CHARTA LEARNING · LESSON NOTES

Banks: Risks, Capital and Structure

FRM Part I

1 A bank in one sentence

- A bank takes deposits and lends them out
- Depositors can ask for their money back at any time
- Four main risks: credit, market, operational, liquidity
- Plus interest rate risk on loans and deposits
- Capital is the cushion that absorbs the losses

IN THE LESSON

- Picture a small shop that takes in savings from the neighbors and lends the money out to local businesses and home buyers.
- The neighbors may ask for their money back any day, yet the loans last for years.
- That is a bank in one sentence, and it explains why banks are risky.
- The principal risks are four.
- Credit risk, when a borrower does not repay.
- Market risk, when prices move against the bank.
- Operational risk, when processes or people fail.
- Liquidity risk, when the bank cannot pay on time.
- Interest rate risk on its loans and deposits is an important relative.
- Capital is the cushion that absorbs the losses, and much of this lesson is about how big that cushion should be, and who decides.

2 Credit risk and what is really exposed

- Credit risk: borrower or counterparty fails to pay
- Arises from loans, bonds held and derivatives
- Derivative exposure = positive replacement value
- Derivative notional is only a reference, not the loss

IN THE LESSON

- Credit risk is the loss when a borrower or counterparty fails to pay what it owes.
- It comes from three places: loans the bank has made, bonds the bank holds, and derivatives.
- The derivative case needs care.
- Suppose a bank has a swap with a notional of one hundred million dollars.
- The notional is only a reference amount used to calculate the payments, so it is not what the bank could lose.
- The exposure is the positive replacement value: what it would cost to replace the trade if the other side defaulted today.
- That only matters when the trade is worth something to the bank.
- If the trade is worth less than nothing to the bank, the counterparty owes it nothing, so there is nothing to lose.

3 Example 1: exposure on a swap

Swap with a counterparty (illustration)

Notional of the swap	reference only, not at risk	**$100m**
Value to the bank today	cost to replace it	**+$4m**
Credit exposure	larger of (4, 0)	**$4m**
If the value were −$3m	larger of (−3, 0)	**$0**

IN THE LESSON

- Let's put numbers on it.
- A swap has a notional of one hundred million dollars.
- That is the face amount, and it is not at risk.
- Today the swap is worth four million dollars to the bank, meaning the bank would be paid four million to replace it.
- If the counterparty defaults today, the credit exposure is the larger of four and zero, which is four million dollars.
- Now suppose instead that the value to the bank were minus three million.
- The bank would owe the counterparty, so a default would cost the bank nothing on this trade.
- The exposure is the larger of minus three and zero, which is zero.
- All the figures here are illustrations.

4 Market, operational, liquidity and rate risk

- Market: rates, FX, equity or commodity prices move
- Operational: process, people, systems, fraud, legal
- Liquidity: short-term funding of long-term assets
- Rate risk: assets and liabilities reprice apart

IN THE LESSON

- Now the other risks, one at a time.
- Market risk is the loss from moves in interest rates, exchange rates, equity prices or commodity prices on the positions a bank holds.
- Operational risk is the loss from inadequate or failed processes, people and systems, or from external events.
- It includes fraud and legal risk.
- Liquidity risk is the inability to meet payments as they fall due.
- It comes from funding long-term assets with short-term deposits or wholesale borrowing, because the money can leave before the loans are repaid.
- Finally, interest rate risk in the banking book.
- Assets and liabilities reprice at different times, and that squeezes net interest income.
- Let's see that squeeze in numbers.

