

Fixed Income Research

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MBS Market – Concepts & Topics

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Key Theme: Prepayments

- Prepayment risk distinguishes MBS
- Comes from prepayment option in residential mortgage loans
- Gives MBS undesirable "negative convexity"
- Gives MBS higher yields than securities without prepayment risk

Ginnie Mae MBS Spread to 5-Year Treasuries
(basis points)



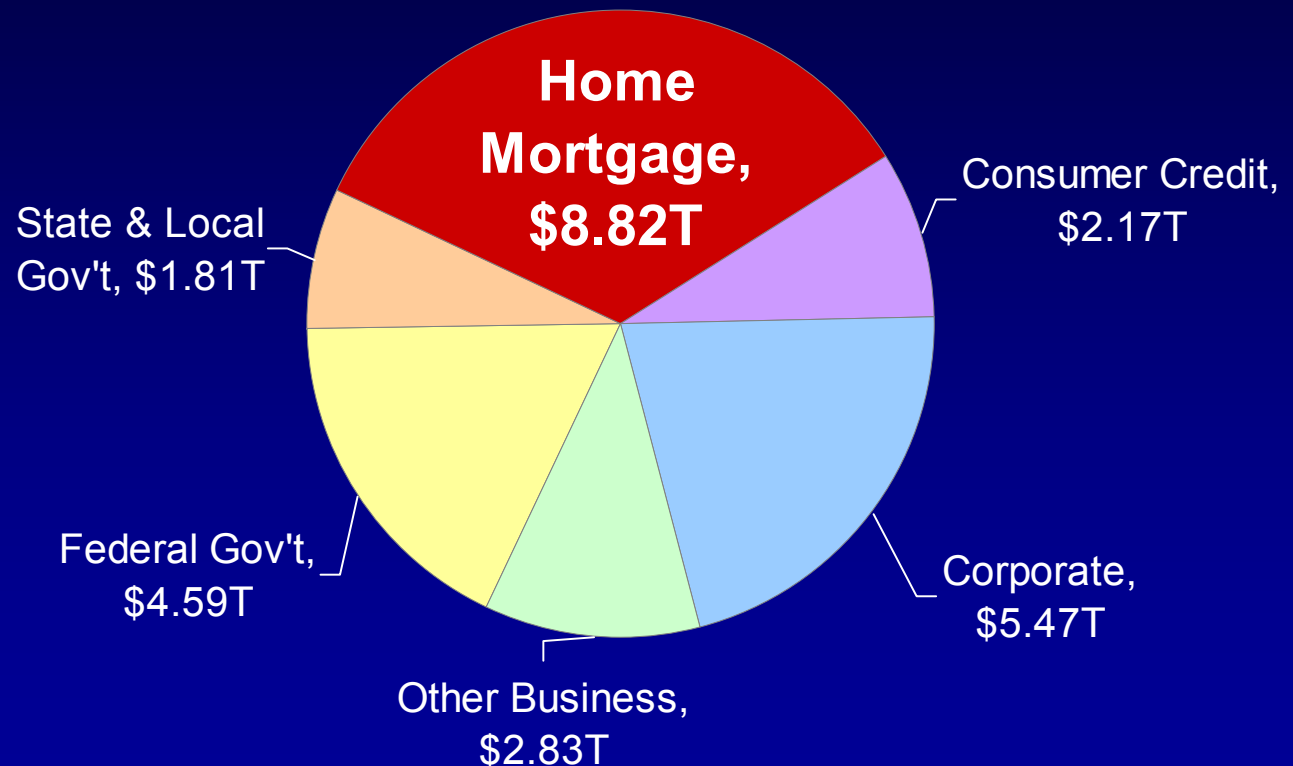
Why Focus on MBS

- Mortgages are a big slice of all U.S. debt
- MBS are a big slice of the bond market
- MBS are the biggest slice of the securitization market
- MBS is the original source of securitization technology
- Understanding MBS is helpful (often essential) to understanding other types of securitizations

Mortgage Debt is a Big Part of the Economy

Debt Outstanding: Domestic Non-financial Sectors
as of 30 September 2005 (\$ trillions)

