CHARTA LEARNING · LESSON NOTES

Judging risk and enterprise risk management

Portfolio Construction

1 A story: the captain's survey

- A captain checks weather, crew, cargo and harbour
- Orvane Heritage Fund: 100bn, saved from gas exports
- The state may draw on it in poor years
- Adviser Dalia Reyes must judge, not just list

IN THE LESSON

- Think of a ship's captain before a long voyage.
- A good captain does not only check the engine.
- She checks the weather ahead, the crew, the cargo, and whether the harbour at the far end will let her in.
- A sovereign fund needs the same survey, and the weather includes the government that owns it.
- Meet the Orvane Heritage Fund.
- It holds one hundred billion, saved from the gas exports of the Republic of Orvane, and the state may draw on it in poor years.
- Dalia Reyes, an adviser at Harrow Advisers, must judge its risks.
- Judging is more than listing.
- She has to rank them, see how they feed each other, and attach a response to each.

2 The map, financial side

- Market: shares fall, energy shares fall with gas
- Credit: a borrower or partner fails to pay
- Liquidity: cash is needed when assets sell badly
- Currency: foreign assets lose value at home
- Concentration: too much tied to gas

IN THE LESSON

- Dalia starts with the map, and the map covers the whole portfolio and the sponsor together.
- Think of a household worrying about money.
- First, prices of the things it owns can fall.
- That is market risk, and at Orvane the shares include energy companies that fall when gas falls.
- Credit risk is that a borrower or a trading partner fails to pay.
- Liquidity risk is needing cash at a moment when assets sell badly.
- Currency risk is that foreign assets lose value when converted home.
- Concentration risk is having too much tied to one thing, and for Orvane that one thing is gas, which pays the state and also drives the fund.
- Five risks, one map.

3 The map, non-financial side

- Environmental: drought and flood hit real assets
- Social: forced labour in a holding's supply chain
- Governance: weak boards and weak controls
- Legal and operational: lawsuits, cyber attacks, errors
- Reputational: the fund's name and legitimacy

IN THE LESSON

- Now the other half of the map, which many people leave blank.
- Picture a restaurant.
- Its accounts can look fine while the kitchen is dirty, and one bad review can empty the room.
- Environmental risk is drought or flood damaging a real asset, or rules that punish polluters.
- Social risk is something like forced labour in the supply chain of a company the fund owns.
- Governance risk is weak boards and weak controls.
- Legal and operational risk covers lawsuits, cyber attacks and plain mistakes.
- Reputational risk is damage to the fund's name and to its right to act for the public.
- For a state fund, these all belong on the same map as the numbers.

4 Example 1: stress the portfolio

Gas price collapse; fund 100bn

Shares 50bn	× −20%	**−10.0bn**
Bonds 30bn	× 0%	**0.0bn**
Real estate 10bn	× −10%	**−1.0bn**
Direct stakes 10bn	× −10%	**−1.0bn**
Investment loss	10 + 0 + 1 + 1	**12.0bn**

IN THE LESSON

- Now Dalia stresses the map with a scenario, a collapse in gas prices.
- The fund holds fifty billion in shares, thirty billion in bonds, ten billion in real estate and ten billion in direct stakes.
- She assumes shares fall twenty per cent, which is a loss of ten billion.
- Bonds are unchanged.
- Real estate falls ten per cent, a loss of one billion, and the direct stakes also fall ten per cent, another billion.
- Adding up the losses, ten plus nought plus one plus one, gives an investment loss of twelve billion.
- That is the market part of the story.
- The state's reaction comes next, and it makes things worse.

5 Hit twice in one year

Fund value (bn)

Start	**100bn**
After the loss	**88bn**
After the payout	**80bn**

Down 20bn: loss 12bn, payout 8bn

IN THE LESSON

- Here is the stress as a picture.
- The vertical axis is the fund's value in billions.
- The first bar is the start, one hundred billion.
- The second bar is the fund after the investment loss, eighty eight billion.
- Now look at the third bar.
- The same gas collapse cuts the state's revenue, so the state draws eight billion out of the fund, and the fund falls to eighty billion.
- Notice what happened.
- The fund is twenty billion smaller, but only twelve billion of that is an investment loss.
- The payout lands when prices are low, so raising the cash is costly.
- One scenario hit the portfolio and the sponsor at once, and a separate list of risks would never show that.

