15.963 Management Accounting and Control
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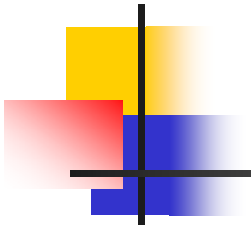
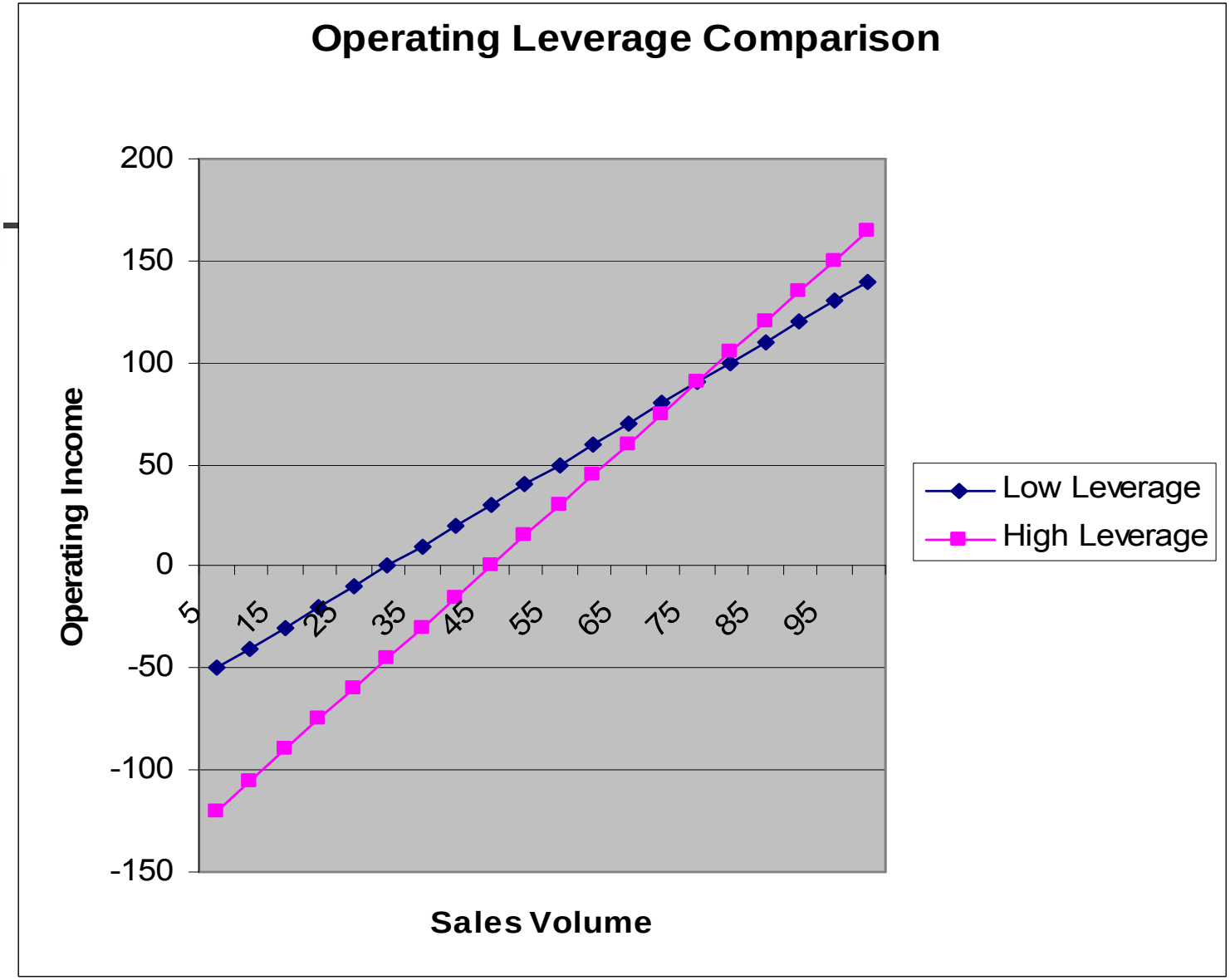
Cost Structure and Competitive Strategy



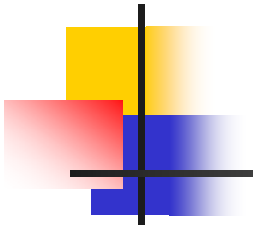
- The relative level of fixed and variable costs is called cost structure.
- Cost structure is a strategic choice.
- The cost structure tradeoff is that higher total fixed costs generally result in lower variable costs per unit.
  - E.g., Amazon, ASP's.
- A summary cost structure index is the degree of operating leverage (DOL).
  - DOL is the sensitivity of operating income to sales volume.

Cost Structure and Competitive Strategy

- At a given level of sales DOL = CM / OI
  - $(\delta(OI)/OI) / (\delta q/q) = CM / OI = CM/(CM-FC)$
  - DOL is increasing in the proportion of fixed costs.
- Consider two companies, Lolev and Hilev, selling identical products (so no price difference). For Lolev, UCM=$2 and FC=$60. For Hilev, UCM=$3 and FC=$135.