\$25.7 trillion
total pie

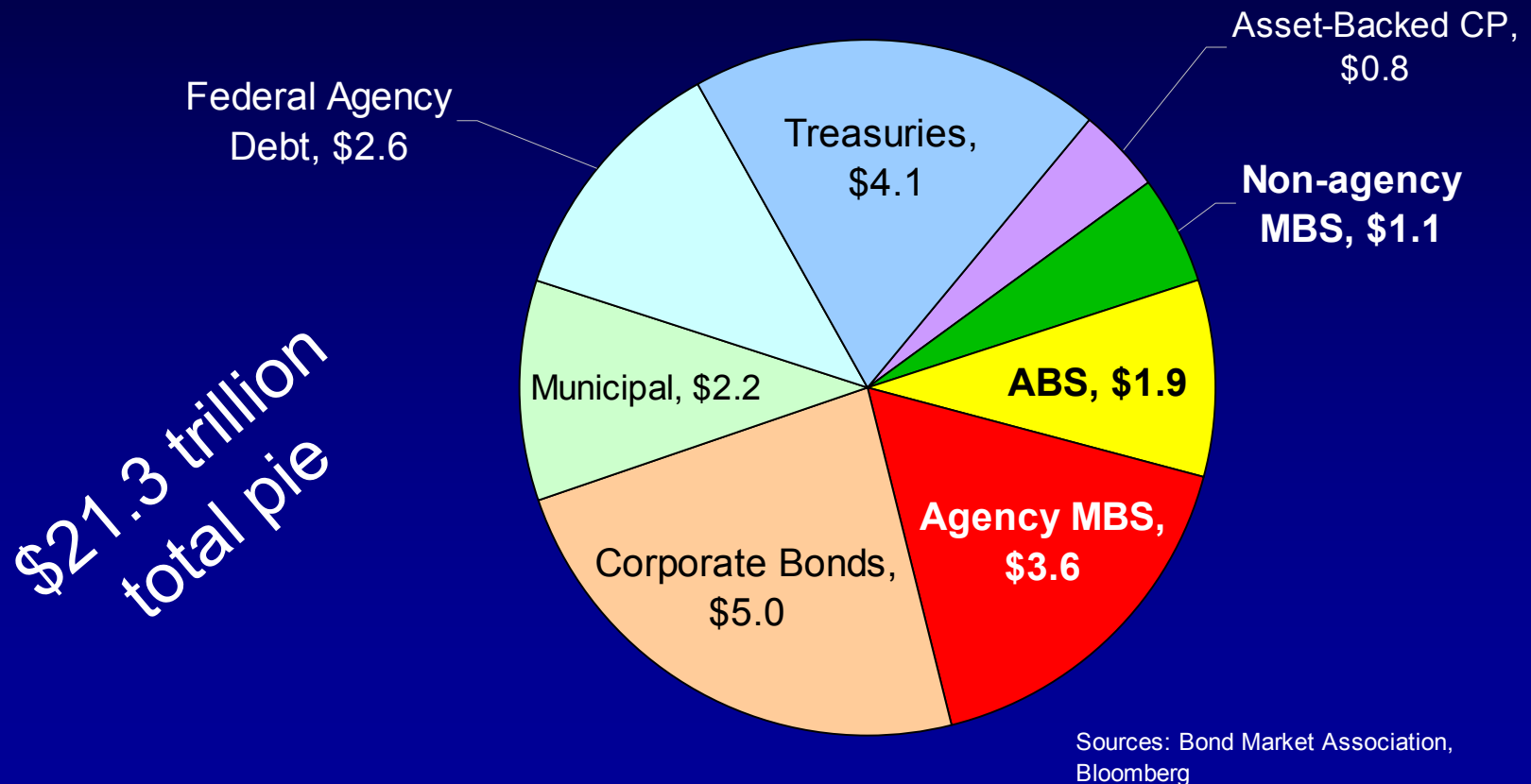


Source: Federal Reserve, Report Z.1, table L.2

MBS Are a Big Piece of the Bond Market

U.S. Debt Capital Markets

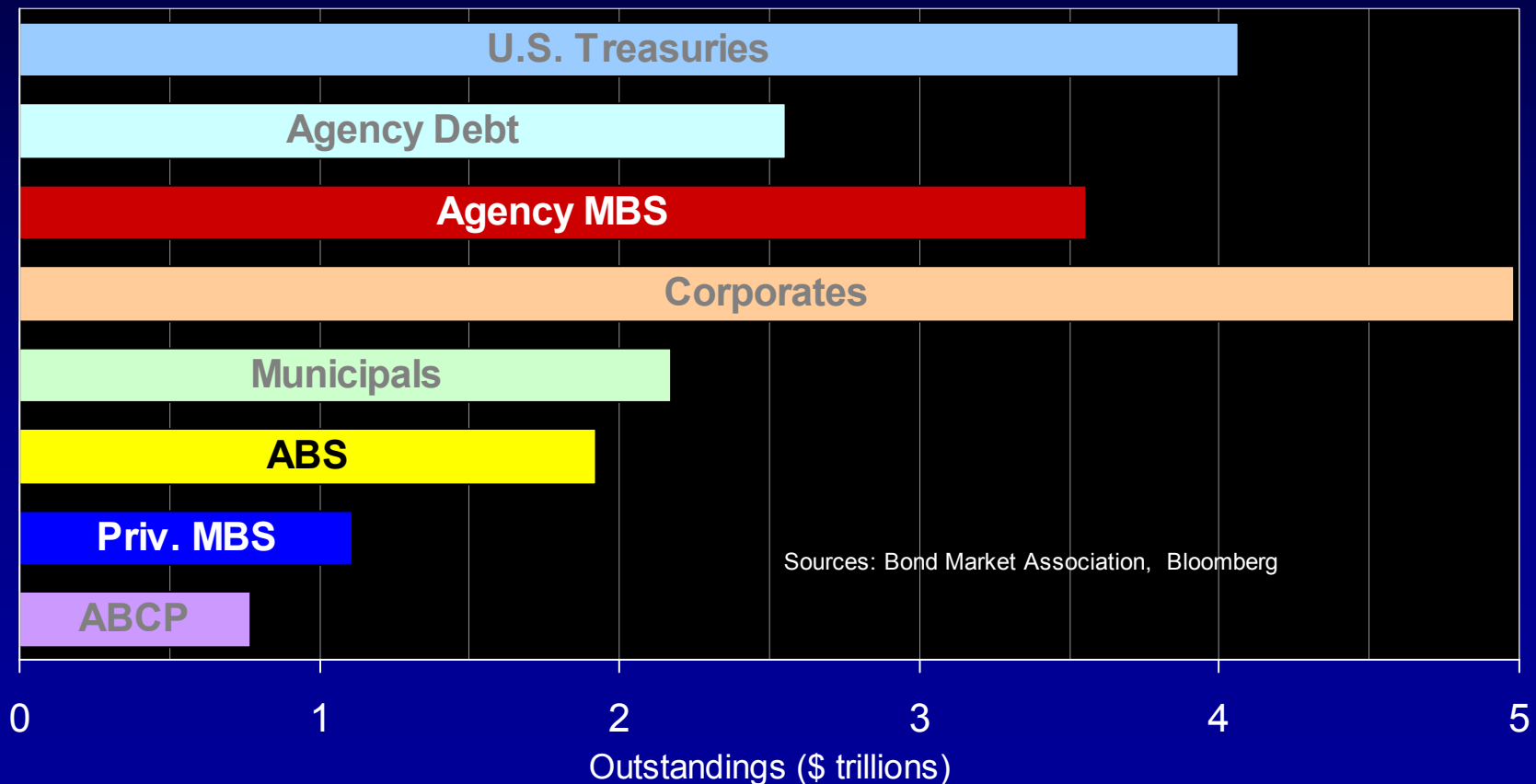
Selected Components, as of 30 September 2005 (\$ trillions)



MBS Are a Big Piece of the Bond Market

U.S. Debt Capital Markets

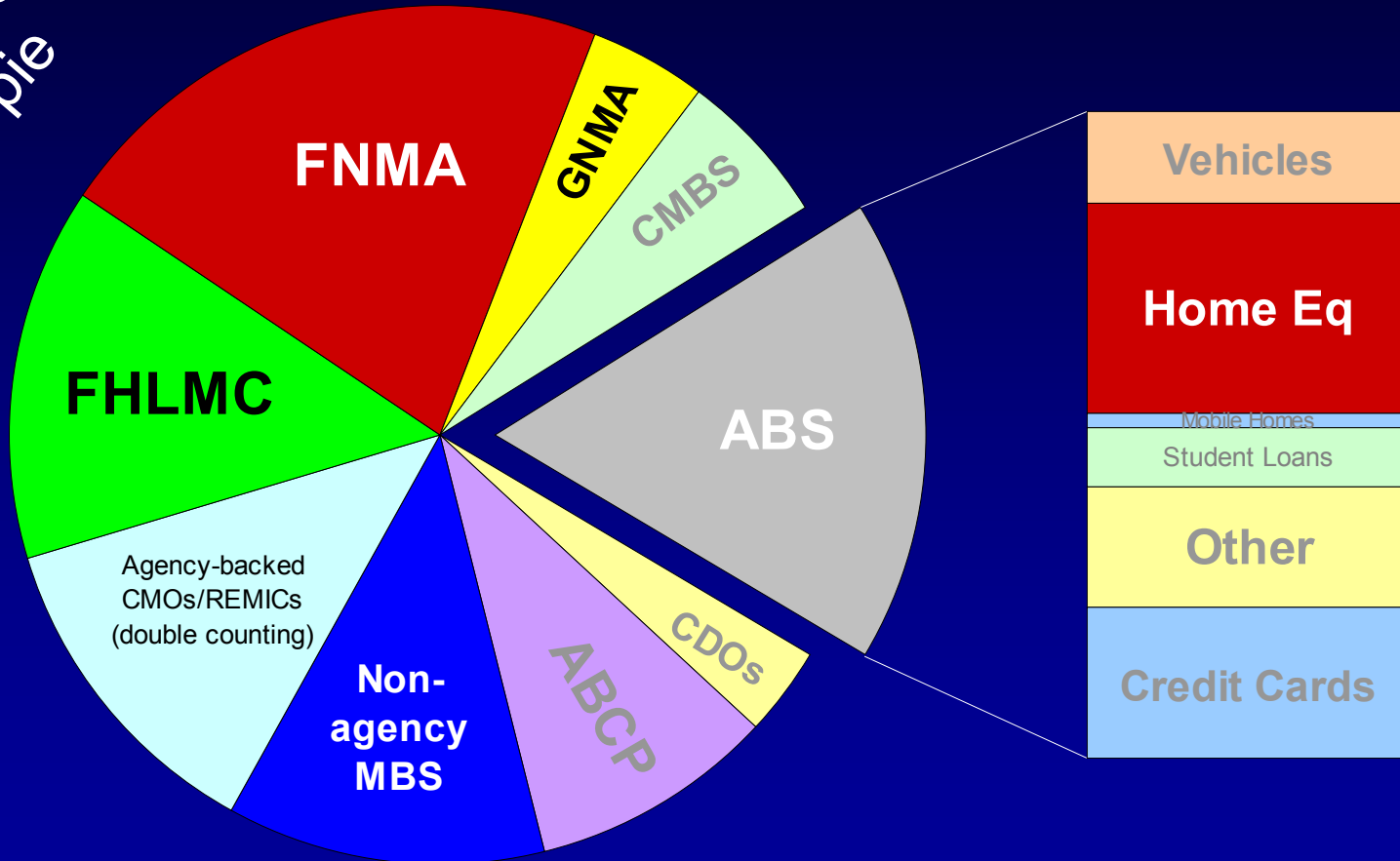
Selected Components, as of 30 September 2005 (\$ trillions)



