CHARTA LEARNING · INTERVIEW PREPARATION

Capital Budgeting and Investment Appraisal

Interview preparation summary · FP track

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INT.FI.1.a · Appraisal methods

Calculate the net present value and internal rate of return of a project from its cash flows and explain what each says about whether to accept it.

Net present value is the sum of a project's cash flows discounted at the required return, with the outlay at time zero. A positive NPV means the project is expected to earn more than the required return, so it adds value for shareholders, and because it is stated in money it is the main decision measure. The internal rate of return is the discount rate at which NPV is exactly zero, and the usual rule is to accept when it exceeds the hurdle rate. For a single independent project with conventional cash flows (an outlay followed by inflows) the two rules agree. Interviewers ask this to check that you can discount year-end cash flows by hand, explain why cash is discounted (time value and risk), and choose the hurdle rate by the risk of the project rather than the cheapest source of funds. Common mistakes are discounting the outlay, using accounting profit instead of cash, describing IRR as the profit earned each year, and treating a forecast NPV as certain.

WORKED EXAMPLE: HOLLIN PACKAGING: A NEW LABELLING LINE

Hollin Packaging is an invented manufacturer. A new labelling line costs 5.00m now and is forecast to produce net cash flows of 1.40m, 1.60m, 1.80m and 2.00m at the end of years 1 to 4. The required return is 10%. Ignore tax and assume the line has no value after year 4. Find the NPV, decide whether to accept, and estimate the IRR.

Answer: NPV is 0.31m at 10% and the IRR is about 12.7%, so accept, subject to the forecasts holding.

> **Interview tip:** Say the rule first (accept if NPV is positive at the hurdle), give the number, then the so-what: the project clears the hurdle by under three percentage points, so I would test the cash flow forecasts before recommending it.

INT.FI.1.b · Appraisal methods

Calculate payback, discounted payback and the profitability index for a project and explain what each does and does not tell you.

Payback is the time taken for cumulative cash inflows to recover the outlay. It is quick, easy to explain and a rough guide to liquidity and risk, but it ignores the time value of money and every cash flow after the cut-off, so it can reject a profitable long-lived project and accept one that pays back fast and then loses money. Discounted payback repeats the calculation using discounted cash flows, which fixes the first weakness but not the second. The profitability index is the present value of the future cash flows divided by the initial outlay, so an index above one means a positive NPV, and it shows value created per pound invested, which matters when capital is limited. Interviewers ask this to see whether you know why NPV is preferred and when the other measures still earn their place. Usual mistakes are dividing the outlay by an average inflow, quoting whole years, and ranking projects on payback alone.

WORKED EXAMPLE: LUDLOW PUMPS: THREE WAYS TO LOOK AT ONE PROJECT

Ludlow Pumps is an invented firm. A project costs 3.00m now and returns 1.00m, 1.20m, 1.40m and 0.80m at the end of years 1 to 4. The required return is 10% and cash flows arrive at year ends. Calculate payback, discounted payback and the profitability index, and say what you would conclude.

Answer: Payback is 2.57 years, discounted payback is 3.09 years, the profitability index is 1.17 and NPV is 0.50m, so the project is worth doing on value grounds.

> **Interview tip:** Lead with the verdict from NPV or the index, then offer payback as a second view: it recovers its cost in about three years, which would matter if cash were tight.

INT.FI.1.c · Appraisal methods

Identify the relevant incremental cash flows of a project, including tax, the depreciation tax shield and working capital, and exclude those that are not relevant.

A project is appraised on incremental cash flows: the cash the company has after the decision less the cash it would have had without it. That includes extra revenue and cash costs, lost sales on existing products (cannibalisation), the opportunity cost of a site or asset that could otherwise earn money, tax, and the investment in working capital, which is paid out at the start and normally recovered at the end. It excludes sunk costs already spent, allocated overheads that do not change, interest and other financing flows (the discount rate already covers the cost of funds), and depreciation itself because it is not cash. Depreciation matters only through the tax it saves, the depreciation tax shield, which is depreciation multiplied by the tax rate. Interviewers use this topic to test cash thinking. Typical mistakes are using accounting profit as cash, counting the sunk study, forgetting the working capital release, and mixing inflated cash flows with a real discount rate.

WORKED EXAMPLE: BRACKENFIELD FOODS: A NEW FILLING LINE

Brackenfield Foods is an invented manufacturer. A new filling line costs 8.00m, is depreciated in a straight line over five years to nil, and is expected to last five years. It adds sales of 9.00m a year and cash operating costs of 6.00m a year. It needs 0.60m of extra working capital at the start, recovered at the end of year 5. A feasibility study costing 0.40m was paid last year. Tax is 25% paid in the same year, the required return is 9% and flows arrive at year ends. Find the annual cash flow and the NPV.

Answer: The annual after-tax cash flow is 2.65m and the NPV is 2.10m at 9%, so the line adds value.

> **Interview tip:** Say what you left out and why: the study is sunk and depreciation is not cash. Interviewers listen for that sentence as much as for the final number.

