IBBM
Financing with Asset-Backed Securities

Mortgage-Backed Securities

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Mortgages and MBS

- Mortgage Loans
- Pass-throughs and Prepayments
- CMOs
- Analysis of MBS Pricing and Convexity

See also: absresearch.com
Structure of the US MBS Market

- **Mortgage Loan**
  - Bank (mortgage originator) makes a whole loan
  - Ancillary: brokers, servicers, insurers

- **Mortgage Pass-Through**
  - FNMA or GMAC (conduit) pools
  - mortgage loans with similar characteristics

- **CMO or REMIC**
  - Takes a mortgage pool and makes the cash flows more predictable by assigning priority of claims to the cash flows

- **MBS Portfolio**
  - Institutional investor evaluates risk/return behavior of mortgage-backed securities through option-adjusted price and spread analysis

**Mortgage Strips**
- Interest-Only and Principal-Only

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US Mortgage-Backed Securities

AGENCY PASS-THROUGHGS

- INTEREST
- PRINCIPAL
- PREPAYMENT

GRANTOR TRUST STRUCTURE

- GNMA MBS (US Govt g'tee)
- FHLMC PC
- FNMA MBS (US Agency g'tee)

PRIVATE-LABEL PASS-THROUGHGS

- INTEREST
- PRINCIPAL
- PREPAYMENT

GRANTOR TRUST STRUCTURE

Credit enhancement:
- Corp g'tee
- L/C
- Insurance (FSA)
- Senior/sub debt
Form of cash flow allocation

- Pay-through obligation
- Different tranches
  - PAC (planned amortization class)
  - TAC (targeted amortization plan)
  - IO/PO strips
Mortgage-Backed Securities

- Mortgage-backed securities are prepayable, so one cannot measure returns or values easily.
- They tend to pay down early when rates fall, and later when rates rise.
Mortgage Prepayments

Complexity of the option -

- Systematic risk: exercise of the interest rate option
- Unsystematic risk: reasons unrelated to mortgage interest rates (eg demographic)
Mortgage Pool Prepayment Conventions

Traditional method is to forecast prepayments by adjusting the PSA (Public Securities Association) benchmark of a prepayment rate that reaches 6% a year for 30 year mortgages.

Annual prepayment rate (CPR):

100% PSA:
If t<=30 CPR=6%t/30
If t>30 CPR=6%

170% PSA:
If t<=30 CPR=170%[6%t/30]
If t>30 CPR=170%[6%]

Monthly prepayment rate (SMM):
SMM=[1-(1-CPR)]/12

Prepayment amount in dollars:
= (Beginning Principal Balance - Scheduled Principal Repayment) * SMM
CMOs and Strips

The technique:

- Allocate cash flows (interest & principal) of MBS to mitigate prepayment risk
- Pay different returns based on risk
- The sum of the part should be worth more than the whole alone.

*Example: MDC Series J CMO with underlying pool WAC 9.5%, 297 months final maturity*
CMOs and Strips

- First-priority classes
- Z-class: last to be paid off
- Floating/inverse floating CMOs
- Planned Amortization Class bonds (PACs) and TACs
- Companions with priority schedules (PAC IIs)
- VADM bonds (use early principal and interest to pay priority bondholders)
- CMO residuals (collateral interest - CMO interest)
- IOs and POs
The Negative Convexity of MBS

Securities backed by fixed-rate mortgages have "negative convexity." This refers to the fact that when interest rates rise, the MBS behave like long-term bonds (their prices fall steeply); but when rates fall, their prices rise slowly or not at all.

Price-yield curve of 20 year bond callable in 3 years
Convexity of Callables

Mortgage-backed securities and other callable bonds may have negative convexity which cushions a bond’s price rise and accelerates its fall!
FNMA Pass-Throughs

$421,306,608

Fannie Mae

Guaranteed REMIC Pass-Through Certificates
Fannie Mae REMIC Trust 1999-1

The Certificates
We, the Federal National Mortgage Association (“Fannie Mae”), will issue the classes of certificates listed in the chart on this page.

Payments to Certificateholders
We will make monthly payments on the certificates. You, the investor, will receive

• interest accrued on the balance of your certificate (except in the case of an accrual class), and
• principal to the extent available for payment on your class.

We may pay principal at rates that vary from time to time. We may not pay principal to certain classes for long periods of time.

The Fannie Mae Guarantee
We will guarantee that required payments of principal and interest on the certificates are distributed to investors on time.

The Trust and its Assets
The trust will indirectly own

• Fannie Mae MBS and

(1) Exchangeable classes.
(2) Notional balances. These are interest only classes.
(3) The H Choe will bear interest during the first twelve interest accrual periods at the rate of 7.00% and thereafter at the rate of 6.50%.
(4) Based on COFI.
MBS: Fannie Mae REMIC Pass-Throughs

- What are the underlying mortgage pools?
- Look at different asset groups:
  - Yields on different classes
  - Price risks on each class
- What do the seller & servicer gain?
Appendix: Bond Valuation, Duration and Convexity
Duration

Duration measures the % price change for a given change in yield:

The steeper the line, the more the price falls for a given rise in yield.
Greater Duration, Greater Risk

Duration is measured as the PV-weighted average life, so low-coupon bonds have greater duration.

