FEDERAL RESERVE BANK OF NEW YORK

MBS Market and Operations

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Agenda

- **1** Mortgage Fundamentals
- 2 U.S. MBS Market
- **3** Spreads and Prepayments
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A mortgage is a form of collateralized lending

- A mortgage is a contract between a home buyer and a lender to borrow money, collateralized by real estate.
- A mortgage-backed security (MBS) gives an investor the right to receive some portion of cash flows from a pool of mortgages.



2 The mortgage industry consists of several players



2 Mortgage finance in the U.S. is fundamentally different from almost every other country on Earth

1	30 Year Term	 The most common mortgage product in the U.S. allows the borrower to repay the loan balance over a period of 30 years Creates credit risk for the lender; risk of default is higher on a 30-year loan than a 1-year loan
2	Fixed Rate	 For the most common mortgages, the interest rate is fixed over the life of the loan, e.g. 30 years Creates interest rate risk for the lender; interest rates will likely change within 30 years
3	Prepay- ment option	 Borrowers can usually prepay some or all of the mortgage balance <i>without penalty</i> at any time Creates prepayment risk for the lender; borrowers will prepay when it is advantageous for them, and disadvantageous to the lender
4	Gov't involve- ment	 Mortgage interest tax deduction creates a strong incentive for people to buy homes, not rent The government-sponsored enterprises (GSEs), Fannie Mae and Freddie Mac, provide credit guarantees to mortgage investors Source of policy risk

- The combination of 30-year loan terms, fixed interest rates, and the option to prepay makes mortgage borrowing attractive to a homebuyer and risky for a lender
- The GSEs alleviate most of the credit risk associated with investing in Agency MBS
- The prepayment option causes MBS to be negatively convex; managing the prepayment risk is the greatest challenge with investing in MBS

2 The Agencies play a central role in American mortgage finance through credit guarantees

Overview of the Agencies

- The "Agencies" are government or government-sponsored entities created by Congress to "support the mortgage market"
- The three agencies are Fannie Mae (FNMA), Freddie Mac (FHLMC), and Ginnie Mae (GNMA)
- Ginnie Mae is formally part of the U.S. Government
- Fannie Mae and Freddie Mac are NOT part of the U.S. Government; they are referred to as government-sponsored enterprises (GSEs)
- On September 6, 2008, Fannie Mae and Freddie Mac were taken into conservatorship by the Federal Housing Finance Agency (FHFA)

Agency functions

- The Agencies provide credit guarantees to mortgage investors; that is, they replace the borrower's credit with their own
- Any MBS securitized by one of these three entities is called "Agency MBS"
- The Agencies charge a fee to provide this credit wrap; essentially this functions like an insurance premium
- If the borrower defaults, the Agency will make the investor whole through a cash payment
- Securities guaranteed by Ginnie Mae are said to have an *explicit* guarantee from the U.S. Government
- Securities guaranteed by Fannie Mae or Freddie Mac are said to have an *implicit* guarantee from the U.S. Government

2 Securitization allows a lender to shift risk and free up capital to make more loans



2 Through securitization, the end MBS investor ultimately provides the cash to buy the home

CONCEPTUAL



2 Home mortgages are roughly one-fourth of the total nonfinancial credit in the United States

U.S. Nonfinancial Debt, Total = \$41.4 trillion



Q4 2014, \$ billions

- There is \$13.2 trillion of mortgage credit in the U.S., or 32% of the total nonfinancial debt in the United States
- Home mortgages are the second-largest credit sector in the U.S., after Treasuries
- Home mortgages make up 82% of mortgage credit, or almost \$11 trillion

2 Agency MBS represents roughly half of the home mortgage credit in the United States



2 The Fed is the largest holder of Agency MBS, with commercial banks coming in second



As of Q4 2014, the domestic official sector (Fed) owned 30% of the Agency MBS market

- Foreign investors held roughly 11%, led by China and Japan
- GSE share has shrunk steadily since the height of the securitization boom; they now comprise less than 5% of the total Agency MBS market

Source: Mortgage Market Statistical Annual 2015

The primary rate offered to borrower depends on mortgage yields, swap rates, and the yield curve



Source: FRBNY analysis

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3 As primary rates fall, borrowers have a greater incentive to refinance, and prepayment speeds rise



3 The borrower's option to prepay creates negative convexity in MBS

CONCEPTUAL



- **Duration**: price sensitivity to a change in interest rates, or weighted average maturity of cash flow
- Convexity: duration sensitivity to a change in interest rates

Prepayments have a large impact on cash flows, and therefore mortgage valuation

Borrowers can prepay their mortgages at any time

For interest rate reasons

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- Get a lower mortgage rate
- For non-interest rate reasons
 - Delinquencies Guarantor or servicers buy out delinquent loans
 - Curtailments Borrowers occasionally make partial prepayments
 - Turnover Borrowers move
 - Cash-out Borrowers tap their home equity

MBS cash flow with zero prepayments



MBS cash flow with moderate prepayments



MBS cash flow with high prepayments



Source: Bloomberg, FRBNY analysis

Portfolio Balance Effect

 By reducing the stock of securities (with duration and convexity risk) held by the public, Federal Reserve purchases impact the term premium for securities causing interest rates to be lower than they otherwise would be.

