Sales and Trading

Interview preparation summary · IB track

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INT.BS.1.a · How a desk works

Distinguish the roles of sales, trading and structuring and the economics of flow and structured business, and use a client axis to match them.

A sales and trading desk splits its front office into three roles. Sales owns the client relationship: it passes on market colour, takes orders, and learns the client's axes, meaning the securities or risks a client is known to want to buy or sell. Traders own the price and the risk: they quote, hold positions in the desk's book and manage inventory inside limits. Structurers design bespoke products, such as a note with an embedded option, and work with traders on how to price and hedge them. Flow business is standardised and high volume, such as cash equities, government bonds and spot FX, and earns a thin margin on a very large number of tickets. Structured business is bespoke and low volume, earns a much larger margin per deal, and brings model risk, hedging cost and lumpy revenue. Interviewers listen for who owns what: sales owns the client, trading owns the risk. The usual mistake is describing sales as order takers rather than as the people who bring axes that let trading clear its inventory.

WORKED EXAMPLE: FLOW AGAINST STRUCTURED REVENUE ON AN EQUITIES DESK

An invented equities desk at Corvane Securities runs two businesses. Flow: 1,200 tickets a day, average size 0.4m, margin 5bp, and an execution and clearing cost of £50 a ticket. Structured: 18 notes a year, each 25m notional, an upfront margin of 1.2% and hedging and model reserves of 0.4% of notional. Compare net annual revenue and revenue per ticket. Convention: 250 trading days, all figures in £.

Answer: Flow earns about 45.0m a year at £150 a ticket. Structured earns about 3.6m at £200,000 a note. Flow is scale and efficiency, structured is skill and relationships.

> **Interview tip:** Give the ticket economics, then the shape: many small stable tickets against few large lumpy ones, and say which role owns the client and which owns the risk.

INT.BS.1.b · How a desk works

Explain how a market maker earns the bid-offer spread, what widens it, and how inventory risk can outweigh the spread earned.

A market maker quotes two prices: the bid, at which it buys, and the offer, at which it sells. The client who trades pays the spread, so a round trip bought at the bid and sold at the offer earns the whole spread, and half of it on each side. The spread pays for processing costs, the risk of holding inventory while the price moves, and adverse selection, the loss to a better informed client. It is wider in illiquid, volatile, large or stressed trades and narrower in liquid, small, competitive ones. When flow is one sided the dealer builds inventory and carries market risk, so on a given day the move in the mid price on that inventory is often larger than the spread captured. A dealer manages this by skewing: lowering both quotes when long, raising both when short, without changing the width. The usual mistake is treating the spread as pure profit rather than as payment for taking risk.

WORKED EXAMPLE: ONE DAY OF MARKET MAKING IN ASHGROVE SHARES

A dealer quotes the invented stock Ashgrove Plc at 4.98 bid and 5.02 offer around a mid of 5.00. Over the day clients buy 100,000 shares from the dealer at 5.02 and sell 80,000 to the dealer at 4.98, and the mid stays at 5.00 for each trade. At the close the mid is 5.05. Split the day's profit into spread capture and inventory result, then say what would have happened had the mid closed at 4.90. Convention: marked to mid, no costs.

Answer: Spread capture is £3,600 and the short inventory loses 1,000, giving £2,600 if the mid rises to 5.05. If it falls to 4.90 the result is £5,600. Inventory is the swing factor, not the spread.

> **Interview tip:** Say that spread capture is the steady income and inventory is the risk, then name how you control it: skew the quotes, hedge, and cap the size of net positions.

INT.BS.1.c · How a desk works

Explain how risk limits control a desk's inventory and how daily P&L is verified, explained and reported.

