

Capstone: Leila's map-shop decisions

Advise the fictional map maker using weighted contributions, opportunity costs, price-response boundaries, switching horizons and capacity. Worked teaching examples use different businesses and numbers.

Written walkthrough. Work through each explanation alongside the PDF slides. The lesson page also includes a captioned video with a generic synthetic narrator. It is not a recording of Craig Wright.

Fictional examples teach reasoning rather than describe a real business. No external academic credit is awarded.

Learning objectives

1. Construct weighted per-order revenue, fees and economic contribution.
2. Reconcile monthly cash and economic surplus with complete time-allocation comparisons.
3. Derive a price-change demand boundary without confusing it with a forecast.
4. Evaluate switching costs over stated horizons and reject infeasible plans.
5. Write an auditable, conditional recommendation and identify evidence that could change it.

Slide 1: Leila's map shop: identify the decisions

Leila makes downloadable walking maps. A single map costs £2 and a three-map bundle £5. Each purchase is one order and one payment. Her forecast is 120 orders: 75% singles and 25% bundles. You will evaluate operating, an additional order, a price change and a service switch. All people, services and figures are fictional.

Walkthrough

This capstone combines the earlier tools rather than introducing a slogan about business success. A positive cash receipt may use time that has a better alternative. A lower transaction charge may accompany a larger monthly bill. A price increase may improve contribution per order while reducing total orders. Treat these as different decisions with different relevant costs. The teaching walkthroughs use other fictional businesses and different numbers, so you can learn the method before independently calculating Leila's case. Her exercise responses are submitted for checking; the teaching slides do not disclose their solutions.

Slide 2: State Leila's time alternative and past commitments

Leila has twenty hours for maps and editing together next month. Editing is available for any of those hours at £18 per hour after its incremental expenses. She values the activities equally apart from financial return. Last month's £240 illustrations and six design hours are unrecoverable. A £12 laptop allocation changes neither spending nor alternative use.

Walkthrough

The editing opportunity supplies a specific, feasible comparison for time spent on maps. Do not replace it with an imagined wage from work she cannot obtain. Equally, do not assume time is free because Leila does not pay herself a wage. The earlier design work can be used with either service and cannot now be recovered. The laptop is retained for editing whichever option she chooses. These facts explain why some accounting entries will not change this decision. A different resale opportunity, personal preference or future benefit would require revisiting the assumptions rather than silently inserting it into the calculation.

Slide 3: Service A: record the complete operating terms

Service A is already configured. It charges £0.20 plus 3% of each order's price and an avoidable £40 monthly operating charge. Delivery and storage cost £0.10 per order. Each order needs three minutes of service time, and monthly maintenance takes four hours. Leila can stop next month without a cancellation charge.

Walkthrough

Write the per-order fee as a fixed amount plus a percentage of that order's price. The word fixed here describes the flat part of a transaction charge; it still varies with the number of orders in a month. Keep it distinct from the monthly charge, which does not vary with orders within the stated range. A bundle is one payment even though it contains three files, so its fixed transaction fee, delivery expense and service time occur once. The monthly charge and maintenance time are avoidable if Leila does not operate next month.

Slide 4: Service B: separate recurring and one-off differences

Service B charges £0.05 plus 5% per order and £55 per operating month. Delivery expense, three-minute service time and four-hour maintenance are unchanged. Switching from A requires £36 cash and two additional hours once. Both services have identical reliability, customer experience and demand in the model. These are assumptions, not claims about actual providers.

Walkthrough

Build two columns before comparing services: recurring monthly consequences and one-off switching consequences. A lower flat transaction charge is only one term. The percentage charge applies to the whole order price, so its importance depends on product mix and prices. The larger monthly fee must also be covered. Switching time displaces available editing just as operating time does, and it uses some of the first month's capacity. Because reliability and demand are stipulated to be identical, do not invent a customer benefit for one provider. Later, question that assumption explicitly as part of sensitivity analysis.

Slide 5: Define measures and rounding before calculating

Calculate fees exactly and aggregate before rounding. There are no taxes, refunds, advertising costs, failed payments or other expenses in this model. Cash surplus subtracts stated cash outlays from revenue. Economic surplus relative to editing also subtracts the value of displaced editing time. Expected fractional orders describe averages, while realised orders are whole counts.

