CHARTA LEARNING · LESSON NOTES

Madoff: A Riot of Red Flags

FRM Part II

1 A story: the fund that never had a bad month

- Orrin Capital: about 11% a year for 8 years
- Only 3 losing months, even when the market fell
- Famous manager, almost no fees, big investors in
- Real case with the same look: Bernard Madoff
- Goal: see the warning signs before you sign

IN THE LESSON

- Imagine you sit on the investment committee of Fenwick Endowment, a made up fund that pays for a university.
- A manager called Orrin Capital, also made up, offers a fund that has earned about eleven per cent a year for eight years.
- In that time it has lost money in only three months, even in months when the stock market fell.
- The manager is famous and friendly, charges almost nothing, and big investors are already in.
- Would you sign?
- Wealthy individuals and large funds did sign with a real manager whose record looked much like this.
- His name was Bernard Madoff, and his fund turned out to be a fraud.
- The goal of this lesson is to see the warning signs before you sign.

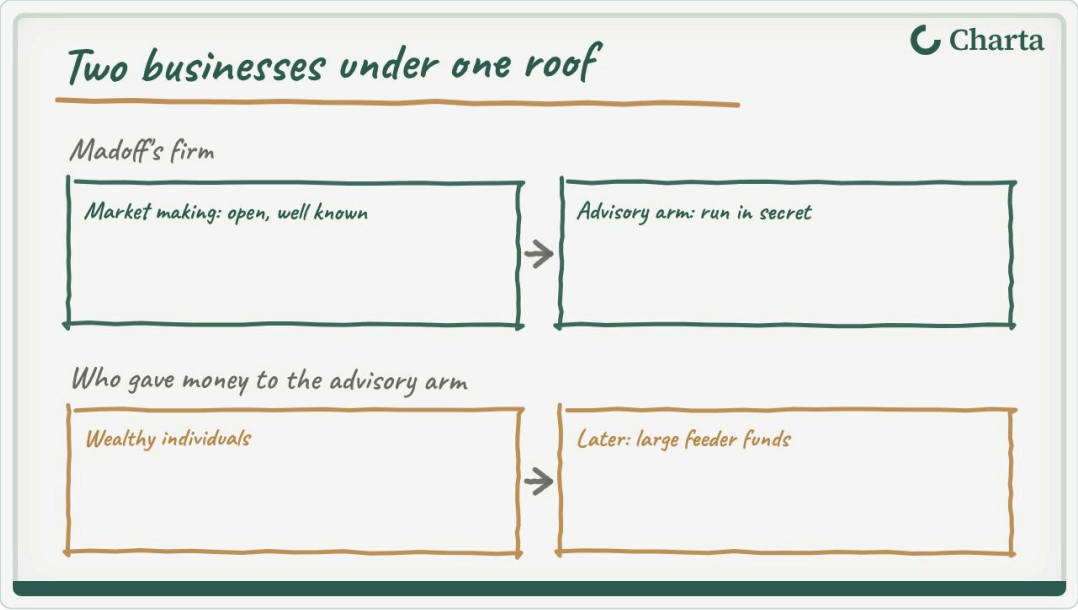
2 Who Bernard Madoff was

- 1960: Madoff founds a broker-dealer
- Broker-dealer: trades for customers and for itself
- Grew into one of Wall Street's largest market makers
- Market maker: always ready to buy and to sell
- A prominent figure, once chairman of NASDAQ

IN THE LESSON

- First, the real history, as far as this lesson needs it.
- In nineteen sixty, Bernard Madoff founded a broker dealer.
- A broker dealer is a firm that buys and sells securities, both for its customers and on its own account.
- His firm grew into one of the largest market makers on Wall Street.
- A market maker stands ready all day to buy from anyone who wants to sell and to sell to anyone who wants to buy, earning a small difference between the two prices.
- Madoff became a prominent figure in the industry, and he served a stint as chairman of Nasdaq, the electronic stock market.
- That reputation will matter later in the story.

