

- Second exam will cover only Chapters 10-12
- Final exam will be cumulative for entire course
- Answers to practice second exam will be reviewed in discussion sections week of Fri Nov 4 to Wed Nov 9
- An alternative practice exam is also available on the course web page

Chapter 12: Economics of Information

- F. Resolving asymmetric information with costly-to-fake signaling
- G. Insurance markets

Insurance policy:

- I pay the insurance company some money now (called the insurance premium)
- The insurance company will cover my expenses if a certain event occurs (house burns down, car is in accident, I get cancer, ...)

- Insurance premium is more than the expected value of payout
- E.g., I pay \$500 for a car insurance policy that has 1/100 chance of paying \$20,000
- insurance premium = \$500
- expected payout = \$200

- People buy policy because they are risk averse
- Insurance company makes profit from law of large numbers
- Note: for some kinds of insurance (e.g., earthquake) law of large numbers doesn't apply-- just roll dice once

Potential problems with insurance markets:

(1) Adverse selection

Suppose there are two kinds of drivers:

- safe drivers: probability of accident = $1/200$ per year
- risky drivers: probability of accident = $1/20$ per year
- payout for accident = \$20,000

Expected payout for safe drivers:
 $(1/200) \times (\$20,000) = \100 per year

Expected payout for risky drivers:
 $(1/20) \times (\$20,000) = \$1,000$ per year

Suppose that $1/2$ the drivers are safe and $1/2$ are risky and an insurance company issues same policy to both types

Expected payout for safe drivers:
 $(1/200) \times (\$20,000) = \100 per year

Expected payout for risky drivers:
 $(1/20) \times (\$20,000) = \$1,000$ per year

Insurance company's expected payout is:
 $(1/2) \times (\$100) + (1/2) \times (\$1,000) = \$550$ per policy

Insurance company must charge more than \$550 premium to make a profit

Expected payout for safe drivers:
 $(1/200) \times (\$20,000) = \100 per year

Expected payout for risky drivers:
 $(1/20) \times (\$20,000) = \$1,000$ per year

Suppose that consumers' risk aversion is such that they're willing to pay \$1.00 premium for every 50¢ in expected payout

Expected payout for safe drivers:
 $(1/200) \times (\$20,000) = \100 per year

Expected payout for risky drivers:
 $(1/20) \times (\$20,000) = \$1,000$ per year

Safe drivers are willing to pay \$200/year premium

Risky drivers are willing to pay \$2,000/year premium

Conclusion: if insurance policy costs \$550, only the risky drivers would buy it

If only risky drivers buy it, insurance company's expected payout is \$1,000

Insurance will cost over \$1,000 in equilibrium

Definition:

adverse selection refers to the phenomenon where high-risk individuals are more likely to buy insurance than low-risk individuals, thereby raising insurance payouts and equilibrium premia

One way insurance companies cope with adverse selection:

statistical discrimination

Insurance company uses some aspect of driver that they can identify that correlates with payout rates

Examples:

- driving record
- age
- zip code

Potential problems with insurance markets:

- (1) Adverse selection
- (2) Moral hazard

Once I have insurance, I no longer personally pay the cost for my risky behavior

If I engage in more risky behavior precisely because I am insured it is called *moral hazard*

Chapter 12: Economics of Information

F. Resolving asymmetric information with costly-to-fake signaling

G. Insurance markets

H. Economics of information and the financial crisis

- moral hazard
- financing of risky loans
- role of insurance companies

Consider risky loan

Expected value
 $= (0.8)(150) + (0.2)(0)$
 $= 120$

Expected return
 $= (120 - 100)/100$
 $= 20\%$

Consider pooling risky loans

If loans are independent, probability both pay off is $(0.8)(0.8) = 0.64$

Consider pooling risky loans

If loans are independent, probability both default is $(0.2)(0.2) = 0.04$

Consider pooling risky loans

If loans are independent, probability exactly one defaults is $2(0.8)(0.2) = 0.32$

