

# Office of Regulatory Activities

TB 12 rescinded 10/21/91. Incorporated into Thrift Activities 442 (542 1/94)

Handbook: Thrift Activities  
Subjects: Mortgage-Backed Securities

Section: 442  
TB 12

December 13, 1988

## Mortgage Derivative Products and Mortgage Swaps

**RESCINDED**  
*Summary:* This Bulletin establishes guidelines for the use of "high-risk" mortgage derivative products and mortgage swaps by thrift institutions and limits the use of such products by weakly capitalized and otherwise troubled institutions.

### *For Further Information Contact:*

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### *Thrift Bulletin 12*

### Background

Innovation in the secondary mortgage market has spawned a new breed of instruments, collectively known as mortgage derivative products. Mortgage derivative products include collateralized mortgage obligations (CMOs), real estate mortgage investment conduits (REMICs), stripped mortgage-backed securities (interest-only securities (IOs) and principal-only securities (POs)) and pass-through mortgage-backed securities with senior/subordinated structures. These securities are derived by real-locating cash flows from mortgage pass-through securities or from pools of mortgage loans.

Derivative mortgage securities provide investors with a broad range of mortgage investment vehicles by tailoring cash flows from mortgages to meet the varied risk-return preferences of investors. These securities enable the issuer to "carve up" the cash flows from the underlying securities and thereby create multiple classes of securities with different maturity and risk characteristics.

While derivative products can be useful investment and hedging

vehicles, they may also expose an institution to considerable risk of loss if they are not managed in a safe and sound manner. In part, the high-risk nature of these products stems from their price volatility. Many of these products, standing alone, exhibit considerably more price volatility than standard mortgage pass-through securities. In addition, because these products are complex, a high degree of technical expertise is required to understand how they behave under various interest rate and prepayment scenarios. Moreover, because the secondary markets for most of these products are relatively thin, it may be difficult to liquidate these instruments should the need arise. Certain products such as mortgage swaps and subordinated interests, may also present credit risk. Finally, there is additional uncertainty because the newest instruments lack a track record. Institutions should be particularly cautious about investment in recently developed products since little is known about their price performance under different interest rate environments. For these reasons, the Office of Regulatory Activities of the Federal Home Loan Bank System has established guidelines and limitations on the use of these products.

### Regulatory Authority

The guidelines set forth below are issued pursuant to the authority established under 12 CFR 563.17-6 and 571.3, which require an insured institution's board of directors to

ensure prudent management of the institution's exposure to interest-rate risk, and under 12 CFR 563.17, which requires an insured institution to maintain safe and sound management commensurate with the business risk of the organization, and to pursue financial policies that are appropriate to the operational capabilities of the institution, including its management expertise, internal control systems, and ability to absorb loss.

The guidelines also require an insured institution to establish, maintain, and make available to examiners such accounting and other records as will provide an accurate and complete record of transactions involving mortgage derivative products in accordance with the requirements of 12 CFR 563.17-1(c). Finally, the guidelines limit the investment activity of institutions that fail to meet their capital requirements, pursuant to 12 CFR 563.13(d)(7).

### Guidelines For Thrift Management

High-risk derivative products are defined to include the residual interest in CMOs and REMICs, stripped mortgage-backed securities, subordinated interests in pass-through securities with senior/subordinated structures, support tranches of planned amortization class (PAC) and targeted amortization class (TAC) bonds, and other derivative products with high-risk characteristics (e.g., inverse-floaters and super-POs). For purposes of these guide-

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lines, the term also includes mortgage swaps and any new mortgage-related innovations which may come on the market and are characterized by a high degree of risk. A description of these instruments is appended to this Bulletin.

Institutions that acquire high-risk mortgage derivative products should do so only in accordance with safe and sound practices. Levels of activity should be reasonably related to the institution's needs, capacity to absorb losses, and level of in-house management sophistication and investment expertise. Prior to taking a position in derivative securities, an institution should evaluate the interest rate exposure resulting therefrom to ensure that the position is consistent with a prudent investment policy. The appropriateness of using these instruments should be evaluated in the context of an institution's total portfolio and should include an assessment of their effect on the market value of portfolio equity (i.e., the net present value of assets, liabilities, and off-balance sheet items) and net interest earnings. An institution should consider the liquidity and price volatility of these products prior to investing in them. In addition, a thrift should compare alternative strategies that might more effectively achieve the desired result. In general, the use of these products should be limited to transactions and strategies that lower or do not increase an institution's overall exposure to interest rate risk.

The following are guidelines for institutions that utilize high-risk mortgage derivative products.

1) Board of Directors' Approval. The board of directors should adopt, and vigorously enforce, a written policy authorizing and governing the use of high-risk mortgage derivative products. The policy should identify the authorized derivative

products, and should mandate recordkeeping systems that are sufficiently detailed to permit internal auditors to determine whether personnel have operated in accordance with the board's authorization.

