

# Standard Formulas

For the Analysis of  
Mortgage-Backed Securities and  
Other Related Securities

The Bond Market Association  
Second Edition



**Second Edition**

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# Standard Formulas for the Analysis of Mortgage-Backed Securities and Other Related Securities

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# Chapter 1

# Introduction

## A. General

The Bond Market Association (the "Association") represents securities firms and banks that underwrite, distribute and trade debt securities, both domestically and internationally. The Association's membership includes all major dealers in mortgage and asset-backed securities, corporate bonds, municipal bonds, government and federal agency securities, money market instruments, and repurchase and securities lending agreements.

The Association was created in 1976 under the name Public Securities Association (PSA) to provide a unified national association for the public securities industry and to advance the common interests of its members. In October 1978, the Association was formally organized into three separate divisions: the Mortgage-Backed Securities Division, the Municipal Securities Division and the Government and Federal Agency Securities Division. In early 1980, in recognition of the Association's increasing effectiveness, the independent Mortgage-Backed Securities Association (previously known as the GNMA Mortgage-Backed Securities Dealers Association), became part of the Mortgage-Backed Securities Division. The merger established the Association as the sole spokesperson for the mortgage-backed securities industry. With the emergence of asset-backed securities in the mid 1990s the mortgage division changed its name to the Mortgage and Asset-Backed Securities Division. On September 29, 1997, to reflect the depth and growing variety of securities represented by the Association as a whole, the Association's name was formally changed to "The Bond Market Association".

From its inception, the Association has been actively involved in addressing significant mortgage-backed securities issues confronting its membership. In the late 1970s several proposals for federal regulation of the Ginnie Mae market were under consideration to curb perceived abuses in the distribution and settlement of Ginnie Mae securities. In response to these proposals, the Association undertook a series of initiatives to standardize common industry practices. All of these initiatives were accomplished under the auspices of the Mortgage Securities Division.

Perhaps the most significant of these initiatives was the development of *Uniform Practices for the Clearance and Settlement of Mortgage-Backed Securities and Other Related Securities* (commonly referred to as *Uniform Practices*). Development of the *Uniform Practice* guidelines began in 1979 and they were first published in 1981 in a comparatively small booklet by their full name. The *Uniform Practices* were intended to provide a common understanding of the terms and conditions for confirming, comparing and settling mortgage-backed securities. Through Associations newsletters the guidelines were continually updated and expanded to reflect the growth and development of the mortgage-backed securities industry. Eventually the length of the documents and the need for a format that could be constantly updated necessitated publishing the guidelines in a loose-leaf manual format. The first edition of the *Uniform Practices* Manual was published in 1988 and represented the first comprehensive revision of the guidelines since their original issuance.

## B. About the Standard Formulas

The first Collateralized Mortgage Obligation (CMO) was issued in 1983, ushering in an era of increasing quantitative rigor in analyzing and processing mortgage securities. The Association established an Education and Research Committee in the Mortgage-Backed Securities Division to assist market participants in understanding the new instruments. From the beginning, the Division saw the importance of consistency in the many calculations necessary for evaluating mortgages and related securities. A first step taken in this direction was the development of the Standard Prepayment Model of The Bond Market Association in 1985. This model has since become the industry standard for describing prepayment rates on newly issued CMOs, REMICs, mortgage strips and other products, expressed in terms of PSA (Prepayment Speed Assumptions).

In 1988, the Research Committee began to codify the many assumptions and formulas then in use. They were adopted by the Mortgage-Backed Securities Division of the Association, in effect to promote consistency and uniformity in the mortgage-backed securities markets. The Division noted that standardizing formulas and assumptions would promote liquidity by minimizing inconsistent trading practices that result from different market assumptions. This effort culminated in the publication of the first *Standard Formulas for the Analysis of Mortgage-Backed Securities and Other Related Securities* guidelines in 1990. They were published as a stand alone manual and as a chapter in *Uniform Practices*.

The current *Standard Formulas* manual has been redesigned and reformatted to conform to the new style of the second revision of *Uniform Practices* in 1998 and is also now available electronically. For the electronic version contact the Publications Department 212.440.9430.

## C. Use of this Manual

This manual is designed for convenient, ongoing revision to reflect new market developments. Each chapter is separately numbered and each page is separately numbered and dated. As changes or additions are made to the manual, replacement pages with new dates will be distributed to subscribers.

## D. Compliance with the Manual

The *Standard Formulas* are standardized formulas and assumptions that the Association believes represent common industry practice among mortgage and asset-backed market participants. Although mortgage and asset-backed securities brokers and dealers and other market participants generally follow these practices, compliance with them is strictly voluntary.

Questions and comments regarding the *Standard Formulas* may be directed to the Association's Uniform Practices Specialist at 212.440.9400.

## Chapter 2

# Definitions of Common Terms

**ABS:** See "Asset-Backed Security."

**Accretion Bond:** See "Accrual Tranche."

**Accrual Tranche:** Also known as "accrual bond." Often the last tranche in a CMO, the accrual receives no cash payments for an extended period of time until the previous tranches are retired. While the other tranches are outstanding, the accrual tranche receives credit for periodic interest payments that increase its face value but are not paid out. When the other tranches are retired, the accrual tranche begins to receive cash payments that include both principal and continuing interest.

**Accrued Interest:** Interest deemed to be earned on a security but not yet paid to the investor. For trades that settle with accrued interest, the accrued interest represents the coupon earned by the seller of the security. The buyer of the security must reimburse the seller for this amount.

**Active Tranche:** An ABS tranche that is currently making principal payments to investors.

**Actual Delay:** The length of time from the end of an interest-accrual period to the actual payment of interest due.

**Adjustable-Rate Mortgage (ARM):** A mortgage loan on which interest rates are adjusted at regular intervals according to predetermined criteria. An ARM's interest rate is tied to an objective, published interest-rate index.

**Agent:** Any person or entity possessing authority to act on behalf of another.

**Allocation:** The process of assigning mortgage-backed security pools to fulfill a TBA transaction by the seller which constitutes good delivery to the buyer.

**American Option:** An option that may be exercised at any time before the expiration date.

**Amortization:** Liquidation of a debt through installment payments.

**Asset-Backed Security (ABS):** A security that is collateralized by any type of financial asset, such as a loan or lease, secured or unsecured receivables, mortgages or installment sales contracts. Although the term "Asset-Backed Security" generally includes any security supported by any type of financial asset, note that it is sometimes used to distinguish non-mortgage-backed securities (such as an auto loan or credit card ABS) from those collateralized by residential or commercial mortgages (which are generally referred to as "mortgage-backed securities").

**Assignee:** The entity to which an assignment is made, and which thereby becomes entitled to performances by an obligor.

**Assignment:** The transfer of rights, duties and/or obligations from one party (the assignor) to another (the assignee).

**Assignor:** The entity originally entitled to receive performance from an obligor, and which assigns such entitlements to a third party (i.e., to an assignee).

**Assumption Agreement:** A contract whereby a buyer acquires title to property and undertakes the obligations of an existing mortgage.

**Average Life:** On a mortgage-backed or asset-backed security, the expected average time to receipt of each dollar of principal, weighted by the amount of each principal prepayment, based on a particular prepayment assumption.

**Balloon Loan:** A mortgage in which the remaining balance becomes fully due and payable at a predetermined time.

**Balloon Payment:** The final payment on a balloon loan.

**Basis Point:** One-one hundredth (1/100 or .01) of one percent. Yield differences among bonds are generally stated in basis points.

**Beneficial Owner:** The party entitled to principal and/or interest payments for a security, even if the security's nominal ownership is in the name of another party.

**Beneficiary Date:** The last day of an interest-accrual period. On the beneficiary date, the beneficial owner is entitled to the upcoming principal and interest (P&I) payment.

**Bid:** The price at which a buyer is willing to purchase a security.

**Blackout Period:** The period from the first day of accrual until the day the factor/coupon is available. Trades settling in this period should be calculated with the last available factor/coupon and subsequently canceled and corrected when the current factor/coupon is published.

**Bond Equivalent Yield:** An adjustment to a security's yield that reflects its greater present value. In the case of mortgage-backed securities, bond equivalent yield is often used because these securities pay monthly or quarterly interest, as opposed to semiannual interest payments on most other types of bonds.

**Book-Entry:** A method of recording and transferring ownership of securities electronically, thereby eliminating the need for physical movement of certificates.

**Broker:** An entity that engages in securities transactions for the account of others. There are two types of brokers: (a) a give-up broker, who reveals the identity of the buyer and seller to each other, and (b) a clearing broker, who does not reveal the identity of the buyer and seller to each other. Brokers usually earn commissions for the services they provide.

**Broker-Dealer:** An entity engaged in buying and selling securities both for its own account and for the account of others.

**Broker or Dealer Loan:** A loan to a broker-dealer from a bank to finance the securities position of the broker-dealer and its customers. Broker-dealer loans may be terminated ("called") on 24-hour notice and, therefore, are also known as broker call loans.

**Builder Buy-Down Loan:** A mortgage loan on newly developed property that the builder subsidizes during the early years of the development. The builder uses cash to buy-down the mortgage rate to a level lower than the prevailing rate for some period of time. Typically, a builder buys-down 3% of interest in the first year, 2% in the second year and 1% in the third year.

**Bullet Bond:** An interest-paying bond that returns all principal on the final maturity date.

**Buydown:** The payment of additional points to a mortgage lender in return for a lower interest rate on the loan.

**Buy-In:** A method of closing out transactions in which a fail to deliver has occurred. The party that is failing to receive purchases the undelivered securities in the open market for the account and at the expense of the party that is failing to deliver.

**Calculated Loan Age (CAGE):** An estimate determined by the average original maturity of the loans in a pool, minus the original Weighted Average Maturity of the loans (at the time of the pool formation), plus the time elapsed since pool formation. Fannie Mae currently infers average loan age by this method and refers to it as Calculated Loan Age, or "CAGE."

**Call Option:** The right, but not the obligation, to purchase a security at a predetermined price on or before a specified future date.

**Call Risk:** The risk that declining interest rates may accelerate underlying loan prepayment speeds, causing an investor's principal to be returned sooner than expected. As a consequence, investors may have to reinvest their principal at a lower rate of interest.

**Cap:** The upper limit for the interest rate on an adjustable-rate loan or security.

**Carry:** The interest cost of financing securities positions, calculated by subtracting the financing costs from the interest earned on securities.

**Ceiling:** Also known as a lifetime cap, the limit beyond which the interest rate on an adjustable mortgage rate may never be raised.

**Claim (P&I):** A request by the beneficial owner of a security (as of the record date) for payment of monies owed for principal and interest. For registered securities, when the security is registered in a name other than that of the beneficial owner, the beneficial owner claims the principal and interest from the registered holder whose name appears on the books of the paying agent as of the record date.

**Clean REMIC:** See "Sequential Pay Security."

**Clean-up Call:** The process of calling a bond when the outstanding balance in a transaction is a small percentage of the original deal (usually 5-15%).

**Clear:** To consummate a trade by delivering securities in proper form to the buyer and funds in proper form to the seller. Trades that are not cleared on the settlement date are said to fail.

**Clearing Agent:** An entity that clears transactions for other entities.

**Clearinghouse Funds:** Funds represented by checks or drafts that pass between banks through the Federal Reserve System. Clearinghouse funds are next-day available funds.

**CMT (Constant Maturity Treasury):** A series of indices of various maturities (one, three, five, seven or ten years) published by the Federal Reserve Board and based on the average yields of a range of Treasury securities adjusted to a constant maturity corresponding to that of the relevant index.

**COFI (Cost of Funds Index):** A bank index reflecting the weighted-average interest rate paid by savings institutions on their sources of funds. There are national and regional COFI indices; the most prevalent is the 11th District COFI.

**Collateral:** Securities or property pledged by a borrower to secure payment of a loan or the performance of some other obligation. If the borrower fails to repay the loan or perform the obligation, the lender may take ownership of or otherwise realize the value of the collateral. Collateral for CMOs consists primarily of mortgage pass-through securities or mortgage loans, although it may also encompass letters of credit, insurance policies or other credit enhancements.

**Collateralized Mortgage Obligation (CMO):** A multiclass issue backed by a pool of mortgage pass-through securities or mortgage loans. Also see "REMIC."

**Companion Tranche:** A CMO tranche that absorbs a higher or lower proportion of prepayments in order to stabilize the principal payment schedule for a related PAC or TAC tranche in the same offering. Also known as a support tranche.

**Confirmation:** A transaction advice — in electronic or physical form — used by securities dealers and banks to express the basic terms of an agreement to buy or sell a security.

**Conventional Mortgage Loan:** A mortgage loan issued by a bank or thrift institution that is based solely on real estate as security and is not insured or guaranteed by a government agency or instrumentality.

**Conventional Pass-Through Securities:** Pass-through mortgage-backed securities whose payments of principal and/or interest are not insured or guaranteed by a government agency or instrumentality.

**Coupon Rate:** The stated annual percentage rate of interest, whether fixed or variable, paid on a fixed-income instrument.

**CPR (Constant Repayment Rate):** The percentage of outstanding mortgage loan principal that prepays in one year, based on the annualization of the Single Monthly Mortality (SMM), which reflects the outstanding mortgage loan principal that prepays in one month.

**Current Face:** The current remaining principal balance outstanding on a security. Current face is computed by multiplying the original face value of the security by the current principal balance factor.

**CUSIP Number:** A unique nine-digit identification number permanently assigned by the Committee on Uniform Securities Identification Procedures to each publicly traded security at the time of issuance. If the security is in physical form, the CUSIP number is printed on its face.

**Customer:** Generally, an individual or other entity that (i) is not a registered broker or dealer, (ii) is not principally engaged in the business of buying or selling securities for its own account, or for the account of others, and (iii) acts as a buyer of securities for its own account, rather than as a seller. Each party to a trade should establish whether its counterparty will be considered to have customer status.

**Dealer:** Generally, an individual or other entity that is principally engaged in the business of buying and selling securities for its own account. Each party to a trade should establish whether its counterparty will be considered to have dealer status.

**Delay:** See "Actual Delay" and "Stated Delay."

**Delayed-Delivery Contract:** A contract for the purchase or sale of a mortgage-backed security to be delivered at an agreed-upon future date. May also be known as a "TBA" ("To Be Announced"), because as of the trade date the seller has not yet identified certain terms of the contract, such as the pool number and number of pools, to the buyer.

**Delivery Date:** The date upon which the actual payment of funds and the delivery of securities occurs. The standard delivery date for a TBA transaction is on the business day 48 hours after the seller gives the buyer pool information, provided that such pool information is given before the requisite cutoff time and provided further that delivery cannot be made before the settlement date.

**Delivery Versus Payment (DVP):** A transaction in which the buyer's payment for securities is due at the time of delivery by the seller of the securities. Payments can be made by bank wire, check or direct credit to an account.

**Depository:** An institution that accepts securities for deposit and that facilitates book-entry delivery and transfer between and among its members.

**The Depository Trust Company (DTC):** A participant-owned securities depository that accepts deposits of eligible securities for custody, executes book-entry deliveries and records book-entry pledges of securities in its custody and provides for withdrawals of securities from its custody. DTC's depository services extend to many CMOs, ABSs and conventional pass-through securities, and, through a separate MBS Division (formerly operating as the Participants Trust Company) to Ginnie Mae and other agency securities. DTC is a limited-purpose trust company chartered by the State of New York, a member of the Federal Reserve system and registered with the Securities and Exchange Commission as a clearing agency.

**DK:** See "Don't Know."

**Don't Know:** Also known as "DK" or "bounce." A term used by a buyer when the buyer or its receiving agent does not recognize or acknowledge the confirmation or the securities that the seller has delivered.

**Draft Delivery:** The delivery of securities to a location outside of New York City (usually) to be paid for upon receipt at their intended destination.

**Due Bill:** (1) A document delivered by the seller of a security to a buyer evidencing that any principal and interest received by the seller past the record date for that security will be paid to the buyer by the seller. (2) A document delivered by a seller to a buyer in lieu of securities which evidences the seller's obligation to deliver securities to the buyer at a later date.

**Due Bill Check:** A post-dated check that is issued by the seller to the buyer and that becomes payable to the buyer on a specified date (the next payable date) in the amount of principal and interest due to the buyer. Prior to the specified payable date, the due bill check serves as a due bill.

**Electronic Pool Notification (EPN):** A real-time centralized computer network offered by the MBS Clearing Corporation (MBSCC) for buyers and sellers of mortgage-backed securities to exchange pool information electronically, eliminating the need to communicate via telephone or facsimile.

**Endorsement:** A signature or equivalent indication on an instrument by which all right, title and interest in such instrument are assigned and transferred by a registered owner or its authorized agent.

**European Option:** An option that may be exercised only on the expiration date.

**Exercise:** The act of calling or putting the option, which results in the receipt or delivery of the underlying security.

**Exercise Date:** The date upon which an option may be exercised.

**Expiration Date:** The last day upon which an option may be exercised.

**Extension Risk:** The risk that rising interest rates may slow anticipated prepayment speeds, causing investors to find their principal committed longer than expected. As a consequence, they may miss the opportunity to reinvest principal at the then higher market rates of interest .

**Factor:** A decimal value reflecting the proportion of the outstanding principal balance of a security, which changes over time in relation to its original principal value, which is expressed as a factor of 1.0.

**Fail:** A trade is said to fail if on the settlement date the seller fails to deliver securities in good delivery form to the buyer. The purchaser who has not received the securities is said to have a "fail to receive." The seller who has not delivered the securities is said to have a "fail to deliver."

**Fannie Mae:** See "Federal National Mortgage Association."

**Fannie Mae Dwarf:** A Fannie Mae mortgage pool backed by fixed-rate mortgages with 15-year terms. Fannie Mae Dwarf is a dealer term and is not used by Fannie Mae.

**FASIT (Financial Asset Securitization Investment Trust):** A special-purpose tax vehicle for a wide range of financial asset securitizations, similar to the tax vehicle employed by REMICs for multiclass mortgage securitizations.

**Fast-Pay Bond:** Tranches in a CMO/REMIC with relatively short average lives that are likely to pay down quickly in a declining interest-rate environment.

**Fed Book-Entry:** An electronic registration, transfer and settlement system for securities on the Federal Reserve system.

**Federal Funds:** Also known as "Fed funds." Funds deposited by commercial banks at Federal Reserve Banks, including funds in excess of bank reserve requirements. Member banks may lend federal funds to each other on an overnight basis. Member banks may also transfer funds between each other or on behalf of customers on a same-day basis by debiting and crediting their balances at the Federal Reserve Bank. Federal funds are immediately available funds.

**Federal Home Loan Bank System:** Established in 1932, the system is made up of 12 regional Federal Home Loan Banks and supplies credit reserves for savings and loan institutions, cooperative banks and other mortgage lenders.

**Federal Home Loan Mortgage Corporation:** Also known as "Freddie Mac" or "FHLMC." Freddie Mac is a federally chartered, publicly owned corporation. It was created by Congress to foster liquidity by creating a secondary market for conventional mortgages. Freddie Mac guarantees the timely payment of interest and the ultimate payment of principal on its pass-through mortgage-backed securities.

**Federal Housing Administration (FHA):** The FHA is a corporate instrumentality of the U.S. Government created in 1934 under the National Housing Act to insure lenders against loss on residential mortgages.

**Federal National Mortgage Association:** Also known as "Fannie Mae" or "FNMA." Fannie Mae is a federally chartered, publicly owned corporation that was created by Congress to enhance the secondary mortgage market. It is authorized to purchase and sell conventional, FHA-insured and VA-guaranteed loans. Fannie Mae guarantees the timely payment of principal and interest on its pass-through, mortgage-backed securities.

**Federal Reserve System (the "Fed"):** A system established by the Federal Reserve Act of 1913 to regulate the U.S. monetary and banking system. The Fed is comprised of the Board of Governors and the Federal Reserve Board, which is the central decision-making authority. The system also includes 12 district Federal Reserve Banks, their 24 branches and all national and state banks that are part of the system. The Fed's functions include regulating the national money supply and operating the Fedwire Network.

**Fedwire® Network:** A computer system linking member banks to the Federal Reserve System and used for making interbank payments of Fed funds and for transferring in book-entry form U.S. Treasury securities and certain federal agency securities, as well as Fannie Mae and Freddie Mac mortgage-backed securities.

**Fedwire Network Message:** An electronic message issued by the Fed that evidences the transfer of securities over the Fedwire Network. The Fed also issues funds Fedwire Network messages that evidence the transfer of funds over the Fedwire Network.

**Fee:** (1) Commitment fee: a payment to investors or prospective investors, which may or may not be refundable, for the purpose of obtaining a commitment to purchase securities. (2) Standby fee: a nonrefundable amount received or paid for the sale or purchase of a standby commitment. (3) Up-front fee: a commitment fee paid in advance of the settlement date to an investor as part of a future purchase.

**Flat:** (1) A trade that settles with no accrued interest. (2) An offsetting position in securities.

**Floating-Rate Security:** A security that pays an adjustable rate of interest tied to a representative interest rate index such as the London Interbank Offered Rate (LIBOR), the Constant Maturity Treasury (CMT) or the Cost of Funds Index (COFI).

**Floor:** The lower limit for the interest rate on an adjustable-rate loan or security.

**Foreclosure:** Legal procedure for enforcing payment of a debt by seizing and selling the mortgaged property.

**48-Hour Rule:** The requirement that all pool information, as specified in these *Uniform Practices*, in a TBA transaction be communicated by the seller to the buyer before the requisite cutoff time on the business day 48 hours prior to the agreed settlement date.

**Forward Trade:** A transaction in which the settlement is scheduled to occur on a specified date in the future at a price agreed upon on the trade date.

**Freddie Mac:** See "Federal Home Loan Mortgage Corporation."

**Ginnie Mae :** See "Government National Mortgage Association."

**Ginnie Mae I:** Ginnie Mae I securities are single-issuer pools. On payable date, the 15th of the month, DTC's MBS Division as registered holder receives separate principal and interest payments on each Ginnie Mae I security, which it allocates to its participants.

**Ginnie Mae II:** Ginnie Mae II securities are collateralized by multiple-issuer pools or custom pools that contain loans from a single issuer. Unlike Ginnie Mae I securities, interest rates may vary within one percentage point. On payable date, the 20th of the month, DTC's MBS Division as registered holder of Ginnie Mae II securities receives an aggregate principal and interest payment from a central paying agent on all Ginnie Mae II securities, which it allocates to its participants.

**Ginnie Mae Midget:** A Ginnie Mae pass-through security backed by fixed-rate mortgages with 15-year terms. Ginnie Mae Midget is a dealer term and is not used by Ginnie Mae.

**Ginnie Mae Platinum:** A reconstituted Ginnie Mae security backed by multiple Ginnie Mae single-class mortgage securities combined into a single larger mortgage security.

**Good Delivery:** A term indicating that a transaction has met all relevant guidelines for clearance, delivery and settlement, such as cutoff times for notification, allocation and endorsement, as set forth in these *Uniform Practices*.

**Good Funds:** Funds that are immediately available to the receiver of the funds (i.e., Fed funds).

**Government National Mortgage Association:** Also known as "Ginnie Mae" or "GNMA." Ginnie Mae is a wholly owned government corporation within the Department of Housing and Urban Development. Ginnie Mae was created to support a secondary market in government-insured and -guaranteed mortgages. Ginnie Mae guarantees the timely payment of principal and interest on its securities. These payments are guaranteed by the full faith and credit of the U.S. Government. Ginnie Mae securities are backed by pools of FHA-insured and VA- and RHS-guaranteed mortgages.

**Graduated Payment Mortgage (GPM):** A mortgage that features negative amortization in which early payments are insufficient to pay the interest due on the outstanding principal. As a result, the unpaid interest is added to the principal, thereby increasing the borrower's balance owed. The payments must graduate or increase over time until they can completely amortize the loan's

remaining principal balance by its maturity. The number, frequency and rate of increases are specified in the original contract.

**Haircut:** The margin or difference between the actual market value of a security and the value assessed by the lending side of a transaction.

**Handle:** The whole-dollar price of a security. For example, if a security is quoted at 101-10/32, 101 is the handle.

**Hedge:** A commitment or investment made with the intention of minimizing the impact of adverse movements in interest rates or securities prices and offsetting potential losses.

**ID:** See "Trade Suite."

**Interest:** Compensation paid or to be paid for the use of money, generally expressed as an annual percentage rate.

**Interest Accrual Period:** The period of time in which a bond accrues interest, usually on a 30/360 basis unless otherwise stated.

**Interest Rate:** The face coupon rate of a security.

**Interest Shortfall:** A deficiency in collections on loans underlying a security, such that the amount of interest actually paid on a class of securities is less than the amount scheduled to be paid. This is caused primarily when mortgagors fully or partially prepay principal, or upon foreclosures or other liquidations of defaulted mortgage loans that result in a prepayment. Interest on the amount prepaid generally accrues only to the date of prepayment.

**Interim Accounting Period:** The period between the record date and the corresponding beneficiary date. Since paying agents distribute principal and interest based on the record-date position, trades settling during the interim accounting period are not reflected in the trustee's record-date position. It therefore is necessary to track the position to the beneficiary date, since that is the date representing entitlement to the payment.

**Inverse Floater:** A security that pays an adjustable rate of interest and that moves in the opposite direction from movements in a representative interest rate index, such as the London Interbank Offered Rate (LIBOR), the Constant Maturity Treasury (CMT) or the Cost of Funds Index (COFI).

**IO (Interest-Only) Security:** A security that pays investors only interest and not principal. IO securities are generally priced at a deep discount to the "notional" amount of principal used to calculate the amount of interest due.

**Issue Date:** The date on which a security is deemed to be issued or originated.

**Issuer:** An entity that issues and is responsible for the ultimate payments on securities.

**Jumbo Pools:** Ginnie Mae II pass-through mortgage securities collateralized by pools that are generally larger and contain mortgages that are often more geographically diverse than single-issuer pools. Mortgage loans in jumbo pools may vary in terms of the interest rate within one percentage point.

**Jump Z-Tranche:** A Z-tranche that may start receiving principal payments before prior tranches are retired if market forces create a “triggering” event, such as a drop in Treasury yields to a defined level or a prepayment experience that differs from assumptions by a specific margin. “Sticky” jump Z-tranches maintain their changed payment priority until they are retired. “Non-sticky” jump Z-tranches maintain their priority only temporarily for as long as the triggering event is present. Although jump Z-tranches are no longer issued, some still trade in the secondary market.

**LIBOR (London Interbank Offered Rate):** The interest rate banks charge each other for short-term Eurodollar loans ranging from overnight to five years in maturity.

**Life Rate Cap:** A consumer protection option (or cap) in an ARM that limits the amount that the interest rate and monthly payment can increase. The Life Rate Cap sets the maximum interest rate that can be charged for the life of the loan.

**Loan-to-Value (LTV):** A measure used to describe the loan amount as a percent of the home's market value. It is calculated by dividing the loan amount by the market value of the home. Its purpose is to ensure that if the borrower defaults on the loan, the property can be sold for enough to satisfy the loan.

**Lockout:** The period of time before an investor will begin receiving principal payments.

**Market Price:** The current price of a security in the market.

**Market Value:** The product of the current face of a security and its market price.

**Mark-to-Market:** The process whereby the book value or collateral value of a security is adjusted to reflect its current market value.

**Maturity Date:** The date on which the principal amount of the security is due and payable to the registered owner of the security.

**MBS Clearing Corporation (MBSCC):** A registered clearing agency with the Securities and Exchange Commission that provides various clearing services to its participants for Ginnie Mae, Fannie Mae and Freddie Mac securities, as well as EPN services that allow mortgage-backed securities buyers and sellers to exchange allocated pool information electronically.

**Mortgage:** A legal instrument that creates a lien upon real estate securing the payment of a specific debt.

**Mortgage-Backed Bond:** A general obligation of the issuer, secured by mortgage collateral, where the issuer retains ownership of the mortgages. The bond is secured by the market value of the underlying mortgages. Since the value of the mortgages will decrease over time as a result of principal amortization and prepayments, the market value of the collateral must exceed the value of the bonds issued. Unlike pass-through securities, the cash flow on a mortgage-backed bond is not directly related to the cash flow of the underlying mortgage collateral. Interest on the bond is paid semiannually at a predetermined rate, and principal is paid at maturity.

**Mortgage-Backed Securities (MBS):** The term mortgage-backed securities is a generic term that, for purposes of these *Uniform Practices*, refers to securities backed by mortgages, pass-through securities, mortgage-backed bonds, mortgage pay-through securities and CMOs. The term also includes all commitments or arrangements to purchase or sell such securities, including stand-by contracts, but, for purposes of these *Uniform Practices*, does not include repurchase agreements, reverse repurchase agreements, transactions for future delivery or options on mortgage-backed securities executed on a contract market or an exchange.

**Mortgage Banker:** An entity that originates mortgage loans, sells them to other investors and services the loans.

**Mortgage Loan:** A loan secured by a mortgage.

**Mortgage Pass-Through Security:** A security representing a direct interest in a pool of mortgage loans. The pass-through issuer or servicer collects the payments on the loans in the pool and "passes through" the principal and interest to the security holders on a pro rata basis. Mortgage pass-through securities are also known as mortgage-backed securities (MBS) and participation certificates (PCs).

**Mortgage Pay-Through Bonds:** These bonds combine features of pass-through securities and mortgage-backed bonds. A pay-through bond, like a mortgage-backed bond, is a debt obligation of the issuer, secured by mortgage collateral that is owned by the issuer. However, like a pass-through security, the cash flow on a pay-through bond is related to the cash flow on the mortgage collateral. Therefore, the cash flow generated by the mortgage collateral must be sufficient to cover principal and interest payments on the bonds. Prepayments on the mortgage collateral will be passed on to the bondholders, thereby causing fluctuations in the principal payment on the bonds.

**Negative Amortization:** A situation in which the current payments on a graduated-payment mortgage or on an adjustable-rate mortgage are insufficient to pay the interest due on the outstanding principal. The unpaid interest is added to the principal, thereby increasing the borrower's balance owed.

**Negative Convexity:** A characteristic of callable or prepayable securities that causes investors to have their principal returned sooner than expected in a declining interest-rate environment or later than expected in a rising interest-rate environment. In the former scenario, investors may have to reinvest their funds at lower rates ("call risk"); in the latter, they may miss an opportunity to earn higher rates ("extension risk").

**Nominee Name:** An entity in whose name securities are registered. Nominee names are usually used to facilitate transactions, but the beneficial owner retains the rights to the security.

**Nonconforming Loan:** A loan that does not meet the size limits mandated by Congress for loans that Fannie Mae and Freddie Mac can buy. Also called a jumbo loan.

**NRSRO (Nationally Recognized Statistical Rating Organization):** An organization designated through an SEC no-action process to provide credit ratings information and opinions to the financial community. The major NRSROs include: Duff & Phelps Credit Rating Co., Inc.; Fitch IBCA; Moody's Investors Service Inc.; and Standard & Poor's Corporation.

**Odd-Lot:** A quantity of securities that is less than the accepted unit of trading.

**Offer:** The price at which a seller is willing to sell a security.

**Offering Materials Guidelines:** Guidelines adopted by Government Sponsored Enterprises (GSEs), which include among others Fannie Mae and Freddie Mac, that require dealers that sell GSE securities to deliver offering materials to investors within a specified distribution period, similar to prospectus delivery requirements under federal law for nonexempt securities.

**Option:** The right, but not the obligation, to purchase or sell a security at a predetermined price, on or before a future specified date.

**Original Face:** The face value or original principal amount of a security on its issue date.

**PAC (Planned Amortization Class) Tranche:** A CMO tranche that uses a mechanism similar to a sinking fund to determine a fixed-principal payment schedule that will apply over a range of pre-payment assumptions. The effect of the prepayment variability that is removed from a PAC bond is transferred to a companion tranche.

**Pair Off:** A process by which two parties offset a position in securities by buying an issue previously sold or selling an issue previously bought.

**Par:** 100% of the face value of a debt security.

**Payable Date:** The scheduled date on which P&I distributions are to be made.

**Paying Agent:** An entity responsible for making the payment of interest and principal to bondholders on behalf of the bond's issuer.

**Payment Date:** Also known as the payable date. The date that actual principal and interest payments are scheduled to be made to the registered holder of a security.

**P&I (Principal and Interest):** The term used to refer to regularly scheduled payments or prepayments of principal and of interest on mortgage securities.

**P&I Check:** A check representing payment of principal and interest owed and received.

**P&I Claim Letter:** A request by the beneficial owner for payment of principal and interest paid to the registered holder.

**Periodic Rate Cap:** The amount that an ARM's interest rate can change from one adjustment interval to the next. For example, if the ARM's periodic rate cap is 2 percent, the interest rate cannot go up or down more than 2 percent from one year to the next, even if the index goes up or down more than 2 percent.

**Plain Vanilla CMO:** See "Sequential Pay Security."

**PO (Principal-Only) Security:** A security that pays investors principal only and not interest. PO securities are generally priced at a deep discount from their face value.

