CHARTA LEARNING · LESSON NOTES

Credit Risk Management

FRM Part II

1 A story: the bank with no rules

- A lender grows fast with no clear rules
- Big loans, one industry, no clear approval rules
- A downturn hits and losses are far larger than expected
- Answer: a board-approved lending policy

IN THE LESSON

- Imagine Marlow Bank, a mid sized lender that wants to grow.
- Its star lender brings in big loans, and nobody stops to ask whether the borrowers are the right kind, how much is too much to one industry, or who is allowed to say yes.
- Years later a downturn hits one industry, and the losses are far bigger than anyone expected.
- What went wrong was not one bad loan.
- The bank had no clear rules.
- The answer is a lending policy.
- That is the board approved, written framework that tells every lender what business the bank wants, how much of it, and on what terms.

2 Building blocks of a lending policy

- Target markets and risk appetite
- Approval authority graded by size and risk grade
- Exposure and concentration limits
- Underwriting: analysis, documents, collateral, covenants
- Risk-based pricing

IN THE LESSON

- A lending policy has building blocks, and you should be able to list them.
- First, the target markets and the risk appetite: which customers and industries the bank wants, and how much risk the board will accept.
- Second, delegated approval authority.
- A junior lender may approve a small loan to a strong borrower, while a large or weak credit goes to a committee.
- Authority is graded by loan size and risk grade.
- Third, exposure and concentration limits, which we study shortly.
- Fourth, underwriting standards, which cover the analysis to be done, the documents, the collateral and the covenants, meaning the promises the borrower must keep.
- Fifth, risk based pricing, so that a riskier borrower pays more.

3 The rest of the policy, and what makes it sound

- Monitoring and early-warning rules
- Classification, provisioning, exceptions, problem loans
- Whole life of a loan: origination to workout
- Sound: testable, independent of sales, reviewed
- Trap: a policy on paper with routine exceptions

IN THE LESSON

- The remaining blocks look after the loan once it is made.
- Monitoring and early warning rules say what the bank watches and what triggers action.
- Classification and provisioning rules say how loans are graded and how much is set aside.
- Exceptions and problem loans need a clear treatment.
- The policy covers the whole life of a loan, from origination to workout, which means the recovery work on a loan that has failed.
- What makes a policy sound?
- It must be specific enough to test.
- It must be applied independently of sales targets.
- And it must be reviewed as conditions change.
- The usual weakness is a policy that exists on paper while exceptions are approved routinely.

4 Example 1: is the policy real?

Marlow approved 400 loans last quarter; 72 were exceptions to policy

Loans approved	last quarter	**400**
Approved as exceptions	outside the written policy	**72**
Exception rate	72 ÷ 400	**18%**
Marlow's own tolerance	set in the policy	**5%**
Verdict	18% ÷ 5% = 3.6 times	**Paper policy**

IN THE LESSON

- Let us test whether Marlow's policy is real.
- Last quarter, Marlow approved four hundred loans.
- Of those, seventy two were approved as exceptions, meaning outside the written policy.
- That is seventy two over four hundred, an exception rate of eighteen per cent.
- Marlow's own tolerance is five per cent.
- Eighteen per cent is three point six times the tolerance.
- So whatever the document says, exceptions are routine, and the policy exists mainly on paper.
- The exam point is to judge a policy by how it is applied, and not only by what it says.

5 Exposure limits and concentration limits

- Exposure limit: caps one obligor, group, industry, country
- Concentration limit: caps a share of portfolio or capital
- Borrowers sharing a driver default together
- So diversification fails and the loss tail fattens
- True even if every name is highly rated

IN THE LESSON

- Marlow now needs limits.
- An exposure limit caps what the bank can lose to a single obligor, a group of connected borrowers, an industry, a country or a product.
- A concentration limit caps the share of the portfolio, or of the bank's capital, that sits in one such bucket.
- Why do they matter?
- Because borrowers that share a driver tend to default together.
- Think of fifty builders that all depend on one property market.
- When it turns, they fail together.
- Diversification, the idea that one borrower's bad luck is cancelled by another's good luck, stops working.
- The tail of the loss distribution, the rare very bad years, becomes fatter.
- That is true even if every name is highly rated.