Walkthrough

Keep intermediate calculations to at least four decimal places, and follow each exercise's requested final precision. A weighted average is useful when the product mix is a planning assumption. If actual counts are known, calculate from those counts instead. An expected 75:25 mix need not be realised exactly in a particular month. Do not call the defined cash surplus a complete accounting profit statement, because the model intentionally excludes many real-world items. Our purpose is to compare stated alternatives consistently, not to imply that running an actual business requires no tax, legal or operational investigation.

Slide 6: Worked example: another seller's weighted order

Noor sells illustrative templates for £4 or £9, with a 60:40 order mix. Weighted price is $0.6 \times £4 + 0.4 \times £9 = £6$. A fee of £0.10 plus 2% averages £0.22. Delivery costs £0.18; two minutes valued at £24 per hour cost £0.80. Contribution is therefore £4.80 per order.

Walkthrough

First apply the order weights to prices: £2.40 plus £3.60 equals £6. Because the percentage fee is linear and each order has one flat charge, its weighted average is ten pence plus two per cent of six pounds, or twenty-two pence. Convert two minutes to hours by dividing by sixty, then multiply by twenty-four pounds to obtain eighty pence. Finally subtract the fee, delivery and time cost: six minus 0.22 minus 0.18 minus 0.80 equals 4.80. Monthly costs remain separate. An unweighted price average would incorrectly assume equal numbers of the two order types.

Slide 7: Worked example: reconcile two monthly calculations

Noor expects fifty orders, pays £65 monthly and spends 1.5 maintenance hours. Fixed economic costs are $£65 + £36 = £101$. Economic surplus is $50 \times £4.80 - £101 = £139$. Alternatively, £300 revenue less £11 fees, £9 delivery and £65 monthly charges gives £215 cash surplus; total time costs £76.

Walkthrough

Check the time calculation carefully. Fifty orders at two minutes each require one hundred minutes, or five-thirds of an hour. Add one and a half maintenance hours to obtain nineteen-sixths of an hour. At twenty-four pounds per hour, that is seventy-six pounds. Subtracting £76 from the £215 cash surplus gives £139, matching the contribution method. This reconciliation is a powerful error check: the two routes organise the same consequences differently. If they disagree, look for omitted maintenance, inconsistent time units, an incorrect mix or an opportunity cost counted twice.

Slide 8: Worked example: compare complete time allocations

Suppose Noor has ten hours available for templates and alternative work paying £24 per hour. Alternative work alone gives £240. Operating uses nineteen-sixths of an hour, leaving forty-one-sixths for other work, worth £164. Adding £215 business cash surplus gives £379. The advantage over £240 is £139, matching the incremental method.

Walkthrough

The complete-allocation method includes the earnings actually received under each plan. Noor's remaining work hours earn one hundred and sixty-four pounds, while the template business produces two hundred and fifteen pounds after its stated cash outlays. Together they give three hundred and seventy-nine pounds. Compare that with two hundred and forty from using all ten hours for the alternative. The difference is one hundred and thirty-nine. Do not subtract the seventy-six-pound time opportunity cost again from this difference: the forgone earnings have already been reflected in the reduced hours available for the alternative.

Slide 9: Worked example: an additional order has a different threshold

For Noor, an extra order priced at p contributes $0.98p - £1.08$ before any new fixed costs. Setting this equal to zero gives $p = 1.08/0.98$, approximately £1.10204. With penny prices, £1.11 is the lowest positive-contribution price. This assumes spare capacity, unchanged other sales and no additional setup requirement.

Walkthrough

Derive the expression instead of memorising a threshold. Revenue is p . Subtract the two-per-cent fee to retain $0.98p$. The remaining per-order costs are ten pence of flat fee, eighteen pence of delivery and eighty pence of time, totalling £1.08. At £1.10, the expression is slightly negative; £1.11 makes it positive. This marginal price does not cover the monthly £101 fixed economic costs if charged across the business without enough contribution. Accepting one additional order after commitments are unavoidable and deciding whether to operate for a month are different comparisons.

Slide 10: Worked example: derive a demand boundary

If Noor raises both prices by 20% with mix unchanged, weighted price becomes £7.20 and the fee £0.244. Contribution becomes £5.976. To match the previous £139 surplus, solve $N \times £5.976 - £101 = £139$. The boundary is approximately 40.1606 expected orders, a 19.6787% decline from fifty. This is a condition, not a demand forecast.

Walkthrough

Calculate the new contribution by subtracting £0.244 fees, £0.18 delivery and £0.80 time from £7.20. To preserve the old result, new total contribution must still cover £101 fixed economic costs and leave £139, so it must equal £240. Divide 240 by 5.976 to find the required expected volume. Then subtract that volume from fifty and divide by fifty to measure the allowed proportional decline. The result says how much loss of demand the model can tolerate. It does not estimate how buyers actually respond to the higher prices or identify a profit-maximising price.