The board of directors should require management to incorporate in their business plan a description of the institution's strategy for the use of derivative products. The board should specifically authorize the plan before management commences any activity involving high-risk mortgage derivative products. Management should be required to report periodically to the board regarding compliance with the board's directives on the use of mortgage derivative products, and the actual versus projected performance of such products.

2) Business Plan. Institutions are required to have a comprehensive business plan detailing their overall interest-rate risk management and investment strategy, pursuant to 12 CFR 563.17-6 and 571.3. That plan should include a thorough description of the institution's mortgage derivative strategy and strategic objectives and should contain an analysis of the expected performance of the strategy under various interest rate and prepayment scenarios (see Sensitivity Analysis below).

The business plan should establish specific position limits (expressed in terms of dollar amounts, or as a percentage of assets or capital) for each major type of mortgage derivative product. The limits should be consistent with the institution's intent, level of management expertise, the sophistication of its internal control and monitoring systems, its asset-liability structure, and its capacity to maintain liquidity and absorb losses out of capital. The board of directors, an authorized committee thereof, or the institution's internal

auditors should review positions periodically to ascertain conformance with such limits. If the periodic review is performed by the institution's internal auditors, the auditors should report their findings to the board of directors or an appropriate committee of the board on a regular basis.

3) Sensitivity Analysis. Prior to making an investment in a mortgage derivative security (or narrow group of securities), an institution should perform a sensitivity or simulation analysis that demonstrates the effect of the security on the institution's net interest earnings and on the market value of portfolio equity under various interest rate and prepayment scenarios.

It is strongly recommended that the analysis show the effect on the market value of portfolio equity (with and without the transaction) of:

- a) instantaneous changes in interest rates from current levels of, for example, plus and minus 100, 200, 300, and 400 basis points; and
- b) adverse changes in mortgage prepayment rates (e.g., 50 percent faster or slower than those anticipated for each interest rate scenario).

The mortgage prepayment rates assumed for each scenario and the assumptions used to determine market values should also be stated. In addition, it is recommended that the analysis show the effect on net interest income of plausible changes in interest rates from current levels over a reasonable time horizon (e.g., three to five years).

The analysis above should provide a reasonable basis for evaluating a prospective transaction. However, depending on the nature of the transaction, the institution may

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wish to undertake a more comprehensive analysis to gain a better understanding of the expected performance under a wide range of interest rate and prepayment scenarios. A more comprehensive analysis might, for example, include an evaluation of the effects of nonparallel shifts in the yield curve, parallel changes in interest rates, and changes in the spread between key short-term interest rates. With respect to residual interests and subordinated interests in senior/subordinated structures, the analysis might also show the effect on net interest income and the market value of portfolio equity of holding prepayment speeds constant over a range of interest rates, and holding interest rates constant over a range of prepayment speeds.

The performance of the transaction (including market value) should be monitored monthly, or more frequently if market conditions change significantly, and should be reviewed quarterly by the board of directors, or an authorized committee thereof.

4) Management Expertise. The board of directors and management should consider the level of expertise needed to implement a strategy involving mortgage derivative products. The board should ensure that personnel authorized to make investment decisions for the institution understand the risk characteristics of those instruments.

Institutions that retain investment advisors to assist in formulating portfolio strategies involving mortgage derivative products should not place undue reliance on, or delegate decision-making authority to, such advisors. Decisions made on the basis of recommendations of third parties should be documented. Personnel authorized to make investment decisions should be capable of explaining the rationale for those

recommendations to senior management and the board of directors. (The use of investment advisors should be in accordance with the guidance provided in Memorandum R-70, "Investment Consultants," issued by the Office of Regulatory Activities on March 16, 1988.)

5) Internal Controls. An institution should establish internal controls and procedures that include periodic reports to management, segregated interests in securities, and a program (to be carried out by the internal audit staff or other management) to assure adherence to internal policies and procedures and to prevent unauthorized investment and other abuses.

The institution should have a monitoring and reporting system that provides the documentation necessary to evaluate the performance of the mortgage derivative products. The reports should compare actual performance to the projected performance. Material deviations from the projected performance should be explained.

For hedging transactions, reports should show the market value of the derivative instruments and reconcile the gains and losses to the changes in the value of hedged balance sheet items. For example, if an institution purchased \$100 million in premium IOs to hedge the market value of \$300 million in mortgage-backed securities, the institution should compare the gains (losses) on the IOs with the losses (gains) on the mortgage-backed securities in order to establish the net gain or loss from the transaction.