6 Score the risk, size the stress

Risk score = likelihood × severity (largest is 25)
Fund after = start − loss − payout
Example: 100 − 12 − 8 = 80bn

Likelihood	Scored 1 to 5
Severity	Scored 1 to 5
Investment loss	From the stress scenario
Payout to the state	Cash the sponsor draws out

IN THE LESSON

- There are two simple rules to carry.
- To rank risks, give each a score from one to five for likelihood and one to five for severity, then multiply them.
- The risk score is likelihood times severity, so the biggest possible score is twenty five.
- It is a rough tool, but it forces a ranking.
- To size a stress, work through the fund.
- The fund after the stress equals the start, less the investment loss, less any payout to the state.
- In our case that is one hundred, less twelve, less eight, which gives eighty.
- Always include the payout, because for a sovereign fund the sponsor is part of the risk.

7 Example 2: rank the risks

Score 1 to 5 for likelihood and severity, then multiply

Gas price collapse	4 × 5	**20**
Reputation: forced labour claim	3 × 4	**12**
Operational: cyber attack	3 × 3	**9**
Currency: foreign assets	4 × 2	**8**
Counterparty default	2 × 3	**6**

IN THE LESSON

- Dalia now ranks five risks.
- She scores each from one to five for likelihood and severity and multiplies.
- A gas price collapse is very likely to matter and would be severe: four times five, which is twenty.
- A reputational blow, such as a forced labour claim against a holding, is three times four, which is twelve.
- A cyber attack is three times three, which is nine.
- A currency loss on foreign assets is likely but small: four times two, which is eight.
- A counterparty default is two times three, which is six.
- So the order is gas first, then reputation, cyber attack, currency and counterparty default.
- The number shows where to look first, not how much to lose.

8 A map of the risks

Chart: Severity (1 to 5) vs Likelihood (1 to 5)

- Gas collapse (4, 5)
- Reputation (3, 4)
- Cyber attack (3, 3)
- Currency (4, 2)
- Counterparty (2, 3)

IN THE LESSON

- The same ranking is easier to see as a map.
- Along the bottom is likelihood, from one to five.
- Up the side is severity, from one to five.
- The two thin lines split the picture, and the top right corner is where risks need action first.
- Gas collapse sits there, at likelihood four and severity five.
- Reputation sits at three and four, high on severity but less likely.
- The cyber attack is at three and three, in the middle.
- Currency is at four and two, likely but small.
- Counterparty default is at two and three, low on both.
- The picture rewards a plain question: which risks are both likely and severe?

9 Risks feed each other

Non-financial to financial

Supplier scandal → Public pressure → Forced sale

Financial to financial

Gas price falls → State draws 8bn → Sell at a low price

IN THE LESSON

- Ranking treats each risk alone, but real events chain together.
- Follow the top row.
- A supplier to one of the fund's holdings is accused of forced labour.
- That is a non financial event.
- Public pressure builds, and the fund's legitimacy takes a hit.
- In the end it is pushed into a forced sale, on someone else's timetable, and sells at a poor price.
- A social problem became a financial loss.
- Now the bottom row.
- Gas prices fall.
- The state draws eight billion from the fund.
- The fund must then sell assets at a low price.
- Here a financial event led to a second financial event.
- This is why a strong analysis shows the links.