5 Example 2: the squeeze on interest income

Fixed loans $1,000m at 5%; deposits $900m at 3% (illustration)

Interest earned	5% × 1,000	**$50m**
Interest paid, before	3% × 900	**$27m**
Net interest income, before	50 − 27	**$23m**
Interest paid, rates +2 pts	5% × 900	**$45m**
Net interest income, after	50 − 45	**$5m**

IN THE LESSON

- A bank holds one thousand million dollars of fixed rate loans earning five per cent.
- It funds nine hundred million of them with short-term deposits costing three per cent, and the remaining one hundred million is its own equity.
- This is an illustration.
- The loans earn five per cent of one thousand, which is fifty million.
- The deposits cost three per cent of nine hundred, which is twenty seven million.
- So net interest income is fifty minus twenty seven, twenty three million.
- Now rates rise by two percentage points.
- The deposits reprice quickly, so they cost five per cent of nine hundred, forty five million.
- The loans are fixed and still earn fifty.
- Net interest income falls from twenty three to fifty minus forty five, just five million.

6 Classify a loss by its source

Five events, five sources

Event	Risk by source
Default after currency fall	Credit risk
Price falls on a bond held	Market risk
Employee fraud	Operational risk
Cannot meet payments due	Liquidity risk
Interest income squeezed	Interest rate risk

IN THE LESSON

- Here is a skill the course expects: classify a loss by its source.
- Take a borrower that defaults because its currency collapsed.
- The currency fall is the trigger, but the loss is the borrower failing to pay, so it is credit risk.
- A bond held by the bank falls in price: that is market risk.
- An employee commits fraud: operational risk.
- The bank cannot meet payments that are due: liquidity risk.
- And net interest income is squeezed because deposits reprice faster than loans: interest rate risk.
- Ask where the loss actually comes from, not what caused the story behind it.
- A default that follows a currency move is still credit risk, because what hurts the bank is that the borrower does not pay.

7 Economic capital: the bank's own estimate

- Economic capital: the bank's own estimate
- Cushion for unexpected loss, usually over one year
- Confidence level chosen to match a target rating
- 99.97% = 0.03% default chance, roughly AA, illustrative
- Used to allocate, price deals, judge performance

IN THE LESSON

- Banks need a cushion against losses, and there are two ways to size it.
- The first is economic capital.
- It is the bank's own estimate of the capital needed to absorb unexpected losses over a horizon, usually one year.
- The bank chooses a confidence level to match a target credit rating.
- For example, ninety nine point nine seven per cent corresponds to a default probability of point zero three per cent, which is only illustratively about a double A rating, because the mapping depends on the agency and the horizon.
- Banks use economic capital internally.
- They allocate capital to business lines, price deals, and judge performance.
- So it answers one question: how much capital do we need, given the risks we run?

8 Economic capital and RAROC

EC = Loss at confidence level − EL
RAROC = (Revenue − Costs − EL) ÷ EC

Loss at confidence level	Loss in a very bad year
EL: expected loss	Average yearly loss, priced in
EC: economic capital	Capital for the unexpected part
RAROC	Profit per dollar of capital

IN THE LESSON

- Economic capital is measured as the loss at the chosen confidence level minus the expected loss.
- Why subtract?
- Expected loss is the average loss the bank expects every year.
- It is not a surprise, so it is covered by pricing, because the bank charges borrowers enough to pay for it, and by provisions.
- Capital is for the unexpected part, the loss beyond the average.
- Banks also use economic capital to judge performance with R A R O C, which is risk adjusted return on capital.
- Take revenue, subtract costs and expected loss, and divide by economic capital.
- It tells you how much profit a business earns for each dollar of capital it uses.
- Notice that expected loss appears in both: it is taken out of the capital, and out of the profit.

9 Example 3: economic capital for a loan book

Loan book, one year, 99.97% confidence (illustration)

Expected loss	average yearly loss	**$100m**
Loss at 99.97% level	bad-year loss	**$700m**
Economic capital	700 − 100	**$600m**
Chance loss exceeds $700m	1 − 0.9997	**0.03%**

IN THE LESSON

- A bank's loan book has an expected loss of one hundred million dollars a year.
- Using its own model, the bank finds that at the ninety nine point nine seven per cent confidence level, the one year loss is seven hundred million.
- Those are illustrations.
- Economic capital is seven hundred minus one hundred, which is six hundred million dollars.
- The first hundred is expected and is handled by pricing and provisions.
- The next six hundred is the unexpected loss that the capital must absorb.
- And the chance that the loss exceeds seven hundred million is one minus point nine nine nine seven, which is point zero three per cent, about three chances in ten thousand in any one year.