MBS Are a Big Piece of the Securitization Market

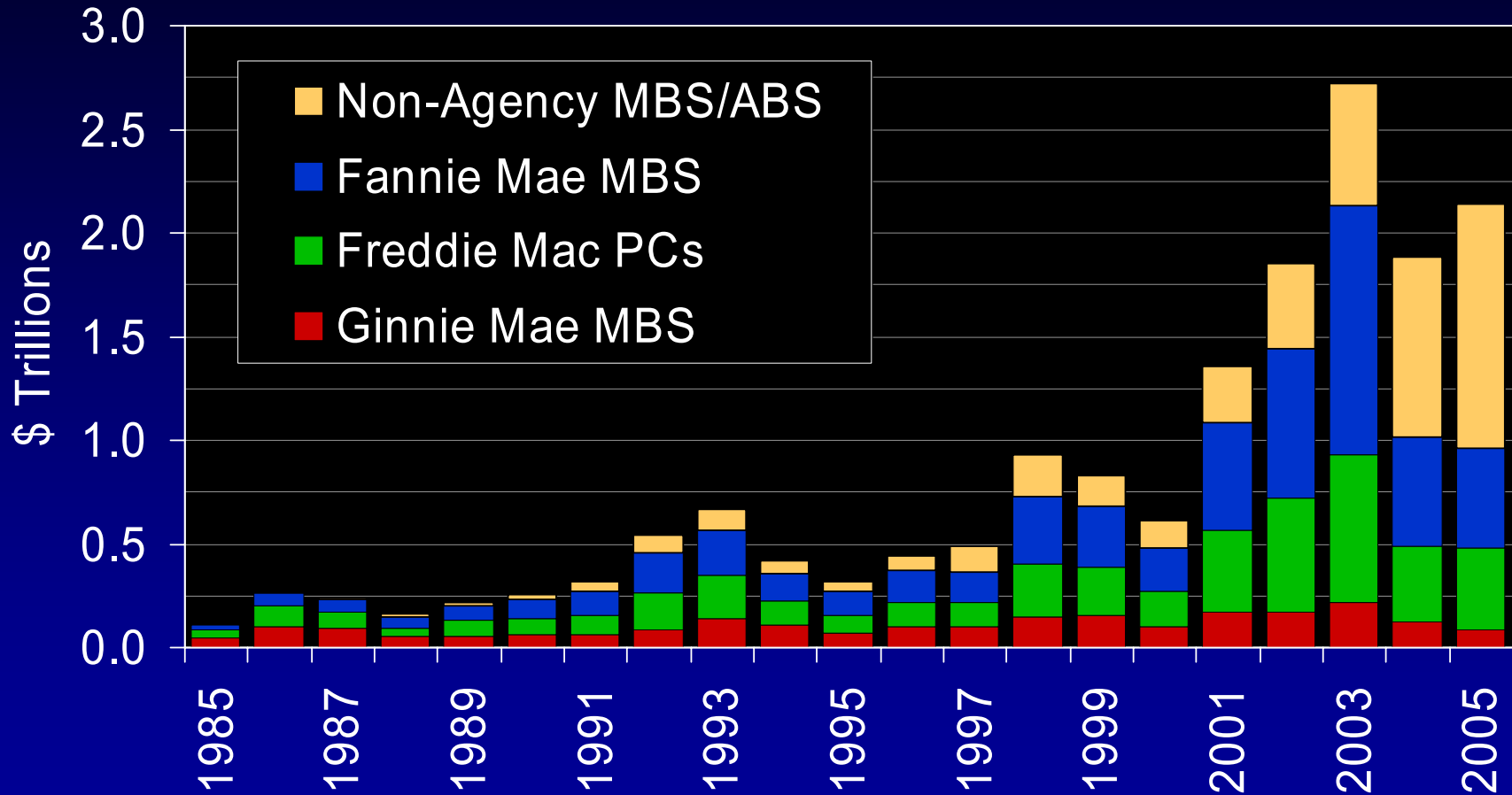
Outstandings as of 30 September 2005

\$9.02 trillion
total pie



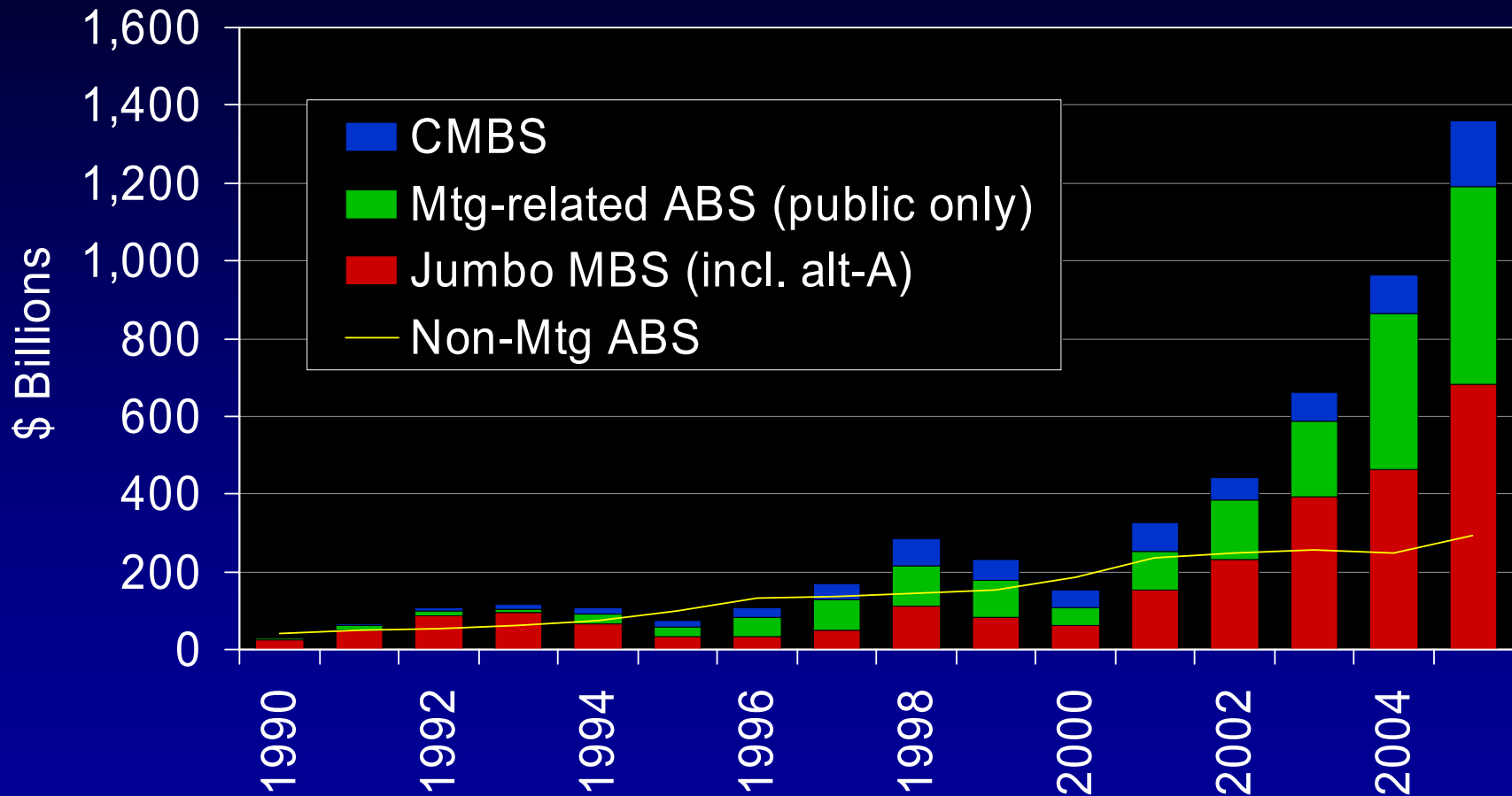
Sources: Bond Market Association, Bloomberg, Trepp

MBS Issuance Volume



Sources: Inside MBS & ABS 1/6/06. Note: Non-Agency MBS/ABS includes jumbo, alt-A, and subprime mortgage products.

Non-GSE MBS Issuance Volume



Sources: Moody's, *Commercial Mortgage Alert*, *Inside MBS & ABS*, The 2005 Mortgage Market Statistical Annual

Note: Mortgage-related ABS includes subprime mortgages, other home equity loans, and manufactured housing loans

Mortgage Loan Basics

- Traditional loan is 30-year, fixed rate, fully amortizing, payable monthly, and prepayable at any time
- Variations
 - 15-year, 20-year
 - adjustable interest rate (ARMs)
 - index
 - caps
 - hybrid (fixed/adjustable)
- Affordability features: interest only, negative am., 40-year
- Specialty mortgage products: alt-A, sub-prime

Refinancing: A Valuable Option

■ Fixed rate loans

- When interest rates fall, a borrower can refinance his loan at a lower interest rate
- When interest rates rise, a borrower has the benefit of having locked-in a lower rate in the past

■ Floating rate loans

- When interest rates fall, a borrower has the ability to "permanently" lock-in the benefit of the low rates by refinancing into a fixed rate loan
- When interest rates start to rise, a borrower can protect himself against further rate increases by refinancing into a fixed rate loan

Mortgage Loan = A Bond minus an Option

- Bond portion: obligation to pay principal and interest in monthly installments
- Option portion: opportunity to "call" (purchase) the bond at a price of par, at any time
- Lender is long the bond and short the option
- Borrower is short the bond and long the option
- Jargon: Mortgage loan contains an embedded short option
- Value of a mortgage loan is the value of the bond minus the value of the option
- Valuing the option is hard to do

MBS Basic Features (GSE MBS)

- Pass-through security
 - Monthly collections of interest and principal, including prepayments, "passed through" to investors
 - Servicer collects payments from borrowers (for a fee)
 - GSE guarantee protects investors from credit risk on loans
- Pass-through rate is like an interest rate on the MBS
 - Lower than the interest rates on the loans
 - Difference is the servicing fee plus the guarantee fee
- Loans backing an MBS are generally similar
 - Interest rates
 - Loan maturities

Basic MBS Cash Flow

Homeowners make monthly payments of principal and interest at the mortgage rate.

The servicer retains a portion of the interest component of each monthly payment as the "servicing fee."

The pass-through rate is the mortgage rate net of the servicing fee rate.

