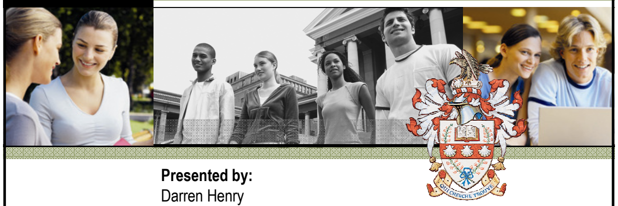
DEBT SECURITIES

Topic 10: Mortgage backed securities

LA TROBE UNIVERSITY — Faculty of Law and Management



Presented by:
Darren Henry
Associate Professor of Finance
Department of Finance, La Trobe Business School

LA TROBE UNIVERSITY — Mortgage backed securities

Student learning objectives

10.1 Describe a mortgage loan and outline the various types or forms of mortgage loans;

10.2 Describe prepayments and how they result in prepayment risk;

10.3 Illustrate the investment characteristics of mortgage passthrough securities;

10.4 Calculate the prepayment amount for a month, given the single monthly mortality rate;

10.5 Compare and contrast the conditional prepayment rate (CPR) to the Public Securities Association (PSA) prepayment benchmark;

LA TROBE UNIVERSITY — Mortgage backed securities

Student learning objectives

10.6 Explain why the average life of a mortgage-backed security is a more relevant measure than the security's maturity;

10.7 Explain the factors that affect prepayments;

10.8 Explain contraction and extension prepayment risks and why they occur;

10.9 Illustrate how a collateralized mortgage obligation (CMO) is created and how it provides a better matching of assets and liabilities for institutional investors;

10.10 Outline the workings of a sequential pay tranche in a CMO and the construction of an amortisation schedule associated with a sequential tranche CMO

LA TROBE UNIVERSITY — Mortgage backed securities

References

> **Fabozzi, F.J. (2007)** *Fixed Income Analysis*. John Wiley and Sons. Chapter 10.

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.1

Mortgage loans

- A **mortgage loan** is a loan secured by the collateral of some specified real estate property which obliges the borrower to make a predetermined series of payments.
  - A mortgage gives the lender the right, if the borrower defaults, to foreclose on the loan and seize the property in order to ensure that the debt is paid off
  - The interest rate on the mortgage loan is called the "mortgage rate"
  - There are many different types of mortgage designs; however, the most common in the U.S. is the fixed-rate, level-payment, fully amortising mortgage
    - Other forms of mortgages are adjustable-rate mortgages, balloon mortgages, growing equity mortgages, reverse mortgages and tiered-payment mortgages
- Have talked earlier in semester about the basics of mortgages – such as calculating mortgage payments and amortisation schedules

---

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.2

Prepayment patterns and prepayment risk

- A major concern associated with investing in mortgage securities is the impact of prepayments
  - A prepayment represents an additional payment of principal in excess of the scheduled principal payment comprising part of the monthly mortgage payment
  - With mortgage loans borrowers have the right to make prepayments of any amount and at any time (in any month). These could represent once-off or regular additional payments (known as curtailments) and could be for up to the total outstanding mortgage balance (known as a prepayment)
  - The effect is to increase the uncertainty associated with the pattern of expected future cash flow for lenders (mortgage holders) and, thus, the risk of their investment
  - This also increases the difficulty in valuing mortgage securities, and requires an assumption to be made about the expected future prepayment pattern / rate

LA TROBE UNIVERSITY | Mortgage backed securities

Objective 10.3

Mortgage passthrough securities

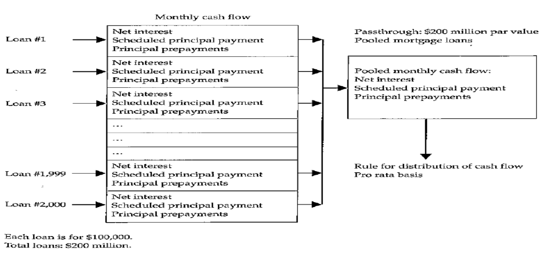
- A mortgage passthrough security is a security created when one or more holders of mortgages form a pool of mortgages and sell shares or participation certificates in the pool
- For example:
  - An investor purchases 2,000 mortgage loans of $100,000 each
  - He then issues 200,000 certificates of $1,000 each secured by the pool of mortgages, with each certificate entitled to 1 / 200,000 of the cash flow (0.0005%)
- The effect is to reduce the prepayment risk to any one certificate holder
- Mortgage passthough securities are issued by Ginnie Mae, Fannie Mae and Freddie Mac, as well as by private organisations