Market Functioning/Liquidity Effect

 By operating as a consistent and significant buyer of assets, Federal Reserve purchases may benefit market functioning and liquidity in the target sector.

Housing Market

 Demand for MBS by the Federal Reserve reduces secondary mortgage rates, which pass through to borrowers who may be able to purchase or refinance home mortgages at attractive rates.

4 MBS Purchase Program: Key Objectives

Each program's goals according to their respective statements:

LSAP 1	"Spreads of rates on GSE debt and on GSE-guaranteed mortgages have widened appreciably of late. This action is being taken to reduce the cost and increase the availability of credit for the purchase of houses, which in turn should support housing markets and foster improved conditions in financial markets more generally." (November 25, 2008)
Expansion of LSAP 1	To provide greater support to mortgage lending and housing markets, the Committee decided today to increase the size of the Federal Reserve's balance sheet further by purchasing up to an additional \$750 billion of agency mortgage-backed securities, bringing its total purchases of these securities to up to \$1.25 trillion this year." (March 18, 2009)
Reinvestments	"To help support conditions in mortgage markets, the Committee will now reinvest principal payments from its holdings of agency debt and agency mortgage-backed securities in agency mortgage-backed securities." (September 21, 2011)
Additional Purchases	"To support a stronger economic recovery and to help ensure that inflation, over time, is at the rate most consistent with its dual mandate, the Committee agreed today to increase policy accommodation by purchasing additional agency mortgage-backed securitiesThese actionsshould put downward pressure on longer-term interest rates, support mortgage markets, and help to make broader financial conditions more accommodative." (September 13, 2012)
End of LSAP	"If incoming information broadly supports the Committee's expectation of ongoing improvement in labor market conditions and inflation moving back toward its longer-run objective, the Committee will end its current program of asset purchases at its next meeting. However, asset purchases are not on a preset course, and the Committee's decisions about their pace will remain contingent on the Committee's outlook for the labor market and inflation as well as its assessment of the likely efficacy and costs of such purchases." (September 17, 2014)

4 MBS Purchase Programs: Key Facts

	LSAP 1	Expansion	Reinvestments	Additional Purchases
Program Size	\$500 billion	Up to \$750 billion	None – Reinvest MBS and Agency paydowns into MBS	\$823 billion
Announcement Date	November 25, 2008	March 18, 2009	September 21, 2011	September 13, 2012
Start Date	Jan 5, [,] 2009	March 19, 2009	Oct 3, 2011	September 14, 2012
End Date	May 27, 2009	March 31, 2010**	Ongoing	October 31, 2014
Pace	Variable	Variable	Variable	Variable

**Initial March 2009 statement indicated that purchases would finish by year-end 2009. The FOMC changed this directive in the Sept 2009 FOMC statement. The new language stated that the purchases would end by the first quarter of 2010 in order to "[P]romote a smooth transition in markets..."

4 MBS Purchase Programs: Operational Similarities

- Outright purchases of fixed-rate mortgage-backed securities guaranteed by Fannie Mae, Freddie Mac, and Ginnie Mae for the System Open Market Account (SOMA)
 - Falls within the Federal Reserve's existing operating framework for SOMA purchases
- Transactions executed on an outright basis in the "to be announced" (TBA) market.
- Transact daily with Primary Dealer counterparties on bilateral basis.
- Dollar rolls used to facilitate settlement.
- Purchase information released to the market weekly.
- Operations a balance of:
 - Security Availability
 - Market Functioning

4 MBS Purchase Programs: Operational Differences

	LSAP 1 & Expansion	Reinvestments & Additional Purchases
Trading Logistics	Trades with Dealers done via Investment Managers	Trading done in house by NY Federal Reserve Bank Staff
Portfolio Composition	Diversification across the MBS market	Purchases concentrated in newly issued origination
Trading Platform	Bloomberg and Tradeweb	Tradeweb and FedTrade

4 MBS Purchase Program: Trajectory



Source: Federal Reserve H.4.1



Source:Federal Reserve Bank of New York



Source: Federal Reserve Bank of New York

4 MBS Purchase Program: Purchase Composition



Source: Federal Reserve Bank of New York

4 MBS Purchase Program: Market Impact



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4 MBS Purchase Program: Market Impact