Homeowners

\$ ↓ Monthly P&I at the mortgage rate (e.g. 6.5%)

Servicer

\$ ↓ Monthly P&I at the pass-through rate (e.g. 6.0%)

Investors

Ginnie Mae – GNMA

- Guarantees securities issued by banks and mortgage banks that participate in Ginnie Mae programs
- Part of HUD
- Loans have federal insurance or guarantees (e.g. FHA or VA; usually low- or moderate income borrowers)
- Full faith and credit guarantee
- 0% risk weight for bank capital
- GN I: All loans have same interest rate
- GN II: Loan rates in 0.5% band
- Competes with sub-prime mortgage ABS for loans

Fannie Mae (FNMA) & Freddie Mac (FHLMC)

- Private corporations, federally chartered & regulated
- Directly issue MBS
- Accept conventional mortgage loans < \$417,000
- Cash and swap programs for lenders
- Regular and special servicing
 - with and without recourse; most sellers choose without
- Guarantees its own MBS against credit losses on the underlying loans
- Guarantee is not backed by the government
- 20% risk weight
- Loan Interest rates usually in 1.75% band

Private-Label MBS

- Issued by private companies
- No GSE guarantee
- Rated securities w/ subordination or other credit support
 - Subordinate tranches absorb losses before senior tranches
 - Mortgage loan credit quality:
 - Collateral – loan-to-value ratio (LTV)
 - Credit – credit score (FICO)
 - Capacity – debt-to-income ratio (DTI)
- Jumbo: loans above conforming limit
- Alt-A: loans that contain non-standard features but which have borrowers of "A" creditworthiness
- Securities backed by sub-prime mortgage loans are classified as "home equity ABS" rather than MBS

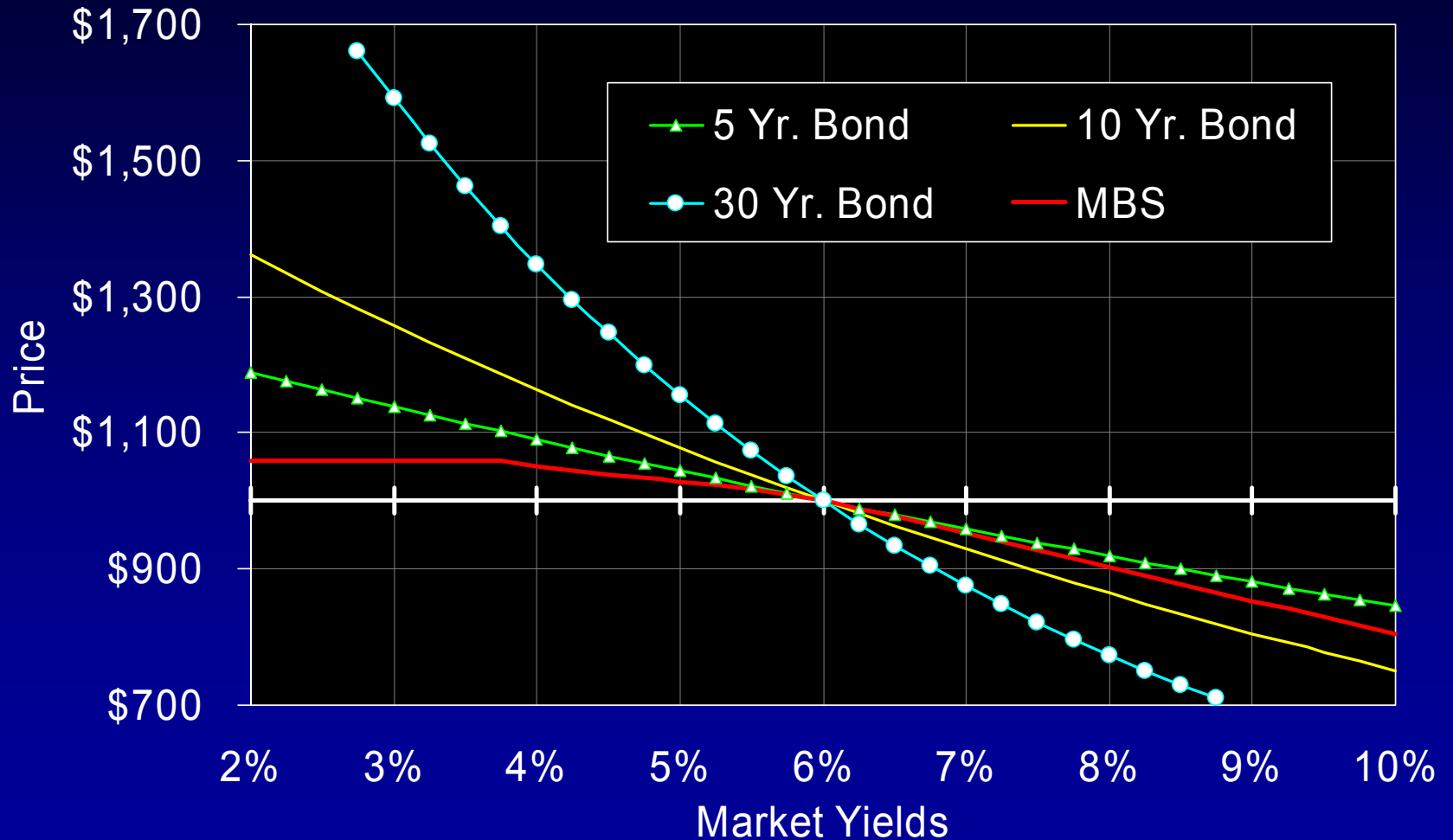
MBS Trading

- TBA (to be announced) pools traded generically
- Cheapest to deliver strategy
- Specified pools – investor knows exactly what he will get but he must pay more and can pick only from what is available
- BloombergSM system provides much information
- The whole GSE MBS market settles trades according to a fixed monthly cycle

MBS Valuation

- Dynamic analysis
- Prepayment models and assumptions
- Interest rate simulations
- Option adjusted spread (OAS) analysis:
 - Applies a fixed spread over benchmark interest rates to calculate a simulated price for the security under each scenario, as well as the average of the simulated prices across all scenarios
 - Adjusts the fixed spread and repeats the calculation process until the average of the simulated prices across all scenarios converges to the actual market price
 - Reported OAS is the fixed spread that equates the average of the simulated prices to the actual market price of the security
- MBS values falls when interest rates are more volatile
- Private label also must consider credit risk

Positive vs. Negative Convexity



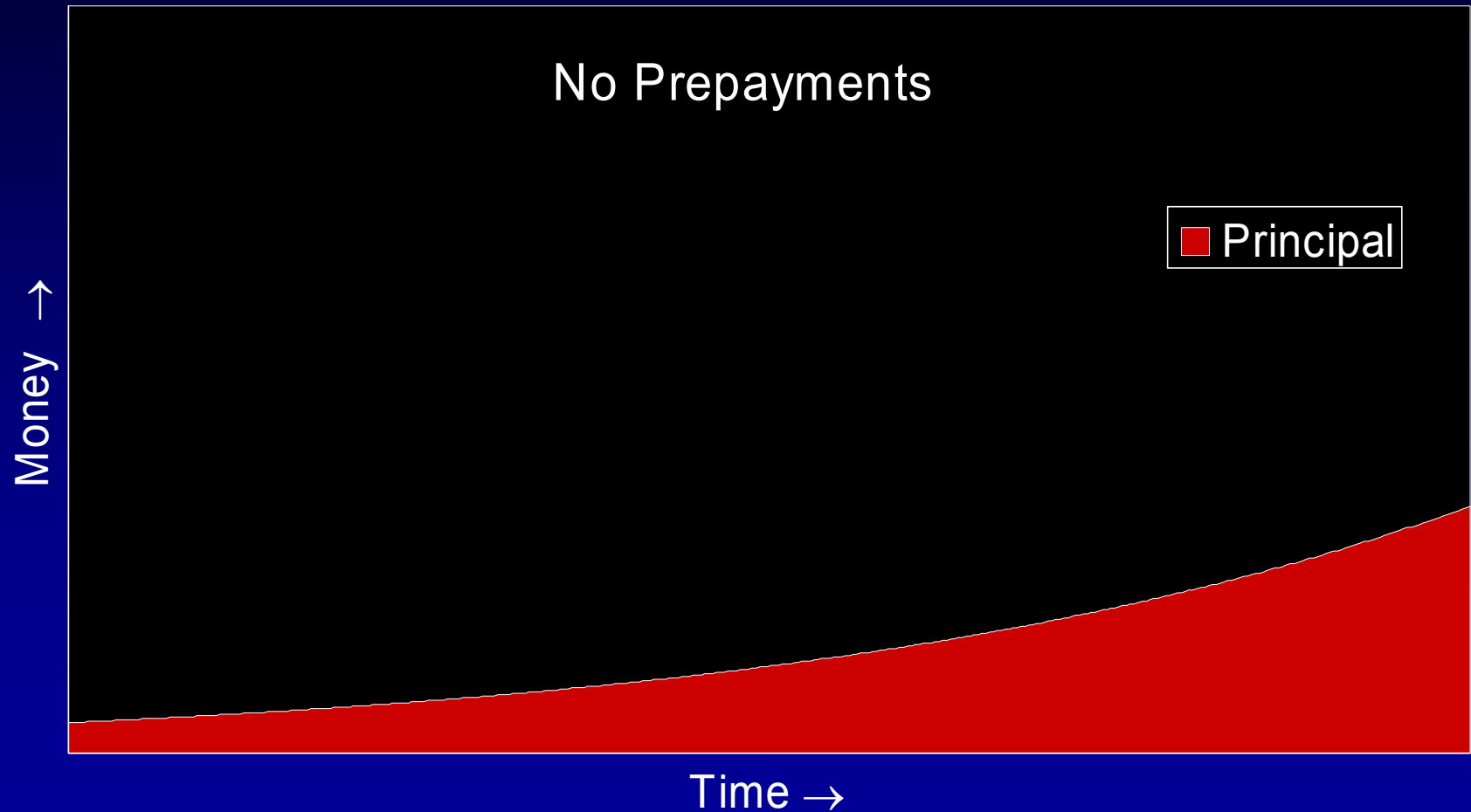
Structure: Prepayments (1)