LA TROBE UNIVERSITY | Mortgage backed securities

Objective 10.3

Mortgage passthrough securities

EXHIBIT 67-7 Creation of a Passthrough Security



LA TROBE UNIVERSITY | Mortgage backed securities

Objective 10.3

Cash flow characteristics of passthrough securities

- The cash flow of a mortgage passthrough security depends on the cash flow of the underlying pool of mortgages
- The coupon rate on a passthrough is called the passthrough rate
  - This is less than the mortgage rate on the underlying pool of mortgages by an amount equal to servicing and guaranteeing fees
  - If underlying mortgages differ as to mortgage rates, a weighted average coupon rate, WAC, is calculated
- The timing of the cash flow is also different, lagging the monthly payments on the mortgages (which is normally on the 1st of the month)
- The maturity of the passthrough will equal the weighted average maturity of the underlying mortgages

LA TROBE UNIVERSITY | Mortgage backed securities

Example 10.3.1

WAC and WAM

?

Loan	Outstanding balance	Weight in pool	Mortgage rate	Months remaining
1	$125,000	22.12%	7.50%	275
2	$85,000	15.04%	7.20%	260
3	$175,000	30.97%	7.00%	290
4	$110,000	19.47%	7.80%	285
5	$70,000	12.39%	6.90%	270

- **Based on the above pool of loans calculate the WAC and WAM.**

LA TROBE UNIVERSITY | Mortgage backed securities

Example 10.3.1

WAC and WAM

Loan	Outstanding balance	Weight in pool	Mortgage rate	Months remaining
1	$125,000	22.12%	7.50%	275
2	$85,000	15.04%	7.20%	260
3	$175,000	30.97%	7.00%	290
4	$110,000	19.47%	7.80%	285
5	$70,000	12.39%	6.90%	270

LA TROBE UNIVERSITY | Mortgage backed securities

Objective 10.3

Types of passthrough securities

- Agency passthrough securities
  - Issued by Ginnie Mae (a federally-related institution)
  - Backed by the full faith and credit of Federal Government
  - Includes only conforming mortgages, which meet specified underwriting standards, such as maximum size, minimum documentation and maximum loan-to-value ratio
- Conventional passthrough securities
  - Issued by Fannie Mae and Freddie Mac (corporate instrumentalities)
  - Includes only conforming mortgages
  - Carry an implied guarantee, but not the full faith and backing of the Government
- Non-agency mortgage passthrough securities
  - Issued privately
  - Includes non-conforming mortgages, supported by credit enhancements

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.3

Quoted price of passthrough securities

- Passthrough prices are quoted in the same manner as U.S. Treasury coupon securities
  - E.g. 94-05 is 94 and 5/32nds of par value or 94.15625% of par value
  - The price the buyer pays is the agreed sale price plus accrued interest
  - Given the par value, the dollar price (excluding accrued interest) equals the quoted price multiplied by par value multiplied by a **pool factor**, where the pool factor equals the percentage of the initial mortgage balance outstanding
  - For example, if the parties agree to a price of 92 for $1 million par value for a passthrough with a pool factor of 0.85, then the dollar price paid by the buyer in addition to accrued interest equals:

$$0.92 \times \$1{,}000{,}000 \times 0.85 = \$782{,}000$$

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.4

Measuring the prepayment rate

- A prepayment is any payment towards the principal in excess of the scheduled amount
- The prepayment rate is called the single monthly mortality rate (SMM)

$$SMM = \frac{\text{Prepayment in month } t}{\text{Month } t \text{ beginning mortgage balance} - \text{Month } t \text{ scheduled principal payment}}$$

$$\textit{Prepayment in month } t = SMM \times (\textit{Month } t \textit{ beg mortgage balance} - \textit{Month } t \textit{ scheduled principal payment})$$

