CHARTA LEARNING · LESSON NOTES

Enterprise Risk Management and Future Trends

FRM Part I

1 A story: four departments, one storm

- Four departments, each inside its own limits
- One recession hits trading, lending and cash at once
- Nobody had added the pieces together
- The gap: many local views, no firm-wide view

IN THE LESSON

- Picture a bank with four departments.
- The trading desk watches market prices.
- The lending team watches borrowers.
- The operations team watches errors and fraud.
- The treasury team watches cash.
- Each has its own limits, its own reports and its own language.
- One day a sharp recession arrives.
- Share prices fall, so trading loses.
- Borrowers default, so lending loses.
- Clients rush for their cash, so treasury scrambles.
- Each department had reported that it was within its limits.
- Yet the same storm hit all of them at once, and nobody had ever added the pieces together.
- That gap, between many local views and one firm-wide view, is what this lesson is about.

2 What enterprise risk management is

- Firm-wide framework for all the material risks
- Identify, measure, aggregate and manage them
- Judged against strategy and risk appetite
- Oversight at board and senior-management level

IN THE LESSON

- Enterprise risk management, or E R M, is a firm-wide framework for identifying, measuring, aggregating and managing all the material risks a firm faces.
- Material just means big enough to matter.
- Notice the words.
- Identify and measure are familiar.
- Aggregate is the new idea: put the risks together into one picture, allowing for the way they move together.
- And everything is judged against two yardsticks: the firm's strategy, meaning what it is trying to achieve, and its risk appetite, meaning how much risk it is willing to take to get there.
- Oversight sits at the top, with the board of directors and senior management, not buried in a back office.

3 Silos versus ERM

The key contrast: integrated and aggregated versus fragmented

Feature	Silo versus ERM
Tools and limits	Per unit versus common language
View of risk	Fragmented versus aggregated
Interactions	Missed versus dependence allowed for
Oversight	Local versus central, board level
Link to strategy	Weak versus capital and strategy

IN THE LESSON

- The traditional approach is called the silo approach, after the tall grain tanks that stand side by side and never connect.
- Each business unit or risk type, whether market, credit, operational or liquidity, runs its own tools, limits and reports.
- Nobody sees the combined position or how the risks interact.
- E R M changes that.
- It adds a common risk language, so a loss number means the same thing everywhere.
- It adds a consistent aggregated view that allows for dependence between risks.
- It adds central oversight, such as a chief risk officer.
- And it links risk taking to capital allocation and strategy.
- The key contrast is simple: integrated and aggregated versus fragmented and unit by unit.

4 What ERM is not

- Not a hedging program: hedging is one tool of many
- Not a central department that replaces the units
- Business units still own the risks they take
- The centre sets rules, aggregates and challenges

IN THE LESSON

- Two mistakes are common.
- The first is to think E R M is a hedging program.
- Hedging means taking a position that offsets a risk, and it is one tool among many.
- E R M is the framework that decides what to hedge, what to keep and what to avoid.
- The second mistake is to think E R M is a central department that takes over risk from the business units.
- It does not.
- The units still own their risks, because they are the ones who take them.
- The central team sets the rules, builds the combined picture and challenges the units.
- Think of a school: the teachers still run the classes, while the head teacher sees the whole timetable and the whole budget.

5 Example 1: why adding the pieces matters

Illustration: two units' worst-case losses at the same confidence level ($ millions)

Trading unit alone	worst-case loss	**30**
Lending unit alone	worst-case loss	**40**
Simple sum, perfect correlation	30 + 40	**70**
Firm-wide, zero correlation	$\sqrt{(30^2 + 40^2)}$	**50**
Diversification benefit	70 − 50	**20**

IN THE LESSON

- Here is a small illustration with made-up numbers.
- A trading unit has a worst-case loss, at some chosen confidence level, of thirty million.
- A lending unit has forty million at the same confidence level.
- In the silo world, the board is told thirty and forty and might add them up to seventy.
- But the two do not always lose together.
- If we assume normally distributed losses that are uncorrelated, the combined figure is the square root of thirty squared plus forty squared.
- That is nine hundred plus sixteen hundred, which is twenty-five hundred, and the square root is fifty million.
- So the firm-wide figure is fifty, not seventy.
- If the units were perfectly correlated it would be seventy, so the diversification benefit is twenty million.
- The point is that the answer depends on dependence, which only an aggregated view can show.