**Pool:** A collection of mortgage loans or other collateral assembled by an originator or master servicer as the collateral for a security. In the case of Fannie Mae, Freddie Mac or Ginnie Mae mortgage pass-through securities, pools are identified by a number assigned by the issuing agency.

**Premium:** A nonrefundable fee paid to the seller of an option by the buyer of the option in consideration for entering into the option agreement.

**Prepayment:** The unscheduled partial or complete payment of the principal amount outstanding on a mortgage loan or other debt obligation before it is due.

**Price:** The dollar amount to be paid for a security, which may also be stated as a percentage of its face value or par in the case of debt securities.

**Principal:** The face amount of a bond, exclusive of accrued interest, if any, and payable at maturity. With mortgage securities, principal refers to the amount outstanding on the mortgage loans.

**Principal Transaction:** A securities transaction in which one or both of the parties act as principals dealing for their own account.

**Private Label:** The term used to describe a mortgage security whose issuer is an entity other than a U.S. Government agency or U.S. Government-sponsored enterprise. Such issuers may be subsidiaries of investment banks, financial institutions or other private entities.

**Put Option:** The right, but not the obligation, to sell a security at a predetermined price on or before a specified future date.

**Ratings:** Designations used by NRSROs to give relative indications of credit quality.

**Reclamation:** A claim for the right to return or the right to demand the return of a security that has been previously accepted as a result of bad delivery or other irregularities in the settlement process.

**Record Date:** The date for determining the registered owner who will receive the next scheduled payment of principal and/or interest on a security.

**Registered Owner:** The name in which a security is registered as stated on the certificate itself or on the books of the paying agent. All principal and interest payments are made to the registered owner as of the record date.

**REMIC (Real Estate Mortgage Investment Conduit):** A federal income tax designation available to certain mortgage securities trusts. Most CMOs are today issued in REMIC form to create certain tax advantages for the issuer. The terms REMIC and CMO are now used interchangeably.

**Repurchase Agreement (Repo):** An agreement of one party to sell securities at a specified price to a second party, and a simultaneous agreement of the first party to repurchase the securities at a specified price on demand or at a specified later date.

**Residual:** The equity interest in a structured product. The residual is the cash flow remaining on each payment date after all payments on other tranches have been made. The primary source of income to the residual is cash generated by the collateral that is greater than the principal and interest payments due on the other tranches.

**Reverse Repurchase Agreement (Reverse Repo):** An agreement of one party to purchase securities at a specified price from a second party, and a simultaneous agreement by the first party to resell the securities at a specified price to the second party on demand or at a specified later date.

**Rural Housing Service (RHS):** A government agency established under the Farmers Home Administration Act of 1946 to provide financing to farmers and other qualified rural borrowers who are unable to obtain loans elsewhere. Formerly known as FmHA, RHS originates, participates in and insures loans for rural housing and other purposes.

**Safekeeping:** The storage and protection of customers' securities provided as a service by a bank or institution acting as agent for the customer.

**Secondary Market:** The market for previously issued securities.

**Secondary Mortgage Market Enhancement Act of 1984 (SMMEA):** Adopted by Congress in 1984, SMMEA was designed to ease and expand the role of private-sector investment entities such as mortgage bankers, investment bankers and pension funds in the secondary mortgage market by, among other things, preempting state investment and securities registration laws.

**Sequential Pay Security:** A security in which all tranches receive regular interest payments, but principal payments are directed initially only to the first tranche until it is completely retired. Once the first tranche is retired, the principal payments are applied to the second tranche until it is fully retired, and so on.

**Serialized Mortgage-Backed Security:** See “Collateralized Mortgage Obligation.”

**Servicer:** An entity that is responsible for the collection and pooling of principal, interest and escrow payments on loans and loan pools, as well as performing certain operational and administrative procedures such as accounting, bookkeeping, insurance, tax records, loan-payment follow-up, delinquency loan follow-up and loan analysis. The servicer receives a servicing fee for providing these loan-maintenance functions.

**Servicing Fee:** The amount retained by the mortgage servicer from monthly interest payments made on a mortgage loan.

**Settlement Balance Order (SBO):** The net position of a firm as a result of netting its transactions with other participants in the Clearing Division of the MBS Clearing Corporation. The end position represents the actual receive/delivery obligations of each participant per coupon (class).

**Settlement Class:** A classification for mortgage-backed securities based on product type for purposes of establishing The Bond Market Association settlement dates.

**Settlement Date:** The date agreed upon by the parties to a transaction for the payment of funds and the delivery of securities.

**Sinking Fund:** Money set aside on a regular basis, sometimes from current earnings, for the specific purpose of redeeming debt.

**Slow-Pay Bond:** See “Collateralized Mortgage Obligation.”

**SMM (Single Monthly Mortality):** The percentage of outstanding mortgage loan principal that prepays in one month.

**Specified Transaction:** A contract for the purchase or sale of securities, the settlement of which is conditional upon specific terms mutually agreed to by both parties at the time of the trade, and which is thus distinguished from a TBA transaction. Note that where the original faces and pool numbers are specified at the time of the trade for a forward transaction, the variance and the 48-hour notification rule do not apply.

**Standard Prepayment Model of The Bond Market Association:** A model based on historical mortgage prepayment rates that is used to express prepayment rates on mortgage securities. The Association’s model is based on the Constant Prepayment Rate (CPR), which annualizes the Single Monthly Mortality (SMM), or the amount of outstanding principal that is prepaid in a month. Projected and historical prepayment rates are often expressed as “percentage of PSA” (Prepayment Speed Assumptions). A prepayment rate of 100% PSA implies annualized prepay-

ment rates of 0.2% CPR in the first month, 0.4% CPR in the second month, 0.6% CPR in the third month and 0.2% increases in every month thereafter until the thirtieth month, when the rate reaches 6%. From the thirtieth month until the mortgage loan reaches maturity, 100% PSA equals 6% CPR.

**Standby Commitment:** An arrangement whereby a buyer is paid a negotiated, nonrefundable fee by a seller which entitles the seller to sell to the buyer, at the seller's option, securities on a specified date and at a specified price.

**Stated Delay:** Time elapsed from the first day of the month of purchase to the first payment date of principal and interest.

**Street Name:** A registered security that has been endorsed "in blank" or in favor of a broker or dealer is said to be in street name.

**Strike Price:** The price at which the underlying security will be purchased or sold for upon exercise.

**Stripped Mortgage-Backed Security:** A security that is created by redistributing the cash flows from the underlying mortgages or mortgage-backed securities to create two or more new securities, each with a specified percentage of the underlying security's principal payments, interest payments or combinations of the two. Securities may be partially stripped, i.e., each investor class receives some interest and some principal. For example, the cash flow on an 8 percent pass-through security might be redistributed to create one security with a 10 percent coupon and another security with a 6 percent coupon. Some securities are completely stripped, thereby creating interest-only and principal-only securities, in which all of the interest is distributed to one security and all of the principal to the other.

**Superfloater:** A floating-rate CMO tranche whose rate is based on a formulaic relationship to a representative interest-rate index.

**Super PO:** A principal-only security structured as a companion bond.

**Support Tranche:** See "Companion Tranche."

**TAC Tranche:** Targeted amortization class tranche. A TAC tranche uses a mechanism similar to a sinking fund to determine a fixed principal payment schedule based on an assumed prepayment rate. The effect of prepayment variability that is removed from the TAC tranche is transferred to a companion tranche.

**TBA:** A To-Be-Announced Trade. See "Delayed-Delivery Contract."

**Toggle Tranche:** See "Jump Z-Tranche."

**Trade Date:** The date on which parties enter into an agreement for the purchase or sale of securities.

**Trade Suite:** Refers to a series of services in DTC's electronic trade confirmation arena including what was previously known as ID.

**Tranche:** A specific class or designation of bonds that shares the same payment and maturity characteristics. "Tranche" is the French word for "slice."

**Transfer Agent:** A party appointed to maintain records of securities owners, to cancel and issue certificates and to address issues arising from lost, destroyed or stolen certificates.

**Trustee:** A financial institution with trust powers which acts in a fiduciary capacity for the benefit of the bondholders in enforcing the terms of the bond contract.

**Variance:** The permitted maximum over- or under-allocation of securities that can be delivered to satisfy an outstanding commitment.

**Veterans Administration (VA):** A U.S. government agency that guarantees home loan mortgages issued by lending institutions to qualified veterans of the U.S. armed forces or to their surviving spouses.

**Weighted Average Coupon (WAC):** The weighted average interest rate of the underlying mortgage loans or pools that serve as collateral for a security, weighted by the size of the principal loan balances.

**Weighted Average Loan Age (WALA):** The weighted average number of months since the date of the loan origination of the mortgages in a mortgage pass-through security pool issued by Freddie Mac, weighted by the size of the principal loan balances.

**Weighted Average Maturity (WAM):** The weighted average number of months to the final payment of each loan backing a mortgage security, weighted by the size of the principal loan balances. Also known as weighted average remaining maturity (WARM) and weighted average remaining term (WART).

**Whole Loan:** An unsecuritized loan.

**Window:** In a CMO bond, the period of time between the expected first payment of principal and the expected last payment of principal.

**Yield:** The annual percentage rate of return earned on a security, as computed in accordance with standard industry practices. Yield is a function of a security's purchase price and interest rate.

**Z-Tranche:** See "Accrual Bond."

# Chapter 3

# U.S. Federal Agencies

## A. Ginnie Mae

### 1. General

The Government National Mortgage Association (Ginnie Mae), a wholly owned government corporation within the Department of Housing and Urban Development (HUD), was created by Congress in 1968. Ginnie Mae was established to expand affordable housing to low- and moderate-income borrowers by providing an efficient government-guaranteed secondary market vehicle linking the capital markets with federal housing markets. It does this by facilitating secondary market activities for residential mortgages and by making mortgage investments attractive to all types of investors. Through its mortgage-backed securities (MBS) programs, Ginnie Mae helps to increase the supply of credit available for housing.

Ginnie Mae does not issue, sell or buy securities. Ginnie Mae guarantees the timely payment of principal and interest on securities backed by the full faith and credit of the United States Government, which are issued by approved entities. The Ginnie Mae pass-through security is a modified pass-through security; holders receive timely payment of principal and interest even if there is a default on a mortgage in the underlying collateral pool or a default by the Ginnie Mae issuer or servicer.

### 2. Issuance of Ginnie Mae Securities

There are approximately 650 active Ginnie Mae issuers, typically mortgage bankers, savings institutions or commercial banks. All Ginnie Mae issuers are Federal Housing Administration (FHA) approved lenders, have a net worth acceptable to Ginnie Mae and have demonstrated adequate experience, management capability and facilities to issue and service MBS.

Mortgage lenders must apply to Ginnie Mae for approval to issue Ginnie Mae securities and for a commitment for the guaranty of a specific amount of securities. An approved issuer originates or acquires FHA-insured and/or Veterans Administration (VA) or Rural Housing Services (RHS) guaranteed mortgages that it then assembles into pools. The issuer submits relevant mortgage documents to a document custodian and pool documents to Ginnie Mae (or its agent) for review and approval. After document submission, Ginnie Mae reviews the issuer's documents and authorizes its transfer agent to prepare and deliver Ginnie Mae-guaranteed securities to investors. The issuer is responsible for marketing and administering the securities and servicing the mortgage pools.

The lender collects a minimum fee of 50 basis points (25 for multifamily pools) for servicing the mortgages and administering the securities. Up to six basis points (13 for multifamily pools) are remitted to Ginnie Mae as a fee for guaranteeing the securities. The guarantee fee is paid monthly by the issuer and is computed on the outstanding balance of the securities.

### 3. Ginnie Mae Programs

Ginnie Mae began issuing pass-through securities in 1970. Currently, there are two active Ginnie Mae pass-through MBS: the original MBS, now called Ginnie Mae I, and the Ginnie Mae II MBS, which began in 1983. Securities issued under both programs carry the same guarantee.

- a. **Ginnie Mae I** Ginnie Mae I MBS have several pool types, each of which securitizes different types of mortgages. All Ginnie Mae I pools do, however, have common features. Ginnie Mae I securities are based on single-issuer pools, in which mortgages of the same type, with the same coupons (except for manufactured housing pools) and similar maturities, are pooled, normally within two years of origination. Most Ginnie Mae I pools feature a 50 basis point servicing fee and a 45-day stated payment delay; the multifamily program has a minimum servicing fee of 25 basis points.

Single-family level-payment pools account for over 95 percent of production.

- b. **Ginnie Mae II** In 1983, Ginnie Mae introduced the Ginnie Mae II MBS. Unlike the Ginnie Mae I MBS, the Ginnie Mae II MBS permits greater flexibility in the range of mortgage notes that may be pooled. The interest rate of a mortgage in a pool must be at least 50 basis points, but not more than 150 basis points, above the interest rate of the pool. The Ginnie Mae II MBS has a 50-day stated payment delay. While the Ginnie Mae I MBS is based on single-issuer pools only, the Ginnie Mae II MBS permits multiple-issuer pools as well as single-issuer pools, also known as custom pools. By allowing issuers to package as little as \$250,000 of mortgages in certain Ginnie Mae II pools, Ginnie Mae is able to accommodate smaller issuers who may not generate the \$1 million minimum volume needed to participate in the Ginnie Mae I MBS. Multiple-issuer pools also provide investors with pools that are typically larger and more geographically diverse than the single-issuer pools. Finally, the Ginnie Mae II MBS features a central paying agent, which consolidates all payments on Ginnie Mae II securities. This enables investors to receive a single monthly check that includes payments on all of their Ginnie Mae II investments.

- c. **Ginnie Mae Multiclass Securities** Established in 1994, the Ginnie Mae Multiclass Securities Program consists of Ginnie Mae Real Estate Mortgage Investment Conduits (REMICs) and Ginnie Mae Platinum securities. The Multiclass Securities Program provides an important adjunct to Ginnie Mae's secondary market activities, allowing the private sector to combine and restructure cash flows from Ginnie Mae MBS into securities that meet unique investor requirements in connection with yield, maturity and call-option protection. The intent of the Multiclass Securities Program is to increase liquidity in the secondary mortgage market and to attract new sources of capital for federally insured or guaranteed residential loans. Under these programs, Ginnie Mae guarantees, with the full faith and credit of the United States Government, the timely payment of principal and interest on Ginnie Mae REMIC and Ginnie Mae Platinum securities.

Ginnie Mae commenced operation of its Multiclass Securities Program in May 1994 with a REMIC offering collateralized by Ginnie Mae I MBS. In February 1995, Ginnie Mae II MBS were structured into a REMIC offering, expanding Ginnie Mae's position in

the REMIC market. The REMIC offerings have also brought increased efficiency to the market by bringing a broader range of investors into the market for mortgage loans. This has increased demand for the federally insured and guaranteed mortgages backing MBS and has transferred economic benefits associated with lower interest rates to American home buyers.

Ginnie Mae commenced operation of its Ginnie Mae Platinum security in November 1994. Through the Ginnie Mae Platinum security, a depositor who holds a number of Ginnie Mae Certificates may deposit them into a Ginnie Mae Platinum Trust. In exchange for the Ginnie Mae Certificates, the Ginnie Mae Platinum Trust will issue one large-denominated Ginnie Mae Platinum Certificate. The Ginnie Mae Platinum security streamlines the administration and accounting process for investors who own pools with small remaining principal balances.

- d. **Callable Trusts** These consist of pairs of classes, designated A and B. The A class may be redeemed at the option of the investors in the B class. These securities allow investors to better manage prepayment risk by providing lockout periods and call redemptions at known prices. Callable trusts may be used to back a REMIC to further customize securities as demanded by investors.

Under changing economic and market conditions, a range of products will allow Ginnie Mae to better satisfy investor needs, ensuring continuous availability of capital to the mortgage markets and the continuous accrual of the benefit from the Multiclass securities programs to mortgagors.

#### 4. Features of Ginnie Mae Mortgage-Backed Securities

	<i>Ginnie Mae I</i>	<i>Ginnie Mae II*</i>
Issuer	Ginnie Mae-approved mortgage lender (single issuers)	Ginnie Mae-approved mortgage lender(s) (single & multiple issuers)
Underlying Mortgages	Government-insured or -guaranteed loans (FHA, VA & RHS)	Government-insured or -guaranteed loans (FHA, VA & RHS)
Pool Types	Single-Family Level-Payment Mortgage  Single-Family Graduated-Payment Mortgage  Single-Family Growing-Equity Mortgage  Single-Family Buydown Mortgage  Manufactured Housing	Single-Family Level-Payment Mortgage  Single-Family Graduated-Payment Mortgage  Single-Family Growing-Equity Mortgage  Single-Family Adjustable-Payment Mortgage  Manufactured Housing

\*Note: Pools may be either single-issuer (custom) pools or multiple-loan-issuer (jumbo) pools.

	<i>Ginnie Mae I</i>	<i>Ginnie Mae II*</i>
Pool Types (cont.)	Serial Notes Multifamily Project Loan Multifamily Construction Loan	
Interest rate on underlying mortgages	All mortgages in a pool have the same interest rate (except manufactured housing pools)	Mortgages in a pool may have interest rates that vary within a one percent range (except manufactured home pools)
Guaranty	Timely payment of principal and interest	Timely payment of principal and interest
Guarantor	Ginnie Mae (full faith and credit of U.S. Government)	Ginnie Mae (full faith and credit of U.S. Government)
Principal and Interest	Paid monthly to holders	Paid monthly to holders
Payment Date	15th of the month	20th of the month
Maturity	Maximum 30 years for single-family, 40 years for multifamily	Maximum 30 years
Minimum Certificate Size	\$25,000	\$25,000
Minimum Pool Size	\$1,000,000 (single-family) \$250,000 (all others)	\$250,000 to \$1,000,000 depending on pool type
Transfer Agent	Chase Manhattan Bank	Chase Manhattan Bank

## 5. Features of Ginnie Mae Multiclass Securities

	<i>REMICs</i>	<i>Ginnie Mae Platinum</i>
Trustee	Ginnie Mae-approved trustee	Chase Manhattan Bank
Collateral	Single-Family MBS Adjustable Rate MBS Multifamily MBS	Single-Family MBS
Guaranty	Timely payment of principal and interest	Timely payment of principal and interest
Guarantor	Ginnie Mae (full faith and credit of U.S. Government)	Ginnie Mae (full faith and credit of U.S. Government)

\*Note: Pools may be either single-issuer (custom) pools or multiple-loan-issuer (jumbo) pools.

	<i>REMICs</i>	<i>Ginnie Mae Platinum</i>
Payment Date	16th or 20th of the month for Ginnie Mae I and II collateral, respectively	Same as the underlying MBS
Record Date	Final day of the month before payment	Final day of the month before payment
Minimum Certificate Size	\$1,000	\$25,000
Information Repository	Chase Manhattan Bank	Chase Manhattan Bank

## B. Fannie Mae

### 1. General

The Federal National Mortgage Association (Fannie Mae) was created by Congress in 1938 to provide liquidity to the mortgage market. To achieve this goal, Fannie Mae was authorized to purchase mortgages issued by the FHA, thus establishing the foundation for the modern secondary mortgage market. In 1948, Fannie Mae's authority was extended to include the purchase of loans guaranteed by the VA. In 1954, Fannie Mae was established as a mixed-ownership corporate instrumentality of the United States, supervised by the precursor of HUD. The most significant step in Fannie Mae's evolution occurred in 1968, when federal legislation divided the original functions of Fannie Mae and established two entities — Ginnie Mae and a federally chartered, privately owned corporation, which retained the name Fannie Mae. The newly privatized Fannie Mae was re-chartered by Congress to enhance the efficient flow of funds through the secondary mortgage market. In addition, Congress mandated that the corporation operate with private capital on a self-sustaining basis. The transition to private status was completed in 1970, when shareholders bought the government's remaining ownership interest. Originally Fannie Mae purchased and sold only FHA-insured and VA-guaranteed mortgages. In 1970, Fannie Mae's authority was expanded to include the purchase of conventional mortgages.

Fannie Mae began its mortgage-backed securities program in 1981 with the issuance of its pass-through security (the "MBS"). Fannie Mae guarantees timely payment of principal and interest to its MBS holders. That is, MBS holders will receive the monthly pass-through of principal and interest due from the underlying mortgages whether or not such payments are made by the mortgagors. This guarantee is a corporate obligation and is not backed by the full faith and credit of the United States Government. However, the market accords them "agency status," and they are considered "AAA" quality when used as collateral in structured financings.

Most Fannie Mae MBS are issued through the "swap" program, under which approved lenders deliver mortgages to Fannie Mae in exchange for an MBS. Fannie Mae also pools mortgages from its own portfolio to create MBS.

## 2. Fannie Mae Programs

- a. **Cash Program** Fannie Mae purchases loans directly from approved lenders to be held as investments for its own portfolio, or the purchased loans may be pooled and sold in the market by Fannie Mae.
- b. **MBS** Fannie Mae MBS are backed by a variety of mortgage types. Primarily, the pools are backed by groups of new or seasoned conventional mortgages. Some Fannie Mae pools may also be backed by pools of seasoned government loans. Each pool must be backed by mortgages on either single- or multifamily (more than four units) properties. Fannie Mae MBS may be backed by fixed-rate mortgages of a specific maturity (i.e., 15, 20 or 30 years), adjustable-rate mortgages tied to various indices (i.e., constant maturity Treasuries, LIBOR or cost-of-funds indexes), co-op loans, balloon mortgages, Title 1 loans, graduated-payment loans or other mortgage types. Each pool is composed of a group of mortgages of the same type and has a unique pool number as an identifier. Additionally, each pool number is preceded by a two-character prefix denoting the mortgage product backing the pool. Pools may include mortgages that bear a range of coupon rates between 50 and 250 basis points above the pass-through rate of the securities. Fannie Mae MBS have a payment delay of 55 days.
- c. **Structured Products** Fannie Mae issues a number of structured mortgage securities that use MBS, whole loans (single-or multifamily) or even other structured securities as collateral. These products include stripped MBS (SMBS), REMICs, callable (also known as redeemable) mortgage pass-through certificates (CPCs), swap trusts and groups of MBS pooled together as a pass-through (MEGA Pools).
- d. **Other Programs** Some Fannie Mae MBS are backed by loans delivered from several lenders (Fannie Majors). This program permits smaller lenders to securitize current production loans into larger, more geographically diverse pools that have narrower ranges of weighted-average maturities and coupons than single-lender pools. A lender can deliver as little as one loan into a Fannie Majors pool. Both 15- and 30-year fixed-rate mortgages, as well as some adjustable-rate mortgages, are eligible under the program.

Fannie Mae also issues securities backed by loans on multifamily properties which have been originated by specially approved lenders without extensive prior review by Fannie Mae under its delegated underwriting service (DUS).

## C. Freddie Mac

### 1. General

The Federal Home Loan Mortgage Corporation (Freddie Mac) is a shareholder-owned, government-sponsored enterprise (GSE) established by Congress in 1970 to provide a continuous flow of funds for residential mortgages. Although it was chartered by Congress, Freddie Mac is not a government agency or part of the government in any other way. Freddie Mac facilitates the flow of affordable mortgage funds by purchasing investment-quality loans from mortgage lenders, packaging those loans into mortgage-backed securities and selling those securities to investors. Mortgage lenders use the proceeds from selling loans to Freddie

Mac to fund new mortgages, constantly replenishing the pool of funds available for lending to homebuyers and apartment owners.

Freddie Mac's federal charter stipulates that Freddie Mac buy only residential mortgages. Most of these mortgages represent single-family, owner-occupied homes, traditionally considered a relatively low-risk type of real estate investment. Freddie Mac guarantees the timely payment of interest and the ultimate collection of principal on all of the mortgage securities it issues. Most of the mortgage securities that Freddie Mac issues have the additional guarantee of the timely payment of monthly principal reduction, subject to a monthly adjustment amount. The guarantee of the securities that Freddie Mac issues is the obligation of Freddie Mac only and does not constitute debts or obligations of the United States or any agency or instrumentality of the United States other than Freddie Mac. Income earned on Freddie Mac mortgage securities has no exemption under federal law from federal, state or local taxation. Freddie Mac securities are exempt from the registration requirements of the Securities Act of 1933 and are "Exempted Securities" within the meaning of the Securities Exchange Act of 1934.

Although Freddie Mac securities are not backed by the full faith and credit of the U.S. Government, the market typically accords them "agency status." This agency status is attributed to the implied support of the federal government, which is demonstrated by the discretionary authority of the Secretary of the Treasury to purchase up to \$2.25 billion of Freddie Mac's obligations (although this has never been done). Federal legislation, specifically the Secondary Mortgage Market Enhancement Act of 1984, also allows federal entities to invest in Freddie Mac securities to the same extent that they may invest in securities guaranteed by the U.S. Government. Agency status allows Freddie Mac to borrow at more favorable rates than other corporations.

## 2. Freddie Mac Programs

- a. **Mortgage Acquisitions Programs** Freddie Mac fulfills its statutory purposes of providing a reliable and low-cost source of mortgage funding for the benefit of a diverse range of homeowners and renters primarily through the purchase of conventional, conforming single-family mortgages, as well as through its multifamily mortgage purchase programs. Freddie Mac may purchase any mortgage loan that meets its charter requirements and satisfies its underwriting standards. Freddie Mac purchases single-family mortgages for cash and in exchange for mortgage securities called PCs.
- b. **PCs (Participation Certificates)** Each PC issued by Freddie Mac represents an undivided interest in a PC pool consisting of mortgages. Freddie Mac was the first entity to issue pass-through securities backed by a pool of conventional mortgage loans. Depending on the PC pool, the underlying mortgages will be fixed-rate conventional mortgages (including balloon/reset mortgages), fixed-rate FHA/VA mortgages, adjustable-rate conventional mortgages or multifamily mortgages. Payments of principal and interest made by borrowers on the mortgages in a PC pool are passed through by Freddie Mac to holders of the PCs representing interests in that PC pool.

Most new fixed-rate pools issued by Freddie Mac fall under Freddie Mac's Gold PC program. Gold PCs have a fixed PC coupon and a payment delay of 45 days. Adjustable-rate

mortgage (ARM) PCs have a payment delay of 75 days. The PC coupon on ARM PCs adjusts in one of two ways. If the security is a WAC ARM PC, the coupon adjusts monthly, reflecting changes in the weighted average of the mortgage coupons of the underlying mortgages. If the PC is a Margin ARM PC, the coupon will adjust periodically based on a prescribed index plus a prescribed PC margin, subject to the same adjustment cap as the underlying mortgages and to a PC lifetime ceiling.

Freddie Mac makes interest and principal payments on PCs monthly on each payment date. The payment date for all Freddie Mac PCs is on or about the fifteenth of the month.

Freddie Mac also issues Giant PCs, which provide a means for combining existing PCs to meet a market need, and for aggregating single-family PCs into larger pools, thereby creating a more liquid security. Giant PCs represent beneficial ownership interests in pools consisting primarily of PCs or other Giant PCs.

- c. **Multiclass Securities** Freddie Mac has issued a number of types of securities that divide the cash flows of the underlying mortgages, PCs or other securities into classes having a variety of features. These features include, among other things, variations relating to (i) expected maturities or weighted average lives; (ii) whether principal and interest, principal only or interest only, are to be received; and (iii) whether the coupon (if any) on the class is fixed or variable rate (and if variable rate, the index to which the variable rate relates). Freddie Mac's multiple-class, mortgage-related securities include multiclass PCs, multiclass Ginnie Mae-backed securities, stripped Giant mortgage PCs and stripped Giant Ginnie Mae-backed securities. Multiclass securities backed directly or indirectly by PCs provide a means for improving the liquidity and value of PCs.

Freddie Mac's principal activity in the area of multiple-class securities is the issuance and sale of multiclass PCs that qualify for treatment as REMICs under the Internal Revenue Code. Multiclass PCs are issued in series, with each series consisting of two or more classes. Freddie Mac has issued multiclass PCs representing beneficial ownership interest in pools consisting of PCs, Giant PCs, Stripped Giant PCs, other multiclass PCs, multifamily mortgages, manufactured housing installment sale contracts or REMIC securities issued by issuers other than Freddie Mac. Freddie Mac has introduced several innovations to the REMIC market, including Modifiable and Combinable REMICs (MACRs) and Callable REMICs.

Stripped Giant PCs are resecuritized securities issued in classes, or "strips," each of which is entitled to receive interest only, principal only or a specified portion of the principal and interest payment received on an underlying pool of securities. Freddie Mac issues stripped Giant PCs backed by PCs, Giant PCs and classes of multiclass PCs.

- d. **Debt Securities** Freddie Mac issues various debt securities to fund its retained mortgage portfolio and overall borrowing needs. Freddie Mac issues debt securities in the form of debentures and discount notes. Debentures are generally unsecured general obligations of the corporation, and all income on debentures is subject to federal, state and local income taxes. Freddie Mac issues both bullet and callable debentures. While debentures offer both fixed- and floating-rate coupons, the majority of issuance has

been fixed rate, specifically bullets and callables. Debentures are issued under both domestic and global facilities.

Discount notes provide an integral source for Freddie Mac's overall funding needs and represent an unsecured obligation of the corporation. Discount notes are distributed through a selling group of dealers. The program is posted daily on Telerate; orders can be relayed through selling group members. In addition to the regular daily posting of the discount note program, there is also a program, during Asian and European business hours. This program is coordinated on a rotating basis by a member of the domestic selling group. The program commences at the opening of business in Asia and is passed along to London as the day begins in Europe.

## D. Small Business Administration

The Small Business Administration (SBA) was created in 1953 and derives its present authority from the Small Business Act of 1958, the Small Business Investment Act of 1958, and various other laws. SBA provides financial, procurement and management assistance to small business concerns and also assists victims of natural and other disasters. In addition, the Small Business Secondary Market Improvement Act of 1984 provided for the pooling of SBA loans and for the registration and servicing of SBA loans sold in the secondary market by a single fiscal and transfer agent (FTA). The FTA, presently Colson Services Corp., handles all clearing, transfers and ongoing servicing for all SBA-guaranteed loans and pools sold in the secondary market.

The majority of SBA-guaranteed loans sold into the secondary market are commercial business loans under the 7(a) program. The 7(a) program allows the SBA to guarantee loans used to fund the varied long-term needs of small businesses. The SBA can guarantee 75 percent of the loan amount up to \$750,000. For loans of \$100,000 or less, the guarantee rate is 80 percent. The interest rate is not to exceed 2.75% over the prime lending rate. Maturities are up to 10 years for working capital and up to 25 years for fixed assets. The guaranteed and non-guaranteed portions of SBA 7(a) loans can be sold by lenders to broker-dealers or directly to investors. The non-guaranteed portion may either be retained by the holder or packaged and securitized.

As part of its financial assistance functions, SBA also guarantees debentures and participating securities issued by small business investment companies (SBICs) (privately owned, SBA-licensed and regulated companies that supply venture capital and long-term financing to small firms) and debentures of certified development companies (CDCs) (mostly not-for-profit, local, private, or public corporations which are certified and regulated by the SBA to provide financing for the acquisition or construction of fixed assets). Currently, SBIC securities and CDC debentures are pooled, and participation certificates in these pools are sold to the public on an underwritten basis with a guarantee of timely payment and backed by the full faith and credit from the U.S. Government.

Investors may purchase SBA-guaranteed interests on an individual basis; these instruments have the full faith and credit guarantee of the U.S. Government but do not have a timely payment guarantee. Since March 1985, SBA has had a loan pooling program which permits approved pool assemblers to form and market pools of SBA-guaranteed interests; the pool certificates have a timely payment and a full faith and credit guarantee from the U.S. Government.

# Chapter SF

# Standard Formulas for the Analysis of Mortgage-Backed Securities and Other Related Securities

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## A. Computational Accuracy

Many common calculations for mortgage-related securities (yields, durations, prepayment rates, etc.) require the calculation of a large number of intermediate quantities (cash flows, principal balances, etc.). All intermediate calculations should be carried out to their full precision, preserving at least ten significant digits of accuracy. This will generally require double-precision computer arithmetic. The only quantities that should be assigned an integer variable type are those that represent whole numbers of days, months or years.

Only when all computations are complete should the final values be rounded for display. Results may be shown to any desired number of decimal places, provided that the last digit presented has been obtained by rounding and not by truncating the complete figure.

The numerical examples that appear throughout the document are intended to provide simple checks against improper implementation of the Standard Formulas, not an exhaustive set of benchmarks that would guarantee conformance.

