AcF 304 Financial Markets

Topic 2: Why Do Financial Financial Crises Occur and Why Are They So Damaging to the Economy?

Part 3 – Mortgage Backed Securities

Case: The Global Financial Crisis of 2007–2009 (1 of 4)

To understand this crisis we need to understand how Mortgage-Backed Securities work.

Case: The Global Financial Crisis of 2007–2009
A detour…U.S. Agency Mortgage-Backed Securities

*We will **not** be referring to The Mortgage Markets (Chapter 14) in the core FM& I textbook. Students should refer to lecture slides and below.*

- For Mortgage Bond Markets refer *Fabozzi*, Fixed Income Analysis, 2nd Edition, CFA Institute Investment Series, Wiley 2007, ISBN 0-470-05221-X. Chapter 3 'Overview of Bond Sectors and Instruments'- U.S. Agency Mortgage-Backed Securities - **Pages 46-52.**

- The Fabozzi text is easily available in electronic form via Lancaster University Library catalogue

A detour…U.S. Agency Mortgage-Backed Securities

Fannie Mae – Federal National Mortgage Association

Freddie Mac – Federal Home Loan Mortgage Corporation

Government agencies – semi-government bonds.

Purpose: Reduce the cost of capital (mortgages for house purchase) for sectors of the economy deemed important enough to warrant assistance e.g. farmers, students, homeowners

Use mortgage loans they underwrite or purchase as collateral

- Mortgage pass-through securities
- Collateralized mortgage obligations (CMOs)

Mortgage Loan

1. Loan Secured by the collateral (a real estate property): if not paid, the lender has the right to **foreclose** (seize) the property
2. Payments: interest, scheduled principal payment, prepayments
3. Prepayments: payments in excess of the required monthly mortgage payment. Occur when for example:
   - Early sale of the property
   - Natural disaster followed by insurance payment
   - Refinancings when interest rates go down.

A detour…U.S. Agency Mortgage-Backed Securities

Prepayment risk: i.e., If I am a bondholder getting 8% a year interest and rates fall to 3% I do not want my 8% bond to be paid back early.

Mortgage rate or contract rate: interest rate on the mortgage

Different types of mortgages:

- **Traditional fixed-rate fully amortizing**
- Floating rate
- Interest-only (fixed or floating)
- Partial amortizing (fixed or floating)

Traditional fixed-rate fully amortizing

My monthly mortgage payment comprises of

- Interest
- Principal repayment.

EXHIBIT 5 Amortization Schedule for a Level-Payment, Fixed-Rate, Fully Amortized Mortgage (Selected Months)

Mortgage loan: $100,000 | Monthly payment: $742.50
Mortgage rate: 8.125% | Term of loan: 30 years (360 months)

(1) Month	(2) Beginning of Month Mortgage Balance	(3) Mortgage Payment	(4) Interest	(5) Scheduled Principal Repayment	(6) End of Month Mortgage Balance
1	$100,000.00	$742.50	$677.08	$65.41	$99,934.59
2	99,934.59	742.50	676.64	65.86	99,868.73
3	99,868.73	742.50	676.19	66.30	99,802.43
4	99,802.43	742.50	675.75	66.75	99,735.68
...	...	...	...	...	...
25	98,301.53	742.50	665.58	76.91	98,224.62
26	98,224.62	742.50	665.06	77.43	98,147.19
27	98,147.19	742.50	664.54	77.96	98,069.23
...	...	...	...	...	...
184	76,446.29	742.50	517.61	224.89	76,221.40
185	76,221.40	742.50	516.08	226.41	75,994.99
186	75,994.99	742.50	514.55	227.95	75,767.04
...	...	...	...	...	...
289	42,200.92	742.50	285.74	456.76	41,744.15
290	41,744.15	742.50	282.64	459.85	41,284.30
291	41,284.30	742.50	279.53	462.97	40,821.33
...	...	...	...	...	...
358	2,197.66	742.50	14.88	727.62	1,470.05
359	1,470.05	742.50	9.95	732.54	737.50
360	737.50	742.50	4.99	737.50	0.00

