 PSA while TAC B and C only protect up to 250 PSA.

Common Uses

TACs attract investors that want higher yield than PACs but more call protection than Sequentials. TAC structure helps protect against fast prepayments.

As with Sequentials and PACs, TACs with different average lives also let portfolios line up assets with liabilities. Principal lockout and window help manage prepayments and positioning along the yield curve.

Primary Investors

Banks and other depositories usually make up the most active investors in TACs since the yield in the structure appeals to these investors.

6. Companion/Support Class (SUP)

Summary

Key Features of Companion Class	• High yield • Average life variability • Principal window • Collateral
Common Uses	• Maintain portfolio yield • Express a view on prepayments
Primary Investors	• Banks and other depositories • Retail investors

While many investors find the stability of SEQs, PACs and TACs attractive, others want higher yield and are willing to take on additional risk. For portfolios that need high current income, taking on prepayment risk in Agency MBS is one way to add income without exposing oneself to credit risk.

Key Features

Companion tranches act as prepayment cash flow shock absorbers for PACs and TACs. At fast prepayment speeds, Companions absorb any principal in excess of the amount needed to keep the PACs or TACs on schedule. Its average life shortens dramatically. At slower prepayment speeds, Companions are behind PACs and TACs when it comes to principal payments. Its average life would extend. Because Companion tranches leverage the prepayment risk in the underlying collateral, understanding characteristics of the underlying collateral is critical.

Companion tranches—often called the Companion strip when grouped together—can vary dramatically in average life as interest rates and prepayments fluctuate during the life of the security. The more PAC or TAC tranches there are in a structure, the more volatile the average life of the Companion. Typically, volatility in average life is also associated with greater negative convexity. To compensate for the risk, Companions trade at much higher yield.

Just like a PAC strip or TAC strip, a Companion strip itself can be structured into different tranches.

- *Companion Sequentials.* This approach simply divides up the Companion strip into separate tranches that pay down sequentially. The first Companion tranche receives principal until it expires, then the second receives principal until it expires and so on. These tranches differ in lockout, principal window, average life, convexity and yield.

- *PAC IIs.* This approach creates a new set of tranches within the Companion strip, PAC II and Companion/Support tranches. PAC II tranches receive principal according to a schedule defined by a PSA collar, similar to a normal PAC I. However these receive principal only after any PAC I in the deal. A PAC II typically has a narrower collar than a PAC I. A PAC II might have a collar of 125-225 PSA in a deal where the PAC I has a collar of 100-250 PSA. If the Companion/Support tranches pay off, then the PAC IIs begin to behave like Companion Sequentials, which provide prepayment protection for the PAC I. The PAC II can be structured into tranches with different average lives.

- *Companion TACs.* This structure creates TAC tranches out of the Companion strip. A single prepayment speed defines the companion TAC's schedule, and principal goes first to pay the TAC down to its scheduled balance. Any excess principal goes to other Companion tranches. Companion TACs generally break faster than normal TACs because Companion TACs get its protection from a smaller set of Companion/Support tranches. Companion TAC can be structured to have different lockout, principal windows and average lives.

- *Others.* The other structures carved out of Companion cash flows range from FFIEC bonds to Companion Z bonds to a host of other mortgage derivatives.

The presence of PAC IIs or Companion TACs in a structure means that any remaining Companion tranches are even more sensitive to prepayments than the original Companion strip.

Common Uses

Companion classes in their various forms usually go to investors looking to maximize portfolio yield. After all, Companions have greater average life variability than Sequentials, PACs, TACs or the underlying pass-throughs. For portfolios expressing the view that interest rates and prepayments would be stable, Companions can be excellent vehicles for capitalizing on that stability.

Primary Investors

The high yield of Companions typically appeals to bank and thrift portfolios and retail investors, groups that often need yield and current income. Companions priced at deep discounts to par and with potential to prepay quickly also attract total return portfolios that expect prepayments to rise.