## B. Prepayments

### 1. Cash Flows

For a level-payment fixed-rate mortgage pool with gross weighted-average coupon C%, current weighted-average remaining term M months, and  $M_0$ -M months elapsed since origination, the *amortized loan balance* (as a fraction of par) is

$$BAL = \frac{1 - (1 + C/1200)^{-M}}{1 - (1 + C/1200)^{-M_0}}$$

and the scheduled gross monthly payment (also as a fraction of par) is

$$\begin{aligned} \text{GROSS MORTGAGE PAYMENT} &= \text{PRINCIPAL} + \text{INTEREST} \\ &= (BAL_1 - BAL_2) + (BAL_1 * C/1200) \\ &= \frac{C/1200}{1 - (1 + C/1200)^{-M_0}}. \end{aligned}$$

The net payment passed through to investors consists of the scheduled gross payment above, plus unscheduled prepayments, minus a servicing fee of  $BAL_1 * S/1200$ , where the servicing percentage (S) is the difference between the gross coupon (C) and the net pass-through coupon of the security.

The *pool factor* (F) expresses the principal remaining in the pool each month as a fraction of the original face amount. The *survival factor* (F/BAL) represents the fraction of \$1.00 unit loans remaining in the pool from those originally present at issuance:

$$\text{POOL FACTOR} = \text{SURVIVAL FACTOR} * \text{AMORTIZED LOAN BALANCE}.$$

By convention, mortgage-related security analysis assumes that all prepayments are whole prepayments on \$1.00 unit loans within the pool.

The cash flows of more complex mortgage securities (CMO bonds, Graduated-Payment Mortgages, Adjustable-Rate Mortgages, etc.) are governed by specific contractual features not addressed here.

**Example:** A mortgage pass-through is issued with a net coupon of 9.0%, a gross coupon of 9.5% and a term of 360 months. If prepayments for the first month are 0.00025022 (as a fraction of par), then the first cash flow paid to investors will consist of the following components:

- (1) Scheduled Amortization = 0.00049188,
- (2) Unscheduled Prepayments = 0.00025022,
- (3) Gross Mortgage Interest = 0.00791667,
- (4) Servicing Fee = 0.00041667,

$$\begin{aligned}
 \text{Pass-Through Principal} &= (1) + (2) \\
 &= 0.00074210, \\
 \text{Pass-Through Interest} &= (3) - (4) \\
 &= 0.00750000, \\
 \text{Pass-Through Cash Flow} &= (1) + (2) + (3) - (4) \\
 &= 0.00824210.
 \end{aligned}$$

## 2. Mortgage Prepayment Models

The prepayment rate of a mortgage pool may be expressed in a number of different ways. These measures are equally valid, although a particular method may be more useful in a given instance.

- a. The SMM (Single Monthly Mortality) rate of a mortgage pool is the percentage of the mortgage loans outstanding at the beginning of a month assumed to terminate during the month. That is, if in some month the initial and final *pool factors* are  $F_1$  and  $F_2$ , respectively (as fractions of the original face amount), and the amortized loan balances are  $BAL_1$  and  $BAL_2$  (as fractions of par), then

$$F_2 = F_1 * \left( \frac{BAL_2}{BAL_1} \right) * \left( 1 - \frac{\text{SMM}}{100} \right).$$

An equivalent means of specifying a one-month prepayment rate is to separate the factor drop for the month ( $F_1 - F_2$ ) into scheduled and unscheduled principal payments. If there were no unscheduled prepayments during the month, then the factor for the end of the month would have been

$$F_{\text{sched}} = F_1 \frac{BAL_2}{BAL_1}.$$

The quantity  $F_1 - F_{\text{sched}}$  represents amortization for the month, and  $F_{\text{sched}} - F_2$  represents early prepayment of principal. The one-month prepayment rate can then be defined as

$$\text{SMM} = 100 \frac{F_{\text{sched}} - F_2}{F_{\text{sched}}}.$$

- b. The CPR (Conditional Prepayment Rate or Constant Prepayment Rate) model is similar to SMM, except that it expresses the prepayment percentage as an annually compounded rate:

$$\left(1 - \frac{SMM}{100}\right)^{12} = 1 - \frac{CPR}{100}.$$

The terms "CPR" and "Monthly CPR" have sometimes been used to express prepayment rates on a monthly basis equivalent to the SMM. This is not recommended, and in the present document, "CPR" will refer exclusively to the annualized prepayment rate defined in the equation above.

- c. *The Standard Prepayment Model of The Bond Market Association* specifies a prepayment percentage for each month in the life of the underlying mortgages, expressed on an annualized basis. Thus, 100% PSA (Prepayment Speed Assumptions) assumes prepayment rates of 0.2% CPR in the first month following origination of the mortgage loans (not the pool) and an additional 0.2% CPR in each succeeding month until the 30th month. In the 30th month and beyond, 100% PSA assumes a fixed annual prepayment rate of 6.0% CPR. To calculate the prepayment rate for any specific multiple of PSA, adjust the annual prepayment rate at 100% PSA by that multiple. (For example, 200% PSA assumes prepayment rates equal to twice the CPRs from the 100% PSA model, on a pool-by-pool basis.) In general,

$$CPR = \min \left\{ \frac{PSA}{100} * 0.2 * \max \left\{ 1, \min \left\{ \text{MONTH}, 30 \right\} \right\}, 100 \right\},$$

where MONTH refers to the accrual period during which the age of the mortgage loans increases from MONTH – 1 to MONTH. If the loan age is computed as zero subsequent to pool-issue date, then for the purposes of the PSA calculations, MONTH equals 1 for all prior months. In the case of Freddie Mac and Fannie Mae pools with "same-month" loan concentrations greater than 50%, MONTH would equal 1 for the first two months of the pool. For Freddie Macs, these pools are identified by the WALA remaining at 0 for the first two months of the pool. For Fannie Maes, these pools are identified by the original WAM being one month greater than the original loan term for a given pool type. For example, an original WAM of 361 would be reported for a "CL" pool that has an original loan term of 360 months.

These CPRs can then be converted into SMMs according to the formula from part (b.) above.

For expositional purposes, AGE is defined as a point in time, whereas MONTH is defined as a span of time. Pool factors therefore are reported as of an AGE whereas prepayment rates are reported for a MONTH. When a mortgage loan is originated, AGE= 0. After MONTH=1, AGE = 1. The diagram below illustrates the distinction.

Month 1	Month 2	Month 3	Month 4	...
Age: 0	1	2	3	4 ...

Mortgages in their first 30 months are commonly referred to as “new”; mortgages older than 30 months are considered “seasoned.”

If the prepayment rate resulting from any of these calculations is either negative or unusually large, then there may be an error in one or both of the pool factors, or possibly in the coupon rate or term to maturity assumed for amortizing the mortgage balance. Such results must be taken with caution.

**Example:** Suppose that for a Ginnie Mae I 9.0% pass-through issued 3/1/88 with a remaining term of 359 months, the 6/1/89 and 7/1/89 pool factors were

$$F_1 = 0.85150625$$

and

$$F_2 = 0.84732282,$$

respectively. How would one compute the prepayment speed for 6/89 using PSA?

The amortized loan balance was

$$BAL_1 = \frac{1 - (1 + 9.5/1200)^{-344}}{1 - (1 + 9.5/1200)^{-359}} = 0.99213300$$

on 6/1/89, and was

$$BAL_2 = \frac{1 - (1 + 9.5/1200)^{-343}}{1 - (1 + 9.5/1200)^{-359}} = 0.99157471$$

on 7/1/89, so with no June prepayments the 7/1/89 pool factor would have been

$$F_{\text{sched}} = F_1 \frac{BAL_2}{BAL_1} = 0.85102709.$$

This allows us to calculate

$$\text{Amortization} = F_1 - F_{\text{sched}} = 0.00047916,$$

$$\text{Prepayments} = F_{\text{sched}} - F_2 = 0.00370427,$$

$$\text{SMM} = 100 \frac{0.00370427}{0.85102709} = 0.435270\%,$$

$$\text{CPR} = 100 \left[ 1 - \left( 1 - \frac{\text{SMM}}{100} \right)^{12} \right] = 5.1000\%.$$

With respect to the underlying 360-month mortgages, 2/88 was month 1, so 6/89 counts as month 17. Therefore,

$$\text{PSA} = 100 * \frac{\text{CPR}}{\min \{0.2 * \text{MONTH } 6.0\}} = 150.00\%.$$

## Prepayment Rate Conversion Table

SMM	CPR	PSA*									
.05	0.6	10	2.30	24.4	406	4.55	42.8	714	6.80	57.0	951
.10	1.2	20	2.35	24.8	414	4.60	43.2	719	6.85	57.3	955
.15	1.8	30	2.40	25.3	421	4.65	43.5	725	6.90	57.6	960
.20	2.4	40	2.45	25.7	429	4.70	43.9	731	6.95	57.9	964
.25	3.0	49	2.50	26.2	437	4.75	44.2	737	7.00	58.1	969
.30	3.5	59	2.55	26.7	444	4.80	44.6	743	7.05	58.4	973
.35	4.1	69	2.60	27.1	452	4.85	44.9	749	7.10	58.7	978
.40	4.7	78	2.65	27.6	459	4.90	45.3	755	7.15	58.9	982
.45	5.3	88	2.70	28.0	467	4.95	45.6	760	7.20	59.2	987
.50	5.8	97	2.75	28.4	474	5.00	46.0	766	7.25	59.5	991
.55	6.4	107	2.80	28.9	481	5.05	46.3	772	7.30	59.7	996
.60	7.0	116	2.85	29.3	489	5.10	46.6	777	7.35	60.0	1000
.65	7.5	125	2.90	29.8	496	5.15	47.0	783	7.40	60.3	1004
.70	8.1	135	2.95	30.2	503	5.20	47.3	789	7.45	60.5	1008
.75	8.6	144	3.00	30.6	510	5.25	47.6	794	7.50	60.8	1013
.80	9.2	153	3.05	31.0	517	5.30	48.0	800	7.55	61.0	1017
.85	9.7	162	3.10	31.5	524	5.35	48.3	805	7.60	61.3	1021
.90	10.3	171	3.15	31.9	532	5.40	48.6	811	7.65	61.5	1025
.95	10.8	180	3.20	32.3	539	5.45	49.0	816	7.70	61.8	1029
1.00	11.4	189	3.25	32.7	546	5.50	49.3	821	7.75	62.0	1034
1.05	11.9	198	3.30	33.1	552	5.55	49.6	827	7.80	62.3	1038
1.10	12.4	207	3.35	33.6	559	5.60	49.9	832	7.85	62.5	1042
1.15	13.0	216	3.40	34.0	566	5.65	50.2	837	7.90	62.8	1046
1.20	13.5	225	3.45	34.4	573	5.70	50.6	843	7.95	63.0	1050
1.25	14.0	234	3.50	34.8	580	5.75	50.9	848	8.00	63.2	1054
1.30	14.5	242	3.55	35.2	587	5.80	51.2	853	8.05	63.5	1058
1.35	15.0	251	3.60	35.6	593	5.85	51.5	858	8.10	63.7	1062
1.40	15.6	259	3.65	36.0	600	5.90	51.8	863	8.15	63.9	1066
1.45	16.1	268	3.70	36.4	607	5.95	52.1	868	8.20	64.2	1070
1.50	16.6	276	3.75	36.8	613	6.00	52.4	873	8.25	64.4	1074
1.55	17.1	285	3.80	37.2	620	6.05	52.7	879	8.30	64.6	1077
1.60	17.6	293	3.85	37.6	626	6.10	53.0	884	8.35	64.9	1081
1.65	18.1	302	3.90	38.0	633	6.15	53.3	889	8.40	65.1	1085
1.70	18.6	310	3.95	38.3	639	6.20	53.6	893	8.45	65.3	1089
1.75	19.1	318	4.00	38.7	645	6.25	53.9	898	8.50	65.6	1093
1.80	19.6	326	4.05	39.1	652	6.30	54.2	903	8.55	65.8	1096
1.85	20.1	335	4.10	39.5	658	6.35	54.5	908	8.60	66.0	1100
1.90	20.6	343	4.15	39.9	664	6.40	54.8	913	8.65	66.2	1104
1.95	21.0	351	4.20	40.2	671	6.45	55.1	918	8.70	66.5	1108
2.00	21.5	359	4.25	40.6	677	6.50	55.4	923	8.75	66.7	1111
2.05	22.0	367	4.30	41.0	683	6.55	55.6	927	8.80	66.9	1115
2.10	22.5	375	4.35	41.4	689	6.60	55.9	932	8.85	67.1	1118
2.15	23.0	383	4.40	41.7	695	6.65	56.2	937	8.90	67.3	1122
2.20	23.4	390	4.45	42.1	701	6.70	56.5	942	8.95	67.5	1126
2.25	23.9	398	4.50	42.5	708	6.75	56.8	946	9.00	67.8	1129

SMM – Single Monthly Mortality (monthly prepayment rate in percent)

CPR – Conditional Prepayment Rate (annual prepayment rate in percent)

PSA – Standard Prepayment Model of The Bond Market Association (percentage of PSA [Prepayment Speed Assumption] model: 100% = 6% CPR)

\* PSA CONVERSION IS ONLY VALID AFTER THE 29TH MONTH OF MORTGAGE LIFE.

## Conversion of One-Month PSA to SMM Based on Months after Mortgage Origination

Months After Origination	PSA:50	SMM																		
		100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
1	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17			
2	0.02	0.03	0.05	0.07	0.08	0.10	0.12	0.13	0.15	0.17	0.19	0.20	0.22	0.24	0.25	0.27	0.29	0.31	0.32	0.34
3	0.03	0.05	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.28	0.31	0.33	0.36	0.38	0.41	0.44	0.46	0.49	0.51
4	0.03	0.07	0.10	0.13	0.17	0.20	0.24	0.27	0.31	0.34	0.37	0.41	0.44	0.48	0.51	0.55	0.59	0.62	0.66	0.69
5	0.04	0.08	0.13	0.17	0.21	0.25	0.30	0.34	0.38	0.43	0.47	0.51	0.56	0.60	0.65	0.69	0.74	0.78	0.83	0.87
6	0.05	0.10	0.15	0.20	0.25	0.31	0.36	0.41	0.46	0.51	0.57	0.62	0.67	0.73	0.78	0.84	0.89	0.95	1.00	1.06
7	0.06	0.12	0.18	0.24	0.30	0.36	0.42	0.48	0.54	0.60	0.67	0.73	0.79	0.86	0.92	0.98	1.05	1.12	1.18	1.25
8	0.07	0.13	0.20	0.27	0.34	0.41	0.48	0.55	0.62	0.69	0.76	0.84	0.91	0.98	1.06	1.13	1.21	1.29	1.36	1.44
9	0.08	0.15	0.23	0.31	0.38	0.46	0.54	0.62	0.70	0.78	0.86	0.95	1.03	1.12	1.20	1.29	1.37	1.46	1.55	1.64
10	0.08	0.17	0.25	0.34	0.43	0.51	0.60	0.69	0.78	0.87	0.97	1.06	1.15	1.25	1.35	1.44	1.54	1.64	1.74	1.84
11	0.09	0.19	0.28	0.37	0.47	0.57	0.67	0.76	0.86	0.97	1.07	1.17	1.28	1.38	1.49	1.60	1.71	1.82	1.93	2.05
12	0.10	0.20	0.31	0.41	0.51	0.62	0.73	0.84	0.95	1.06	1.17	1.29	1.40	1.52	1.64	1.76	1.88	2.01	2.13	2.26
13	0.11	0.22	0.33	0.44	0.56	0.67	0.79	0.91	1.03	1.15	1.28	1.40	1.53	1.66	1.79	1.92	2.06	2.20	2.34	2.48
14	0.12	0.24	0.36	0.48	0.60	0.73	0.86	0.98	1.12	1.25	1.38	1.52	1.66	1.80	1.95	2.09	2.24	2.39	2.54	2.70
15	0.13	0.25	0.38	0.51	0.65	0.78	0.92	1.06	1.20	1.35	1.49	1.64	1.79	1.95	2.10	2.26	2.42	2.59	2.76	2.93
16	0.13	0.27	0.41	0.55	0.69	0.84	0.98	1.13	1.29	1.44	1.60	1.76	1.92	2.09	2.26	2.43	2.61	2.79	2.97	3.16
17	0.14	0.29	0.44	0.59	0.74	0.89	1.05	1.21	1.37	1.54	1.71	1.88	2.06	2.24	2.42	2.61	2.80	3.00	3.20	3.40
18	0.15	0.31	0.46	0.62	0.78	0.95	1.12	1.29	1.46	1.64	1.82	2.01	2.20	2.39	2.59	2.79	3.00	3.21	3.43	3.65
19	0.16	0.32	0.49	0.66	0.83	1.00	1.18	1.36	1.55	1.74	1.93	2.13	2.34	2.54	2.76	2.97	3.20	3.43	3.66	3.91
20	0.17	0.34	0.51	0.69	0.87	1.06	1.25	1.44	1.64	1.84	2.05	2.26	2.48	2.70	2.93	3.16	3.40	3.65	3.91	4.17
21	0.18	0.36	0.54	0.73	0.92	1.12	1.32	1.52	1.73	1.95	2.17	2.39	2.62	2.86	3.10	3.35	3.61	3.88	4.15	4.44
22	0.19	0.37	0.57	0.76	0.97	1.17	1.38	1.60	1.82	2.05	2.28	2.52	2.77	3.02	3.28	3.55	3.83	4.11	4.41	4.72
23	0.19	0.39	0.59	0.80	1.01	1.23	1.45	1.68	1.91	2.15	2.40	2.66	2.92	3.19	3.46	3.75	4.05	4.36	4.67	5.01
24	0.20	0.41	0.62	0.84	1.06	1.29	1.52	1.76	2.01	2.26	2.52	2.79	3.07	3.35	3.65	3.96	4.27	4.60	4.95	5.30
25	0.21	0.43	0.65	0.87	1.11	1.35	1.59	1.84	2.10	2.37	2.64	2.93	3.22	3.53	3.84	4.17	4.51	4.86	5.23	5.61
26	0.22	0.44	0.67	0.91	1.15	1.40	1.66	1.92	2.20	2.48	2.77	3.07	3.38	3.70	4.04	4.38	4.75	5.12	5.52	5.93
27	0.23	0.46	0.70	0.95	1.20	1.46	1.73	2.01	2.29	2.59	2.89	3.21	3.54	3.88	4.23	4.60	4.99	5.40	5.82	6.27
28	0.24	0.48	0.73	0.98	1.25	1.52	1.80	2.09	2.39	2.70	3.02	3.35	3.70	4.06	4.44	4.83	5.24	5.68	6.13	6.61
29	0.24	0.50	0.76	1.02	1.30	1.58	1.87	2.18	2.49	2.81	3.15	3.50	3.87	4.25	4.65	5.06	5.50	5.97	6.46	6.97
30	0.25	0.51	0.78	1.06	1.35	1.64	1.95	2.26	2.59	2.93	3.28	3.65	4.04	4.44	4.86	5.30	5.77	6.27	6.79	7.35

Find the column corresponding to the ONE-MONTH PSA, and the row corresponding to the number of months after origination of the underlying mortgages.

The intersection of column and row gives the one-month equivalent SMM.

Do not use this table for 3-month, 1-year, or-to-date PSA, as results will be inaccurate.

Results will be imprecise to the extent that mortgages in a pool have differing ages.

### 3. Average Prepayment Rates for Mortgage Pools

Often it is necessary to calculate an average prepayment rate for a single mortgage pool or an aggregation of pools (such as those backing a particular CMO) over a specific historical period.\* Regardless of which particular prepayment model is chosen, the proper speed is that which, if applied separately to the underlying mortgages over the entire period, would result in the actual aggregate balance recorded at the end of the period. Pools which were not present at the start of the period should be excluded from the calculation entirely, as should any pools with incorrect or missing factors at the start or end of the period.\*\*

For certain security types, including many CMOs backed by classes of two or more other CMOs, and many whole loan pass-throughs with principal/interest stripping, the cash flows and principal balances are not derived from pro rata shares of mortgage pass-throughs, and no single prepayment rate or aggregate balance is sufficient to characterize the security cash flows. In these cases, it is generally not meaningful to define an average prepayment rate, and none should be reported. Instead, the average prepayment rate for each underlying CMO class should be reported individually, or if not practical, then summarized together as a range (lowest and highest).

Unless otherwise specified, amortization of updated fixed-rate mortgage pools should be based exclusively on the most recent weighted average maturity information (WAM or WARM) and prepayment calculations on the most recent weighted average loan age (WALA) information provided by the issuer or guarantor at the time the calculation is performed. (See Section D.) Thus, it is not necessary to save prior information for these pools once updated values become available, nor is it necessary to recompute previously calculated prepayment rates. This method, while computationally simple, will produce different results for the same time period when calculations are made at different times. Thus, the January 1991 PSA rate for a pool may be different when calculated in February 1992 than when first computed in February 1991, because the WAM and/or the WALA may not have decreased and/or increased, respectively, by exactly 12 months. Individual firms may use either method to report historical prepayment rates. This decision affects only calculations of historical prepayment rates; projected cash flows, yields, average lives, and other measures are not affected, since forward projections always use the most recently available data.

For certain security types, such as Fannie Mae Trust strips and Megapools, multiple pass-through pools are actually combined into a new pass-through security (an aggregate pool for which the issuer reports monthly factors). Even in these cases, historical and projected prepayments should be calculated on the basis of the most detailed pool information available for the underlying mortgages.

\* For a mortgage security (including but not limited to CMOs, REMICs, Megapools and strips), the phrase "prepayment rate since issue" can refer to the time since issuance of either the underlying pass-through pools or the mortgage security itself. Market participants should therefore distinguish between "prepayment rate since pool issue" and "prepayment rate since deal issue." The precise wording is left to the user's discretion, so long as the intent is clear.

\*\* Note that an aggregate calculation for "prepayment rate since pool issue" generally does not refer to a historical period with a uniform starting date. Therefore, the only pools that should be excluded from this particular calculation are those with incorrect or missing factors at the end of the period.

With the Standard Prepayment Model, these calculations will generally require an iterative trial-and-error procedure, even for a single pool; the aggregate PSA speed should not be computed as a weighted average of individual pool speeds. Likewise, it is generally not accurate to apply an average prepayment speed to a hypothetical single pool having the aggregate WAC and WAM of the pools to be analyzed. At best, these calculations can provide a first iteration toward the correct value. Average prepayment rates that do not meet the precise specifications of the preceding paragraphs should be acknowledged as nonstandard approximations.

Iteration is not necessary for computing average prepayment rates in terms of SMM or CPR. Instead, one should sum the scheduled balances for the loans at the end of the period, computed as if there were no prepayments during the period. The average prepayment rate for the aggregation is then

$$SMM_{avg} = 100 \left[ 1 - \left( \frac{\text{FINAL AGGREG. BAL}_{actual}}{\text{FINAL AGGREG. BAL}_{sched}} \right)^{\frac{1}{\text{months in period}}} \right],$$

or

$$CPR_{avg} = 100 \left[ 1 - \left( \frac{\text{FINAL AGGREG. BAL}_{actual}}{\text{FINAL AGGREG. BAL}_{sched}} \right)^{\frac{12}{\text{months in period}}} \right].$$

Finally, for the special case in which all the mortgages in the sample being considered are fully seasoned at the start of the period, even the aggregate PSA speed can be computed without iteration:

$$PSA_{avg} = 100 * \frac{CPR_{avg}}{6.0}.$$

**Example:** Consider two Ginnie Mae I 9.0% pass-throughs with the following characteristics:

	<u>Pool 1</u>	<u>Pool 2</u>
Original Face:	\$1,000,000	\$2,000,000
Original Remaining Term:	358 mo	360 mo
Origination Date:	4/1/88	12/1/88
1/1/89 Factor:	0.86925218	0.99950812
7/1/89 Factor:	0.84732282	0.98290230

To determine the average prepayment rate of the two pools over the first six months of 1989, first compute the actual final balance,

$$1,000,000 (0.84732282) + 2,000,000 (0.98290230) = 2,813,127.42 ,$$

and the scheduled final balance,

$$\begin{aligned} & 1,000,000 (0.86925218) \frac{1-(1+9.5/1200)^{-343}}{1-(1+9.5/1200)^{-349}} \\ & + 2,000,000 (0.99950812) \frac{1-(1+9.5/1200)^{-353}}{1-(1+9.5/1200)^{-359}} = 2,859,330.23 . \end{aligned}$$

Then,

$$\begin{aligned} SMM_{avg} &= 100 \left[ 1 - \left( \frac{2,813,127.42}{2,859,330.23} \right)^{\frac{1}{6}} \right] = 0.271142\% , \\ CPR_{avg} &= 100 \left[ 1 - \left( \frac{2,813,127.42}{2,859,330.23} \right)^{\frac{12}{6}} \right] = 3.2056\% , \end{aligned}$$

and, by iterative trial-and-error,

$$PSA_{avg} = 212.02\% .$$

#### 4. ABS Prepayment Rates for Asset Pools

The ABS model defines an increasing sequence of monthly prepayment rates (SMM, the percentage of remaining loans that prepay each month), which corresponds to a constant absolute level of loan prepayments in all future periods. For a pool of new loans, the SMM sequence for X% ABS is equivalent to the prepayment each month of X% of the loans originally in the pool. For a pool of seasoned loans, however, this interpretation of the SMM sequence is generally not valid. To avoid possible confusion, the ABS speed and the age of the underlying loans (not the pool) should always be converted directly into a sequence of SMM rates according to the formula

$$SMM = \frac{100 * ABS}{100 - ABS * (MONTH - 1)}.$$

If desired, one can then convert these SMM rates into CPR or PSA according to the usual formulas. (See Section B.2.)

For purposes of describing an empirical prepayment pattern over a selected historical period, the appropriate ABS speed is the one whose monthly prepayment rates give the correct cumulative paydown for the period. The following formula provides the correct historical ABS speed for any time interval in which the loan age, pool factor and amortized loan balance (as a fraction of par) changed from AGE<sub>1</sub>, F<sub>1</sub>, BAL<sub>1</sub> to AGE<sub>2</sub>, F<sub>2</sub>, BAL<sub>2</sub>:

$$\text{ABS} = 100 \frac{(F_1/F_2) - (BAL_1/BAL_2)}{\text{AGE}_2(F_1/F_2) - \text{AGE}_1(BAL_1/BAL_2)}.$$

The size of the pool at origination is not required. BAL may be calculated as in Section B.1.

**Example:** For a pool of 36-month car loans issued 1/1/89 with an original WAM of 34 months, a prepayment speed of 2% ABS for 9/89 would correspond to

$$\text{SMM} = \frac{100 * 2}{100 - 2 * (11 - 1)} = 2.5000\%.$$

If the gross WAC of the pool is 10.00% and the 10/1/89 factor is 0.64140448, then the average prepayment speed over the nine-month life of the pool is

$$\text{ABS} = 100 \frac{\left(\frac{1.00000000}{0.64140448}\right) - \left(\frac{1 - (1 + 10/1200)^{-34}}{1 - (1 + 10/1200)^{-25}}\right)}{11 \left(\frac{1.00000000}{0.64140448}\right) - 2 \left(\frac{1 - (1 + 10/1200)^{-34}}{1 - (1 + 10/1200)^{-25}}\right)} = 1.7000\%.$$

**Conversion of ABS to SMM**

Months after Origination	0.50 ABS	0.75 ABS	1.00 ABS	1.25 ABS	1.50 ABS	1.75 ABS	2.00 ABS
1	0.50	0.75	1.00	1.25	1.50	1.75	2.00
2	0.50	0.76	1.01	1.27	1.52	1.78	2.04
3	0.51	0.76	1.02	1.28	1.55	1.81	2.08
4	0.51	0.77	1.03	1.30	1.57	1.85	2.13
5	0.51	0.77	1.04	1.32	1.60	1.88	2.17
6	0.51	0.78	1.05	1.33	1.62	1.92	2.22
7	0.52	0.79	1.06	1.35	1.65	1.96	2.27
8	0.52	0.79	1.08	1.37	1.68	1.99	2.33
9	0.52	0.80	1.09	1.39	1.70	2.03	2.38
10	0.52	0.80	1.10	1.41	1.73	2.08	2.44
11	0.53	0.81	1.11	1.43	1.76	2.12	2.50
12	0.53	0.82	1.12	1.45	1.80	2.17	2.56
13	0.53	0.82	1.14	1.47	1.83	2.22	2.63
14	0.53	0.83	1.15	1.49	1.86	2.27	2.70
15	0.54	0.84	1.16	1.52	1.90	2.32	2.78
16	0.54	0.85	1.18	1.54	1.94	2.37	2.86
17	0.54	0.85	1.19	1.56	1.97	2.43	2.94
18	0.55	0.86	1.20	1.59	2.01	2.49	3.03
19	0.55	0.87	1.22	1.61	2.05	2.55	3.13
20	0.55	0.87	1.23	1.64	2.10	2.62	3.23
21	0.56	0.88	1.25	1.67	2.14	2.69	3.33
22	0.56	0.89	1.27	1.69	2.19	2.77	3.45
23	0.56	0.90	1.28	1.72	2.24	2.85	3.57
24	0.56	0.91	1.30	1.75	2.29	2.93	3.70
25	0.57	0.91	1.32	1.79	2.34	3.02	3.85
26	0.57	0.92	1.33	1.82	2.40	3.11	4.00
27	0.57	0.93	1.35	1.85	2.46	3.21	4.17
28	0.58	0.94	1.37	1.89	2.52	3.32	4.35
29	0.58	0.95	1.39	1.92	2.59	3.43	4.55
30	0.58	0.96	1.41	1.96	2.65	3.55	4.76
31	0.59	0.97	1.43	2.00	2.73	3.68	5.00
32	0.59	0.98	1.45	2.04	2.80	3.83	5.26
33	0.60	0.99	1.47	2.08	2.88	3.98	5.56
34	0.60	1.00	1.49	2.13	2.97	4.14	5.88
35	0.60	1.01	1.52	2.17	3.06	4.32	6.25
36	0.61	1.02	1.54	2.22	3.16	4.52	6.67
37	0.61	1.03	1.56	2.27	3.26	4.73	7.14
38	0.61	1.04	1.59	2.33	3.37	4.96	7.69
39	0.62	1.05	1.61	2.38	3.49	5.22	8.33
40	0.62	1.06	1.64	2.44	3.61	5.51	9.09
41	0.63	1.07	1.67	2.50	3.75	5.83	10.00
42	0.63	1.08	1.69	2.56	3.90	6.19	11.11
43	0.63	1.09	1.72	2.63	4.05	6.60	12.50
44	0.64	1.11	1.75	2.70	4.23	7.07	14.29
45	0.64	1.12	1.79	2.78	4.41	7.61	16.67
46	0.65	1.13	1.82	2.86	4.62	8.24	20.00
47	0.65	1.15	1.85	2.94	4.84	8.97	25.00
48	0.65	1.16	1.89	3.03	5.08	9.86	33.33
49	0.66	1.17	1.92	3.13	5.36	10.94	50.00
50	0.66	1.19	1.96	3.23	5.66	12.28	100.00

## C. Defaults

The following description of default analysis is intended only for the analysis of credit-sensitive securities (e.g., subordinated securities such as B-pieces, mezzanines, etc.). Standard prepayment analysis projects cash flows assuming that unscheduled payoffs are composed of both voluntary prepayments and defaults. When the following default methodology is being used, voluntary prepayments and defaults are projected separately.

### 1. Mortgage Cash Flows with Defaults: Description of Basic Concepts

A loan in default is defined as one that no longer pays principal and interest and then remains delinquent until liquidated. Thus, delinquencies that cure are *not* included in this computation.

When a loan first goes into default, it is included in New Defaults for the given month. New Defaults are projected forward using the Monthly Default Rate and the prior month's Performing Balance before subtracting the current month's scheduled amortization.

The prior month's Performing Balance is the total balance of all loans that have continued to make full monthly payments through the prior month. These, plus Loans in Foreclosure, are the loans that survive into the current month. In the current month, they will either default (New Defaults), prepay (Voluntary Prepayments), or merely amortize. As with New Defaults, Voluntary Prepayments are also projected forward using the prior month's Performing Balance. However, Voluntary Prepayments are computed after the current month's Scheduled Amortization is subtracted.

Expected Amortization in a given month is the amortized principal that is expected to be received from all existing loans, including those currently in default that have not yet been liquidated (Loans in Foreclosure). If there are New Defaults, then Amortization from Defaults is the amount of principal that is not received from the borrowers, and Actual Amortization is the amount of principal that is actually received from the borrowers. (A loan's original amortization schedule continues to be computed even while it is in foreclosure.)

Analogously, Expected Interest in a given month is interest due on the balance of all existing loans (including Loans in Foreclosure). Interest Lost is the amount of interest not received, and Actual Interest is Expected Interest minus Interest Lost.

Usually (but not always), Servicer Advances are made. If principal and interest are advanced, the amount of principal advanced each month is equal to Amortization from Defaults, and the amount of interest advanced exactly compensates for Lost Interest. The result is that investors receive all Expected Amortization and Expected Interest regardless of the amount of New Defaults and Loans in Foreclosure. New Defaults, however, are still calculated based on the prior month's Performing Balance only.

Liquidation of New Defaults is assumed to occur after a fixed user-specified number of months (Months to Liquidation). If the liquidation results in a loss, the loss is taken in the month of liquidation, treated as a loss of principal (Principal Loss), and the amount of the loss is based on the Loss Severity and the unpaid principal balance of New Defaults when the loan first went into default.