Basic Cash Flows, 30 Year, 7% Mortgage Loan



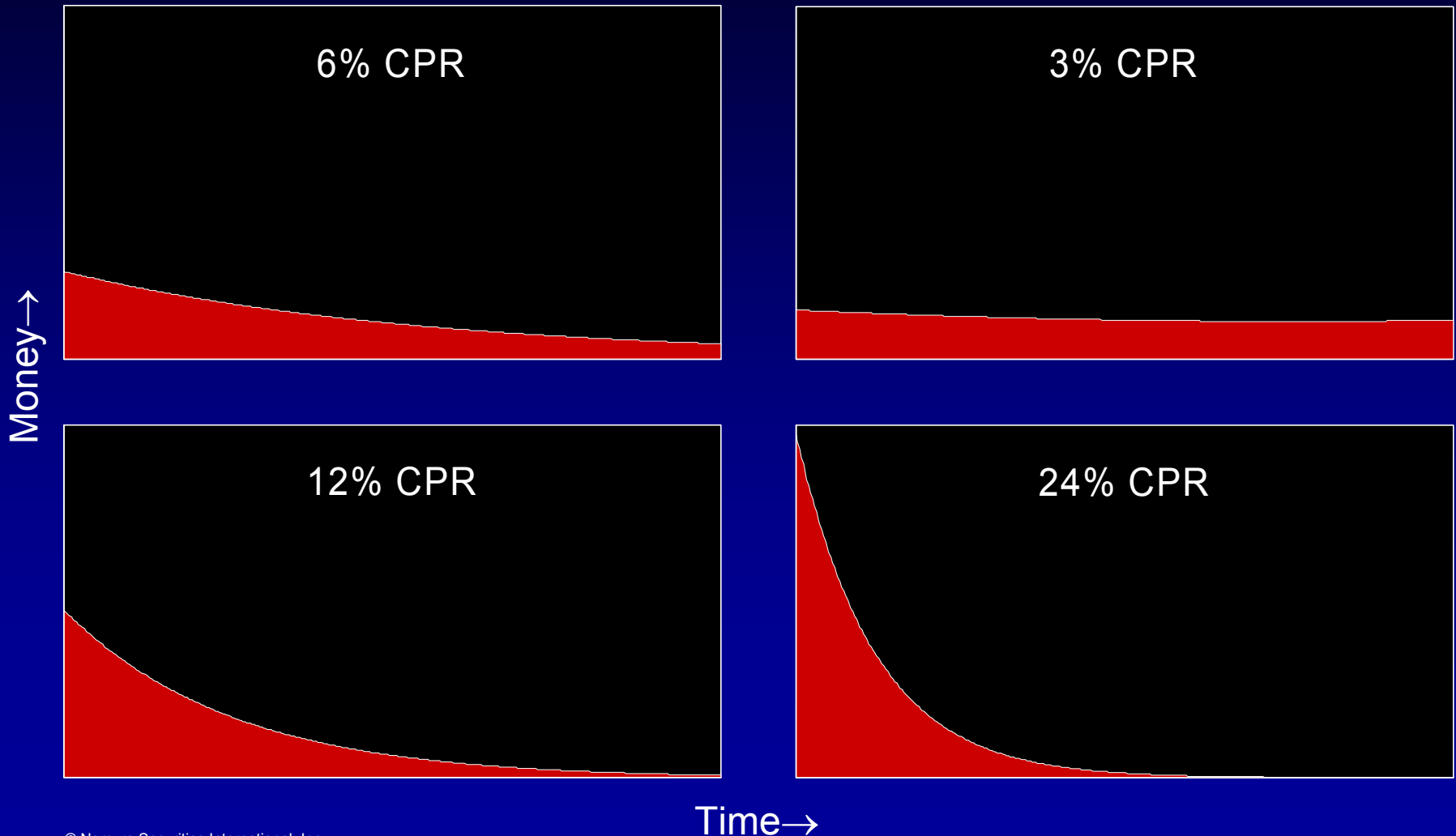
Structure: Prepayments (2)

Principal Cash Flows, 30 Year, 7% Mortgage Loan



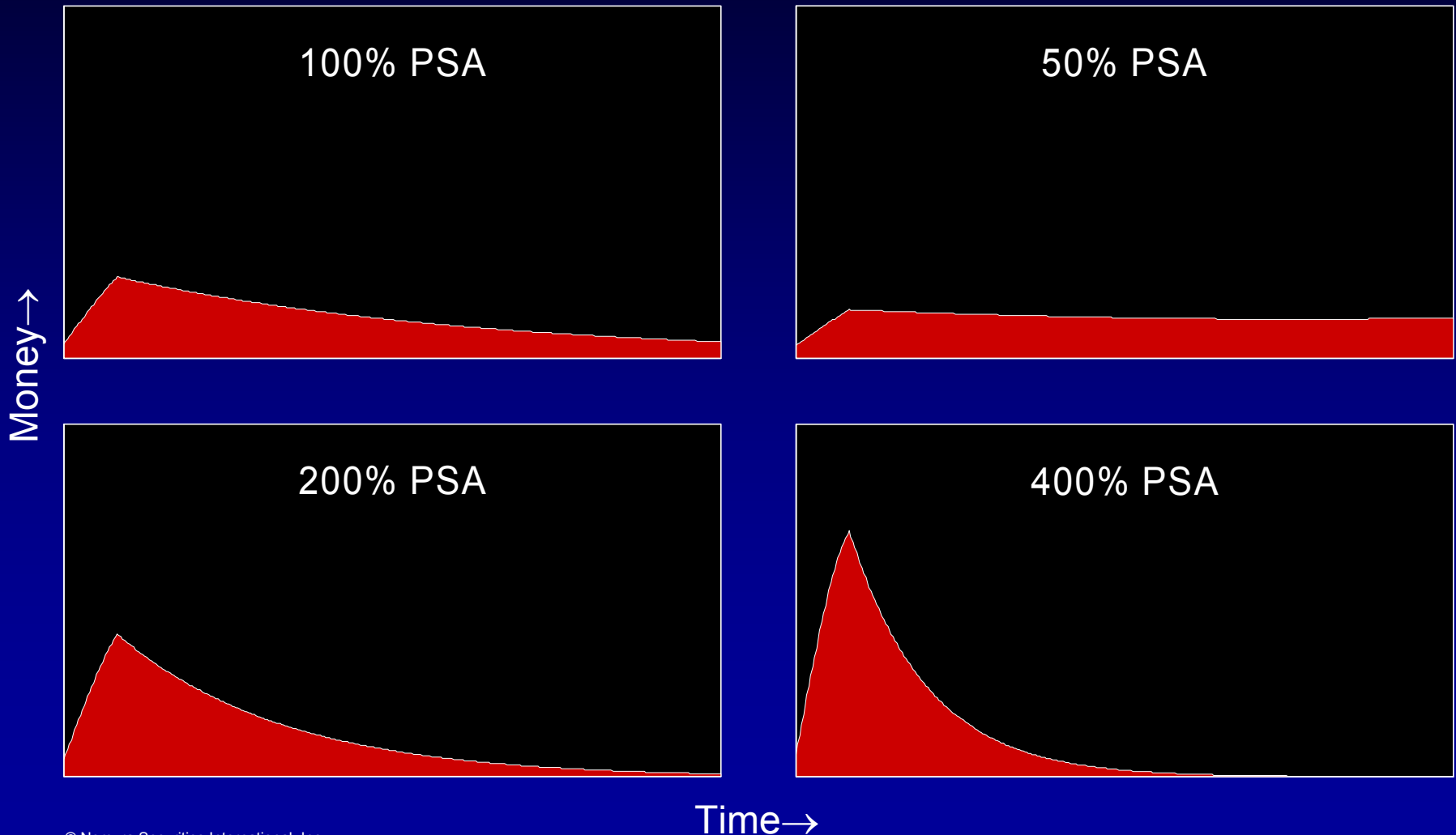
Structure: Prepayments (3)