3 Two businesses under one roof



IN THE LESSON

- Look at the boxes.
- Madoff's firm had two businesses under one roof.
- The first was market making, done in the open and very well known.
- The second was an investment advisory arm, which is a business that manages other people's money, and it was run in secrecy.
- Who gave money to the advisory arm?
- At first, wealthy individuals.
- Later, large feeder funds.
- A feeder fund is a fund that collects money from many investors and passes all or most of it to one outside manager to invest.
- So many investors never dealt with Madoff at all.
- They bought a feeder fund, and the feeder fund handed their money on.

4 Two option tools: calls and puts

- Option: a right, not an obligation
- Call: right to buy at the strike price
- Put: right to sell at the strike price
- The buyer pays the seller a premium
- Out of the money: would not pay today; cheaper

IN THE LESSON

- Before the strategy, we need two tools.
- An option is a contract that gives its holder a right, but not an obligation.
- A call option gives the right to buy an asset at a fixed price, called the strike price, until an expiry date.
- A put option gives the right to sell at the strike price.
- The buyer pays the seller a price for this right, called the premium.
- An option is out of the money when using it today would not pay: for example, a call whose strike is above the current price, or a put whose strike is below it.
- Out of the money options are cheaper, because they pay only after a sizeable move.

5 The claimed strategy: split-strike conversion

- Name: split-strike conversion
- Hold a basket of large S&P 100 stocks
- Sell out-of-the-money calls: give away big gains
- Buy out-of-the-money puts: protect against big losses
- Stocks + bought put + sold call = a collar; T-bills at times

IN THE LESSON

- Now the strategy Madoff claimed to follow.
- It was called the split strike conversion.
- The fund said it held a basket of large stocks from the S and P one hundred, an index of one hundred of the biggest U S companies.
- Against that basket it sold out of the money calls, which brings in premium but gives away gains above the call strike.
- And it bought out of the money puts, which costs premium but protects against losses below the put strike.
- Holding stocks with a bought put and a sold call is called a collar, and the premium from the calls helps pay for the puts.
- At times, the fund said, it sold everything and moved into Treasury bills, which are short term U S government debt.

6 Example 1: the collar Orrin claims

Orrin claims: basket at 100, put strike 95, call strike 105, one month

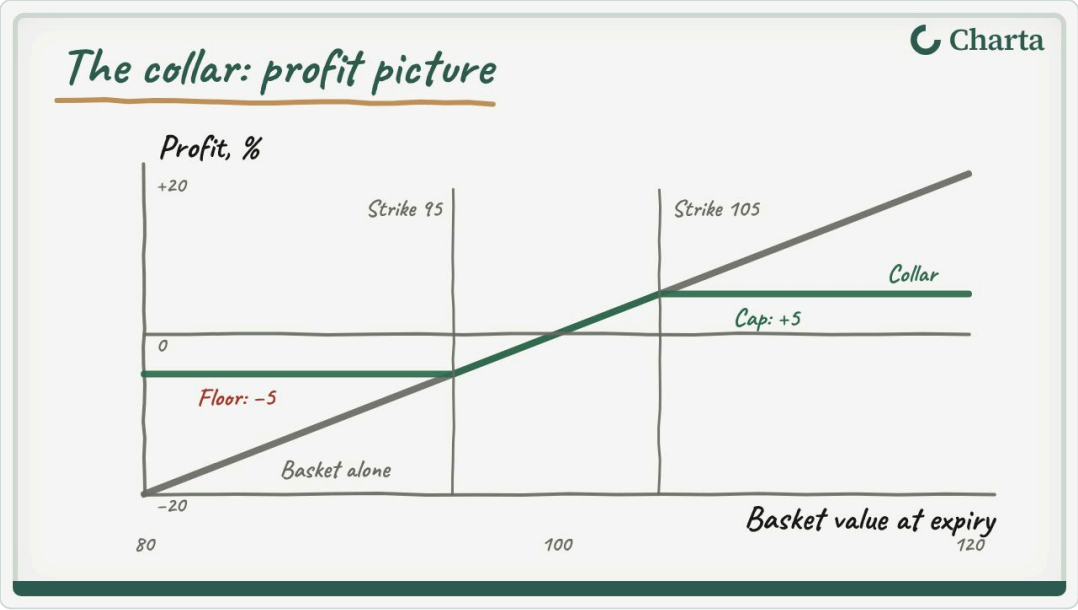
Put bought, strike 95	premium paid	**−1.5**
Call sold, strike 105	premium received	**+1.5**
Net premium	−1.5 + 1.5	**0**
Worst case: the floor	(95 − 100) ÷ 100	**−5%**
Best case: the cap	(105 − 100) ÷ 100	**+5%**