6 Why limits are hard to set

- Correlations are unobserved and unstable
- Derivative exposure moves: needs potential future exposure
- Hidden links, such as parent and subsidiary
- Limits set against capital move when capital moves
- Too tight costs business; too loose threatens capital

IN THE LESSON

- Limits are easy to describe and hard to set.
- First, the correlations that drive concentration cannot be observed, and they change, usually upward in a crisis.
- Second, a derivative has no fixed balance.
- Its exposure depends on market moves, so the bank needs potential future exposure, meaning how large the exposure could plausibly become.
- Third, links between names are easy to miss, such as a parent and its subsidiary, which should be counted together.
- Fourth, when a limit is expressed relative to capital, it moves when capital moves.
- Last, there is a balance to strike.
- A limit that is too tight costs the bank business, and one that is too loose threatens its capital.
- And remember that exposure should include committed lines, not only drawn balances.

7 Example 2: a single-obligor limit check

Capital $1,000m; limit 10% of capital. Count committed lines and linked names

Parent: drawn plus committed	60 + 30	**$90m**
Subsidiary: drawn	Tanner Foods	**$25m**
Group exposure	90 + 25	**$115m**
Limit	10% × 1,000	**$100m**
Excess over limit	115 − 100	**$15m**

IN THE LESSON

- Here is a limit check for Marlow, whose capital is one thousand million dollars.
- Its single obligor limit is ten per cent of capital, so one hundred million dollars.
- The borrower is Tanner Group.
- It has drawn sixty million, and it has a committed but undrawn line of thirty million, so counting the commitment its exposure is ninety million.
- Drawn balances alone would show sixty, comfortably inside the limit.
- But Tanner Foods, a subsidiary, has drawn a further twenty five million.
- Counting the group together, exposure is one hundred and fifteen million, which is fifteen million over the limit.
- Two lessons follow: include committed lines, and combine connected names.
- Both mistakes make exposure look smaller than it is.

8 Example 3: a limit that moves with capital

Marlow loses $150m of capital. Tanner parent exposure stays at $90m

Capital before		**$1,000m**
Limit before	10% × 1,000	**$100m**
Capital after the loss	1,000 − 150	**$850m**
Limit after	10% × 850	**$85m**
Tanner parent: excess	90 − 85	**$5m over**

IN THE LESSON

- Now suppose Marlow has a bad year and loses one hundred and fifty million dollars of capital, so capital falls from one thousand to eight hundred and fifty.
- The limit of ten per cent of capital falls from one hundred to eighty five.
- The exposure to Tanner's parent, ninety million, has not changed at all.
- Yet it now breaches the limit by five million.
- The bank must decide whether to cut the exposure, seek approval for an excess, or raise capital.
- This shows why a limit tied to capital is dynamic, and why risk managers watch both the exposure and the capital it is measured against.
- Setting limits too tight also costs good business.

9 The scope of a credit facility

- Scope: amount, purpose, type, tenor, repayment, pricing
- Also the security and the covenants
- Match the facility to the real need and cash flows
- Long-lived asset: do not use a short revolver
- A mismatch creates refinancing risk

IN THE LESSON

- Let us now see how Marlow handles a single credit facility.
- Its scope is the full description of the deal: the amount, the purpose, the type of facility, the tenor, which is its length, the repayment structure, the pricing, the security and the covenants.
- The golden rule is that the scope should match the borrower's real need and its cash flows.
- A long lived asset should not be financed with a short revolver.
- A revolver is a line that the borrower can draw, repay and draw again, usually for a year or so.
- If the borrower uses it to buy a machine that pays back over ten years, the bank must decide again every year whether to lend, and the borrower faces refinancing risk.

10 Example 4: matching tenor to the asset

Machine $12m, life 10 years, earns $2.0m a year. Revolver term is one year

Cash flow from the machine	per year	**$2.0m**
Revolver: repaid in year one	from cash flow	**$2.0m**
Revolver: to refinance	12 − 2	**$10.0m**
Share to refinance	10 ÷ 12	**83.3%**
Matched loan: principal a year	12 ÷ 10	**$1.2m**

Matched 10-year loan: cash flow covers principal 1.67 times

IN THE LESSON

- Take a machine costing twelve million dollars, with a life of ten years, which earns two million dollars a year.
- If Marlow finances it with a one year revolver, only two million can be repaid from the first year's cash flow.
- Ten million, which is eighty three point three per cent of the loan, must be refinanced, and that works only if lenders are willing in a possibly bad year.
- If instead the loan runs ten years with equal principal repayments, the principal due is twelve divided by ten, one point two million a year.
- The machine's cash flow of two million covers that one point six seven times.
- The trap is to choose the cheaper short facility and ignore refinancing risk.