## 2. Specifying Mortgage Default Assumptions: Standards and Definitions

### Introduction

The prepayment calculations discussed in Section B.2. derive monthly prepayment rates (SMM) from a vector of pool factors ( $F$ ) over time. In other words, a prepayment rate is derived from actual performance data.

The Default Standards are intended to be used for *projecting* cash flows, *not* for deriving historical default rates from actual performance data. In other words, we start with a Monthly Default Rate (MDR) and use it to calculate New Defaults (NEW DEF) in a given month.

### Default Analysis Standards and Definitions

- a. Default analysis is intended to model defaults only, not delinquencies. Delinquent loans that are cured will not be part of this analysis. For this purpose, a loan in default is one that no longer pays principal and interest and then remains delinquent until liquidated.
- b. Default analysis specifies default rates, not loss rates. Loss rates (i.e., “Loss Severities”) are specified separately.
- c. The default rate in a given month is specified as a percentage of the aggregate *performing* balance of all loans still outstanding at the end of the prior month, *before* taking into account the current month’s scheduled amortization.
- d. Prepayment rates and default rates are specified *separately*. Total unscheduled principal received will then be the sum of Voluntary Prepayments and Principal Recoveries from liquidations.
- e. The prepayment rate in a given month is specified as a percentage of the aggregate *performing* balance of all loans still outstanding at the end of the prior month, after removing the *current* month’s scheduled amortization. Prepayments will still be deemed to have a scheduled component, whereas the default balance is computed *before* taking into account the current month’s amortization. Voluntary Prepayments are constrained by the following condition: Actual Amortization plus New Defaults plus Voluntary Prepayments cannot exceed the prior period’s Performing Balance. (If they do, then cap Voluntary Prepayments such that the current period’s Performing Balance is zero.)
- f. When performing default analysis, in addition to specifying default rates, the following assumptions *must* be specified:
  - Time to Liquidation after the loan first misses a payment (“0 months to Liquidation” means that liquidation proceeds are received in the month the loan first becomes delinquent).
  - Loss Severity or Loss Severity curve. “Loss Severity” is defined as a loss amount divided by the principal balance of the loan at the time it goes into default. A “Loss Severity curve” is a vector of different loss severities over time.
  - Whether or not P&I are advanced in the structure. If P&I are advanced, they are assumed to be advanced every month through to liquidation.

- g. The Loss Severity is applied to the balance of the loan as of the month it first went into default. The loss rate should include all costs: foreclosure costs, servicer interest advances and principal advances.

If P&I are being advanced, the maximum principal amount that can be passed through to investors when the loan is finally liquidated is the balance of the loan when it became delinquent minus any principal that has been advanced.

If P&I are not being advanced, then 0% loss severity (i.e., 100% recovery) will not include recovery of unpaid interest unless explicitly specified to the contrary.

Note: With this definition and "Time to Liquidation" as defined above, 0 months to liquidation with 0% Loss Severity will produce the same total principal cash flow as Voluntary Prepayment, except that Scheduled Amortization is *not* broken out separately. (Also, if P&I are not being advanced, the default cash flow will *not* include the final month's interest.)

- h. Because defaults are being specified as a percentage of the then outstanding Performing Balance, a higher prepayment assumption at a given default rate will result in lower cumulative defaults. Therefore, a table *must* be produced that shows cumulative defaults in a matrix format using the different default and prepayment rates employed in the analysis.
- i. A similar matrix of loss amounts should also be produced using the Loss Severity assumption.

### 3. Standard Formulas for Computing Mortgage Cash Flows with Defaults

The following formulas detail the calculations:

PERF BAL(i)	= Performing Balance in month i  = PERF BAL(i-1) - NEW DEF(i) - VOL PREPAY(i) - ACT AM (i)
NEW DEF(i)	= New Defaults  = PERF BAL(i-1) * MDR(i)
FCL(i)	= Loans in Foreclosure  = (NEW DEF(i) + FCL(i-1) - ADB(i)) - AM DEF(i)
SCH AM(i)	= Amortization Schedule assuming no prepayments
EXP AM(i)	= Expected Amortization  = (PERF BAL(i-1) + FCL(i-1) - ADB(i)) * [1-SCH AM(i)/SCH AM(i-1)]
VOL PREPAY(i)	= Voluntary Prepayments  = PERF BAL(i-1) * [SCH AM(i)/SCH AM(i-1)] * SMM(i)

AM DEF(i)	= Amortization from Defaults
	If P&I are advanced:
	= (NEW DEF(i) + FCL(i-1) – ADB(i)) * [1 – SCH AM(i)/SCH AM(i-1)]
	or if P&I are not advanced:
	= 0
ACT AM(i)	= Actual Amortization
	= (PERF BAL(i-1) – NEW DEF(i)) * [1 – SCH AM(i)/SCH AM(i-1)]
EXP INT(i)	= Expected Interest
	= (PERF BAL(i-1) + FCL(i-1)) * Net Mortgage Rate
LOST INT(i)	= Interest Lost
	= (NEW DEF(i) + FCL(i-1)) * Net Mortgage Rate
ACT INT(i)	= Actual Interest
	= EXP INT(i) – LOST INT(i) = (PERF BAL(i-1) – NEW DEF(i))
	* Net Mortgage Rate
PRIN RECOV(i)	= Principal Recovery
	= MAX [ADB(i) – PRIN LOSS(i) ; 0]
PRIN LOSS(i)	= Principal Loss
	= MIN [NEW DEF(i – months until recovery) * Severity Rate ; ADB(i)]
ADB(i)	= Amortized Default Balance in Recovery Month
	If P&I are advanced:
	= NEW DEF(i – months until recovery)
	* [SCH AM(i-1)/SCH AM(i-1-months until recovery)]
	or if P&I are not advanced:
	= NEW DEF(i – months until recovery) * 1
MDR(i)	= Monthly Default Rate
SMM(i)	= Monthly Prepayment Rate

**Notes for clarification:**

- a. "New Defaults" are the product of the default rate and prior period's Performing Balance.
- b. "Voluntary Prepayments" are the product of the prepayment rate and the prior period's Performing Balance, minus expected amortization from performing balance.
- c. Voluntary Prepayments and New Defaults are constrained by the following condition: Actual Amortization + New Defaults + Voluntary Prepayments cannot exceed the prior period's Performing Balance. (See Section C. 2.e.)
- d. "Expected Amortization" is computed from the sum of the prior period's Performing Balance and Loans in Foreclosure.
- e. Loans in Foreclosure do not include any loans that are liquidated in the current month.
- f. Expected Amortization and Amortization from Defaults are not computed for loans in their liquidation month. (This is a consequence of (d) and (e).)
- g. "Actual Amortization" is computed based on the prior period's Performing Balance minus New Defaults.
- h. Principal Recovery is constrained by the following condition:  
If Amortization from Defaults is advanced, the maximum Principal Recovery amount is the loan balance when the loan went into foreclosure minus the cumulative amortization advanced until the loan was liquidated (i.e., the Amortized Default Balance in the liquidation month). (See Section C. 2.g.)
- i. Principal Loss is constrained by the following condition:  
If Amortization from Defaults is advanced, the maximum Principal Loss is the Amortized Default Balance in the liquidation month.
- j. Default rate is set to 0 for the last n months before the scheduled final maturity of the pool where n = Time to Liquidation.

**4. The Standard Default Assumption (SDA)**

A Standard Default Assumption ("100% SDA") for performing default analysis will have the following characteristics:

- a. Rise from 0 to "peak" during the first 30 months of mortgage age;
- b. Remain constant at peak value for the next 30 months (i.e., months 30 to 60 are at peak value);
- c. Decline from "peak" to "tail" over the next 60 months (i.e., decline begins in month 61 and reaches tail value in month 120);

- d. Remain constant at "tail" value for the remaining life of the pool (except for the last n months, when the default rate will be 0. n = Time to Liquidation); and
- e. Reach a default peak of 0.60% per annum and decline to a default tail of 0.03% per annum.
- f. To adjust the Standard Default Assumption rate for any specific multiple of SDA, adjust the annual default rate at 100% SDA by that multiple. (For example, 200% SDA assumes a default rate equal to twice the annual rates specified by 100% SDA.)
- g. When implementing default percentages, the annual default rates must be converted to Monthly Default Rates according to the following formula:

$$\text{MDR} = \text{Monthly Default Rate} = 100 * (1 - (1 - (\text{Annual Default Rate} / 100))^{1/12})$$

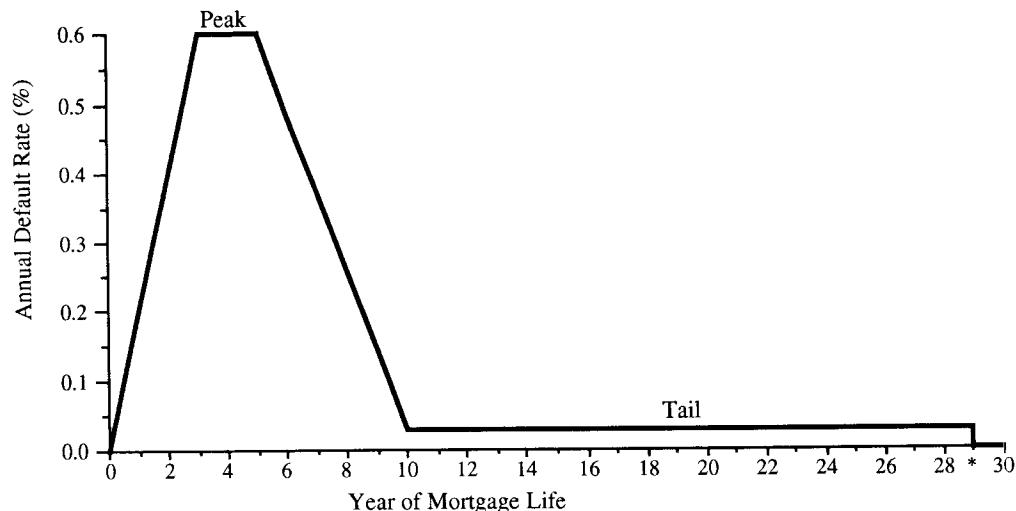
(in percent)

The following table illustrates the default matrix that must be produced as discussed in Section C.2.h. For example, 100% SDA would result in approximately 2.78% cumulative defaults over the life of a pool of new 8%, 30-year mortgages that also prepay at 150% PSA.

		% SDA						
		50	100	150	200	250	300	
% PSA		100	1.56	3.09	4.59	6.08	7.53	8.97
		125	1.47	2.92	4.35	5.76	7.14	8.51
		150	1.40	2.78	4.13	5.47	6.79	8.08
		175	1.33	2.64	3.93	5.20	6.45	7.69
		200	1.26	2.51	3.74	4.95	6.14	7.32
		250	1.15	2.28	3.40	4.50	5.59	6.66
		300	1.05	2.08	3.10	4.11	5.10	6.08
		400	0.88	1.74	2.60	3.45	4.29	5.12
		500	0.74	1.48	2.21	2.93	3.64	4.35

100% SDA is represented graphically as follows:

### Annualized Default Rate



\* Last 12 months are at a 0% default rate assuming 12 months to liquidation for 30-year loans. (See Section C.3.j.)

## 5. Use of the SDA for Products Other Than 30-Year Conventional Mortgages

The SDA was designed for use with fully amortizing residential mortgages with a term of at least 15 years. It was not intended to be used with other securitized products, e.g., balloon mortgages, commercial mortgages, home equity loans or any nonmortgage assets such as auto loans and credit card receivables.

## 6. Numerical Examples of SDA

### Sample Cash Flows

The following two sample cash-flow tables were computed using new 30-year loans with an 8% WAC, 12-month recovery period, 20 percent loss severity and servicer advances. Further, Cash Flow A illustrates 1% Monthly Prepayments (1% SMM) with a 1% Monthly Default Rate (1% MDR), and Cash Flow B illustrates 150% PSA Prepayments with 100% SDA.

## Standard Default Methodology

Principal and Interest Are Advanced

Prepay Rate 1% SMM  
Default Rate 1% MDR

**The Bond Market Association**

**Uniform Practices/Standard Formulas**

## Cash Flow A

Month	Performing Balance	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	Amort From Defaults	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	In Recovery Month	Amortized Default Bal	Default Rate	Monthly Prepay Rate	
	100,000,000			1.0000	999,329	0.9993	67,098	999,329	671	66,427	666,667	6,667	660,000		0.01	0.01		
1	97,934,244	1,000,000		0.9987	66,870	1,977,334	0.9987	67,337	65,332	65,337	13,191	646,366		0.01	0.01			
2	95,910,689	975,342		0.9980	66,644	2,934,442	0.9980	66,644	5,982	1,999	64,650	652,587	19,576	633,011	0.01	0.01		
3	93,928,478	959,107		0.9973	66,436	3,871,069	0.9973	66,436	5,882	1,657	63,779	645,753	25,825	619,928	0.01	0.01		
4	91,986,774	939,285		0.9966	66,231	4,787,627	0.9966	66,231	19,232	3,310	62,920	639,052	31,113	607,113	0.01	0.01		
5	90,084,753	919,868		0.9959	66,032	900,221	0.9959	66,032	3,959	62,073	632,483	37,923	594,559		0.01	0.01		
6	88,221,612	900,848		0.9952	65,841	882,216	0.9952	65,841	4,604	61,237	626,041	43,778	582,263		0.01	0.01		
7	86,396,561	872,161		0.9945	65,658	7,420,848	0.9945	65,658	5,245	60,412	619,721	49,507	570,217		0.01	0.01		
8	84,608,828	863,966		0.9938	65,481	8,261,054	0.9938	65,481	5,882	59,599	613,531	55,113	558,418		0.01	0.01		
9	82,857,654	846,088		0.9931	65,312	9,083,115	0.9931	65,312	827,983	6,515	58,796	60,598	546,861		0.01	0.01		
10	81,142,299	828,577		0.9924	65,149	9,887,394	0.9924	65,149	8,10,837	7,145	58,005	601,503	535,539		0.01	0.01		
11	79,462,034	811,423		0.9916	64,994	10,674,244	0.9916	64,994	7,94,042	7,770	595,663	71,213	524,449		0.01	0.01		
12	77,816,148	794,620		0.9909	64,118	10,453,093	0.9909	64,118	7,77,591	7,666	56,453	76,349	513,587	791,646	200,000	991,646		
13	76,203,943	778,161		0.9902	63,255	10,236,469	0.9902	63,255	7,61,477	7,562	55,693	57,714	74,768	775,233	195,868	971,101		
14	74,624,734	762,039		0.9895	62,403	10,024,279	0.9895	62,403	74,692	7,460	54,943	73,218	492,523	759,155	950,977	911,264		
15	73,077,852	746,247		0.9887	61,563	730,231	0.9887	61,563	7,360	54,203	64,203	71,700	743,407	187,857		0.01		
16	71,562,639	730,779		0.9877	60,734	7,612,844	0.9880	60,734	7,261	53,471	542,527	70,214	472,314	727,982	183,974	911,955		
17	70,078,454	715,626		0.9867	59,916	7,00,252	0.9872	59,916	7,163	52,753	531,275	68,758	462,518	712,872	180,170	893,041		
18	68,624,665	700,785		0.9859	59,109	9,218,089	0.9865	59,109	685,721	7,067	52,042	520,254	67,331	452,923	698,072	176,443	874,515	
19	67,200,655	686,247		0.9852	59,026,756	5,9857	56,313	671,488	6,971	51,341	509,458	65,234	443,524	683,575	172,793	856,368		
20	65,805,819	672,007		0.9849	58,339,343	8,839,343	0.9849	58,339,343	57,528	657,547	6,878	50,650	488,884	64,565	343,318	669,376	169,218	
21	64,439,565	658,058		0.9842	56,753	8,655,771	0.9842	56,753	6,785	49,986	488,526	63,225	425,501	655,467	165,715	821,183		
22	63,101,310	644,396		0.9834	55,989	8,475,962	0.9834	55,989	6,30,515	6,694	49,295	478,381	61,912	416,469	641,844	162,235		
23	61,790,487	631,013		0.9826	55,299,839	8,299,839	0.9826	55,299,839	6,17,414	6,603	46,631	468,443	60,626	407,817	628,500	158,924	878,424	
24	60,506,537	617,905		0.9818	54,919	8,127,328	0.9818	54,919	5,94,259	6,088	44,832	47,976	458,709	59,366	399,343	615,430	155,632	
25	59,248,915	605,065		0.9810	53,757	7,958,355	0.9810	53,757	5,92,011	6,427	47,330	44,9,175	47,330	58,132	391,043	602,628	152,408	
26	58,017,084	592,489		0.9802	53,033	579,699	0.9802	53,033	5,79,699	6,340	46,693	488,836	56,924	382,913	590,868	149,249	739,338	
27	56,810,522	580,171		0.9794	52,319	5,630,735	0.9794	52,319	5,637,640	6,255	43,064	43,046	55,740	374,949	520,077	146,156	723,962	
28	55,628,712	568,105		0.9786	51,614	5,725,599	0.9786	51,614	5,55,828	6,171	45,444	421,730	54,580	367,150	565,777	143,125		
29	54,471,153	556,287		0.9778	50,919	7,316,424	0.9778	50,919	5,44,259	6,088	44,832	412,954	53,444	359,310	553,994	140,157	694,151	
30	53,337,352	544,712		0.9770	50,334	7,164,089	0.9770	50,334	5,32,927	6,006	44,228	404,359	42,332	352,027	462,453	137,249	679,702	
31	52,226,823	533,374		0.9762	49,957	4,613,581	0.9762	49,957	521,828	5,925	43,632	43,632	51,242	344,697	531,149	134,401		
32	51,139,095	522,268		0.9753	48,890	4,618,847	0.9753	48,890	51,0956	5,845	43,045	387,693	50,175	337,518	520,077	131,612	651,689	
33	50,073,703	511,391		0.9745	48,786,740	4,562,717	0.9745	48,786,740	50,308	5,766	42,485	379,616	49,130	330,486	509,233	128,879	638,112	
34	49,030,193	500,737		0.9737	48,680	4,44,463	0.9736	48,680	47,82	489,879	5,689	41,833	371,705	48,106	323,599	498,611	126,203	624,814
35	48,008,119	490,302		0.9729	48,585,399	4,348,081	0.9729	48,585,399	47,82	44,463	440,860	5,316	39,147	334,523	42,390	285,149	439,315	111,257
36	47,007,045	480,081		0.9721	48,488,079	4,23,043	0.9721	48,488,079	47,82	44,864	431,653	5,244	32,759	327,539	42,390	285,149	439,315	111,257
37	46,026,543	470,070		0.9713	48,399	4,14,183	0.9713	48,399	46,9,659	5,179	40,223	348,934	45,159	303,775	468,039	118,498	586,537	
38	45,066,195	460,265		0.9705	48,298	4,05,527	0.9705	48,298	45,026,1	5,035	39,682	341,654	44,217	297,437	458,265	116,034	516,781	
39	44,125,591	450,662		0.9697	48,196	4,44,463	0.9697	48,196	45,026,450	5,036	39,680	43,967	36,582	301,009	387,957	102,278	505,978	
40	43,204,327	441,256		0.9689	48,098	4,32,043	0.9689	48,098	45,026,777	5,036	39,680	40,989	388,382	49,714	38,142	256,572	430,700	100,147
41	42,302,010	432,043		0.9681	47,994	4,23,274	0.9681	47,994	45,026,543	5,036	39,680	40,989	38,563	288,549	37,344	251,205	386,973	98,060
42	41,418,255	423,020		0.9673	47,897	4,14,183	0.9673	47,897	45,026,442	5,036	39,680	40,989	38,563	288,549	37,344	251,205	386,973	98,060
43	40,552,682	414,183		0.9665	47,790	4,05,527	0.9665	47,790	45,026,442	5,036	39,680	40,989	38,563	288,549	37,344	251,205	386,973	98,060
44	39,704,922	405,304		0.9657	47,683	4,05,527	0.9657	47,683	45,026,442	5,036	39,680	40,989	38,563	288,549	37,344	251,205	386,973	98,060
45	38,874,612	397,049		0.9649	47,575	4,05,527	0.9649	47,575	45,026,442	5,036	39,680	40,989	38,563	288,549	37,344	251,205	386,973	98,060
46	38,061,395	388,746		0.9641	47,468	4,04,437	0.9641	47,468	45,026,442	5,036	39,680	40,989	38,563	288,549	37,344	251,205	386,973	98,060
47	37,264,924	380,614		0.9633	47,361	4,01,172	0.9633	47,361	45,026,442	5,036	39,680	40,989	38,563	288,549	37,344	251,205	386,973	98,060
48	36,484,857	372,649		0.9625	47,257	4,00,619	0.9625	47,257	45,026,442	5,036	39,680	40,989	38,563	288,549	37,344	251,205	386,973	98,060

## Standard Default Methodology

Principal and Interest Are Advanced

Month	Performing Balance	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	Amort From Defaults	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	Amortized Default Bal In Recovery Month	Monthly Default Rate	Monthly Prepay Rate
49	35,720,859	364,849	4,899,923	0.9613	39,356	364,499	4,705	34,650	276,597	35,797	240,800	370,929	94,014	464,943	0.01	0.01
50	34,972,604	357,209	4,797,283	0.9603	38,826	356,863	4,642	34,184	270,805	35,048	235,758	363,154	92,053	455,207	0.01	0.01
51	34,239,769	349,726	4,696,758	0.9594	38,303	346,385	4,579	33,723	26,133	34,319	230,819	355,539	90,132	445,672	0.01	0.01
52	33,522,040	342,398	4,598,306	0.9585	37,787	342,062	4,518	33,269	259,577	33,594	225,982	348,082	88,251	436,333	0.01	0.01
53	32,819,109	335,220	4,501,883	0.9575	37,278	334,889	4,457	32,821	254,136	32,890	221,245	340,778	86,409	427,187	0.01	0.01
54	32,130,675	328,191	4,407,448	0.9566	36,776	327,864	4,397	32,379	248,807	32,200	216,606	333,625	84,604	418,229	0.01	0.01
55	31,456,441	321,307	4,314,962	0.9556	36,281	320,984	4,337	31,943	243,525	31,202	212,062	326,619	82,857	409,456	0.01	0.01
56	30,796,117	314,564	4,224,384	0.9546	35,792	321,426	4,279	31,513	238,476	30,864	207,613	319,758	81,105	409,864	0.01	0.01
57	30,149,420	307,961	4,135,675	0.9537	35,310	307,647	4,221	31,089	233,470	30,216	203,254	313,039	79,410	392,449	0.01	0.01
58	29,516,072	301,494	4,048,796	0.9527	34,835	301,184	4,165	30,670	228,567	29,581	198,986	306,458	77,749	384,208	0.01	0.01
59	28,895,799	295,161	3,963,712	0.9517	34,366	294,855	4,109	30,257	223,766	28,960	194,806	300,914	76,123	376,137	0.01	0.01
60	28,288,335	288,958	3,880,385	0.9507	33,903	288,656	4,053	28,351	219,063	28,351	190,712	293,702	74,530	368,232	0.01	0.01
61	27,693,418	282,883	3,798,778	0.9497	33,446	282,586	3,995	29,448	214,458	27,755	186,703	287,521	72,970	360,491	0.01	0.01
62	27,110,792	276,934	3,718,858	0.9487	32,996	276,641	3,945	29,051	209,948	27,171	182,777	281,468	71,442	352,910	0.01	0.01
63	26,540,206	271,108	3,640,589	0.9477	32,551	270,818	3,892	28,660	205,531	26,600	178,931	275,540	69,945	345,485	0.01	0.01
64	25,981,413	265,402	3,563,938	0.9467	32,113	265,116	3,839	28,274	201,205	26,040	175,165	269,734	68,480	338,214	0.01	0.01
65	25,434,174	259,814	3,488,872	0.9456	31,681	259,532	3,788	27,893	219,969	25,492	171,477	264,049	67,044	331,093	0.01	0.01
66	24,898,251	254,342	3,415,358	0.9446	31,254	254,064	3,737	27,515	218,820	24,920	167,866	258,481	65,638	324,119	0.01	0.01
67	24,373,413	248,983	3,343,365	0.9436	30,833	248,708	3,686	27,147	188,757	24,429	164,328	253,028	64,261	317,290	0.01	0.01
68	23,859,434	243,734	3,272,861	0.9425	30,418	243,464	3,637	26,781	184,779	23,914	160,865	247,689	62,913	310,601	0.01	0.01
69	23,356,691	238,594	3,203,816	0.9415	30,008	238,327	3,588	26,421	180,882	23,410	157,472	242,459	61,592	304,052	0.01	0.01
70	22,863,168	233,561	3,136,200	0.9404	29,604	233,298	3,539	26,065	177,066	22,916	154,150	237,338	60,299	297,637	0.01	0.01
71	22,380,450	228,632	3,069,985	0.9393	29,205	228,372	3,492	25,714	173,329	22,432	150,897	232,324	59,032	291,356	0.01	0.01
72	21,907,730	223,805	3,005,140	0.9383	28,812	223,548	3,445	25,368	169,670	21,959	147,711	227,413	57,792	285,204	0.01	0.01
73	21,444,802	219,077	2,941,639	0.9372	28,424	218,825	3,398	25,026	166,086	21,495	144,591	222,603	56,577	279,180	0.01	0.01
74	20,991,467	214,448	2,879,454	0.9361	28,041	214,199	3,352	24,689	162,576	21,041	141,536	217,894	51,387	273,281	0.01	0.01
75	20,547,527	209,915	2,818,558	0.9350	27,664	209,669	3,307	23,506	159,139	20,596	123,882	213,282	54,222	267,504	0.01	0.01
76	20,112,790	205,475	2,758,924	0.9339	27,291	205,233	3,263	24,028	155,774	20,160	135,614	208,766	53,080	261,846	0.01	0.01
77	19,687,069	201,128	2,700,527	0.9328	26,924	200,888	3,219	23,705	152,478	19,734	132,744	204,344	51,963	256,306	0.01	0.01
78	19,270,178	196,871	2,643,341	0.9316	26,561	196,634	3,175	23,386	149,251	19,316	129,935	200,013	50,868	250,881	0.01	0.01
79	18,861,937	192,702	2,587,341	0.9305	26,203	192,469	3,133	23,071	146,090	18,907	127,183	195,772	49,797	245,569	0.01	0.01
80	18,462,168	188,619	2,532,504	0.9294	25,851	188,389	3,091	22,760	142,995	18,506	124,489	191,619	48,747	240,366	0.01	0.01
81	18,070,698	184,622	2,478,805	0.9282	25,502	184,955	3,049	22,454	139,964	18,114	121,850	187,553	47,719	235,272	0.01	0.01
82	17,687,357	180,707	2,426,221	0.9271	25,159	180,483	3,008	22,151	136,997	17,730	119,267	183,571	46,712	230,283	0.01	0.01
83	17,311,977	176,874	2,374,729	0.9259	24,820	176,653	2,967	21,853	134,091	17,354	116,737	179,672	45,726	225,398	0.01	0.01
84	16,944,397	173,120	2,324,307	0.9248	24,486	172,902	2,927	21,559	131,245	16,986	114,259	175,853	44,761	220,614	0.01	0.01
85	16,584,456	169,444	2,274,933	0.9236	24,156	169,536	2,888	21,268	128,458	16,625	111,833	172,115	43,815	215,930	0.01	0.01
86	16,231,997	165,845	2,226,585	0.9224	23,831	165,633	2,849	20,982	125,729	16,272	109,457	168,454	42,890	211,343	0.01	0.01
87	15,886,866	162,320	2,179,243	0.9212	23,510	162,111	2,811	20,699	123,057	15,926	107,131	164,869	41,983	206,852	0.01	0.01
88	15,548,915	158,869	2,132,885	0.9200	23,193	158,662	2,773	20,421	120,441	15,587	104,853	161,358	41,095	202,454	0.01	0.01
89	15,217,994	155,489	2,087,492	0.9188	22,881	155,286	2,736	20,146	117,879	15,256	102,623	147,921	40,226	198,147	0.01	0.01
90	14,893,961	152,180	2,043,043	0.9176	22,573	151,979	2,699	19,874	115,370	14,931	100,439	154,556	39,374	193,930	0.01	0.01
91	14,576,673	148,940	1,999,520	0.9164	22,269	148,742	2,662	19,607	112,913	14,613	98,300	151,260	38,540	189,800	0.01	0.01
92	14,265,993	145,767	1,956,903	0.9152	21,969	145,571	2,626	19,343	110,508	14,302	96,206	148,633	37,724	185,757	0.01	0.01
93	13,961,783	142,660	1,915,174	0.9139	21,673	142,467	2,591	19,082	108,153	13,997	94,156	144,874	41,095	204,454	0.01	0.01
94	13,663,913	139,618	1,874,315	0.9127	21,381	139,428	2,556	18,825	105,846	13,699	92,148	141,780	36,141	177,924	0.01	0.01
95	13,372,250	136,639	1,834,306	0.9114	21,093	136,452	2,522	18,572	103,588	13,406	90,182	138,751	35,375	174,125	0.01	0.01
96	13,086,669	133,723	1,795,132	0.9102	20,809	133,537	2,488	18,322	101,377	13,120	88,257	135,758	34,624	170,409	0.01	0.01

## Standard Default Methodology

### Cash Flow A

Principal and Interest Are Advanced

WAC	8.00%	Prepay Rate	1% SMM	Recover after	12 months (time to liquidation)
WAM	360	Default Rate	1% MDR	Loss Severity	20.00%

