Mortgage Debt and US Capital Markets

Presented by
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Finance Department, University of Sydney
and
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Cornell University
Residential Mortgage Markets

Securitization — the process by which illiquid financial assets and liabilities are transformed into capital market instruments.
What Has Been Securitized?

Aircraft-lease receivables
Airline-ticket receivables
Auto Leases
**Auto loans**
Boat loans
**Bank loans (CLOs)**
Catastrophic risk
Collateralized bond obligation
Credit risk
Consumer loans, unsecured
**Credit cards**
Delinquent receivables
Delinquent taxes
Equipment loans
Equipment leases
Export receivables
Factoring receivables
Miscellaneous fees
Franchise fees
Franchise loans
Health-club dues
Healthcare receivables
**Home-equity loans**
Home-improvement loans
Home-equity lines of credit
Insurance-premium loans
Loans (bank-to-bank)
Multi-family (apt. leases)
**Manufactured-housing loans**
Non-U.S. residential loans
Motorcycle loans
Mutual fund (12b-1) fees
High-LTV (“no-equity”) loans
Natural resources
Project finance
Repackaged ABS
Residential mortgages
Rent receipts
Royalties
Unsecured REIT bonds
Railcar
Retail sales
Recreational-vehicle loans
Small-business loans
Stock
Legal settlements
Ship leases
State-lottery winnings
Sub-prime home loans
Shipping receivables
**Student loans**
Tax-exempt lease contracts
Tax liens
Timeshare loans
Toll-road receivables
Trade receivables
Truck loans
Utility receivables
Weather
Thompkins County Tobacco Settlements
What mortgage products are available to households?

**Mortgage Product Interest-Rate Variability**

Long term, fixed-rate mortgages dominate US, and ARMs elsewhere.

Sources: Research Institute for Housing America, RBA, CHMC, KHFC, EMF, GPG, MBA and S&P
What investors buy mortgages?

Securitization funds most mortgages in U.S., deposits elsewhere.

Sources: Research Institute for Housing America, ABS, CMHC, EMF, ESF, FRB, Merrill Lynch Europe, AU, CA, U.S. 2008, Japan 2006
Do product mix, funding sources and risk allocation affect homeownership rates?

Homeownership rates are broadly similar in developed countries.

Sources: Research Institute for Housing America, ABS, CMHC, Delft University, EMF, Bureau of the Census
Mortgage Debt Outstanding in U.S. is Greater Than Next 10 Countries Combined

Estimated value of mortgage debt outstanding, millions USD, 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Estimated Value (millions USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>$10,060,547</td>
</tr>
<tr>
<td>UK</td>
<td>$1,731,222</td>
</tr>
<tr>
<td>Germany</td>
<td>$1,382,634</td>
</tr>
<tr>
<td>Japan</td>
<td>$973,649</td>
</tr>
<tr>
<td>France</td>
<td>$955,920</td>
</tr>
<tr>
<td>Australia</td>
<td>$870,944</td>
</tr>
<tr>
<td>Spain</td>
<td>$816,250</td>
</tr>
<tr>
<td>Netherlands</td>
<td>$754,984</td>
</tr>
<tr>
<td>Canada</td>
<td>$750,500</td>
</tr>
<tr>
<td>China</td>
<td>$704,790</td>
</tr>
<tr>
<td>Switzerland</td>
<td>$477,504</td>
</tr>
<tr>
<td>Italy</td>
<td>$422,414</td>
</tr>
<tr>
<td>Sweden</td>
<td>$340,399</td>
</tr>
<tr>
<td>Denmark</td>
<td>$284,776</td>
</tr>
<tr>
<td>Norway</td>
<td>$263,258</td>
</tr>
<tr>
<td>Belgium</td>
<td>$196,043</td>
</tr>
<tr>
<td>Ireland</td>
<td>$162,967</td>
</tr>
<tr>
<td>Portugal</td>
<td>$137,464</td>
</tr>
<tr>
<td>Greece</td>
<td>$96,608</td>
</tr>
</tbody>
</table>

Top 10 non-US Estimated Value: $9,418,397

Currency conversions based on 10-year average exchange rates
US Experience

What have we learned?
Dedicated Mortgage Banks – Savings and Loans (S&Ls) or Thrifts