11 Example 5: allocating capacity by return on risk

Net income after expected loss and risk capital, $m. Two business lines

Retail: income ÷ risk capital	9 ÷ 60	**15.0%**
Property: income ÷ risk capital	12 ÷ 120	**10.0%**
Next capacity goes to	higher return, within limits	**Retail**

IN THE LESSON

- Allocation is the decision, within limits and risk appetite, of how much lending capacity goes to each obligor, sector, region and business line.
- The test is return on risk.
- Risk capital here means the capital held against unexpected loss.
- Marlow has two business lines.
- Retail earns expected net income, after expected losses, of nine million dollars on risk capital of sixty million, a return of fifteen per cent.
- Commercial property earns twelve million on risk capital of one hundred and twenty million, ten per cent.
- Other things equal, the next slice of capacity goes to retail, until limits or appetite stop it.
- The income must be measured after expected losses.

12 Cutting credit risk, and the new risk each step brings

Each step reduces one risk and can create another

Step	Risk it can leave or create
Diversification and limits	Correlated names fall together
Collateral and guarantees	Wrong-way collateral; guarantor fails
Covenants, pricing, monitoring	Work only if enforced in time
Netting and margining	Enforceability; margin-call liquidity
CDS, syndication, securitisation	Seller defaults; retained pieces

IN THE LESSON

- The bank has a toolkit to reduce credit risk, and the table pairs each step with the new risk it can create.
- It diversifies and sets limits, but correlated names still fall together.
- It takes collateral and guarantees, but collateral can lose value just when the borrower fails, which is wrong way risk, and a guarantor can fail too.
- It writes covenants, prices for risk and monitors early, but these work only if enforced in time.
- On derivatives it uses close out netting and margining, which depend on legal enforceability and can strain liquidity.
- And it can buy credit default swaps, syndicate or sell loans, or securitise them.
- Then the protection seller may default, and retained pieces keep some risk.
- Every step transfers or reduces some risk, but may create another.

13 The classification ladder

A common ladder; the last three are the classified assets

Class	Meaning
Pass	Repaying as agreed
Special mention	Weakness: watch closely
Substandard	Repayment in doubt: classified
Doubtful	Loss likely: classified
Loss	Uncollectible: classified

IN THE LESSON

- Marlow must now decide how bad each loan is.
- Credit asset classification sorts loans by how likely they are to be repaid in full, so that provisioning, pricing, management attention and reporting all follow risk.
- A common ladder has five rungs.
- Pass loans are performing as agreed.
- Special mention loans show a weakness that deserves watching but are not yet clearly impaired.
- Substandard loans have a clear weakness that puts repayment in doubt.
- Doubtful loans are those where a loss is likely.
- Loss assets are regarded as uncollectible in the normal course.
- The last three, substandard, doubtful and loss, are called classified assets.
- Names and details vary by jurisdiction.

14 What feeds into a classification

- Repayment capacity from cash flow
- Payment record: 90 days past due often non-performing
- Financial trends and industry conditions
- Collateral: adequacy and realisable value
- Documents, covenants, restructuring due to difficulty

IN THE LESSON

- What feeds into the grade?
- First and most important, the borrower's capacity to repay from its cash flow.
- Second, the payment record.
- A loan ninety days past due is a common threshold for non performing, although conventions vary.
- Third, financial trends, and fourth, conditions in the industry.
- Fifth, the adequacy and the realisable value of the collateral, which is what it could really be sold for, after costs and delays.
- Then there are documentation and covenant compliance, and whether the loan has been restructured because the borrower was in difficulty.
- Classification should be forward looking, and not driven by arrears or collateral alone.