Month	Performing Balance	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	From Defaults	Amort	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	Amortized Default Bal In Recovery Month	Monthly Default Rate	Monthly Prepay Rate
97	12,807,043	130,867	1,756,776	0.9089	20,529	130,684	2,454	18,075	99,212	12,840	86,372	132,881	33,889	166,769	0.01	0.01	
98	12,533,251	128,070	1,719,219	0.9076	20,253	127,890	2,421	17,831	97,092	12,566	84,526	130,037	33,169	163,206	0.01	0.01	
99	12,265,173	125,333	1,682,446	0.9063	19,980	125,155	2,389	17,591	95,016	12,297	82,719	127,253	32,464	159,717	0.01	0.01	
100	12,002,690	122,652	1,646,440	0.9050	19,711	122,476	2,356	17,354	92,984	12,034	80,950	124,527	31,774	156,301	0.01	0.01	
101	11,745,689	120,027	1,611,187	0.9037	19,445	119,854	2,325	17,121	90,994	11,776	79,218	121,858	31,098	152,956	0.01	0.01	
102	11,494,055	117,457	1,576,670	0.9024	19,184	117,286	2,293	16,890	89,046	11,524	77,522	119,245	30,436	149,681	0.01	0.01	
103	11,247,680	114,941	1,532,874	0.9011	18,925	114,772	2,263	16,663	87,138	11,277	75,861	116,686	29,788	146,474	0.01	0.01	
104	11,006,454	112,477	1,509,784	0.8998	18,670	112,311	2,232	16,438	85,270	11,036	74,235	114,181	29,153	143,334	0.01	0.01	
105	10,770,272	110,065	1,477,386	0.8984	18,419	109,901	2,202	16,217	83,442	10,799	72,643	111,728	28,532	140,260	0.01	0.01	
106	10,539,029	107,703	1,445,666	0.8971	18,171	107,541	2,172	15,999	81,651	10,567	71,084	109,327	27,924	137,250	0.01	0.01	
107	10,312,625	105,390	1,414,610	0.8957	17,926	105,231	2,143	15,783	79,898	10,340	69,558	106,976	27,328	134,304	0.01	0.01	
108	10,090,960	103,126	1,384,203	0.8944	17,685	102,969	2,114	15,571	78,182	10,118	68,063	104,674	26,745	131,418	0.01	0.01	
109	9,873,935	100,910	1,354,433	0.8930	17,447	100,754	2,086	15,361	76,501	9,901	66,600	102,420	26,173	128,594	0.01	0.01	
110	9,661,455	98,739	1,325,287	0.8916	17,212	98,586	2,058	15,154	74,856	9,688	65,168	100,214	25,614	125,828	0.01	0.01	
111	9,453,427	96,615	1,296,751	0.8902	16,980	96,464	2,030	14,950	73,245	9,479	63,766	98,054	25,067	123,120	0.01	0.01	
112	9,249,759	94,534	1,268,814	0.8888	16,751	94,385	2,003	14,749	71,668	9,275	62,393	95,939	24,530	120,469	0.01	0.01	
113	9,050,361	92,498	1,241,462	0.8874	16,526	92,351	1,976	14,550	70,124	9,075	61,048	93,868	24,005	117,874	0.01	0.01	
114	8,855,145	90,504	1,214,683	0.8860	16,303	90,359	1,949	14,354	68,612	8,880	59,732	91,841	23,491	115,333	0.01	0.01	
115	8,664,024	88,551	1,188,467	0.8845	16,084	88,408	1,923	14,161	67,132	8,688	58,444	89,857	22,988	112,845	0.01	0.01	
116	8,476,915	86,551	1,162,800	0.8831	15,867	86,499	1,897	13,970	65,683	8,501	57,183	87,914	22,495	110,410	0.01	0.01	
117	8,293,734	84,769	1,137,673	0.8817	15,653	84,630	1,871	13,782	64,265	8,317	55,948	86,012	22,013	108,025	0.01	0.01	
118	8,114,400	82,937	1,113,073	0.8802	15,442	82,800	1,846	13,596	62,876	8,137	54,739	84,150	21,541	105,691	0.01	0.01	
119	7,938,834	81,144	1,088,991	0.8787	15,235	81,009	1,821	13,413	61,516	7,961	53,555	82,327	21,078	103,405	0.01	0.01	
120	7,766,559	79,388	1,065,414	0.8772	15,029	79,255	1,797	13,233	60,185	7,789	52,396	80,543	20,625	101,168	0.01	0.01	
121	7,598,697	77,360	1,042,333	0.8758	14,827	78,538	1,773	13,054	59,882	7,621	51,262	78,796	20,182	98,978	0.01	0.01	
122	7,433,975	75,987	1,019,738	0.8743	14,627	75,857	1,749	12,879	57,607	7,455	50,151	77,086	19,748	96,834	0.01	0.01	
123	7,272,718	74,340	997,618	0.8727	14,430	74,211	1,725	12,705	56,358	7,294	49,064	75,412	19,323	94,734	0.01	0.01	
124	7,114,856	72,727	975,963	0.8712	14,236	72,601	1,702	12,534	55,136	7,136	48,000	73,773	18,907	92,686	0.01	0.01	
125	6,960,319	71,149	954,765	0.8697	14,044	71,024	1,679	12,365	53,939	6,981	46,958	72,168	18,500	90,668	0.01	0.01	
126	6,809,037	69,603	934,013	0.8682	13,855	69,480	1,656	12,199	52,767	6,829	45,938	70,598	18,101	88,698	0.01	0.01	
127	6,660,943	68,090	913,699	0.8666	13,669	67,969	1,634	12,034	51,620	6,681	44,940	69,060	17,710	86,771	0.01	0.01	
128	6,515,972	66,660	893,813	0.8651	13,485	66,490	1,612	11,872	50,498	6,535	43,962	67,555	17,328	84,883	0.01	0.01	
129	6,374,058	65,160	874,346	0.8635	13,303	65,041	1,590	11,713	49,399	6,393	43,005	66,082	16,954	83,036	0.01	0.01	
130	6,235,139	63,741	855,290	0.8619	13,124	63,624	1,569	11,555	48,323	6,254	42,069	64,640	16,587	81,228	0.01	0.01	
131	6,099,152	62,351	836,637	0.8603	12,947	62,326	1,548	11,399	47,270	6,118	41,152	63,228	16,229	79,457	0.01	0.01	
132	5,966,037	60,992	818,377	0.8587	12,773	60,878	1,527	11,246	46,239	5,984	40,254	61,847	15,878	77,724	0.01	0.01	
133	5,835,734	59,660	800,503	0.8571	12,601	59,548	1,506	11,094	45,229	5,854	39,376	60,494	15,534	76,028	0.01	0.01	
134	5,708,185	58,557	783,007	0.8555	12,431	58,247	1,486	10,945	44,242	5,726	38,516	59,170	15,197	74,367	0.01	0.01	
135	5,583,333	57,082	765,880	0.8538	12,264	56,973	1,466	10,797	43,275	5,601	37,674	58,874	14,868	72,742	0.01	0.01	
136	5,461,122	55,833	749,116	0.8522	12,098	55,726	1,446	10,652	42,328	5,478	36,850	56,606	14,545	71,151	0.01	0.01	
137	5,341,497	54,611	732,707	0.8505	11,936	54,505	1,427	10,509	41,402	5,358	36,043	55,364	14,230	69,594	0.01	0.01	
138	5,224,405	53,415	716,645	0.8489	11,775	53,310	1,408	10,367	40,495	5,241	35,254	54,148	13,921	68,069	0.01	0.01	
139	5,109,793	52,244	700,924	0.8472	11,616	52,141	1,389	10,227	39,607	5,126	34,481	53,959	13,618	66,557	0.01	0.01	
140	4,997,609	51,098	685,535	0.8455	11,460	50,996	1,370	10,090	38,738	5,013	33,725	51,795	13,322	65,116	0.01	0.01	
141	4,887,804	49,976	670,473	0.8438	11,305	49,876	1,352	9,954	37,888	4,903	32,984	50,655	13,032	63,687	0.01	0.01	
142	4,780,327	48,878	655,730	0.8421	11,153	48,779	1,333	9,820	37,055	4,796	32,260	49,539	12,748	62,287	0.01	0.01	
143	4,675,131	47,803	641,300	0.8404	11,003	47,705	1,315	9,688	36,240	4,690	31,550	48,448	12,470	60,918	0.01	0.01	
144	4,572,168	46,751	627,176	0.8386	10,855	46,655	1,298	9,557	35,443	4,587	30,856	47,379	12,198	59,557	0.01	0.01	

## **Standard Default Methodology**

Principal and Interest Are Advanced

Recover after	12 months (time to liquidation)
Loss Severity	20.00%

12 months (time to liquidation)											
Recover after Loss Severity 20.00%											
WAC		8.00%		Prepay Rate Default Rate		1% SMM MDR		Amort Factor		Expected Amortization	
Performing Balance	Month	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	From Defaults	Actual Amort	Expected Interest	Interest Lost	Principal Recovery
Month	Month	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	From Defaults	Actual Amort	Expected Interest	Interest Lost	Principal Recovery
145	4,471,391	45,722	613,352	0.8369	10,709	45,626	1,280	9,428	34,662	30,176	4,486
146	4,372,756	44,714	599,822	0.8351	10,564	44,620	1,263	9,301	33,898	4,387	29,511
147	4,276,217	43,728	586,580	0.8333	10,422	43,635	1,246	9,176	33,151	4,290	28,860
148	4,181,732	42,762	573,619	0.8316	10,282	42,671	1,229	9,053	32,419	4,196	28,223
149	4,089,257	41,817	560,934	0.8298	10,143	41,727	1,213	8,931	31,702	4,103	27,599
150	3,998,750	40,893	548,159	0.8280	10,007	40,804	1,196	8,810	31,001	2,046	26,989
151	3,910,171	39,987	536,368	0.8261	9,872	39,900	1,180	8,692	30,315	2,026	21,428
152	3,823,479	39,102	524,477	0.8243	9,739	39,015	1,164	8,575	29,644	1,987	20,509
153	3,738,636	38,235	512,838	0.8225	9,608	38,149	1,149	8,459	28,986	1,951	19,627
154	3,655,602	37,386	501,448	0.8206	9,479	37,302	1,133	8,345	28,343	1,915	18,768
155	3,574,340	36,556	490,302	0.8188	9,351	36,473	1,118	8,233	27,714	1,877	17,906
156	3,494,814	35,743	479,393	0.8169	9,225	35,661	1,103	8,122	27,098	1,839	17,045
157	3,416,986	34,948	468,717	0.8150	9,101	34,867	1,088	8,013	26,495	1,797	16,184
158	3,340,821	34,170	458,269	0.8131	8,978	34,090	1,073	7,905	25,905	1,757	15,325
159	3,266,285	33,408	448,045	0.8112	8,857	33,329	1,059	7,798	25,327	1,719	14,463
160	3,193,284	32,663	438,039	0.8092	8,738	32,585	1,045	7,693	24,762	1,681	13,595
161	3,121,964	31,933	428,248	0.8073	8,620	31,857	1,031	7,590	24,209	1,641	12,727
162	3,052,112	31,220	418,666	0.8053	8,504	31,144	1,017	7,488	23,668	1,603	11,860
163	2,983,758	30,521	409,290	0.8034	8,390	30,447	1,003	7,387	23,139	1,563	11,000
164	2,916,869	29,838	400,115	0.8014	8,277	29,764	990	7,287	22,620	1,523	10,139
165	2,851,415	29,169	391,136	0.7994	8,165	29,096	976	7,189	22,113	1,483	9,278
166	2,787,467	28,514	382,350	0.7974	8,055	28,443	963	7,092	21,617	1,443	8,417
167	2,724,693	27,874	373,753	0.7954	7,947	27,803	950	6,997	21,131	1,393	7,557
168	2,663,366	27,247	365,341	0.7933	7,840	27,177	937	6,903	20,656	1,353	6,700
169	2,603,358	26,634	357,109	0.7913	7,734	26,565	925	6,810	20,191	1,313	5,845
170	2,544,641	26,034	349,055	0.7892	7,630	25,966	912	6,718	19,736	1,273	5,000
171	2,487,188	25,446	341,174	0.7871	7,527	25,379	900	6,627	19,291	1,233	4,158
172	2,430,972	24,872	333,463	0.7850	7,426	24,806	888	6,538	18,856	1,193	3,322
173	2,375,968	24,310	325,918	0.7829	7,326	24,245	876	6,450	18,430	1,153	2,484
174	2,322,149	23,760	318,535	0.77808	7,227	23,695	864	6,363	18,013	1,113	1,646
175	2,269,492	23,221	311,312	0.77478	7,130	23,158	852	6,278	17,605	1,073	1,805
176	2,217,972	22,695	304,245	0.77065	7,034	22,632	841	6,193	17,205	2,227	1,964
177	2,167,564	22,180	297,330	0.7744	6,939	22,118	830	6,110	16,815	2,176	1,939
178	2,118,247	21,676	290,565	0.7722	6,846	21,615	818	6,027	16,433	2,127	1,895
179	2,069,996	21,182	283,947	0.7700	6,754	21,122	807	5,946	16,059	2,078	1,852
180	2,022,789	20,700	277,471	0.7684	6,663	20,641	797	5,866	15,693	2,031	1,811
181	1,976,604	20,228	271,136	0.7656	6,573	20,169	786	5,787	15,335	1,985	1,768
182	1,931,421	19,766	264,938	0.7634	6,484	19,708	775	5,709	14,985	1,939	1,727
183	1,887,217	19,314	258,874	0.7611	6,397	19,257	765	5,632	14,642	1,895	1,687
184	1,843,972	18,872	252,942	0.7589	6,311	18,816	754	5,556	14,307	1,852	1,649
185	1,801,667	18,440	247,139	0.7566	6,226	18,384	744	5,482	13,979	1,809	1,611
186	1,760,280	18,017	241,462	0.7543	6,142	17,962	734	5,408	13,659	1,768	1,581
187	1,719,793	17,603	235,909	0.7520	6,059	17,549	724	5,335	13,345	1,727	1,518
188	1,680,188	17,198	230,476	0.7496	5,978	17,145	715	5,263	13,038	1,687	1,435
189	1,641,444	16,802	225,161	0.7473	5,897	16,749	705	5,192	12,738	1,649	1,305
190	1,603,545	16,414	219,962	0.7440	5,749	16,363	696	5,122	12,444	1,611	1,201
191	1,566,471	16,035	214,877	0.7426	5,740	15,984	686	5,053	12,157	1,573	1,100
192	1,530,207	15,665	209,902	0.7402	5,662	15,614	677	4,985	11,876	1,537	1,000

## Standard Default Methodology

Principal and Interest Are Advanced

	WAC WAM	8.00% 360	Prepay Rate Default Rate	1% SMM 1% MDR	Recover after Loss Severity	12 months (time to liquidation)											
Month	Performing Balance	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	Amort From Defaults	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	Principal Loss	Amortized Default Bal In Recovery Month	Monthly Default Rate	Monthly Prepay Rate
193	1,494,734	15,302	205,037	0.7378	5,586	15,252	668	4,918	11,601	1,501	10,099	15,455	4,046	19,500	0.01	0.01	
194	1,460,037	14,947	200,277	0.7354	5,511	14,898	639	4,852	11,332	1,467	9,865	15,095	3,953	19,048	0.01	0.01	
195	1,426,098	14,600	195,622	0.7329	5,437	14,552	650	4,787	11,069	1,433	9,636	14,743	3,863	18,606	0.01	0.01	
196	1,392,901	14,261	191,068	0.7305	5,363	14,213	641	4,722	10,811	1,399	9,412	14,399	3,774	18,173	0.01	0.01	
197	1,360,432	13,929	186,614	0.7280	5,291	13,882	633	4,659	10,560	1,367	9,193	14,062	3,688	17,750	0.01	0.01	
198	1,328,674	13,604	182,258	0.7255	5,220	13,558	624	4,596	10,314	1,335	8,979	13,733	3,603	17,337	0.01	0.01	
199	1,297,612	13,287	177,997	0.7230	5,150	13,241	616	4,534	10,073	1,304	8,769	13,411	3,521	16,932	0.01	0.01	
200	1,267,232	12,976	173,830	0.7205	5,080	12,931	607	4,473	9,837	1,273	8,564	13,096	3,440	16,536	0.01	0.01	
201	1,237,520	12,672	169,754	0.7180	5,012	12,628	599	4,413	9,607	1,243	8,364	12,789	3,360	16,149	0.01	0.01	
202	1,208,460	12,375	165,768	0.7154	4,944	12,331	591	4,353	9,382	1,214	8,168	12,487	3,283	15,770	0.01	0.01	
203	1,180,040	12,085	161,869	0.7129	4,878	12,094	583	4,295	9,162	1,186	7,976	12,193	3,207	15,400	0.01	0.01	
204	1,152,245	11,800	158,056	0.7103	4,812	11,758	575	4,237	8,946	1,158	7,788	11,905	3,133	15,038	0.01	0.01	
205	1,125,063	11,522	154,328	0.7077	4,747	11,480	568	4,180	8,735	1,131	7,605	11,623	3,060	14,684	0.01	0.01	
206	1,098,480	11,251	150,681	0.7051	4,683	11,209	560	4,123	8,529	1,104	7,425	11,348	2,989	14,337	0.01	0.01	
207	1,072,483	10,985	147,115	0.7024	4,620	10,944	552	4,068	8,328	1,078	7,250	11,078	2,920	13,998	0.01	0.01	
208	1,047,061	10,725	143,628	0.6998	4,558	10,684	545	4,013	8,131	1,052	7,078	10,815	2,852	13,667	0.01	0.01	
209	1,022,201	10,471	140,218	0.6971	4,497	10,431	538	3,959	7,938	1,027	6,911	10,557	2,786	13,343	0.01	0.01	
210	997,890	10,222	136,883	0.6944	4,436	10,183	530	3,906	7,749	1,003	6,747	10,306	2,721	13,026	0.01	0.01	
211	974,118	9,979	133,622	0.6917	4,376	9,940	523	3,853	7,565	979	6,586	10,059	2,657	12,717	0.01	0.01	
212	950,873	9,741	130,434	0.6890	4,317	9,703	516	3,801	7,385	956	6,429	9,818	2,595	12,414	0.01	0.01	
213	928,143	9,509	127,316	0.6862	4,259	9,471	509	3,750	7,209	933	6,276	9,583	2,534	12,117	0.01	0.01	
214	905,918	9,281	124,267	0.6835	4,202	9,244	502	3,700	7,036	911	6,126	9,353	2,475	11,828	0.01	0.01	
215	884,187	9,059	121,286	0.6807	4,145	9,022	496	3,650	6,868	889	5,979	9,128	2,417	11,545	0.01	0.01	
216	862,939	8,842	118,372	0.66779	4,090	8,806	489	3,601	6,703	868	5,836	9,098	2,360	11,268	0.01	0.01	
217	842,164	8,629	115,522	0.6651	4,034	8,584	482	3,552	6,542	847	5,695	8,692	2,304	10,997	0.01	0.01	
218	821,852	8,422	112,736	0.6622	3,980	8,386	476	3,504	6,385	826	5,558	8,482	2,250	10,732	0.01	0.01	
219	801,993	8,219	110,011	0.6694	3,927	8,184	469	3,457	6,231	806	5,424	8,276	2,197	10,473	0.01	0.01	
220	782,577	8,020	107,348	0.6665	3,874	7,985	463	3,411	6,080	787	5,293	8,075	2,145	10,220	0.01	0.01	
221	763,595	7,826	104,744	0.6636	3,821	7,792	457	3,365	5,933	768	5,165	7,879	2,094	9,973	0.01	0.01	
222	745,037	7,636	102,199	0.6607	3,770	7,602	451	3,319	5,789	749	5,040	7,686	2,044	9,731	0.01	0.01	
223	726,895	7,450	99,710	0.6577	3,719	7,417	445	3,275	5,648	731	4,917	7,499	1,996	9,494	0.01	0.01	
224	709,159	7,269	97,277	0.6548	3,669	7,236	439	3,230	5,511	713	4,798	7,315	1,948	9,263	0.01	0.01	
225	691,821	7,092	94,899	0.6518	3,620	7,059	433	3,187	5,376	696	4,680	7,135	1,902	9,037	0.01	0.01	
226	674,872	6,918	92,574	0.6488	3,571	6,886	427	3,144	5,245	679	4,566	6,960	1,856	8,816	0.01	0.01	
227	658,305	6,749	90,301	0.6458	3,523	6,717	421	3,102	5,116	662	4,454	6,788	1,812	8,600	0.01	0.01	
228	642,109	6,583	88,080	0.6428	3,475	6,552	416	3,060	4,991	646	4,345	6,621	1,768	8,389	0.01	0.01	
229	626,279	6,421	85,908	0.6397	3,429	6,391	410	3,019	4,868	630	4,238	6,457	1,726	8,183	0.01	0.01	
230	610,805	6,263	83,786	0.6367	3,382	6,233	404	2,978	4,748	614	4,133	6,297	1,684	7,981	0.01	0.01	
231	595,681	6,108	81,711	0.6336	3,337	6,078	399	2,938	4,631	599	4,031	6,140	1,644	7,784	0.01	0.01	
232	580,898	5,957	79,683	0.6304	3,292	5,928	394	2,898	4,516	584	3,931	5,987	1,604	7,591	0.01	0.01	
233	566,450	5,809	77,701	0.6273	3,248	5,780	388	2,859	4,404	570	3,834	5,837	1,565	7,403	0.01	0.01	
234	552,328	5,664	75,764	0.6242	3,204	5,636	383	2,821	4,294	556	3,739	5,691	1,527	7,219	0.01	0.01	
235	538,527	5,523	73,871	0.6210	3,161	5,495	378	2,783	4,187	542	3,645	5,548	1,490	7,039	0.01	0.01	
236	525,039	5,385	72,021	0.6178	3,118	5,355	373	2,745	4,083	528	3,554	5,409	1,454	6,863	0.01	0.01	
237	511,857	5,250	70,213	0.6146	3,076	5,223	368	2,708	3,980	515	3,465	5,272	1,418	6,691	0.01	0.01	
238	498,975	5,119	68,446	0.6113	3,035	5,092	363	2,672	3,880	502	3,378	5,139	1,384	6,523	0.01	0.01	
239	486,386	4,990	66,719	0.6081	2,994	4,963	358	2,636	3,783	490	3,293	5,009	1,350	6,359	0.01	0.01	
240	474,084	4,864	65,031	0.6048	2,954	4,838	353	2,600	3,687	477	3,210	4,882	1,317	6,198	0.01	0.01	

## Standard Default Methodology

Principal and Interest Are Advanced

WAC 8.00% Prepay Rate 1% SMM  
WAM 360 Default Rate 1% MDR

Recover after 12 months (time to liquidation)  
Loss Severity 20.00%

Month	Performing Balance	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	Amort From Prepayments	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	Amortized Default Bal in Recovery Month	Monthly Default Rate	Monthly Prepay Rate	
241	462,063	4,741	63,382	0.6015	2,914	4,715	348	2,565	3,594	465	3,129	4,757	1,284	6,041	0.01	0.01	
242	450,316	4,621	61,771	0.5981	2,875	4,595	344	2,531	453	3,050	4,636	1,253	5,888	0.01	0.01	0.01	
243	438,338	4,503	60,197	0.5948	2,836	4,478	339	2,497	442	2,972	4,517	1,222	5,739	0.01	0.01	0.01	
244	427,623	4,388	58,658	0.5914	2,798	4,364	334	2,463	3,327	431	2,896	4,401	1,191	5,592	0.01	0.01	0.01
245	416,665	4,276	57,155	0.5880	2,760	4,252	330	2,430	3,242	420	2,822	4,288	1,162	5,449	0.01	0.01	0.01
246	405,359	4,167	55,686	0.5846	2,723	4,142	326	2,397	3,159	409	2,750	4,177	1,133	5,310	0.01	0.01	0.01
247	395,498	4,060	54,252	0.5812	2,686	4,036	321	2,365	3,078	398	2,679	4,069	1,105	5,173	0.01	0.01	0.01
248	385,279	3,955	52,850	0.5777	2,650	3,931	317	2,333	2,998	388	2,610	3,963	1,077	5,040	0.01	0.01	0.01
249	375,295	3,853	51,480	0.5742	2,614	3,830	313	2,302	2,921	378	2,543	3,860	1,050	4,910	0.01	0.01	0.01
250	365,541	3,753	50,142	0.5707	2,579	3,730	308	2,271	2,845	368	2,477	3,759	1,024	4,783	0.01	0.01	0.01
251	356,013	3,655	48,835	0.5672	2,544	3,633	304	2,240	2,771	359	2,413	3,660	998	4,658	0.01	0.01	0.01
252	346,705	3,560	47,558	0.5636	2,510	3,538	300	2,210	2,699	349	2,350	3,564	973	4,537	0.01	0.01	0.01
253	337,612	3,467	46,311	0.5600	2,476	3,445	296	2,180	2,628	340	2,288	3,470	948	4,418	0.01	0.01	0.01
254	328,731	3,376	45,093	0.5564	2,443	3,354	292	2,151	2,559	331	2,228	3,378	924	4,302	0.01	0.01	0.01
255	320,056	3,287	43,903	0.5528	2,410	3,266	288	2,122	2,492	323	2,170	3,289	901	4,189	0.01	0.01	0.01
256	311,582	3,201	42,741	0.5492	2,378	3,179	284	2,093	2,426	314	2,112	3,201	878	4,079	0.01	0.01	0.01
257	303,307	3,116	41,605	0.5455	2,346	3,095	280	2,065	2,362	306	2,056	3,115	855	3,971	0.01	0.01	0.01
258	295,224	3,033	40,497	0.5418	2,314	3,012	277	2,037	2,299	298	2,002	3,032	833	3,865	0.01	0.01	0.01
259	287,330	2,952	39,414	0.5381	2,283	2,932	273	2,010	2,238	290	1,948	2,950	812	3,762	0.01	0.01	0.01
260	279,620	2,873	38,356	0.5343	2,252	2,853	269	1,983	2,178	282	1,896	2,871	791	3,662	0.01	0.01	0.01
261	272,091	2,796	37,323	0.5305	2,222	2,776	266	1,956	2,120	274	1,845	2,793	771	3,563	0.01	0.01	0.01
262	264,739	2,721	36,315	0.5267	2,192	2,701	262	1,930	2,063	267	1,796	2,717	751	3,467	0.01	0.01	0.01
263	257,560	2,647	35,330	0.5229	2,162	2,628	259	1,904	2,007	260	1,747	2,643	731	3,374	0.01	0.01	0.01
264	250,549	2,576	34,369	0.5191	2,133	2,557	255	1,878	1,953	253	1,700	2,570	712	3,282	0.01	0.01	0.01
265	243,704	2,505	33,430	0.5152	2,104	2,487	252	1,853	1,899	246	1,654	2,499	693	3,193	0.01	0.01	0.01
266	237,021	2,437	32,513	0.5113	2,076	2,419	248	1,828	1,848	239	1,608	2,430	675	3,106	0.01	0.01	0.01
267	230,495	2,370	31,618	0.5073	2,048	2,352	245	1,803	1,797	233	1,564	2,363	657	3,020	0.01	0.01	0.01
268	224,124	2,305	30,744	0.5034	2,021	2,287	242	1,779	1,747	226	1,521	2,297	640	2,937	0.01	0.01	0.01
269	217,904	2,241	29,891	0.4994	1,993	2,224	238	1,755	1,699	220	1,479	2,233	623	2,856	0.01	0.01	0.01
270	211,832	2,179	29,038	0.4954	1,967	2,162	235	1,731	1,652	214	1,438	2,170	607	2,777	0.01	0.01	0.01
271	205,905	2,118	28,244	0.4914	1,940	2,101	232	1,708	1,606	208	1,398	2,109	590	2,699	0.01	0.01	0.01
272	200,119	2,059	27,451	0.4873	1,914	2,042	229	1,685	1,561	202	1,359	2,049	575	2,624	0.01	0.01	0.01
273	194,471	2,001	26,676	0.4832	1,888	1,984	226	1,662	1,517	196	1,321	1,959	559	2,550	0.01	0.01	0.01
274	188,958	1,945	25,920	0.4791	1,863	1,928	223	1,640	1,474	191	1,284	1,934	544	2,478	0.01	0.01	0.01
275	183,577	1,890	25,182	0.4749	1,838	1,873	220	1,618	1,433	185	1,247	1,878	529	2,408	0.01	0.01	0.01
276	178,325	1,836	24,461	0.4708	1,813	1,820	217	1,596	1,392	180	1,212	1,824	515	2,339	0.01	0.01	0.01
277	173,200	1,783	23,758	0.4666	1,788	1,767	214	1,575	1,352	175	1,177	1,771	501	2,272	0.01	0.01	0.01
278	168,198	1,732	23,072	0.4624	1,764	1,716	211	1,553	1,313	170	1,143	1,720	487	2,207	0.01	0.01	0.01
279	163,317	1,682	22,403	0.4581	1,741	1,667	208	1,533	1,275	165	1,110	1,669	474	2,143	0.01	0.01	0.01
280	158,554	1,633	21,749	0.4558	1,717	1,618	205	1,512	1,238	160	1,078	1,620	461	2,081	0.01	0.01	0.01
281	153,907	1,586	21,112	0.4495	1,694	1,570	203	1,492	1,202	156	1,046	1,572	448	2,021	0.01	0.01	0.01
282	149,372	1,539	20,490	0.4452	1,671	1,524	200	1,471	1,167	151	1,016	1,525	436	1,961	0.01	0.01	0.01
283	144,948	1,494	19,883	0.4408	1,649	1,479	197	1,452	1,132	147	986	1,480	124	1,904	0.01	0.01	0.01
284	140,631	1,449	19,291	0.4364	1,627	1,435	194	1,432	1,099	142	957	1,435	412	1,847	0.01	0.01	0.01
285	136,420	1,406	18,713	0.4320	1,605	1,392	192	1,413	1,066	138	928	1,392	400	1,792	0.01	0.01	0.01
286	132,312	1,364	18,150	0.4275	1,583	1,350	189	1,394	1,034	134	900	1,350	389	1,738	0.01	0.01	0.01
287	128,304	1,323	17,600	0.4230	1,562	1,309	187	1,375	1,003	130	873	1,308	378	1,686	0.01	0.01	0.01
288	124,395	1,283	17,064	0.4185	1,541	1,269	184	1,357	973	126	847	1,268	367	1,635	0.01	0.01	0.01

## Standard Default Methodology

Principal and Interest Are Advanced

WAC 8.00% Prepay Rate 1% SMM  
WAM 360 Default Rate 1% MDR

Recover after 12 months (time to liquidation)  
Loss Severity 20.00%

**The Bond Market Association**

**Uniform Practices/Standard Formulas**

## Cash Flow A

Month	Performing Balance	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	From Defaults	Amort From Defaults	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	Amortized Default Bal In Recovery Month	Monthly Default Rate	Monthly Prepay Rate
289	120,583	1,244	16,541	0.4140	1,520	1,230	182	1,338	943	122	821	1,229	357	1,585	0.01	0.01
290	116,864	1,206	16,031	0.4094	1,499	1,192	179	1,320	914	118	796	1,190	346	1,537	0.01	0.01
291	113,238	1,169	15,533	0.4048	1,479	1,155	177	1,302	886	115	771	1,153	336	1,489	0.01	0.01
292	109,701	1,132	15,048	0.4001	1,459	1,119	174	1,285	858	111	747	1,116	327	1,443	0.01	0.01
293	106,252	1,097	14,575	0.3955	1,440	1,084	172	1,268	832	108	724	1,081	317	1,398	0.01	0.01
294	102,889	1,063	14,114	0.3908	1,420	1,050	170	1,251	806	104	701	1,046	308	1,354	0.01	0.01
295	99,610	1,029	13,664	0.3860	1,401	1,016	168	1,234	780	101	679	1,012	299	1,311	0.01	0.01
296	96,413	996	13,225	0.3813	1,382	984	165	1,217	755	98	657	979	290	1,269	0.01	0.01
297	93,296	964	12,798	0.3765	1,364	952	163	1,201	731	95	636	947	281	1,229	0.01	0.01
298	90,258	933	12,381	0.3716	1,345	921	161	1,185	707	92	616	916	273	1,189	0.01	0.01
299	87,296	903	11,975	0.3668	1,327	891	159	1,169	684	89	596	886	265	1,150	0.01	0.01
300	84,409	873	11,579	0.3619	1,309	861	157	1,153	662	86	576	856	257	1,112	0.01	0.01
301	81,595	844	11,193	0.3570	1,292	833	154	1,137	640	83	557	827	249	1,076	0.01	0.01
302	78,852	816	10,816	0.3520	1,274	805	152	1,122	619	80	539	799	241	1,040	0.01	0.01
303	76,155	780	10,450	0.3470	1,257	777	150	1,107	598	77	520	771	234	1,005	0.01	0.01
304	73,575	762	10,093	0.3420	1,240	751	148	1,092	578	75	503	744	226	971	0.01	0.01
305	71,037	736	9,744	0.3369	1,224	725	146	1,077	558	72	486	718	219	938	0.01	0.01
306	68,565	710	9,405	0.3318	1,207	700	144	1,063	539	70	469	693	213	905	0.01	0.01
307	66,155	686	9,075	0.3267	1,191	675	142	1,048	520	67	453	668	206	874	0.01	0.01
308	63,808	662	8,753	0.3215	1,175	651	140	1,034	502	65	437	644	199	843	0.01	0.01
309	61,522	638	8,439	0.3164	1,159	628	139	1,020	484	63	421	620	193	813	0.01	0.01
310	59,295	615	8,134	0.3111	1,143	605	137	1,007	466	60	406	496	187	784	0.01	0.01
311	57,126	593	7,836	0.3059	1,128	583	135	993	450	58	391	575	181	756	0.01	0.01
312	55,014	571	7,546	0.3006	1,113	561	133	980	433	56	377	553	175	728	0.01	0.01
313	52,957	550	7,264	0.2952	1,098	540	131	967	417	54	363	532	169	701	0.01	0.01
314	50,954	530	6,989	0.2899	1,083	520	129	954	401	52	350	512	163	675	0.01	0.01
315	49,004	510	6,722	0.2845	1,068	500	128	941	386	50	336	492	158	649	0.01	0.01
316	47,105	490	6,462	0.2790	1,054	481	126	928	372	48	323	472	152	624	0.01	0.01
317	45,257	471	6,208	0.2735	1,040	462	124	916	357	46	311	453	147	600	0.01	0.01
318	43,457	453	5,961	0.2680	1,026	443	123	903	343	44	299	435	142	577	0.01	0.01
319	41,706	435	5,721	0.2625	1,012	426	121	891	329	43	287	417	137	554	0.01	0.01
320	40,002	417	5,487	0.2569	998	408	119	879	316	41	275	399	132	531	0.01	0.01
321	38,343	400	5,260	0.2513	985	391	118	867	303	39	264	382	128	510	0.01	0.01
322	36,730	383	5,038	0.2456	972	375	116	856	291	38	253	366	123	489	0.01	0.01
323	35,160	367	4,823	0.2399	959	359	115	844	278	36	242	349	119	468	0.01	0.01
324	33,632	352	4,613	0.2342	946	343	113	833	267	34	232	334	114	448	0.01	0.01
325	32,147	336	4,410	0.2284	933	328	112	821	255	33	222	319	110	429	0.01	0.01
326	30,701	321	4,211	0.2226	920	313	110	810	244	32	212	304	106	410	0.01	0.01
327	29,296	307	4,019	0.2167	908	299	109	799	233	30	203	289	102	391	0.01	0.01
328	27,929	293	3,831	0.2108	896	285	107	789	222	29	193	275	98	373	0.01	0.01
329	26,601	279	3,649	0.2049	884	271	106	778	212	27	184	262	94	356	0.01	0.01
330	25,309	266	3,472	0.1989	872	258	104	768	202	26	176	248	91	339	0.01	0.01
331	24,053	253	3,299	0.1929	860	245	103	757	192	25	167	236	87	323	0.01	0.01
332	22,833	241	3,132	0.1869	848	233	101	747	182	24	159	223	83	307	0.01	0.01
333	21,646	228	2,969	0.1808	837	221	100	737	173	22	151	211	80	291	0.01	0.01
334	20,494	216	2,811	0.1746	826	209	99	727	164	21	143	199	77	276	0.01	0.01
335	19,374	205	2,658	0.1685	815	198	97	717	155	20	135	188	73	261	0.01	0.01
336	18,286	194	2,508	0.1622	804	187	96	708	147	19	128	177	70	247	0.01	0.01