- The SMM can be used both to calculate past monthly prepayment rates and as a basis of forecasting future prepayment rates
- The annualised SMM is the conditional prepayment rate (CPR):

$$CPR = 1 - (1 - SMM)^{12} \qquad SMM = 1 - (1 - CPR)^{1/12}$$

LA TROBE UNIVERSITY — Mortgage backed securities

Example 10.4.1

Measuring the prepayment rate

> Beginning mortgage balance in month 33	$358,326,766
> Scheduled principal payment in month 33	$297,825
> Prepayment in month 33	$1,841,347

- **Calculate the single monthly mortality rate for month 33.**

LA TROBE UNIVERSITY — Mortgage backed securities

Example 10.4.2

Measuring the prepayment rate

> Beginning mortgage balance in the month	$290,000,000
> Scheduled principal payment in month 33	$3,000,000
> SMM allocations	0.5143%

- **Calculate the conditional prepayment rate for month 33.**

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.5

PSA prepayment benchmark

- PSA stands for the Public Securities Association (later renamed the Bond Market Association), which established the **PSA prepayment benchmark**
  - This defines a typical pattern of prepayments over the life of a mortgage pool
  - It is expressed as a monthly series of CPRs
  - It assumes that the prepayment rate is originally low and will speed up as it nears maturity
  - If t is less than 30 months, CPR equals 6% × (t / 30)
  - If t is greater than or equal to 30 months, CPR equals 6%
  - Slower or faster speeds are referred to as a percentage of PSA
  - Eg "165 PSA" means 1.65 times the CPR calculated above

LA TROBE UNIVERSITY — Mortgage backed securities

Example 10.5.1

PSA prepayment benchmark

- **Calculate the SMM in months 5 and 32, based on a prepayment rate of 165 PSA**

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.5.2

Illustrating monthly cash flow construction

- The underlying mortgages for a passthrough security are assumed to be fixed rate, level payment, fully amortising mortgages with a WAC of 8.125%, a pass-through rate of 7.5% and a WAM of 357 months
- The mortgages were originally taken out as 30-year loans and the current outstanding balance is $400,000,000
- The benchmark is 100 PSA

- **Calculate the cash flows for the first 3 months**

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.19

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.5.2

Illustrating monthly cash flow construction

Months from now	Months Seasoned[1]	Outstanding Balance	SMM	Mortgage Payment
1	4	400,000,000	0.00067[2]	2,975,868[3]

- [1] 30 year (360 month) loans with a WAM of 357 months are seasoned by 3 months
- [2] $CPR = 6\% \times (t/30) = 6\% \times (4/30) = 0.008 = 0.8\%$

  $SMM = 1-(1-CPR)^{1/12} = 1-(1-0.008)^{1/12} = 0.00067$
- [3] $MP = B\left[\dfrac{r(1+r)^n}{(1+r)^n-1}\right]$

  $= 400{,}000{,}000\left[\dfrac{(0.08125/12)(1+0.08125/12)^{357}}{(1+0.08125/12)^{357}-1}\right] = \$2{,}975{,}868$

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.20

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.5.2

Illustrating monthly cash flow construction

Months from now	Months Seasoned	Outstanding Balance	SMM	Mortgage Payment
1	4	400,000,000	0.00067	2,975,868

Net Interest	Scheduled Principal	Prepayment	Total Principal	Cash Flow
2,500,000[4]	267,535[5]	267,470[6]	535,005[7]	3,035,005[8]

- [4] $400,000,000 × 7.5% / 12 = $2,500,000
- [5] $2,975,868 – ($400,000,000 × 8.125% / 12) = $267,535
- [6] $\text{Prepayment} = SMM \times (\text{Beg Mort Bal} - \text{Sched Princ Pmt})$

  $= 0.00067 \times (400{,}000{,}000 - 267{,}535) = \$267{,}470$
- [7] $267,535 + $267,470 = $535,005
- [8] $2,500,000 + $535,005 = $3,035,005