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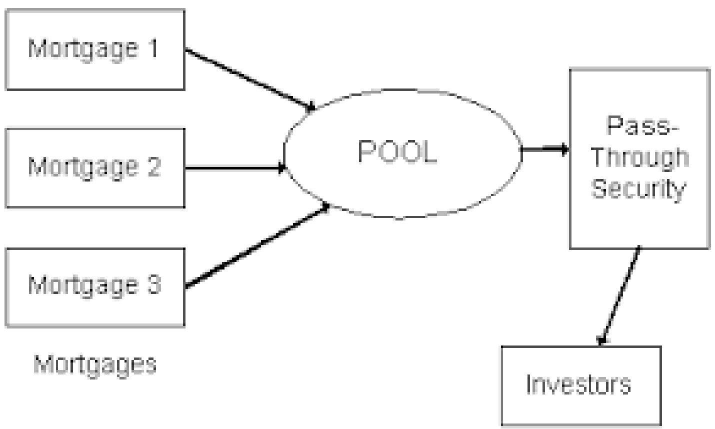
Our illustration of the cash flow for a level payment, fixed rate, fully amortized mortgage assumes that the homeownwer does not pay off any portion of the mortgage principal balance prior to the scheduled payment date.

But homeowners do pay off mortgages early – prepayment risk to the lender of the mortgage or to a bondholder whose bond is based on mortgage payments.

- Mortgage Pass-through securities

- Holders (Fannie Mae / Freddie Mac) of the mortgages form a pool of mortgages and sells shares

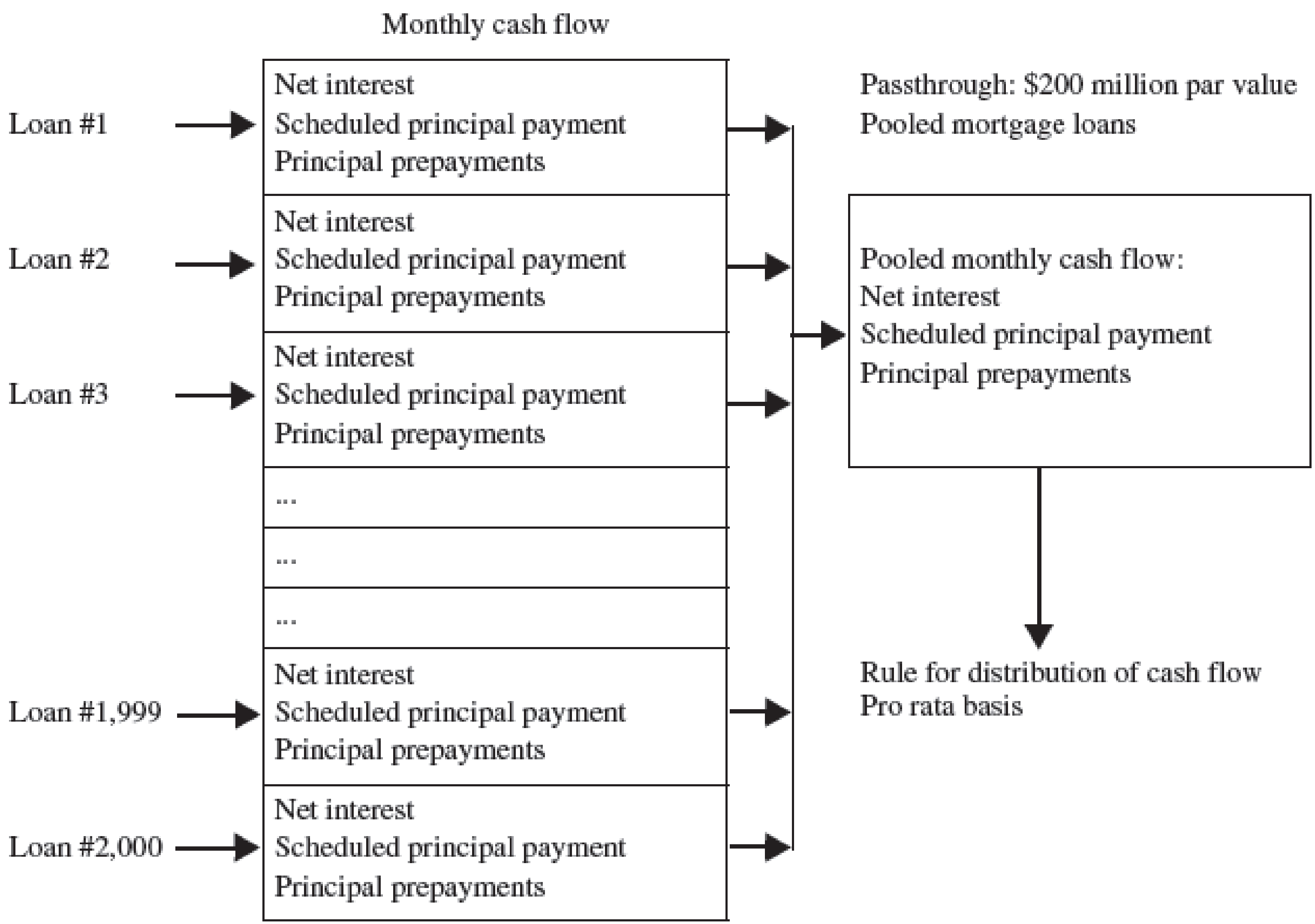
or participation certificates in the pool