– Promote homeownership after the Great Depression (1929-1939)
– Dedicated to home mortgage origination
  – Perks
    • Government guaranteed deposits
    • Local monopoly
    • Deposit ceilings higher for thrifts
  – Must only engage in home mortgage lending
– Funded by deposits
– Worked under the 3-6-3 rule

– Creation of Government Sponsored Enterprises (GSE)
  – Government National Mortgage Association (Ginnie Mae – 1968)
  – Federal National Mortgage Association (Fannie Mae – 1938)
  – Federal Home Lone Mortgage Corporation (Freddie Mac – 1970)
Dedicated Mortgage Banks – Savings and Loans (S&Ls) or Thrifts

- S&Ls retain all mortgage loans

- Inflation (1979 - 1981)
  - Inflation premiums and uncertainty increased mortgage rates
  - Fed policy inverted yield curve
  - Traditional lending model does not work
  - Duration mismatching – duration of mortgages much longer than on deposits
  - Exposed interest rate risk of holding mortgages

- Massive S&L insolvency
  - Estimate two-thirds (475) of all thrifts were insolvent – negative net worth of $109 billion
Dedicated Mortgage Banks – Savings and Loans (S&Ls) or Thrifts

- Deregulation
  - Eliminate deposit ceilings
  - Increase competition
  - Relax restrictions on lending

- Suggested factors leading to insolvency
  - Duration mismatching
  - Excessive risk taken by insolvent thrifts
  - Overspecialization in mortgages
  - Deposit insurance

- Lesson – risky for financial institutions to retain mortgages
- Need a secondary market for mortgages - securitization
US Secondary Mortgage Market

Mortgage Origination

Conforming “Agency” Mortgages
- GSE
  - Fannie Mae
  - Freddie Mac
  - Ginnie Mae
- Jumbo
  - 700+ FICO
  - Conforming except by size
  - 65%-80%LTV
- Alt-A
  - 640-730 FICO
  - No Doc/Lo Doc
  - 70-100%LTV
- Subprime
  - 500-660 FICO
  - Poor credit history
  - Poor documentation

Non-Conforming Mortgages
Conforming Market

- Conforming Borrower
- Originating Lenders and Servicers
  - GNMA guarantee
  - FNMA, FHLMC
  - Brokers or dealers
    - Mortgage-backed Securities
    - Investment Banks
    - Investors
Secondary Mortgage Market

- **Conforming or Agency Market**
  - GSEs provide guarantee against default risk — no default risk
  - Primary risk is prepayment — premature return of mortgage principal
  - Loan originators retain servicing role

- **Financial Engineering**
  - Collateralized Mortgage Obligation (CMO)
  - Strips — high coupon and deep discount
  - IO, PO Strips
  - Floater and Inverse Floaters
  - Planned Amortization Class (PAC)
Secondary Mortgage Markets

- Nonconforming market
  - Private sector securitizations – no GSEs involved
  - Default risk
  - Subordination as credit support
  - Products sold in the Asset-Backed Securities (ABS) market

- Subprime was only a small part of the market
Securitization Has Replaced Depositories as the Predominant Source of Mortgage Money

Total Residential Mortgage Debt Outstanding by Holder

Source: Federal Reserve Board; Data as of 3Q 2011
Benefits to Homeowners: Conforming Mortgage Interest Rates Below Jumbo Rates

Effective Interest Rate Spread Between Jumbo and Conforming 30-Year Fixed-Rate Mortgages (Basis Points)

- Record: 184 bps 12/19/08
- Current: 33 bps

Source: HSH Associates (last data: week ending April 19, 2013)

Note: Effective spread adds fees and points to the interest rate; 20-year average computed over April 1986 to July 2007.
Did GSEs Cause The Financial Crisis?

Loans 90 Days or More Delinquent or in Foreclosure (percent of number)

Source: Mortgage Bankers Association (Quarterly data not seasonally adjusted; 1998Q1-2012Q3). Freddie Mac. Prime includes Alt-A.
Was It A Global Contagion? The Housing Bubble Was Larger in Other Countries

Annual Home Price Growth Rate (Percent)
Commercial Mortgages
US CMBS ISSUANCE
($millions)
CMBS Senior Subordinate Tranching - JPMCC-CIB5