7. Non-Accelerated Senior Class (NAS)

Summary

Key Features of NAS Class	• Principal lock out for a specific period. Usually diverted to a Short Sequential • Back-loaded principal repayment • The size of the NAS class as a percent of the total deal—a signal of the stability of the NAS class' average life • The underlying collateral
Common Uses	• Reduce portfolio prepayment risk • Match the average life or duration of a liability • Manage yield curve exposure
Primary Investors	• Money managers • Banks and other depositories • Insurance companies

Non-Accelerated Senior or NAS classes offer the same properties as a PAC, but with one important difference. Its structure stands up better to wide swings in prepayments. Although PACs return principal predictably if prepayments stay within a predetermined range, wide swings in prepayment speeds can erode the PAC bands and leave an investor holding a cash flow almost identical to a Sequential. For investors trying to match MBS assets against liabilities, eroding PAC bands create challenges. And for investors managing for total return, eroding bands can hurt price performance. NAS classes solve the challenges of PAC band drift while still offering principal lockout and the flexibility to customize principal windows and average lives.

Key Features

Normally, a non-sequential tranche would receive the full amount of its pro-rata share of principal repayment. For example, in a month where the unpaid principal balance in the tranche amounted to 20% of total unpaid principal in the deal, the pro-rata amount would be 20% of any repaid principal. If the underlying collateral generated $10 million amortization and prepayments in one month, the pro-rata amount for the tranche would be $2 million.

To achieve greater duration stability, NAS class doesn't receive the entire $2 million principal repayment. Instead it would only receive a percentage of $2 million. This percentage changes over time according some rules. This is called a *shifting interest schedule* since the NAS class' interest in or share of pro-rata principal shifts or changes over time.

The rules usually define the NAS percentage as a fraction of the principal that would flow to the tranche if it simply received its pro-rata or fair share of amortization and prepayments. The percentage actually paid to NAS is a fraction of the pro-rata amount. If the underlying collateral generates $2 million principal payment in one month, a 0% share of the pro-rata amount would tally to $0, a 20% share to $400,000 and a 100% share to $2 million. Classic NAS receive 0% of the pro-rata amount for the first five years, 30% for the sixth year, 40% for the seventh, 60% for the eighth, 80% for the ninth and 100% for the tenth and later years. In situations where the NAS is the only remaining class in a deal, it gets 100% of any repaid principal regardless of the shifting interest schedule.

By assigning NAS class 0% share of its pro-rata principal for its first few years, NAS class is effectively locked out from receiving any principal. During this period, every other class in a deal would have to pay down before the NAS would get its first dollar of principal. That can buffer the NAS from dramatic swings in prepayments. The quality of that buffer depends on the percentage of the total structure that lies outside of the NAS class. The smaller the NAS class, the more collateral there is in the structure to buffer NAS against prepayments.

Common Uses

NAS classes serve the same investment purposes as PACs, adding stability to the return of portfolio principal. For asset-liability mangers, that stability can help the portfolio pay off liabilities scheduled for certain periods or can help avoid the reinvestment risk that would come with uncertain principal return. For managers focused on total returns, the stability of NAS principal makes the structure useful for creating exposure to different parts of the yield curve. Since NAS offer more reliable principal repayment than pass-throughs or even PACs, it carries a lower yield in return.

Primary Investors

NAS classes attract a wide audience but get particular attention from money managers and insurers. The NAS' principal stability makes the structure competitive with U.S. Treasuries, Agencies and corporate bonds. Since typical NAS structure has average life that is between 7 and 10 years, the structure has its greatest appeal to portfolios that target securities with intermediate duration.

8. Z Bond and VADM

Summary

Key Features of Z-Bonds and VADMs	Z-Bonds • A zero-coupon class until the principal window opens • Rising principal balance • Support other structures — Sequential, PAC, Companion, other VADMs • Easily determined maximum average life • No risk to structure from interest rate whipsaw
Common Uses	Z-Bonds • Increase portfolio duration • Increase portfolio yield VADMs • Reduce extension risk
Primary Investors	Z-Bonds • Insurance companies VADMs • Money managers

Structures presented so far (SEQ, PAC, TAC etc) focused primarily on the division of principal cash flow. Interest cash flows from the collateral were distributed pro-rata as a function of principal outstanding. In contrast, VADMs and Z bonds not only reorder principal payment but also rearrange interest payment to achieve desired risk profiles.

Z bonds attempt to meet the needs of investors looking for a combination of long duration and high yield. Z bonds create duration and yield by initially deferring payment of their coupon and principal. This is the origin of their name, since they often get compared to zero-coupon Treasuries. Z bonds support other tranches by deferring interest and principal until others are paid off.

Very Accurately Determined Maturity classes or VADMs address an entirely different concern—extension risk. VADMs provide a guaranteed final date for receipt of MBS principal and a maximum weighted average life even if prepayments drop to zero. For investors who need certainty around final return of principal, this structure provides significant value.