10 Example 4: RAROC for a business line

Economic capital $400m, one year (illustration)

Revenue		**$180m**
Costs		**$90m**
Expected loss		**$30m**
Profit after expected loss	180 − 90 − 30	**$60m**
RAROC	60 ÷ 400	**15%**

IN THE LESSON

- Now R A R O C for a business line.
- Its economic capital is four hundred million dollars.
- Over the year it earned revenue of one hundred eighty million and paid costs of ninety million.
- Its expected loss is thirty million.
- Profit after expected loss is one hundred eighty minus ninety minus thirty, which is sixty million.
- R A R O C is sixty divided by four hundred, fifteen per cent.
- The bank then compares fifteen per cent with a hurdle rate it requires from its capital.
- A business above the hurdle creates value, and one below it might need repricing or shrinking.
- Another business might earn more profit in dollars yet use so much capital that its R A R O C is lower, which is why we divide by capital.

11 Economic versus regulatory capital

Internal and risk-based versus external and rule-based

Capital	Nature
Economic capital	Internal, risk-based
Regulatory capital	External, rule-based
Economic: used to	Allocate, price, judge
Regulatory: used to	Comply, every bank alike
Meeting the minimum	Proves nothing about economic

IN THE LESSON

- Now set the two kinds of capital side by side.
- Economic capital is internal and risk based.
- The bank builds it with its own models, and uses it to allocate capital, price deals and judge performance.
- Regulatory capital is external and rule based.
- It is the minimum the supervisor requires, calculated with prescribed formulas such as risk weights, and it applies to every bank alike.
- It is a compliance constraint.
- The two can differ in either direction.
- Sometimes the rules ask for more than the bank's model, and sometimes for less.
- So meeting the regulatory minimum does not prove that economic capital is sufficient.
- A bank can pass the regulatory test and still be thin against the risks it really runs.

12 Basel I: the first common rule

- 1988: capital of at least 8% of risk-weighted assets
- Weights: 0% OECD government debt, 20% OECD banks
- 50% residential mortgages, 100% corporate loans
- Aims: adequate capital and a level playing field

IN THE LESSON

- Regulatory capital rules are set by the Basel committee of bank supervisors, and they developed in stages.
- Basel I, from nineteen eighty eight, is historical now, but it is the base to understand.
- It required capital of at least eight per cent of risk weighted assets.
- Each asset gets a weight reflecting its riskiness.
- Government debt of O E C D countries had a weight of zero per cent.
- Loans to O E C D banks, twenty per cent.
- Residential mortgages, fifty per cent.
- Corporate loans, one hundred per cent.
- The aims were that banks hold adequate capital, and that they compete on a level playing field across countries, so no bank gained by holding less capital than its rivals.

13 Example 5: risk-weighted assets under Basel I

Total assets $1,000m, Basel I weights (illustration)

Govt $200m, banks $100m	0% and 20% weights	**$20m**
Mortgages $300m	× 50%	**$150m**
Corporate loans $400m	× 100%	**$400m**
Risk-weighted assets	20 + 150 + 400	**$570m**
Minimum capital	8% × 570	**$45.6m**

IN THE LESSON

- Here is a balance sheet of one thousand million dollars, an illustration.
- Two hundred million is government debt of O E C D countries, and one hundred million is loans to O E C D banks.
- Two hundred times zero is nothing, and one hundred times twenty per cent is twenty million of risk weighted assets.
- Mortgages of three hundred million at fifty per cent give one hundred fifty million.
- Corporate loans of four hundred million at one hundred per cent give four hundred million.
- Risk weighted assets are twenty plus one hundred fifty plus four hundred, five hundred seventy million.
- The minimum capital is eight per cent of five hundred seventy, forty five point six million dollars.
- Notice that risk weighted assets are far smaller than the thousand million of total assets.