Between 95 and 105 the collar moves one for one with the basket

IN THE LESSON

- Orrin claims a basket worth one hundred, a put with a strike of ninety five and a call with a strike of one hundred and five, all for one month.
- Orrin pays one point five for the put and receives one point five for the call, so the net premium is zero.
- This is called a zero cost collar.
- If the basket ends below ninety five, the put lets Orrin sell at ninety five, so the worst result is ninety five minus one hundred, over one hundred: a loss of five per cent.
- If the basket ends above one hundred and five, the buyer of the call takes the stocks at one hundred and five, so the best result is a gain of five per cent.
- Between ninety five and one hundred and five, the collar moves one for one with the basket.

7 The collar: profit picture



IN THE LESSON

- Here is the picture.
- Along the bottom is the basket's value at the end of the month, and up the side is the profit in per cent.
- The grey diagonal is the basket alone: it loses twenty if the basket falls to eighty, and gains twenty at one hundred and twenty.
- The green line is the collar.
- On the left it is flat at minus five, the floor set by the put.
- Between the strikes of ninety five and one hundred and five it rises one for one with the basket.
- On the right it is flat at plus five, the cap set by the sold call.
- So the collar caps both gains and losses.
- That is why smooth returns sounded believable: the claimed strategy itself cuts off the extremes.

8 Example 2: three months under the collar

Zero-cost collar, strikes 95 and 105. The basket moves +8%, −10%, then −2%

Month 1: basket +8%	capped: 3 points given up	**+5%**
Month 2: basket −10%	floored: 5 points saved	**−5%**
Month 3: basket −2%	between strikes: follows	**−2%**

A collar limits losses; it does not remove losing months

IN THE LESSON

- Now three months under the same collar, with the basket moving up eight per cent, then down ten per cent, then down two per cent.
- In the first month the basket rises eight per cent, but the sold call caps Orrin at plus five, so three points of gain are given up.
- In the second month the basket falls ten per cent, but the put sets the floor at minus five, so five points of loss are saved.
- In the third month the basket falls two per cent.
- That is between the strikes, so neither option pays and the collar follows the basket down two per cent.
- This is the key test.
- A collar limits how much it can lose, but it still loses in a month when the basket falls.
- It does not remove losing months.

9 What Madoff reported, and what was true

- Reported: roughly 10-12% a year, steady
- Very few losing months
- In bull and bear markets alike
- Truth: a Ponzi scheme
- Ponzi: pays withdrawals out of new deposits

IN THE LESSON

- What did Madoff's fund report?
- Steady returns of roughly ten to twelve per cent a year.
- It had very few losing months, and that held in bull markets, when stocks were rising, and in bear markets, when stocks were falling, alike.
- In truth there was no such performance.
- The fund was a Ponzi scheme.
- A Ponzi scheme pays the withdrawals of existing investors out of the new deposits of other investors, while sending everyone statements that show gains that were never earned.
- The next example tests Orrin's record, and the one after shows how a Ponzi scheme keeps paying.