Z BOND

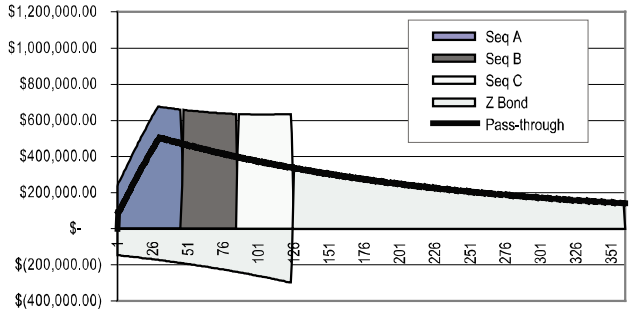
Key Features

The cash flow of a Z bond falls into two phases:

- *Accrual Phase.* During the accrual phase, the Z bond receives no interest payments. Interest due to the Z is redirected toward paying down outstanding balance of other tranches. Z bond's principal balance increases each month by the amount of deferred interest; Z's principal balance grows over time at the stated coupon rate, compounding at the payment frequency and avoiding any reinvestment risk. This accrual mechanism continues until other tranches in the structure has been paid off. At that point, the accrual phase ends. Typically, a Full Z bond doesn't receive principal or interest until tranches with higher priorities above get fully paid off.
- *Payment Phase.* Z bond begins to receive both monthly principal and interest until it is finally paid down.

The effect of adding a Z bond to a Sequential deal best illustrates the benefits. Additional principal payments to the Sequential tranches (Chart 8, area above the pass-through line) come from deferred interest of the Z bond. Replacing the last Sequential tranche with a Z bond shortens average lives across all tranches in the structure, as deferred interest accelerates the amortization of these tranches (Table 4).

Chart 8: Principal Cash Flows at 90 PSA
Principal Repayment at 90 PSA
30 Year, 7%, $100,000,000 Pass-through



Source: JPMorgan

Table 4: Weighted-Average Lives When Tranche D is Converted from Sequential to a Z Bond

Effect of Adding a Z Bond on WAL	90 PSA			
	All Sequential	With a Z	Effect	% Change
Tranche A	3.1	2.3	Shortened	-26%
Tranche B	8.0	5.5	Shortened	-31%
Tranche C	14.4	8.8	Shortened	-39%
Tranche D	23.8	18.8	Shortened	-21%

Moreover, the average lives of all tranches are less volatile for structures with a Z bond (Table 5). This is because Z bond interest payment (diverted to Sequential tranches) is relatively insensitive to short-term changes in prepayments, creating stable principal cash flow.

Table 5: Percent Change in Weighted-Average Lives When Prepayment Speeds Increase from 90 PSA to 175 PSA

90 to 175 PSA	All Sequential	With a Z Bond
Tranche A	-29%	-21%
Tranche B	-37%	-27%
Tranche C	-37%	-26%
Tranche D	-25%	-23%

Replacing the bottom Sequential with a Z bond shortens the duration of higher tranches but lengthens the duration of the Z as a result of lockout and its accruing principal balance. Because a Z bond has zero cash flow in the accrual phase, the cash flows are weighted towards the end of the Z bond's life, extending its duration. (Table 6). Z bond embodies extension risk.

Table 6: Effect on Duration of Restructuring a Sequential as a Z Bond, 175 PSA

Effect of Adding a Z Bond on Duration	175 PSA			
	All Sequential	With a Z	Effect	% Change
Tranche A	1.9	1.6	Shortened	-15%
Tranche B	4.1	3.4	Shortened	-17%
Tranche C	6.4	5.0	Shortened	-22%
Tranche D	9.5	12.1	Lengthened	27%

The price of a Z is highly sensitive to changes in interest rates because of its longer duration. Z bonds therefore typically offer higher yields than comparable Sequentials or zero-coupon Treasuries.

Common Uses

Rising principal balance and the absence of any coupon are features that increase duration. Z-bonds offer duration that rivals the duration of a 30-year Treasury bond. The structure appeals to portfolios looking to replace Treasuries, Agencies or corporate bonds with higher yield securities.

Primary Investors

Life insurance companies traditionally dominate the market for Zs, which match well against long-term liabilities. Money managers occasionally buy Z bonds for duration and yield. Companion Zs, which can sell at prices well below par, appeal to some investors that want to peculate on rising prepayments.