Management should maintain documentation demonstrating that it took reasonable steps to assure that the prices paid for derivative securities represent fair market value. Generally, price quotes should be obtained from at least two brokers

prior to executing a trade. If, because of the unique or proprietary nature of the transaction or product, or for other legitimate reasons, bids cannot be obtained from other brokers, management should document the reasons for not obtaining such quotes. In addition, management should analyze the reasonableness of interest rate and prepayment assumptions provided by the selling broker prior to making an acquisition.

Management should carefully review all contractual and account documents related to a transaction, to ascertain the rights and obligations of all parties to the transaction, including margin and collateralization requirements, and the recourse available to each party. Management should thoroughly understand those rights and obligations in order to avoid possible misunderstandings that could prove costly.

Internal systems and procedures should be established to monitor activities involving the use of mortgage derivative products should provide for segregation of duties among those responsible for execution, record-keeping, and verification. Such policies and procedures are for the mutual protection of the employer and its employees.

6) Counterparty Credit Risk. To limit counterparty credit risk associated with certain transactions, including mortgage swaps, institutions should engage in transactions only with financially strong counterparties. Institutions should conduct a thorough credit analysis of the counterparty prior to entering into a transaction. This analysis should be updated on a regular basis. In addition, institutions should investigate the dealer's general reputation for fair and honest dealings with customers. Institutions should also conduct an inquiry of appropriate State or Federal securities regulators and

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securities industry self-regulatory organizations concerning any formal enforcement actions against the dealer, its affiliates or associated personnel.

7) Accounting Treatment. Mortgage derivative securities must be accounted for according to generally accepted accounting principles (GAAP). Management should consult with its independent auditor to assure compliance with GAAP. Where GAAP does not specifically address the accounting treatment for a particular derivative instrument, the accounting treatment employed by the institution should be documented and recorded and should include the basis for the adopted treatment.

## Special Guidelines for Mortgage Swaps

A mortgage swap is a structured transaction that replicates the purchase of mortgage securities with a short-term or floating rate source of funding. In essence, the transaction combines a forward commitment to purchase mortgage-backed securities with an amortizing interest rate swap. Because the mortgage swap transaction is not reported on an institution's balance sheet, care must be taken to ensure that the institution's capital base is sufficient to support the risks associated with the transaction. In addition, as with certain other securities transactions, mortgage swaps may pose significant counterparty credit risk. For these reasons, the Principal Supervisory Agent (PSA) may require institutions that engage in mortgage swap transactions to maintain a level of capital above minimum required levels.

The Individual Minimum Capital Requirement (IMCR), 12 CFR 563.14, provides the Federal Home Loan Bank Board and the FSLIC with authority to require an insured

institution to maintain a level of capital above the minimum regulatory capital requirements if the institution "...has a high degree of exposure to interest-rate-risk, prepayment risk, credit risk, or similar risks; or a high proportion of off-balance-sheet risk." The off-balance-sheet nature of mortgage swaps may justify use of the IMCR to impose higher capital requirements to protect the interests of the FSLIC. The PSA may impose such a requirement when a thrift institution has a significant mortgage swap position in relation to its capital base and overall interest rate exposure.

The creditworthiness of the counterparty should be of concern to an institution that engages in a mortgage swap. In a mortgage swap transaction, agency credit guaranteeing performance of mortgage pools is replaced with the credit of the counterparty. In the event of a significant deterioration in the creditworthiness of the counterparty, the counterparty cannot be replaced without an open market termination of the mortgage swap, possibly resulting in a loss. In addition, an institution may be exposed to significant loss in the event the counterparty defaults on the transaction. Consequently, to limit counterparty risk in mortgage swap transactions, institutions that engage in swap transactions should do so only with financially strong counterparties.

## Restrictions on Institutions That Fail to Satisfy Regulatory Capital Requirements or That Warrant Special Supervisory Attention

The use of high-risk mortgage derivative securities may expose a thrift institution and, indirectly, the FSLIC to the risk of considerable loss. Consequently, mortgage derivative products cannot be considered as suitable investments for institutions

that are insolvent or fail to meet minimum capital requirements, and institutions with a MACRO rating of 4 or 5 that have been identified as troubled institutions by supervisory personnel. An insolvent, undercapitalized, or otherwise troubled institution may not acquire such securities unless granted a waiver from this general prohibition by their Principal Supervisory Agent (PSA) in accordance with the conditions set forth below.

## Undercapitalized and Otherwise Troubled Institutions

A PSA (or designee) may grant a waiver to an undercapitalized or otherwise troubled institution to acquire high-risk mortgage derivative products under the following conditions:

(1) the institution has demonstrated to the satisfaction of the District Bank that the transaction will reduce the institution's overall exposure to interest rate risk under a wide range of plausible interest rate and prepayment scenarios; and

(2) the use of the derivative instruments is conducted under terms and conditions agreed to by the District Bank.