14 Basel II: three pillars

- More risk-sensitive than Basel I
- Pillar 1: minimum capital for three risks
- Pillar 2: supervisory review
- Pillar 3: market discipline through disclosure
- Three risks: credit, market, operational

IN THE LESSON

- Basel II made the rules more risk sensitive, and it did so through three pillars.
- Pillar one is minimum capital for credit risk, market risk and operational risk.
- So operational risk now carried an explicit charge.
- Pillar two is supervisory review: supervisors check each bank's own assessment of its risks and can ask for more capital.
- Pillar three is market discipline through disclosure.
- If a bank must publish its risks and capital, investors and depositors can reward or punish it.
- The idea behind all three was that capital should follow risk more closely than the crude weights of Basel I, and that rules alone are not enough without supervision and disclosure.

15 Basel III: more and better capital

- After the 2007-09 crisis: more and better capital
- CET1 4.5%, Tier 1 6%, total 8% of risk-weighted assets
- Buffers: 2.5% conservation (equity) + countercyclical
- Leverage ratio at least 3%: Tier 1 ÷ total exposure
- Liquidity: 30-day LCR and NSFR, each at least 100%

IN THE LESSON

- After the two thousand seven to two thousand nine crisis, Basel III raised both the quality and the quantity of capital.
- As a share of risk weighted assets, common equity tier one must be at least four point five per cent, tier one at least six per cent, and total capital at least eight per cent.
- On top sits a capital conservation buffer of two point five per cent, held in common equity, and a countercyclical buffer.
- It also added a leverage ratio of at least three per cent, defined as tier one over total exposure, with no risk weights.
- Finally, two liquidity standards: a thirty day liquidity coverage ratio, and a net stable funding ratio, each with a minimum of one hundred per cent.

16 Basel III minimums at a glance

Risk-weighted ratios, and one that is not

Measure	Minimum
CET1 ratio	4.5% of RWA
Tier 1 ratio	6% of RWA
Total capital ratio	8% of RWA
Conservation buffer	2.5%, in common equity
Leverage ratio	3%: Tier 1 ÷ total exposure

IN THE LESSON

- Let's collect the numbers in one table.
- Common equity tier one, four point five per cent of risk weighted assets.
- Tier one, six per cent.
- Total capital, eight per cent.
- The conservation buffer adds two point five per cent in common equity.
- The leverage ratio, three per cent, is the odd one out: it is tier one divided by total exposure, with no risk weights.
- The first four are measured against risk weighted assets, and the leverage ratio is not.
- That difference is a favorite trap, so do not mix the two.
- The leverage ratio is a backstop.
- It stops a bank from looking safe only because its risk weights are low.

17 Example 6: checking a bank against Basel III

RWA 570, exposure 1,000, CET1 42; total capital assumed ok

CET1 ratio	42 ÷ 570	**7.4%**
Needed: 4.5% + 2.5%	7.0% × 570	**$39.9m**
Meets the buffered minimum?	42 is above 39.9	**Yes**
Leverage ratio	42 ÷ 1,000	**4.2%**
Against the 3% minimum	no risk weights	**Passes**

IN THE LESSON

- Use the balance sheet from before.
- Risk weighted assets are five hundred seventy million, total exposure is one thousand million, and tier one is forty two million, all of it common equity.
- Everything here is illustrative, and we assume tier two capital already takes total capital above the eight per cent test.
- Here we check only the buffered ratio and the leverage ratio.
- The common equity ratio is forty two over five hundred seventy, seven point four per cent.
- With the conservation buffer the requirement is four point five plus two point five, seven per cent, which on five hundred seventy is thirty nine point nine million.
- Forty two is above thirty nine point nine, so the bank meets it.
- Now the leverage ratio: forty two over one thousand, four point two per cent.
- It is measured on total exposure with no weights, and it clears the three per cent minimum.