10 Example 3: count the losing months

Orrin: 96 months, 3 losing. The basket fell in 36 of the same 96 months

Orrin: losing months	3 ÷ 96	**3.1%**
Basket: losing months	36 ÷ 96	**37.5%**
A collar should lose	whenever the basket falls	**about 36**
Orrin against the collar	36 ÷ 3	**12 times fewer**

Escape route: T-bills before every fall, which needs perfect timing

IN THE LESSON

- Orrin reports ninety six months with only three losing months, while the stock basket fell in thirty six of the same ninety six months.
- Orrin's share of losing months is three over ninety six, about three point one per cent.
- The basket's share is thirty six over ninety six, thirty seven point five per cent.
- With a zero cost collar, the fund falls in every month the basket falls, because between the strikes it follows the basket and below them it is floored at a loss.
- So an honest collar should show about thirty six losing months.
- Orrin shows three, which is twelve times fewer.
- The only escape is to have sat in Treasury bills before nearly every fall, and that needs perfect timing, month after month.

11 Example 4: how a Ponzi scheme keeps paying

Statements $1,000m, real cash $400m: gap starts at $600m. Gain 11% a year

Statements after the gain	1,000 × 1.11	**$1,110m**
Real cash after flows	400 − 150 + 180	**$430m**
Statements after flows	1,110 − 150 + 180	**$1,140m**
Gap: promised minus real	1,140 − 430	**$710m**
Bad year: cash	430 + 50 − 500	**−$20m**

New deposits pay old withdrawals, until the deposits stop

IN THE LESSON

- Statements show one thousand million dollars, while the real cash is only four hundred million, and the reported gain is eleven per cent a year.
- These are made up figures in millions, so the gap between promised and real money starts at six hundred, which is one thousand minus four hundred.
- After a year, the statements show one thousand times one point one one, which is one thousand one hundred and ten.
- Investors withdraw one hundred and fifty, and new investors deposit one hundred and eighty.
- Real cash becomes four hundred minus one hundred and fifty plus one hundred and eighty, which is four hundred and thirty.
- Statements become one thousand one hundred and forty.
- The gap has grown to seven hundred and ten.
- Then comes a bad year: deposits fall to fifty and withdrawals jump to five hundred.
- Cash would be minus twenty, so the scheme cannot pay.

12 Why the story was believed

- A prominent figure with a real Wall Street business
- A named strategy with real instruments
- 10-12% a year sounded modest, not wild
- Feeder funds: investors assumed someone else checked
- Plausible is not verified: test it

IN THE LESSON

- Why would careful people believe such a story?
- Put the pieces together.
- The manager was a prominent figure who had run a large, real business on Wall Street since nineteen sixty, and had chaired Nasdaq.
- The strategy had a sensible name and used real instruments, and a collar really does narrow the range of returns.
- Steady returns of ten to twelve per cent a year sounded modest, not wild.
- And the money often arrived through feeder funds, so investors assumed that someone else had checked.
- Each piece made the record look plausible.
- But plausible is not the same as verified.
- A plausible story survives only until someone tests it against what the strategy can actually deliver, as we just did.

13 What a red flag is

- Red flag: a trait that raises the odds of fraud
- It does not prove fraud
- It demands independent verification
- Verify with a party with no stake: custodian, auditor
- Madoff's fund showed many at once

IN THE LESSON

- Now the second part: the red flags.
- A red flag is a trait that does not prove fraud, but raises the odds of fraud enough to demand independent verification.
- Independent verification means checking a fact with someone who has no stake in the answer, such as a custodian or an auditor, instead of taking the manager's word.
- Notice the two halves of the definition.
- A single red flag is not an accusation, because honest managers can show one.
- But a red flag shifts the burden.
- You no longer accept the manager's numbers until an outside party confirms them.
- Madoff's fund showed not one red flag but many at once, which is why the case is called a riot of red flags.

