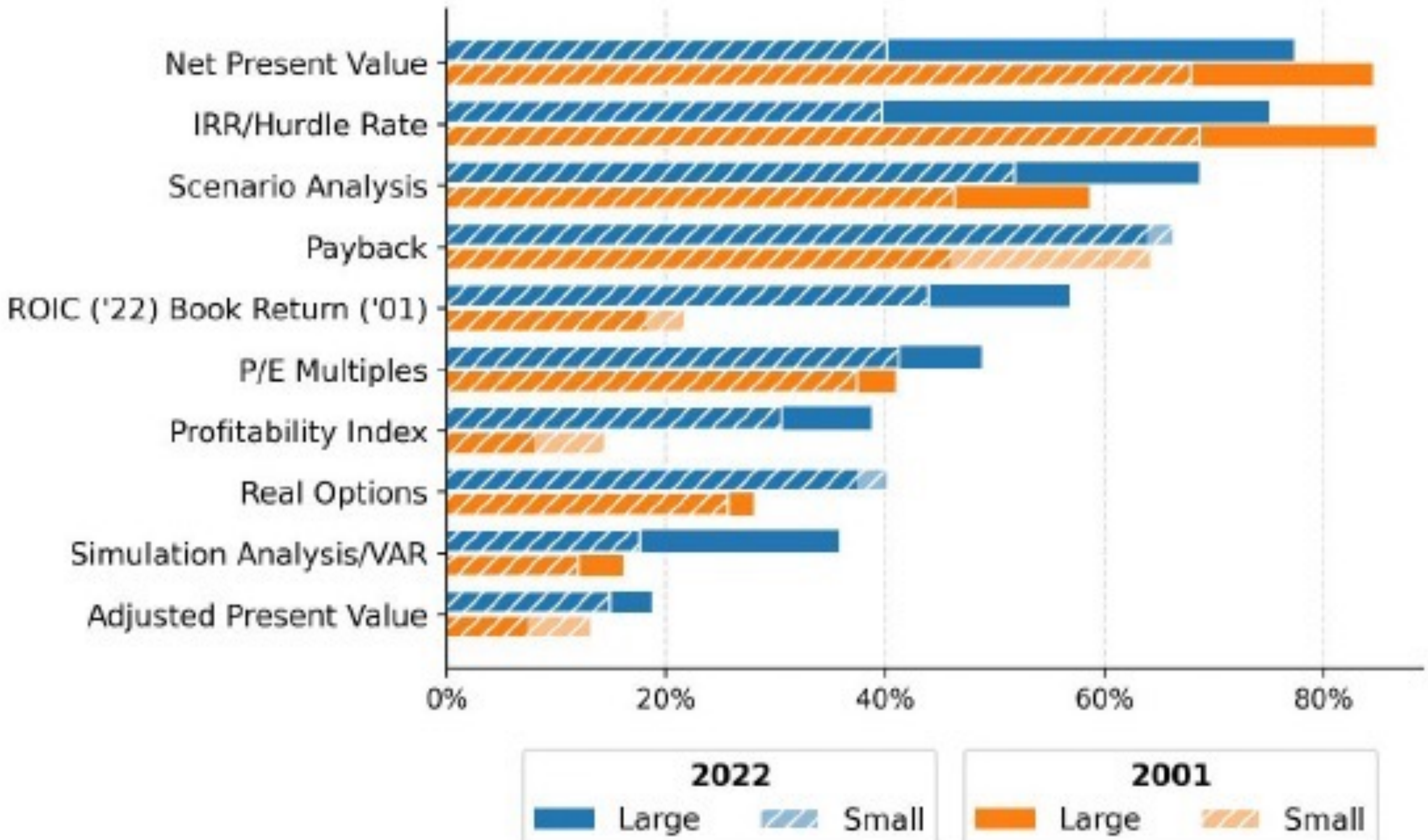
What would you choose as your investment tool?