VADM

Key Features

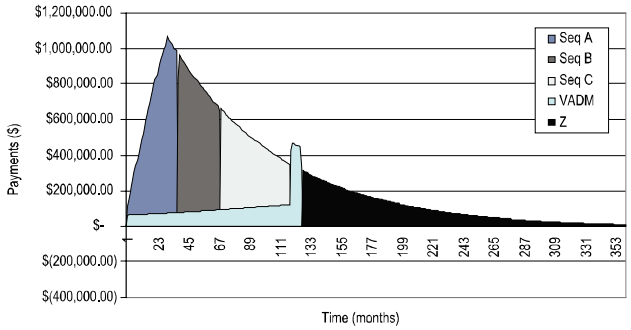
A *Very Accurately Determined Maturity Bond* or VADM is a CMO class designed to provide protection against extension risk. Its total cash flows are derived from the deferred interest of a Z bond. The cash flow is more certain because interest payment is much less sensitive to prepayment. VADMs do not extend even under a zero prepayment scenario.

To ensure that VADMs are protected against extension, VADMs are structured for the worst prepayment (or lack of therefore) scenario. The last cash flow of the VADM is determined by the size of Z and its deferred interest payment at 0 PSA.

To achieve longer average life and some degree of call protection, VADMs are combined with Sequential tranches (Chart 8). In the event of faster prepayment, Sequentials will absorb the excess principal payment. Therefore, average lives of VADMs can remain stable within a range of prepayment speeds, usually between 0-200 PSA. VADMs consequently have a fixed maturity until prepayment rates rise excessively and cause the Sequential tranche to pay off early. At this point, the principal balance of the Z bond stops accruing and the VADM begins receiving principal earlier than it would if prepayment speeds were slower. Table 7 reveals that the weighted-average life of a VADM will remain constant

Chart 8: Principal Cash Flows at Faster Prepayment Speeds

Z/VADM Tranche Payments at 225 PSA



Source: JPMorgan

at slower prepayment rates and will decrease at prepayment rates above the pricing speed.

Table 7: A Z/VADM Structure at Different Life Prepayment Speeds

WALs at Varying Prepayment Rates	0 PSA	90 PSA	175 PSA	225 PSA	500 PSA
Seq A	9.0	3.1	2.2	1.9	1.3
Seq B	19.0	8.0	5.1	4.3	2.6
Seq C	24.5	14.4	9.2	7.5	4.0
VADM	6.9	6.9	6.9	6.7	4.7
Z Bond	28.4	23.8	17.9	15.8	8.8

*Shaded highlighting represents protection against extension risk at prepayment speeds below the pricing speed (175 PSA)

When the Sequentials are paid off before the VADM pays down completely, Z bond's principal amortization must be deferred until the VADM is fully amortized. All principal cash flows from the underlying collateral, as well as accruing interest on the Z bond, are directed to paying down the VADM. Once the VADM matures, the Z bond begins amortizing its accreted balance.

Common Uses

VADMs fit extremely well in portfolios that want protection against extension risk and that want to avoid the kinds of structural changes found in PACs as interest rates vary. The effective PAC bands can change over time, and a period of fast prepayments followed by slow prepayments could lead to unexpected extension for PACs. *VADMs do not have this whipsaw risk.*

Primary Investors

VADMs cater to a wide range of investors depending on changing preferences for extension risk. Because VADMs require the presence of a Z-bond in the structure, VADMs show up much less often than PACs or Sequentials and are in smaller tranche size.

9. CMO Floaters

Summary

Key Features of Floating-Rate Class	• A floating-rate coupon based on floating-rate index + margin • A cap on the coupon • The underlying fixed-coupon class
Common Uses	• Limit interest rate risk • Earn a spread to floating-rate funding
Primary Investors	• Banks and other depositories • Money managers

Not all investors want the interest rate risk associated with a security with fixed coupon. For those investors, the CMO market has developed floating-rate classes. Floating-rate CMOs have coupons that reset periodically reflecting changing interest rates—as long as rates remain below a predetermined maximum or *the cap rate*. Floating-rate coupon keeps the price of the security around par, although this becomes more difficult or even impossible when market interest rates approach or exceed the cap rate. This structure can have tremendous value for investors who want to reduce price volatility of their MBS holdings, or for investors who finance their MBS using floating-rate funding.