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.21

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.5.2

Illustrating monthly cash flow construction

Months from now	Months Seasoned[1]	Outstanding Balance	SMM	Mortgage Payment
1	4	400,000,000	0.00067	2,975,868
2	5	399,464,995[9]	0.00084	2,973,877
3	6	398,861,631	0.00101	2,971,387

- [9] $400,000,000 – $535,005 = $399,464,995
- Note also that the monthly mortgage payments decline due to prepayments made

	Net Interest	Scheduled Principal	Prepayment	Total Principal	Cash Flow
1	2,500,000	267,535	267,470	535,005	3,035,005
2	2,496,656	269,166	334,198	603,364	3,100,020
3	2,492,885	270,762	400,800	671,562	3,164,447

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.22

LA TROBE UNIVERSITY Mortgage backed securities

Objective 10.6

Average life of a passthrough security

- A bullet bond and a passthrough security have different exposures to interest rate risk
- The average life or weighted average life is an alternative to duration as a method for estimating the exposure of the security to interest rate risk
- The average life is the average time to receipt of principal payments (scheduled payments and projected prepayments)
- This is closer to a Macaulay duration-like measure:

$$\text{Average life} = \sum_{t=1}^{T} \frac{t \times \text{Projected principal received at time } t}{12 \times \text{Total principal}}$$

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.23

LA TROBE UNIVERSITY Mortgage backed securities

Objective 10.6

Average life of a pass-through security

- The average life of a passthrough security depends on the prepayment assumption
- To see this, the average life is shown below for different prepayment speeds for the passthrough security used in Example 10.5.2

PSA speed	50	100	165	200	300	400	500	600	700
Average life (years)	15.11	11.66	8.76	7.68	5.63	4.44	3.68	3.16	2.78

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.24

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.7

Factors that affect prepayment behaviour

- The prevailing mortgage rate
  - The lower the prevailing mortgage rate, the greater the **incentive to refinance** for a homeowner on a fixed rate mortgage
- The level of housing turnover
  - The higher the level of housing turnover (which is linked to economic growth) the greater the likelihood that a homeowner will repay a loan when a house is sold and take out a new loan for the next house
- The characteristics of the underlying residential mortgage loans
  - As we saw when we discussed the PSA prepayment benchmark, prepayment rates initially increase steadily during the life of a loan, before levelling off
  - In some regions prepayment rates tend to be faster than others (caused by differences in local economies which affect housing turnover)

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.25

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.8

Contraction risk and extension risk

- Prepayment risk comprises **contraction risk** and **extension risk**
- Contraction risk arises when interest rates fall
  - Borrowers are more likely to prepay, or repay the entire loan, in order to refinance at lower interest rates
  - Increased prepayments shorten the timing of cash flows from a passthrough
  - The increased cash flows must be reinvested at less than the passthrough rate
- Extension risk arises when interest rates increase
  - Borrowers are less likely to prepay, or repay the entire loan, so that they can continue to enjoy a fixed rate that is less than the current level of interest rates
  - Fewer prepayments lengthen the timing of cash flows from a passthrough (compared to the expected cash flows based on assumed prepayment levels)
  - There is a reduction in cash flows that are able to be reinvested at interest rates that are now higher than the passthrough rate

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.26

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.9

Collateralized mortgage obligations (CMO)

- One way to alter the cash flows from a passthrough security to reduce contraction risk and extension risk is via a CMO
- A CMO is a mortgage-backed security, secured by a pool of passthrough securities held in trust, which redistributes prepayment risk among investors in the CMO
- For example:
  - The pool of $200m principal is divided into three tranches, each ranking differently for the priority of repayment of principal
  - All scheduled and prepaid principal payments are directed to the first tranche until its principal is repaid, then to the second and finally to the third
  - Each tranche is securitised into a number of certificates
- The effect of the CMO is to create a number of mortgaged-backed securities with more clearly defined and distinguishable maturities

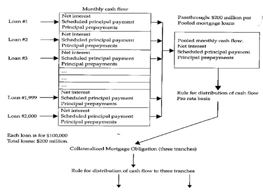
These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.27