14 Example 5: how much a flag raises the chance

1,000 managers, 10 frauds. Flag seen in 8 frauds and in 50 honest managers

Fraud rate before any flag	10 ÷ 1,000	**1.0%**
Managers showing the flag	8 + 50	**58**
Fraud rate given the flag	8 ÷ 58	**13.8%**
Rise in the chance	13.8% ÷ 1.0%	**about 14 times**
Flagged but honest	50 ÷ 58	**86%**

IN THE LESSON

- Picture one thousand managers, of whom ten are frauds, and a flag that shows up in eight of the frauds and in fifty of the honest managers.
- These numbers are made up, to show the logic.
- Before any flag, the chance that a manager is a fraud is ten over one thousand, one per cent.
- Now count the managers who show the flag: eight frauds plus fifty honest ones, fifty eight in all.
- Of those, eight are frauds, so the chance is eight over fifty eight, about thirteen point eight per cent.
- That is about fourteen times the starting chance.
- Yet fifty of the fifty eight, about eighty six per cent, are honest.
- So the flag is not proof, but the chance has risen far too much to accept the numbers unchecked.

15 Red flags in the returns and the strategy

What investors could see in the numbers and the story

Red flag	Why it hints at fraud
Returns far too smooth	Sharpe ratio no collar could deliver
Returns ignore the market	A collar moves with its stocks
Opaque strategy, no answers	Claims cannot be checked
Options volume too big	Listed market could not absorb it

IN THE LESSON

- These are the flags investors could see in the numbers and the story.
- We take them in two groups, and this first group is about the returns and the strategy.
- The returns were far too smooth, with a Sharpe ratio that no collar strategy could deliver.
- The returns did not move with the market, even though a fund holding a collared basket of stocks should rise and fall with those stocks.
- The strategy was opaque, and the manager refused to explain it, so no one could check the claims.
- And the options volume the strategy needed was larger than the listed market could absorb, so the trades could not all have happened.
- Most of these can be tested with public data and a calculator, as we will do for Orrin.

16 Red flags in the structure

Who held the assets, who checked them, and who got paid

Red flag	Why it hints at fraud
Adviser was also broker	It confirmed its own trades
Adviser was also custodian	Nobody independent held assets
Adviser made the statements	It reported its own numbers
Tiny, unknown auditor	No credible outside check
Commissions only	Feeders took the usual fees

IN THE LESSON

- The second group is about the structure: who held the assets, who checked them, and who got paid.
- The adviser was also the broker, the firm that carries out trades, so it confirmed its own trades.
- It was also the custodian, the firm that holds the assets for safekeeping, so nobody independent held them.
- It also produced the statements investors received, so it reported its own numbers.
- The auditor was a tiny, unknown firm, so there was no credible outside check.
- And Madoff charged only trading commissions, forgoing the usual fees, while the feeder funds collected those fees.
- Let us now take the flags one at a time, with numbers where we can.

17 Red flag: returns far too smooth

- Sharpe ratio = (return − risk-free rate) ÷ volatility
- Volatility: standard deviation of returns
- A collar cuts volatility but also cuts return
- So it can lift the Sharpe ratio only a little
- Madoff's Sharpe ratio: beyond any collar

IN THE LESSON

- Start with smoothness.
- The Sharpe ratio measures return per unit of risk.
- It is the fund's average return minus the risk free rate, which is the return on Treasury bills, divided by the volatility of the fund's returns.
- Volatility is the standard deviation, a measure of how much returns swing around their average.
- A high Sharpe ratio means a lot of extra return for very little swing.
- A collar does cut volatility, but it also cuts return, because the sold calls give away the best months.
- So it can lift the Sharpe ratio only a little.
- Madoff's reported returns implied a Sharpe ratio that no collar strategy could deliver.
- Smoothness that the strategy cannot explain is a red flag.

18 Example 6: Orrin's Sharpe ratio

Risk-free 4%. Orrin 11%, vol 2.5%. Index 9%, vol 15%. Collar 7%, vol 8%

Orrin	(11 − 4) ÷ 2.5	**2.80**
Stock index	(9 − 4) ÷ 15	**0.33**
Honest collar (assumed)	(7 − 4) ÷ 8	**0.375**
Orrin against the collar	2.80 ÷ 0.375	**about 7.5 times**

IN THE LESSON

- Take a risk free rate of four per cent.
- Orrin earns eleven per cent with volatility of two point five per cent.
- The stock index earns nine per cent with volatility of fifteen.
- An honest collar earns seven per cent with volatility of eight, and these collar figures are assumptions for illustration.
- Orrin's Sharpe ratio is eleven minus four, which is seven, divided by two point five, giving two point eight.
- The index gives nine minus four, which is five, over fifteen, about point three three.
- The collar gives seven minus four, which is three, over eight, which is point three seven five.
- So Orrin claims about seven and a half times the return per unit of risk of an honest collar.
- That gap, not the eleven per cent itself, is the red flag.