A desk runs inside limits set by risk management, independent of the front office. Position limits cap notional or inventory by product and ageing. Sensitivity limits cap exposure to a market move, such as DV01 for rates, delta for equities and vega for options. Value at risk caps the estimated loss on a normal day, and stop-loss limits cap the cumulative loss over a day or a month and force a review when reached. A breach is escalated and either approved with a plan or cut back, and it is not acceptable because the position happens to be profitable. Daily P&L is the change in the marked value of positions plus the result on new trades, carry and fees. Product control, not the desk, verifies the marks. The P&L explain splits the number into market moves, carry, new trades and other, and a large unexplained amount points to a bad price, a booking error or a missing risk factor. The usual mistake is to treat a profit as proof that the risk was acceptable.

WORKED EXAMPLE: A DAY OF P&L EXPLAIN AND A LIMIT CHECK

A rates desk is long £40,000 per basis point (DV01) of rate risk, so a 1bp rise in yields costs £40,000. Today yields rose 3bp. Carry earned was 18,000 and spread captured on new trades was 64,000. Product control reports the desk's P&L as a loss of 29,000. Month to date before today the desk was down 310,000 against a monthly stop-loss of 400,000, and policy requires escalation to the head of desk at 75% of the stop. Explain the day and check the limit.

Answer: Explained -38,000, reported -29,000, unexplained +9,000. Month to date is -339,000, 84.8% of the stop-loss, so the head of desk is already involved and the desk should be reducing, not adding, risk.

> **Interview tip:** Quote the three components, give the unexplained number and say what you would check, then link the day to the limit: say where the desk stands and what happens next.

INT.BS.2.a · Products and risk

Price a forward from spot, funding cost and income, and explain carry, basis and roll-down on a trade.

A forward price is the spot price plus the cost of carry, which is the financing cost of holding the asset less the income it pays. For an equity index with simple interest the fair futures price is spot times one plus the interest rate less the dividend yield, times the time to maturity. For a stock with a known dividend, subtract the dividend with the interest it would earn. In FX, the forward reflects the interest rate gap between the two currencies, so the currency with the higher rate trades at a forward discount. For a bond, carry is the coupon income less the repo financing cost, and roll-down is the price gain as the bond ages along an upward sloping curve. The basis is the futures price less the cash price, or less fair value, and cash and carry arbitrage keeps it near fair. A forward is not a forecast of spot. The usual mistake is to say that it is. Interviewers also ask what breaks the arbitrage, such as borrow costs, uncertain dividends and funding spreads.

WORKED EXAMPLE: FAIR VALUE OF AN INDEX FUTURE AND A CASH AND CARRY TRADE

An invented index trades at 4,000. Financing costs 4.0% a year, the index yields 2.0% in dividends, and a futures contract expires in three months. Each index point is worth £10 per contract. The future trades at 4,032. Find the fair price, the mispricing and the trade. Convention: simple interest, dividends received evenly, no costs.

Answer: Fair value is 4,020. The future is 12 points rich, so sell the future and buy the basket, locking in £120 a contract before costs.

> **Interview tip:** Give the formula in words, put the numbers in, say which side you trade, then say what could make the gap real rather than free money.

INT.BS.2.b · Products and risk

Compute option payoffs at expiry, explain delta, gamma, vega and theta, and describe how a dealer delta hedges and what remains.

A call pays the larger of spot less strike and zero at expiry, and a put pays the larger of strike less spot and zero. The buyer pays a premium up front, so the profit is the payoff less the premium, and the seller keeps the premium and takes the other side. Delta is the change in option value for a one unit move in the underlying, between 0 and 1 for a call and between -1 and 0 for a put, and about 0.5 at the money. Gamma is the change in delta as the underlying moves and is highest for at the money options near expiry. Vega is the change in value for a one point move in implied volatility, and theta is the value lost each day

as time passes. A buyer is long gamma and vega and short theta, and a seller the reverse. A dealer who sells options hedges delta with the underlying, but the book still carries gamma, vega and theta. The usual mistake is to treat a delta hedged book as risk free.