15 Example 6: provisions by class

Book $1,000m. Assumed rates: 1%, 5%, 20%, 50%, 100%

Pass	800 × 1%	**$8.0m**
Special mention	100 × 5%	**$5.0m**
Substandard	60 × 20%	**$12.0m**
Doubtful	30 × 50%	**$15.0m**
Loss	10 × 100%	**$10.0m**

Total $50m = 5%. Grade forward: secured is not healthy, restructured not cured

IN THE LESSON

- Here is Marlow's loan book of one thousand million dollars sorted into the five classes, with provisioning rates the bank has assumed: one per cent for pass, five for special mention, twenty for substandard, fifty for doubtful and one hundred for loss.
- Pass loans total eight hundred million, needing eight million.
- Special mention is one hundred million, needing five million.
- Substandard is sixty million, needing twelve.
- Doubtful is thirty million, needing fifteen.
- Loss is ten million, needing ten.
- The total provision needed is fifty million dollars, five per cent of the book.
- Now the traps.
- A well secured loan whose borrower cannot service it is still weak, and a restructured loan that is current is not automatically cured.
- Grades must look forward.

16 Provisions and reserves

- Provision: income statement expense for expected losses
- Reserve or allowance: balance deducted from loans
- Specific: impaired loans. General: the performing book
- Reserves absorb expected loss; capital absorbs unexpected
- Trap: a write-off is not a second expense

IN THE LESSON

- Now to the accounts.
- Two words are often confused.
- A loan loss provision is an expense in the income statement.
- It is the cost recognised in a period for expected credit losses.
- The loan loss reserve, also called the allowance, is the running balance on the balance sheet, deducted from gross loans to give net loans.
- Provisions come in two kinds.
- Specific provisions cover individually identified impaired loans.
- General or collective provisions cover losses in the performing portfolio, which cannot yet be pinned on particular borrowers.
- Reserves exist to absorb expected loss, and capital exists to absorb unexpected loss.
- The common mistake is to treat a write-off as a second expense.

17 The reserve roll-forward

End = Begin + Provision − CO + Recoveries
Provision = End − Begin + NCO

Reserve at the end	Balance sheet, deducted from loans
Reserve at the start	Last period's closing balance
Provision expense	The expense in the period
Net charge-offs	Written off, less recoveries

IN THE LESSON

- The two are linked by a roll forward.
- Write Begin and End for the reserve at the beginning and the end of the period.
- Write C O for gross charge-offs, which are loans written off and taken out of gross loans.
- Recoveries are cash later collected on loans already written off.
- N C O, net charge-offs, is charge-offs less recoveries.
- The reserve at the end equals the reserve at the start, plus the provision expense, minus charge-offs, plus recoveries.
- Now rearrange to find the expense for the period.
- Provision equals End minus Begin, plus net charge-offs.
- Use net charge-offs, not gross.

18 Example 7: finding the provision expense

Begin reserve $40m; charge-offs $18m; recoveries $3m; End reserve $52m

Net charge-offs	18 − 3	**$15m**
Change in reserve	52 − 40	**$12m**
Provision expense	12 + 15	**$27m**
Check: roll forward	40 + 27 − 18 + 3	**$52m**
Wrong: change in reserve only	forgets net charge-offs	**$12m**

IN THE LESSON

- Marlow starts the year with a reserve of forty million dollars.
- During the year it charges off eighteen million of loans and later recovers three million from loans previously written off.
- Net charge-offs are eighteen minus three, fifteen million.
- The reserve it needs at the year end is fifty two million.
- The provision expense is the end reserve minus the beginning reserve, plus net charge-offs: fifty two minus forty, plus fifteen, which is twenty seven million.
- Check by rolling forward: forty plus twenty seven, minus eighteen, plus three, gives fifty two.
- The common error is to use the change in the reserve, twelve million, as the expense.

19 Example 8: a write-off is not a second expense

A fully reserved $10m loan is written off. Amounts in $m

Gross loans, before and after	1,000 and 990	**−$10m**
Reserve, before and after	40 and 30	**−$10m**
Net loans, before and after	960 and 960	**no change**
New expense from write-off	already booked	**$0**

A write-off uses up the reserve; the expense was booked earlier

IN THE LESSON

- Let us test the common mistake.
- Marlow has gross loans of one thousand million dollars and a reserve of forty million, so net loans are nine hundred and sixty million.
- One loan of ten million is fully reserved, that is, ten million of the reserve was set aside for it.
- The bank now writes it off.
- Gross loans fall by ten million to nine hundred and ninety.
- The reserve is used up by ten million, falling to thirty.
- Net loans are nine hundred and ninety minus thirty, still nine hundred and sixty.
- Nothing has changed in net loans, and no new expense appears, because the expense was recognised when the reserve was built.
- Treating the write-off as a second expense would count the same loss twice.