Diagram illustrating the relationship between price and yield for different bond types: 9% Bond, 6% Bond, and 0% Bond.
Calculating Duration: MacCauley and Modified

\[ D_{MAC} = \sum_{t=1}^{n} \frac{tCF_t}{P} \frac{(1 + r)^t}{P} \]

\[ D_{MOD} = \% \Delta P = \frac{dP}{P} = -\frac{D}{(1 + r)} \]
Bond Price Changes: Actual vs. Duration-Based

There’s an error in duration-based estimation, because duration is linear.
Bond Price Changes: Actual vs. Duration-Based

There’s an error in duration-based estimation, because duration is linear.
Convexity:
The Change in Duration

The percentage price change in a bond can be approximated using both duration and convexity.
Convexity for Different Bonds

Positive convexity is desirable, because it cushions a bond’s price fall and accelerates its rise.
European MBS

European MBS Issuance
by Collateral Type—2003

- RMBS 85%
- CMBS 9%
- Mixed 6%

Sources: Dealogic Bondware, Thomson Financial Securities Data, J.P. Morgan Securities Inc., EuroWeek
European MBS

Second quarter 2002 ABS issuance by asset class in bn Euro (Source: ING)
Example of Residential MBS: Greece

RMBS/Greece
Presale Report

Byzantium Finance PLC

Summary
This EUR250 million transaction is the first public residential mortgage-backed securities issue from Greece and the first Greek securitisation to be originated by a non-government-related entity. The mortgages in the portfolio are first-ranking, mortgage loans originated in, and secured on residential property located in Greece. Loans include non-subsidised loans as well as loans subsidised by the Greek government and the Workers Housing Association (“OEK”), a government-sponsored housing body. Fitch Ratings has assigned expected ratings to the notes to be issued by Byzantium Finance Plc (“Byzantium” or “the issuer”) as indicated at left.

Byzantium is a special-purpose company incorporated under the laws of England and Wales with limited liability. The shares of the issuer are owned by a charitable trust.

The portfolio consists of loans originated by Aspis Bank S.A. (“Aspis” or “the originator”) which will continue to service the loans. Established in 1992, Aspis was the first private mortgage lender in Greece and has a current market share of 3.6%.

The expected ratings are based on the high quality of the collateral, the underwriting and servicing capabilities of Aspis, available credit enhancement and the sound legal and financial structures. Initial credit enhancement, provided by subordination and the reserve fund, will total 11.0% for the class A notes, 5.0% for the class B notes and 1.0% for the class C notes. In addition to

Key Information

Portfolio Characteristics
Total Amount: EUR256,153,152
WA Remaining Maturity (Years): 11.4
WA Seasoning (Years): 3.6
WA Original LTV: 67.1%
Largest OLT: 67.1%
WA Current LTV: 56.7%
Highest CLTV: 65.9%
WA Indexed Current LTV: 50.7%
Pool Cut-Off Date: 30 September 2003

Key Parties
Issuer: Byzantium Finance PLC
Originator/Seller/Service: Aspis Bank, SA
Share Trustee: SPV Management Limited
Swap Counterparty/Liquidity Facility Provider: ABN AMRO Bank N.V (rated ‘AA-/F1+’)
Principal Paying Agent: ABN AMRO Bank N.V
Arrangers and Lead Managers: ABN AMRO and NBD International
Optional Redemption Date: Jan 2009
Legal Maturity: Oct 2032

Source: Fitch
Byzantine Finance

Structure Diagram

Source: Transaction documents
Commercial MBS

2001/2002 European CMBS issuance volumes in % by underlying assets (Source: HVB Credit Research)
6 Battery Road
Commercial MBS: Risks

- market risks
- location risks
- property related risks
- partnership risks
- fiscal and legal risks
- financial risks
Commercial MBS Valuation

- Market value
- Sustainable asset value
- Lending value
Ffr1,543,834,596 Commercial Mortgage-Backed Floating-Rate Notes

Ratings
Ffr585,700,000 Class A .................. AA
Ffr215,800,000 Class B .................. A
Ffr154,100,000 Class C .................. BBB
Ffr588,234,596 Subordinated
   Notes (Classes D-F) .................. NR
NR – Not rated.

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Summary
Belenus Securities PLC’s commercial mortgage-backed floating-rate notes are rated as listed at left. Belenus is a securitization of a French franc (Ffr) 1.5 billion portfolio of 427 performing loans generally secured by 406 commercial real estate properties in France.

