

CHAPTER 14

The Basics of Capital Budgeting

- **Project classifications**
- **Role of financial analysis**
- **Cash flow estimation**
- **Breakeven and profitability measures**
- **The post-audit**

Capital Budgeting Basics

- **Capital budgeting** is the analysis of potential additions to a business's fixed assets.
- Such decisions:
 - Typically are long term in nature
 - Often involve large expenditures
 - Usually define strategic direction
- Thus, capital budgeting decisions are very *important* to businesses.

Project Classifications

■ Proposed projects are **classified** according to purpose and size. For example,

- Mandatory replacement
- Expansion of existing services
 - Less than \$1 million
 - \$1 million or more
- Expansion into new services
 - Less than \$1 million
 - \$1 million or more

? How are such classifications used?

Role of Financial Analysis

- For *investor-owned businesses*, financial analysis identifies those projects that are expected to contribute to shareholder wealth.
- For *not-for-profit businesses*, financial analysis identifies a project's expected effect on the business's financial condition.
Why is this important?

Overview of Capital Budgeting Financial Analysis

1. Estimate the *cash flows*:
 - *Initial cash outlay (cost)*
 - *Operating flows*
 - *Terminal (ending) flow*
2. Assess the project's *riskiness*.
3. Estimate the *project cost of capital (opportunity cost of capital or discount rate)*.
4. Measure the *financial impact*.

Key Concepts in Cash Flow Estimation

- Focus on *cash flow* as opposed to *accounting income*

- Focus on **incremental** cash flow:

$$\text{Inc. CF} = \text{CF}_{(\text{w/ project})} - \text{CF}_{(\text{w/o project})}$$

- Cash flow timing

- Usually cash flows occur daily
- Often approximated by annual flows

- Project life

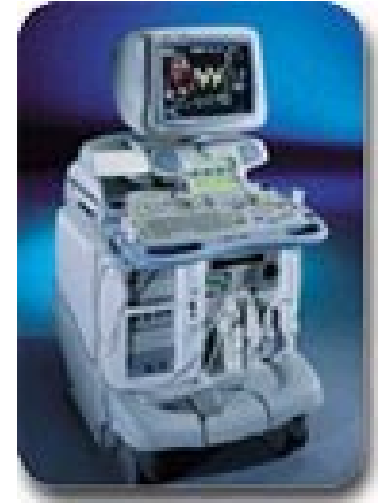
- Often unknown
- Often truncated if long

Key Concepts (Cont.)

- Do *not* include **sunk costs**
- Do include **opportunity costs**:
 - For capital
 - For other resources
- Be sure to consider the **impact on other business lines**
- **Inflation effects** must be considered
- Any **strategic value** implications must be considered