- Given the advantages/disadvantages outlined for each of the different decision rules, which one would you choose to adopt?
  a. Return on Investment (ROE, ROC)
  b. Payback or Discounted Payback
  c. Net Present Value
  d. Internal Rate of Return
  e. Profitability Index
- Do you think your choice has been affected by the events of the last quarter of 2008? If so, why? If not, why not?

What firms actually use ..



II. Side Costs and Benefits

- Most projects considered by any business create side costs and benefits for that business.
  - The side costs include the costs created by the use of resources that the business already owns (opportunity costs) and lost revenues for other projects that the firm may have.
  - The benefits that may not be captured in the traditional capital budgeting analysis include project synergies (where cash flow benefits may accrue to other projects) and options embedded in projects (including the options to delay, expand or abandon a project).
- The returns on a project should incorporate these costs and benefits.

A. Opportunity Cost

- An opportunity cost arises when a project uses a resource that may already have been paid for by the firm.
- When a resource that is already owned by a firm is being considered for use in a project, this resource has to be priced on its next best alternative use, which may be
  - *a sale of the asset*, in which case the opportunity cost is the expected proceeds from the sale, net of any capital gains taxes
  - *Renting or leasing the asset out*, in which case the opportunity cost is the expected present value of the after-tax rental or lease revenues.
  - *use elsewhere in the business*, in which case the opportunity cost is the cost of replacing it.

Case 1: Foregone Sale?

- Assume that Disney owns land in Rio already. This land is undeveloped and was acquired several years ago for $ 5 million for a hotel that was never built.
- It is anticipated, if this theme park is built, that this land will be used to build the offices for Disney Rio. The land currently can be sold for $ 40 million, though that would create a capital gain (which will be taxed at 20%).
- In assessing the theme park, which of the following would you do:
  - Ignore the cost of the land, since Disney owns its already
  - Use the book value of the land, which is $ 5 million
  - Use the market value of the land, which is $ 40 million
  - Other:

Case 2: Incremental Cost? An Online Retailing Venture for Bookscape

- The initial investment needed to start the service, including the installation of additional phone lines and computer equipment, will be $1 million. These investments are expected to have a life of four years, at which point they will have no salvage value. The investments will be depreciated straight line over the four-year life.
  - The revenues in the first year are expected to be $1.5 million, growing 20% in year two, and 10% in the two years following. The cost of the books will be 60% of the revenues in each of the four years.
  - The salaries and other benefits for the employees are estimated to be $150,000 in year one and grow 10% a year for the following three years.
  - The working capital, which includes the inventory of books needed for the service and the accounts receivable will be 10% of the revenues; the investments in working capital have to be made at the beginning of each year. At the end of year 4, the entire working capital is assumed to be salvaged.
  - The tax rate on income is expected to be 40%.

Cost of capital for Bookscape investment

- We will re-estimate the beta for this online project by looking at publicly traded online retailers.
  - The unlevered total beta of online retailers is 3.02, and we assume that this project will be funded with the same mix of debt and equity (D/E = 21.41%, Debt/Capital = 17.63%) that Bookscape uses in the rest of the business.
  - We will assume that Bookscape's tax rate (40%) and pre-tax cost of debt (4.05%) apply to this project.

  Levered Beta $_{\text{Online Service}}$ = 3.02 [1 + (1 – 0.4) (0.2141)] = 3.41

  Cost of Equity $_{\text{Online Service}}$ = 2.75% + 3.41 (5.5%) = 21.48%

  Cost of Capital$_{\text{Online Service}}$= 21.48% (0.8237) + 4.05% (1 – 0.4) (0.1763) = 18.12%
- This is much higher than the cost of capital (10.30%) we computed for Bookscape earlier, but it reflects the higher risk of the online retail venture.