19 Example 7: a gain in a falling month

One month the basket fell 9%. Orrin reported +0.9%. T-bills pay 4% a year

Basket this month	given	**−9%**
Collar: floored by the put	loss capped at 95	**−5%**
All in T-bills	4% ÷ 12	**0.33%**
Orrin reported	given	**+0.9%**
Verdict	above both routes	**not possible**

IN THE LESSON

- In one month the basket fell nine per cent, yet Orrin reported a gain of point nine per cent, and Treasury bills paid four per cent a year.
- Can the claimed strategy produce that?
- Holding the collar, the put floors the loss at ninety five, so the best the collar can do is minus five per cent.
- Moved fully into Treasury bills, the fund earns four per cent divided by twelve, about point three three per cent for the month.
- Orrin's point nine per cent is above both routes, so the verdict is that it is not possible.
- A fund whose claimed holdings fell should not report a gain at all.
- Returns that ignore the very market the fund is invested in hint that the numbers are invented.

20 Red flag: an opaque strategy

- Opaque: outsiders cannot see how it works
- The manager refused, calling it proprietary
- Some secrecy about trading signals is normal
- Investors must check the strategy is possible and real
- Control defeated: strategy transparency

IN THE LESSON

- Next, opacity.
- Madoff's strategy was opaque, meaning outsiders could not see how it really worked, and the manager refused to explain it.
- Managers often protect their methods by calling them proprietary, meaning their own secret.
- Some secrecy about exact trading signals is normal.
- But investors must be able to check that the strategy can produce the returns, and that the positions are real.
- When a manager refuses both, the investor has no way to test any claim at all.
- The control this defeats is strategy transparency.

21 Example 8: more options than the market held

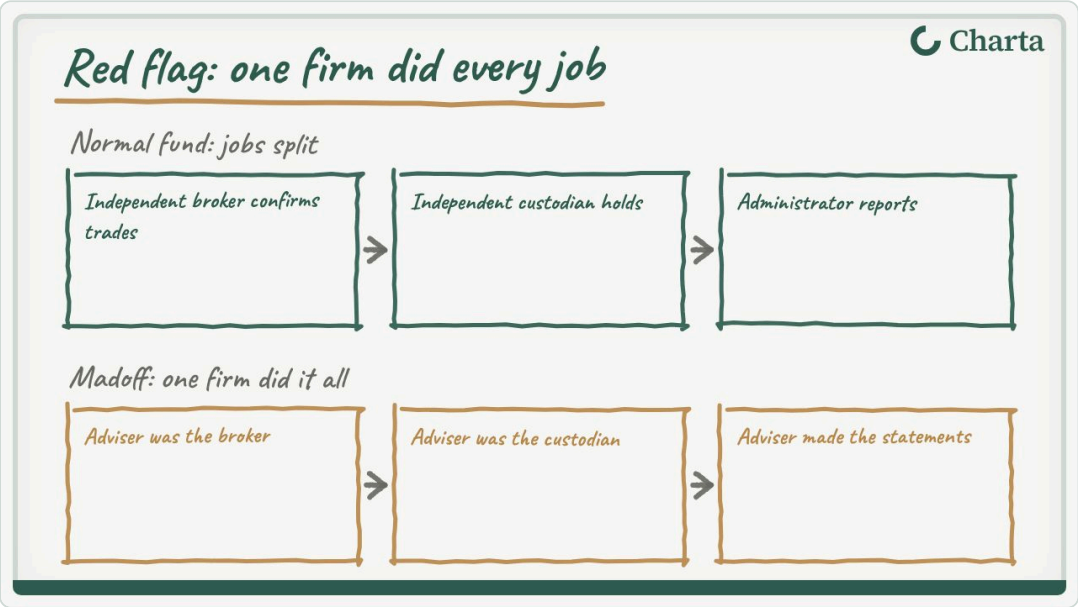
Orrin claims a $6bn basket; one expiry and strike pair. Index 600, contract = 100 × index