Principal Cash Flows, 30 Year, 7% Mortgage Loans



Structure: Prepayments (4)

Principal Cash Flows, 30 Year, 7% Mortgage Loans



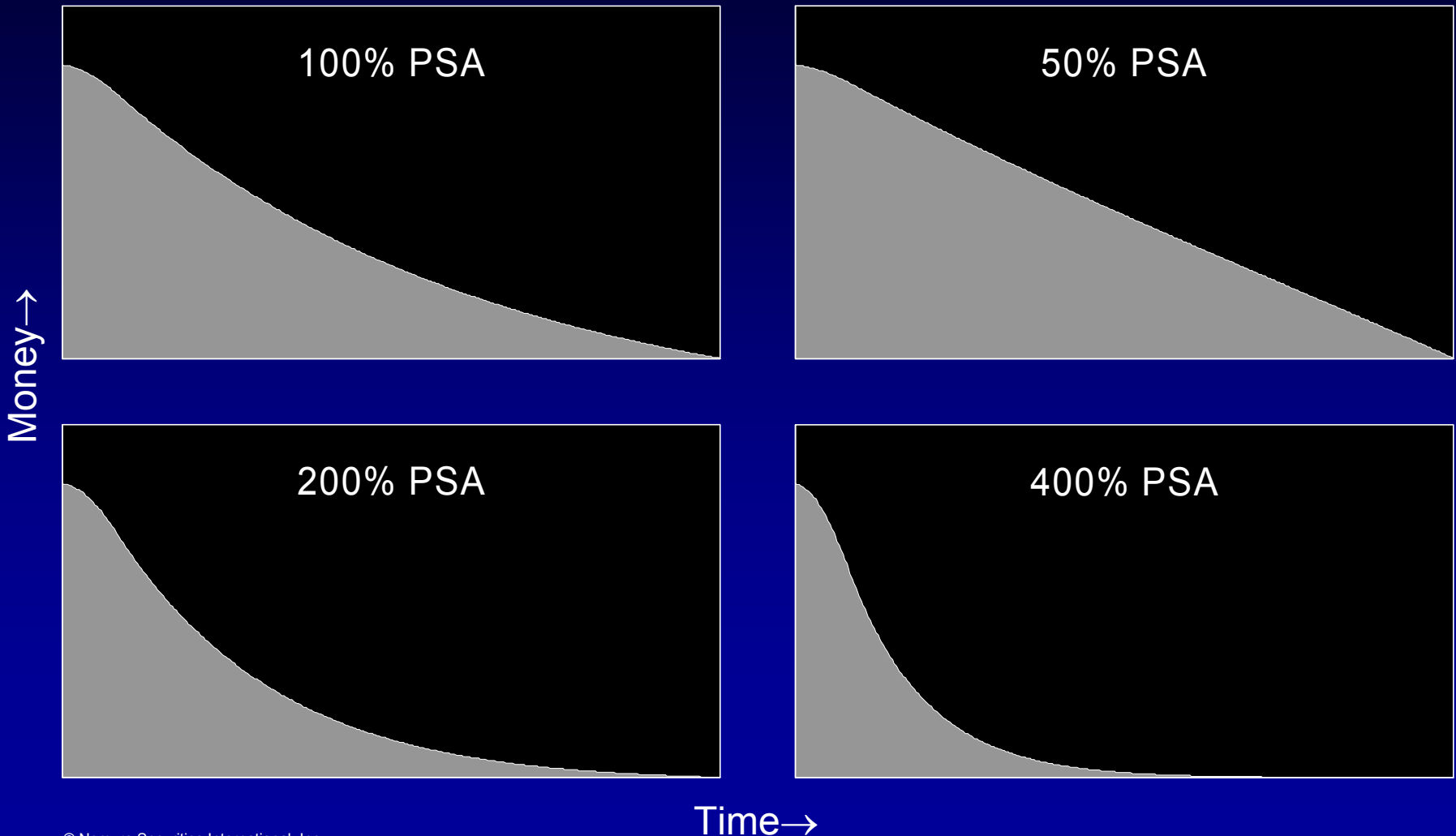
Structure: Prepayments (5)

Interest Cash Flows, 30 Year, 7% Mortgage Loan



Structure: Prepayments (6)

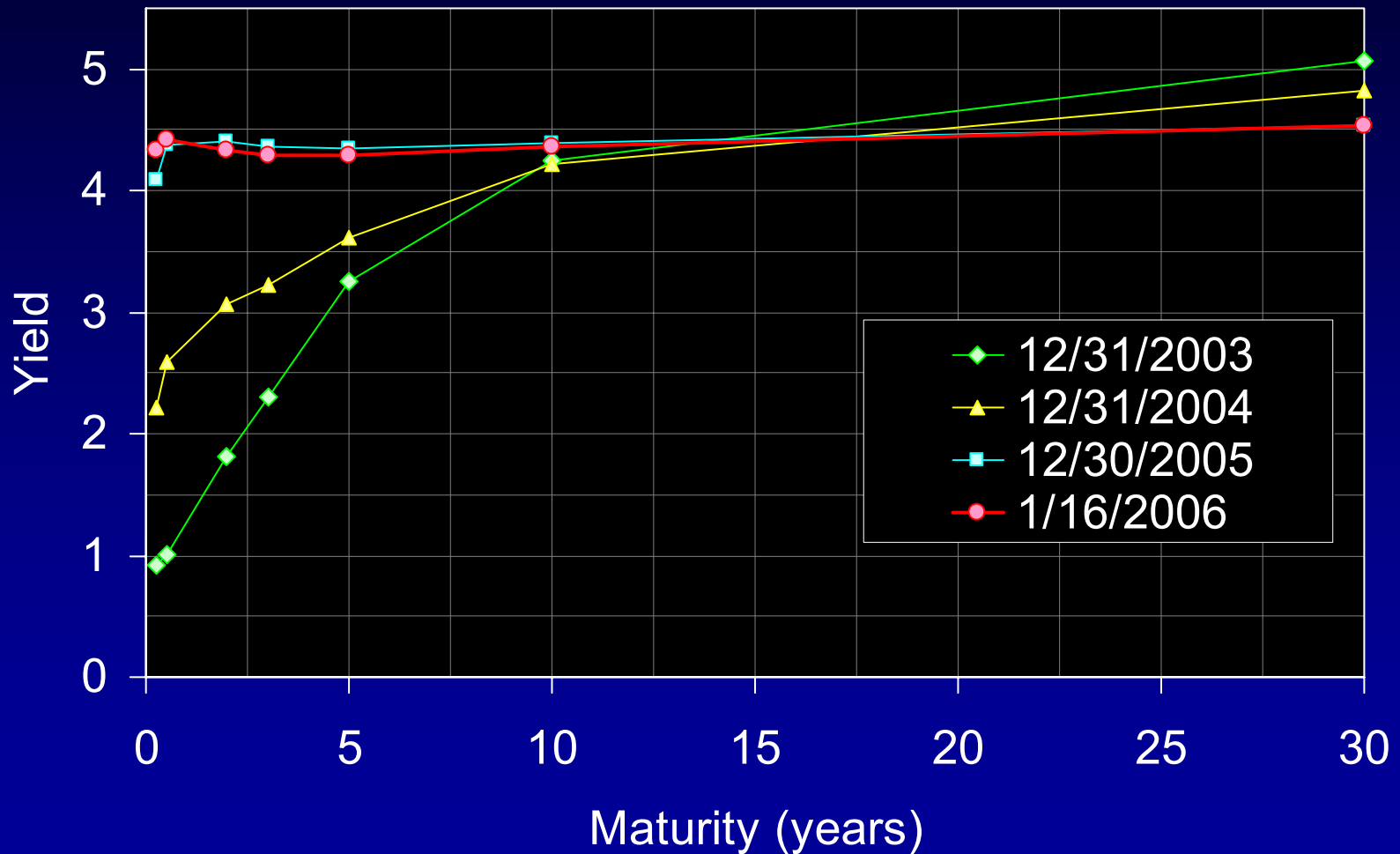
Interest Cash Flows, 30 Year, 7% Mortgage Loans