## Insolvent Institutions

A PSA (or designee) may grant an institution, insolvent under regulatory accounting principles, a waiver which permits it to acquire high-risk mortgage derivative products provided that: (a) the two conditions listed above are satisfied and (b) the transaction is necessary to maintain the "franchise value" of the institution as defined in Regulatory Bulletin 3a, "Policy Statement on Growth for Insured Institutions," issued by the Office of Regulatory Activities on September 7, 1988, and is otherwise consistent with that Bulletin.

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The PSA may require insolvent, undercapitalized, or otherwise troubled institutions to divest existing holdings of mortgage derivative products that are deemed unsafe and unsound.

## Supervisory Monitoring Requirements

All documentation relating to the use of mortgage derivative products should be made available to examiners and supervisory personnel upon request. In general, such documentation should include:

- the institution's policy, business plan, position limits, and internal controls and procedures applicable to mortgage derivative products;
- the sensitivity or simulation analysis performed by the institution (or a third party) prior to

purchase, that shows the effect of holding the instrument on the market value of portfolio equity and net interest income under various interest rate and prepayment scenarios;

- the assumptions made by the institution used in performing the sensitivity analysis;

• a record of all holdings of high-risk mortgage derivative instruments showing:

- the type of instrument;
- the carrying value and market value of each instrument;

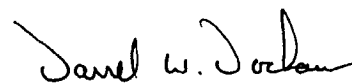
- a statement as to the purpose for which the instrument was acquired (e.g., to hedge a particular balance sheet position); and

— a record of the competitive quotes on the instrument that were offered by dealers at the time of purchase, or a statement as to why such quotes were not obtained;

- monthly updates of performance of the instruments showing actual versus projected performance; and
- a list of personnel authorized to make investment decisions involving mortgage derivative products and a description of their qualifications.

The use of mortgage derivative products should commence only after the risks have been thoroughly evaluated and policies and procedures have been established and documented.

Attachment



— Darrel W. Dochow, Executive Director

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### Descriptions of High-Risk Mortgage Derivative Products and Mortgage Swaps

#### *Stripped Mortgage-Backed Securities (SMBS)*

Stripped mortgage-backed securities are created by either partially or completely separating the mortgage principal and interest payments on pass-through securities or whole loans. The early strip transactions involved the partial stripping of mortgage pass-throughs to produce two classes of securities having synthetic mortgage coupons different from the underlying pass-through: one class, a discount coupon security, with the prepayment profile of a higher coupon security, and the other, a premium security with a lower prepayment rate. [1] The recent production of stripped mortgage-backed securities, however, has been confined almost exclusively to transactions involving the complete separation of principal and interest to create principal only (PO) and interest only (IO) securities.

The process of stripping enables the issuer to obtain a greater value for the underlying collateral by providing a product that broadens the base of investor demand for mortgage production. Many investors find mortgage strips attractive because they can purchase that part of the mortgage cash flow they desire most or can synthetically create a security with the desired coupon and prepayment characteristics.

Stripped mortgage-backed securities exhibit more price volatility than standard pass-throughs, making them highly leveraged hedging or speculative vehicles. Prepayment rates and discount rates determine the expected maturity (measured in terms of duration) and value of these instruments.

Prepayment rates will vary with a large number of factors, including the regional economy, seasonal factors, demographic factors, including age and mobility, and the assumability of the underlying mortgages. The largest direct determinant of prepayment rates is interest rates. A fall in interest rates will tend to increase the number of refinancings. Thus, in a decreasing interest rate environment, the expected life of a mortgage or mortgage-backed security decreases. When interest rates rise, prepayments slow as a result of fewer refinancings. The slower prepayments increase the expected life of a mortgage or mortgage-backed security.

[1] A discount coupon mortgage-backed security is a security that carries a lower coupon than the prevailing or current coupon rate on mortgage-backed securities. A premium coupon mortgage-backed security is one that carries a coupon that is above the current coupon rate.

Principal only securities are similar to zero coupon bonds in that the securities are issued at deep discounts from par value and the investor receives no interest cash flows. The entire cash flow on a PO strip is in the form of principal repayments. However, in contrast to a zero coupon bond where the investor receives the entire principal at maturity, the investor in a PO receives a stream of cash flows over time resulting from the normal amortization of mortgages as well as their prepayments. Barring default, the investor will recover the par value of the PO security.