Key Features

Structuring a Floater starts with a fixed-coupon security. The underlying securities can take many forms—Pass-through, Sequential, PAC, TAC etc. The fixed-coupon MBS will be split into two new classes—a floating-rate class and an inverse floating-rate class, referred to as the *Floater* and *Inverse Floater*. Two key considerations figure in the structure of these two classes:

- The total principal cash flow going to the Floater and Inverse Floater can never exceed the principal payment going to the parent fixed-coupon class, and
- The total interest cash flow going to the Floater and Inverse Floater can never exceed the interest going to the parent class

These limitations are the reasons for the cap on coupon rate. For example, a dealer could take $100 million pass-through with a 6.0% coupon and create $100 million Floater. However, the maximum possible coupon or cap for the Floater must be 6.0%. Otherwise, the Floater coupon might require more interest cash flow than is available from the collateral. If the dealer carved out a $50 million Floater instead, the maximum cap would be 12.0%, or just enough to exhaust the interest available.

Alternatively, the dealer could also elect to set a lower cap for the Floater and divert the unused interest payment to another part of the CMO structure. With 6% fixed coupon from the underlying, the Floater could pay 3M-Libor capped at 6%, the Inverse Floater could pay 6% - 3M-Libor floored at 0%.

The other key features of a Floater are its *index* and *margin*. The index is the reference interest rate that determines the size and the reset frequency of the Floater coupon. Common indices are 1M to 6M-LIBOR. The margin is the spread of the coupon over the index. A Floater with a 1M-LIBOR index and a 50 basis point margin would have a coupon that resets monthly to 1M-LIBOR + 50 basis points. The coupon would reset according to this formula as long as the total interest rate remain less than or equal to the Floater's cap. The index value where the Floater coupon hits its cap is called the *strike*.

Funding mismatch is an issue for CMO Floater investors who finance their securities through the repo market. The challenge comes from the fact that Floater coupon arrives with 14 or 24-day delays for pass-through and most CMOs. The delay creates a mismatch between the date when one receives the coupon income and the date when one pays for financing. For these investors, dealers can structure 0-day delay Floaters. This way, investors can settle both their purchase and financing on the same day and cover financing costs without any mismatch in timing.

Another important element of CMO Floater discussion is the *discount margin*. The term describes the degree to which Floaters trade above or below par. The discount margin represents the difference between the Floater's projected yield and the current index level. For a par Floater, discount margin equals the margin. For a floater trading above par, the yield takes into account the need to amortize the price premium, and the discount margin consequently is less than the margin. And for a floater trading below par, the yield incorporates the price discount, and the discount margin is greater than the margin. The concept is similar to yield spread to treasury for fixed-coupon instrument.

The key features of a floater are summarized in Table 8. The interplay between a Floater's cap and its structure is the most important aspect of understanding this security. The longer the Floater's average life, the greater the chance that the floating coupon would hit its cap. Once the coupon is near the cap, a Floater trades like a fixed-coupon MBS. Floaters, for this reason, do not always trade at par. In fact, some floaters with low caps and long average lives can trade well below par. To compensate for the price risk, investors are paid large margins over the reference index. Investors should

understand the trade-off between cap, average life and margin in order to find the Floater that provides the appropriate mix of risk and reward.

Table 8: Key Features of a CMO Floater

Feature	Definition
Structure	The underlying fixed-coupon securities from which the floater was structured (Pass-through, Sequential, PAC, TAC or Companion)
Index	The reference interest rate that determines the size and the reset frequency of floating coupon
Margin	The spread of the Floater coupon over the index
Cap	The maximum value of the Floater coupon
Strike	The level of the index where the coupon hits its cap
Delay	The number of days between the end of the accrual period for the Floater coupon and the payment of the coupon, such as 0- or 24-day delay
Discount Margin	The difference between the yield of the Floater and its index; Used to estimate the effective margin for Floaters priced above or below par

Common Uses

CMO Floaters work well in portfolios that want short-duration, relatively liquid structured MBS. Portfolios benchmarked to a floating rate also find CMO Floaters useful. Some portfolio managers use the most liquid CMO Floaters as a way to enhance returns on cash.

Investors can "uncap" the Floater by purchasing a cap in the interest rate derivatives market at the same strike. The combined value of the Floater and the cap stays closer to par and behaves like a pure floating rate security. An investor holding a CMO Floater indexed to 1M-LIBOR, for example, could buy a cap on 1M-LIBOR that amortizes roughly in line with the principal balance of the Floater. If 1M-LIBOR rises above the Floater cap, the cap purchased from the derivatives market will be in-the-money.