10 Example 3: against the objectives

Tolerance: lose up to 15% a year; find 8bn in a month

Investment loss vs limit	12% against a 15% limit	**Within**
Liquidity: bonds ÷ draw	30bn ÷ 8bn	**3.75 times**
Gas-linked energy shares	20bn ÷ 100bn	**20%**
Hard-to-sell holdings	(10bn + 10bn) ÷ 100bn	**20%**
Verdict	reduce the gas overlap	**Concentration**

IN THE LESSON

- Finally, Dalia compares the exposures with what the fund can bear.
- The board's tolerance is a fall of up to fifteen per cent in a year, and the state may need eight billion within a month.
- First, the investment loss is twelve per cent against a limit of fifteen, so it is within tolerance, though the payout takes the whole fall to twenty per cent.
- Second, liquidity.
- Bonds of thirty billion divided by the eight billion draw gives three point seven five times cover, which is comfortable.
- Third, gas linked energy shares are twenty billion, twenty per cent of the fund.
- Fourth, real estate and direct stakes together are twenty billion, also twenty per cent, and hard to sell.
- The verdict is that concentration is the worry, so the overlap with gas should shrink.

11 The top four risks get a response

Dalia's ranked risks and what answers them

Ranked risk	Response
Gas price collapse	Cash buffer
Reputation	Supplier checks
Cyber attack	Incident plan
Currency	Hedge

IN THE LESSON

- A judgement is not finished until each of the top four risks is linked to a response, a way to reduce it or to watch it.
- Look at the table.
- The gas price collapse, ranked first, gets a cash buffer, sized to the payouts the state might ask for.
- Reputation gets checks on the suppliers of the companies the fund owns, so that trouble is found before it becomes a headline.
- The cyber attack gets an incident plan, which says who does what on the first day.
- Currency gets a hedge on the foreign assets.
- Notice the table puts the non financial risks right beside the financial ones.
- The trap is to give them a separate box, when they so often drive the financial result.

12 A story: the hotel in a far town

- A direct stake is like a hotel in a far town
- It may pay for decades, but you cannot sell by Friday
- Offer: 3bn of the Harbour Gate port
- Patience is not protection: controls are needed

IN THE LESSON

- Imagine you are offered a hotel in a faraway town.
- It may earn well for decades, and you can wait.
- But you cannot sell it by Friday, nobody posts a daily price, and if the manager is poor you cannot simply walk away.
- Long term direct investments are like that hotel.
- Here they are stakes held straight, in private companies, infrastructure or real estate, rather than through a fund or the stock market.
- Orvane's board is offered a three billion stake in the Harbour Gate port, which ships the country's gas.
- A patient investor suits such an asset, but patience is not protection.
- Dalia must say how to control the risks.

13 Five risk groups in one deal

- Concentration: one deal is a big slice
- Illiquidity: no quick way out
- Valuation: no market price, only opinions
- Operational and governance: someone must run it
- Reputation: your name is on it

IN THE LESSON

- Dalia first names the risks, because a control only makes sense against a risk.
- Concentration comes first.
- A single deal is large, so one failure can dent the whole fund.
- Illiquidity means there is no quick way out.
- Valuation risk means there is no market price, only opinions, and opinions can be generous.
- Operational and governance risk means someone has to run the port or oversee those who do, and the fund's team may not have the skills.
- Reputational risk is that the fund's name is on the port, so any accident, strike or scandal is also the fund's.
- Six risks in five groups, one line each.

14 Layers of control

Before the deal

Due diligence → Spread and co-invest → Governance rights

In the deal and after

Staging, covenants, exits → Hedging → Monitoring and valuation

IN THE LESSON

- Controls work in layers, and the order matters.
- Read the top row first, the controls before the money goes in.
- Due diligence is a thorough investigation of the asset against clear investment criteria, so that the worst deals never get in.
- Then the fund spreads and co invests.
- It diversifies across sectors, regions and vintages, meaning the years in which money is committed, and it invests alongside experienced partners to share both the skill and the risk.
- Next come governance rights, such as board seats, vetoes and information rights.
- The bottom row is the deal and after: staging of payments, covenants and exit options, then hedging of currency and interest rates, then monitoring with independent valuation and attention to environmental, social and governance issues.