18 Deposit insurance and moral hazard

- Repays depositors up to a limit if the bank fails
- Moral hazard: protected people take more risk
- Depositors stop monitoring or demanding higher rates
- Shareholders hold a call option on the bank's assets
- More asset risk: equity value up, insurer's loss up

IN THE LESSON

- Deposit insurance repays depositors, up to a limit, if their bank fails.
- It is funded by premiums paid by banks and is ultimately backed by the government.
- It protects ordinary savers and helps prevent panics.
- But it creates moral hazard, which means protection from the consequences of risk leads to more risk taking.
- Insured depositors have no reason to watch the bank or to demand a higher rate from a risky one, so market discipline weakens.
- Shareholders then hold something like a call option on the bank's assets.
- They keep the upside of risky bets, while losses beyond their equity fall on depositors, and therefore on the insurer.
- Raising asset risk raises the value of equity and also the insurer's expected loss.

19 Example 7: the call option in numbers

Assets $100m, deposits $90m; risky: 130 or 70, 50/50

Safe: equity at year-end	100 − 90	**$10m**
Risky, good case: equity	130 − 90	**$40m**
Risky, bad case: equity	larger of (−20, 0)	**$0**
Risky: expected equity	0.5 × 40 + 0.5 × 0	**$20m**
Insurer's expected loss	0.5 × (90 − 70)	**$10m**

IN THE LESSON

- Here is the option logic in numbers.
- A bank has assets of one hundred million dollars, insured deposits of ninety million, and equity of ten.
- Illustration.
- In the safe plan the assets end the year at one hundred.
- Equity is one hundred minus ninety, ten million.
- In the risky plan the assets end at either one hundred thirty or seventy, equally likely, so the average asset value is still one hundred.
- In the good case equity is one hundred thirty minus ninety, forty million.
- In the bad case the assets of seventy are below the ninety owed, so equity is the larger of minus twenty and zero, nothing, because shareholders cannot lose more than they have.
- Expected equity is half of forty plus half of zero, twenty million, double the safe plan.
- The insurer's expected loss is half of twenty, ten million.

20 Limiting moral hazard

- Risk-based premiums; a flat premium is worse
- Minimum capital requirements and supervision
- Coverage caps or coinsurance: large depositors exposed
- Moral hazard = behavior changes after coverage
- Adverse selection = risky banks keenest to join

IN THE LESSON

- How do we limit the problem?
- Charge risk based premiums, so riskier banks pay more.
- A flat premium makes the problem worse, because a risky bank pays the same as a safe one.
- Add minimum capital requirements and supervision, so shareholders have more to lose and someone is watching.
- Use coverage caps or coinsurance, which leave large depositors exposed, and therefore watching.
- Then keep two ideas apart.
- Moral hazard is the change in behavior after coverage is in place.
- Adverse selection is different: it is the tendency of risky banks to be the keenest to join the scheme in the first place.
- One happens after the insurance, the other before it.

21 Five ways to raise funds

Five ways; firm vs best efforts: who bears unsold risk?

Method	Key point
Firm commitment	Bank buys all, earns spread
Best efforts	Agent, earns commission
Dutch auction	One clearing price for all
Public offering	Registered, open to all
Private placement	Limited group, less liquid

IN THE LESSON

- An investment bank helps companies and governments raise funds, and there are five ways to know.
- In a firm commitment, the underwriter buys the whole issue at a fixed price and resells it, so it bears the risk of unsold securities and earns the spread.
- In best efforts, the bank is only an agent, sells what it can for a commission, and the issuer bears the risk of an undersubscribed issue.
- In a Dutch auction, investors bid price and quantity, and every successful bidder pays one clearing price.
- A public offering is registered and open to all investors.
- A private placement goes to a limited group of institutions, avoids full registration, and is faster and cheaper, but investors get less liquidity.
- For the first two, the question to ask is who carries the unsold risk.