20 Expected loss: the three parts

EL = PD × LGD × EAD
LGD = 1 − recovery rate

Probability of default	Chance the borrower defaults
Loss given default	Share lost after recoveries
Exposure at default	Amount owed at default

IN THE LESSON

- Now let us break expected loss into its parts.
- Expected loss is the average credit loss over a horizon, usually one year.
- It is the product of three things.
- The probability of default, written P D, which is how likely the borrower is to fail.
- The loss given default, L G D, the fraction of the exposure that is lost after recoveries, so it equals one minus the recovery rate.
- And the exposure at default, E A D, the amount owed at the moment of failure.
- For a partly drawn facility, the exposure at default is the drawn amount plus a conversion factor times the undrawn amount, because borrowers often draw more as they get into trouble.
- Expected loss is a cost of doing business, priced into spreads and covered by provisions and reserves.

21 Example 9: expected loss of a revolver

Limit $20m, drawn $12m. Conversion factor 50%, PD 1.5%, recovery 35%

Exposure at default	12m + 50% × 8m	**$16m**
Loss given default	1 − 35%	**65%**
Expected loss	1.5% × 65% × 16m	**$156,000**
Wrong: recovery for LGD	1.5% × 35% × 16m	**$84,000**

EL is priced into spreads and covered by provisions and reserves

IN THE LESSON

- Marlow has granted Calder Logistics a revolving facility with a limit of twenty million dollars.
- Calder has drawn twelve million, leaving eight million undrawn.
- Marlow estimates that half of the undrawn amount would be used by the time of default, so the conversion factor is fifty per cent.
- Exposure at default is twelve plus half of eight, which is sixteen million.
- Calder has a default probability of one point five per cent.
- Recovery is thirty five per cent, so loss given default is sixty five per cent.
- Expected loss is point zero one five times point six five times sixteen million, which is one hundred and fifty six thousand dollars.
- The classic error is to use the recovery rate as loss given default, giving only eighty four thousand dollars.

22 Unexpected loss, and how it differs

UL (SD) = EAD × LGD × √(PD × (1 − PD))
Capital version: credit VaR at a level − EL

Exposure at default	Amount owed at default
Loss given default	Share lost after recoveries
Probability of default	Chance the borrower defaults
Unexpected loss	Covered by capital, not provisions

IN THE LESSON

- Expected loss is only the average.
- Unexpected loss is the variability of losses around that average, which a simplified model measures as a standard deviation.
- For one loan with fixed loss given default and fixed exposure, there are only two outcomes, default or no default.
- The standard deviation is the exposure times the loss given default, times the square root of P D times one minus P D.
- Be careful.
- A different quantity is also used for capital: the credit value at risk at a stated confidence level, minus expected loss.
- It is a quantile, not a standard deviation, so check which meaning is in use.
- Unexpected loss is covered by capital, and for a portfolio it depends on default correlation.

23 Example 10: expected and unexpected loss for two loans

Calder: $16m, LGD 65%, PD 1.5%. Orchard: $9m, LGD 50%, PD 2%. ρ = 0.3

Expected losses add	156,000 + 90,000	**$246,000**
UL (SD), Calder	16×65%=10.4m, ×√0.014775	**$1,264,146**
UL (SD), Orchard	9×50%=4.5m, ×√0.0196	**$630,000**
Combined, ρ = 0.3	$\sqrt{(\sigma_1^2+\sigma_2^2+0.6\sigma_1\sigma_2)}$	**$1,572,517**
Plain sum of the two	1,264,146 + 630,000	**$1,894,146**

UL does not add unless defaults are perfectly correlated

IN THE LESSON

- Marlow's second loan is to Orchard Foods: exposure nine million, loss given default fifty per cent, default probability two per cent.
- Its expected loss is ninety thousand dollars, so the pair have two hundred and forty six thousand.
- Expected losses simply add.
- Now unexpected loss as a standard deviation.
- For Calder it is sixteen million times sixty five per cent, ten point four million, times the square root of point zero one four seven seven five, about one million two hundred and sixty four thousand dollars.
- For Orchard it is nine million times fifty per cent, four point five million, times the square root of point zero one nine six, exactly six hundred and thirty thousand.
- With a default correlation of point three, so point six in the variance formula, the combined figure is about one million five hundred and seventy three thousand, below the plain sum of one million eight hundred and ninety four thousand.