6 Why a firm would adopt ERM

- Better capital allocation and strategic choices
- Less costly volatility in earnings and cash flow
- No duplicated or offsetting hedges
- Meets regulator, rating agency and investor expectations
- Board knows its risk capacity and can seize opportunities

IN THE LESSON

- Now the motives.
- Why would a firm go to the trouble?
- The first reason is better decisions.
- With a view of total risk and of risk adjusted returns across businesses, management can send capital to the places where each unit of risk earns the most.
- The second is to reduce earnings and cash flow volatility where that volatility is costly.
- The third is to remove waste: duplicated hedges, or hedges that cancel one another.
- The fourth is expectations.
- Regulators, rating agencies and investors increasingly expect a firm to know its total risk.
- And the fifth is confidence.
- If the board knows its capacity for risk, it can pursue opportunities deliberately instead of nervously.

7 Why volatility can actually cost money

- CAPM: only systematic risk is priced
- So the case rests on market imperfections
- Distress costs, costly external funding, underinvestment
- ERM promises neither higher returns nor no losses

IN THE LESSON

- Here is a subtle point that trips people up.
- You might argue that shareholders dislike total risk, so cutting any volatility must help.
- That is the wrong argument.
- Under the capital asset pricing model, which you will meet in another lesson, investors can diversify for themselves, so only systematic risk, the part tied to the whole market, is rewarded.
- A firm's own particular risk is not priced.
- So the case for E R M rests on market imperfections.
- First, financial distress costs: customers, suppliers and staff flee a firm that looks shaky.
- Second, costly external funding: raising money in a hurry is expensive.
- Third, underinvestment: when internal cash runs short, good projects are dropped.
- E R M cannot promise higher returns or no losses.

8 Example 2: profit versus profit per unit of risk

Illustration: profit and risk capital by unit ($ millions)

Unit X: profit ÷ risk capital	12 ÷ 60	**20%**
Unit Y: profit ÷ risk capital	15 ÷ 150	**10%**
Hurdle rate	return needed for the risk	**12%**
Unit X versus hurdle	20% − 12%	**+8 points**
Unit Y versus hurdle	10% − 12%	**−2 points**

IN THE LESSON

- A firm has two business units, and the board wants to know which deserves more capital.
- Unit X earned twelve million of profit using sixty million of risk capital, which is the capital held against its risks.
- Unit Y earned fifteen million, using one hundred and fifty million.
- On raw profit, unit Y looks better, fifteen against twelve.
- But divide profit by capital.
- Unit X earned twenty per cent on its risk capital.
- Unit Y earned ten per cent.
- Suppose the firm's hurdle rate, the return it needs to justify taking risk, is twelve per cent.
- Then unit X creates value and unit Y does not.
- Only a firm-wide view of risk capital allows this comparison.

9 Example 3: duplicated hedges and natural offsets

Illustration: euro receipts and payments in the same month (millions of euros)

Unit A: euros to receive	exposure of unit A	**+10**
Unit B: euros to pay	exposure of unit B	**−8**
Silo hedging, two contracts	10 + 8	**18 hedged**
Net exposure, firm-wide	10 − 8	**2**
Hedging contracts saved	18 − 2	**16**

IN THE LESSON

- Now a waste example.
- A firm has two units that each deal in euros.
- Unit A will receive ten million euros in three months.
- Unit B must pay out eight million euros in the same month.
- In a silo world each unit buys its own hedge: A sells ten million euros forward, B buys eight million forward.
- Together that is eighteen million euros of hedging contracts, each with a cost.
- But look at the combined position.
- The receipts and payments partly cancel, a natural offset, leaving a net exposure of only two million euros.
- An aggregated view lets the firm hedge just the two million.
- It pays for one ninth of the contracts, and it avoids the risk that one hedge is paid out while the other is not.