Primary Investors

U.S. banks and thrifts, as well as international banks with U.S. dollar deposits, have typically invested in CMO Floaters. The floating coupon matches the funding costs of depositories. U.S. money managers also have invested steadily in this area as a way to enhance returns in a range of short-duration portfolios with total return mandate. CMO Floater is part of a group of short-duration assets with some spread over commercial paper and other traditional cash proxies.

10. CMO Inverse Floaters

Summary

Key Features of Inverse Floating-Rate Class	• A coupon that floats inversely with changes of an index – higher value of the index leads to a lower coupon, and lower value of the index leads to a higher coupon • The amount of leverage embedded in the structure (multiplier)
Common Uses	• Yield Enhancement • Interest-Rate Play • Floating-rate portfolio hedge • To add long duration to a portfolio
Primary Investors	• Hedge funds and money managers • Insurance companies

Key Features

Floaters and Inverse-Floaters are usually paired together. Using the previous example, a $50 million bond with 6% coupon can be split into $100 million Floater paying 3M-Libor with a cap at 6% and $100 million Inverse Floater paying 6% - 3M-Libor. The cap on the Floater's coupon puts a floor on the Inverse Floater's coupon. If, in the example above, the Floater's coupon is capped at 6%, then the Inverse Floater's coupon can be as low as 0%. If instead the Floater cap is 4.5%, then the floor on the Inverse's coupon is 1.5%.

In the example, the ratio between face value of Floater and Inverse Floater is 1. However this doesn't have to be the case. One can divide the bond into $150 million Floater and $50 million Inverse Floater. The ratio or *multiplier* would be 3. This would mean that the Inverse Floater coupon changes by 3 bps for 1 bps change in 1M-Lbor, creating leveraged exposure to floating interest rate. As the leverage is increased on the Inverse Floater, its multiplier and coupon cap also increase whereas the Floater coupon cap must decrease.

Floater has a small positive duration. Therefore, the price volatility due to interest rate is transferred to the inverse floater (typically a much longer duration). Furthermore, price behavior of Inverse Floaters is also dependent on the shape of the yield curve. For example, if the curve bull-steepens, short-term coupon would increase but the effect is offset by smaller coupon in the future. Given the large number of potential scenarios, investors should use a simulation approach to analyze the specific characteristics of an Inverse Floater.

Common Uses

Inverse Floater is a good candidate for yield enhancement for those willing to assume some price risk. Furthermore, it also allows an investor to take a leveraged position on the direction of interest rate. For those investors holding Floaters, Inverse Floater is a natural hedge for some of the interest-rate risk. Adding Inverse Floater would lengthen duration and lower the sensitivity of portfolio to changes in short-term rates.

Primary Investors

Hedge funds and money managers have been the primary investors in Inverse Floaters, with insurance companies participating occasionally. Money managers have used the structure to add leverage to a portfolio. Insurance companies have bought Inverses for their long duration, and to earn the extra yield.

11. Trust IO/POs and Structured IO/POs

Summary

Key Features of Interest-Only and Principal-Only Class	Interest-Only (IO) • Pays interest on underlying MBS but no principal • Can be structured using many types of underlyings • Has negative duration—price rises as rates rise, and price falls as rates fall Principal-Only (PO) • Pays principal on underlying MBS but no interest • Can be structured using many types of underlyings • Often has long duration and positive convexity
Common Uses	Interest-Only (IO) • To shorten portfolio duration • To add yield or carry • To hedge PO in portfolio Principal-Only (PO) • To add portfolio duration or convexity • To hedge IO in portfolio
Primary Investors	• Hedge funds and money managers • Mortgage servicers

No securities show the impact of prepayments on MBS more clearly than Interest-Only (IO) and Principal-Only (PO) strips. These structures, among the oldest in the CMO market, create unique tools for managing interest and prepayment risk because of their extreme convexity profile. They can play versatile roles in fixed income portfolios

The IO/PO market falls into two areas:

