



Institute of Actuaries of Australia

# 4th Financial Services Forum

*Innovation in Financial Markets*

19 and 20 May 2008 – Melbourne

## The management of liquidity risk

***Anthony Asher, Simon Webb and  
Andrew Doughman***



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# AGENDA

Definition and theoretical causes

The role of government

The 2007 credit crunch

Avoiding liquidity crises

Building better models



# Definition and theoretical causes

## Definition

- The risk that assets cannot be turned into cash or equivalently;
- A market failure, caused by insufficient buyers (or sometimes sellers) at a fair price

## Causes

- Monopoly power, externalities or asymmetric information
- In the context of the current crisis, insufficient buyers for securitised loans because potential buyers do not have the information to determine a fair price



# The role of government

- Government intervention is intended to ameliorate externalities ...but can lead to market failure (global food shortage)
- Governments preserve the integrity of the payment system...
- This leads to moral hazards, banks take on unsustainable risks
  - Savings & Loans, emerging markets, junk bonds, sub-prime
  - No charge for liquidity (M1 is 20% of GDP; M3 is 100%)
- Challenge is to reduce the need for implicit government guarantees
  - A role for professional liquidity-risk actuaries within banks?
  - Insurance can replace need for liquidity



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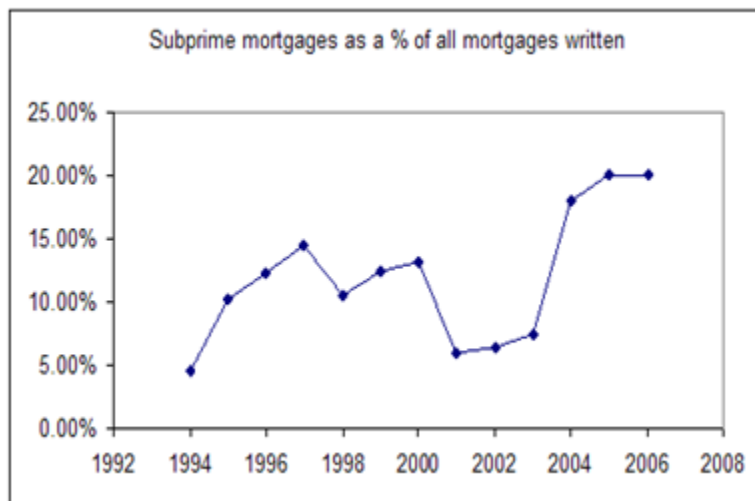
## The 2007 credit crunch in short