Cash Flow Estimation Example

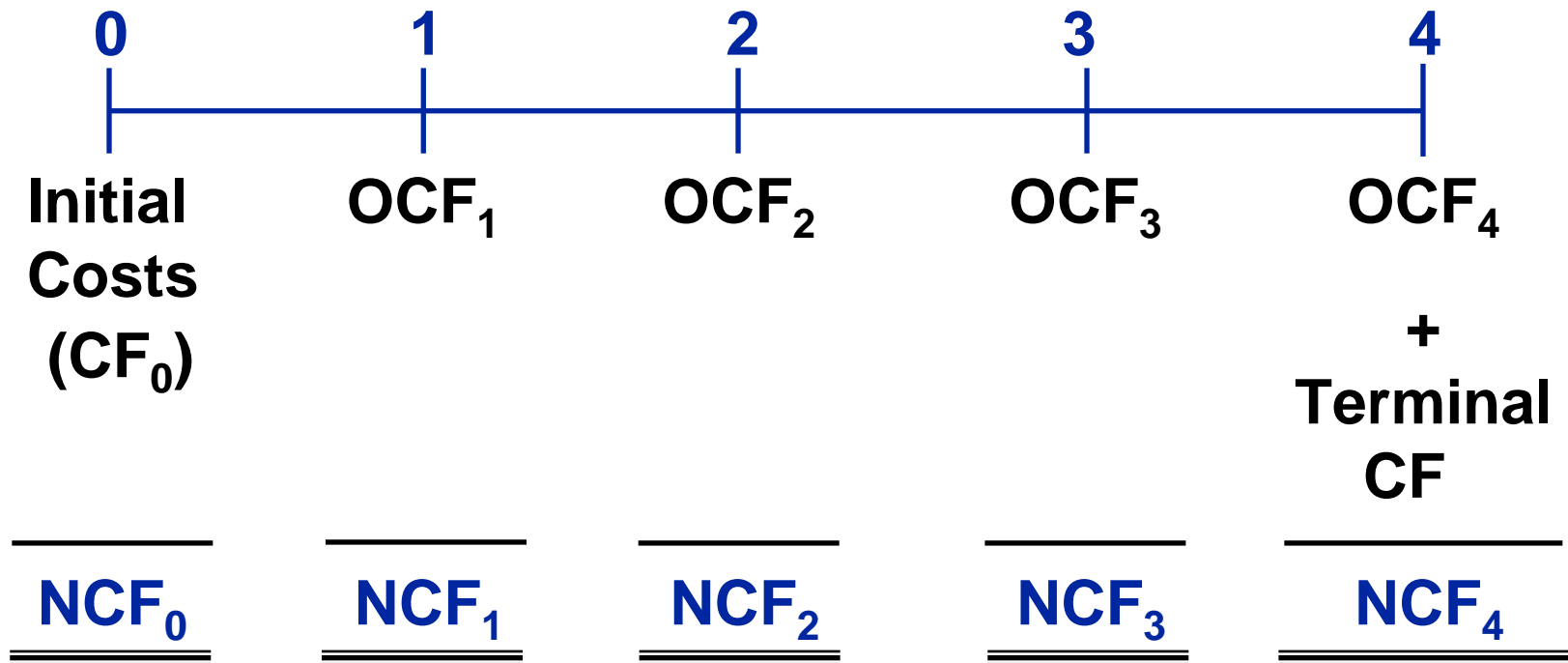
- Assume Midtown Clinic, a *not-for-profit* provider, is evaluating a new piece of diagnostic equipment.
- Cost:
 - \$200,000 purchase price
 - \$40,000 shipping and installation
- Expected life = **four** years.
- Salvage value = **\$25,000**.



Cash Flow Estimation Example (Cont.)

- Utilization = **5,000** scans/year.
- Net revenue = **\$80** per scan.
- Supplies costs = **\$40** per scan.
- Labor costs = **\$100,000**.
- *Neutral* inflation rate = **5%**.
- Corporate cost of capital = **10%**.

Time Line Setup



Investment at $t = 0$ (000s)

Equipment	\$200
Installation & Shipping	40
	<hr/>
Net cash <i>outlay</i>	\$240
	<hr/> <hr/>

Operating cash flows (000s)

	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Revenues	\$400	\$420	\$441	\$463
Supplies costs	200	210	221	232
Labor costs	100	105	110	116
Net op. CF	<u><u>\$100</u></u>	<u><u>\$105</u></u>	<u><u>\$110</u></u>	<u><u>\$116</u></u>

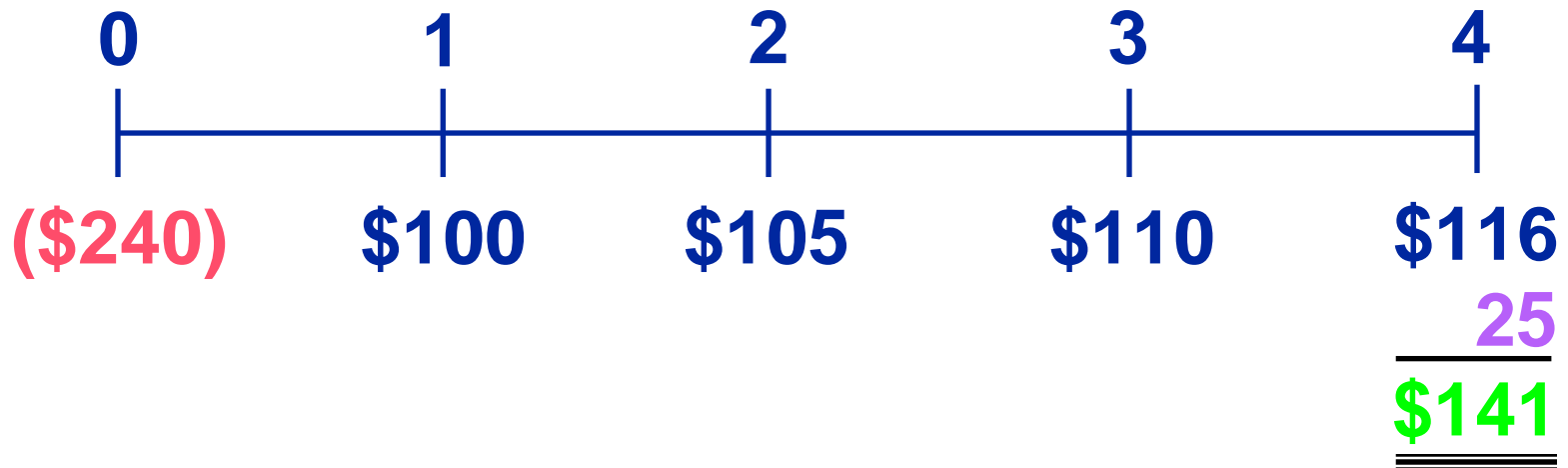
? How were these values developed?