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.9

Collateralized mortgage obligations (CMO)

EXHIBIT 67-8 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 Tranche B paid off, receives all monthly principal

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.28

LA TROBE UNIVERSITY — Mortgage backed securities

Objective 10.10

Sequential CMO

- A **sequential CMO** is structured so that each class of bond would be retired sequentially, by
  - Distributing all principal payments to the tranches in sequential order so that the first tranche is fully repaid prior to distributing repayments to the second
  - Distributing interest in accordance with the principal amount outstanding in each tranche
  - Hence, if $10,000,000 is outstanding and the coupon rate is 7.5% then the interest paid to that tranche is 7.5% multiplied by $10,000,000.
- The effects of a sequential CMO are as follows:
  - It reduces the average life of the passthrough security for some tranches, and increases it for others
  - The earlier tranches are protected against extension risk and the later tranches against contraction risk

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.29

LA TROBE UNIVERSITY — Mortgage backed securities

Example 10.10.1

Sequential CMO

?

- FJF-01 is a sequential-pay CMO
- The collateral is a passthrough with a total par value of $400 million, a passthrough coupon rate of 7.5%, a weighted average coupon of 8.125% and a weighted average maturity of 357 months
- Four tranches are created, as shown on the next slide, with a total value equal to the collateral and coupon rates also equal to that of the collateral (7.5%)
  - This is done here for simplicity – typically the coupon rate varies by tranche
- Cash flow is projected assuming a PSA speed of 165
- **Calculate the cash flows and repayment schedules for each tranche in months 1, 2, 81, 82, 100, 101, 178, 179 and 357.**

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.30

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.10.1

Sequential CMO

Tranche	Par Amount ($)	Coupon Rate (%)
A	194,500,000	7.5
B	36,000,000	7.5
C	96,500,000	7.5
D	73,000,000	7.5
Total	400,000,000	

Payment rules:

1. ***For payment of monthly coupon interest:*** **Disburse monthly coupon interest to each tranche on the basis of the amount of principal outstanding for each tranche at the beginning of the month.**
2. ***For disbursement of principal payments:*** **Disburse principal payments to tranche A until it is completely paid off. After tranche A is completely paid off, disburse principal payments to tranche B until it is completely paid off. After tranche B is completely paid off, disburse principal payments to tranche C until it is completely paid off. After tranche C is completely paid off, disburse principal payments to tranche D until it is completely paid off.**

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.10.1

Illustrating monthly cash flow construction

	Tranche A			Tranche B		
Month	Balance	Principal	Interest[2]	Balance	Principal	Interest[2]
1	194,500,000	709,923[1]	1,215,625	36,000,000	0	225,000
2	193,790,077	821,896	1,211,188	36,000,000	0	225,000

	Tranche C			Tranche D		
Month	Balance	Principal	Interest[2]	Balance	Principal	Interest[2]
1	96,500,000	0	603,125	73,000,000	0	456,250
2	96,500,000	0	603,125	73,000,000	0	456,250

> [1] This is the total principal repayment (scheduled principal payments plus pre-payments based on 165 PSA) on the total outstanding balance (i.e. $400,000,000)

> [2] These amounts represent the interest payable on the amount outstanding within each tranche – e.g. $194,500,000 × 7.5% / 12 = $1,215,625

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.10.1

Illustrating monthly cash flow construction

	Tranche A			Tranche B		
Month	Balance	Principal	Interest[2]	Balance	Principal	Interest[2]
81	311,926	311,926[1]	1,950	36,000,000	1,720,271[1]	225,000
82	0	0	0	34,279,729	2,014,130	214,248

	Tranche C			Tranche D		
Month	Balance	Principal	Interest[2]	Balance	Principal	Interest[2]
81	96,500,000	0	603,125	73,000,000	0	456,250
82	96,500,000	0	603,125	73,000,000	0	456,250

> [1] $311,926 + $1,720,271 represents the principal repayment on the total outstanding balance at that point in time (i.e. $205,811,926 as at the beginning of month 81)