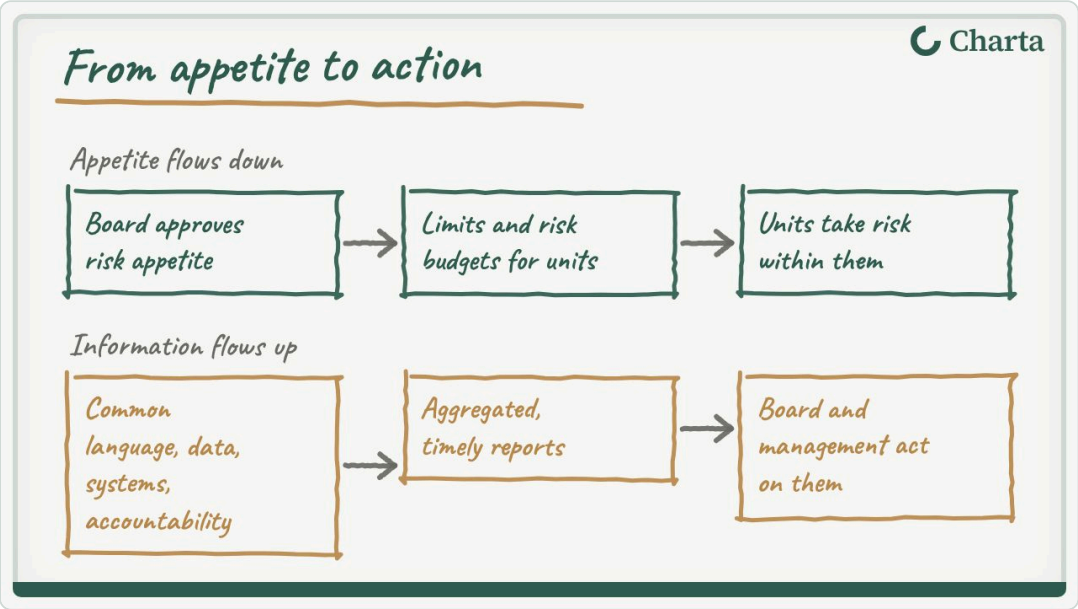
10 Governance starts with the board

- Board oversees risk and approves the risk appetite
- Management proposes the appetite
- Usually through a board risk committee
- Everything below flows from the approved appetite

IN THE LESSON

- Now, how should an E R M program be governed?
- It starts with the board of directors.
- The board oversees risk and approves the risk appetite that management proposes.
- Risk appetite is a statement of how much and what kinds of risk the firm will accept in pursuit of its goals.
- Boards usually carry out this work through a risk committee, a small group of directors who spend the time that the full board cannot.
- The logic is that the people who answer to the owners should decide how much of the owners' money may be put at risk.
- Management proposes, the board approves, and everything below flows from that approved appetite.

11 From appetite to action



IN THE LESSON

- Look at the two rows.
- The top row is how an appetite becomes real.
- The board approves the appetite.
- That is turned into limits and risk budgets, which are allowances of risk handed down to each business unit, the way a household might give each member a monthly spending budget.
- Then the units operate within them.
- The bottom row is the information coming back.
- Timely, aggregated reporting shows where the firm stands.
- That requires a common risk language so reports can be added, adequate data and systems, and clear accountability, meaning a named person for each risk.
- The test of the whole thing is whether the information actually changes decisions.

12 The chief risk officer

- Senior, so the role has weight
- Independent of the revenue-generating units
- Direct access to the board
- Not paid on unit profits
- Leads the risk function; units keep their risks

IN THE LESSON

- The second pillar is the chief risk officer, usually called the C R O.
- The best practice has several parts.
- The C R O is senior, so that the role carries weight in the room.
- The C R O is independent of the revenue generating units, so that the person who judges the risk is not the person who earns from it.
- The C R O has direct access to the board, so bad news cannot be filtered on the way up.
- And the C R O is not paid on unit profits.
- Think of a referee paid by one of the teams: you would not trust the whistle.
- The C R O leads the risk function, which builds the aggregated picture, but does not take the units' risk away from them.

13 The three lines model

Who does what in a well-governed ERM program

Line	Role
First: business units	Take risk and own it
Second: risk and compliance	Set standards, monitor, challenge
Third: internal audit	Independent assurance to the board
Mistake to avoid	Risk reporting under the business

IN THE LESSON

- Many firms organise responsibility using the three lines model.
- The first line is the business units themselves.
- They take the risks and therefore own them, day to day.
- The second line is the independent risk and compliance function.
- It sets standards, measures and monitors, and challenges the first line.
- The third line is internal audit, which gives independent assurance to the board that the first two lines are doing their jobs, and reports on weaknesses.
- A frequent mistake is to place risk reporting under the very business it monitors, which damages independence.
- Another is to forget that implementation is more than a policy document: the program has to work in practice.