Incremental Cash flows on Investment

	0	1	2	3	4
Revenues		$1,500,000	$1,800,000	$1,980,000	$2,178,000
Operating Expenses					
Labor		$150,000	$165,000	$181,500	$199,650
Materials		$900,000	$1,080,000	$1,188,000	$1,306,800
Depreciation		$250,000	$250,000	$250,000	$250,000
Operating Income		$200,000	$305,000	$360,500	$421,550
Taxes		$80,000	$122,000	$144,200	$168,620
After-tax Operating Income		$120,000	$183,000	$216,300	$252,930
+ Depreciation		$250,000	$250,000	$250,000	$250,000
- Change in Working Capital	$150,000	$30,000	$18,000	$19,800	-$217,800
+ Salvage Value of Investment					$0
Cash flow after taxes	-$1,150,000	$340,000	$415,000	$446,500	$720,730
Present Value	-$1,150,000	$287,836	$297,428	$270,908	$370,203

NPV of investment @18.12% = $76,375

The side costs…

- It is estimated that the additional business associated with online ordering and the administration of the service itself will add to the workload for the current general manager of the bookstore.
  - As a consequence, the salary of the general manager will be increased from $100,000 to $120,000 next year; it is expected to grow 5 percent a year after that for the remaining three years of the online venture.
  - After the online venture is ended in the fourth year, the manager's salary will revert back to its old levels.
- It is also estimated that Bookscape Online will utilize an office that is currently used to store financial records. The records will be moved to a bank vault, which will cost $1000 a year to rent.

NPV with side costs…

- Additional salary costs = PV of $34,352

	1	2	3	4
Increase in Salary	$20,000	$21,000	$22,050	$23,153
After-tax expense	$12,000	$12,600	$13,230	$13,892
Present Value @18.12%	$10,159	$9,030	$8,027	$7,136

- Office Costs
  - After-Tax Additional Storage Expenditure per Year = $1,000 (1 – 0.40) = $600
  - PV of expenditures = $600 (PV of annuity, 18.12%,4 yrs) = $1,610
- NPV with Opportunity Costs = $76,375 – $34,352 – $1,610= $ 40,413
- Opportunity costs aggregated into cash flows

Year	Cashflows	Opportunity costs	Cashflow with opportunity costs	Present Value
0	($1,150,000)		($1,150,000)	($1,150,000)
1	$340,000	$12,600	$327,400	$277,170
2	$415,000	$13,200	$401,800	$287,968
3	$446,500	$13,830	$432,670	$262,517
4	$720,730	$14,492	$706,238	$362,759
Adjusted NPV				$40,413

Case 3: Excess Capacity

- In the Vale example, assume that the firm will use its existing distribution system to service the production out of the new iron ore mine.
- The mine manager argues that there is no cost associated with using this system, since it has been paid for already and cannot be sold or leased to a competitor (and thus has no competing current use). Do you agree?
    a. Yes
    b. No

A Framework for Assessing The Cost of Using Excess Capacity

- If I do not add the new product, when will I run out of capacity?
- If I add the new product, when will I run out of capacity?
- When I run out of capacity, what will I do?
  - Cut back on production: cost is PV of after-tax cash flows from lost sales
  - Buy new capacity: cost is difference in PV between earlier & later investment

Product and Project Cannibalization: A Real Cost?

- Assume that in the Disney theme park example, 20% of the revenues at the Rio Disney park are expected to come from people who would have gone to Disney theme parks in the US. In doing the analysis of the park, you would
  a. Look at only incremental revenues (i.e. 80% of the total revenue)
  b. Look at total revenues at the park
  c. Choose an intermediate number
- Would your answer be different if you were analyzing whether to introduce a new show on the Disney cable channel on Saturday mornings that is expected to attract 20% of its viewers from ABC (which is also owned by Disney)?
  a. Yes
  b. No

B. Project Synergies

- A project may provide benefits for other projects within the firm. Consider, for instance, a typical Disney animated movie. Assume that it costs $ 50 million to produce and promote. This movie, in addition to theatrical revenues, also produces revenues from
  - the sale of merchandise (stuffed toys, plastic figures, clothes ..)
  - increased attendance at the theme parks
  - stage shows (see "Beauty and the Beast" and the "Lion King")
  - television series based upon the movie
- In investment analysis, however, these synergies are either left unquantified and used to justify overriding the results of investment analysis, i.e,, used as justification for investing in negative NPV projects.
- If synergies exist and they often do, these benefits have to be valued and shown in the initial project analysis.