# Growth in US sub-prime defaults

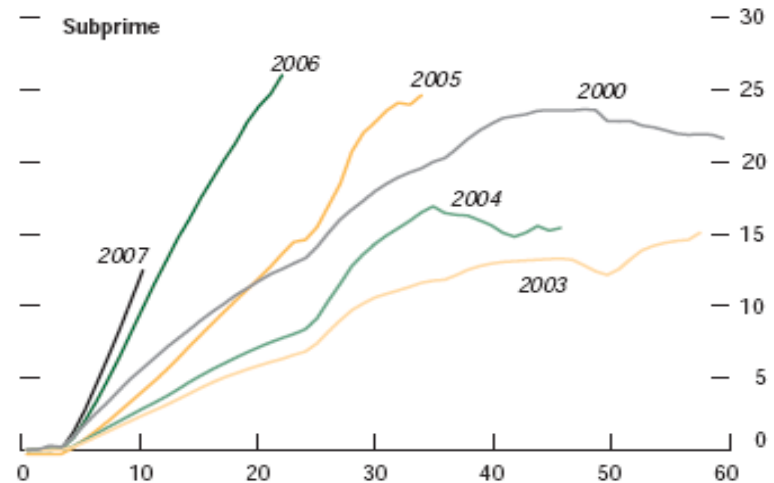
## US Subprime Market Share



Sources: Edward Gramlich, FRB, and Mara Lee, NPR

## Mortgage Delinquencies by Vintage Year

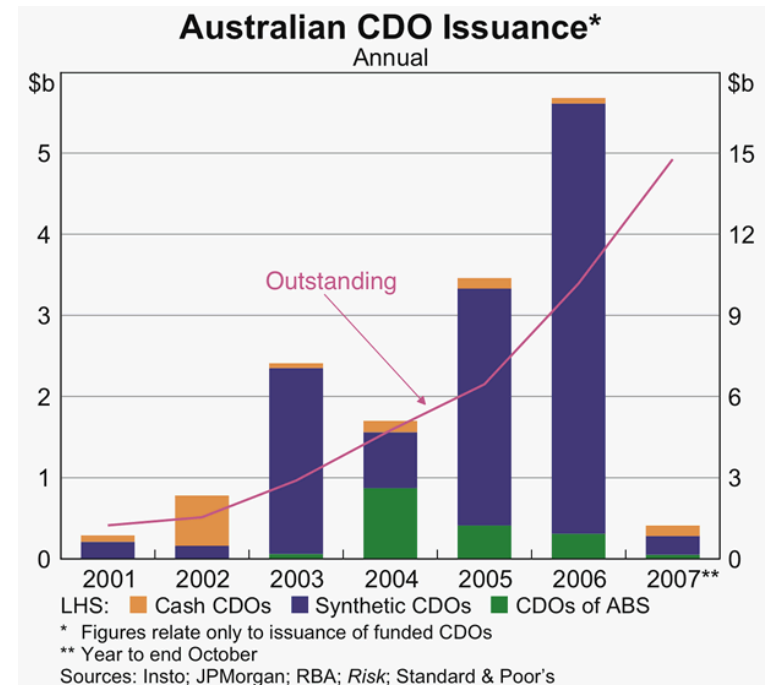
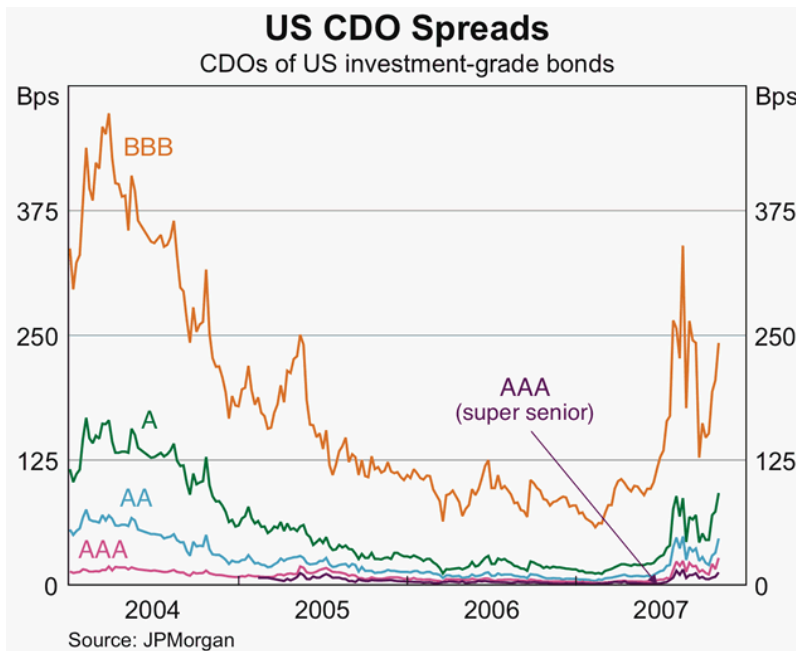
(60+ day delinquencies, in percent of balance)