The ratings reflect the Fitch French default study and the subordination provided to the various classes in the following amounts: 62% to class A; 48% to class B; and 38% to class C. Positive factors affecting the credit enhancement levels include the diversity of property types, the servicer’s retention of the first loss piece, and the liquidity provisions. Concerns include the high Fitch loan-to-value ratio (LTV), the loans with balloon risk, and the limitations of the advances facility. The rating levels reflect the integrity of the legal and financial structures. Fitch’s ratings do not address the likelihood of receipt of prepayment premiums or default interest.
Belenus

- What is the nature and value of the assets?
- How strong is the legal structure?
- Is the collateral sufficient? Would you recommend purchasing the second (B) tranche?
- What could go wrong with this deal? What could go right?
Sale-and-Leaseback Financing

- Need for financing/balance sheet management
- Focus on core business/outsourcing property management
- Rationalization of space usage
Sale-and-Leaseback Structures

Structures used so far:
• Sale and leaseback - the properties are sold to a property investor; the former owner becomes the tenant, occupying the property under a lease arrangement. This configuration is used for a complete disposal of the asset by the corporate.
• Hold and leaseback - the property is transferred to an orphan subsidiary and leased back. In this type of structure, the corporate retains freehold ownership of the asset and the estate is still consolidated in its balance sheet: the focus is to raise long-term financing backed by the portfolio of properties with the benefit of an institutional lease in place.
• Lease and leaseback - the leasehold interest is sold to a third party, with the company retaining the freehold reversionary interest and entering into an arrangement to lease back on a shorter lease. The corporate entity is committed to the longterm ownership of the asset.
Diagram illustrates simplistically the types of transactions recently analysed by Fitch with the grey area representing the most challenging assets to analyse - not unique utility assets, nor prime office, retail or industrial but bespoke or tertiary properties located in areas with little demand or with very specialist fittings or approaching technical or locational obsolescence and without a credit tenant to mitigate the property risk. The Fitch credit approach will be conservative in this area.
# Recent Securitizations of Sale-and-Leaseback

<table>
<thead>
<tr>
<th>Examples of European Property Sale and Leaseback Securitisation Rated by Fitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>(as of July 2003) Research Reports are Available on the Agency's Website</td>
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<table>
<thead>
<tr>
<th>Issuance</th>
<th>Issuance Date</th>
<th>Type</th>
<th>Tenant</th>
<th>Tenant Rating</th>
<th>Underlying Assets</th>
<th>Diversification</th>
<th>Issuance Rating</th>
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</thead>
<tbody>
<tr>
<td>Annington 4</td>
<td>Feb 1998</td>
<td>Sale and Leaseback</td>
<td>UK Sec. of State</td>
<td>AAA</td>
<td>Residential Property</td>
<td>More than 56,000 Dwellings Located in UK</td>
<td>AAA/A</td>
</tr>
<tr>
<td>Powerhouse Finance</td>
<td>Jun 2001</td>
<td>Sale and Leaseback</td>
<td>Electricité de France (EDF)</td>
<td>AAA</td>
<td>Residential Property</td>
<td>More than 10,000 Residential Dwellings Located in France</td>
<td>AAAA/BBB</td>
</tr>
<tr>
<td>Werretown Supermarkets Securitisation</td>
<td>Jun 2001</td>
<td>Sale and Leaseback</td>
<td>J Sainsbury Plc</td>
<td>A+</td>
<td>Food Superstores</td>
<td>35 Properties Across UK</td>
<td>AAAA+/A</td>
</tr>
<tr>
<td>Amethyst Finance Plc</td>
<td>Nov 2001</td>
<td>Hold and Leaseback</td>
<td>Marks and Spencer Plc</td>
<td>A</td>
<td>Retail Stores</td>
<td>45 Properties Across UK</td>
<td>A/YNR</td>
</tr>
<tr>
<td>Dionysius (ELoC No 9)</td>
<td>Jun 2002</td>
<td>Sale and Leaseback</td>
<td>Electricité de France (EDF)</td>
<td>AAA</td>
<td>Regional Offices</td>
<td>56 Properties Across France</td>
<td>AAA/AAA+/A</td>
</tr>
<tr>
<td>IMSEL Securitisation S.r.l.</td>
<td>Oct 2002</td>
<td>Sale and Leaseback</td>
<td>Telecom Italia SpA</td>
<td>A-</td>
<td>Telephony Operating Assets / Office</td>
<td>227 Properties Across Italy</td>
<td>AAA (Wrapped) / NR/ A-</td>
</tr>
<tr>
<td>First real Estate S.A</td>
<td>July 2003</td>
<td>Hold and Leaseback</td>
<td>Banca Popolare di Lodi S.C</td>
<td>BBB+</td>
<td>Bank Branches and Regional Headquarters</td>
<td>279 Properties Across Italy</td>
<td>AA/BBB+</td>
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<tr>
<td>Jutuma (ELoC No 10)</td>
<td>July 2003</td>
<td>Lease and Leaseback</td>
<td>British Broadcasting Corporation (BBC)</td>
<td>Not publicly rated</td>
<td>BBC’s new Headquarters Development</td>
<td>One Property Site Located in Central London, UK</td>
<td>AAA (Wrapped)</td>
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