14 Risk culture: what people actually do

- Norms, attitudes and behaviours about risk
- How people identify, discuss and act on risk
- Two banks, same manual, very different outcomes
- Culture is what happens when nobody is checking

IN THE LESSON

- Rules and limits only go so far.
- The most powerful force in a firm is its culture.
- Risk culture is the set of norms, attitudes and behaviours in a firm that shape how people identify, understand, discuss and act on risk.
- Imagine two banks with identical policy manuals.
- In the first, a junior analyst who spots a problem tells her manager and is thanked.
- In the second, she stays quiet, because the last person who raised a concern was labelled difficult.
- On paper the banks are the same.
- In practice, one will hear about trouble early and the other will hear about it from the newspapers.
- Culture is what happens when nobody is checking.

15 What marks a strong risk culture

- Tone from the top, backed by senior managers' actions
- Clear accountability for risk at every level
- Open talk: bad news travels up, challenge welcome
- Incentives reward risk-adjusted performance

IN THE LESSON

- A strong risk culture usually shows four marks.
- First, tone from the top, backed by what senior managers actually do.
- If the chief executive praises caution but rewards only the biggest bets, staff will notice.
- Second, clear accountability for risk at every level, so nobody can say it was somebody else's job.
- Third, open communication, where bad news travels upward and challenge is welcome.
- Fourth, incentives that reward risk adjusted performance, not short term profit alone.
- If a bonus is paid on this year's profit, with no charge for the risk taken to earn it, you are paying people to gamble with other people's money.

16 The obstacles to building one

- Hard to measure and slow to change
- Bonus schemes can reward risk-taking
- Silos, regions and mergers bring different norms
- Profit centres may see risk managers as a brake

IN THE LESSON

- Building a strong culture is hard, and the curriculum names the obstacles.
- Culture is hard to measure, because there is no instrument that reads it, and it is slow to change, often taking years.
- Bonus schemes can reward risk taking, pulling behaviour the wrong way.
- Business and geographic silos, and firms stitched together by mergers, bring different norms that clash.
- And profit centres, the parts of the firm that earn money, may see risk managers as a brake on their growth, or as the people who say no.
- Each obstacle suggests a remedy, though these are suggestions rather than the curriculum's list: better incentives, shared standards, visible support from the top, and risk staff who are seen as partners.

17 Classification exercise: reading the evidence

What each observation suggests about culture

Observation	Reading
Thick policy manual	Proves little on its own
Zero reported breaches	Not proof of health; maybe silence
Many reported breaches	May show people feel safe to speak
Bonus on profit only	Warning sign
Trader can overrule risk	Warning sign

IN THE LESSON

- Let us practise reading evidence, because behaviour matters more than documents.
- Take five observations.
- A thick policy manual tells you little by itself, since a manual can sit on a shelf.
- A firm that reports no breaches for years is not necessarily healthy; it may be one where nobody dares report.
- A firm with many reported breaches may in fact have a healthy culture, because people feel safe to speak up.
- By contrast, bonuses based only on this year's profit are a warning sign, and so is a senior trader who can overrule the risk manager.
- Judge a culture by what people do, how they are paid, and what happens to the person who raises a concern.

18 Scenario analysis: asking what if

- What happens to earnings, capital, liquidity if...?
- A specified combination of risk-factor moves
- Taken from history, or built by judgement
- Like a fire drill for the whole firm

IN THE LESSON

- Now the tools.
- Scenario analysis asks a plain question: what would happen to our earnings, capital or liquidity if a specified combination of risk factor moves occurred?
- A risk factor is something whose change moves the firm's results, such as an interest rate, a share price or an unemployment rate.
- The scenario can come from history, for example repeating a past crisis, or be built hypothetically by judgement, for example a sudden fall in house prices together with a rise in unemployment and a freeze in funding markets.
- Think of a fire drill.
- You do not know when a fire will come, but you can imagine one and see how the building copes.