WORKED EXAMPLE: SELLING 100,000 CALLS AND DELTA HEDGING FOR A DAY

A client buys 100,000 three-month at the money calls on an invented stock, Dunmere Instruments, from your desk. One call is on one share. The stock is 100, the strike 100, interest 4%, no dividends, implied volatility 25%. A pricing model gives a price of 5.47, delta 0.557, gamma 0.0316, vega 0.197 per volatility point and theta of -0.0325 per day. The desk delta hedges at once. The next day the stock closes at 102 with volatility unchanged. What happens to the hedged book? Convention: 365 calendar days a year, hedge stock financing already in theta.

Answer: The hedged book lost about £2,927 on a 2 point move. The desk is short gamma and short vega, earns theta, and must buy more stock as the price rises.

> **Interview tip:** Say delta is hedged, then name what is left: gamma, vega and theta. A seller of options earns theta and pays gamma and wins when realised volatility is lower than implied.

INT.BS.2.c · Products and risk

Size a hedge from DV01 or delta, and explain value at risk, what it measures and where it fails.

A position is sized by the risk it carries and not by its notional. Rates risk is measured by DV01, the loss for a one basis point rise in yields, which is notional times modified duration times 0.0001. A hedge ratio divides the position's DV01 by the hedge instrument's DV01. A hedge removes the risk factor it targets and leaves basis risk, because the hedge does not move one for one with the position, and it adds carry and transaction costs. Value at risk, or VaR, is the loss that should not be exceeded with a stated confidence over a stated horizon. The parametric version multiplies a z-score, 2.33 at 99%, by the daily volatility of the P&L, and scales to longer horizons by the square root of time. VaR does not say how bad the loss is when it is exceeded, assumes the past volatility continues, and understates the risk of options and crowded positions. It is therefore used alongside stress tests and sensitivity limits. The usual mistake is to treat VaR as the most the desk can lose.

WORKED EXAMPLE: HEDGING A BOND POSITION AND MEASURING ITS VAR

A desk holds 80m of a bond with modified duration 8.0. A hedging future has a DV01 of £85 per contract. The daily volatility of the bond's yield is 6bp. The yield difference between the bond and the future has a daily standard deviation of 1.5bp. Find the hedge and the 99% one day VaR before and after hedging. Convention: z-score 2.326, normal returns, hedge rounded to whole contracts.

Answer: Sell 753 contracts. One day 99% VaR falls from about £893,184 to about £223,296, and basis risk is what remains.

> **Interview tip:** State the DV01, give the hedge in contracts, then add that VaR is a normal-day measure, supported by stress tests.

INT.BS.3.a · Markets in practice

Read the yield curve, credit spreads, implied volatility and central bank signals together, and say what they imply for positioning.

A trader reads four things at once. The curve shows the market's path for policy rates: an inverted curve, with short yields above long yields, usually means cuts are expected, often because growth is expected to slow. Forward rates, backed out of today's curve, give the rate the market is pricing for a future period, and they are compared with the central bank's current rate and guidance. Credit spreads show the extra yield investors demand over government bonds, so wider spreads signal more fear of defaults or less appetite for risk, and a bond's price falls by roughly its spread duration times the widening. Implied volatility is the market's estimate of how much prices will move, and divided by the square root of 252 it gives a typical daily move. Central banks matter through the rate path and the words they use. The usual mistakes are to read each signal alone and to treat forward rates as forecasts rather than prices that include risk premia.

WORKED EXAMPLE: READING ONE DAY'S MARKET

Policy rate is 4.50%. The 6-month rate is 4.40% and the 1-year rate is 4.20%, both simple. The 2-year yield is 4.00% and the 10-year yield is 3.70%. Over a month, the investment grade credit spread index has moved from 95bp to 125bp with a spread duration of 5.0, and an equity index implied volatility has moved from 16 to 24. What is the market saying? Convention: 252 trading days, simple rates for periods up to a year.