? Why haven't we included depreciation?

Terminal cash flows at t = 4 (000s)

Salvage value	\$25
Tax on SV	0
	<hr/>
Net terminal CF	\$25
	<hr/> <hr/>

Net cash flows (000s)



Note that these cash flows are **estimates**.

If this were a replacement rather than a new (expansion) project, would the analysis change?

- **The relevant operating cash flows would be the *difference* between the cash flows on the new and old project.**
- **Also, selling the old equipment would produce an *immediate* cash inflow, but the salvage value at the end of its original life is *forgone*.**

Discussion Items

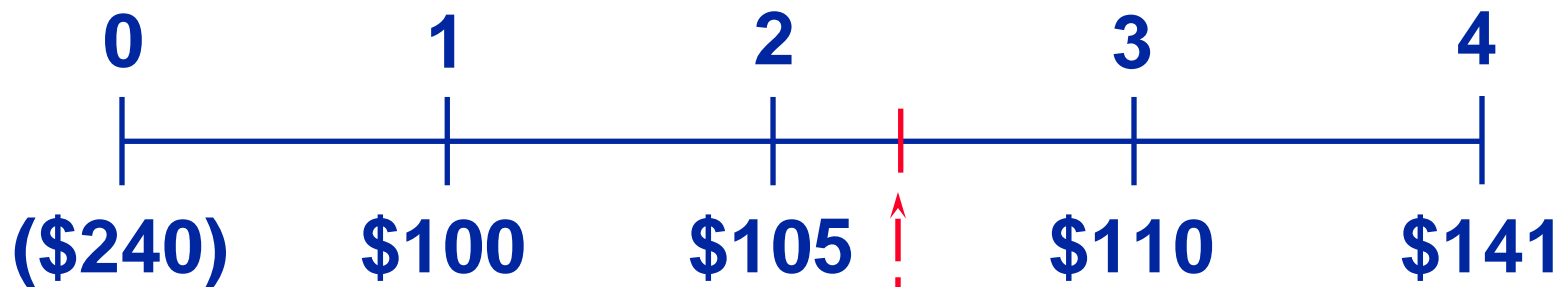
What impact would the following factors have on the cash flow estimates?

- **The loan to buy the equipment will require \$5,000 in annual interest expense.**
- **\$25,000 was spent last year to improve the space that will house the equipment.**
- **The space for the equipment could be rented out for \$1,000 per month.**
- **The new equipment would reduce the volume of an existing service line.**

Breakeven Analysis

- There are many different approaches to **breakeven** in project analysis:
 - Time breakeven
 - Input variable breakeven
 - Unit sales (4,142 versus 5,000 expected)
 - Net revenue (\$73.13 versus \$80 expected)
- We will focus on time breakeven, which is measured by **payback** (or **payback period**).

Payback Illustration



Cumulative CFs:

(\$240)	(\$140)	(\$ 35)	\$ 75	\$216
---------	---------	---------	-------	-------

Payback = $2 + 35 / 110 = 2.3$ years.

Advantages of Payback:

1. Provides an indication of a project's *risk* and *liquidity*.
2. Easy to calculate and understand.

Disadvantages of Payback:

1. Ignores time value.
2. Ignores all cash flows that occur after the payback period.

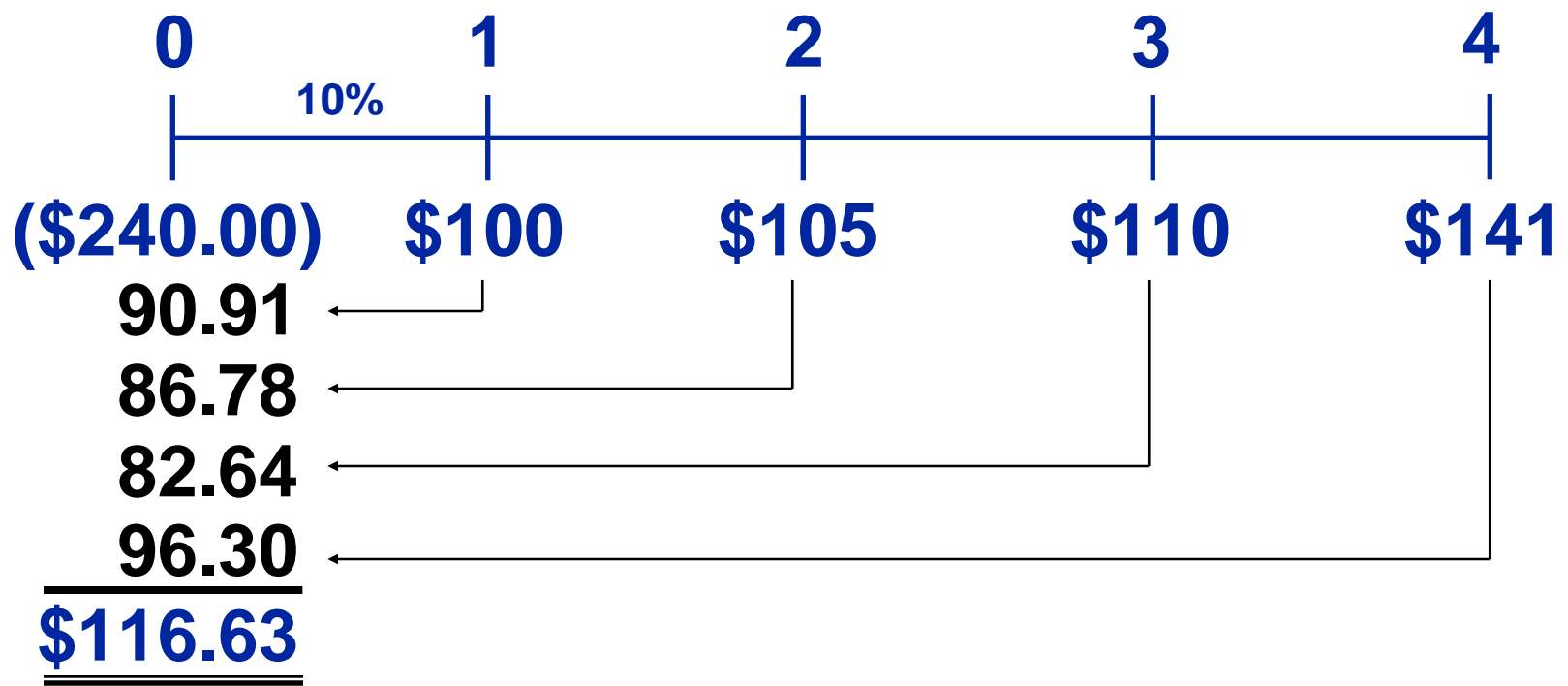
Profitability (ROI) Analysis

- **Return on investment (ROI)** analysis focuses on a project's financial *return*.
- As with any investment, returns can be measured either in *dollar* terms or in *rate of return (percentage)* terms.
 - **Net present value (NPV)** measures a project's time value adjusted dollar return.
 - **Internal rate of return (IRR)** measures a project's rate of (percentage) return.
 - **Modified IRR (MIRR)** also measures percentage return.

Net Present Value (NPV)

- NPV measures return on investment (ROI) in *dollar* terms.
- NPV is merely the sum of the present values of the project's net cash flows.
- The discount rate used is called the *project cost of capital*. If we assume that the illustrative project has *average risk*, its project cost of capital is the *corporate cost of capital, 10%*.

Net Present Value (NPV) Calculation



Thus, the project's NPV is about **\$117,000**.

Spreadsheet Solution

	A	B	C	D
1				
2	10.0%		Project cost of capital	
3	\$ (240)		Cash flow 0 (000s)	
4	100		Cash flow 1 (000s)	
5	105		Cash flow 2 (000s)	
6	110		Cash flow 3 (000s)	
7	141		Cash flow 4 (000s)	
8				
9				
10	\$ 117	=NPV(A2,A4:A7)+A3 (entered into Cell A10)		

Interpretation of the NPV

- NPV is the *excess dollar contribution* of the project to the *equity value* of the business.
- A positive NPV signifies that the project will *enhance* the financial condition of the business.
- The greater the NPV, the more attractive the project financially.