15 Example 4: shrinking the slice

Port stake 3bn; direct holdings 10bn; fund 100bn

Stake against the fund	3bn ÷ 100bn	**3.0%**
Stake against direct holdings	3bn ÷ (10bn + 3bn)	**23%**
Specialist takes half	3bn ÷ 2	**1.5bn**
Orvane's share of the fund	1.5bn ÷ 100bn	**1.5%**
Share of direct holdings	1.5bn ÷ (10bn + 1.5bn)	**13%**

IN THE LESSON

- Let us measure the concentration.
- The port stake is three billion.
- Against the hundred billion fund that is three per cent, which sounds small.
- But Orvane's direct holdings total ten billion, so with this stake added they would be thirteen billion, and the stake would be twenty three per cent of them.
- That is a lot of eggs in one basket, and the basket ships gas, the same driver as the state's revenue.
- Dalia proposes inviting a specialist infrastructure manager to take half.
- Half of three billion is one and a half billion, which is one and a half per cent of the fund and thirteen per cent of the enlarged direct holdings.
- The slice is halved, and the fund gains a partner who has run ports before.

16 Expected loss of a deal

Expected loss = chance of failure × loss rate × money at risk

Chance of failure	Over the risky phase
Loss rate	Share lost if it fails
Money at risk	Only what is invested so far

IN THE LESSON

- Now a way to put a number on a control.
- An expected loss is the chance of a bad outcome, times how much would be lost if it happens, times the money that is actually exposed.
- Written out, expected loss equals the chance of failure times the loss rate times the money at risk.
- The last term is the one a good contract can change.
- If the fund has not yet sent the money, it cannot lose it.
- That is why staged commitments are so powerful: they cut the money at risk during the riskiest phase, without changing the chance of failure or the loss rate.
- These are illustrations, not forecasts.

17 Example 5: staging the money

20% chance of failure in construction; 50% of money lost

All 3,000m at once	20% × 50% × 3,000m	**300m**
Staged: 1,200m first	20% × 50% × 1,200m	**120m**
Saved by staging	300m − 120m	**180m**
Staged, specialist halves it	20% × 50% × 600m	**60m**
Cut against all at once	300m − 60m	**240m**

IN THE LESSON

- Suppose, as an illustration, there is a twenty per cent chance that the port fails during construction, and if it does half the money invested is lost.
- If Orvane sends all three thousand million at once, the expected loss is twenty per cent times fifty per cent times three thousand million, which is three hundred million.
- Now stage it.
- Send twelve hundred million first, and the rest only when construction is complete.
- The expected loss falls to twenty per cent times fifty per cent times twelve hundred million, which is one hundred and twenty million.
- That saves one hundred and eighty million.
- If the specialist also halves the early money to six hundred million, the expected loss falls to sixty million, and the total cut against all at once is two hundred and forty million.
- Both controls clearly pay their way.

18 Expected loss, three ways

Expected loss (millions)

All at once	**300m**
Staged	**120m**
Staged and shared	**60m**

Same 20% chance, same 50% loss rate

IN THE LESSON

- Here are the three choices side by side.
- The vertical axis is the expected loss in millions.
- The first bar is the plan to send all the money at once, and it is the tallest, three hundred million.
- The second bar is the staged plan, one hundred and twenty million.
- The third bar, the shortest, is the staged plan with a specialist sharing the early money, sixty million.
- Notice what changed between the bars.
- The chance of failure never moved, and neither did the loss rate.
- Only the money exposed was changed, by the terms of the deal and the choice of partner.
- The seller may ask a higher price for the flexibility, and Dalia should weigh that price against the saving.