24 IFRS 9: three stages

30 and 90 days past due are rebuttable presumptions

Stage and test	Allowance and interest
1: no significant rise in credit risk	12-month ECL
2: significant rise (30 days past due)	Lifetime ECL
3: credit-impaired (90 days past due)	Lifetime ECL
Stage 3 interest	On the net carrying amount

IN THE LESSON

- Now the accounting standard.
- I F R S nine replaced the incurred loss model, with an expected credit loss model, so losses are recognised before a default occurs.
- Assets sit in three stages.
- Stage one assets, with no significant increase in credit risk since initial recognition, carry an allowance equal to twelve month expected credit losses.
- Stage two assets, where credit risk has increased significantly, carry lifetime expected credit losses.
- There is a rebuttable presumption of this at thirty days past due.
- Stage three assets are credit impaired.
- They also carry lifetime losses, and interest is earned on the net carrying amount, that is, after deducting the allowance.
- Ninety days past due is a rebuttable presumption of default.
- Rebuttable means evidence can show the presumption does not hold.

25 Example 11: twelve-month versus lifetime ECL

$10m bullet loan, LGD 40%, discount 5%. PD in years 1, 2, 3: 2%, 3%, 4%

Year 1 loss, discounted	2% × 4m ÷ 1.05	**$76,190**
Year 2 loss, discounted	3% × 4m ÷ 1.05^2	**$108,844**
Year 3 loss, discounted	4% × 4m ÷ 1.05^3	**$138,214**
Stage 1: 12-month ECL	year 1 only	**$76,190**
Stage 2: lifetime ECL	sum of three years	**$323,248**

IN THE LESSON

- Take a three year bullet loan of ten million dollars to Penhale Foods.
- Loss given default is forty per cent and the effective interest rate is five per cent.
- Seen from today, the chances that default falls in years one, two and three are two, three and four per cent.
- We assume default happens at a year end, with the full ten million owed.
- Year one loss is eighty thousand, discounted to seventy six thousand one hundred and ninety.
- Year two is one hundred and twenty thousand, discounted twice, one hundred and eight thousand eight hundred and forty four.
- Year three is one hundred and sixty thousand, discounted three times, one hundred and thirty eight thousand two hundred and fourteen.
- Stage one is year one alone.
- Stage two uses the sum.
- Stage three is lifetime too, but measured on a loan already in default, three hundred and twenty three thousand two hundred and forty eight dollars.

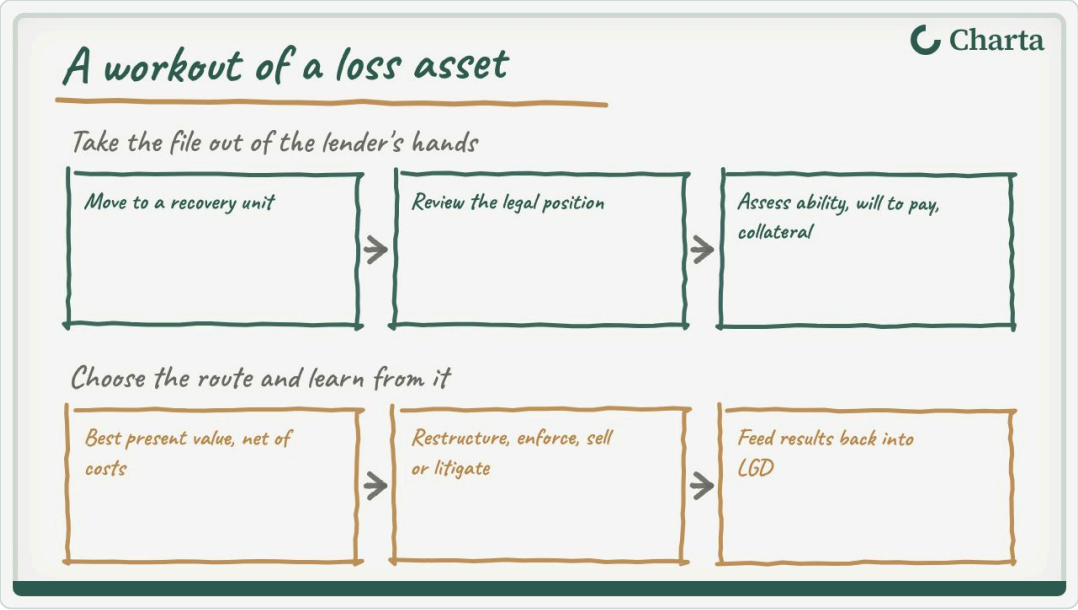
26 What the estimate must reflect

- Unbiased and probability weighted across scenarios
- Time value: discount at the effective interest rate
- Reasonable, supportable information, including forecasts
- Stage test is relative to origination, not an absolute PD
- PD 0.5% to 1.5%: may reach Stage 2. 4% to 4%: Stage 1