Slide 11: Apply the method to Leila's proposed prices

Leila considers a 10% increase to £2.20 and £5.50 on Service A. Keep the same expected mix and other costs. Compare scenarios of 102 and 96 expected orders, and derive the volume that matches her original economic surplus. No demand curve is supplied. Changes in mix, support time or customer exposure could change the comparison.

Walkthrough

Work from weighted contribution rather than assuming that a ten-per-cent price rise creates a ten-per-cent improvement in surplus. Percentage fees change with prices, while other per-order costs remain fixed under the assumptions. The fixed monthly economic costs remain the same. Compute each scenario separately and compare it with the starting case. Then solve for the exact expected order count needed to match that starting result. Fractional expected counts are allowed for this boundary. A recommendation must distinguish this conditional arithmetic from evidence about which demand scenario is likely.

Slide 12: Worked example: compare recurring service costs

A separate seller, Rowan, has £10 orders. Provider X charges £0.30 plus 2%; provider Y charges £0.10 plus 3%. Their fees are £0.50 and £0.40 per order. Y saves £0.10 per order but costs £8 more monthly. Its recurring advantage is therefore £0.10N – £8, positive above eighty orders.

Walkthrough

First calculate each provider's entire transaction charge at the same order price. For X, thirty pence plus twenty pence gives fifty pence. For Y, ten pence plus thirty pence gives forty pence. Subtract to obtain ten pence saved per order. Multiplying by monthly volume gives total variable savings, from which the eight-pound extra monthly cost must be deducted. At eighty orders, those effects exactly offset. This recurring comparison deliberately excludes a one-off switch, which belongs in a separate calculation. It also assumes no difference in demand, quality or service time.

Slide 13: Worked example: add switching costs and time

Rowan's switch costs £20 cash and 1.5 hours worth £20 per hour, totalling £50. At 180 monthly orders, recurring advantage is £10. Cumulative advantage after m months is $£10m - £50$: minus £20 after three months, zero after five and plus £10 after six. This undiscounted calculation assumes stable monthly conditions.

Walkthrough

Value switching time using Rowan's stated alternative: one and a half hours times twenty pounds is thirty pounds. Add the twenty-pound payment to get fifty pounds. At 180 orders, ten pence per order saves eighteen pounds before the extra eight-pound monthly charge, leaving ten pounds per month. Multiply that recurring advantage by the horizon and subtract the switch once. Do not subtract it every month or omit it entirely. A longer horizon can make a switch attractive, but only if the recurring assumptions hold and the transition fits available capacity. Discounting would be needed if the chosen comparison required it.

Slide 14: Evaluate Leila's services over stated horizons

Return Leila to the original £2 and £5 prices. Compare B with A at 120 orders, first on recurring costs and then including switching. Derive recurring and first-month volume thresholds. Separately examine 240 orders per month for ten months, with no discounting, and compare the cumulative results after three and ten months.

Walkthrough

Do not mix the higher-price scenario with the service-switching scenario unless explicitly asked to build a new combined case. For this comparison, both services use the original prices, original mix and identical demand. The first-month threshold must include the cash and time cost of switching, while later months should not repeat that one-off cost. The separate 240-order scenario is a planning assumption, not evidence that demand has increased. Your recommendation should state what must remain true over the horizon and whether a small conditional advantage is robust to plausible changes in workload or sales.

Slide 15: A threshold must fit the resource budget

Check Leila's twenty-hour limit before recommending any order threshold. Maintenance uses time even at low volume, and switching consumes additional first-month time. For comparison, Noor's ten-hour budget, 1.5 maintenance hours and two minutes per order permit 255 orders. An extra one-hour setup would reduce that illustrative first-month capacity to 225.

Walkthrough

The capacity method starts by subtracting all relevant fixed time from available time. For Noor, ten minus one and a half leaves eight and a half hours. Multiplying by sixty gives 510 minutes; dividing by two gives 255 orders. With the additional setup hour, remaining minutes fall to 450, giving 225 orders. Apply the same method independently to Leila's own figures. A profitable-looking algebraic threshold outside capacity is not an available choice. Meeting it would require a new assumption about labour, service time or available hours, and that change may alter the cost comparison.