Stock covered by one contract	600 × 100	**$60,000**
Put contracts needed	6bn ÷ 60,000	**100,000**
Call contracts needed	same size, sold	**100,000**
Open interest (assumed)	contracts outstanding	**40,000**
Share of the market needed	100,000 ÷ 40,000	**2.5 times**

IN THE LESSON

- Orrin claims a basket of six billion dollars, with the index at six hundred and each option contract covering one hundred times the index.
- We use one expiry and one pair of strikes.
- So one contract covers six hundred times one hundred, which is sixty thousand dollars of stock.
- To collar six billion dollars, Orrin needs six billion over sixty thousand, one hundred thousand put contracts, and the same size again in call contracts, sold.
- Now compare open interest, which is the number of contracts outstanding in the market.
- Assume the listed options at these strikes have open interest of forty thousand contracts.
- Orrin would need two and a half times the entire market, on each side.
- When the claimed trading is larger than the market itself, the trades probably never happened.

22 Red flag: one firm did every job



IN THE LESSON

- Look at the boxes.
- In a normal fund the jobs are split between separate parties.
- An independent broker executes and confirms the trades.
- An independent custodian holds the assets.
- And an administrator, an independent firm, values the fund and reports to investors.
- In Madoff's case one firm did everything.
- The adviser was its own broker.
- The adviser was its own custodian.
- And the adviser made the statements.
- So when an investor got a statement, the trades, the holdings and the report all came from the same people, and nobody independent ever checked that the assets existed.
- This defeats independent custody.
- The due diligence response is to confirm holdings directly with a custodian that the manager does not own.

23 Red flag: a tiny, unknown auditor

- Auditor: outside firm that checks the statements
- Expect staff, experience and reputation to match
- Madoff: a tiny, unknown firm
- Few people to test; little reputation at risk
- Control defeated: audit. Check size, standing, work

IN THE LESSON

- An auditor is an outside accounting firm that checks a fund's financial statements and confirms that its assets exist.
- For a fund holding large sums for many investors, you would expect an auditor whose staff, experience and reputation match the job.
- Madoff's auditor was a tiny, unknown firm.
- A tiny firm has few people to test a large fund's holdings, and an unknown firm has little reputation at risk if it signs carelessly.
- So the control defeated is an independent audit.
- The due diligence test is to check the auditor's size against the fund's size, its standing in the industry, and whether it really does the work it signs.

24 Example 9: who earned the fees?

Fenwick puts $10m in a feeder fund. Reported gross return 11%

Reported gain	11% × $10m	**$1,100,000**
Feeder: management fee	1% × $10m	**$100,000**
Feeder: performance fee	20% × $1.1m	**$220,000**
Fenwick keeps	1.1m − 0.32m	**$780,000**
Orrin: commissions only	assumed, inside the return	**$40,000**

Normal fee $320,000 − $40,000: Orrin forgoes $280,000; feeders keep fees

IN THE LESSON

- Fenwick puts ten million dollars into a feeder fund that invests with Orrin, and the reported gross return is eleven per cent.
- The reported gain is eleven per cent of ten million, one point one million dollars.
- The feeder fund charges a management fee of one per cent of the assets, which is one hundred thousand, and a performance fee of twenty per cent of the gain, which is two hundred and twenty thousand.
- Fenwick keeps one point one million minus point three two million, which is seven hundred and eighty thousand dollars.
- Orrin, like Madoff, charges only trading commissions, assumed here at forty thousand dollars and already inside the reported return.
- A normal manager would charge the same one per cent and twenty per cent, three hundred and twenty thousand.
- So Orrin forgoes three hundred and twenty minus forty, which is two hundred and eighty thousand, for every ten million.
- A manager who turns down fees is odd, and the feeder funds that collect them have a reason not to ask hard questions.