Mortgage Pass-through securities

- Holders of the mortgages form a pool of mortgages and sells shares or participation certificates in the pool
- Monthly mortgage payments are passed through to the (bond) certificate holders on a pro rata basis
- When mortgages in the pool are collateralized, the mortgage pool is considered to be securitized
- The exact cash flow amount received by the bond investor is uncertain: depends on the cash flow of the borrowers/mortgage holders in the pool (principal and interest less any servicing fees)
- Looking at 1 individual mortgage the prepayment risk is potentiall high.Looking at a pool of 2000 mortgages prepayment risk is reduced.

EXHIBIT 7 Creation of a Passthrough Security



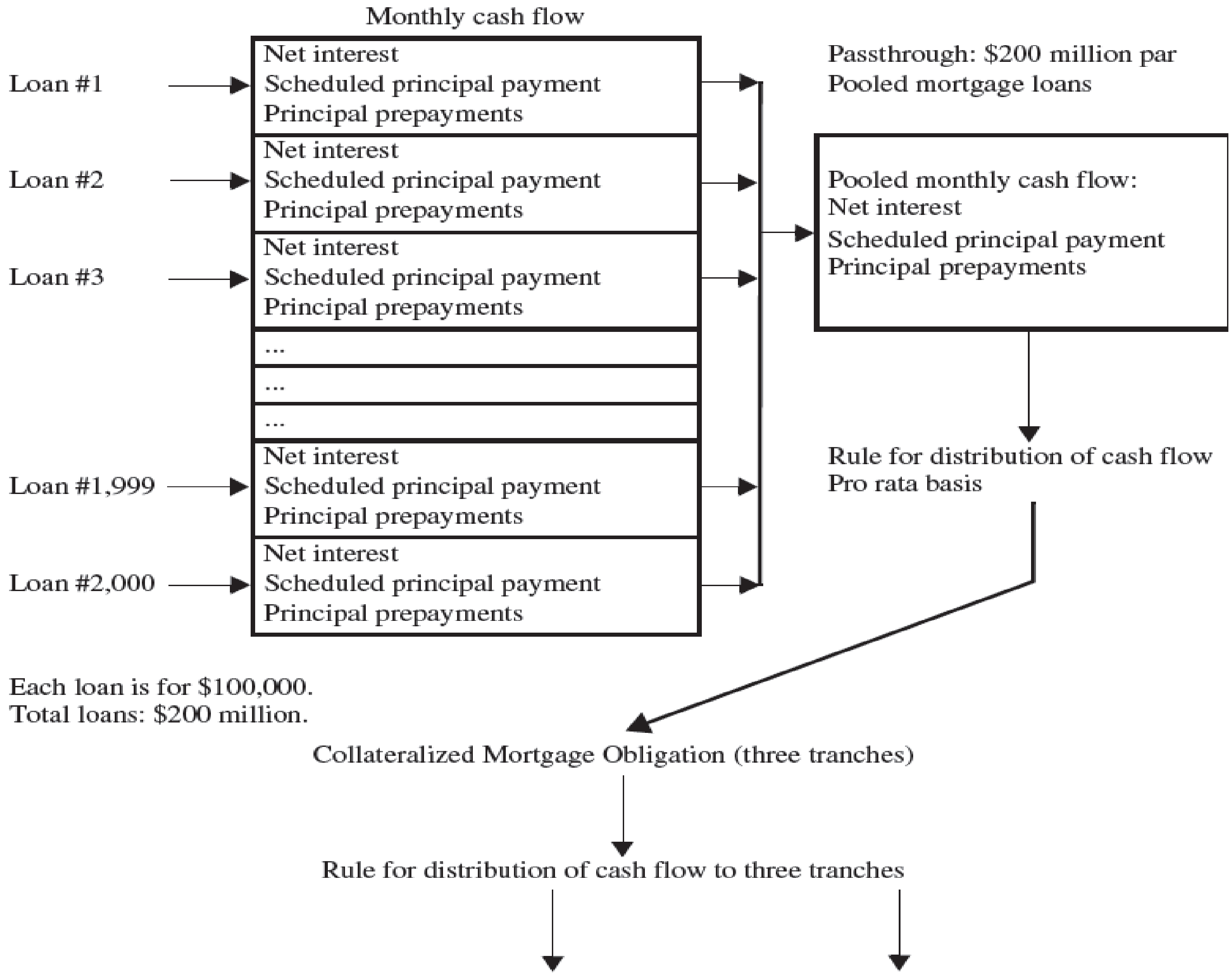
Each loan is for $100,000.
Total loans: $200 million.