Sources: IMF, Merrill Lynch; and LoanPerformance



# Increased spreads and market turnover

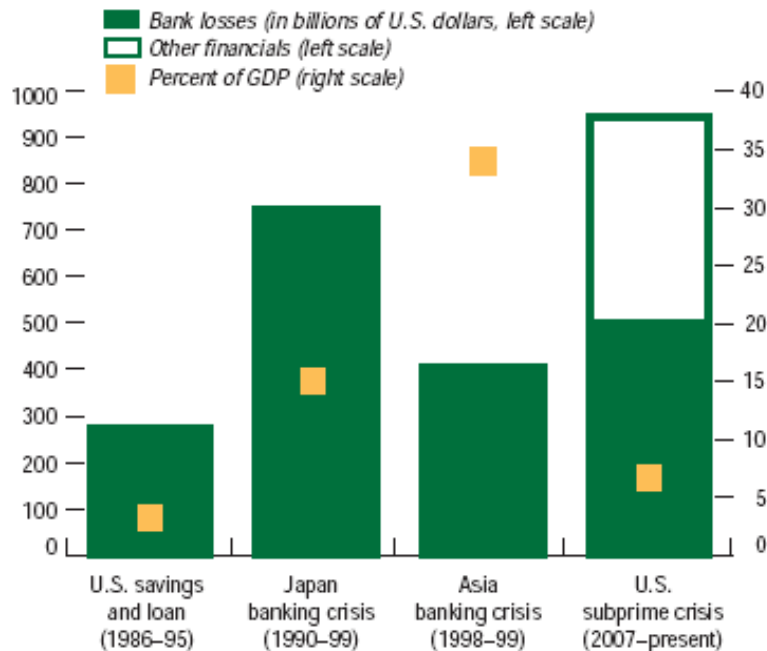






# Significant losses

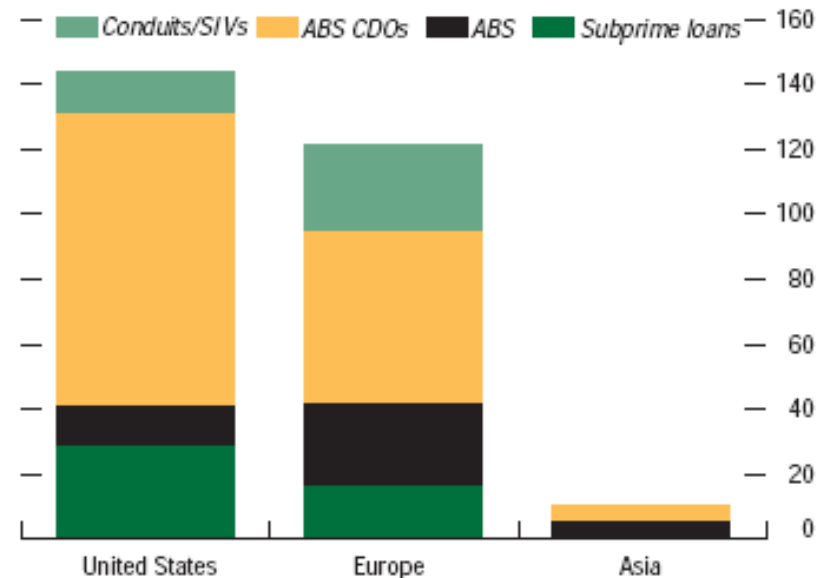
## Comparison of Financial Crises



Sources: World Bank; and IMF staff estimates.

Note: U.S. subprime costs represent staff estimates of losses on banks and other financial institutions from Table 1.1. All costs are in real 2007 dollars. Asia includes Indonesia, Korea, the Philippines, and Thailand.

## Expected Bank losses as of March 2008 (USD billions)



Sources: Goldman Sachs; UBS; and IMF staff estimates.

Note: ABS = asset-backed security; CDO = collateralized debt obligation; SIV = structured investment vehicle.



# Causes and moral hazard

## **Financial Innovation**

- Securitisation provided suitable investments for institutions with matching long-term liabilities
- Development of a liquid market for previously unmarketable long-term assets

## **Complexity**

- CDO structures created where mechanics of risk transfer are clouded by an increasing variety of customised terms and structures
- Investors exhibit bounded rationality and rely on heuristics (rules of thumb) when making investments