Slide 16: Write a conditional, auditable recommendation

Your brief should cover operating, pricing and switching under their separate scenarios. Support it with checked calculations, units and stated assumptions. Identify two material uncertainties and practical ways to investigate them. Distinguish Leila's private economic return from effects on walkers or neighbourhoods. The written brief is ungraded reflection; numerical checks do not certify the quality of the whole recommendation.

Walkthrough

A strong brief says what should be done under which conditions and what evidence would change that view. Useful tests might measure service minutes by product, track the realised bundle share or compare customer exposure across periods. Avoid a vague instruction to collect more data without specifying the decision it would inform. If the editing work disappears, identify the new feasible alternative rather than mechanically retaining the old wage or declaring time worthless. Your conclusion should show how assumptions connect to numbers and numbers connect to a decision, while acknowledging questions of rights and wider consequences that the private-return model does not settle.

Questions students ask

Should I count the files in a bundle as separate orders?

No. In this case a bundle is one order and one payment. Apply the stated per-order fee, delivery cost and service time once to a bundle.

Why can the best marginal decision differ from the best monthly decision?

An additional order may contribute towards commitments that cannot now be avoided. Opening next month can involve avoidable monthly cash and time costs that the extra-order calculation does not include.

Can I claim the price increase is optimal if one scenario improves the result?

No. A scenario shows a conditional outcome, and a boundary identifies a required response. Neither supplies a full demand curve or proves which price maximises the relevant objective.

Your exercises

Submit your answers on the lesson page at craigwright.net/learning. Numerical and choice checks receive server feedback. Written responses are saved ungraded. No assessment answer key appears in this guide.

1. Leila: build the per-order economics

Use Leila's original prices, 75:25 order mix and Service A terms from the lesson. Calculate the single-order fee, bundle-order fee, weighted order price and weighted economic contribution after fees, delivery and service-time opportunity cost. Keep monthly costs separate. Give fees and contribution to four decimal places and weighted price to two.

Fee on one single-map order (£ per order)

Fee on one bundle order (£ per order)

Weighted order price (£ per order)

Weighted economic contribution (£ per order)

2. Leila: evaluate next month

At 120 orders under the original Service A assumptions, calculate monthly cash surplus, total map-business hours and economic surplus relative to editing. Then calculate the continuous expected-order boundary for zero monthly economic surplus, maintaining the expected mix. Round money to two decimals and the order boundary to four; do not require the expected mix to be exactly realised at every count.

Cash surplus (£)

Total map-business hours (hours)

Economic surplus relative to editing (£)

Zero-economic-surplus expected volume (expected orders)

3. Leila: test the 10% price increase

Keep Service A and the original expected mix. With prices £2.20 and £5.50, calculate weighted economic contribution to five decimal places; economic surplus at 102 and 96 orders to two decimals; the expected order count matching the original surplus to four decimals; and the corresponding maximum percentage decline from 120 to two decimals. All other assumptions stay fixed.

New weighted economic contribution (£ per order)

Economic surplus at 102 orders (£)

Economic surplus at 96 orders (£)

Expected volume matching the original surplus (expected orders)

Maximum decline from the original expected volume (%)

4. Leila: compare services and capacity

Return to the original prices and mix. Calculate B's recurring economic surplus at 120 orders, the expected-volume threshold where its recurring result equals A, and its first-month equality threshold including switching. Give thresholds to four decimals. Calculate A's normal capacity and B's switching-month capacity. Separately, at 240 orders every month with no discounting, calculate B minus A cumulative advantage after three and ten months, including the switch once. Give money to two decimals.

B's recurring surplus at 120 orders (£)

Recurring equality threshold (expected orders)

First-month equality threshold (expected orders)

A's normal monthly capacity (orders)

B's switching-month capacity (orders)

B minus A after three months at 240 orders/month (£)

B minus A after ten months at 240 orders/month (£)

5. Leila: check the framing and write the decision brief

First answer the objective framing check. Its mark applies only to that choice, never to the written brief. Write 400–600 words advising Leila about operating next month, the proposed price increase, and switching services. Keep the 120-order starting case separate from the ten-month 240-order scenario. Support your conclusions with your checked calculations, explain the editing alternative without double counting, address capacity and identify two material assumptions with practical tests. This written brief is explicitly ungraded: review it for economic framing, numerical support, uncertainty, conditional decision quality and clear communication.

Which description correctly frames the economic comparison with editing?

1. Subtract only the cash payments made by the map business.
2. Subtract relevant cash costs and the value of the editing time given up.
3. Subtract cash costs, then add the editing income given up as a benefit.
4. Subtract every past payment, even when it cannot change between the available choices.

Ungraded decision brief