22 Example 8: firm commitment versus best efforts

10m shares, offer $20, bank pays $19 (illustration)

Firm: issuer receives	10m × $19	**$190m**
Firm: bank sells 9m at $20	9 × 20	**$180m**
Firm: last 1m sold at $17	1 × 17	**$17m**
Firm: bank's profit	180 + 17 − 190	**$7m**
Best efforts, 3% fee	9m sold: 180−5.4; 1m unsold	**$174.6m**

IN THE LESSON

- Compare firm commitment and best efforts on one issue.
- The issuer wants to sell ten million shares at an offer price of twenty dollars, an illustration.
- In a firm commitment the bank buys all ten million at nineteen dollars, so the issuer receives one hundred ninety million for certain.
- The market takes only nine million at twenty, giving one hundred eighty million, and the bank sells the last million at seventeen, which brings seventeen million.
- The bank's profit is one hundred eighty plus seventeen minus one hundred ninety, seven million, not the ten million it hoped for.
- With best efforts, the bank sells nine million at twenty and charges three per cent: one hundred eighty minus five point four leaves one hundred seventy four point six million for the issuer, and the last million shares stay unsold with the issuer.

23 Example 9: a Dutch auction

100 shares. Bids: A 40@25, B 30@24, C 50@23, D 40@22

A and B: 40 + 30	highest bids first	**70 shares**
Add C: 70 + 50	120 covers the 100	**covers issue**
Clearing price	lowest price that sells all	**$23**
C receives	100 − 70	**30 shares**
Proceeds	100 × 23	**$2,300**

IN THE LESSON

- Now a Dutch auction.
- A company sells one hundred shares.
- Four investors bid price and quantity.
- A wants forty shares at twenty five dollars, B thirty at twenty four, C fifty at twenty three, and D forty at twenty two.
- Rank the bids from the highest price down.
- A and B together want seventy shares.
- Adding C takes demand to one hundred twenty, which covers the issue.
- So the clearing price is the lowest price at which the whole issue sells: twenty three dollars.
- Every successful bidder pays that one price, even A, who offered twenty five.
- C receives one hundred minus seventy, thirty shares, fewer than the fifty it asked for, and D, who bid below the clearing price, gets nothing.
- Proceeds are one hundred times twenty three, two thousand three hundred dollars.

24 Where the arms of a universal bank clash

- Universal bank: three arms, many clients
- Lender knows borrower is weak, desk sells its bonds
- Analysts pressed to rate banking clients well
- Funds steered into securities the bank underwrites
- Advising on a takeover of a company it lends to

IN THE LESSON

- A universal bank combines three arms: commercial banking, which takes deposits and lends, securities services such as brokerage, research, custody and asset management, and investment banking, such as underwriting and advice.
- Conflicts arise because the arms serve clients with opposing interests and hold confidential information.
- Four examples.
- A lender learns that a borrower is weak, while the underwriting desk is selling that borrower's bonds.
- Research analysts are pressed to rate investment banking clients favorably.
- The asset management arm is steered into securities the bank is underwriting.
- And the bank advises on a takeover of a company it also lends to.
- In each case, one client's trust or one arm's information is being used against someone else.

25 Resolving the conflicts

- Information barriers (Chinese walls) and compliance
- Separate reporting lines and pay for research and deals
- Restricted lists and watch lists
- Disclosure with informed consent
- Decline the mandate if it cannot be managed

IN THE LESSON

- What can be done?
- The first tool is information barriers, often called Chinese walls, with compliance oversight, so confidential information stays in its own arm.
- Add separate reporting lines and separate pay for research and investment banking, so analysts do not depend on deal fees.
- Use restricted lists and watch lists to control trading and advice around sensitive deals.
- Where a conflict is real but can be managed, use disclosure with informed consent from the client.
- And when it cannot be managed, the right answer is to decline the mandate.
- Remember that a wall controls the flow of information only.
- Conflicts of duty, serving two clients with opposing interests, also need disclosure or abstention.