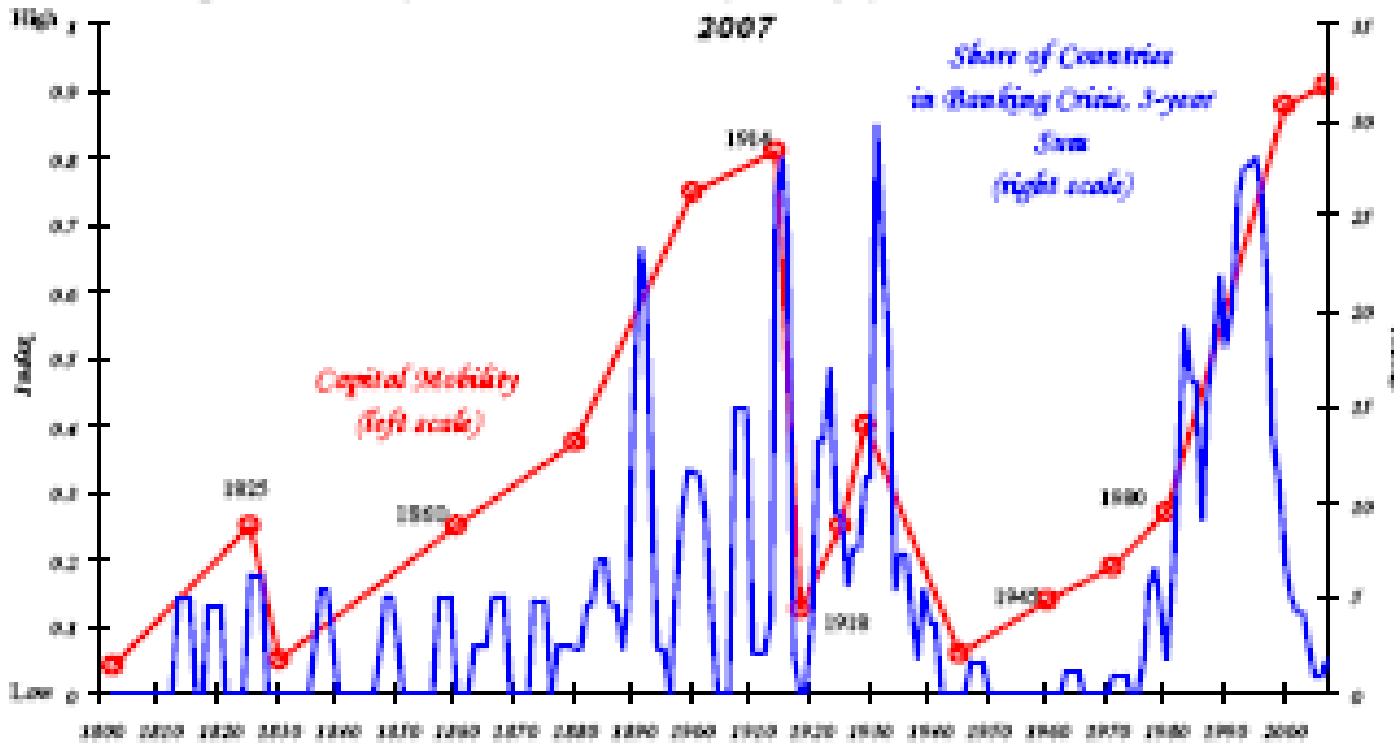
## **Moral hazards (securitised mortgage assets)**

- Mortgage brokers, originator's employee paid commission on sale of loan but not exposed to subsequent losses
- Originator minimally exposed to risks of default
- Rating agency determining credit rating not exposed at all
- Merchant banks establishing structures pass risk to institutional investors