- Trust IO/POs
- Structured IO/POs

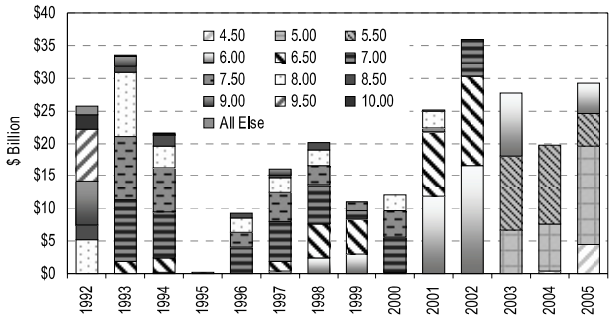
Trust IO/POs

Key Features

Trust IO/POs are created by separating or stripping apart the interest and principal payment of pass-throughs. The pass-throughs go into a trust created solely to produce the new securities. The IO class receives all interest, and the PO class receives all principal. Pass-throughs are the pure building blocks of Trust IO/PO market.

New IO/PO trusts typically come together through the joint efforts of several dealers responding to investor demand. Billions of dollars go into new IO/PO trusts every year (Chart 9). Either Fannie Mae or Freddie Mac can set up the new trust and coordinate the issuance syndicate. Each participating dealer announces the amount of pass-throughs that the firm will contribute to

Chart 9: Issuance 1992 - 2005 of New Trust IO/PO by Coupon



Source: JPMorgan

the new trust. At settlement, the dealer pays a fee and exchanges the committed amount of pass-throughs for an equal face amount of new IO and PO. A dealer contributing $100 million of pass-throughs to a new trust, for example, would receive $100 million of the new IO and $100 million of the new PO[2]. Together, cash flow from IO and PO tranches matches those from the underlying pass-throughs, making the transaction an even exchange. In fact, Fannie Mae and Freddie Mac allow dealers or any investor to exchange a matched amount of IO and PO for the same face amount of the underlying pass-throughs. Among other things, this usually prevents the combined price of the IO and PO from falling below the price of the corresponding pass-throughs. If it did, the market would recombine the IO and PO and sell them at the higher pass-through price.

Separating pass-throughs into IO and PO creates securities with prepayment and price profiles that differ dramatically from each other and from the parent pass-through. This is the appeal of mortgage strips — the unique features of IO/PO make them useful in a much wider range of applications than the pass-through alone. A trust backed by pass-throughs priced at $100-00 might produce an IO priced at $25-00 and a PO priced at $75-00. As interest rates change, however, those prices move in dramatically different ways.

IOs benefit from rising interest rates, which drive prepayments down. As principal remains outstanding for longer period of time, additional interest payments are made to holder of IOs. The impact of additional future interest payment is much greater than that of higher discount rates. As a result, higher interest rates lead to

[2] The trust also contains other classes besides the simple IO and PO. Synthetic Pass-through Securities or SPS combine IO and PO in different proportions, creating securities with coupons ranging from 0.50% to as much as twice the coupon of the underlying pass-throughs. These trade less frequently than the simple IO or PO. One advantage of SPS is to allow a portfolio to hold combinations of IO and PO without showing them separately on their books.

higher bond price (and vice versa), a characteristic that gives IOs negative duration. IOs also often have large negative convexity—a drop in interest rates driving down the price much more than a similar rise in rates drives price up. (Chart 10) As with most MBS, significant negative convexity usually comes with high yield to compensate for the risk[3]

POs benefit from falling interest rates, which increase prepayments as borrowers refinance. Prepayments return principal at par, and, because PO investors usually buy the bond at deep discount to par, the quick return of principal at par produces significant price gain. PO price rise as interest rates fall. The opposite occurs when interest rates rise. Higher rates put the brakes on prepayments; principal payback is pushed further into the future. PO price consequently falls. This pattern gives POs long effective duration. Unless PO price is near par, it usually has positive convexity (Chart 11). In other words, a drop in interest rates drives up the price more than a comparable increase in interest rates. Because of this positive convexity, POs often trade at modest yields.[4]

In general, Trust IO/PO strips are very liquid because of their simple structure and broad distribution.