INT.FI.2.a · Judgement

Test how sensitive a project's NPV is to its main assumptions, run scenarios, and find the break-even value of a key input.

A single NPV hides the uncertainty in its forecasts. Sensitivity analysis changes one input at a time, such as price, volume, unit cost or the outlay, and shows how far NPV moves; the break-even value of an input is the level at which NPV falls to zero, and it tells you how much room for error exists. Scenario analysis changes several linked inputs together into a coherent story, for example a downturn with lower volume, lower price and higher costs, and weighting the scenarios by probability gives an expected NPV and a sense of the chance and size of a loss. Neither method replaces judgement: the useful result is knowing which assumptions drive the answer and how well each is evidenced. Interviewers ask how you would stress a case and what you would do next. Typical mistakes are moving variables that are really linked, treating scenario probabilities as precise, and reporting a table of numbers without a recommendation.

WORKED EXAMPLE: CORRIN LABELS: STRESS TESTING A PRINTING LINE

Corrin Labels is an invented printer. A new line costs 4.50m, lasts six years and sells 400,000 units a year at 15.00 with a variable cost of 9.50 a unit and fixed cash costs of 0.80m a year. The required return is 9%, flows arrive at year ends, ignore tax. Find the base NPV, the effect of a 5% lower price and of 10% lower volume, the break-even price, and the expected NPV across a downside, base and upside scenario with probabilities of 25%, 50% and 25%.

Answer: Base NPV is 1.78m, the break-even price is 14.01 (about 6.6% below plan), and the expected NPV across the scenarios is 1.57m with a one in four chance of a loss.

> **Interview tip:** Give the break-even as a distance from the plan: price can fall about 7% before value is destroyed. That is a number a business leader can judge for themselves.

INT.FI.2.b · Judgement

Choose between mutually exclusive projects and under capital rationing, and explain when IRR gives a misleading ranking.

When projects are mutually exclusive, only one can be chosen, and the right test is the one that maximises the value added: the highest NPV at the appropriate discount rate, provided no capital constraint binds. IRR can rank the other way because it is a percentage that ignores scale and the timing of cash flows, so a small project with a high rate can lose to a large one with a lower rate that still beats the hurdle on the extra investment; the incremental cash flows show this. IRR can also give no answer or several when the sign of the cash flows changes more than once, for example when a closure cost follows the inflows. Under capital rationing, where funds for the year are limited, rank by profitability index (NPV per pound of the scarce resource), but check whole combinations if projects cannot be split. For projects with unequal lives compare equivalent annual cost or annual value. Interviewers look for NPV as the anchor, and for you to name the assumption that makes each shortcut fail.

WORKED EXAMPLE: GARROW LOGISTICS: SMALL DEPOT OR LARGE DEPOT

Garrow Logistics is an invented firm choosing one of two mutually exclusive depots. The small depot costs 2.00m and returns 1.00m a year for three years. The large depot costs 5.00m and returns 2.40m a year for three years. The required return is 10%, flows arrive at year ends, ignore tax and capital limits. Compare the NPV and IRR of each, then test the extra investment.

Answer: Choose the large depot: its NPV of 0.97m beats 0.49m even though its IRR of 20.7% is below 23.4%, because the extra investment earns 18.9%.

> **Interview tip:** Say that IRR is a rate and NPV is an amount of value, and that with no capital limit you want the most value. Offer the incremental IRR as the bridge between the two.

INT.FI.2.c · Judgement

Explain how real options and strategic benefits can change an appraisal, how a post-investment review closes the loop, and how to write a clear investment case.

Standard NPV assumes a project is fixed at the start and cannot be changed. Real projects often carry options: to expand if demand proves strong, to delay until more is known, to switch inputs or to abandon and recover value. A staged investment, for example a pilot followed by a rollout, can be worth more than its static NPV because the company commits further capital only in the good outcome. Strategic benefits are real but easily overstated, so the discipline is to say exactly what the benefit is, estimate its cash effect or option value, and treat any NPV shortfall as the price being paid for it. After approval a post-investment review compares actual outcomes with the case, separates forecasting error from execution and external factors, and feeds lessons into the next forecasts. A good investment case states the recommendation, the money requested, the return, the assumptions and their evidence, the alternatives including doing nothing, the main risks and what would change the decision.

WORKED EXAMPLE: WEXCOMBE RETAIL: PILOT STORE WITH AN OPTION TO ROLL OUT

Wexcombe Retail is an invented chain. A pilot format costs 1.20m now. Its own cash flows have a present value of 0.90m at 10%. After a year the company will know whether demand is strong, which management puts at a 40% chance. If it is strong, a rollout can be made whose NPV at that date, after its own cost, is 3.50m. If demand is weak the company stops and the rollout is not made. Value the pilot including the option, and find how likely strong demand must be to justify it.

Answer: Static NPV is -0.30m but including the rollout option the pilot is worth about 0.97m, and it pays if strong demand is more than about 9.4% likely.

> **Interview tip:** Say that flexibility has value only if you really can stop, and show the break-even probability so the listener sees how much of the answer rests on one estimate.

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