The price behavior of a PO is determined by prepayment rates and interest rates. POs increase (decrease) in value as interest rates decline (rise) due to a "prepayment effect" and a "discounting effect." As interest rates decline, mortgage prepayments tend to accelerate and the investor in the PO receives the return of principal more quickly. Because of the time value of money, an acceleration in the return of principal will cause the value of the PO to rise. Conversely, an increase in interest rates will cause prepayments to slow. Because the investor will have to wait longer to receive the principal when prepayments slow, the value of the PO will decline. This response in price performance to prepayments is called the prepayment effect. Apart from the effect on prepayment rates, a decline in interest rates will also cause the value of the POs to increase because a lower discount rate would be used to determine the present value of any future cash flows. This is called the discounting effect. Conversely, both the prepayment effect and the discounting effect cause the value of the PO to decline when interest rates rise.

The price behavior of POs is also critically dependent on whether the mortgage collateral backing the PO is in the form of discount, current, or premium mortgages. A PO strip that is backed by discount coupon collateral will appreciate greatly in value as interest rates decline relative to PO strips backed by premium coupon collateral, but will not suffer as significant a decrease in value when interest rates rise. The difference in price performance reflects the relationship between prepayment rates and the coupon rates on the collateral backing the PO securities. Prepayments on discount coupon POs are generally significantly lower than prepayments on premium coupon POs. As interest rates decline, prepayments on both discount and premium coupon POs will accelerate; however, prepayments on premium coupon POs will not change as much because prepayments on these instruments are already at a high level. Conversely, when interest rates rise, prepayments on discount coupon collateral will not slow significantly

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because they are already at a relatively low level, but prepayments on premium coupon POs would decline sharply.

Because POs generally increase in value in response to declining interest rates, they are sometimes used to hedge instruments for mortgage servicing rights, residual interests in mortgage securities, and IOs. Thrift institutions, however, tend to be “liability sensitive” (i.e., their liabilities reprice more quickly than their assets) and are negatively affected by an increase in interest rates. Therefore, the use of POs to reduce the interest-rate risk of a particular asset, such as a mortgage servicing right, could prove counterproductive if the institution’s overall exposure to interest rate risk actually increases. Consequently, the appropriateness of POs as hedging vehicles should not be evaluated in isolation but rather in the context of their effect on the overall interest rate exposure of the institution.

Interest only securities (IOs) receive all of the interest payments on an underlying pool of mortgages. Like POs, IOs are extremely sensitive to changes in prepayments and interest rates. However, IOs may be useful hedging vehicles for mortgage portfolios since prepayments cause the value of an IO strip to move in the opposite direction from those of mortgages and traditional fixed-income securities.

A premium coupon IO strip may be a more useful hedging vehicle than a discount coupon IO strip, as it will show greater appreciation than the discount IO when interest rates increase, and will not suffer as significant a decrease in value with falling interest rates. When interest rates fall, prepayments generally increase, and thus the interest income generated from the IO decreases because interest is earned on a smaller remaining principal balance. Although the discounting of the stream of interest receipts at a lower interest rate increases the economic value of each dollar of interest received, the negative effect of increased prepayments will generally outweigh the positive discounting effect, and therefore the market value of the IO will decline. IOs generally will increase in value in a rising rate environment because as prepayments slow, the principal balance remains outstanding for a longer period and therefore, interest is earned for a longer period. However, these instruments do not always perform in line with expectations. It is possible to have a negative return on an investment in an IO; in other words, the total cash flow from the IO may be less than the initial purchase price.

### *Residuals Of REMICs or Collateralized Mortgage Obligations*

Residuals are securities representing the excess cash flows from a REMIC or CMO bond. The residual cash

flow is the excess of the monthly receipts from the underlying mortgage collateral and any reinvestment earnings thereon, less the cash payments to the bondholders and any trust administrative expenses. This cash flow is extremely sensitive to prepayments, and thus contains a high degree of interest rate risk. From a legal perspective, residual securities represent an ownership interest in the underlying collateral, subject to the first lien and indenture of the debtholders (the CMO or REMIC investors).

There are typically three major sources of residual cash flows. The first source is the differential between the weighted average coupon on the underlying collateral and the weighted average coupon on the REMIC or CMO bonds. The second source is the overcollateralization provided to obtain a AAA rating. The third source is derived from reinvestment income. Because payments from the mortgage collateral are received monthly, and CMOs and REMICs often pay quarterly or semi-annually, these receipts are reinvested until the bond payments are distributed.

In order to evaluate the expected return on a residual, the purchaser must understand the underlying collateral and its expected performance under varying interest rate and prepayment scenarios. In addition, the expected cash flows from a residual depend on the structure of the underlying REMIC or CMO issue. For example, the structure can require fixed payments to the bondholders or variable payments. Residuals created from CMOs with only fixed-rate tranches are referred to as “fixed-rate residuals”; those created from CMOs that have a floating-rate tranche are “floating-rate residuals.”