Case 1: Adding a Café to a bookstore: Bookscape

- Assume that you are considering adding a café to the bookstore. Assume also that based upon the expected revenues and expenses, the café standing alone is expected to have a net present value of -$87,571.
- The cafe will increase revenues at the book store by $500,000 in year 1, growing at 10% a year for the following 4 years. In addition, assume that the pre-tax operating margin on these sales is 10%.

		1	2	3	4	5
Increased Revenues		$500,000	$550,000	$605,000	$665,500	$732,050
Operating Margin		10.00%	10.00%	10.00%	10.00%	10.00%
Operating Income		$50,000	$55,000	$60,500	$66,550	$73,205
Operating Income after Taxes		$30,000	$33,000	$36,300	$39,930	$43,923
PV of Additional Cash Flows		$27,199	$27,126	$27,053	$26,981	$26,908
PV of Synergy Benefits		$135,268				

- The net present value of the added benefits is $135,268. Added to the NPV of the standalone Café of -$87,571 yields a net present value of $47,697.

Case 2: Synergy in a merger..

- We valued Harman International for an acquisition by Tata Motors and estimated a value of $ 2,476 million for the operating assets and $ 2,678 million for the equity in the firm, concluding that it would not be a value-creating acquisition at its current market capitalization of $5,248 million. In estimating this value, though, we treated Harman International as a stand-alone firm.
- Assume that Tata Motors foresees potential synergies in the combination of the two firms, primarily from using Harman's high-end audio technology (speakers, tuners) as optional upgrades for customers buying new Tata Motors cars in India.
- To value this synergy, let us assume the following:
  - It will take Tata Motors approximately 3 years to adapt Harman's products to Tata Motors cars.
  - Tata Motors will be able to generate Rs 10 billion in after-tax operating income in year 4 from selling Harman audio upgrades to its Indian customers, growing at a rate of 4% a year after that in perpetuity (but only in India).

Estimating the cost of capital to use in valuing synergy..

- Business risk: The perceived synergies flow from optional add-ons in auto sales. We will begin with the levered beta of 1.10, that we estimated for Tata Motors in chapter 4, in estimating the cost of equity.
- Geographic risk: The second is that the synergies are expected to come from India; consequently, we will add the country risk premium of 3.60% for India, estimated in chapter 4 (for Tata Motors) to the mature market premium of 5.5%.
- Debt ratio: Finally, we will assume that the expansion will be entirely in India, with Tata Motors maintain its existing debt to capital ratio of 29.28% and its current rupee cost of debt of 9.6% and its marginal tax rate of 32.45%.
  - Cost of equity in Rupees = 6.57% + 1.10 (5.5%+3.60%) = 16.59%
  - Cost of debt in Rupees = 9.6% (1-.3245) = 6.50%
  - Cost of capital in Rupees = 16.59% (1-.2928) + 6.50% (.2928) = 13.63%

Estimating the value of synergy… and what Tata can pay for Harman

- Value of synergy$_{\text{Year 3}}$ = $\frac{\text{Expected Cash Flow}_{\text{Year 4}}}{(\text{Cost of Capital - g})} = \frac{10{,}000}{(.1363\text{-}.04)} = \text{Rs } 103{,}814 \text{ million}$
- Value of synergy today = $\frac{\text{Value of Synergy}_{\text{year 3}}}{(1\text{+Cost of Capital})^3} = \frac{103{,}814}{(1.1363)^3} = \text{Rs } 70{,}753 \text{ million}$
- Converting the synergy value into dollar terms at the prevailing exchange rate of Rs 60/$, we can estimate a dollar value for the synergy from the potential acquisition:
  - Value of synergy in US $ = Rs 70,753/60 = $ 1,179 million
- Adding this value to the intrinsic value of $2,678 million that we estimated for Harman's equity in chapter 5, we get a total value for the equity of $3,857 million.
  - Value of Harman = $2,678 million + $1,179 million = $3,857 million
- Since Harman's equity trades at $5,248 million, the acquisition still does not make sense, even with the synergy incorporated into value.