CMOs/REMICs

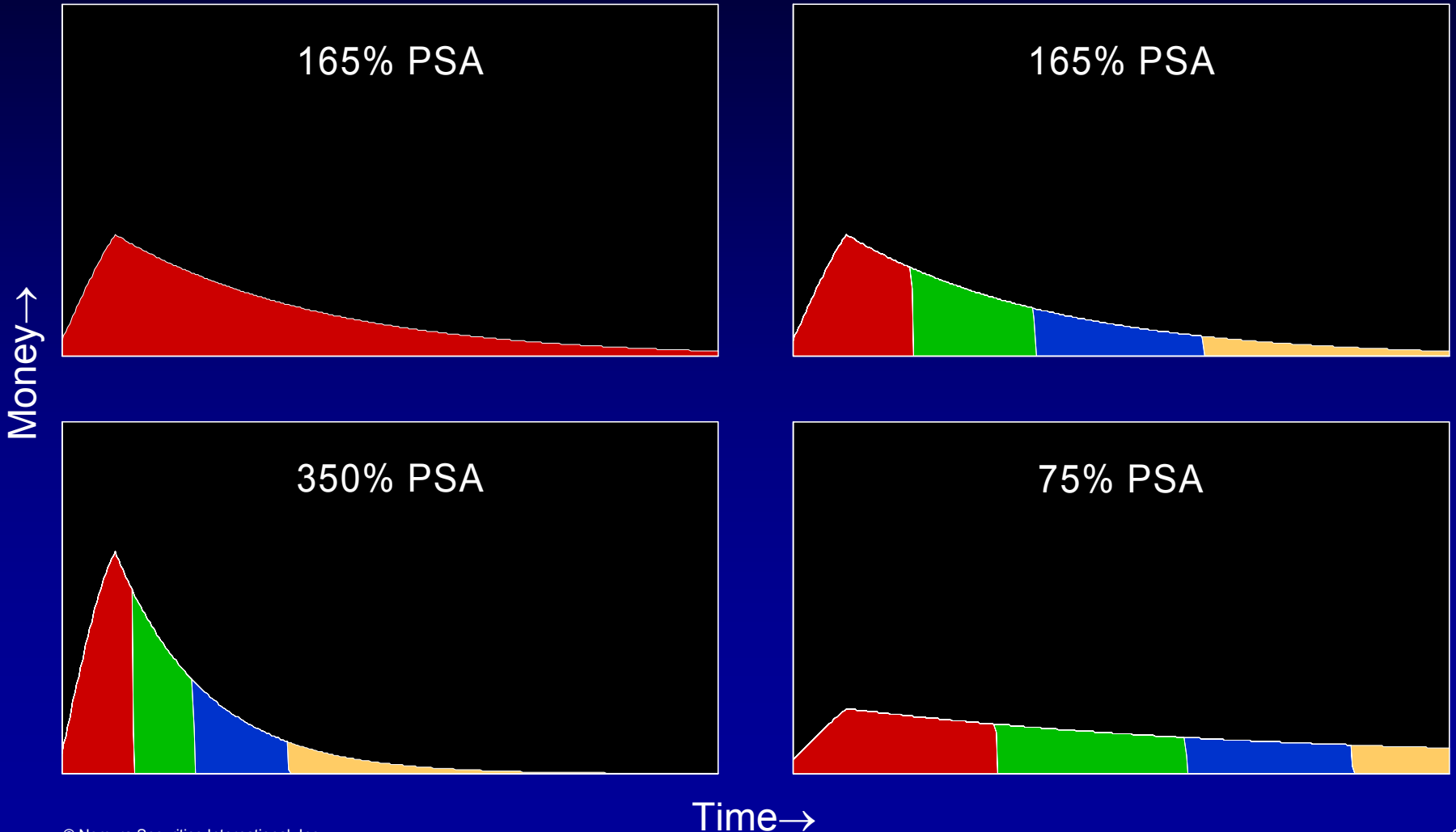
- Time-tranching of cash flows
- Underlying assets can be GSE MBS, raw mortgage loans, or other REMIC securities
- GSEs issue CMOs/REMICs
- Private MBS issuers typically structure all their deals as CMOs/REMICs

Treasury Yield Curves



Structure: Prepayments (7)

Slicing Principal Cash Flows over Time: Building a CMO



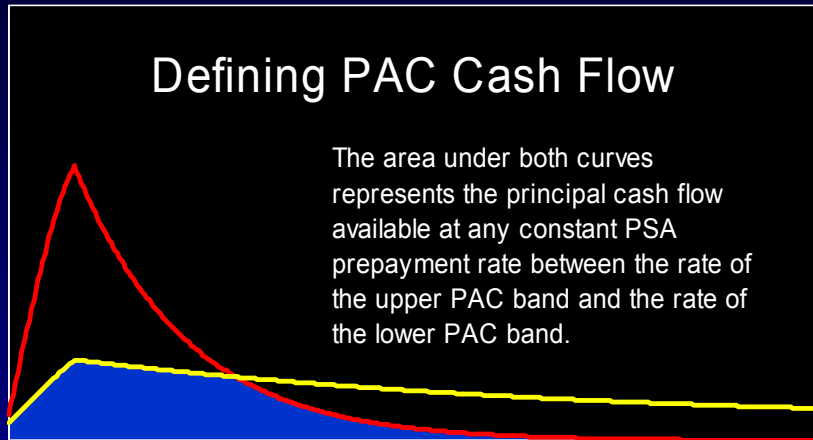
Structure: Prepayments (8)

Shifting Prepayment Risk: Building PAC Classes in a CMO

Defining PAC Cash Flow

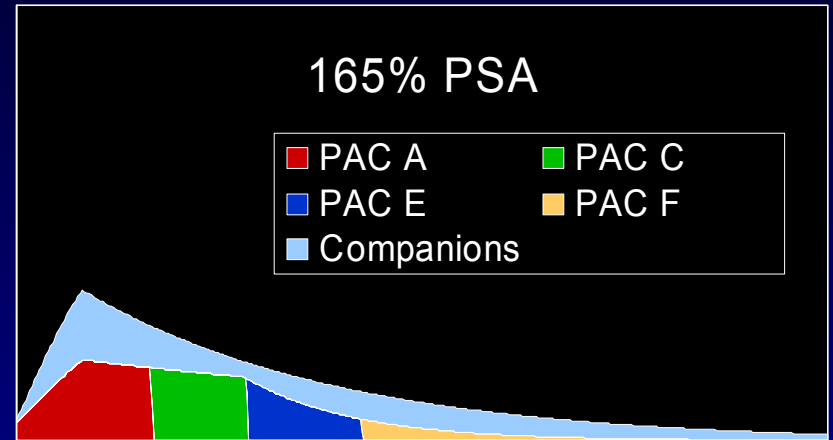
The area under both curves represents the principal cash flow available at any constant PSA prepayment rate between the rate of the upper PAC band and the rate of the lower PAC band.

Money →

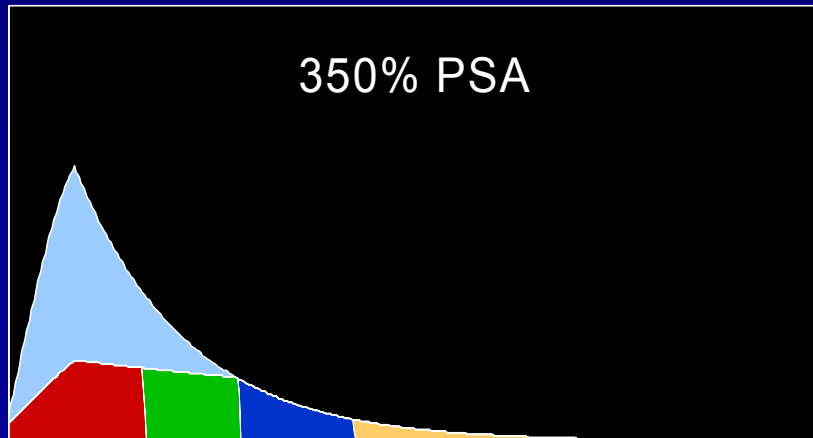


165% PSA

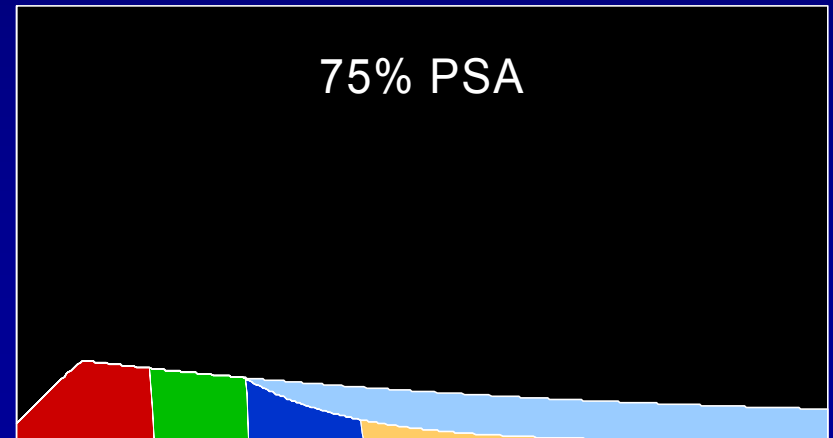
- PAC A
- PAC C
- PAC E
- PAC F
- Companions