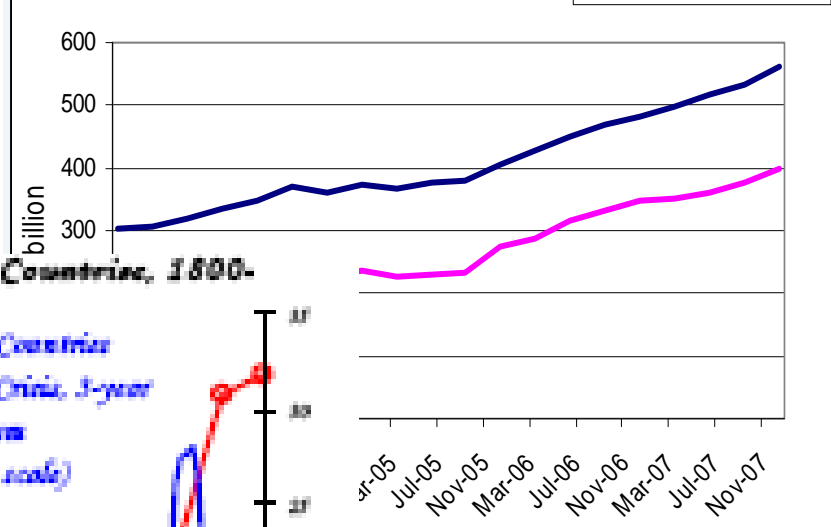


# A historical perspective

Capital Mobility and the Incidence of Banking Crisis: All Countries, 1890-2007



Australian gross foreign liabilities



Australian banks have \$350bn of foreign liabilities, 75% to other banks



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# Avoiding liquidity crises

- Actively manage liquidity
  - Charge internally
- Create sources of liquidity
  - Stand by arrangements with regular fire drills
  - Marketable assets that are regularly traded
- Match investors and borrowers by term
- Avoid making liquidity promises
- Value illiquid liabilities at higher rates



# Salary linked home finance

- Superannuation funds => Pooling vehicle => Homeowner
  - Amount borrowed / (repayment term x average income) = %
  - \$360 000 / (20 years x \$120 000 taxable income) = 15%
  - Repayments always 15% of taxable income
- Market interest rates do not influence installments
  - Amount outstanding = (repayment term x average income) x %
  - \$450 000 = (15 years x \$200 000 taxable income) x 15%
- Investment return = rate of growth in remuneration
- Minimal risks for both borrowers and investors



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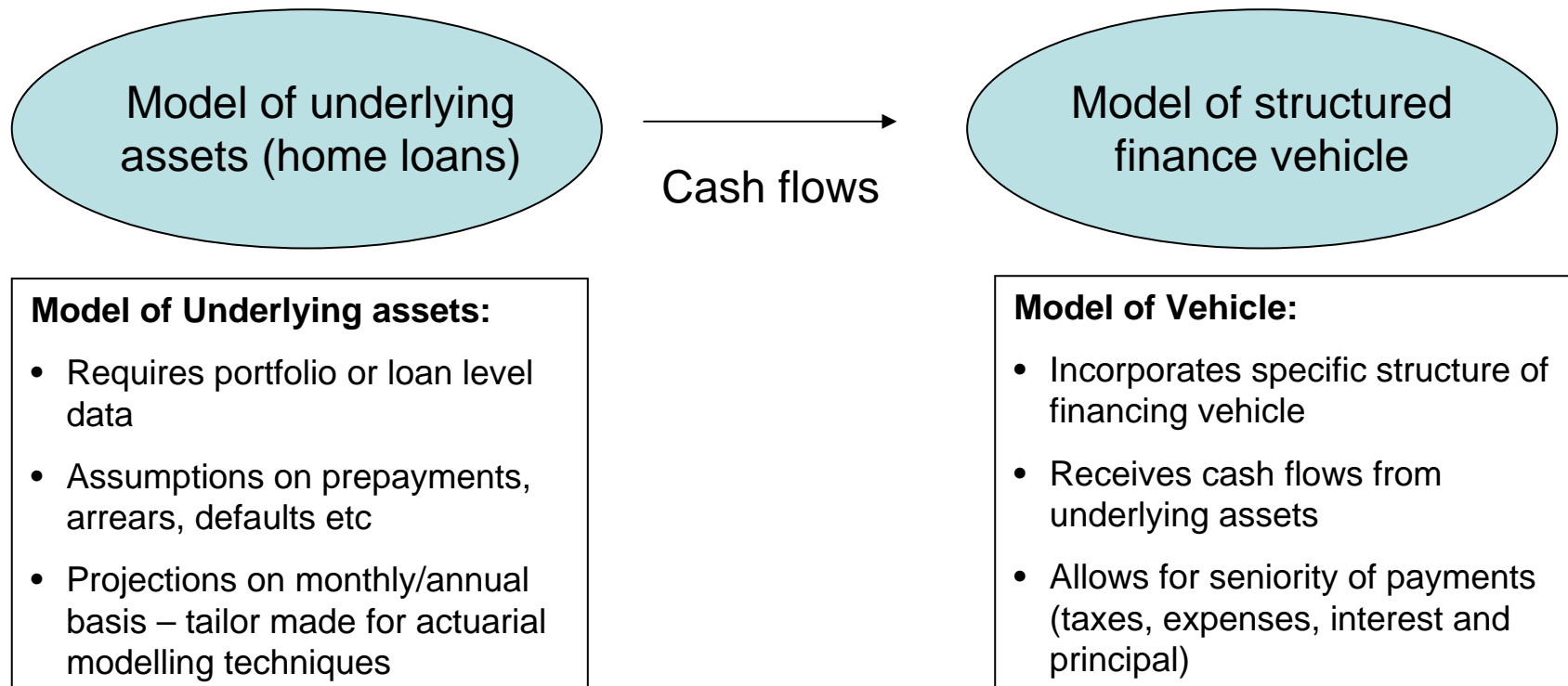
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## Building better models