Answer: The curve is inverted by 30bp, the forward rate of 3.91% prices cuts, credit has lost about 1.5% and expected daily equity moves have risen to 1.51%. The message is slowdown and risk aversion.

> **Interview tip:** Give one number from each signal, then the story they tell together, then what is already priced in. Saying what would change your reading is better than giving a forecast.

INT.BS.3.b · Markets in practice

Build a trade idea with a thesis, catalyst, entry, target, stop and size, compute its risk and reward, and pitch it clearly to a client.

A trade idea is more than a direction. It states the thesis (what is mispriced or not yet priced in), the catalyst and timing, the instrument that best expresses the view, and three levels: entry, target and stop. The risk to reward ratio is the move to the target divided by the move to the stop. The break-even hit rate is risk divided by risk plus reward, so a 2 to 1 trade needs to win only a third of the time. Carry, the income or cost of holding the position, is added to both sides, and the size is set from the risk budget: the loss at the stop must fit inside what the desk or client can afford to lose. A pitch leads with the idea and why now, gives the levels and the size, and states what would prove it wrong. Interviewers dislike a view without a stop, levels without a size, and an idea that ignores the client's mandate. The usual mistake is to give a direction and call it a trade.

WORKED EXAMPLE: PITCHING A BOND RALLY WITH SIZED RISK

You want to pitch a client a purchase of a 5-year government bond at a yield of 4.20%. The target is a yield of 3.95% and the stop is 4.35%. The bond has a modified duration of 4.4 and is financed at 3.60% in repo. The client allows £150,000 of loss at the stop. Find the risk to reward ratio, the break-even hit rate, the size and the effect of carry. Convention: price move only for the stop and target, carry for three months added to both.

Answer: Buy about 22.7m of the 5-year at 4.20, target 3.95, stop 4.35. Risk to reward is 1.67 to 1, the loss at the stop is £150,000 before carry, and the break-even hit rate is 37.5%, or 29.0% with carry.

> **Interview tip:** Say the idea in one sentence, give the three levels, then the size and the loss at the stop. End with what would make you wrong.

INT.BS.3.c · Markets in practice

Explain how to respond to a trading loss, and describe how electronic trading and regulation shape a desk's business.

When a position loses money, a good trader tells the supervisor and risk early and gives the loss and its cause plainly. The next step is to re-underwrite the trade: ignore the entry price and ask whether the trade would be opened today at this size, given the stop and the loss limit remaining. Cutting, reducing or holding with a reason are all defensible. Adding to a loser to get back to even, moving the stop, or disguising the mark are not. Recovery is harder than the loss: losing 20% needs a 25% gain. A desk's business is also shaped by structure. Electronic trading, including request for quote platforms and algorithms, has narrowed spreads in liquid products and increased the importance of speed, automation and scale, while large illiquid trades still depend on judgement and balance sheet. Regulation, described here at overview level and varying by jurisdiction, raises the cost of capital, limits proprietary trading outside client-driven activity and hedging, and requires best execution, reporting and surveillance. The usual mistake is to ask what a trader hopes the market will do, not what the position is worth now.

WORKED EXAMPLE: IS IT RIGHT TO HOLD A POSITION AT FULL SIZE AFTER A LOSS?

A trader has lost £380,000 this month against a monthly stop-loss of 500,000, with 12 trading days left. The position's daily P&L standard deviation is £90,000. He believes the trade will recover and wants to hold at full size. Estimate the chance that the stop is reached, and compare it with halving the position. Convention: illustrative only, daily P&L is normal with zero drift, losses are monitored continuously.

Answer: At full size the chance of reaching the stop in the next 12 days is about 70%. Halving the position cuts it to about 44%. The loss is a reason to resize the risk to the remaining headroom.

> **Interview tip:** Say you would tell your supervisor first, then re-underwrite and resize to the limit. Do not talk about getting back to even.

Summary of the Charta interview-preparation topic. Companies and figures in the examples are invented. Draft content, not yet expert reviewed.