

Risk Management and Derivatives | Lecture 8

Pooling, Tranching, and the Credit Crisis

Group activity solutions

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Phase 1: Concept checks

- **CT1: (c).** The pool's expected loss is a property of the loans, not of how you slice the claims. Tranching is redistribution, not destruction. It changes who loses first (the equity tranche), not the total expected loss. Options (a) and (d) both say risk disappears; it does not.
- **CT2: (c).** The senior tranche only loses in the "everything fails at once" state. Correlation is exactly what makes that state likely. So with the same average default rate, the senior tranche is riskier in the correlated Pool Y. Options (a) and (d) both say the senior is safe regardless of correlation; that is the blind spot.
- **CT3: (c).** When you sell the loan you keep the fee and pass on the loss, so you no longer bear the default risk and have a weaker reason to screen. This is the originate-to-distribute moral hazard. Options (a) and (b) assume the incentive survives the sale; it does not.

Phase 2: Desk problem, fully worked

(a) Split the loss

Intuition. Losses fill the tranches from the bottom up. The equity tranche is wiped before the senior loses a single dollar. Each tranche only takes the part of the loss that falls inside its own band.

Calculation.

pool loss L	equity (0–5)	mezz (5–20)	senior (20–100)	sum
\$4m	\$4m	\$0	\$0	\$4m
\$12m	\$5m	\$7m	\$0	\$12m
\$30m	\$5m	\$15m	\$10m	\$30m

At $L = 4m$ the equity tranche is not even full. At $L = 12m$ the equity is full (5) and the mezzanine takes the next $12 - 5 = 7$. At $L = 30m$ the equity is full (5), the mezzanine is full (15), and the senior takes the rest, $30 - 20 = 10$. In every row the three losses add back to L .

(b) Attachment and the loss rate

Intuition. The senior tranche sits behind a cushion. It only loses once that cushion is gone. The cushion is just the equity plus the mezzanine.

Calculation.

- (1) The senior tranche has an attachment point of \$20m, so it starts losing only once total pool losses *exceed* \$20 million.
- (2) Equity (\$5m) plus mezzanine (\$15m) gives \$20m of cushion. $20/100 = 0.20$, so a pool-loss **rate of 20 per cent** exactly exhausts equity and mezzanine, leaving the senior at the edge of its first loss.

(c) The two-loan correlation example

Intuition. The senior piece only loses when both loans fail together. Whether “both fail” is rare or common is decided by correlation, not by each loan’s own default rate. Same average loans, very different senior risk.

Calculation.

- (1) **Independent:** $P(\text{both default}) = 0.10 \times 0.10 = 0.01$, that is **1 per cent**.
- (2) **Perfectly correlated:** they default together with probability 0.10, so $P(\text{both default}) = 0.10$, that is **10 per cent**.

The senior piece’s loss probability jumps by a factor of 10 (from 1 per cent to 10 per cent), even though each loan’s own default rate (10 per cent) is unchanged. Cross-check the pool’s total expected loss: in both cases it is $2 \times 0.10 \times 50 = 10$. Correlation does *not* change the pool’s expected loss; it moves risk into the senior piece. This is Concept Check 2 made into arithmetic.

(d) Keep it or sell it

Intuition. If you keep the loan you carry the default loss. If you sell it you keep only the fee and walk away. The fee is certain; the default loss is the part you hand to someone else.

Calculation.

- **Keep:** expected profit $= 0.92 \times 6 + 0.08 \times (-60) = 5.52 - 4.80 = \mathbf{0.72}$.
- **Sell:** expected profit $= \mathbf{2.00}$ (the fee, with certainty, no default exposure).

Selling is worth $2.00 - 0.72 = \mathbf{1.28}$ more in expected profit, *and* it removes the $0.08 \times 60 = 4.80$ expected default loss from your book. The originator is paid to write the loan and walk away. This is Concept Check 3, in money.

(e) Re-securitisation

Intuition. Pooling only helps when the pieces fail for unrelated reasons. If they all share one driver, pooling does nothing; the “everything fails together” state just arrives all at once.

Answer. Every underlying mezzanine tranche is exposed to the *same* housing factor, so they are highly correlated. When losses rise across the whole housing market, all the mezzanines are hit at once. The new senior slice sits on top of pieces that all fail together, so the diversification it appears to add is illusory, and it is wiped out alongside them. Re-securitisation amplifies correlation risk rather than reducing it.

Extension: the ratings illusion

Answer. The AAA rating relied on a *low* assumed correlation between the BBB tranches, so the model said “they will not all fail together”. But every BBB tranche shared the same subprime housing driver, so the true correlation was high. Under high correlation (part (c)), the senior slice’s loss probability is many times larger than the low-correlation model claimed. The AAA was an artefact of the correlation assumption, not of genuine safety. This is the Gaussian-copula blind spot, and the direct bridge to the case.

The one idea behind every part: tranching does not destroy risk, it decides who is paid first and who loses first. A senior tranche is only as safe as the assumption that the loans will not all fail together, and correlation is what governs that assumption.

Phase 3: Case, what happened

You were stopped on 26 April 2007, just as the Abacus 2007-AC1 deal closed. Here is what happened next.

The reference portfolio behaved as if it had been picked to fail. John Paulson was on the **short** side: he had helped select the bonds precisely because he wanted to bet *against* them. Within months the referenced subprime bonds were downgraded. The long investors lost over \$1 billion in total, with ACA losing about \$900 million and IKB about \$150 million (these two split figures are reported estimates). Paulson's short position made about \$1 billion.

On **16 April 2010** the US Securities and Exchange Commission charged Goldman Sachs, and its employee Fabrice Tourre, with securities **fraud**. The charge was not about losing money. It was about **disclosure**: the marketing said the portfolio was selected by ACA, and never told investors that Paulson had helped pick it and was betting it would fail, with interests directly opposed to theirs.

On **15 July 2010** Goldman settled for \$550 million, at the time the largest penalty ever paid by a Wall Street firm to the SEC. Of that, \$300 million went to the US Treasury and \$250 million was returned to harmed investors through a Fair Fund. Goldman did not admit or deny wrongdoing, but admitted its marketing materials "contained incomplete information".

The lesson, stated plainly. This is Concept Check 3 and Part 2(d) in real life. The party choosing the loans had no stake in their success; he had the opposite stake, and the conflict was not disclosed. That is the moral hazard at the heart of originate-to-distribute, scaled to a billion dollars. The deal also shows the correlation point: a synthetic CDO referencing subprime bonds is a senior slice that is safe only while the housing loans do not all fail together. They did.

A note on the four questions. (Q1) In a synthetic CDO the short side profits if the reference portfolio fails, and the long side profits if it performs; IKB is on the *long* side. (Q2) If you wanted the portfolio to fail you would fill it with the weakest subprime bonds, which is exactly why a short-seller's role in choosing the bonds matters. (Q3) The one missing fact was that Paulson helped pick the bonds and was short the deal. (Q4) The sentence regulators wanted disclosed was, in effect, "the party who helped choose this portfolio is betting it will fail".

Tranching decides who is paid first and who loses first; it does not destroy risk. A senior slice built on correlated loans, sold without disclosing who chose them, is the credit crisis in one deal.

End of solutions.