19 Which control answers which risk

Match the control to the risk it answers

Control	Risk it answers
Due diligence	Choosing a bad deal
Co-investing	Concentration
Board seat and vetoes	Governance
Independent valuation	Valuation

IN THE LESSON

- A good answer matches each control to the risk it answers, rather than reciting the whole list.
- Look at the table.
- Due diligence answers the risk of choosing a bad deal in the first place.
- Co investing answers concentration, and also brings skill that the team lacks.
- A board seat with veto powers answers governance risk: it lets the fund see problems and act on them from the inside, which matters because it cannot easily leave.
- An independent valuation answers valuation risk, because the people running the asset should not be the only ones saying what it is worth.
- Whatever Dalia recommends must also suit the fund's own capability.
- Orvane has no port expertise, so a partner is a necessity, not a luxury.

20 How fast can you leave?

- Cash
- Listed shares
- Real estate fund
- Direct port stake

IN THE LESSON

- Here is the trap that catches many candidates.
- They write that a long horizon removes risk, because the investor can wait.
- Look at the line, which runs from a quick exit on the left to a slow exit on the right.
- Cash can be spent the same day.
- Listed shares can be sold within days.
- A real estate fund takes months, and may limit withdrawals.
- The direct port stake sits at the far right, where an exit takes years and needs a buyer.
- If results disappoint, the listed holder can sell, while the direct holder is stuck and must fix the problem from inside.
- Time lets value emerge, but it does not undo a failed project.

21 Example 6: who values the stake?

Orvane's 1.5bn share, two years on: two valuations

Operator's value of the stake		**1,800m**
Independent valuer's value		**1,530m**
Overstated by	1,800m − 1,530m	**270m**
Share of operator's figure	270m ÷ 1,800m	**15%**
Share of the fund	270m ÷ 100,000m	**0.27%**

IN THE LESSON

- Last, monitoring.
- Two years on, the port operator reports that Orvane's one and a half billion share is worth eighteen hundred million.
- Dalia asks an independent valuer, who says fifteen hundred and thirty million.
- The gap is eighteen hundred less fifteen thirty, which is two hundred and seventy million.
- That is fifteen per cent of the operator's own figure.
- Against the whole hundred billion fund it is only point two seven per cent, so the damage is small this time.
- But the habit matters.
- A generous valuation can hide a problem for years, and with an illiquid asset there is no market price to reveal it.
- Independent valuation, regular reports and attention to environmental, social and governance issues catch trouble while it can still be fixed.

22 Mistakes to avoid so far

- Listing risks without ranking or responses
- Putting non-financial risks in a separate box
- Thinking a long horizon removes the risk
- Buying a stake the team cannot oversee
- Accepting the operator's valuation unchecked

IN THE LESSON

- Let us collect the common mistakes from the first two topics.
- One: listing risks without ranking them or linking each to a response.
- Two: putting non financial risks in a separate box, when a scandal can force a sale and a financial loss.
- Three: believing that a long horizon removes risk, when illiquidity means a problem cannot be exited quickly.
- Four: buying a direct stake that the fund's own team is unable to oversee, instead of investing alongside a specialist.
- Five: accepting the operator's own valuation without an independent check.
- Each of these is a failure of judgement, not of arithmetic, so check your answer against them.

23 A story: how an airline stays safe

- An airline: pilots fly, a safety team checks
- Inspectors audit both; the board sets the rules
- ERM: one system for every risk in the organisation
- Dalia must say what Orvane's does well and badly

IN THE LESSON

- Think of how an airline stays safe.
- Pilots and engineers fly and fix the planes, and they own the risk in their daily work.
- A separate safety team, which does not report to the flight operations chief, sets rules and challenges them.
- Inspectors then audit both.
- Above all sits a board that decides how much risk the airline will accept.
- Enterprise risk management, or E R M, is the same idea for an investor: one system that covers every risk in the organisation, with clear owners and a board at the top.
- Dalia is now asked to evaluate Orvane's system, saying what it does well, what it does badly, and how to strengthen it.