Fixed-rate residuals typically perform well in a rising interest rate environment but perform more poorly as rates decline. The main source of cash flow on a fixed-rate residual comes from the interest differential between the weighted average coupon on the underlying collateral and the coupons on the CMO tranches. The earlier tranches in a CMO usually carry a lower coupon than the later tranches, and therefore the interest differential cash flow on the residual is greatest in the early years of the CMO. As the early coupon tranches are extinguished, the residual income declines. Thus, the longer the lower coupon tranches remain outstanding, the greater the cash flow accruing to the CMO residuals. As interest rates decline, prepayments accelerate, the interest differential narrows, and the cash flow from the CMO declines. Conversely, as interest rates climb, prepayments slow, generating a larger cash flow on the residuals.

Floating-rate residuals, on the other hand, usually perform best in a stable interest rate environment. As with

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the fixed-rate residual, the main source of cash flow on the floating-rate residual comes from the interest differential between the weighted average coupon on the underlying collateral and the coupons on the CMO tranches. Because one (or more) of the CMO tranches is tied to a floating rate, the interest differential will change when the coupon on the floating-rate tranche is reset. When interest rates rise, the coupon on the floating rate bond is reset at a higher rate, and more of the cash flow from the underlying collateral is absorbed by the floating rate tranche, leaving less cash flow for the residual. The increase in interest rates may also cause prepayments to slow, increasing the period over which the interest differential income is earned by the residual holders. Thus, a rise in interest rates produces a negative, as well as a positive effect on the value of the residual. Whether the negative effect will outweigh the positive effect will depend on the interrelationship between the interest on the floating rate tranche and mortgage prepayment speeds.

When interest rates decline, the coupon on the floating rate class decreases, but prepayments of the lower coupon bonds are likely to accelerate. The loss of interest income from prepayments on the lower coupon bonds will typically offset a widening of the interest differential stemming from the lower rate on the floating rate tranche, thus reducing the cash flow on the residual.

While there are both positive and negative effects on the floating rate residual when rates move in either direction, the negative effects tend to dominate when interest rates move significantly up or down, provided that the interest rate on the floating rate CMO tranche moves in the same direction as mortgage rates.

The discount rate that is applied to the residual cash flows will also affect the market value of both fixed and floating-rate residuals. For example, when interest rates rise, prepayments slow, and the interest differential cash flows to the residual are paid over a longer period. However, because the discount rate applied to the cash flows also increases, the present value of each dollar of future cash flow declines. Generally, the prepayment factor outweighs the discount effect for increases in interest rates of approximately 200 basis points or more. After rates rise to a certain level, prepayments slow significantly, and the discount rate factor begins to dominate.

The projected yield on these investments has been inversely related to their effectiveness as hedging vehicles. Thus, the highest yielding CMO residuals, those priced to yield 8 to 10 percent above the current mortgage rate, have limited hedging value. At the other end of the spectrum, CMO residuals with relatively low projected yields often have positive hedging characteristics and usually involve a standard CMO structure.

While CMOs tend to be rated triple-A, the residual interests are often not rated because they are susceptible to interest rate risk. Some residual interests, however, particularly those of a REMIC, receive a triple-A rating by putting a small amount of principal with a large percentage of residual interest-derived cash flow. Although rated, such hybrid instruments present the same range of interest rate risk as unrated residual securities. A triple-A rating does not address the issue of whether the investor will realize the anticipated yield, but only whether the minimum required payments of principal and/or interest will be received.

In summary, residual cash flows are highly dependent upon the characteristics of the collateral and the structure of the REMIC or CMO. For both fixed-rate and floating-rate residuals, it is important to stress that the prepayments are dependent upon the collateral underlying the CMO, and thus, proper analysis of any residual requires a thorough analysis of the underlying collateral. Analysis based on "generic" securities may be misleading because specific pools perform very differently. In addition, the structure of the CMO is a major determinant of residual cash flows because the structure is responsible for the assignment of the collateral cash flows to the various tranches. That is, the structure defines the payment priorities. For example, the performance of the residual will vary with the presence of special payment classes such as a planned amortization class (in PAC bonds), or superfloater bonds. Higher yielding residuals must be regarded with particular caution, as the investor's assumed return over the life of the REMIC or CMO may carry with it an even higher interest rate risk.

### *Subordinated Interests In CMOs or REMICs*

The senior/subordinated structure is often used to provide credit enhancement for mortgage pass-through securities when the underlying collateral is not guaranteed by an agency of the U.S. Government. These structures divide mortgage pools or securities into two risk classes: a senior class and a subordinated class. The subordinated class provides protection to the senior class.

In exchange for a higher return, subordinated noteholders usually buy an unrated security with increased credit risk. When the cash flow is impaired, debt service first goes to the holders of the senior class securities. In addition, incoming cash flow may also go into a reserve fund to meet any future shortfalls of cash flow to senior noteholders. The subordinated noteholders may not receive any funds until senior noteholders have been paid, and, when appropriate, until a specified level of funds has been contributed to the reserve fund.