19 Strengths and weaknesses of scenario analysis

Both sides matter

Strengths	Weaknesses
Forward looking	Subjective choice of scenarios
Allows unprecedented events	Cannot cover all possibilities
Combines market, credit, liquidity	Anchors on past crises
No estimated distributions needed	No objective probability

IN THE LESSON

- Scenario analysis has real strengths.
- It is forward looking.
- It can include events with no precedent.
- It can combine market, credit and liquidity effects in one story.
- It does not depend on estimated distributions or correlations, which are unreliable in a crisis.
- And it is easy to explain to a board.
- The weaknesses are just as real.
- Choosing and calibrating scenarios is subjective.
- You cannot cover every possibility.
- People anchor on past crises and fight the last war.
- And no objective probability is attached to a scenario, so you cannot say how likely it is.
- Keep both lists in mind.

20 Example 4: expected loss from judgemental probabilities

Illustration: three scenarios with judgemental probabilities ($ millions)

Mild downturn	60% × 5	**3**
Serious recession	30% × 40	**12**
Severe crisis	10% × 200	**20**
Expected loss	3 + 12 + 20	**35**

IN THE LESSON

- Suppose management builds three scenarios and assigns subjective probabilities.
- A mild downturn, sixty per cent likely, costs five million.
- A serious recession, thirty per cent likely, costs forty million.
- A severe crisis, ten per cent likely, costs two hundred million.
- Expected loss is each loss times its probability, added up.
- Sixty per cent of five is three.
- Thirty per cent of forty is twelve.
- Ten per cent of two hundred is twenty.
- The total is thirty-five million.
- Look at what that figure hides.
- The severe case costs two hundred, far above the expected thirty-five.
- And the probabilities are judgement calls: change them a little and the answer moves a lot.
- So treat the number as a conversation starter, not a measurement.

21 Scenario analysis and VaR work together

- A scenario loss is not a VaR at a confidence level
- VaR: statistical, good for daily limits, rests on history
- Scenarios: judgemental, reach beyond history
- The key point: they are complementary

IN THE LESSON

- A common mistake is to read a scenario result as though it were a value at risk figure.
- Value at risk, or V a R, is a loss level that is not expected to be exceeded at a stated confidence level, over a stated period.
- It rests on estimated statistics.
- A scenario loss has no such confidence level attached.
- It simply says: if this happens, we lose this much.
- So the two tools answer different questions and complement one another.
- V a R is objective in method and good for day to day limits, but it rests on history and on assumed distributions.
- Scenarios are subjective but reach beyond history.
- Used together, each covers the blind spots of the other.

22 Stress testing is built on scenarios

- Severe but plausible adverse scenario
- Coherent macro and market shocks over several periods
- Projects losses, earnings, RWA, liquidity and capital
- Needed: tails are rare, and shocks interact

IN THE LESSON

- Stress testing is a major use of scenario analysis in E R M.
- A stress test applies a severe but plausible adverse scenario, usually a coherent set of macroeconomic and market shocks spread over several periods, and projects its effect on losses, earnings, risk weighted assets, liquidity and capital.
- Risk weighted assets are a bank's assets scaled up by how risky they are.
- We need scenarios because tail events are rare, so history may not contain them, and because shocks interact: a recession hits credit, markets and funding together.
- Two words matter.
- Severe means painful enough to teach us something.
- Plausible means believable enough that management cannot dismiss it.

23 Example 5: a stress test feeds the capital plan

Illustration: capital ratio after a 3-year stress ($ millions, RWA = 100)

Start: capital ÷ RWA	12 ÷ 100	**12%**
After stress, dividends paid	12 − 5 + 2 − 2 = 7	**7%**
Compare with minimum	7% against 8%	**Breach**
After stress, no dividend	12 − 5 + 2 = 9	**9%**
Shortfall to 10% target	10 − 9	**1 of capital**

IN THE LESSON

- A bank starts with twelve of capital against one hundred of risk weighted assets, a capital ratio of twelve per cent.
- The regulatory minimum is eight per cent, and management's own target is ten.
- Over the three year stress scenario, losses total five.
- Earnings before losses add two.
- The plan also calls for dividends of two.
- Capital ends at twelve minus five plus two minus two, which is seven.
- That is a ratio of seven per cent, below the minimum of eight.
- So the plan fails.
- To keep the arithmetic simple, risk weighted assets stay at one hundred, whereas a real test would project them.
- If the dividend is cut to zero, capital is nine, a ratio of nine per cent: above the minimum but below the ten per cent target.
- To reach the target the bank needs one more of capital.
- Besides cutting dividends and buybacks, a capital plan can raise capital or reduce risk.
- That is capital planning in action.