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5 Useful Websites

- Agency MBS Purchase Program:
 - FAQs: <u>http://www.newyorkfed.org/markets/mbs_faq.html</u>
 - Operations: <u>http://www.newyorkfed.org/markets/mbs/</u>
- Agency MBS Reinvestment Purchases:
 - FAQs: <u>http://www.newyorkfed.org/markets/ambs/ambs_faq.html</u>
 - Operations Summary: <u>http://www.newyorkfed.org/markets/ambs/</u>
 - Tentative Purchase Amounts and Historical Operational Results: <u>http://www.newyorkfed.org/markets/ambs/ambs_schedule.html</u>
- SOMA Holdings:
 - http://www.newyorkfed.org/markets/soma/sysopen_accholdings.html

5 Reform Issues in U.S. Housing Finance

Component	Current Structure	Considerations for Future Structure	
Role of government	 Government provides "explicit" credit guarantee for Ginnie Mae securities, and "implicit" guarantee for Fannie/Freddie 	 Most, but not all, proposals envision an "explicit" government guarantee for mortgage credit. The idea is that only the government can insure tail risk 	
Future of GSEs	 GSEs are winding down investment portfolios, but not guarantee books 	 Most proposals envision the wind down or privatization of Fannie and Freddie 	
Role of private sector	 No private-sector first-loss capital, other than common shareholder investment in Fannie/Freddie (currently subsumed by U.S. Treasury ownership of preferred shares and net income sweep) and mortgage insurance 	 Most proposals envision the private sector bearing the first loss from mortgage defaults, although the amount of private sector capital varies from proposal to proposal 	
	for high LTV borrowers	Proposals differ on how the price of the government guarantee should be determined:	
Cost of government guarantee	 Guarantee fees (g-fees) set by regulator, but with discounts for volume and premiums based on risk 	some plans call for uniform pricing that does not consider geography, while other plans allow for risk-based pricing	
Securitization platform	 Separate securitization platforms for Fannie, Freddie and Ginnie 	 Most proposals would establish a single securitization platform 	
Secondary market trading	 TBA market creates homogeneity, providing liquidity to investors 	 Most proposals seek to preserve TBA market functioning and liquidity 	

Although interest rates are the primary driver of prepayments, other factors matter as well

	Impact on prepayments	Considerations
Interest rates	 Falling interest rates increase the attractiveness for a borrower to refinance The higher the spread between the mortgage coupon and market rates, the more attractive it is to refinance 	 Key important factor in prepayment speeds Hedging interest-rate related risks is key to managing a mortgage asset portfolio
Aging	 New loans have slower prepayment speeds than old loans 	 Can be difficult to hedge as conventional measures of aging assume the same aging pattern for all loans
Burnout	 Slowdown in interest-rate-driven prepayments in a pool of mortgages after periods of refinancing Reflects that borrowers with highest propensity to refinance have already done so 	 Sometimes older mortgage pools will trade at a significant spread above new securities because they have much lower prepayment risk
Seasonality	 Close interaction of prepayments with housing market activity Higher prepayments in the summer due to higher home turnover 	 More pronounced for discount coupon loans as premium loan prepayments are driven mostly by refinancing activity
Macro factors	 Housing markets—falling housing prices, weak economic activity and unemployment 	 Can be difficult to hedge

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5 "To Be Announced" (TBA) Market

TBA market characteristics

- Anatomy of a TBA trade
- Most trading in MBS occurs in the TBA market
- The TBA market is a forward-settling market
- Coupon, agency, term and settlement date are specified on the trade date
- Detailed pool characteristics are not known until two days prior to settlement (48 hour day)
- Sellers deliver the least valuable pools that meet generic TBA requirements, known as "cheapest-todeliver"
- Enhances liquidity by homogenizing mortgage pools, of which there are more than 1 million



- Investor buys \$100mm 30-year FNCL 4.5% for January settlement in the TBA market
- 2 Pool number / CUSIP is "announced" by the seller 2 days prior to common industry settlement date
 - This is known as "notification day" or more commonly as "48-hour day"
 - Buyer pays for the pool on settlement day, including accrued interest, and receives title to the pool
- Since the buyer is the owner on record date at the end of January, the investor is entitled to the cash-flows (interest, scheduled principal, unscheduled principal) in February.