Operating Leverage Comparison
200
150
100
50
0
-50
-100
-150
Operating Income
5
15
25
35
45
55
65
75
85
95
Sales Volume
Low Leverage
High Leverage

Cost Structure and Competitive Strategy



- Takeaways (we will return to this):
  - Economic implications of cost structure
    - short-run price wars
    - economic fluctuations and breakeven (WorldCom, airlines).
  - How companies manage the cost structure
    - E.g., outsourcing parts and services.

Opportunity Costs and Sunk Costs

- An opportunity cost is the benefit foregone from the next best alternative.
  - Requires identifying the opportunity set, or set of available alternatives.
  - E.g., opportunity cost of inventory. Other examples follow.
  - Financial accounting system does not record opportunity costs, because foregone alternatives are not transactions.
- A sunk cost is one that is irrecoverable, regardless of the alternative chosen. Examples follow.

Replacement Decisions

- A common decision companies face is whether / when to replace old equipment.

- Jones Company is considering replacing a metal cutting machine with a newer model.
- The new machine is more efficient than the old machine, but it has a shorter life.

Replacement Decisions

- Here is the data the management accountant prepares for the existing (old) machine and the replacement (new) machine:

	Old	New
Original Cost	$1,000,000	$600,000
Useful Life	5 Years	2 Years
Current Age	3 Years	0 Years
Remaining Useful Life	2 Years	2 Years
Accumulated Depreciation	$600,000	n.a.
Book Value	$400,000	n.a.
Current Disposal Value	$40,000	n.a.
Terminal Disposal Value	$0	$0
Annual Operating Costs	$800,000	$460,000

Replacement Decisions

- Jones Corporation uses straight-line depreciation.

- To focus on relevance, we ignore the time value of money and income taxes.
- Revenues of $1.1m per year will be unaffected by the decision.
- Should Jones replace its old machine?

Replacement Decisions

- Operating Income Comparison
  - Two Years Together:

	Keep	Replace
Revenues	$2,200,000	$2,200,000
Operating Costs	$1,600,000	$920,000
Depreciation of Old Machine	$400,000	-
Lump Sum Write-Off	-	$400,000
Disposal Value of Old Machine	-	$(40,000)
Depreciation New Machine	-	$600,000
Total Operating Costs	$2,000,000	$1,880,000
Operating Income	$200,000	$320,000

Replacement Decisions

- Consider whether each of the following items in Jones's equipment replacement decision is relevant or irrelevant:
  - Accumulated depreciation of $600k, and book value of $400k
    - Irrelevant. These are financial accounting constructs. Book value is not the same as resale value. It is largely a sunk cost.
    - How much of the original cost is sunk?
  - Current Disposal Value of Old Machine = $40,000
    - Relevant, because it is an expected future benefit that will only occur if the machine is replaced.

Replacement Decisions

- Loss on disposal of $360,000
  - Irrelevant. This too is a financial accounting construct that is meaningless for the decision at hand.
- Cost of new machine = $600,000
  - Relevant, because it is an expected future cost that will occur only if the machine is purchased.

Replacement Decisions

- Cost Comparison: **Relevant Items Only**
  - Two Years Together:

	Keep	Replace
Operating Costs	$1,600,000	$920,000
Disposal Value of Old Machine	-	$(40,000)
Depreciation New Machine	-	$600,000
Total Operating Costs	$1,600,000	$1,480,000

  - Note that the answer is the same – higher operating income as a result of lower costs of $120,000 by replacing the machine.

Relevant Costs

- Takeaways from example:
  - (i) When considering alternatives (under certainty), relevant costs
    - Occur in the future
    - Differ between alternatives
      - The second criterion does not hold when cash flows are uncertain.
  - (ii) Sunk costs are irrelevant (in this case, the $960k)
    - But not for the guy who sunk them!
    - i.e., irrelevant for decision making
    - But not irrelevant for control (we will return to this in another session)

Relevant Costs

- (iii) Financial accounting constructs can be irrelevant in decision making because
  - the financial reporting system reports on past transactions
  - financial accounting numbers are based on particular rules that are not decision relevant, e.g.,
    - book value is not the same as replacement cost
    - recall that gross margin on income statement was less useful than CM (not on income statement) for decision making and analysis.

Decision Making – Special Orders

- Jekova Company produces sound systems for cars and sells them to automotive manufacturers for $100 each.
- Full capacity is 20,000 systems per month, but it is currently producing 18,000 systems per month for its regular customers.
- Jekova's manager, Ro Watts, receives a call regarding a one-time special order:
  - Strickler Automotive needs 2,000 systems and will pay $65 per system.
  - Jekova will incur no selling costs for the special order.

Decision Making – Special Orders

- Jekova reports the following monthly results:

	Per Unit	Total
Revenue	$100	$1,800,000
Direct Materials	$25	$450,000
Direct Labor	$10	$180,000
Variable Overhead	$22	$396,000
Fixed Overhead	$3	$54,000
Variable Selling Expenses	$19	$342,000
Fixed Selling Expenses	$2	$36,000
Total Costs	$81	$1,458,000
Operating Income	$19	$342,000

Decision Making – Special Orders

- Should Watts accept this one-time special order?