## Standard Default Methodology

Principal and Interest Are Advanced

WAC	8.00%	Prepay Rate
WAM	360	Default Rate

1% SMM	12 months (time to liquidation)	Recover after Loss Severity
1% MDR	20.00%	Amort From Prepayments

Month	Performing Balance	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	Actual Amort	From Defaults	Interest Lost	Expected Interest	Interest Lost	Principal Recovery	Principal Loss	Amortized in Recovery	Default Month	Default Rate	Monthly Prepay Rate
337	17,229	183	2,363	0.1560	793	176	95	698	139	18	121	166	67	233	0.01	0.01	
338	16,203	172	2,223	0.1497	782	165	94	689	131	17	114	155	64	220	0.01	0.01	
339	15,206	162	2,086	0.1433	772	155	92	679	123	16	107	145	61	206	0.01	0.01	
340	14,239	152	1,953	0.1370	761	145	91	670	115	15	100	135	59	194	0.01	0.01	
341	13,299	142	1,824	0.1305	751	136	90	661	108	14	94	126	56	181	0.01	0.01	
342	12,388	133	1,699	0.1241	741	126	89	652	101	13	88	116	53	169	0.01	0.01	
343	11,503	124	1,578	0.1176	731	117	87	644	94	12	82	107	51	158	0.01	0.01	
344	10,644	115	1,460	0.1110	721	109	86	635	87	11	76	98	48	147	0.01	0.01	
345	9,812	106	1,346	0.1044	711	100	85	626	81	10	70	90	46	136	0.01	0.01	
346	9,004	98	1,235	0.0978	702	92	84	618	74	10	65	82	43	125	0.01	0.01	
347	8,220	90	1,128	0.0911	692	84	83	610	68	9	59	74	41	115	0.01	0.01	
348	7,461	82	1,023	0.0844	683	76	82	601	62	8	54	66	39	105	0.01	0.01	
349	6,793	0	854	0.0776	674	69	75	599	57	7	50	59	37	95	0.00	0.01	
350	6,134	0	701	0.0708	665	62	68	597	51	6	45	51	34	86	0.00	0.01	
351	5,483	0	563	0.0639	656	55	61	595	46	5	41	44	32	77	0.00	0.01	
352	4,841	0	442	0.0570	647	49	54	593	40	4	37	37	30	68	0.00	0.01	
353	4,207	0	336	0.0500	638	42	47	591	35	3	32	31	28	59	0.00	0.01	
354	3,582	0	245	0.0430	629	36	40	589	30	2	28	24	27	51	0.00	0.01	
355	2,965	0	169	0.0360	620	30	33	587	26	2	24	18	25	43	0.00	0.01	
356	2,356	0	107	0.0289	612	24	26	585	21	1	20	12	23	35	0.00	0.01	
357	1,755	0	60	0.0217	603	18	20	583	16	1	16	6	21	28	0.00	0.01	
358	1,162	0	26	0.0145	594	12	13	581	12	0	12	1	20	20	0.00	0.01	
359	577	0	7	0.0073	586	6	7	579	8	0	8	0	13	13	0.00	0.01	
360	0	0	0	0.0000	577	0	0	577	4	0	4	0	7	7	0.00	0.00	
<b>Total</b>				<b>47,576,640</b>	<b>5,510,477</b>	<b>47,527,662</b>	<b>614,780</b>	<b>4,895,697</b>	<b>37,446,547</b>	<b>9,515,314</b>	<b>46,961,860</b>						

## Cash Flow A

## Standard Default Methodology

Principal and Interest Are Advanced

## Cash Flow B

	WAC WAM	8.00% 360	Prepay Rate Default Rate	150% PSA 100% SDA	Recover after Loss Severity	12 months (time to liquidation)										
Month	Performing Balance	New Defaults	Amort In Foreclosure	Expected Amortization Factor	Voluntary Prepayments	Amort From Defaults	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	Amortized Default Bal In Recovery Month	Annual Default Rate	Monthly Default Rate	Monthly Prepay Rate
1	100,000,000	1,667	1,666	0.9993	67,098	25,018	1	67,997	666,667	11	666,656		0.000200	0.000117	0.000250	
2	99,906,219	3,331	4,993	0.9987	67,528	50,057	3	67,525	666,053	33	666,019	0.000400	0.000033	0.000501	0.000501	
3	99,785,306	4,991	9,977	0.9980	67,944	75,098	7	67,938	665,269	67	665,202	0.000600	0.000050	0.000753	0.000753	
4	99,462,179	6,645	16,611	0.9973	68,346	100,121	11	68,334	664,315	111	664,204	0.000800	0.000067	0.001006	0.001006	
5	99,260,067	8,292	24,886	0.9966	68,732	125,104	17	68,715	663,192	166	663,026	0.001000	0.000083	0.001259	0.001259	
6	99,031,028	9,931	34,793	0.9959	69,103	150,028	24	69,079	661,900	232	661,668	0.001200	0.000100	0.001513	0.001513	
7	98,775,168	11,561	46,321	0.9952	69,459	174,872	33	69,426	660,439	309	660,130	0.001400	0.000117	0.001667	0.001667	
8	98,492,616	13,180	59,459	0.9945	69,799	199,616	42	69,747	668,810	397	688,413	0.001600	0.000133	0.002022	0.002022	
9	98,183,522	14,786	74,192	0.9938	70,122	224,239	53	70,069	657,014	495	656,519	0.001800	0.000150	0.002278	0.002278	
10	97,188,057	16,379	90,506	0.9931	70,429	248,722	65	70,364	655,051	604	654,448	0.002000	0.000167	0.002535	0.002535	
11	97,486,418	17,957	108,385	0.9924	70,718	273,043	78	70,640	652,924	723	652,201	0.002200	0.000184	0.002792	0.002792	
12	97,098,818	12,719	127,811	0.9916	70,991	297,182	93	70,898	650,632	853	649,779	0.002400	0.000200	0.003051	0.003051	
13	96,685,496	21,063	147,113	0.9909	71,246	321,121	108	71,138	648,178	992	647,185	1,320	333	1,653	0.002600	
14	96,246,710	22,589	166,276	0.9902	71,481	344,839	123	71,358	645,551	1,131	644,419	2,637	666	3,303	0.002800	
15	95,782,739	24,095	185,285	0.9895	71,698	368,316	138	71,560	642,753	1,269	641,484	3,950	998	4,948	0.003000	
16	95,293,884	25,580	204,123	0.9887	71,895	503,534	153	71,742	639,87	1,016	638,381	5,259	1,329	6,588	0.003200	
17	94,780,464	27,042	222,776	0.9880	72,072	414,473	168	71,904	636,653	1,541	635,112	6,563	1,658	8,221	0.003400	
18	94,242,822	28,481	241,228	0.9872	72,230	437,115	184	72,046	633,355	1,675	631,680	7,859	1,986	9,845	0.003600	
19	93,681,317	29,896	259,465	0.9865	72,368	459,441	199	72,169	629,894	1,807	628,086	9,148	2,312	11,460	0.003800	
20	93,096,328	31,285	277,471	0.9857	72,486	481,432	214	72,271	626,272	1,938	624,334	10,428	2,636	13,064	0.004000	
21	92,488,255	32,647	295,233	0.9849	72,583	503,073	230	72,354	622,494	2,067	620,425	11,698	2,957	14,655	0.004200	
22	91,857,515	312,736	319,822	0.9842	72,660	524,344	245	72,415	618,597	2,195	616,362	12,957	3,276	16,233	0.004400	
23	91,204,543	35,287	329,967	0.9834	72,717	545,229	261	72,456	614,468	2,320	612,148	14,204	3,591	17,795	0.004600	
24	90,529,791	36,562	346,911	0.9826	72,753	565,713	276	72,477	610,230	2,444	607,787	15,438	3,904	19,342	0.004800	
25	89,833,729	37,807	363,556	0.9818	72,768	585,778	291	72,477	605,845	2,565	603,280	16,658	4,213	20,871	0.005000	
26	89,116,843	39,021	379,889	0.9810	72,763	605,409	307	72,456	601,315	2,684	598,631	17,864	4,518	22,381	0.005200	
27	88,379,636	40,202	395,897	0.9802	72,736	624,591	322	72,414	608,645	2,801	593,844	19,053	4,819	23,872	0.005400	
28	87,622,624	41,350	411,569	0.9794	72,689	643,311	337	72,351	591,837	2,915	588,922	20,225	5,116	25,341	0.005600	
29	86,846,340	42,464	426,892	0.9786	72,620	661,553	353	72,268	586,895	3,027	583,868	21,380	5,408	26,788	0.005800	
30	86,051,329	43,543	441,856	0.9778	72,531	679,304	368	72,163	581,822	3,136	578,685	22,515	5,696	28,212	0.006000	
31	85,263,063	43,144	455,009	0.9770	72,421	673,082	381	72,039	576,621	3,233	573,388	23,631	5,979	29,611	0.006200	
32	84,481,486	42,749	466,380	0.9762	72,310	666,912	394	71,916	571,454	3,318	568,135	24,727	6,257	30,984	0.006400	
33	83,706,543	42,357	476,002	0.9753	71,197	660,794	405	71,792	566,319	3,392	562,928	25,801	6,529	32,331	0.006600	
34	82,938,177	41,969	483,906	0.9745	70,984	654,729	415	71,669	561,217	3,453	557,764	26,853	6,796	33,650	0.006800	
35	82,176,333	41,584	490,126	0.9736	71,969	648,715	423	71,545	551,147	3,503	552,644	27,883	7,057	34,190	0.007000	
36	81,420,258	41,202	494,697	0.9728	71,853	642,751	431	71,422	551,110	3,542	547,568	28,888	7,312	36,200	0.007200	
37	80,671,996	40,447	497,553	0.9719	71,736	636,839	436	71,300	546,104	3,570	542,334	29,869	7,561	37,430	0.007400	
38	79,929,395	40,047	499,030	0.9711	71,618	630,977	441	71,177	541,131	3,587	537,544	30,825	7,804	38,629	0.007600	
39	79,193,100	40,475	498,866	0.9702	71,499	625,164	444	70,955	536,190	3,594	532,295	31,755	8,040	39,795	0.007800	
40	78,463,060	39,706	497,198	0.9694	71,379	619,401	446	70,933	528,280	3,590	527,689	32,658	8,270	40,928	0.008000	
41	77,739,222	39,340	494,063	0.9685	71,257	613,687	447	70,811	526,402	3,577	522,825	33,535	8,493	42,028	0.008200	
42	77,021,535	38,977	485,502	0.9676	71,135	608,022	446	70,689	521,555	3,554	518,002	34,384	8,709	43,092	0.008400	
43	76,309,946	38,617	484,380	0.9667	71,013	602,404	445	70,568	516,740	3,521	513,249	34,066	8,629	42,695	0.008600	
44	75,604,405	38,260	480,496	0.9658	70,891	596,835	444	70,446	511,966	3,488	508,478	33,750	8,550	42,300	0.008800	
45	74,904,860	37,907	476,050	0.9649	70,769	591,312	443	70,323	507,233	3,456	503,777	33,438	8,471	41,901	0.009000	
46	74,211,263	37,556	471,642	0.9640	70,647	585,837	443	70,204	502,539	3,424	499,115	33,127	8,394	41,521	0.009200	
47	73,523,563	37,208	467,271	0.9631	70,526	580,408	442	70,084	497,886	3,392	494,494	32,820	8,317	41,137	0.009400	
48	72,841,712	36,863	462,938	0.9622	70,404	575,025	441	69,963	493,272	3,361	489,911	32,515	8,240	40,756	0.009600	

Standard Default Methodology

Principal and Interest Are Advanced

## Cash Flow B

12 months (time to liquidation)											
WAC 8.00%			Prepay Rate 150% PSA			Recover after 12 months			Loss Severity 20.00%		
WAM 360		Default Rate 100% SDA		Amort Factor		Expected Amortization		Voluntary Prepayments		From Defaults	
Month	Balance	New Defaults	In Foreclosure	Amort	Factor	Amortization	Prepayments	Voluntary	From	Amort	Actual
4	9	72,165,659	36,521	458,641	0.9613	70,283	569,589	440	69,843	488,698	3,330
5	50	71,495,356	36,182	454,381	0.9603	70,163	564,397	440	69,440	484,162	3,299
51	51	70,830,756	35,157	450,157	0.9594	70,042	559,151	439	69,603	479,665	3,268
52	52	69,171,811	35,513	445,967	0.9585	69,922	553,949	438	69,484	475,206	3,238
53	53	69,518,472	35,183	441,817	0.9575	69,802	548,791	437	69,354	470,785	3,208
54	54	68,870,695	34,855	437,700	0.9566	69,682	543,677	437	69,245	466,402	3,178
55	55	68,228,431	34,530	433,618	0.9556	69,562	538,607	436	69,126	462,056	3,148
56	56	67,591,635	34,208	429,571	0.9546	69,442	533,580	435	69,007	457,747	3,119
57	57	66,960,261	33,889	425,559	0.9537	69,323	528,596	434	68,889	453,475	3,090
58	58	66,334,264	33,573	421,580	0.9527	69,204	523,654	434	68,770	449,239	3,061
59	59	65,713,599	33,259	417,636	0.9517	69,085	518,755	433	68,652	445,039	3,032
60	60	65,098,221	32,948	413,725	0.9507	68,966	513,897	432	68,534	440,875	3,004
61	61	64,488,603	32,121	409,329	0.9497	68,848	509,080	431	68,417	436,729	2,972
62	62	63,884,646	31,307	404,460	0.9487	68,729	504,309	429	68,300	432,653	2,958
63	63	63,286,415	30,505	399,127	0.9477	68,611	499,582	427	68,184	428,594	2,930
64	64	62,693,730	29,716	393,340	0.9467	68,493	494,900	424	68,069	424,570	2,859
65	65	62,106,576	28,939	387,108	0.9456	68,375	490,261	420	67,955	420,580	2,815
66	66	61,524,896	28,173	384,443	0.9446	68,258	485,665	416	67,842	416,625	2,769
67	67	60,948,635	27,420	373,353	0.9436	68,112	481,112	412	67,729	412,702	2,719
68	68	60,377,937	26,678	365,847	0.9425	68,023	476,602	407	67,617	408,813	2,667
69	69	59,812,150	25,948	357,936	0.9415	67,906	472,134	401	67,505	404,957	2,612
70	70	59,251,819	25,229	349,627	0.9404	67,789	467,707	395	67,395	401,134	2,554
71	71	58,696,691	24,522	341,931	0.9393	67,673	463,321	388	67,285	397,343	2,494
72	72	58,146,714	23,825	331,857	0.9383	67,556	458,976	380	67,176	393,584	2,432
73	73	57,601,835	23,140	322,923	0.9372	67,440	454,672	373	67,067	389,857	2,367
74	74	57,062,004	22,465	314,129	0.9361	67,325	450,407	366	66,960	386,165	2,303
75	75	56,527,169	21,801	305,471	0.9350	67,211	446,182	358	66,853	382,508	2,240
76	76	55,997,280	21,147	296,949	0.9339	67,097	441,996	351	66,746	378,884	2,177
77	77	55,472,287	20,504	286,561	0.9328	66,984	437,848	344	66,641	375,295	2,116
78	78	52,422,434	19,870	280,305	0.9316	66,872	433,739	337	66,536	371,739	2,056
79	79	54,436,795	19,247	272,179	0.9305	66,761	429,668	330	66,431	368,216	1,997
80	80	53,926,98	18,634	264,181	0.9294	66,650	425,635	322	66,328	364,726	1,939
81	81	53,420,304	18,031	256,310	0.9282	66,540	421,638	315	66,225	361,269	1,881
82	82	52,919,065	17,437	248,563	0.9271	66,431	417,679	308	66,123	357,844	1,825
83	83	52,422,434	16,853	240,941	0.9259	66,322	413,756	301	66,021	354,451	1,769
84	84	51,930,367	16,279	233,440	0.9248	66,215	409,869	294	65,921	351,089	1,715
85	85	51,442,815	15,713	226,059	0.9236	66,107	406,017	287	65,820	347,759	1,661
86	86	50,959,736	15,157	218,797	0.9224	66,001	402,201	280	65,721	344,459	1,608
87	87	50,481,803	14,610	211,651	0.9216	65,922	398,420	273	65,622	341,190	1,556
88	88	50,006,812	14,072	204,622	0.9200	65,590	394,674	266	65,524	337,952	1,505
89	89	49,536,381	13,543	197,706	0.9188	65,486	380,962	259	65,427	334,743	1,454
90	90	49,071,244	13,022	190,902	0.9176	65,382	387,284	252	65,330	331,564	1,405
91	91	48,609,361	12,516	184,216	0.9164	65,479	383,640	245	65,234	328,414	1,356
92	92	48,152,587	12,057	177,626	0.9152	65,377	380,028	238	65,139	325,294	1,308
93	93	47,699,382	11,512	171,151	0.9139	65,275	376,450	232	65,044	322,202	1,261
94	94	47,250,803	11,025	164,783	0.9127	65,174	372,905	225	64,956	319,139	1,215
95	95	46,806,009	10,546	158,519	0.9114	65,074	369,391	218	64,856	316,104	1,169
		120,250	10,277	64,975	0.9105	64,910	365,910	211	64,763	313,097	1,124

## Standard Default Methodology

Principal and Interest Are Advanced

## Cash Flow B

Month	Performing Balance	New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	Amort From Defaults	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Loss	Principal Recovery	Amortized Default Bal.	Default Month	Annual Default Rate	Monthly Default Rate	Monthly Prepay Rate
		WAC WAM	8.00% 360	150% PSA Default Rate	100% SDA	Recover after Loss Severity	12 months (time to liquidation)	20.00%	17	18	19	20	21	22	23	24	25	26
97	45,928,516	9,612	146,302	0.9089	64,876	362,460	204	64,671	310,117	1,080	309,038	12,323	3,143	15,465	0,002485	0,000207	0,007828	
98	45,495,737	9,157	140,346	0.9076	64,778	359,042	198	64,580	307,165	1,036	306,129	11,885	3,031	14,916	0,002390	0,000199	0,007828	
99	45,066,883	8,710	134,489	0.9063	64,680	355,655	191	64,489	304,241	994	303,247	11,454	2,922	14,376	0,002295	0,000191	0,007828	
100	44,641,915	8,271	128,731	0.9050	64,583	352,298	184	64,399	301,342	952	300,391	11,030	2,814	13,845	0,002200	0,000184	0,007828	
101	44,220,795	7,839	123,069	0.9037	64,487	348,972	178	64,309	298,471	910	297,561	10,614	2,709	13,322	0,002105	0,000176	0,007828	
102	43,803,485	7,414	117,504	0.9024	64,391	345,676	171	64,220	295,626	870	294,756	10,204	2,604	12,808	0,002010	0,000168	0,007828	
103	43,389,947	6,996	112,033	0.9011	64,296	342,410	164	64,132	292,807	830	291,977	9,801	2,502	12,303	0,001915	0,000160	0,007828	
104	42,980,143	6,586	106,655	0.8998	64,202	339,173	158	64,044	290,013	791	289,222	9,405	2,401	11,806	0,001820	0,000152	0,007828	
105	42,574,036	6,183	101,369	0.8984	64,108	335,966	151	63,957	287,245	752	286,493	9,016	2,302	11,318	0,001725	0,000144	0,007828	
106	42,171,591	5,787	96,174	0.8971	64,015	332,787	145	63,871	284,503	714	283,788	8,633	2,205	10,838	0,001630	0,000136	0,007828	
107	41,772,770	5,398	91,069	0.8957	63,923	329,638	138	63,785	281,785	677	281,108	8,256	2,109	10,366	0,001535	0,000128	0,007828	
108	41,377,537	5,016	86,052	0.8944	63,831	326,516	131	63,700	279,092	641	278,452	7,887	2,015	9,902	0,001440	0,000120	0,007828	
109	40,985,859	4,641	81,222	0.8930	63,740	323,423	125	63,616	276,424	605	275,819	7,523	1,922	9,445	0,001345	0,000112	0,007828	
110	40,597,696	4,272	76,279	0.8916	63,650	320,357	118	63,532	273,780	569	273,211	7,166	1,831	8,997	0,001250	0,000104	0,007828	
111	40,213,021	3,910	71,520	0.8902	63,560	317,319	112	63,448	271,160	535	270,625	6,814	1,742	8,556	0,001155	0,000096	0,007828	
112	39,831,793	3,554	66,845	0.8888	63,471	314,308	106	63,366	268,564	500	268,063	6,469	1,654	8,123	0,001060	0,000088	0,007828	
113	39,453,981	3,205	62,252	0.8874	63,383	311,325	99	63,284	265,991	467	265,524	6,130	1,568	7,698	0,000980	0,000080	0,007828	
114	39,079,549	2,862	57,741	0.8860	63,295	308,368	93	63,202	263,442	434	263,007	5,797	1,483	7,280	0,000870	0,000073	0,007828	
115	38,708,466	2,525	53,311	0.8845	63,208	305,437	86	63,121	260,915	402	260,513	5,470	1,399	6,869	0,000775	0,000065	0,007828	
116	38,340,698	2,194	48,960	0.8831	63,121	302,533	80	63,041	258,412	370	258,042	5,148	1,317	6,465	0,000680	0,000057	0,007828	
117	37,976,213	1,870	44,687	0.8817	63,035	299,654	74	62,961	255,931	339	255,592	4,832	1,237	6,069	0,000585	0,000049	0,007828	
118	37,614,978	1,551	40,492	0.8802	62,950	296,801	67	62,882	253,473	308	253,164	4,522	1,157	5,722	0,000490	0,000041	0,007828	
119	37,256,962	1,238	36,373	0.8787	62,865	293,974	61	62,804	251,036	278	250,758	4,217	1,080	5,297	0,000395	0,000033	0,007828	
120	36,902,132	932	32,329	0.8772	62,781	291,172	55	62,726	248,622	249	248,374	3,918	1,003	4,921	0,000300	0,000025	0,007828	
121	36,550,166	923	28,652	0.8758	62,697	288,395	49	62,648	246,230	222	246,008	3,624	928	4,552	0,000300	0,000025	0,007828	
122	36,201,041	914	25,333	0.8743	62,614	285,640	43	62,571	243,859	197	243,662	3,335	854	4,189	0,000300	0,000025	0,007828	
123	35,854,735	905	22,666	0.8727	62,532	282,908	39	62,493	241,509	175	241,334	3,052	782	3,834	0,000300	0,000025	0,007828	
124	35,511,225	896	19,743	0.8712	62,450	280,197	34	62,416	239,181	155	239,026	2,773	711	3,484	0,000300	0,000025	0,007828	
125	35,170,490	888	17,459	0.8697	62,369	277,509	31	62,339	236,873	138	236,736	2,500	641	3,141	0,000300	0,000025	0,007828	
126	34,832,507	879	15,507	0.8682	62,289	274,842	28	62,261	234,457	122	234,464	2,232	572	2,804	0,000300	0,000025	0,007828	
127	34,497,256	871	13,879	0.8666	62,209	272,197	25	62,184	232,320	109	232,211	1,969	505	2,474	0,000300	0,000025	0,007828	
128	34,164,713	863	12,369	0.8651	62,130	269,573	23	62,107	230,074	98	229,976	1,711	439	2,150	0,000300	0,000025	0,007828	
129	33,834,859	854	11,571	0.8635	62,051	266,970	21	62,030	227,849	89	227,759	1,457	374	1,831	0,000300	0,000025	0,007828	
130	33,507,671	846	10,878	0.8619	61,973	264,388	20	61,953	225,643	83	225,560	1,209	310	1,519	0,000300	0,000025	0,007828	
131	33,183,129	838	10,484	0.8603	61,896	261,828	19	61,876	223,457	78	223,379	965	248	1,213	0,000300	0,000025	0,007828	
132	32,861,212	830	10,382	0.8587	61,819	259,288	19	61,800	221,291	75	221,215	726	1,969	912	0,000300	0,000025	0,007828	
133	32,541,899	822	10,281	0.8571	61,743	256,768	19	61,723	219,144	75	219,069	719	1,856	903	0,000300	0,000025	0,007828	
134	32,225,169	814	10,181	0.8555	61,666	254,269	19	61,647	217,015	74	216,941	712	1,83	894	0,000300	0,000025	0,007828	
135	31,911,003	806	10,082	0.8538	61,590	251,790	19	61,570	214,902	73	214,829	705	1,81	886	0,000300	0,000025	0,007828	
136	31,599,380	798	9,983	0.8522	61,513	249,331	19	61,494	212,807	73	212,735	698	1,79	877	0,000300	0,000025	0,007828	
137	31,290,280	790	9,886	0.8505	61,437	246,892	19	61,418	210,729	72	210,657	691	1,78	868	0,000300	0,000025	0,007828	
138	30,983,682	782	9,789	0.8489	61,361	244,473	19	61,342	208,668	71	208,597	684	1,76	860	0,000300	0,000025	0,007828	
139	30,679,568	775	9,693	0.8472	61,285	242,974	19	61,266	206,523	70	206,553	677	1,74	852	0,000300	0,000025	0,007828	
140	30,377,918	767	9,597	0.8455	61,209	239,694	19	61,190	204,595	70	204,525	671	1,73	843	0,000300	0,000025	0,007828	
141	30,078,711	760	9,503	0.8438	61,133	237,333	19	61,114	202,583	69	202,514	664	1,71	835	0,000300	0,000025	0,007828	
142	29,781,930	752	9,409	0.8421	61,057	234,991	19	60,938	200,588	68	200,520	658	1,69	827	0,000300	0,000025	0,007828	
143	29,487,555	745	9,316	0.8404	60,982	232,668	19	60,936	198,509	68	198,541	651	1,68	819	0,000300	0,000025	0,007828	
144	29,195,566	737	9,224	0.8386	60,906	230,364	19	60,887	196,646	67	196,579	645	1,66	810	0,000300	0,000025	0,007828	

## Standard Default Methodology

Principal and Interest Are Advanced

## Cash Flow B

WAC 8.00% Prepay Rate 150% PSA  
WAM 360 Default Rate 100% SDA

Month	Performing Balance	New Details	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	Amort From Defaults	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	Amortized Default Bal In Recovery Month	Annual Default Rate	Monthly Default Rate	Monthly Prepay Rate
145	28,905,945	730	9,132	0.8369	60,831	228,079	19	60,812	194,699	66	194,632	638	164	802	0.000300	0.000025	0.007828
146	28,618,674	723	9,042	0.8351	60,755	225,812	19	60,736	192,767	66	192,701	632	163	794	0.000300	0.000025	0.007828
147	28,333,733	716	8,952	0.8333	60,680	223,564	19	60,661	190,851	65	190,786	625	161	787	0.000300	0.000025	0.007828
148	28,051,104	708	8,862	0.8316	60,605	221,334	19	60,586	188,951	64	188,887	619	160	779	0.000300	0.000025	0.007828
149	27,770,770	701	8,774	0.8298	60,530	219,122	19	60,511	187,066	64	187,003	613	158	771	0.000300	0.000025	0.007828
150	27,492,712	694	8,686	0.8280	60,455	216,928	19	60,436	185,197	63	185,134	607	156	763	0.000300	0.000025	0.007828
151	27,216,912	687	8,599	0.8261	60,380	214,752	19	60,361	183,343	62	183,280	601	155	756	0.000300	0.000025	0.007828
152	26,943,351	681	8,512	0.8243	60,305	212,593	19	60,286	181,503	62	181,442	595	153	748	0.000300	0.000025	0.007828
153	26,672,014	674	8,427	0.8225	60,230	210,453	19	60,211	179,679	61	179,618	589	152	741	0.000300	0.000025	0.007828
154	26,402,881	667	8,342	0.8206	60,156	208,329	19	60,137	177,870	61	177,809	583	150	733	0.000300	0.000025	0.007828
155	26,135,536	660	8,257	0.8188	60,081	206,223	19	60,062	176,075	60	176,015	577	149	726	0.000300	0.000025	0.007828
156	25,871,161	653	8,174	0.8169	60,007	204,133	19	59,988	174,295	59	174,235	571	147	718	0.000300	0.000025	0.007828
157	25,608,539	647	8,091	0.8150	59,932	202,061	19	59,914	172,529	59	172,470	565	146	711	0.000300	0.000025	0.007828
158	25,348,054	640	8,008	0.8131	59,858	200,006	19	59,839	170,778	58	170,719	559	145	704	0.000300	0.000025	0.007828
159	25,089,687	634	7,922	0.8112	59,784	197,967	19	59,765	169,040	58	168,983	554	143	697	0.000300	0.000025	0.007828
160	24,833,424	627	7,846	0.8092	59,710	195,945	19	59,691	167,317	57	167,260	548	142	690	0.000300	0.000025	0.007828
161	24,579,246	621	7,765	0.8073	59,636	193,940	19	59,617	165,608	56	165,552	542	140	683	0.000300	0.000025	0.007828
162	24,327,137	615	7,686	0.8053	59,562	191,951	19	59,543	163,913	56	163,858	537	139	676	0.000300	0.000025	0.007828
163	24,077,082	608	7,607	0.8034	59,488	189,977	19	59,470	162,232	55	162,177	531	137	669	0.000300	0.000025	0.007828
164	23,829,064	602	7,528	0.8014	59,414	188,021	19	59,396	160,565	55	160,510	526	136	662	0.000300	0.000025	0.007828
165	23,583,066	596	7,451	0.7994	59,341	186,080	19	59,322	158,911	54	158,856	520	135	655	0.000300	0.000025	0.007828
166	23,339,074	590	7,374	0.7974	59,267	184,154	19	59,249	157,270	54	157,217	515	133	648	0.000300	0.000025	0.007828
167	23,097,070	584	7,297	0.7954	59,194	182,245	19	59,175	155,643	53	155,590	509	132	641	0.000300	0.000025	0.007828
168	22,857,578	578	7,221	0.7933	59,120	180,351	19	59,102	154,029	52	153,977	504	131	635	0.000300	0.000025	0.007828
169	22,618,047	572	7,146	0.7913	59,047	178,472	19	59,029	152,428	52	152,376	499	129	628	0.000300	0.000025	0.007828
170	22,382,837	566	7,072	0.7892	58,974	176,609	18	58,956	150,841	51	150,789	494	128	622	0.000300	0.000025	0.007828
171	22,148,633	560	6,998	0.7871	58,901	174,761	18	58,883	149,266	51	149,215	488	127	615	0.000300	0.000025	0.007828
172	21,916,341	554	6,924	0.7850	58,828	172,928	18	58,810	147,704	50	147,654	483	125	609	0.000300	0.000025	0.007828
173	21,685,946	548	6,851	0.7829	58,755	171,111	18	58,737	146,155	50	146,105	478	124	602	0.000300	0.000025	0.007828
174	21,457,332	542	6,779	0.7808	58,682	169,307	18	58,664	144,619	49	144,569	473	123	596	0.000300	0.000025	0.007828
175	21,230,786	537	6,708	0.7787	58,610	167,519	18	58,591	143,995	49	143,046	468	122	590	0.000300	0.000025	0.007828
176	21,005,991	531	6,637	0.7765	58,537	165,745	18	58,519	141,583	48	141,535	463	120	584	0.000300	0.000025	0.007828
177	20,783,033	525	6,566	0.7744	58,464	163,986	18	58,446	140,984	48	140,936	458	119	577	0.000300	0.000025	0.007828
178	20,561,899	520	6,496	0.7722	58,392	162,241	18	58,374	138,597	47	138,550	453	118	571	0.000300	0.000025	0.007828
179	20,342,572	514	6,427	0.7700	58,320	160,511	18	58,301	137,123	47	137,076	448	117	565	0.000300	0.000025	0.007828
180	20,125,040	509	6,358	0.7678	58,247	158,794	18	58,229	135,660	46	135,614	444	116	559	0.000300	0.000025	0.007828
181	19,909,288	503	6,290	0.7656	58,175	157,092	18	58,157	134,209	46	134,164	439	114	553	0.000300	0.000025	0.007828
182	19,695,302	498	6,222	0.7634	58,103	155,404	18	58,085	132,771	45	132,725	434	113	547	0.000300	0.000025	0.007828
183	19,483,067	492	6,155	0.7611	58,031	153,729	18	58,013	131,343	45	131,299	429	112	541	0.000300	0.000025	0.007828
184	19,272,571	487	6,089	0.7589	57,959	152,068	18	57,941	129,928	44	129,884	425	111	535	0.000300	0.000025	0.007828
185	19,063,799	482	6,023	0.7566	57,887	150,421	18	57,869	128,524	44	128,481	420	110	530	0.000300	0.000025	0.007828
186	18,856,738	477	5,958	0.7543	57,816	148,787	18	57,798	127,132	43	127,089	416	108	524	0.000300	0.000025	0.007828
187	18,651,374	471	5,893	0.7520	57,744	147,167	18	57,723	125,751	43	125,708	411	107	518	0.000300	0.000025	0.007828
188	18,447,694	466	5,828	0.7496	57,672	145,559	18	57,654	124,382	42	124,339	406	106	513	0.000300	0.000025	0.007828
189	18,245,684	461	5,764	0.7473	57,601	143,966	18	57,583	123,023	42	122,982	402	105	507	0.000300	0.000025	0.007828
190	18,045,332	456	5,701	0.7449	57,530	142,385	18	57,512	121,676	41	121,635	398	104	501	0.000300	0.000025	0.007828
191	17,846,623	451	5,638	0.7426	57,458	140,817	18	57,440	120,340	41	120,299	393	103	496	0.000300	0.000025	0.007828
192	17,649,546	446	5,576	0.7402	57,387	139,262	18	57,369	119,015	41	118,975	389	102	491	0.000300	0.000025	0.007828