24 Example 6: reverse stress testing

Illustration: working back from the failure point

Capital today	same bank; RWA 100	**12**
Minimum needed	8% × 100 of RWA	**8**
Cushion before breach	12 − 8	**4**
Loans at about 60% risk weight	100 ÷ 0.6	**≈ 160**
Loss rate on 160 of loans	4 ÷ 160	**≈ 2.5%**

IN THE LESSON

- Reverse stress testing turns the question around.
- Instead of choosing a scenario and seeing the result, you start from a failure outcome, such as capital falling below the minimum, and work back to the scenarios that could cause it.
- Take the same bank: twelve of capital, eight per cent minimum on one hundred of risk weighted assets, so capital must stay above eight.
- The cushion is twelve minus eight, which is four.
- Suppose the bank has a loan book of one hundred and sixty, with loans averaging about a sixty per cent risk weight.
- A loss of four on one hundred and sixty is two and a half per cent of the loans.
- So losses of roughly two and a half per cent, with no offsetting earnings, would take the bank to its minimum.
- Management then asks: what could cause that, and how plausible is it?

25 Four mistakes to avoid

- 1. ERM as hedging, or a department replacing the units
- 2. Judging culture by manuals and zero reported breaches
- 3. Reading a scenario loss like a VaR at a confidence level
- 4. Stress tests on the last crisis, static, one day

IN THE LESSON

- Let us gather the most common errors.
- One.
- Treating E R M as a hedging program, or as a central department that takes risk ownership away from the units.
- Two.
- Judging a risk culture by the policy manual or by a clean record of no reported breaches, instead of by behaviour.
- Three.
- Reading a scenario result as a loss at a confidence level, the way you read V a R, or ignoring the weaknesses of scenarios.
- Four.
- In stress testing, using only the last crisis, a static balance sheet, or a one day horizon, instead of a severe but plausible, multi period scenario linked to capital decisions.
- If you can spot these four errors in a question, you will avoid most of the traps.

26 Recap: the whole module in one page

- ERM: aggregated and firm-wide, not silos
- Motives: capital use, distress costs, waste
- Governance: board, independent CRO, three lines
- Culture is behaviour: tone, accountability, incentives
- Scenarios complement VaR; stress tests drive capital

IN THE LESSON

- Let us pull it together.
- E R M is a firm-wide framework that aggregates all material risks against strategy and risk appetite, in contrast with silos.
- Firms adopt it for better capital allocation, less costly volatility, no wasteful hedges, outside expectations and board confidence, and the case rests on market imperfections, not on investors disliking risk.
- Good governance has a board that approves the appetite, an independent chief risk officer, and three lines of responsibility.
- A strong risk culture shows in behaviour.
- Scenario analysis is forward looking but subjective, and complements V a R.
- Stress testing builds on scenarios, and capital planning acts on the results.

27 Try three quick questions

1. Units with losses of 30 and 40, uncorrelated: firm-wide figure?
   Answer: $\sqrt{(30^2 + 40^2)} = 50$, below the simple sum of 70.
2. Three years with zero reported breaches: proof of a good culture?
   Answer: No: it may mean silence. Judge behaviour, not documents.
3. Stress test leaves 7% capital against an 8% minimum. What now?
   Answer: Capital plan: cut dividends, raise capital or cut risk.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- Two units have worst-case losses of thirty and forty million, and their losses are uncorrelated.
- What is the firm-wide figure, and why is it below the sum?
- It is fifty million, because the units are unlikely to lose the maximum together.
- Question two.
- Management gives a report with no breaches in three years.
- Is that proof of a strong risk culture?
- No, it may mean nobody dares report, so look at behaviour.
- Question three.
- A stress test leaves a bank with a capital ratio of seven per cent against an eight per cent minimum.
- What does capital planning do?
- It cuts dividends, raises capital or reduces risk.