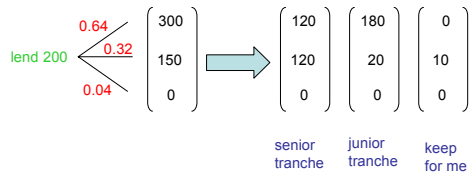
Could split the pool into new assets with very different risk characteristics

senior tranche junior tranche keep for me

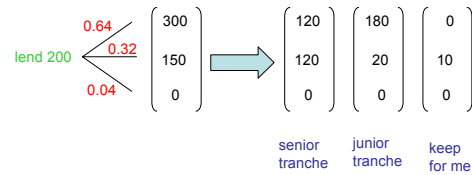
- senior tranche sold to investor for 100
- pays 120 with probability $0.64 + 0.32 = 0.96$
- pays 0 with probability 0.04
- expected value $= (0.96)(120) = 115.2$
- expected return = 15.2%
- less expected return, but safer

senior tranche junior tranche keep for me

- junior tranche sold to another investor for 100
- expected value = $(0.64)(180) + (0.32)(20) = 121.6$
- expected return = 21.6%
- higher expected return, but riskier



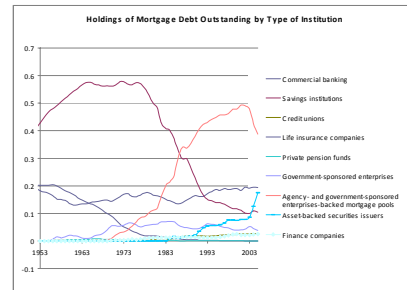
- investors covered all the 200 lent, and I get something for nothing



Historical system: bank made loan directly, bank held the risk



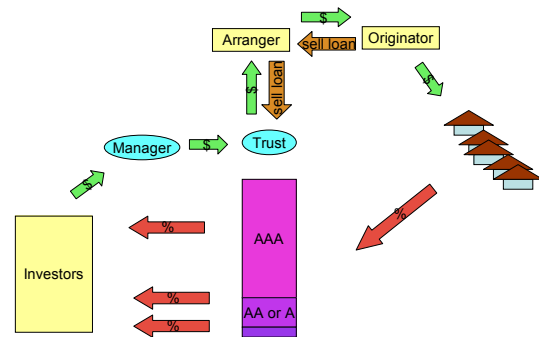
One-bank loan process was gradually replaced by securitization by govt sponsored enterprises (red) and private mortgage-backed securities (blue)



How private mortgage-backed securities (MBS) worked

- Loan originators would make loan, sell it off to loan aggregator
- Loan aggregator would buy pool of loans and slice into tranches
- Ratings agencies (Standard & Poor's and Moody's) would rate each tranche for risk (AAA, AA, etc.)
- Senior tranches sold off to investors (pension funds, hedge funds, domestic and foreign banks)

Flow chart for how mortgage securitization worked



Originator makes profit by issuing a loan, not affected by whether loan gets repaid

Moral hazard-- make as risky loans as possible to anybody

- no documentation of income
- little or no down payment
- ballooning interest payments that can't be met

Three factors convinced buyers of senior MBS they were safe

- (1) the junior-senior structure
- (2) credit-default swaps

- For extra guarantee of safety, buyers of MBS would also buy credit default swaps (CDS)

- functioned for the buyer like insurance policy

- I pay fixed fee to seller of CDS
- seller of CDS compensates me if my MBS doesn't pay me

- CDS sold by businesses like AIG, a huge insurance company that promised to back 1/2 trillion worth of securities

- However, there is no law of large numbers working in AIG's favor here (aggregate risk of multiple defaults)

- CDS contract isn't insurance at all, it is just a market wager by AIG

- moral hazard for AIG

- if no aggregate event, company collects big premiums and their staff get big bonuses
- if big aggregate event, they don't have the money to pay claims anyway