24 What a sound system does

Set up and measure

Board sets appetite → Identify and measure → Add risks together

Own and report

Name an owner → Report regularly → Act on breaches

IN THE LESSON

- So what does a sound system actually do?
- Follow the cycle on the board.
- In the top row, the board first approves a risk appetite, which is a statement of how much risk the organisation is willing to take.
- Then every material risk is identified and measured, whichever team it sits in.
- Then the risks are added together, so that interactions show, like a gas price fall that hurts both shares and the state's budget.
- In the bottom row, each risk gets a named owner.
- Reports go regularly to the people making decisions.
- And when a limit is breached, someone acts on it.
- A system missing any of these steps is leaking somewhere.

25 Three lines and a board

Three lines of defence

Business units → Risk function → Internal audit

Above all three

Board approves appetite → Board gets the reports

IN THE LESSON

- Next, how the work is divided.
- The three lines of defence are shown in the top row.
- The first line is the business units, such as the investment teams and operations staff, who take risk every day.
- They own it and manage it within limits.
- The second line is an independent risk function.
- It measures risk across the whole organisation, adds it up, and has the authority to challenge the first line.
- The third line is internal audit, which checks that both are working as designed.
- In the bottom row, above all three, sits the board.
- It approves the appetite and receives the reports.
- Weak spots tend to appear where this chain is broken.

26 Strength or weakness?

Signs seen at Orvane, and what each tells you

Sign you see	Verdict
Appetite approved by the board	Strength
Risk head reports to the investment head	Weakness
Stress tests built in	Strength
Desks measure risks alone	Weakness

IN THE LESSON

- Evaluating a system means reading signs.
- Look at the table.
- A risk appetite approved by the board each year is a strength, because it gives the whole system a limit to work to.
- If the risk head reports to the investment head, who also sets the teams' bonuses, that is a weakness, because the risk function cannot say no to the people who pay it.
- Stress tests built into the process are a strength.
- And if each desk measures its own risks and nobody adds them up, that is a weakness, a silo, because the dangerous risks are the ones that arrive together.
- Other weaknesses to hunt for include missing non financial risks, poor data and heavy reliance on backward looking models.

27 Reported risk against the limit

Breach = scenario loss − risk appetite limit
95% one-month VaR: beaten in 5 months in 100

Value at risk	Loss beaten in 5 months in 100
Scenario loss	A chosen, plausible storm
Risk appetite	The board's cap on a bad month
Breach	Scenario loss above the cap

IN THE LESSON

- One weakness deserves a closer look: heavy reliance on value at risk.
- Value at risk is a loss figure estimated from past returns.
- A ninety five per cent one month value at risk says that, in ninety five months out of a hundred, the loss should not be worse than the figure.
- It says nothing about the other five months, and if it is estimated from calm years it understates them.
- To judge it, compare it with a scenario.
- The breach equals the scenario loss, less the risk appetite limit.
- If that is above zero, the system has a gap, however comfortable the reported figure looks.

28 Example 7: the comfortable number

Appetite: no more than 6% lost in a severe month

Reported value at risk	3 calm years	**2.5%**
Risk appetite limit		**6.0%**
Scenario loss	gas collapse, shares down	**10.0%**
Breach	10.0% − 6.0%	**4.0 points**
Breach in money	4% × 100bn	**4bn**

IN THE LESSON

- Here is the case.
- Orvane's report shows a one month value at risk of two point five per cent, estimated from the last three calm years.
- The board's risk appetite caps the loss in a severe but plausible month at six per cent.
- On the face of it, there is room to spare.
- But Dalia runs a scenario that the risk team never ran: a gas collapse together with a fall in global shares.
- It costs ten per cent in a month.
- Ten less six is a breach of four percentage points.
- On a hundred billion fund, four per cent is four billion.
- The board was told it was inside its limit, and a plausible month would have broken it.

29 The number the board saw

One-month loss (%)

VaR shown	**2.5%**
Appetite limit	**6.0%**
Scenario loss	**10.0%**

Breach: 10.0% − 6.0% = 4.0 points

IN THE LESSON

- Here are the three figures as a picture.
- The vertical axis is the one month loss, in per cent.
- The first bar is the value at risk the board was shown, two point five.
- The second bar is the board's own limit, six.
- The third bar is the scenario loss, ten, and it stands far above the limit.
- Read the gap between the second and third bars: that is the four point breach nobody saw.
- The first bar was not wrong as a statement about the past.
- It was simply the wrong tool for this question, because three calm years say very little about a gas collapse.
- The remedy must therefore be aimed at exactly that gap.