$1B Pool of Commercial Mortgage Loans

Credit Support

<table>
<thead>
<tr>
<th>Credit Grade</th>
<th>5yr AAA</th>
<th>10yr AAA</th>
<th>20.63%</th>
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<tr>
<td>AA</td>
<td>17.00%</td>
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<tr>
<td>A</td>
<td>12.88%</td>
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<tr>
<td>A-</td>
<td>11.50%</td>
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<tr>
<td>BBB</td>
<td>8.63%</td>
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<td>BBB-</td>
<td>7.00%</td>
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<tr>
<td>BB</td>
<td>3.88%</td>
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<tr>
<td>B</td>
<td>2.00%</td>
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<tr>
<td>B-</td>
<td>1.75%</td>
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<td>First Loss</td>
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AvgLife

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<th>5.7 yr</th>
<th>9.8 yr</th>
<th>9.9 yr</th>
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<th>10.0 yr</th>
<th>12.9 yr</th>
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</tbody>
</table>
Collateral Mortgage Rate 6%

- AAA Bonds 2%
- AA Bonds 3%
- A Bonds 5%
- BBB Bonds 8%
- BB Bonds 11%
- B Bonds 18%
- NR (Non-Rated) Bonds – 22%

Weighted Average Coupon 4.5%
10-Year CMBS Spread over Treasury

<table>
<thead>
<tr>
<th>Key</th>
<th>Axis</th>
<th>Name</th>
<th>Last</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
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<tbody>
<tr>
<td>Left</td>
<td>SD</td>
<td>CMBS Fixed AAA 10Yr</td>
<td>38.800</td>
<td>21.500</td>
<td>102.500</td>
<td>41.649</td>
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<tr>
<td>Left</td>
<td>SD</td>
<td>CMBS Fixed AA 10Yr</td>
<td>55.800</td>
<td>36.000</td>
<td>117.500</td>
<td>58.365</td>
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<tr>
<td>Left</td>
<td>SD</td>
<td>CMBS Fixed A 10Yr</td>
<td>73.800</td>
<td>49.500</td>
<td>137.500</td>
<td>75.161</td>
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<tr>
<td>Left</td>
<td>SD</td>
<td>CMBS Fixed BB 10Yr</td>
<td>540.000</td>
<td>240.000</td>
<td>700.000</td>
<td>472.126</td>
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<tr>
<td>Left</td>
<td>SD</td>
<td>CMBS Fixed BBB 10Yr</td>
<td>129.800</td>
<td>74.500</td>
<td>230.800</td>
<td>128.483</td>
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<tr>
<td>Left</td>
<td>SD</td>
<td>CMBS Fixed BBB- 10Yr</td>
<td>164.800</td>
<td>104.500</td>
<td>327.200</td>
<td>194.074</td>
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<table>
<thead>
<tr>
<th>Key</th>
<th>Axis</th>
<th>Name</th>
<th>Last</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>SD</th>
<th>SD Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Left</td>
<td>CMBS Fixed AAA 10Yr</td>
<td>0.000</td>
<td>0.000</td>
<td>10/01/2008</td>
<td>319.000</td>
<td>47.017</td>
<td>8.978</td>
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<td>0</td>
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<td>CMBS Fixed AA 10Yr</td>
<td>4663.176</td>
<td>29.000</td>
<td>02/15/2005</td>
<td>566.060</td>
<td>286.409</td>
<td>30.236</td>
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<td>0</td>
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<td>CMBS Fixed A 10Yr</td>
<td>5740.206</td>
<td>38.000</td>
<td>02/15/2005</td>
<td>721.404</td>
<td>577.674</td>
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<td>CMBS Fixed BB 10Yr</td>
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<td>240.000</td>
<td>02/13/1998</td>
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<td>971.194</td>
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<td>0</td>
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<td>CMBS Fixed BBB 10Yr</td>
<td>6958.164</td>
<td>68.000</td>
<td>02/22/2007</td>
<td>989.782</td>
<td>941.988</td>
<td>35.422</td>
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<tr>
<td>0</td>
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<td>CMBS Fixed BBB- 10Yr</td>
<td>7235.284</td>
<td>87.000</td>
<td>02/23/2007</td>
<td>1094.654</td>
<td>027.736</td>
<td>36.797</td>
</tr>
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Deconstructing the Real Estate Finance Tower

$500 Million Valued Office Tower

$400 Million Large Loan

Commercial Real Estate Investment Bank

$100 Million Equity

Real Estate Company or Other Entity Owning, Operating or Controlling Property

A-Note 1
$100 Million

A-Note 2
$100 Million

A-Note 3
$100 Million

Investment-Grade CMBS

Subordinate CMBS or "B-Pieces"

B-Note
$50 Million

C-Note
$50 Million

$25 Million Mezzanine Loan

$25 Million Preferred Equity

$50 Million Common Equity

Managed CRE CDO

Mezzanine Loan

Preferred Equity

B-Note

Subordinate CMBS or "B-Pieces"

Conduit Loans, Other A-Notes, etc.