25 The common thread: layers of control

- Independent custody: the assets exist
- Independent broker, confirmations: the trades happened
- Independent reporting and audit: the numbers are honest
- Strategy transparency: the returns are possible
- Each trait removed a layer: one party invents unchecked

IN THE LESSON

- What links all of these traits?
- Think of the controls that protect an investor as layers.
- Independent custody makes sure the assets exist.
- An independent broker and its trade confirmations make sure the trades happened.
- Independent reporting and audit make sure the numbers are honest.
- Strategy transparency lets anyone check that the returns are possible.
- Each of Madoff's traits removed one layer, and with every layer gone, one party could invent numbers unchecked, and no one would ever compare them with reality.
- For the exam, link each flag to the control it defeats, such as independent custody, audit or strategy transparency.

26 Example 10: Fenwick's verification plan

Fenwick will not invest until an outside party confirms each claim

Do the assets exist?	ask an independent custodian	**Custody**
Did the trades happen?	match to exchange records	**Trading**
Is the auditor real?	check size and standing	**Audit**
Are the returns possible?	replicate the collar monthly	**Transparency**
Could the market absorb it?	contracts vs open interest	**Capacity**

A refusal of any step is itself a red flag

IN THE LESSON

- Fenwick will not invest until each claim is confirmed by an outside party.
- Do the assets exist?
- Fenwick asks an independent custodian, not Orrin, which tests custody.
- Did the trades happen?
- Fenwick matches Orrin's reported option trades to exchange records, which tests trading.
- Is the auditor real?
- Fenwick checks its size and standing against the size of the fund, which tests the audit.
- Are the returns possible?
- Fenwick replicates the collar on the basket month by month and compares, which tests transparency.
- Could the market absorb the trades?
- Fenwick compares the contracts needed with open interest, which tests capacity.
- If Orrin refuses any one of these steps, that refusal is itself a red flag, and Fenwick walks away.

27 Mistakes to avoid

- One red flag is not proof: verify
- Reputation is not verification
- A feeder fund's checks are not your checks
- Smooth returns read as skill, not tested
- 'Proprietary' never covers whether assets exist

IN THE LESSON

- Five mistakes come up again and again.
- First, treating a single red flag as proof of fraud.
- It is a reason to verify, not a verdict.
- Second, being reassured by reputation.
- Madoff had chaired Nasdaq and built a large firm, and that said nothing about whether the advisory accounts held real assets.
- Third, trusting someone else's checks.
- Investing through a feeder fund does not mean that anyone verified the manager.
- Fourth, reading smooth returns as skill rather than testing them against the strategy.
- Fifth, accepting the word proprietary as an answer.
- Secrecy about signals is fine, but secrecy about whether the assets exist is not.

28 Try three quick questions

1. Zero-cost collar on 100: put 92, call 107. Basket falls 12%. Return?
   Answer: Floored at 92: −8%.
2. 2,000 managers, 20 frauds. Flag in 15 frauds, 105 honest. Fraud chance if flagged?
   Answer: 15 ÷ (15 + 105) = 12.5%.
3. Adviser's own brokerage holds the assets and sends statements. Control defeated?
   Answer: Independent custody: confirm with an independent custodian.

IN THE LESSON

- Now try three quick questions.
- Pause the video, think, then listen to the answers.
- Question one.
- A zero cost collar on a basket worth one hundred has a put strike of ninety two and a call strike of one hundred and seven.
- In one month the basket falls twelve per cent.
- What is the fund's return?
- The put floors the value at ninety two, so the return is minus eight per cent.
- Question two.
- Of two thousand managers, twenty are frauds.
- A flag shows up in fifteen of the frauds and in one hundred and five honest managers.
- What is the chance that a flagged manager is a fraud?
- Fifteen over one hundred and twenty, which is twelve point five per cent.
- Question three.
- The adviser's own brokerage holds the assets and sends the statements.
- Which control is defeated?
- Independent custody, so confirm the assets with an independent custodian.