> [2] E.g. $311,926 × 7.5% / 12 = $1,950
> $36,000,000 × 7.5% / 12 = $225,000

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.10.1

Illustrating monthly cash flow construction

	Tranche A			Tranche B		
Month	Balance	Principal	Interest	Balance	Principal	Interest[2]
100	0	0	0	642,350	642,350[1]	4,015
101	0	0	0	0	0	0

	Tranche C			Tranche D		
Month	Balance	Principal	Interest[2]	Balance	Principal	Interest[2]
100	96,500,000	1,072,194[1]	603,125	73,000,000	0	456,250
101	95,427,806	1,699,243	596,424	73,000,000	0	456,250

> [1] $642,350 + $1,072,194 represents the principal repayment on the total outstanding balance at that point in time (i.e. $170,142,350 as at the beginning of month 100)

> [2] E.g. $642,350 × 7.5% / 12 = $4,015
> $96,500,000 × 7.5% / 12 = $603,125

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.10.1

Illustrating monthly cash flow construction

	Tranche A			Tranche B		
Month	Balance	Principal	Interest	Balance	Principal	Interest
178	0	0	0	0	0	0
179	0	0	0	0	0	0

	Tranche C			Tranche D		
Month	Balance	Principal	Interest	Balance	Principal	Interest
178	675,199	675,199[1]	4,220[2]	73,000,000	170,824[1]	456,250[2]
179	0	0	0	72,829,176	838,300	455,182

> [1] $675,199 + $170,824 represents the principal repayment on the total outstanding balance at that point in time (i.e. $73,675,199 as at the beginning of month 178)

> [2] $675,199 × 7.5% / 12 = $4,220
> $73,000,000 × 7.5% / 12 = $456,250

LA TROBE UNIVERSITY Mortgage backed securities

Example 10.10.1

Illustrating monthly cash flow construction

	Tranche A			Tranche B		
Month	Balance	Principal	Interest	Balance	Principal	Interest
357	0	0	0	0	0	0

	Tranche C			Tranche D		
Month	Balance	Principal	Interest	Balance	Principal	Interest
357	0	0	0	148,802	148,802[1]	930[2]

> [1] This represents the principal repayment on the total outstanding balance at that point in time (i.e. $148,802 as at the beginning of month 357)

> [2] $148,802 × 7.5% / 12 = $930

Mortgage backed securities

Focus on prepayment risk and the global financial crisis

- Fabozzi textbook focuses on prepayment risk as being the primary concern in relation to mortgage passthrough securities and CMOs
  - Likely due to the buoyant housing market in the US in the last decade or so, with low default rates due to rising house prices and home-owners being able to re-finance using the equity in their homes
  - This is also correct in relation to securities issued by Ginnie Mae, which carry the full faith and credit of the US government.
- Credit risk also became a prominent concern during the sub-prime mortgage crisis which preceded the recent global financial crisis
  - Particularly in relation to Fannie Mae and Freddie Mac
  - Substantial defaults on 'sub-prime' mortgages which impacted on their cash flows, and their ability to meet the payment obligations on mortgage passthrough securities that they created by pooling mortgages
  - Led to significant bail-out funding being provided by the US Government

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.37

Mortgage backed securities

Goldman Sachs CDO and SEC indictment announced in 2010

- Relates to a collateralized debt obligation (CDO), comprised mainly of mortgages, named Abacus 2007-AC1, that was issued in April 2007
  - It was indicated that the mortgages were pooled by ACA, a collateral manager, which helped the CDO obtain a AAA credit rating from Moody's and S&P. This CDO was then promoted to Goldman Sachs' clients
  - The indictment claimed that this security was actually structured by John Paulson, a hedge fund manager, and that it primarily comprised less-than investment grade (or 'junk') mortgage assets selected by Paulson
  - Paulson then short-sold the CDO expecting it to fall in value or default, and Goldman Sachs also entered into credit default swap transactions to provide insurance protection against the CDO defaulting
  - By January 2008, 99% of the CDO loans had been downgraded, and the Paulson hedge fund made approximately $1 billion from this fall in value of the CDO

These slides have been drafted by the Department of Finance, La Trobe Business School based on Fabozzi (2007). 10.38