The senior/subordinated pass-through has been issued with two different types of structures: the "reserve



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fund” structure and the “shifting interest” structure. The reserve fund structure functions in accordance with the preceding description. The “shifting interest” structure avoids the need for a reserve fund by allocating ownership interests in principal payments (available primarily through prepayments) to senior certificate holders until their interest is paid down. In this structure, the senior class operates almost as if it were the first tranche of a two tranche CMO. The consequences of owning the different structures are significant: the senior class, in the shifting interest structure, experiences prepayment speeds greater than actual pool experience, increasing the yield of senior interests purchased at a discount and reducing those purchased at a premium.

When a thrift institution purchases a senior interest, it should look to the mortgage pool or mortgage-backed securities underlying the structure and the underlying credit structure to determine the risks of the transaction. When acquiring a subordinated interest, the thrift, in addition to examining the structure of the underlying collateral, should carefully determine the amounts due on the senior interest, any reserve fund priorities, the effects of a shifting interest structure when appropriate, and evaluate the risk of default resulting from the cash flows on the underlying collateral.

### Support Classes of CMOs and REMICs with Planned Amortization Class (PAC) and Targeted Amortization Class (TAC) Tranches

CMOs and REMICs have been issued with unique tranches, known as planned amortization classes (PACs) and targeted amortization classes (TACs) that provide increased protection against prepayment risk. PACs and TACs transfer risk to the non-PAC tranches and non-TAC tranches of CMO and REMIC issues. These non-PAC and non-TAC tranches are sometimes referred to as “support classes” or “support tranches”.

**PAC Bonds.** A PAC bond or PAC tranche is significantly protected from prepayment risk by a planned amortization schedule which requires scheduled sinking fund payments for the PAC tranche of the CMO on each bond payment date. Payments to the other CMO classes are allocated in the usual order only after the scheduled sinking fund payment to the PAC tranche has been made. The scheduled amortization payments on the PAC are satisfied before principal is paid down on any of the remaining CMO tranches.

The protection offered the PAC, while significant, is incomplete. The protection covers a range of prepayment speeds; the size of the range is dependent on the proportion of the PAC or PACs relative to the entire CMO and on the relative speed of the planned amortization schedule. The stated PAC range will generally be more conservative than the actual protected range

except for the longest PAC. Thus, a PAC quoted at the pricing range of 70-270% of the Public Securities Association Standard Prepayment Model (PSA) may offer protected ranges of 70-875% PSA for one tranche, 70-325% PSA for another tranche, and 70-270% PSA for the third PAC tranche. In previously issued PAC CMOs, the PAC has been more than amply protected by the allocation of risk to the other CMO classes.

Investors in the non-PAC tranches of a CMO accept a significant increase in prepayment risk. This risk is very significant for the shorter CMO classes when prepayments are slower than originally assumed, and for the longer classes at higher prepayment speeds than originally assumed. While investors purchase shorter tranches of ordinary CMOs in an effort to lower the interest rate sensitivity of their portfolios, the shorter non-PAC tranches of a PAC bond are not likely to accomplish the desired result of lowering interest rate risk.

The lower yield of these securities is reflected in their market value. Investors demand a higher risk premium for the non-PAC tranches.

**TAC Bonds.** Support tranches of TAC CMOs, like support tranches of PAC CMOs, serve the function of providing support to a protected class, the TAC. A TAC tranche, however, does not receive as wide a range of protection as a PAC tranche. The TAC CMO is structured so that the TACs amortize first only at a single prepayment rate/pricing speed, unlike the PACs which are protected for a range of prepayment speeds. At a fast prepayment rate, the TAC support bonds are often available for support during the scheduled amortization period; however, they may be exhausted before the maturity of a long TAC. At prepayment rates below the pricing speed, the life of TAC tranches will extend like standard CMO classes. Thus, the TAC tranche is afforded asymmetrical protection. For example, a CMO containing several TAC tranches and TAC-support bonds will be devised to amortize at the prepayment rate of 105% PSA. When collateral prepaids at a rate below the pricing speed, there are no cash flows available to be diverted from the TAC-support bonds to the TACs. At a fast prepayment speed, as described above, the support bonds will very possibly be outstanding during the TAC’s amortization period, particularly if the scheduled amortization period is short.

There is a corresponding asymmetry in the prepayment risk of the non-TAC classes. At fast prepayment speeds, they will shorten more rapidly than standard CMO classes. Unlike PAC bonds, they do not suffer increased extension risk (i.e., they do not bear the risk of an unexpectedly slow prepayment schedule). The price of these classes should reflect the increased contraction risk (i.e., the risk of carrying unexpectedly high prepayments in

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support of the PACs) and this characteristic should be considered in evaluating the effect of an investment in a non-TAC tranche on the interest rate sensitivity of an institution's portfolio.