## Standard Default Methodology

Principal and Interest Are Advanced

## Cash Flow B

Month	Performing Balance	WAC WAM	8.00% 360	Prepay Rate Default Rate	150% PSA 100% SDA	Recover after Loss Severity			12 months (time to liquidation)			Amortized Default Bal	Annual Default Rate	Monthly Default Rate	Monthly Prepay Rate	
						New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	Actual Amort	Expected Interest	Interest Lost	Actual Interest	In Recovery Month	
193	17,454,087	441	5,514	0.7378	57,316	137,720	18	57,298	117,701	40	117,661	384	101	485	0.000300	0.000025
194	17,260,234	436	5,453	0.7354	57,245	136,190	18	57,227	116,397	40	116,558	380	100	480	0.000300	0.000025
195	17,067,973	432	5,392	0.7329	57,174	134,673	18	57,156	115,105	39	115,065	376	98	474	0.000300	0.000025
196	16,877,293	427	5,332	0.7305	57,103	133,168	18	57,085	113,822	39	113,784	372	97	469	0.000300	0.000025
197	16,688,180	422	5,272	0.7280	57,032	131,676	18	57,015	112,551	38	112,512	367	96	464	0.000300	0.000025
198	16,500,622	417	5,213	0.7255	56,962	130,196	18	56,944	111,290	38	111,252	363	95	459	0.000300	0.000025
199	16,314,608	413	5,154	0.7230	56,891	128,729	18	56,873	110,039	38	110,001	359	94	454	0.000300	0.000025
200	16,130,124	408	5,096	0.7205	56,821	127,273	18	56,803	108,794	37	108,761	355	93	448	0.000300	0.000025
201	15,947,159	403	5,038	0.7180	56,750	125,829	18	56,733	107,568	37	107,531	351	92	443	0.000300	0.000025
202	15,765,701	399	4,981	0.7154	56,680	124,397	18	56,662	106,348	36	106,312	347	91	438	0.000300	0.000025
203	15,585,737	394	4,924	0.7129	56,610	122,977	18	56,592	105,138	36	105,102	343	90	433	0.000300	0.000025
204	15,407,256	390	4,868	0.7103	56,540	121,569	18	56,522	103,938	35	103,902	339	89	428	0.000300	0.000025
205	15,230,246	385	4,812	0.7077	56,470	120,173	18	56,452	102,712	35	102,712	335	88	423	0.000300	0.000025
206	15,054,696	381	4,756	0.7051	56,400	118,787	18	56,382	101,567	35	101,532	331	87	419	0.000300	0.000025
207	14,880,594	376	4,701	0.7024	56,330	117,414	18	56,312	100,396	34	100,362	327	86	414	0.000300	0.000025
208	14,707,928	372	4,647	0.6998	56,260	116,051	18	56,242	99,235	34	99,201	324	85	409	0.000300	0.000025
209	14,536,688	368	4,593	0.6971	56,190	114,700	18	56,173	98,084	33	98,050	320	84	404	0.000300	0.000025
210	14,366,861	363	4,539	0.6944	56,121	113,360	18	56,103	96,942	33	96,909	316	83	400	0.000300	0.000025
211	14,198,438	359	4,486	0.6917	56,051	112,031	18	56,033	95,809	33	95,777	312	83	395	0.000300	0.000025
212	14,031,405	355	4,433	0.6890	55,982	110,713	18	55,964	94,686	32	94,654	309	82	390	0.000300	0.000025
213	13,865,754	351	4,381	0.6862	55,912	109,406	18	55,895	93,572	32	93,540	305	81	386	0.000300	0.000025
214	13,701,472	347	4,329	0.6835	55,843	108,110	17	55,825	92,468	32	92,436	301	80	381	0.000300	0.000025
215	13,538,548	343	4,277	0.6807	55,774	106,824	17	55,756	91,372	31	91,341	298	79	377	0.000300	0.000025
216	13,376,973	339	4,226	0.6779	55,705	105,549	17	55,687	90,286	31	90,255	294	78	372	0.000300	0.000025
217	13,216,735	334	4,176	0.6751	55,636	104,285	17	55,618	89,208	30	89,178	291	77	368	0.000300	0.000025
218	13,057,824	330	4,125	0.6722	55,567	103,031	17	55,549	88,139	30	88,109	287	76	363	0.000300	0.000025
219	12,900,230	326	4,076	0.6694	55,498	101,788	17	55,480	87,080	30	87,050	284	75	359	0.000300	0.000025
220	12,743,941	323	4,026	0.6665	55,429	100,555	17	55,412	86,029	29	85,999	280	74	355	0.000300	0.000025
221	12,588,947	319	3,977	0.6636	55,360	99,332	17	55,343	84,986	29	84,957	277	74	350	0.000300	0.000025
222	12,435,239	315	3,929	0.6607	55,292	98,119	17	55,274	83,953	29	83,924	273	73	346	0.000300	0.000025
223	12,282,806	311	3,881	0.6577	55,223	96,916	17	55,206	82,928	28	82,900	270	72	342	0.000300	0.000025
224	12,131,638	307	3,833	0.6548	55,155	95,723	17	55,138	81,911	28	81,883	267	71	338	0.000300	0.000025
225	11,981,725	303	3,785	0.6518	55,086	94,540	17	55,069	80,903	28	80,876	263	70	333	0.000300	0.000025
226	11,833,057	300	3,738	0.6488	55,018	93,367	17	55,001	79,903	27	79,876	260	69	329	0.000300	0.000025
227	11,685,625	296	3,692	0.6458	54,950	92,204	17	54,933	78,912	27	78,885	257	69	325	0.000300	0.000025
228	11,539,417	292	3,646	0.6428	54,882	91,050	17	54,865	77,929	27	77,902	253	68	321	0.000300	0.000025
229	11,394,425	289	3,600	0.6397	54,814	89,906	17	54,797	76,954	26	76,928	250	67	317	0.000300	0.000025
230	11,250,640	285	3,554	0.6367	54,746	88,772	17	54,729	75,987	26	75,961	247	66	313	0.000300	0.000025
231	11,108,051	281	3,509	0.6336	54,678	87,647	17	54,661	75,028	26	75,002	244	65	309	0.000300	0.000025
232	10,966,648	278	3,465	0.6304	54,610	86,531	17	54,593	74,077	25	74,052	241	65	305	0.000300	0.000025
233	10,826,424	274	3,420	0.6273	54,543	85,425	17	54,526	73,134	25	73,109	238	64	298	0.000300	0.000025
234	10,687,368	271	3,377	0.6242	54,475	84,327	17	54,458	72,199	25	72,174	235	63	295	0.000300	0.000025
235	10,549,470	267	3,333	0.6210	54,408	83,239	17	54,391	71,272	24	71,247	232	62	294	0.000300	0.000025
236	10,412,723	264	3,290	0.6178	54,340	82,160	17	54,323	70,352	24	70,328	229	61	290	0.000300	0.000025
237	10,277,116	260	3,247	0.6146	54,273	81,090	17	54,256	69,440	24	69,416	226	61	286	0.000300	0.000025
238	10,132,641	257	3,204	0.6113	54,206	80,029	17	54,189	68,536	23	68,512	223	60	282	0.000300	0.000025
239	10,009,289	254	3,162	0.6081	54,139	79,977	17	54,122	67,639	23	67,616	220	59	279	0.000300	0.000025
240	9,877,050	250	3,121	0.6048	54,071	77,934	17	54,055	66,750	23	66,727	217	58	275	0.000300	0.000025

## Standard Default Methodology

Principal and Interest Are Advanced

## Cash Flow B

**The Bond Market Association**      **Uniform Practices/Standard Formulas**

Month	Performing Balance	WAC	WAM	Repay Rate		150% PSA		12 months (time to liquidation)									
				New Defaults	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	From Details	Amort	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	Amortized Default Bal In Recovery Month
241	9,745,917	247	3,079	0.6015	54,004	54,904	76,899	17	53,988	22	63,845	214	58	271	0.000300	0.000025	0.007828
242	9,615,879	244	3,038	0.5981	53,938	75,873	17	53,921	22	64,971	211	57	268	0.000300	0.000025	0.007828	
243	9,486,930	240	2,997	0.5957	53,871	74,856	17	53,854	22	64,104	208	56	264	0.000300	0.000025	0.007828	
244	9,359,059	237	2,957	0.5914	53,804	73,847	17	53,787	22	63,245	205	56	261	0.000300	0.000025	0.007828	
245	9,232,258	234	2,917	0.5880	53,737	72,846	17	53,720	21	62,413	202	55	257	0.000300	0.000025	0.007828	
246	9,106,520	231	2,877	0.5846	53,671	71,854	17	53,654	21	61,568	200	54	254	0.000300	0.000025	0.007828	
247	8,981,834	228	2,838	0.5812	53,604	70,870	17	53,587	21	60,729	197	53	250	0.000300	0.000025	0.007828	
248	8,858,194	225	2,799	0.5777	53,538	69,895	17	53,521	20	59,877	194	53	247	0.000300	0.000025	0.007828	
249	8,735,591	221	2,760	0.5742	53,471	68,927	17	53,455	20	59,053	191	52	243	0.000300	0.000025	0.007828	
250	8,614,016	218	2,721	0.5707	53,405	67,968	17	53,388	20	58,236	189	51	240	0.000300	0.000025	0.007828	
251	8,493,462	215	2,683	0.5672	53,339	67,017	17	53,322	20	57,425	186	51	237	0.000300	0.000025	0.007828	
252	8,373,920	212	2,646	0.5636	53,273	66,073	17	53,256	19	56,622	183	50	233	0.000300	0.000025	0.007828	
253	8,255,382	209	2,608	0.5600	53,207	65,138	17	53,190	19	55,825	181	49	230	0.000300	0.000025	0.007828	
254	8,137,840	206	2,571	0.5564	53,141	64,211	17	53,124	19	55,035	178	49	227	0.000300	0.000025	0.007828	
255	8,021,287	203	2,534	0.5528	53,075	63,291	17	53,058	18	54,251	176	48	224	0.000300	0.000025	0.007828	
256	7,905,715	201	2,498	0.5492	53,009	62,379	17	52,993	17	53,474	173	47	220	0.000300	0.000025	0.007828	
257	7,791,115	198	2,461	0.5455	52,944	61,475	17	52,927	18	52,703	170	47	217	0.000300	0.000025	0.007828	
258	7,677,481	195	2,426	0.5418	52,878	60,560	17	52,861	17	51,939	168	46	214	0.000300	0.000025	0.007828	
259	7,564,804	192	2,390	0.5381	52,813	59,689	17	52,796	17	51,182	165	46	211	0.000300	0.000025	0.007828	
260	7,453,076	189	2,355	0.5343	52,747	58,808	17	52,731	17	50,448	163	45	208	0.000300	0.000025	0.007828	
261	7,342,291	186	2,320	0.5305	52,682	57,934	17	52,665	17	49,703	161	44	205	0.000300	0.000025	0.007828	
262	7,222,441	184	2,284	0.5267	52,616	57,067	16	52,600	17	48,947	158	44	202	0.000300	0.000025	0.007828	
263	7,123,518	181	2,251	0.5229	52,551	56,207	16	52,535	16	48,232	156	43	199	0.000300	0.000025	0.007828	
264	7,015,515	178	2,216	0.5191	52,486	55,355	16	52,470	16	47,489	153	42	196	0.000300	0.000025	0.007828	
265	6,908,425	175	2,183	0.5152	52,421	54,510	16	52,405	16	46,769	151	42	193	0.000300	0.000025	0.007828	
266	6,802,240	173	2,149	0.5113	52,356	53,672	16	52,340	16	46,055	149	41	190	0.000300	0.000025	0.007828	
267	6,696,953	170	2,116	0.5073	52,291	52,842	16	52,275	15	45,347	146	41	187	0.000300	0.000025	0.007828	
268	6,592,558	167	2,083	0.5034	52,226	52,018	16	52,210	15	44,660	145	40	184	0.000300	0.000025	0.007828	
269	6,489,047	165	2,050	0.4994	52,162	51,201	16	52,145	15	43,944	142	40	181	0.000300	0.000025	0.007828	
270	6,386,412	162	2,018	0.4954	52,097	50,391	16	52,081	15	43,274	139	39	178	0.000300	0.000025	0.007828	
271	6,284,648	160	1,986	0.4914	52,033	49,588	16	52,016	15	42,575	137	38	176	0.000300	0.000025	0.007828	
272	6,183,747	157	1,954	0.4873	51,968	48,792	16	51,952	14	41,897	135	38	173	0.000300	0.000025	0.007828	
273	6,083,702	155	1,922	0.4832	51,904	48,003	16	51,887	14	41,224	133	37	170	0.000300	0.000025	0.007828	
274	5,984,507	152	1,891	0.4791	51,839	47,220	16	51,823	14	40,557	130	37	167	0.000300	0.000025	0.007828	
275	5,886,154	150	1,860	0.4749	51,775	46,444	16	51,759	14	39,896	128	36	164	0.000300	0.000025	0.007828	
276	5,788,638	147	1,829	0.4708	51,711	45,675	16	51,695	13	39,240	126	36	162	0.000300	0.000025	0.007828	
277	5,691,951	145	1,798	0.4666	51,647	44,912	16	51,631	13	38,590	124	35	159	0.000300	0.000025	0.007828	
278	5,596,086	142	1,768	0.4624	51,583	44,155	16	51,567	13	37,958	122	35	156	0.000300	0.000025	0.007828	
279	5,501,038	140	1,738	0.4581	51,519	43,405	16	51,503	13	37,306	120	34	154	0.000300	0.000025	0.007828	
280	5,406,800	138	1,708	0.4538	51,455	42,662	16	51,439	13	36,673	118	33	151	0.000300	0.000025	0.007828	
281	5,313,365	135	1,679	0.4495	51,391	41,925	16	51,375	12	36,044	116	33	149	0.000300	0.000025	0.007828	
282	5,220,727	133	1,649	0.4452	51,328	41,194	16	51,312	12	35,422	114	32	146	0.000300	0.000025	0.007828	
283	5,128,879	131	1,620	0.4408	51,264	40,469	16	51,248	12	34,804	112	32	143	0.000300	0.000025	0.007828	
284	5,037,816	128	1,592	0.4364	51,201	39,750	16	51,185	12	34,192	110	31	141	0.000300	0.000025	0.007828	
285	4,947,531	126	1,563	0.4320	51,137	39,038	16	51,121	11	33,585	108	31	138	0.000300	0.000025	0.007828	
286	4,858,018	124	1,535	0.4275	51,074	38,332	16	51,058	11	32,984	106	30	136	0.000300	0.000025	0.007828	
287	4,769,271	121	1,507	0.4230	51,011	37,631	16	50,995	11	32,386	104	30	134	0.000300	0.000025	0.007828	
288	4,681,283	119	1,479	0.4185	50,947	36,937	16	50,931	11	31,794	102	29	131	0.000300	0.000025	0.007828	

## Standard Default Methodology

Principal and Interest Are Advanced

## Cash Flow B

	WAC WAM	8.00% 360	Prepay Rate Default Rate	150% PSA 100% SDA	Recover after Loss Severity	12 months (time to liquidation) 20.60%											
Month	Performing Balance	New Details	In Foreclosure	Amort Factor	Expected Amortization	Voluntary Prepayments	Amort From Defaults	Actual Amort	Expected Interest	Interest Lost	Actual Interest	Principal Recovery	Principal Loss	Amortized Default Bal in Recovery Month	Annual Default Rate	Monthly Default Rate	Monthly Prepay Rate
289	4,594,049	117	1,451	0.4140	50,884	36,249	16	50,868	31,218	11	30,626	98	28	129	0.000300	0.000025	0.007828
290	4,507,562	115	1,424	0.4094	50,821	35,566	16	50,805	30,637	10	30,050	96	28	126	0.000300	0.000025	0.007828
291	4,421,817	113	1,397	0.4048	50,758	34,890	16	50,742	30,060	10	29,488	94	28	122	0.000300	0.000025	0.007828
292	4,336,808	111	1,370	0.4001	50,695	34,219	16	50,679	29,488	10	29,478	92	27	119	0.000300	0.000025	0.007828
293	4,252,529	108	1,344	0.3955	50,632	33,554	16	50,617	28,921	10	28,911	90	27	117	0.000300	0.000025	0.007828
294	4,168,974	106	1,317	0.3908	50,570	32,895	16	50,554	28,359	10	28,349	88	26	115	0.000300	0.000025	0.007828
295	4,086,138	104	1,291	0.3860	50,507	32,241	16	50,491	27,802	9	27,792	87	26	112	0.000300	0.000025	0.007828
296	4,004,014	102	1,265	0.3813	50,444	31,593	16	50,429	27,250	9	27,240	85	25	110	0.000300	0.000025	0.007828
297	3,922,597	100	1,239	0.3765	50,382	30,951	16	50,366	26,702	9	26,693	83	25	108	0.000300	0.000025	0.007828
298	3,841,881	98	1,214	0.3716	50,320	30,314	16	50,304	26,159	9	26,150	81	24	106	0.000300	0.000025	0.007828
299	3,761,861	96	1,189	0.3668	50,257	29,683	16	50,241	25,621	9	25,612	80	24	103	0.000300	0.000025	0.007828
300	3,682,531	94	1,163	0.3619	50,195	29,057	16	50,179	25,087	9	25,078	78	23	101	0.000300	0.000025	0.007828
301	3,603,886	92	1,139	0.3570	50,133	28,436	16	50,117	24,558	8	24,550	76	23	99	0.000300	0.000025	0.007828
302	3,525,920	90	1,114	0.3520	50,071	27,821	16	50,055	24,033	8	24,025	74	23	97	0.000300	0.000025	0.007828
303	3,448,628	88	1,090	0.3470	50,009	27,211	16	49,993	23,514	8	23,506	73	22	95	0.000300	0.000025	0.007828
304	3,372,004	86	1,065	0.3420	49,947	26,606	16	49,931	22,998	8	22,990	71	22	93	0.000300	0.000025	0.007828
305	3,296,044	84	1,041	0.3369	49,885	26,007	16	49,869	22,487	8	22,479	69	21	91	0.000300	0.000025	0.007828
306	3,220,741	82	1,018	0.3318	49,823	25,413	16	49,807	21,981	7	21,973	67	21	89	0.000300	0.000025	0.007828
307	3,146,091	81	994	0.3267	49,761	24,824	16	49,746	21,478	7	21,471	65	21	87	0.000300	0.000025	0.007828
308	3,072,089	79	971	0.3215	49,699	24,240	16	49,684	20,981	7	20,973	66	20	86	0.000300	0.000025	0.007828
309	2,998,729	77	947	0.3164	49,638	23,661	16	49,622	20,487	7	20,480	64	20	84	0.000300	0.000025	0.007828
310	2,926,005	75	924	0.3111	49,576	23,087	16	49,561	19,998	7	19,991	63	20	82	0.000300	0.000025	0.007828
311	2,853,914	73	902	0.3059	49,515	22,518	16	49,499	19,513	7	19,506	61	19	80	0.000300	0.000025	0.007828
312	2,782,450	71	879	0.3006	49,454	21,955	15	49,438	19,032	6	19,026	60	19	78	0.000300	0.000025	0.007828
313	2,711,608	70	857	0.2952	49,392	21,396	15	49,377	18,556	6	18,549	58	18	76	0.000300	0.000025	0.007828
314	2,641,383	68	835	0.2899	49,331	20,842	15	49,316	18,083	6	18,077	57	18	75	0.000300	0.000025	0.007828
315	2,571,770	66	813	0.2845	49,270	20,292	15	49,255	17,615	6	17,609	55	18	73	0.000300	0.000025	0.007828
316	2,502,765	64	791	0.2790	49,198	19,748	15	49,184	17,151	6	17,145	53	17	71	0.000300	0.000025	0.007828
317	2,434,362	63	769	0.2735	49,148	19,208	15	49,133	16,690	6	16,685	52	17	69	0.000300	0.000025	0.007828
318	2,366,556	61	748	0.2680	49,087	18,673	15	49,072	16,234	6	16,229	50	16	67	0.000300	0.000025	0.007828
319	2,299,343	59	726	0.2625	49,026	18,143	15	49,011	15,782	5	15,777	49	16	65	0.000300	0.000025	0.007828
320	2,232,719	57	705	0.2569	48,965	17,617	15	48,950	15,334	5	15,329	47	16	63	0.000300	0.000025	0.007828
321	2,166,677	56	685	0.2513	48,905	17,096	15	48,889	14,889	5	14,884	46	15	61	0.000300	0.000025	0.007828
322	2,101,215	54	664	0.2456	48,844	16,579	15	48,829	14,449	5	14,444	45	15	60	0.000300	0.000025	0.007828
323	2,036,327	53	643	0.2399	48,784	16,067	15	48,768	14,013	5	14,008	43	15	58	0.000300	0.000025	0.007828
324	1,972,008	51	623	0.2342	48,723	15,560	15	48,708	13,580	5	13,575	42	14	56	0.000300	0.000025	0.007828
325	1,908,254	49	603	0.2284	48,663	15,057	15	48,648	13,151	4	13,146	40	14	54	0.000300	0.000025	0.007828
326	1,845,961	48	583	0.2226	48,603	14,558	15	48,587	12,726	4	12,721	39	14	52	0.000300	0.000025	0.007828
327	1,782,423	46	563	0.2167	48,542	14,064	15	48,527	12,304	4	12,300	38	13	51	0.000300	0.000025	0.007828
328	1,720,338	45	544	0.2108	48,482	13,574	15	48,467	11,887	4	11,883	36	13	49	0.000300	0.000025	0.007828
329	1,658,799	43	524	0.2049	48,422	13,089	15	48,407	11,473	4	11,469	35	13	47	0.000300	0.000025	0.007828
330	1,597,803	41	505	0.1989	48,362	12,607	15	48,347	11,062	4	11,058	33	12	46	0.000300	0.000025	0.007828
331	1,537,346	40	486	0.1929	48,302	12,130	15	48,287	10,655	4	10,652	32	12	44	0.000300	0.000025	0.007828
332	1,477,423	38	467	0.1869	48,242	11,657	15	48,227	10,252	3	10,249	31	11	42	0.000300	0.000025	0.007828
333	1,418,030	37	448	0.1808	48,183	11,189	15	48,167	9,853	3	9,849	29	11	41	0.000300	0.000025	0.007828
334	1,359,162	35	429	0.1746	48,123	10,724	15	48,108	9,457	3	9,453	28	11	39	0.000300	0.000025	0.007828
335	1,300,816	34	411	0.1685	48,063	10,264	15	48,048	9,064	3	9,061	27	11	37	0.000300	0.000025	0.007828
336	1,242,987	33	393	0.1622	48,004	9,808	15	47,989	8,675	3	8,672	26	10	36	0.000300	0.000025	0.007828

Standard Default Methodology

Principal and Interest Are Advanced

Total

## D. Assumptions for Generic Pools

### I. Mortgage Maturity

As noted in Section B.3., amortization of fixed-rate mortgage pools should be based on the most recent weighted-average maturity information (WAM or WARM) provided by the issuer or guarantor at the time the calculation is performed. The published WAM for a pool is the WAM as of a particular date. If the calculation is being performed as of a month other than the month to which the WAM applies, the WAM should be incremented or decremented by the number of months prior or subsequent to the WAM as-of month, respectively.

If the issuer or guarantor of a particular pass-through security has not released an updated WAM, the most recently released WAM may be used as described in the preceding paragraph, adjusted as described therein for the time elapsed since the as-of date of the WAM.

If the issuer or guarantor of a particular pass-through security has released neither updated nor original WAM information, then the remaining term to maturity should be used as a proxy.

Fannie Mae and Freddie Mac provide updated WAM information on a monthly basis. Fannie Mae's and Freddie Mac's monthly WAM updates are as of the current month. Freddie Mac's monthly WAM updates appear on its "quartile" tapes.

Ginnie Mae provides updated WAM information on a quarterly basis. The as-of date for the reported WAM depends on when the pool was issued. For pools issued before the third month prior to the start of the current quarter, the WAM is as of four months prior to the month of the quarterly release, as described in the table below:

Month of Data Release	For Pools Issued Prior To	WAM Information Is As Of
January	Previous October	September
April	Previous January	December
July	Previous April	March
October	Previous July	June

For pools issued during or subsequent to the third month prior to the start of the current quarter, the WAM is as of the pool's issue date.

To adjust the most recently updated WAM on a Ginnie Mae pool to the current month, the WAM should be decremented by the number of months subsequent to the as-of month for the WAM, as described below:

$$\text{Current WAM} = \text{most recent WAM update} - (\text{number of months between the as-of month of the WAM and the current date})$$

For example, to adjust the WAM for the October 1993 tape for pools issued prior to July 1993 to be consistent with the October 1993 factor, subtract four months from the WAM. For pools issued in July, August and September 1993, subtract three months, two months and one month, respectively.

In some cases, the WAM that is released exceeds the time to final maturity of the pool. In these cases, the WAM should be set to MIN (updated WAM, time to maturity), where time to maturity is defined as the time between the as-of date and the pool maturity date.

For Fannie Mae pools with "same-month" loan concentrations greater than 50%, the original WAM may be reported as one month greater than the original loan term for a given pool type. For consistency with other mortgage calculations, the first month of amortization should be based on the reported WAM.

## 2. Mortgage Age

As noted in Section B.3., prepayment calculations should be based on the most recently updated weighted-average loan age information (WALA) provided by the issuer or guarantor at the time the calculation is performed. The published WALA for a pool is the WALA as of a particular date. If the calculation is being performed as of a month other than the month to which the WALA applies, the WALA should be incremented or decremented by the number of months subsequent or prior to the WALA as-of month, respectively.

Ginnie Mae releases updated WALA information on a quarterly basis, and as is the case with Ginnie Mae WAM updates, this information is reported with a lag. For pools issued before the third month prior to the month of the most recent WALA update, the WALA is as of four months prior to the month of the quarterly release, as shown in the table below:

Month of Data Release	For Pools Issued Prior To	WAM Information Is As Of
January	Previous October	September
April	Previous January	December
July	Previous April	March
October	Previous July	June

For pools issued during or subsequent to the third month prior to the start of the current quarter, the WALA is as of the pool's issue date.

To adjust the most recently updated WALA on a Ginnie Mae pool to the current month, the WALA should be incremented by the number of months subsequent to the as-of month for the WALA, as described below:

$$\text{Current WALA} = \text{most recent WALA update} + (\text{number of months between the as-of month of the WALA and the current date})$$

For example, to adjust the WALA for the October 1993 tape for pools issued prior to July 1993 to be consistent with the October 1993 factor, add four months to the WALA. For pools issued in July, August and September 1993, add three months, two months and one month, respectively.

In some cases, a pool's WAM plus its WALA may add up to more than 360 months for a 30-year pool, or 180 months in the case of a 15-year pool. In those cases, a pool's age should be defined as  $360 - \text{WAM}$  for a 30-year pool, or  $180 - \text{WAM}$  for a 15-year pool.

In some cases, the reported WALA may be less than the age of the pool itself. For Ginnie Maes, the age should be set to MAX (updated WALA, pool age), where pool age is defined as the time between pool-issue date and as-of date. For Freddie Mac, the loans in a pool may have an age that is less than the pool age. For any month that the loan age is being calculated for a month prior to the as-of date of the reported WALA, the minimum loan age is zero.

For Fannie Mae MBS calculations prior to December 7, 2000, or when a WALA for any agency security is not reported, the age of the mortgages should be estimated as the average original maturity of the loans (assumed to be 180 or 360 months for 15- and 30-year pools; 120 or 240 months for 10- and 20-year pools), minus the original WAM of the loans (at the time of the pool formation), plus the time elapsed since pool formation. This method is referred to as a Calculated Loan Age, or "CAGE."

In the case of "same-month" loan concentrations greater than 50%, the original WAM may be reported as one month greater than the original loan term for a given pool type. For example, an original WAM of 361 would be reported for a "CL" pool that has an original loan term of 360 months. The CAGE should be set to 0 for the first month of these pools, instead of -1, which would be the result of the calculation. The second month of these pools would also have a CAGE of 0, while the third month would have a CAGE of 1.

**Example of CAGE calculation:**

Original Maturity:	360 months
Original WAM:	348 months
Issue Date:	7/1/91
Current Date:	7/1/92

CAGE is calculated as  $(360 - 348) + 12 = 24$ .

In some cases, this calculation will result in an age estimate that is too long. If the age as calculated above is greater than the original maturity minus the current WAM, then CAGE should be defined as the original maturity minus the current WAM.

<b>Example:</b>	Original Maturity:	360 months
	Original WAM:	300 months
	Current WAM:	348 months
	Issue Date:	7/1/91
	Current Date:	7/1/92

The age estimate  $(360 - 300) + 12 = 72$  is greater than  $360 - 348 = 12$ , so the average loan age should be set to 12.

If there is a dispersion of loan terms within a given pool, the CAGE calculation will give a loan age estimate that is too long.

If the original WAM of the loans is not available, the average loan age should be estimated as the average original maturity of the loans minus the remaining WAM; if the remaining WAM is not available, the average loan age should be estimated as the average original maturity of the loans minus time to final maturity.

As noted in Section B, the Standard Prepayment Model of The Bond Market Association and the ABS model both specify prepayment percentages based on the age of the underlying loans, not the age of the pool itself. The age of the pool should only be used if there is insufficient information to estimate loan age by any of the above-mentioned methods, subject to the exception noted below. All WAMs and ages should be rounded to the nearest full month for use in calculations.

The examples that follow illustrate the determination of WAM and age for selected Freddie Mac GOLD, Freddie Mac 75-day, Fannie Mae and Ginnie Mae pools.

#### **Freddie Mac 75-Day or Gold Freddie Mac\***

WAM reported on quartile tape received March 1993:	342 months
Age reported on quartile tape received March 1993:	seven months
Factor reported on factor tape received March 1993:	0.9708674
Factor reported on factor tape received February 1993:	0.9785748
Gross Coupon:	9.69%

WAM used with factor of 0.9708674 is 342 months (as reported on quartile tape).

Age used with factor of 0.9708674 is seven months (as reported on quartile tape).

WAM used with factor of 0.9785748 is 343 months (increment the most recently available WAM by one month).

Age used with factor of 0.9785748 is six months (decrement the most recently available age by one month).

The one-month PSA rate is 604. The value used for MONTH in the PSA formula is 7.

#### **Fannie Mae**

Issue month reported on factor tape received March 1992:	Sept. 1991
Original WAM reported on factor tape received March 1992:	350 months
WAM reported on factor tape received March 1992:	341 months
Factor reported on factor tape received March 1992:	0.96783524
Factor reported on factor tape received February 1992:	0.96891577
Gross Coupon:	10.03%

\* Prior to March 1993, the WAMs reported on Freddie Mac's quartile tape were for the prior month, although the factor reported on the GOLD factor tape reflected scheduled principal advanced through the current settlement month. This made it necessary to decrement the GOLD quartile tape WAM by one month to calculate the prepayment rate. As of March 1993, this calculation will have already been incorporated in the Freddie Mac quartile tape, so no adjustment is necessary.

Age not reported by Fannie Mae.

Average original loan term not reported by Fannie Mae.

WAM used with factor of 0.96783524 is 341 months (as reported on factor tape).

Age used with factor of 0.96783524 is 16 months (assume from pool type that average original maturity of loans is 360 months, subtract original WAM of 350 months and add six months elapsed since pool issuance).

WAM used with factor of 0.96891577 is 342 months (increment the most recently available WAM by one month).

Age used with factor of 0.96891577 is 15 months (decrement the most recently available age by one month).

The one-month PSA rate is 22. The value of MONTH in the PSA formula is 16.

### Ginnie Mae Pool

Pool Issue Month:	May 1993
WAM as reported on tape received October 1993:	359 months
Age reported on tape received October 1993:	one month
Factor reported on factor tape received October 1993:	0.960000
Factor reported on factor tape received September 1993:	0.970000
Gross Coupon:	7.50%

WAM used with factor of 0.960000 is 355 months (October reported WAM minus four months to adjust for reporting lag).