26 Banking book versus trading book

Intent and liquidity decide the book

Book	Features
Banking book	Held; credit and rate risk
Trading book	Trading, hedging; market risk
Banking: accounting	Amortized cost, provisions
Trading: accounting	Marked to market daily
Trading capital	VaR or expected shortfall

IN THE LESSON

- A bank splits its positions into two books.
- The banking book holds loans, deposits and other positions the bank intends to hold to maturity.
- Its main exposures are credit risk and interest rate risk, managed through asset liability management.
- The trading book holds positions taken for market making, short term profit, or hedging other trading positions, so its main exposure is market risk.
- On accounting, the banking book is carried at amortized cost with loan loss provisions, so price changes do not hit profit and loss at once.
- The trading book is marked to market daily, and gains and losses go straight to profit and loss.
- Capital for the trading book is set against market risk, using value at risk or expected shortfall.
- Intent and liquidity decide the allocation.

27 Example 10: the same bond in two books

Bond $50m bought at par, price falls to 94 (illustration)

Fall in value	(94 − 100)% × 50	**−$3m**
Trading book: P&L hit	marked to market	**−$3m**
Banking book: P&L hit	carried at cost	**$0**
Hidden if moved across	to the banking book	**$3m**

IN THE LESSON

- Why does the book matter?
- Take a bond position of fifty million dollars bought at par, which then falls in price to ninety four.
- An illustration.
- The fall in value is six per cent of fifty million, three million dollars.
- If the bond sits in the trading book, it is marked to market and the three million loss hits profit and loss at once.
- If it sits in the banking book at cost, profit and loss shows nothing.
- The same bond receives very different treatment.
- So a bank could hide a loss by moving the bond to the banking book.
- Or it could pick whichever book has the lower capital charge, which is regulatory arbitrage.
- That is why regulators restrict transfers between the books.

28 Originate to distribute: how it works

- Make loans, then sell them instead of holding them
- Pooled in a special purpose vehicle (SPV)
- The SPV issues asset-backed securities
- Gains: capital relief, new funding, fee income
- Gain: credit risk spread across many investors

IN THE LESSON

- In the originate to distribute model, a bank makes loans, typically mortgages, and then sells them to investors instead of holding them to maturity.
- Often it pools them in a special purpose vehicle, which issues asset backed securities to investors.
- The gains are four.
- Capital relief, since sold loans no longer need capital.
- New funding, because the sale proceeds can be recycled into more lending.
- Fee income.
- And the spreading of credit risk across many investors instead of one bank's balance sheet.
- Let's measure the capital relief.

29 Example 11: capital relief from a sale

Mortgages $1,000m, 50% weight, 8% capital (illustration)

Risk-weighted assets removed	50% × 1,000	**$500m**
Capital released	8% × 500	**$40m**
Capital per $1 of mortgages	8% × 50%	**4 cents**
New lending it can support	40 ÷ 0.04, if also mortgages	**$1,000m**

IN THE LESSON

- A bank has mortgages of one thousand million dollars with a fifty per cent risk weight, and it must hold capital of eight per cent.
- An illustration.
- Selling the mortgages removes risk weighted assets of fifty per cent of one thousand, which is five hundred million.
- The capital released is eight per cent of five hundred, forty million.
- Put another way, each dollar of mortgages needs eight per cent times fifty per cent, which is four cents of capital.
- So forty million of capital can support forty divided by point zero four, one thousand million of new lending, if those loans are also fifty per cent weighted mortgages, funded by the sale proceeds.
- The loop can repeat, which is the attraction, and also the danger.

30 Originate to distribute: the costs

- Weaker screening: originator keeps little of the loss
- Less transparency about underlying credit quality
- Reliance on rating agencies and open markets
- Implicit support: bank takes assets back in a crisis
- Fix: originator retains a share of the risk

IN THE LESSON

- Now the costs.
- First, weaker incentives to screen borrowers, because the originator keeps little of the loss.
- Second, less transparency about the quality of the underlying credits once they are pooled and sold.
- Third, dependence on rating agencies, and on securitization markets staying open.
- If the markets close, the funding stops.
- Fourth, implicit support: in a crisis, the bank may feel forced to take assets back, even with no legal duty to do so.
- These features contributed to the two thousand seven to two thousand nine crisis.
- The usual response is to require the originator to retain a share of the risk.
- And remember that capital relief is real only if the risk has truly been transferred.