IN THE LESSON

- I F R S nine also says how the estimate must be built.
- It must be unbiased and probability weighted, so it reflects a range of outcomes.
- It must reflect the time value of money, by discounting at the effective interest rate.
- And it must use reasonable and supportable information, including forecasts of future conditions.
- The stage test is relative to origination, not an absolute level of default probability.
- A loan whose default probability has risen from half of one per cent to one and a half per cent has tripled in risk and may move to stage two, even though one and a half per cent looks low.
- A loan that began at four per cent and is still at four per cent stays in stage one.

27 A workout of a loss asset



IN THE LESSON

- A loss asset is regarded as uncollectible in the normal course, but recovery work continues.
- Look at the boxes.
- A workout moves the file to a specialised recovery unit, separate from the lender who originated the loan,.
- The unit reviews the legal position, and it assesses the borrower's ability and willingness to pay, and the realisable value of the collateral.
- It then chooses the route with the best present value net of costs: restructure where the business is viable, enforce the security, sell the claim to a distressed investor, or litigate.
- Finally, actual recoveries, costs and timing are fed back into the loss given default estimates, so the next provision is better informed.

28 Example 12: choosing the recovery route

Claim $10m. Discount rate 8%. Costs paid now. Amounts in $m

Restructure	7.0 in 3 years, cost 0.3	**$5.26m**
Enforce security	5.5 in 1 year, cost 0.8	**$4.29m**
Sell to distressed investor	4.8 now, cost 0.1	**$4.70m**
Litigate	8.0 in 4 years, cost 1.5	**$4.38m**

Best: restructure. Recovery 52.6%, so LGD feedback 47.4%

IN THE LESSON

- Marlow's claim on a failed borrower is ten million dollars.
- The recovery unit compares four routes at an eight per cent discount rate, with costs paid now.
- Restructuring returns seven million in three years, cost three hundred thousand.
- Enforcing security returns five and a half million in one year, cost eight hundred thousand.
- Selling gives four point eight million today, less one hundred thousand.
- Litigation returns eight million in four years, cost one and a half million.
- Net present values are about five point two six, four point two nine, four point seven zero and four point three eight million.
- Restructuring wins, assuming the business is viable.
- Its value of five point two six is a recovery of about fifty two point six per cent, which then feeds loss given default.

29 Keep it on the books, or write it off?

- Keep fully reserved: visibility and the claim preserved
- But gross loans and the NPL ratio stay inflated
- Write off: a cleaner balance sheet and lower NPL ratio
- Example: NPLs 50 of 1,000 = 5.0%; write off 10: 4.0%
- Accounting only: debt not forgiven, recoveries credited

IN THE LESSON

- Should a fully reserved loss asset stay on the books or be written off?
- Keeping it preserves visibility and the claim.
- But it inflates gross loans and the ratio of non performing loans to gross loans.
- Writing off cleans the balance sheet.
- Suppose Marlow has non performing loans of fifty million out of gross loans of one thousand million, a ratio of five per cent.
- It writes off a ten million loan that was fully reserved.
- Non performing loans fall to forty million and gross loans to nine hundred and ninety, a ratio of about four per cent.
- Remember that a write-off is an accounting step.
- It does not forgive the debt, and later recoveries are credited when they arrive.

30 The elements of credit risk analysis

- Request: purpose and structure
- Business, industry, management quality and character
- Financials: profit, leverage, liquidity, cash flow
- Projections: base case and stress case
- Collateral, guarantees, conditions and covenants

IN THE LESSON

- Back at the start of a loan, the analyst asks two questions: can the borrower repay, and will it?
- And, if not, what would the bank recover?
- The elements start with the purpose and structure of the request.
- Then the business and its industry, including competitive position and how cyclical the industry is.
- Then management quality and character, which is about willingness as much as ability.
- Financial analysis covers profitability, leverage, liquidity and cash flow.
- Then come projections, under a base case and under a stress case.
- Last, the collateral and guarantees, and the conditions and covenants of the loan.
- The classic summary is the five Cs: character, capacity, capital, collateral and conditions.