	Per Unit	Total
Revenue	$65	$130,000
Direct Materials	$25	$50,000
Direct Labor	$10	$20,000
Variable Overhead	$22	$44,000
Fixed Overhead		$ 0
Variable Selling Expenses		$ 0
Fixed Selling Expenses		$ 0
Total Costs	$57	$114,000
Operating Income	$8	$16,000

Decision Making – Special Orders

- Jekova has the 2,000 unit capacity needed to satisfy the one-time special order.
- Since Strickler will pay $65 per system, and Jekova will only incur variable manufacturing costs of $57 (= $25 + $10 + $22) per unit, Jekova stands to make an additional profit of $8 per system.
- Watts should accept the order since it will raise operating income by $16,000 from $342,000 to $358,000.

Decision Making – Special Orders

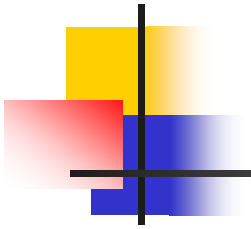
- Strickler's manager calls again: They've run some new calculations, and they really need X systems at the same $65 price.
- It will have to be an all-or-nothing deal.
- This order will displace some of the volume sold to regular customers who are a lot more profitable.
- Assuming that Jekova's regular customer relationships will not suffer due to a small one-time volume reduction, and based on financial considerations alone, what is the maximum value of X?

Decision Making – Special Orders

- Start with the baseline case:
  - At X=2000, Jekova earns a total CM of $16k more than it would otherwise earn.
  - For X>2000, Jekova gains $8 in UCM from the special order, but has an opportunity cost of $24 in UCM from established customers.
- Now let Y=X-2000. For every Y, $16 in UCM is lost.
  - As Y increases, the total CM of $16k from the first 2000 systems is reduced.
  - When Y=1000, the entire CM from the first 2000 systems is eliminated, and the company is back to its current operating income.
- So the maximum value of X is 3000.

Decision Making – Special Orders

- Takeaways from this example:
  - A decision with no long run implications is a short run decision;
  - The short run decision rule is to maximize total contribution margin;
    - E.g., last minute pricing at Delta airlines
  - For short run decisions, fixed costs are irrelevant.
- Return to cost structure and competitive strategy.



Summary

- Today, we have talked about:
  - Cost structure and operating leverage;
  - Opportunity costs, sunk costs and relevant costs;
  - Short run decision rule.

Relevant-Cost Analysis and Opportunity Costs

- The U.S. Defense Department has the difficult decision of choosing which military base to shut down.
- Military and political factors obviously matter, but cost savings are also an important factor.
- Consider two naval bases located on the West Coast – one in Alameda, California, and the other in Everett, Washington.
- The Navy has decided that it needs only one of those two bases permanently, so one must be shut down.
- The decision will be made on cost considerations alone.

Relevant-Cost Analysis and Opportunity Costs

- The following information is available:
  - The Alameda base was built at a cost of $100 million.
  - The operating costs of the base are $400 million per year.
  - The base is built on land owned by the Navy, so the Navy pays nothing for the use of the property.
  - If the base is closed, the land will be sold to developers for $500m.
  - If the Alameda base is shut down, the Navy will have to transfer some personnel to the Everett facility. As a result, the yearly operating costs at Everett will increase by $100 million per year.

Relevant-Cost Analysis and Opportunity Costs

- The following information is available:
  - The Everett base was built at a cost of $150 million on land leased by the Navy from private citizens. The land and buildings will immediately revert to the owner if the base is closed. If the Everett facility is closed down, no extra costs will be incurred to operate the Alameda facility.
  - The Navy can choose to lease the land permanently for a lease payment of $3 million per year. The operating costs of the base, excluding the lease payments, are $300 million per year.
  - If it decides to keep the Everett base open, the Navy plans to invest $60 million in a fixed income note, which at 5% interest will earn $3 million the government needs for the lease payments.

Relevant-Cost Analysis and Opportunity Costs

- Which base to close?
  - The future outlay operating costs will be $400 million regardless of which base is closed, given the additional $100 million in costs at Everett if Alameda is closed.
  - Further, one of the bases will permanently remain open while the other will be shut down.
  - The only relevant revenue and costs comparisons are:
    - $500 million from sale of the Alameda base.
    - $60 million in savings in fixed income note if the Everett base is closed.

Relevant-Cost Analysis and Opportunity Costs

- Which base to close?
  - Note that the historical costs of building the Alameda base ($100 million) and the Everett base ($150 million) are irrelevant.
  - Note also that future increases in the value of the land at the Alameda base are also irrelevant.
    - One of the bases must be kept open, so if it is decided to keep the Alameda base open, the Defense Department will not be able to sell this land at a future date.
  - The relevant costs and benefits analysis favors closing the Alameda base.
    - The net benefit equals $440 (= $500 - $60) million.