- moral hazard for buyer of CDS

- if AIG doesn't pay me, maybe government will pick up their bill

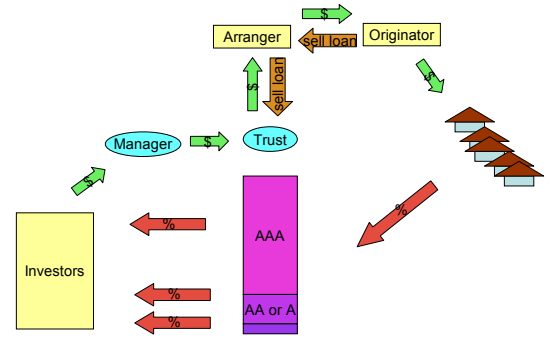
Three factors convinced buyers of senior MBS they were safe

- (1) the junior-senior structure
- (2) credit-default swaps
- (3) the ratings agencies gave these securities very high credit ratings

Ashcraft and Schuermann (2007):

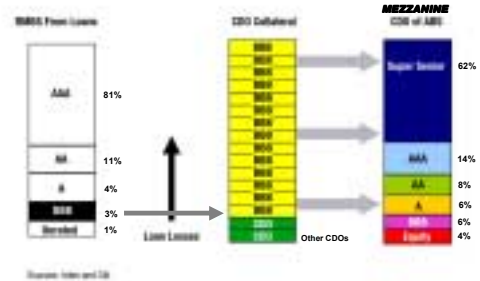
- Studied 4000 mortgages originated in 2006 by New Century Financial (now bankrupt)
- All subprime (poor income, credit rating, and/or collateral)
- Almost all called for borrower to increase monthly payments by 25% to 45% within 2-1/2 years
- 79% rated AAA
- 94% rated at least A

Flow chart for how mortgage securitization worked



Who was willing to buy the junior tranches ("toxic waste")?

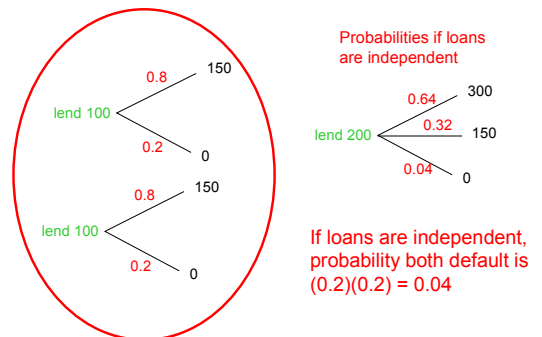
Answer: Collect toxic waste in CDOs (Collateralized Debt Obligations) for retransferring

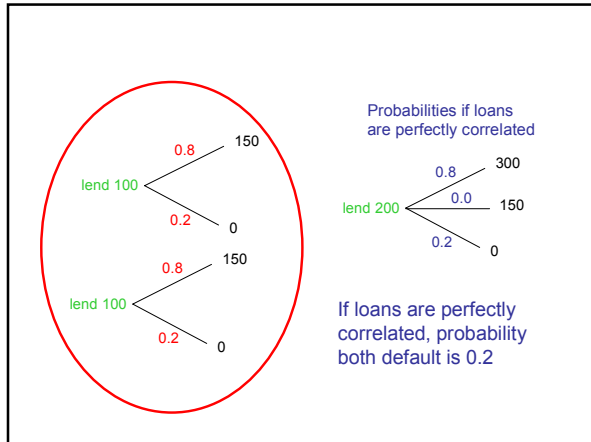


Then collect toxic tranches from CDOs in "CDOs squared"

Why did the ratings agencies say these were so safe?

key parameters for evaluating senior tranches are (a) default probabilities and (b) correlations





- Ratings agencies assumed default rates and correlations would remain at their old historical levels
- But the magnitude of the securitization and new loans extended vastly changed the default rates and correlations
- When house prices were rising, default rates and correlations were low