Mortgage Pass-through Securities versus a 'Normal' Coupon Bonds

	Mortgage Pass-through	Coupon bonds
Principal payments prior to maturity	Yes	No
Payments	Monthly	Annual /Semi-annual
Payment uncertainty	Higher (prepayments)	No

- Collateralized Mortage Obligations
  - There are rules for the payment of interest and principal (scheduled and prepaid) to the bond classes (tranches) in the CMO
  - The purpose of the CMO is to redistribute prepayment risk to **different tranches**

EXHIBIT 8 Creation of a Collateralized Mortgage Obligation



Tranche (par value)	Net interest	Principal
A ($80 million)	Pay each month based on par amount outstanding	Receives all monthly principal until completely paid off
B ($70 million)	Pay each month based on par amount outstanding	After Tranche A paid off, receives all monthly principal
C ($50 million)	Pay each month based on par amount outstanding	After Tanche B paid off, receives all monthly principal

Collateralized Debt Obligations (CDOs)

1. Significant growth in recent years until the subprime mortgage crisis
2. Similar to collateralized mortgage obligation (CMO), except that the assets pledged as collateral are:

- Credit Cards
- Domestic and foreign bonds
- Bank loans
- Distressed debt
- Foreign bank loans
- Asset-backed securities
- Commercial and residential mortgage-backed securities

CDOs are packaged to provide unique income streams and risk levels (tranches)

CDOs…a recap (1 of 3)

Collateralized Debt Obligations (CDOs) role in the crisis.

- A *special purpose vehicle* (SPV) is created to buy assets, create securities from those assets, and then sell those securities to investors.
- In a CDO, the securities (or tranches) are created based on default priorities. The first defaults go to the lowest rated tranches. The highest rated tranches only suffer defaults if most of the assets default.

CDOs (2 of 3)

There are many, many tranches in a CDO, each with different exposure to defaults:

- The highest rated tranches are called ***super senior*** tranches
- The next bucket is known as the ***senior*** tranche – it has a little more risk and pays a higher interest rate
- The next tranche is the ***mezzanine*** tranche - it bears more risk and has an even higher interest
- The lowest tranche is the ***equity*** tranche - this is the first tranche that suffers losses from defaults

CDOs (3 of 3)

- If this sounds complicated, you are right. It can be difficult to determine exactly what they are worth and who has the rights to what cash flows.
- In a speech in the middle of the crisis, Ben Bernanke, the chairman of the Federal Reserve, joked that he “would like to know what those damn things are worth.”
- Bottom line - increased complexity of structured products can actually reduce the amount of information in financial markets. Makes you wonder who is willing to buy these in the first place!

AcF 304 Financial Markets

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Part 4 – 2008 Financial Crisis