31 Example 12: retention restores the incentive

Pool $1,000m loses 4%; retention 5% (illustration)

Loss on the pool	4% × 1,000	**$40m**
Originator keeps nothing	0% × 40	**$0**
Originator keeps 5%	5% × 40	**$2m**
Investors bear the rest	40 − 2	**$38m**

IN THE LESSON

- See how retention changes the incentive.
- A pool of one thousand million dollars of mortgages loses four per cent, which is forty million.
- An illustration.
- If the originator keeps nothing, its share of the loss is zero, so it has little reason to screen carefully.
- Suppose a rule says it must retain five per cent of the risk.
- Its share is five per cent of forty, two million dollars.
- The investors bear the rest, forty minus two, thirty eight million.
- Two million may look small, but it is real money that the originator loses if it lends badly, and the rule changes how it behaves while it lends.

32 Four mistakes to avoid

- Notional is not the exposure: use positive value
- Capital is not the full loss: subtract expected loss
- Keep leverage (no weights) apart from weighted ratios
- A wall is not a cure: duty conflicts need disclosure

IN THE LESSON

- Four mistakes to avoid.
- One, treating the notional of a derivative as the credit exposure.
- Instead, use the positive replacement value, the cost of replacing the trade today.
- Two, forgetting that economic capital is the loss at the confidence level minus the expected loss, not the whole loss.
- Three, mixing the risk weighted ratios with the leverage ratio.
- The leverage ratio uses total exposure and no weights, so keep it apart.
- Four, believing an information barrier solves every conflict.
- A wall controls information only, so conflicts of duty need disclosure or abstention.
- Check your answers against these four before you move on.

33 Recap: banks in five lines

- Risks: credit, market, operational, liquidity, rates
- Economic capital: internal; regulatory: rule-based
- Basel I, II, III; risk-weighted versus leverage
- Deposit insurance and moral hazard; raising funds
- Conflicts, two books, originate to distribute

IN THE LESSON

- Let's recap.
- A bank faces credit, market, operational and liquidity risk, with interest rate risk in the banking book, and we classify each loss by its source.
- Economic capital is the bank's internal, risk based estimate, the loss at a confidence level minus expected loss, while regulatory capital is the external rule based minimum that Basel I, II and III built up, with risk weighted ratios kept apart from the leverage ratio.
- Deposit insurance creates moral hazard, and the ways to raise funds differ, for example in who carries the unsold risk and in the single price of a Dutch auction.
- Conflicts inside a universal bank need walls, disclosure or abstention.
- Finally, the banking and trading books are treated differently, and originate to distribute brings capital relief at the cost of weaker screening.

34 Try three quick questions

1. Swap notional $200m, worth +$5m to the bank. Credit exposure?
   Answer: The positive replacement value: $5m, not $200m.
2. Loss at confidence level $450m, expected loss $90m. Economic capital?
   Answer: 450 − 90 = $360m.
3. RWA $800m. Common equity needed with the conservation buffer?
   Answer: (4.5% + 2.5%) × 800 = $56m.

IN THE LESSON

- Time for three quick questions.
- Pause the video after each one.
- Question one.
- A swap has a notional of two hundred million dollars and is worth five million dollars to the bank today.
- What is the credit exposure?
- Question two.
- The loss at the chosen confidence level is four hundred fifty million dollars, and the expected loss is ninety million.
- What is economic capital?
- Question three.
- Risk weighted assets are eight hundred million dollars.
- How much common equity must the bank hold under Basel III, counting the conservation buffer?
- The answers are on the board.