- Models enable investors to gain an in-depth understanding of the structure of instruments and determine estimates for cashflows





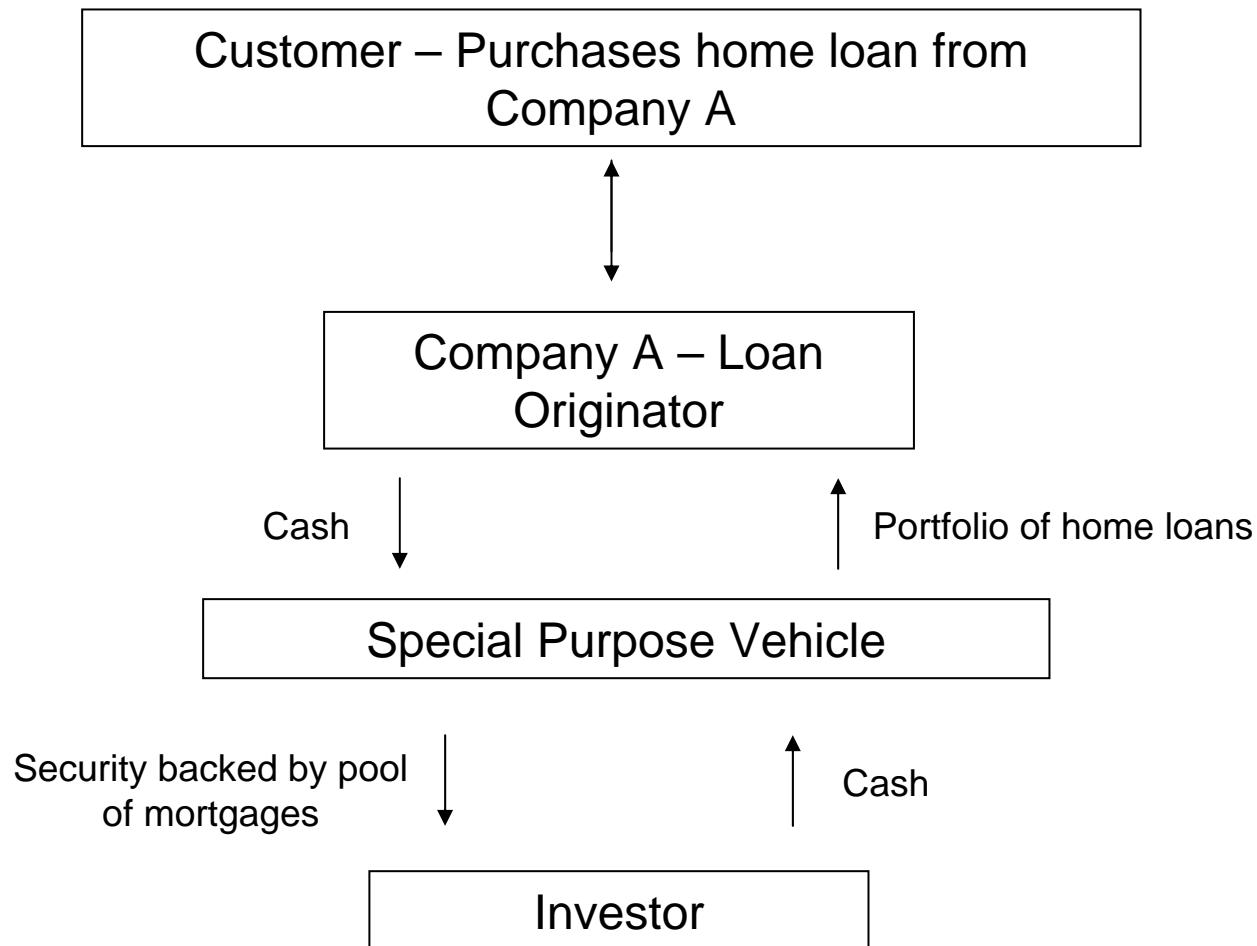


## Key considerations

- Portfolio level or loan level data
  - Portfolio level requires less input data, model significantly smaller. Less granular
  - Loan level captures individual loan characteristics. Data requirements and size of model potentially onerous
- Assumptions
  - Prepayment rates
  - Arrears rates
  - Default rates and loss-given-default rates
- Identify and model key cash flows
  - Principal and interest payments
  - Fee income

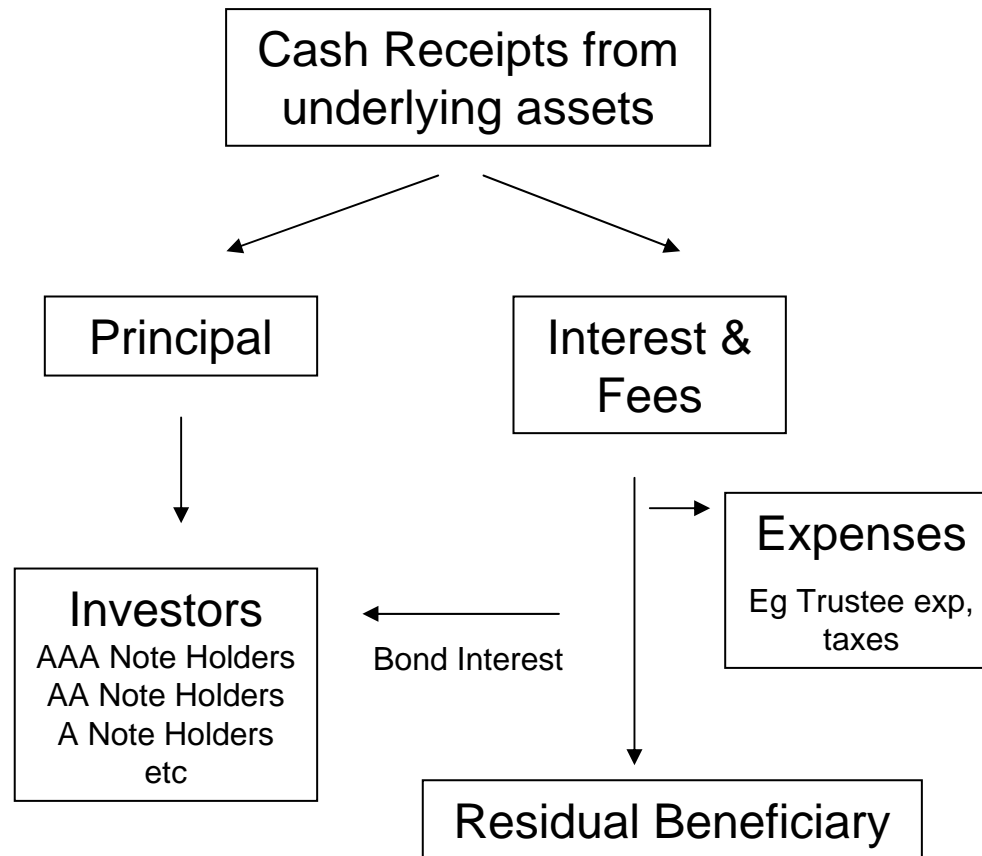


## Modeling the securitisation structure





## Modeling the securitisation structure (2)





# Common structures and enhancements

## Common Structures

- Sequential-Pay
- Accrual Tranches
- Interest-Only Tranches
- Stripped Mortgage Backed Securities

## Credit Enhancements

- Built into structure
  - Senior/subordinated structures
  - Reserve funds
  - Over-collateralisation
- External to structure
  - Third party guarantees (mono-line insurers, the originator)



## Conclusion

Actuaries are well placed to contribute

- Modelling the underlying credit risks
- Designing matching instruments
- Determining the charge for liquidity
- Modelling customer behaviour