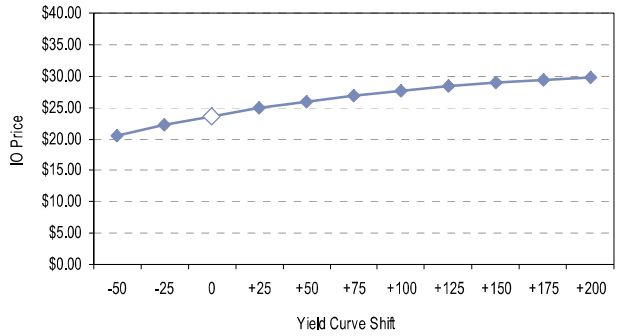
Common Uses

One of the most common uses of IOs is to reduce a portfolio's effective duration. The gain in IOs would offset the loss of other MBS or fixed-income securities when rates increase. Because IOs offer attractive yield, investors often consider holding IOs a more efficient hedge than shorting Treasuries. IOs may lack the liquidity of Treasury securities, but they compensate through the yield enhancement. For portfolios that cannot short fixed income securities or that do not want to sell any existing holdings, adding IOs may be the only way to shorten portfolio duration.

IOs can also help hedge PO exposure in a portfolio. If the PO is backed by pass-throughs similar to those backing the IO, then the effect of prepayments in each strip will offset one another.

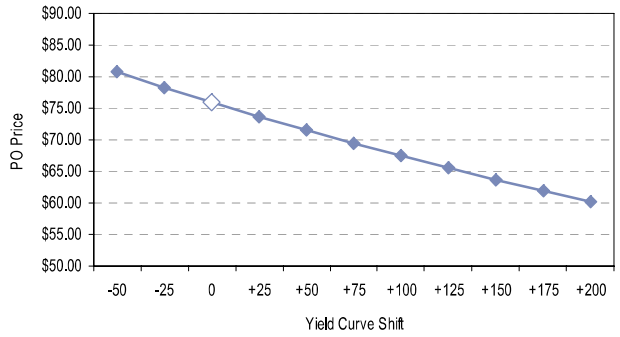
POs offer long, positive duration and positive convexity. POs can partially offset the impact of rising prepayments offering prepayment protection. For portfolios that contain IOs or MBS purchased at a premium to par, the offsetting benefits of POs can be critical if interest rates fall sending prepayments higher.

Chart 10: IO Price Profile



Source: JPMorgan

Chart 11: PO Price Profile



Source: JPMorgan

Primary Investors

Key IO investors include hedge funds and money managers equipped to manage negative duration and negative convexity of these strips. These investors often view themselves as well equipped to take on prepayment risk for higher yield. Banks and insurance companies occasionally buy IOs, particularly when IOs hedge other parts of their balance sheet.

POs attract investment from mortgage servicers, Their portfolio often behave like a portfolio of IOs. In these portfolios, the POs offset the negative duration and negative convexity of the servicing rights, and also protect against unexpected shifts in prepayment risk.

[3] IOs can become positively convex if interest rates drop far enough to push prepayments close to their maximum rate. At that point, any further drop in rates has limited impact on the IO cash flows and limited potential to force price down further. The IO then has limited price downside, but significantly more price upside – another way of describing positive convexity.

[4] POs become negatively convex if interests rates drop far enough to push prepayments to their maximum. At that point, any further drop in rates has limited impact on the PO cash flows. The PO price then has limited upside, and a much larger downside.

STRUCTURED IO/POs

Structured IOs and POs are securities created using other CMO classes. With any security that has a coupon, part of the coupon can be stripped off to create a structured IO. Structured IO and PO are built using underlying collateral such as Sequentials, PACs, TACs, Companions and other classes. They would inherit the same structural features of the underlying collateral, including principal lockout, different principal windows, average lives and different levels of prepayment protection. Potential combination can be as diverse as the CMO market itself.

The price profiles of Structured IO and PO are related to Trust IO and PO but can be materially different. The price of a Structured IO, for example, typically rises and falls with interest rates, just like a Trust IO. The magnitude of change could be vastly different. An IO stripped off of a short Sequential class with an open principal window can be much more sensitive to changes in interest rates than a Trust IO. This short Sequential IO is immediately exposed to prepayment risk and could be extinguished after a single prepayment wave. In comparison, the Trust IO could remain outstanding much longer. An IO stripped off of a stable 5-year PAC locked out from prepayments, by contrast, would be much less sensitive to interest rate changes than a Trust IO. The PAC structure and the lockout protect the IO from erosion of the underlying principal over a range of interest rate movement.

The primary uses of Structured IO and PO are similar to the uses of Trust strips. Investor often relies on the structure characteristics of the underlying collateral to manage the performance of Structured IO or PO. An investor wary of a short-term drop in interest rates but forecast a long-term rise in rates can search for Structured IO with a few years of principal lockout as protection against a short-term dip in rates.

The primary investors in Structured IO and PO are money managers and hedge funds.

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