### *Other High-Risk Mortgage Derivative Products*

Like the support tranches of PAC and TAC CMOs, which reflect a reallocation of risk, other unique classes of CMOs and REMICs have been created which are distinguished by their high-risk characteristics. Examples of such high risk classes include the Z-tranche, Super Floaters, Inverse Floaters, and Super POs.

These unique, risk-bearing classes appear to have characteristics similar to IOs, POs and residuals, with respect to the high degree of price volatility they exhibit compared with the volatility normally observed in standard CMOs and mortgage-backed securities. Accordingly, any derivative products exhibiting a high degree of price volatility, including any new products which may come on the market, should be viewed as "high-risk" mortgage derivative products for purposes of this thrift bulletin.

### *Mortgage Swaps*

Mortgage swaps are off-balance sheet transactions that are designed to replicate the purchase of mortgage-backed securities financed with a short-term or floating rate source of funds. In essence, the transaction combines a forward commitment to purchase mortgage-backed securities with an amortizing interest rate swap. In a typical mortgage swap transaction, an investor (e.g., a thrift institution) contracts with a third party (e.g., a securities dealer) to receive cash flows based on a generic class of mortgage-backed securities over a specified period in exchange for the payment of interest, typically LIBOR less a spread. The payments are made as if there were an underlying notional pool of mortgage securities. Payments are exchanged on a monthly basis.

The contract requires the investor either to take physical delivery of mortgages at a predetermined price when the contract expires, or to settle in cash for the difference between the original price of the mortgages and their current market value as determined by the dealer. A mortgage swap agreement also runs for a fixed term, generally five years.

The monthly cash flows received by the investor are based on a specific class of mortgage securities, for example, all GNMA 8 1/2s maturing in the two-year range, 2016-2017, or all FNMA 9 1/2s maturing in 2014-2015. The cash flows received by the investor are derived not only from the fixed coupon on the generic class of securities, but also, to the extent that the coupon is above or below par, from the benefit or loss implicit to the dis-

count or premium. The notional amount of the mortgage swap is adjusted monthly based on the amortization and prepayment experience of the generic class of securities.

At the time the contract is initiated the investor is required to post initial collateral, similar to mortgage financing "haircuts" for reverse repos, with the dealer. The amount of the collateral is decided on a customer-by-customer basis. Additional collateral is taken by the dealer (given to the investor) if the market price of the underlying generic mortgages falls (rises). This two-way collateral policy reduces counterparty credit risk. Collateral is posted on a monthly basis.

At the termination of the contract, the investor is required either to accept delivery of mortgage securities of the identified agency and coupon type, or pay the difference between the original cost and the current market value of the generic security. The "current market value" is based on an average of relevant bids received by the dealer within a specified time period.

The dealer is likely to deliver those mortgage securities that are "cheapest to deliver." "Cheapest to deliver" means that the delivered mortgages are of the specified agency and coupon rate, but there is no guarantee as to maturity. The dealer will simply purchase those mortgage securities of the identified agency and coupon that are at the lowest price in the market. Thus, the prepayment history of the securities will not be known until the time of delivery.

Mortgage swaps are an alternative to a straight purchase of mortgage-backed securities. These transactions involve a great deal of leverage because the initial collateral on the transaction is a small fraction (typically four points) of the par value of the mortgage securities and the transaction is off-balance sheet. They also may enable the investor to effectively finance mortgage securities at a rate tied to a floating rate index below LIBOR on a guaranteed multi-year basis.

Any potential benefits of a mortgage swap must be weighed against the risks inherent in mortgage swap transactions. These transactions carry substantial interest rate risk since the investor is receiving a fixed-rate payment stream in exchange for a floating-rate payment stream. Thus, on a stand-alone basis, the transaction would increase the interest rate exposure of the typical thrift institution.

The liquidity of the mortgage swap market is also a relevant consideration. The ownership interest in a swap is less marketable than standard mortgage-backed securities. An investor that chooses to terminate the transaction before the end of the contract period could incur a significant expense in unwinding the transaction in the dealer market.

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In contrast to the direct purchase of mortgage-backed securities, mortgage swaps pose an element of credit risk. The risk is whether the dealer will be in existence and able to deliver the mortgages when the contract terminates. Obviously, if the dealer cannot perform, the investor would suffer a loss if the mortgages are selling above the original contract price at settlement, and could also lose any margin or collateral retained by the dealer against the ultimate purchase of the mortgage securities. Similarly, the investor is also exposed to counterparty default risk on the interest rate swap component of the transaction over the term of the contract.