Age used with factor of 0.960000 is five months (October reported WALA plus four months to adjust for reporting lag).

WAM used with factor of 0.9700000 is 356 months (increment WAM used with the October factor by one).

Age used with factor of 0.9700000 is four months (decrement WALA used with the October factor by one).

The one-month PSA rate is 1087. The value of MONTH in the PSA formula is 5.

### 3. Mortgage Coupon

If the issuing agency has not released the gross weighted-average coupon (WAC) of the mortgages underlying a fixed-rate, single-family pool, or if no particular WAC assumption is specified, then a fixed servicing spread above the pass-through rate must be assumed. For recently issued pools, the spread should be as follows:

Ginnie Mae I	+ 50 bp
Ginnie Mae II	+ 75 bp
Fannie Mae	+ 65 bp
Freddie Mac	+ 65 bp

## E. Day Counts

### 1. Calendar Basis

The number of days from  $M_1/D_1/Y_1$  to  $M_2/D_2/Y_2$  on a 30/360 calendar basis is computed according to the following algebraic procedure:

If  $M_1$  is 2 and  $D_1$  is 28 in a nonleap year (or 29 in a leap year), then change  $D_1$  to 30.

If  $D_1$  is 31, change  $D_1$  to 30.

If at this point  $D_1$  is 30 and  $D_2$  is 31, change  $D_2$  to 30.

Then, the number of days is

$$N = \max \{360 * (Y_2 - Y_1) + 30 * (M_2 - M_1) + (D_2 - D_1), 0\}$$

The computation draws no distinctions among business days, holidays and weekends.

These conventions shall apply for both accrued interest and yield calculations on all fixed-rate, mortgage-backed securities, unless explicitly stated otherwise.

Floating-rate and short-term instruments may be quoted on either a Money Market or a Bond-Equivalent Yield basis, following Section G.2. Money Market accounting makes use of the actual number of days from  $M_1/D_1/Y_1$  to  $M_2/D_2/Y_2$ , including the former but not the latter, with the day count then divided by 360.

### 2. Delay Days

*Delay* refers to the length of time from the end of an interest-accrual period to the actual payment of the interest due. The “stated delay” of a mortgage-backed, pass-through security also includes the time during which interest accrues, and sometimes the accrual date itself. Ginnie Mae and Freddie Mac include the accrual date in their documentation of securities; Fannie Mae does not.

The yield, duration and average life of a pass-through should be calculated and expressed in terms of its actual cash-flow delay, defined as the difference between (1) the date a payment is assumed to be made to investors and (2) the date the payment is assumed to be received from homeowners, assuming 30-day months.

Market practice for CMOs and derivatives has been to use actual delay. The adoption of actual delay as the standard for pass-throughs, and the continuation of the use of actual delay for CMOs and derivatives, will bring greater uniformity to the mortgage market.

Delay days will be assumed to be “actual” unless labeled as “stated,” and stated delay should always be accompanied by a disclosure of the actual delay. Stated delay may also be called, simply, “days to first payment.”

If the following types of mortgage securities are issued on March 1, and if every full calendar month is counted as 30 days, then the delays are as follows:

Pass-Through Type	First Payment Assumed Due From Homeowners	First Payment Due to Investors	Actual Delay	Stated Delay *
Ginnie Mae I	April 1	April 15	14 days	45 days
Ginnie Mae II	April 1	April 20	19 days	50 days
Fannie Mae	April 1	April 25	24 days	55 days
Freddie Mac NONGOLD	April 1	May 15	44 days	75 days
Freddie Mac GOLD	April 1	April 15	14 days	45 days

No conclusions can be drawn concerning the delay of a principal-only CMO bond, and hence the ownership period corresponding to a particular payment, absent explicit disclosure by the issuer. This information is generally available from the issuer for new issues.

## F. Settlement-Based Calculations

### 1. General Rules

For all mortgage pass-throughs and mortgage strips, prospective quotations of yield, duration and average life should be based on the actual settlement date of the transaction or, if not otherwise specified, The Bond Market Association standard settlement date for the quoted delivery month. However, if the quotations are made later than two business days before the standard settlement date, for delivery in the same month, then settlement should be assumed to occur either two business days later or on the last business day of the month, whichever is sooner. In all cases, calculations involving yields or durations should incorporate the correct amount of accrued interest.

CMOs and Asset-Backed Securities (ABSs) should continue to follow corporate settlement rules.

Comparisons between current and historical market quotations should be made on a consistent basis (first-of-month vs. first-of-month, for example, or settlement-date vs. settlement-date). The basis of comparison should be disclosed if it would otherwise be a source of ambiguity or confusion.

#### a. Settlement Amount

The amount payable by the buyer to the seller on the settlement date is known as the settlement amount, net proceeds or total cost, and is the sum of the principal amount and accrued interest:

$$\text{COST} = [\text{PRINCIPAL AMOUNT}] + [\text{ACCRUED INTEREST}].$$

\* These stated delays would be 44, 49, 54 and 74 days, respectively, under the alternate convention in which the accrual date itself is not counted.

For most mortgage-related securities, the principal amount and accrued interest are computed as described in parts b and c below. Special procedures for CMO bonds whose settlement factors have not been released by the time of settlement, and for Freddie Mac Multiclass PCs (REMICs), are the subjects of Sections F.2. and F.3. below.

b. Principal Amount

For most mortgage-related securities, the principal amount (or "current face amount," or "current balance") is equal to the product of the original face amount and the current factor:

$$\text{PRINCIPAL AMOUNT} = \text{FACE} * (\text{PRICE}/100) * F,$$

where  
 FACE = original face amount of bond  
 PRICE = price, as a percentage of current face amount  
 F = current factor (factor at start of the payment period containing the settlement date).

c. Accrued Interest

For most mortgage-related securities, interest accrues according to the following standard calculation:

$$\text{ACCRUED INTEREST} = \text{FACE} * F * (\text{COUPON}/100) * (N/360),$$

where  
 COUPON = annual coupon rate of the security, in percent  
 N = number of days from the first day of the accrual period (the "as-of" date for the factor F) to the settlement date itself. (The day count is computed according to the 30/360 calendar, as specified in Section E.1.)

## 2. CMO Bonds with Unknown Settlement Factors

a. General Rule

If settlement occurs in a payment period whose factor is not yet available at the time of settlement, settlement may proceed using the most recently published factor ( $F_0$ ) in place of the current factor (F) in the settlement formulas of Section F.1., to be corrected once the current factor is released. This general rule does not apply to accrual bonds in an accretion period (any payment period immediately following a payment date on which no cash payments were made).

b. CMO Accrual Bonds

For CMO accrual bonds that are traded during their accretion period and settled in a payment period whose current factor is not available at the time of settlement, settlement may proceed using an estimated current factor ( $F_{\text{est}}$ ) in place of the current factor (F) in the settlement formulas of Section F.1., to be corrected once the current factor is released. The estimated current factor is computed as follows:

$$F_{est} = F_0 * \left[ 1 + \left( COUPON/100 \right) * \left( N_0/360 \right) \right],$$

where  $F_0$  is the most recently published factor, COUPON is the annual coupon rate of the security in percent and  $N_0$  is the number of days from the "as-of" date for  $F_0$  to the "as-of" date for the current settlement factor  $F$ , measured according to the 30/360 calendar.

### 3. Freddie Mac Multiclass PCs (REMICs)

Unlike most other mortgage-related securities, Freddie Mac REMICs have record dates that are in the middle of the month, while the tranche factors are updated at the beginning of the month. This practice requires special considerations for the computation of settlement balances and accrued interest. (Parties to transactions may agree on terms other than those set out here.)

#### a. Fixed-Rate REMIC Classes

Principal and accrued interest are determined using the factor as of the last Record Date prior to the Settlement Date. Accrued interest will be paid to the seller for the time from the day following that Record Date to the Settlement Date.

**Example:**

Factor Dates - 1/1, 2/1, 3/1, etc.

Record Dates - 1/14, 2/14, 3/14, etc.

Settlement Date - 2/15 to 3/14

Accrued Interest calculation - days from 2/15 to Settlement Date (no accrued interest if Settlement Date is 2/15)

A holder of record on 3/14 (the buyer) receives principal and interest from Freddie Mac on 4/15. The dollar amounts are determined by the following formulas, where  $F(m/d)$  denotes the factor as of a date, FACE denotes the original face amount and COUPON denotes the annual coupon rate in percent:

$$\text{Principal} = [F(2/1) - F(3/1)] * \text{FACE},$$

$$\text{Interest} = F(2/1) * \text{FACE} * \text{COUPON}/1200.$$

#### b. Variable-Rate REMIC Classes

Principal is determined using the factor as of the last Record Date prior to the Settlement Date. Accrued interest is determined using the factor as of the second Record Date prior to the Settlement Date, however, because the accrual period follows the Record Date for variable-rate classes whereas it precedes the Record Date for fixed-rate classes. Therefore, at settlement, one should deduct from the cost the accrued interest for the time from the Settlement Date to the day following the first Record Date on or after the Settlement Date, at the coupon rate in effect as of the Settlement Date.

**Example:**

Factor Dates - 1/1, 2/1, 3/1, etc.

Record Dates - 1/14, 2/14, 3/14, etc.

Settlement Date - 2/15 to 3/14

Accrued Interest calculation - days from Settlement Date to 3/15

(always at least one day of accrued interest)

A holder of record on 2/14 (the seller) receives principal and interest from Freddie Mac on 3/15. The dollar amounts are determined by the following formulas, where  $F(m/d)$  denotes the factor as of a date, FACE denotes the original face amount, and COUPON( $m/d$ ) denotes the annual coupon rate in percent as of a date:

$$\text{Principal} = [F(1/1) - F(2/1)] * \text{FACE},$$

$$\text{Interest} = F(1/1) * \text{FACE} * \text{COUPON}(2/15)/1200.$$

## G. Yield and Yield-Related Measures

### 1. General Rules

All mortgage-related yields, durations, convexities and holding-period returns should be calculated uniformly on a semiannual-compounding basis, regardless of the frequency of the actual cash flows used in computing these measures.\* The correct computations are specified in detail below.

- a. *Bond-Equivalent Yield* (or *Semiannual Yield* or simply *Yield*) is the number  $Y$ , which satisfies the equation

$$P = \frac{CF_1}{(1 + Y/200)^{2T_1}} + \frac{CF_2}{(1 + Y/200)^{2T_2}} + \dots,$$

where  $P$  is the dollar price of the security (including the correct accrued interest),  $CF_K$  is the cash flow received by the investor at time  $T_K$  after settlement (measured in years, on a 30/360 calendar basis, including actual delay days), and the sum is over all future cash flows  $K=1,2,\dots$ . Unlike the standard definitions of yield for government, municipal and corporate bonds, the standard for mortgage-related securities is free of exceptional cases for single- or odd-coupon periods.

- b. *Mortgage Yield* or *Monthly Yield*: If clearly labeled, yield may also be quoted on a monthly compounding basis:

$$\text{Mortgage Yield} = 1200 \left[ (1 + Y/200)^{1/6} - 1 \right].$$

\* In certain instances, semiannual computations are undefined for overnight investments. These are more appropriately analyzed using money-market formula standards.

However, Mortgage Yield should not be used in the duration or convexity formulas below, where Y refers strictly to Semiannual Yield.

- c. *Average Life* is the dollar-weighted average time to receive future payments of principal ( $PR_K$ ), where again the  $T_k$ 's measure the time elapsed from the settlement date to the actual receipt of the cash flows:

$$\text{Average Life} = \frac{T_1 PR_1 + T_2 PR_2 + \dots}{PR_1 + PR_2 + \dots}.$$

The precise definition of principal payments for accrual instruments (CMO Z-bonds, GPMs and certain ARMs) is the subject of Section H.1.

- d. *Macaulay Duration*, or simply *Duration*, is the PV-weighted average time to receive future payments:

$$\text{Duration} = \frac{1}{P} \left[ \frac{T_1 CF_1}{(1+Y/200)^{2T_1}} + \frac{T_2 CF_2}{(1+Y/200)^{2T_2}} + \dots \right].$$

- e. *Modified Duration* represents the ratio of a small percentage increase in price to the accompanying decrease in Semiannual Yield, assuming cash flows are held fixed. It is calculated by dividing the Macaulay Duration by the appropriate semiannual compounding factor:

$$\text{Modified Duration} = \frac{\text{Duration}}{1+Y/200}.$$

Modified Duration should not be called simply Duration, to avoid confusion between the two concepts.

- f. *Convexity* is a measure of the decrease in price-sensitivity of a security per unit increase in yield. More precisely, convexity equals the price of the security, differentiated twice with respect to Semiannual Yield, divided by the price. Assuming fixed cash flows (no prepayment variability), then

$$\text{Cash-Flow Convexity} = \frac{1}{(1+Y/200)^2 P} \left[ \frac{T_1 (T_1 + 1/2) CF_1}{(1+Y/200)^{2T_1}} + \frac{T_2 (T_2 + 1/2) CF_2}{(1+Y/200)^{2T_2}} + \dots \right].$$

Convexity may be divided by 100 for purposes of expression.

- g. For securities with fixed cash flows, Modified Duration and Cash-Flow Convexity can be used to approximate the price/yield relationship according to the formula

$$P \approx P_0 \left[ 1 - (\text{Mod. Dur.}) \frac{Y - Y_0}{100} + \frac{1}{2} (\text{Cash-Flow Conv.}) \left( \frac{Y - Y_0}{100} \right)^2 \right],$$

where  $P_0$  and  $Y_0$  are the price and yield today, respectively, and  $P$  and  $Y$  are the corresponding new price and yield.

When duration and convexity values are computed which do account for interest-sensitive cash flows in the above equation, reasonable care should be taken to distinguish these measures from their static cash-flow counterparts. (An adjective such as *Option-Adjusted*, *Empirical*, *Effective* or *Implied* would be appropriate.) For example, the Cash-Flow Convexity of a mortgage pass-through is always positive, while the Effective Convexity is frequently negative. Effective Duration should never be called Duration or Modified Duration.

- h. An investment of  $P_0$  today, resulting in a market value of  $P_T$  after  $T$  years on the 30/360 calendar, constitutes a *Bond-Equivalent Total Rate of Return* equal to

$$200 \left[ \left( P_T / P_0 \right)^{1/(2T)} - 1 \right].$$

On a nonannualized basis, the *Total Percentage Return* (or *Actual* or *Simple Total Return*) is

$$100 \left[ \left( P_T / P_0 \right) - 1 \right].$$

All cash flows to which the holder would be entitled, as the owner of record during the holding period, are included. Cash flows not coinciding with the first or last day of the holding period should be compounded (or discounted, as appropriate) according to a specified reinvestment rate assumption. In particular, cash flows received on a delayed basis after the end of the holding period are discounted back to the end of the holding period using the assumed reinvestment rate.

The Bond-Equivalent Total Rate of Return is equal to the Bond-Equivalent Yield if the investment is held to final maturity and the intermediate cash flows are reinvested at a rate equal to the Bond-Equivalent Yield.

The phrase *Total Return* may be used to designate either the Rate of Return or the Percentage Return, but the choice of method should be made clear. Quotations that provide annualized rates other than on a bond-equivalent basis should be avoided.

**Example:** For a Ginnie Mae I 9.0% pass-through with 14-day actual delay, settled on the issue date, the correct price/yield equation is

$$P = \frac{CF_1}{\left(1 + Y/200\right)^{2(44/360)}} + \frac{CF_2}{\left(1 + Y/200\right)^{2(74/360)}} + \dots .$$

If the security is priced at par with a term of 360 months and an assumed prepayment speed of 150% PSA, then

P	=	100.0000,
CF <sub>1</sub>	=	0.8242,
CF <sub>2</sub>	=	0.8491,
CF <sub>3</sub>	=	0.8738,
CF <sub>K</sub>	=	...,
CF <sub>360</sub>	=	0.0562,
Yield	=	9.10675%,
Mortgage Yield	=	8.93863%,
Average Life	=	9.77844 years,
Duration	=	5.73147 years,
Modified Duration	=	5.48186 years,
Cash-Flow Convexity	=	54.4326 years <sup>2</sup> (or 0.544326).

In addition, if a variable prepayment-rate model were estimating prices of 99.453 and 100.541 for yield shifts of 10 basis points up and down, respectively, then Effective Duration and Effective Convexity would be the numbers satisfying the equations

$$99.453 \approx 100.000 \left[ 1 - (\text{Eff. Dur.}) \frac{0.10}{100} + \frac{1}{2} (\text{Eff. Conv.}) \left( \frac{0.10}{100} \right)^2 \right],$$

$$100.541 \approx 100.000 \left[ 1 - (\text{Eff. Dur.}) \frac{-0.10}{100} + \frac{1}{2} (\text{Eff. Conv.}) \left( \frac{-0.10}{100} \right)^2 \right].$$

The simultaneous solution is

$$\begin{aligned} \text{Effective Duration} &\approx 5.44 \text{ years}, \\ \text{Effective Convexity} &\approx -60.0 \text{ years}^2 \text{ (or } -0.600 \text{).} \end{aligned}$$

If the security is sold three months later at an identical yield, with an assumed bond-equivalent reinvestment rate of R = 8% for the three pass-through cash flows, then

$$\begin{aligned} P_T &= (\text{Sale Price})(\text{Pool Factor}) + CF_1(1+R/200)^{2(T-T_1)} + CF_2(1+R/200)^{2(T-T_2)} \\ &\quad + CF_3(1+R/200)^{2(T-T_3)} \\ &= (99.9934)(0.99701075) + 0.8242(1.04)^{2(90-44)/360} + 0.8491(1.04)^{2(90-74)/360} \\ &\quad + 0.8738(1.04)^{2(90-104)/360} \\ &= 102.2502, \end{aligned}$$

$$\text{Total Rate of Return} = 9.102\%,$$

$$\text{Total Percentage Return} = 2.250\%.$$

**Example:** If the same Ginnie Mae I 9.0% pass-through (360-month term, 150% PSA) is purchased at par, but for settlement seven days after the issue date, then the 360 cash flows are the same as in the previous example, but now (with accrued interest)

$$\begin{aligned} P &= 100.1750, \\ \text{Yield} &= 9.10644\%. \end{aligned}$$

## 2. Calculations for Floating-Rate MBS

Definitions follow for two of the most common measures of the value of a floating-rate security: *Yield-to-Maturity Spread* (YTM Spread) and *Discounted Margin* (DM). The consistency of calendar assumptions is particularly important for these calculations.

- a. The YTM Spread is the difference between (1) the yield of a floating-rate security and (2) the yield of the index rate itself, assuming in both cases that the index rate takes on a certain fixed value for the indefinite future. (Unless otherwise specified, this should be the current level of the index rate.)

- (1) Cash flows for the floater are computed strictly according to the specifics of the security (calendar basis, accrued interest, payment delay, reset frequency, reset margin, caps, floors, prepayment rates, etc.). The cash-flow yield of the floater is computed on a 30/360 Bond-Equivalent basis (as specified in Section G.1.) or else on an ACTUAL/360 Money-Market basis (following the same yield formula but defining the exponents  $T_K$  according to ACTUAL/360 calendar accounting). Ordinarily, the  $T_K$  will be computed on the same calendar basis as the cash flows. However, it is sometimes necessary to compare two securities whose cash flows are determined by different calendar bases. The  $T_K$  must be computed on the same calendar basis for both. Quotations should always specify which calendar basis is being used.
- (2) The cash-flow yield of the benchmark index is simply the index itself, converted if necessary to a 30/360 Bond-Equivalent basis or an ACTUAL/360 Money-Market basis, depending on the basis used to compute the cash-flow yield of the floater in (1) above. To convert ACTUAL/360 yields to 30/360 yields (or vice versa), the index rate should be multiplied (or divided, as appropriate) by a gross-up factor of 365/360. No gross-up conversion is necessary between ACTUAL/ACTUAL and 30/360 yields. After converting the index rate to the desired calendar basis (30/360 or ACTUAL/360), index rates expressed on a monthly, quarterly or annual compounding basis should be converted to semiannual compounding.

Calendar conventions for the most common reset indexes are as follows:

Index	Term	Calendar	Payment/Compounding
LIBOR	under 1 year	ACT/360	monthly, quarterly, semiannual
LIBOR	1 year & over	ACT/ACT	annual
T-Bills		ACT/360	quarterly, semiannual, annual
TSY/CMT	1 year & over	30/360	semiannual
11th District COFI		ACT/ACT	monthly

- b. The DM represents the increment over the index rate that causes the settlement price of a floating-rate security to equal the discounted present value of its cash flows, with yield-compounding frequency matching the security payment schedule. As in the YTM Spread calculation, the DM uses assumed future values for the index rate (which must be specified if not equal to the current level). The DM is more general than the YTM Spread, however, in that the DM allows for varying interest-rate scenarios and the YTM Spread does not. At the same time, the DM is less general than the YTM Spread in that DMs cannot be compared for securities with different payment frequencies, while YTM Spreads can. The full equation defining DM is

$$\begin{aligned}
 P = & \frac{CF_1}{\left[1 + \frac{I_1 + DM}{100} * (T_1 - T_0)\right]} + \frac{CF_2}{\left[1 + \frac{I_1 + DM}{100} * (T_1 - T_0)\right] * \left[1 + \frac{I_2 + DM}{100} * (T_2 - T_1)\right]} \\
 & + \frac{CF_3}{\left[1 + \frac{I_1 + DM}{100} * (T_1 - T_0)\right] * \left[1 + \frac{I_2 + DM}{100} * (T_2 - T_1)\right] * \left[1 + \frac{I_3 + DM}{100} * (T_3 - T_2)\right]} \\
 & + \dots ,
 \end{aligned}$$

where  $P$  is the dollar price of the security (including the correct accrued interest),  $CF_K$  is the cash flow received by the investor at time  $T_K$  (measured in years, and where  $T_0$  is settlement day),  $I_K$  is the assumed index rate from time  $T_K - 1$  to time  $T_K$  (with gross-up calendar conversion as described in (2) above, as appropriate, but without semiannual compounding conversion), and the sum is over all future cash flows  $K = 1, 2, \dots$ . Ordinarily, the  $T_K$  will be computed on the same calendar basis as the cash flows. However, it is sometimes necessary to compare two securities whose payment frequencies are the same but whose cash flows are determined by different calendar bases. The  $T_K$  must be computed on the same calendar basis for both. Quotations should always specify which calendar basis is being used.

**Example:** Each March 1 and September 1, a hypothetical FRCMO pays the interest accrued during the six-month period ending one month prior to the payment date, computed on an ACTUAL/ACTUAL calendar basis, using a rate that resets monthly to 50 basis points above the three-month LIBOR level on the second business day prior to the first of that month. Assume that the security trades at 99 for settlement on 3/17/89, with three-month LIBOR at 10-3/16%. Assume further that LIBOR was 9-3/8% on 1/30/89 and 10-15/16% on 2/27/89, and that half the principal is repaid on 9/1/89 and half on 3/1/90.

All calculations will use the same cash flows:

$$\begin{aligned}
 P &= 99 + 100 \left[ \left( \frac{28}{365} \right) 0.098750 + \left( \frac{16}{365} \right) 0.114375 \right] \\
 &= 100.2589, \\
 CF_1 &= 50 + 100 \left[ \left( \frac{28}{365} \right) 0.098750 + \left( \frac{31}{365} \right) 0.114375 + \left( \frac{122}{365} \right) 0.106875 \right] \\
 &= 55.3012, \\
 CF_2 &= 50 + 50 \left[ \left( \frac{184}{365} \right) 0.106875 \right] \\
 &= 52.6938.
 \end{aligned}$$

**Bond-Equivalent basis (30/360)***Yield of FRCMO:*

$$P = \frac{CF_1}{\left(1 + Y/200\right)^{2(164/360)}} + \frac{CF_2}{\left(1 + Y/200\right)^{2(344/360)}}$$

Result: 10.96675%

*Yield of Index:*

$$Y_{\text{Index}} = 200 \left\{ \left[ 1 + \left( \frac{365}{360} \right) 10.1875 / 400 \right]^2 - 1 \right\}$$

Result: 10.46235%

*YTM Spread:*

$$Y - Y_{\text{Index}} = 10.96675\% - 10.46235\%$$

Result: 50.44 basis points

*Discounted Margin:*

$$P = \frac{CF_1}{\left[ 1 + \frac{I_1 + DM}{100} * \frac{164}{360} \right]} + \frac{CF_2}{\left[ 1 + \frac{I_1 + DM}{100} * \frac{164}{360} \right] * \left[ 1 + \frac{I_2 + DM}{100} * \frac{180}{360} \right]}$$

$$I_1 = I_2 = \left( \frac{365}{360} \right) 10.1875$$

Result: 62.05 basis points

**Money-Market basis (ACTUAL/360)***Yield of FRCMO:*

$$P = \frac{CF_1}{\left(1 + Y/200\right)^{2(168/360)}} + \frac{CF_2}{\left(1 + Y/200\right)^{2(349/360)}}$$

Result: 10.76838%

$$\begin{aligned} P &= 99 + 100 \left[ \left( \frac{28}{365} \right) 0.098750 + \left( \frac{16}{365} \right) 0.114375 \right] \\ &= 100.2589, \end{aligned}$$

$$\begin{aligned} CF_1 &= 50 + 100 \left[ \left( \frac{28}{365} \right) 0.098750 + \left( \frac{31}{365} \right) 0.114375 + \left( \frac{122}{365} \right) 0.106875 \right] \\ &= 55.3012, \end{aligned}$$

$$\begin{aligned} CF_2 &= 50 + 50 \left[ \left( \frac{184}{365} \right) 0.106875 \right] \\ &= 52.6938. \end{aligned}$$

**Bond-Equivalent basis (30/360)***Yield of FRCMO:*

$$P = \frac{CF_1}{\left(1 + Y/200\right)^{2(164/360)}} + \frac{CF_2}{\left(1 + Y/200\right)^{2(344/360)}}$$

Result: 10.96675%

*Yield of Index:*

$$Y_{Index} = 200 \left\{ \left[ 1 + \left( \frac{365}{360} \right) 10.1875 / 400 \right]^2 - 1 \right\}$$

Result: 10.46235%

*YTM Spread:*

$$Y - Y_{Index} = 10.96675\% - 10.46235\%$$

Result: 50.44 basis points

*Discounted Margin:*

$$P = \frac{CF_1}{\left[ 1 + \frac{I_1 + DM}{100} * \frac{164}{360} \right]} + \frac{CF_2}{\left[ 1 + \frac{I_1 + DM}{100} * \frac{164}{360} \right] * \left[ 1 + \frac{I_2 + DM}{100} * \frac{180}{360} \right]}$$

$$I_1 = I_2 = \left( \frac{365}{360} \right) 10.1875$$

Result: 62.05 basis points

**Money-Market basis (ACTUAL/360)***Yield of FRCMO:*

$$P = \frac{CF_1}{\left(1 + Y/200\right)^{2(168/360)}} + \frac{CF_2}{\left(1 + Y/200\right)^{2(349/360)}}$$

Result: 10.76838%

*Yield of Index:*

$$Y_{\text{Index}} = 200 \left[ \left( 1 + 10.1875 / 400 \right)^2 - 1 \right]$$

Result: 10.31723%

*YTM Spread:*

$$Y - Y_{\text{Index}} = 10.76838\% - 10.31723\%$$

Result: 45.11 basis points

*Discounted Margin:*

$$P = \frac{CF_1}{\left[ 1 + \frac{I_1 + DM}{100} * \frac{168}{360} \right]} + \frac{CF_2}{\left[ 1 + \frac{I_1 + DM}{100} * \frac{168}{360} \right] * \left[ 1 + \frac{I_2 + DM}{100} * \frac{181}{360} \right]}$$

$$I_1 = I_2 = 10.1875$$

Result: 56.89 basis points

### 3. Putable Project Loans

Certain Federal Housing Administration (FHA) project loans contain provisions allowing the holders of the loans to put them back to the Department of Housing and Urban Development (HUD) in exchange for a ten-year current-coupon FHA debenture. The current coupon is defined as an average ten-year Treasury rate. The face amount of the debenture is the remaining balance of the loan on the put date. The put feature can be exercised for one year beginning in the month following 20 years after the final endorsement date on the loan.

The following assumptions apply to yield and average-life calculations for putable project loans:

- a. Although the debentures carry a ten-year current coupon and are backed by the full faith and credit of the U.S. Government, it is uncertain what the market value of the debentures will be immediately after they are issued. The standard assumption has been that the debentures trade roughly 60 basis points above the ten-year Treasury, equating to a dollar price of 96. In lieu of a specific yield assumption, the put price of the remaining project loan balance should therefore be assumed to be 96, unless explicitly stated otherwise.
- b. The final endorsement date of a project loan may be before or after the origination of the loan. Therefore, a standard put date cannot be assumed (e.g., 20 years after loan origination). The put date used for calculations should be stated explicitly.
- c. Once a put is declared to FHA, the agency is responsible for paying accrued interest on the debentures starting from the put date itself. Therefore, the debentures should be val-

ued as if received on the put date, regardless of scheduled loan payment dates or payment delay.

**Example:** Suppose an FHA project loan pass-through has the following characteristics:

Gross Coupon	=	7.50%
Net Coupon	=	7.43%
Actual Delay	=	24 days
Original Term	=	40 years
Origination Date	=	2/1/79
Put Date	=	6/1/99

Put calculations should then be based on the investor's receiving the 6/99 principal balance (valued at 96%, paid on the put date) plus 100% of the final pass-through cash flow (the principal and interest for 5/99, paid on 6/25/99 according to the scheduled delay). These represent standard valuation assumptions, not actual cash flows. If the security trades at 85 for settlement on 2/1/89, then

Yield to Put = 9.77078%,

Average Life to Put = 9.72452 years.

## H. Accrual Instruments

### 1. Average Life of Accrual Instruments

For CMO Z-bonds, Graduated-Payment Mortgages (GPMs) or Adjustable-Rate Mortgages (ARMs) with capped payments, principal balances can increase over the life of the bonds. Interest accrued (but not paid out) for a payment period is treated as a negative principal payment, occurring on the payment date for that period. This is consistent with the accepted definition of the net cash flow on a payment date as the sum of

(1) simple interest due on the principal balance for the full payment period

and

(2) a return of principal (positive or negative).

No portion of the cash flow is treated as interest-on-interest. Instead, there is a formal conversion of accrued interest to loan principal on payment dates (negative amortization).

It follows that at the end of every payment period, one should first compute the value of "(1)" and then subtract it from the net cash flow on the payment date to obtain the correct value of "(2)." The outstanding principal balance changes by amount "(2)," and only on payment dates, not daily.

Long-standing market practices have resulted in different methods for calculating average life for pass-through securities (notably GPMs and payment-capped ARMs) and for CMOs. Because of widespread acceptance of these methods within their respective market segments, the Standard Formulas for average life are product-specific.

For GPMs and ARMs, all periodic principal payments, positive or negative, should be included in both the numerator and denominator of the average-life calculation (see Section G.1.c.), so that the denominator equals the principal balance in effect for the period of the settlement date (exclusive of accrued interest). For Z-bonds, the numerator and denominator should include only the positive principal payments (amount “(2)” if positive, 0 otherwise), and the denominator will generally be larger than the principal balance at settlement.

**Example:** To illustrate these points, consider the following hypothetical accrual instrument:

Time	Net Cash Flow	10% Periodic Interest	Principal Repayment (= Cash Flow – Interest)	Principal Balance
0	-100			100
1	0	10	-10	110
2	11	11	0	110
3	121	11	110	0

If there is no cash-flow delay, then the average life under the GPM/ARM convention is

$$\frac{1(-10) + 2(0) + 3(110)}{-10 + 0 + 110} = \frac{320}{100} = 3.20 \text{ periods.}$$

Under the Z-bond convention, the average life is

$$\frac{1(0) + 2(0) + 3(110)}{0 + 0 + 10} = \frac{330}{110} = 3.00 \text{ periods.}$$

The GPM/ARM definition has the advantage of preserving the intended relationship between average life and interest-rate risk. In particular, the average life of a fixed-income security should roughly equal the term to maturity for which a bullet with the same coupon would have the same price-sensitivity per purchase dollar. This is the purpose for which average life is used in the absence of duration measures. In general, negative principal payments lead to longer average lives, in some cases longer than the final maturity.

It should be noted that the Z-bond definition of average life can substantially underestimate the true interest-rate sensitivity of a security, and that the combined average life of the bond classes of a CMO containing Z-bonds can be inconsistent with the average life of the underlying collateral. Analysts and traders should be aware of these facts when average-life comparisons are being made.

## 2. Accrual Calculations for CMO Z-Bonds

The special calculation method for the settlement of accrual bonds has been discontinued for trades made on or after July 15, 1991, with settlement on or after October 1, 1991. Henceforth, these trades will follow the standards set forth in Sections F.1. and F.2.