Source: Wachovia Securities
Interest Rate Increase

Which ones?
Fed Undertakes QE3 With $40 Billion Monthly MBS Purchases
Interest Rates – Long versus Short

– Term Structure of Interest Rate

– Traditionally, open market operations impact short term rates
– Long term rates driven by economy’s fundamentals and not subjected to monetary policy

– QE3 targeted long term rates

– Possible only because of MBS
Quantitative Easing 3 (9/12 – 10/14)
Interest Rate Increase

Impact on commercial mortgage market.
How Does Rate Increases Affect Commercial Lending?


– Lenders require target DCR (2017Q4 – 2.2)

– To offset higher rates (and higher debt service) lenders will reduce loan size

– Borrowers will seek additional financing
Example of Funding Needs

- Borrow $10 mill on a property that generates $900,000 NOI
- 4.5% senior loan
- Annual Debt Service $450,000
- DCR 2.0
- If rates increase to 5%
  - Loan reduced to $9 mil to maintain DCR of 2.0

- Borrower will need to seek additional $1 mill loan (mezzanine)

- Will lead to a short term boost in loan demand
Interest Rate Increase

Affect on Commercial Mortgage Prepayment
Balloon Due Dates
CMBS Defeasance

- Defeasance – substitution of a coupon-matching portfolio of Treasury securities for mortgage

- Factors leading to defeasance
  - Property appreciation
  - Past lock-out period
  - Increasing interest rates

![Annual Defeasance ($Bil.)](chart.png)

Source: Moody's
Debt Funds – the new lending force?
CMBS Performance

CMBS Delinquencies

Percentage of loans balances in filed-rated U.S. CMBS that are delinquent by

<table>
<thead>
<tr>
<th></th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
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<tbody>
<tr>
<td>Retail</td>
<td>12</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Office</td>
<td>8</td>
<td>6</td>
<td>4</td>
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<tr>
<td>Industrial</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Mixed-use</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hotel</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Multi-Family</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
<td>5</td>
<td>4</td>
</tr>
</tbody>
</table>
Debt Funds

- Debt Funds raised over $50.7 billion, 21% over last year
- More than double from three years ago
- Targeting bridge and mezzanine loans – returns of 10%
- Fill void by banks pulling back from lending due to regulatory concerns
- Funds possibly used to acquire CMBS retention slice
MARKETS | CREDIT MARKETS

China Becomes Asia’s Biggest Securitization Market

China’s issuance of asset-backed securities rose by a quarter in the first eight months of 2015

Securitization Surge
China has become Asia’s biggest securitization market.

<table>
<thead>
<tr>
<th>Total outstanding value of securitization markets</th>
<th>New issuance in China's securitization market</th>
</tr>
</thead>
<tbody>
<tr>
<td>China $88.9 billion</td>
<td>$50 billion</td>
</tr>
<tr>
<td>South Korea 74.1</td>
<td>40</td>
</tr>
<tr>
<td>Japan 36.7</td>
<td>30</td>
</tr>
<tr>
<td>Australia 24.3</td>
<td>20</td>
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*As of Sept. 24
Source: Dealogic

By FIONA LAW

Updated Sept. 24, 2015 10:18 p.m. ET
Add one more item to the list of products "made in China": debt backed by commercial mortgages.

Bank of China Ltd. is already one of the largest foreign lenders to commercial real estate in the U.S., helping finance prestige properties. Now, it is staking a claim in the red-hot market for bonds backed by packages of commercial-real-estate loans.

In November, Bank of China became the first Chinese lender to participate in the sale of U.S. commercial-mortgage-backed securities, known as CMBS. Bank of China joined a group of banks in a $950 million loan to finance a 43-story building at 1290 Avenue of the Americas in midtown Manhattan that was then packaged into bonds.

The Chinese bank is planning loans that would end up in two or three more CMBS deals, a person with knowledge of the bank said. State-controlled Bank of China earns a profit from selling loans via CMBS. It also frees up its balance sheet to make more loans.