31 Example 13: the main ratios, and a stress case

EBIT 18m, interest 6m, debt 75m, EBITDA 30m, cash flow 15m, principal 6m

Interest coverage	EBIT ÷ interest = 18 ÷ 6	**3.0 times**
Leverage	debt ÷ EBITDA = 75 ÷ 30	**2.5 times**
DSCR	15 ÷ (6 + 6)	**1.25 times**
DSCR, cash flow down 20%	12 ÷ (6 + 6)	**1.00 times**

Five Cs: character, capacity, capital, collateral, conditions. Capacity first

IN THE LESSON

- Marlow analyses Brightwater Foods.
- Interest coverage is E B I T divided by interest.
- With E B I T of eighteen million and interest of six million, coverage is three times.
- Leverage is debt divided by E B I T D A.
- Debt of seventy five million over E B I T D A of thirty million is two point five times.
- The debt service coverage ratio is cash flow available for debt service, divided by interest plus principal.
- Cash flow of fifteen million over twelve million of interest and principal is one point two five times.
- In a stress case, cash flow falls by twenty per cent to twelve million, and coverage falls to exactly one, no cushion at all.
- Operating cash flow is the primary source of repayment and collateral is secondary, so capacity is judged first.
- Strong collateral does not rescue weak cash flow.

32 A bank's capacity to manage credit risk

- Governance: appetite, committees, independent credit unit
- People: skilled staff; incentives not rewarding volume alone
- Processes: ratings, data, limits, early warning, stress tests
- Financial: capital for UL, liquidity, reserves for EL

IN THE LESSON

- A bank's capacity to manage credit risk combines four things.
- Governance means a board approved risk appetite and credit policy, a clear committee structure, and a credit risk function that is independent of the business lines and has the authority to challenge them.
- People means skilled credit staff, with incentives that do not reward volume alone.
- Processes include validated rating systems and models, good data, management information, early warning indicators, limit monitoring, portfolio reporting and stress testing.
- Financial capacity means capital and liquidity to absorb unexpected losses, and reserves for expected ones.
- A weakness in any one of the four can undo the others.
- Marlow, in our story, had a star lender and no independent challenge.

33 Questions the board should ask

- Does risk appetite fit strategy and capital?
- Where are the concentrations?
- How are provisions set? What do stress tests show?
- Limits breached? How were exceptions approved?
- Is the credit function independent and resourced?

IN THE LESSON

- What should the board of directors ask?
- First, does the risk appetite fit the strategy and the capital?
- Second, where are the concentrations, and are they inside the limits?
- Third, how are provisions set, and do they reflect expected losses, looking forward?
- Fourth, what do the stress tests show, and could the bank survive them?
- Fifth, which limits were breached, and why, and how were exceptions approved?
- Last, is the credit function independent and properly resourced?
- Policy, limits, grading, provisioning, workout and analysis each feed an answer.
- A board that asks them regularly is the final point of oversight against a Marlow style story.

34 Try three quick questions

1. Reserve starts $25m. Charge-offs $12m, recoveries $2m, ends $30m. Provision?
   Answer: NCO = 10. 30 − 25 + 10 = $15m.
2. Exposure $5m, PD 4%, recovery 60%. Expected loss?
   Answer: LGD 40%. 4% × 40% × 5m = $80,000.
3. Credit risk up significantly since origination, no default. IFRS 9 stage?
   Answer: Stage 2: lifetime expected credit losses.

IN THE LESSON

- Now try three quick questions.
- Pause the video, think, then listen to the answers.
- Question one.
- A reserve begins the year at twenty five million dollars.
- During the year, charge-offs are twelve million and recoveries two million, and the reserve ends at thirty million.
- What is the provision expense?
- Net charge-offs are ten million, so the provision is thirty minus twenty five plus ten, which is fifteen million dollars.
- Question two.
- A five million dollar exposure has a default probability of four per cent and a recovery rate of sixty per cent.
- What is the expected loss?
- Loss given default is forty per cent, so four per cent times forty per cent times five million is eighty thousand dollars.
- Question three.
- A loan has not defaulted, but its credit risk has risen significantly since origination.
- Which I F R S nine stage and allowance?
- Stage two, with lifetime expected credit losses.