Dollar roll transaction

- A funding transaction specific to mortgage markets, with some similarities to repo transactions
- Involves the purchase or sale of MBS for delivery in the current month, with the simultaneous agreement to resell or repurchase substantially similar securities in the future – two TBA trades, a buy and a sell, with different settlement months
- Dollar roll price is the difference between the current and future month TBA price, and includes an implied cost of financing for the TBA position
- Buyer assumes prepayment risk over term of roll
- SOMA portfolio engages in dollar roll trades in order to facilitate settlement and market functioning



- 1 Investor buys \$100mm 30-year FNCL 4.5% for January settlement in the TBA market
- 2 Investor sells \$100mm 30-year FNCL 4.5% Jan/Feb dollar roll
 - "Selling" the Jan/Feb roll means selling TBA securities in January, and buying substantially similar securities back in February
 - Effectively selling-back the MBS due in January
- 3 Investor does not take delivery of TBAs on January settlement day
 - The original purchase of January TBAs and the sales leg of the Jan/Feb dollar roll are offsetting transactions, so no settlement needed
- 4 Investor takes delivery of TBAs on February settlement day
 - Settlement of the purchase leg of the Jan/Feb dollar roll
 - Selling Jan/Feb dollar roll effectively delayed settlement of TBA securities purchased in January for one month

5 MBS Definitions: The Basics (1/3)

MBS: Mortgage-backed security.

Agency: In mortgage space, refers to Fannie Mae, Freddie Mac, and Ginnie Mae.

GSE: Government-sponsored enterprise. Refers to Fannie Mae and Freddie Mac, as opposed to Ginnie Mae, which is part of the government rather than government-sponsored.

FNMA: Federal National Mortgage Association. Also known as Fannie Mae.

FHLMC: Federal Home Loan Corporation. Also known as Freddie Mac.

GNMA: Government National Mortgage Association. Also known as Ginnie Mae.

Prepayments: Refers to early return of mortgage principal to the mortgage investor from the mortgage borrower. A core feature of mortgage-backed securities and crucial to their valuation.

SMM: Single Monthly Mortality. Method of measuring prepayment. Calculation = Prepayment divided by beginning month principal balance.

CMM: Constant Prepayment Rate. Calculated by annualizing the SMM.

PSA: Public Securities Association. Refers to another measure of prepayment, built to account for seasoning. Equal to 0 CPR in the first month, and then ramping up 0.2% CPR per month. Peaks at 6% in 30 months.

Speeds: Refers to prepayment speeds, usually quoted in CPR.

Passthrough: Agency MBS are also called passthroughs, because the interest and principal payments are "passed through" from the borrower to the end investor.

5 MBS Definitions: Valuation (2/3)

Duration: Measure of the approximate sensitivity of a bond's value to parallel shifts in the yield curve. Conceptually, also the first derivative of the price-to-yield function for a fixed income security.

Convexity: Price sensitivity to parallel shifts in the yield curve unexplained by duration--used to approximate the change in price that is not explained by duration. Conceptually, the second derivative of the price-to-yield function.

Negative convexity: Reverse of positive convexity; the increase in price if yields decline will be smaller than the decrease in price if rates rise. A feature of MBS created by the borrower's prepayment option.

Ticks: MBS prices are normally quoted in 1/32nds of a point, called ticks. One tick is equal to 3.125 basis points.

Nominal spread: The difference between the expected yield-to-maturity on a mortgage-backed security and a Treasury security. Ignores optionality and yield curve shape.

Zero-volatility spread: The difference between the expected yield-to-maturity on a mortgage-backed security and a Treasury security, but adjusts discount rates and amount of cash flows based on the shape of the yield curve.

Option-adjusted spread: The spread to a benchmark interest rate that equates the theoretical price of a bond to its market price. Alternately, the nominal yield-to-maturity spread over the spot yield curve minus the value of the prepayment option. Accounts for optionality and yield curve shape.

5 MBS Definitions: Market Conventions (3/3)

TBA: To-be-announced. Refers to a trading convention for mortgages. In a TBA trade, the actual mortgage pools that the seller will receive are not announced until 48-hour day.

Cheapest-to-deliver: TBA trading convention. In a TBA trade, the buyer will be delivered the lowest-value (i.e., cheapest) loans that meet the delivery criteria.

48-hour day: In a TBA trade, the seller has to notify the buyer which pools will actually be delivered. This happens 48 hours before the settlement date of the trade, and the day is known as 48-hour day.

Settlement: All TBA trades settle four times a month, on days called Class-A, -B, -C, and -D settlement day.

FNMA 30-year: A Fannie Mae, 30-year fixed rate mortgage security. The benchmark security in mortgage markets, against which swap spreads to other securities are calculated.

Dwarf: A 15-year Fannie Mae security. Called a dwarf because it's smaller than a 30-year security.

Nugget: Freddie Mac securities are also called Golds, abbreviated GLD. A nugget is a small (15-year) GLD.

Midget: A small (15-year) GNMA security.

Current coupon: The theoretical coupon on a mortgage security that would be trading at par given current market prices. Calculated by interpolating the prices of the two securities trading closest to par, both above and below.