30 Fit the fix to the gap

Each weakness has its own remedy

Weakness found	Fix that fits
Models only look backwards	Scenario analysis
Non-financial risks missing	Widen coverage
Problems stall below the board	Escalation lines
Limits are vague	Clear limits

IN THE LESSON

- Now to propose improvements.
- A strong answer names the weakness first and then gives the fix that closes it.
- Look at the table.
- If the models only look backwards, the fix is scenario analysis, reported against the risk appetite.
- If environmental, social and governance risks are not covered at all, the fix is to widen the coverage to include them.
- If problems stall below the board, as when an overruled risk warning is never reported, the fix is stronger escalation lines.
- If limits are vague, so that nobody knows what counts as a breach, the fix is clearer limits.
- Each fix answers one named fault.
- That match is what a marker looks for.

31 The trap: the generic fix

- Name the weakness first, then the fix
- Generic advice such as better culture scores little
- Orvane's gap: a model that looks only backward
- Orvane's fix: scenarios reported against the appetite

IN THE LESSON

- Here is the trap in this topic.
- Under pressure, many candidates write that the organisation should improve its risk culture, hire more people or buy better software.
- Those sentences could be pasted into any answer, so they earn little.
- The sound habit is to be specific.
- Name the weakness you found in the case.
- Then give the remedy that closes that exact gap.
- For Orvane, the gap is a model that looks only backward, and the fix is scenarios reported against the appetite.
- If a second weakness appears, such as an independence problem, it gets its own matching fix.
- Advice that is not tied to a finding is only decoration.

32 Recap: the lesson in five lines

- Map, rank and stress risks together, with the sponsor
- Non-financial risks often drive financial losses
- Control direct stakes: diligence, co-invest, stage, monitor
- Sound ERM: appetite, owners, three lines, a board
- Every fix must close a named gap

IN THE LESSON

- Let us pull the lesson together.
- First, judging risk means mapping financial and non financial risks across the portfolio and the sponsor, ranking them by likelihood and severity, and stressing them together, as the gas collapse showed when it hit the fund twice.
- Second, non financial risks can drive financial ones.
- Third, direct investments are controlled by diligence, spreading, co investing, governance rights, staging, hedging and independent monitoring, and a long horizon does not remove risk.
- Fourth, a sound enterprise risk system has an appetite, owners, three lines and a board.
- Fifth, every proposed fix must close a named gap.

33 Try three quick questions

1. Fund 200bn; stress loss 10%; payout 6bn. Fund after?
   Answer: 200 − 20 − 6 = 174bn.
2. Fail 10%, loss rate 40%, 500m in. Expected loss? Only 200m first?
   Answer: 0.1 × 0.4 × 500 = 20m; staged 8m.
3. Reported VaR 3%, limit 5%, scenario loss 8%. Breach?
   Answer: 8 − 5 = 3 points; VaR hid it.

IN THE LESSON

- Now try three quick questions yourself.
- Pause after each one.
- Question one.
- A fund of two hundred billion suffers a stress loss of ten per cent and the state draws six billion.
- What is the fund afterwards?
- Ten per cent of two hundred is twenty, so two hundred less twenty less six leaves one hundred and seventy four billion.
- Question two.
- A deal has a ten per cent chance of failure, a forty per cent loss rate and five hundred million invested.
- What is the expected loss, and what if only two hundred million is invested first?
- Point one times point four times five hundred is twenty million, and with two hundred million it is eight million.
- Question three.
- Reported value at risk is three per cent, the limit is five per cent and the scenario loss is eight per cent.
- How big is the breach?
- Eight less five is three points, which the reported figure hid from the board.