350% PSA



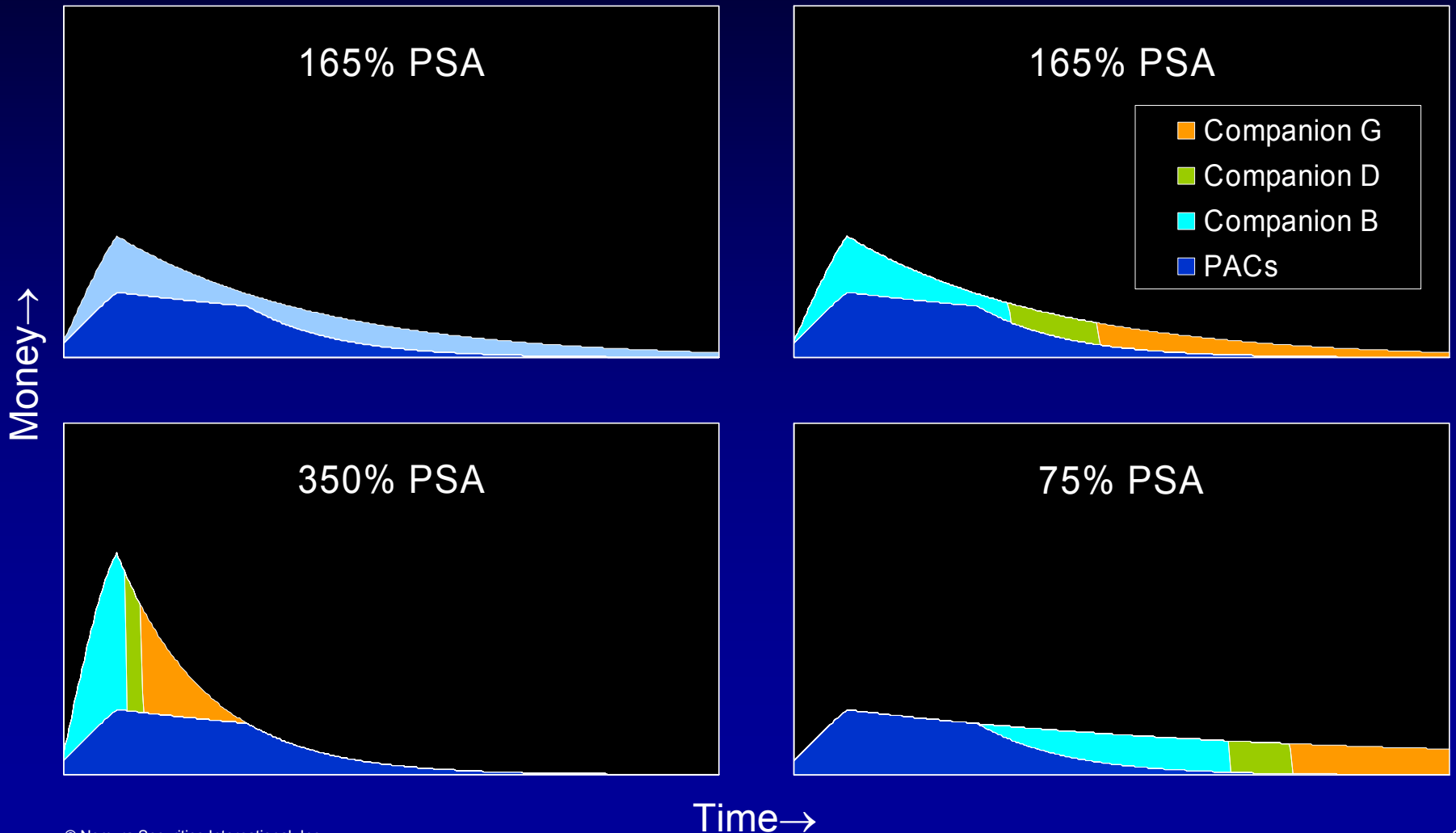
75% PSA



Time →

Structure: Prepayments (9)

Shifting Prepayment Risk: Sensitivity of Companion Classes



Conclusion

- Prepayments are the key to understanding MBS cash flows, performance and valuations
- MBS represent a large portion of all fixed income activity in the U.S.
- MBS represent the largest portion of securitization activity in the U.S.
- No fixed income professional can afford to be ignorant about MBS

Appendix

MBS Early History 1

- Long before the first mortgage-backed security was ever created, financial institutions engaged in the practice of "participating" in each other's loans. That is, one bank could purchase a "piece of the action" in another bank's loan to a borrower. Among the major commercial banks, this practice dates back to before the turn of the century.
- In partial response to the Great Depression, Congress established the Federal Housing Administration ("FHA") in 1934 to provide government guaranteed mortgage insurance.
- In 1938, the Federal National Mortgage Association ("FNMA") was chartered to provide a secondary market in FHA-insured mortgages.
 - FNMA originally performed two functions: the "special assistance" function and the "secondary mortgage market" function.
 - The special assistance function amounted to a form of subsidy to provide low interest rate mortgage loans through certain of the FHA programs. FNMA purchased at par certain FHA-insured mortgage loans with artificially low interest rates and, if required, resold the mortgage loans at discount prices. The loss incurred by FNMA through the special assistance function was borne by the U.S. Treasury.
 - The secondary mortgage market function was limited to FHA-insured mortgage loans. It was not a subsidy and was required to be completely self-supporting.
 - In 1948, FNMA purchased its first mortgage loan guaranteed by the Veterans Administration ("VA").
 - In 1949, the first secondary market transaction between two savings and loan associations took place.
 - In 1954, the FNMA Charter Act converted FNMA to a privately owned and financed corporation. Supervisory authority over FNMA remained in the Housing and Home Finance Agency. In 1957, the Federal Home Loan Bank Board ("FHLBB") issued the first regulations permitting the purchase and sale by thrift institutions of participation interests in mortgage loans.

MBS Early History 2

- In 1957, the Federal Home Loan Bank Board ("FHLBB") issued the first regulations permitting the purchase and sale by thrift institutions of participation interests in mortgage loans.
- In 1968, Congress created the Government National Mortgage Association ("GNMA") and transferred to GNMA the special assistance function formerly performed by FNMA. At that time, FNMA ceased to be a government agency but remained subject to the oversight of the Department of Housing and Urban Development ("HUD"). For purposes of this discussion, however, FNMA will be referred to as a government agency.
- In 1970, GNMA guaranteed the first publicly traded pass-through securities representing undivided interests in "pools" of FHA/VA mortgage loans.
- Also in 1970, Congress passed the Emergency Home Finance Act, which established the Federal Home Loan Mortgage Corporation ("FHLMC") to provide a secondary mortgage market for non-federally insured home mortgage loans ("conventional mortgage loans"). Congress also authorized FNMA to provide a secondary market for the same type of mortgage loans.
- In 1971, FHLMC introduced the first conventional mortgage pass-through certificate.
- From 1971 through 1977, virtually all mortgage-backed securities ("MBS") were either guaranteed by GNMA or issued directly by FHLMC. During that period the volume of outstanding MBS issued or guaranteed by the two agencies increased dramatically. FNMA had not yet become actively involved in issuing MBS. FNMA continued to purchase mortgage loans to hold in its portfolio and did not commence actively issuing MBS until later. Private institutions developed an interest in creating and issuing their own MBS without the involvement of the agencies.

MBS Early History 3

- In 1977, Bank of America National Trust & Savings Association became the first true private sector issuer of MBS.
- From 1978 to 1984, a limited number of private institutions became issuers of MBS. The major Wall Street investment banking firms established MBS departments. The major impediment to the growth of the market for private (i.e., non-agency) MBS were legal restrictions on the ability of regulated institutional investors to invest in private MBS.
- In June 1983, FHLMC issued the first collateralized mortgage obligations ("CMOs").
- In 1984, the Secondary Mortgage Market Enhancement Act of 1984 ("SMMEA") became law. The most important change brought about by SMMEA was the removal of restrictions on investment by regulated financial institutions in many private MBS.
- In July 1986, FNMA issued the first stripped MBS providing for disproportionate allocation of principal and interest between two classes of certificates representing interests in a single mortgage pool.
- In 1986, the Tax Reform Act of 1986 became law and established real estate mortgage investment conduits ("REMICs") as a new tax classification for CMOs and certain other MBS. The REMIC tax classification provided greater flexibility to issuers in structuring MBS and caused a further expansion of the MBS market.
- In August 1989, the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 ("FIRREA") was signed into law. FIRREA abolished the FHLBB and transferred certain of its regulatory functions to the newly created Office of Thrift Supervision ("OTS").

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