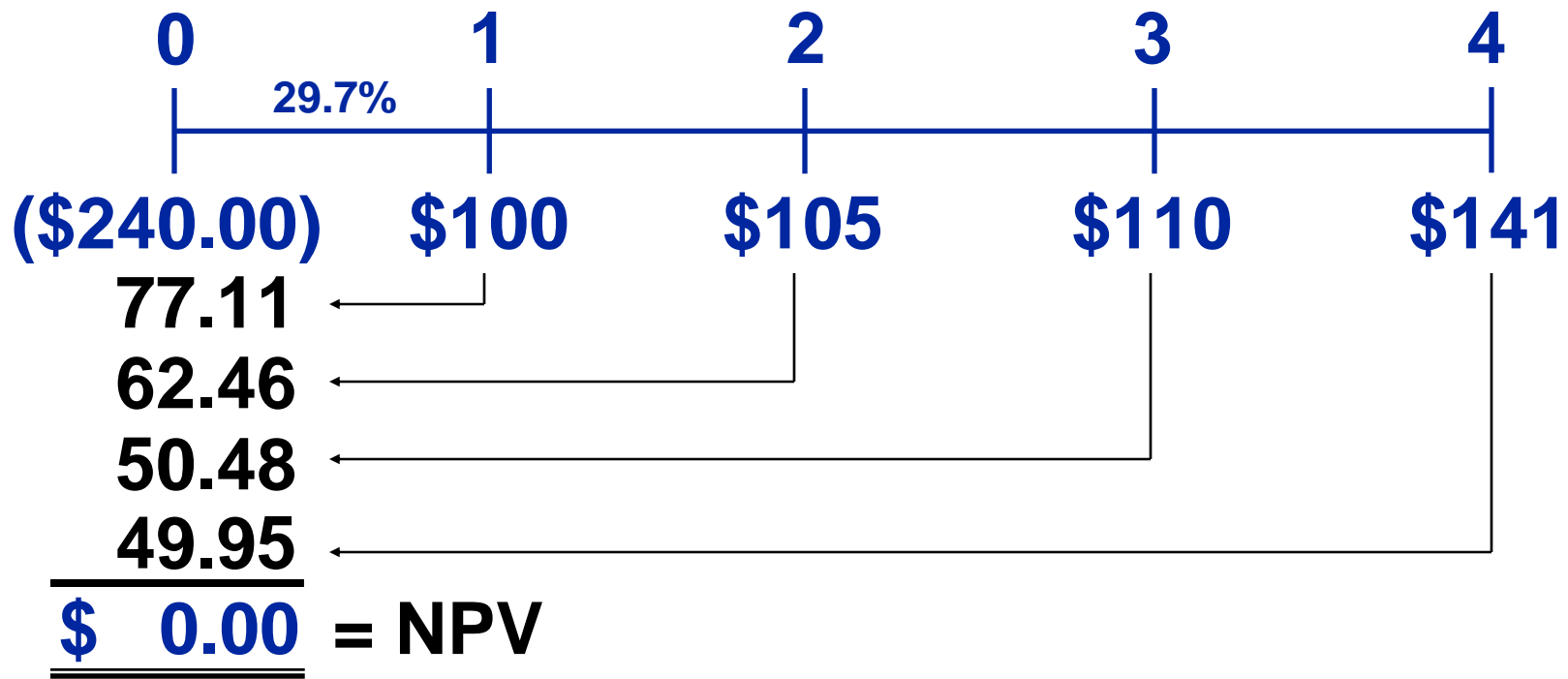
Discussion Item

What is the meaning of an NPV of \$0?

Internal Rate of Return (IRR)

- IRR measures ROI in *percentage (rate of return)* terms.
- It is the discount rate that forces the PV of the inflows to equal the cost of the project. In other words, it is the discount rate that forces the project's NPV to equal **\$0**.
- IRR is the project's *expected rate of return*.

IRR Calculation (Cont.)



Thus, the project's IRR is **29.7%**.

Spreadsheet Solution

	A	B	C	D
1				
2	10.0%		Project cost of capital	
3	\$ (240)		Cash flow 0 (000s)	
4	100		Cash flow 1 (000s)	
5	105		Cash flow 2 (000s)	
6	110		Cash flow 3 (000s)	
7	141		Cash flow 4 (000s)	
8				
9				
10	29.7%	=IRR(A2,A3:A7) (entered into Cell A10)		

Interpretation of the IRR

- If a project's IRR is *greater* than its cost of capital, then there is an “excess” return that contributes to the equity value of the business.
- In our example, IRR = **29.7%** and the project cost of capital is **10%**, so the project is expected to *enhance* Midtown Clinic's financial condition.

Discussion Items

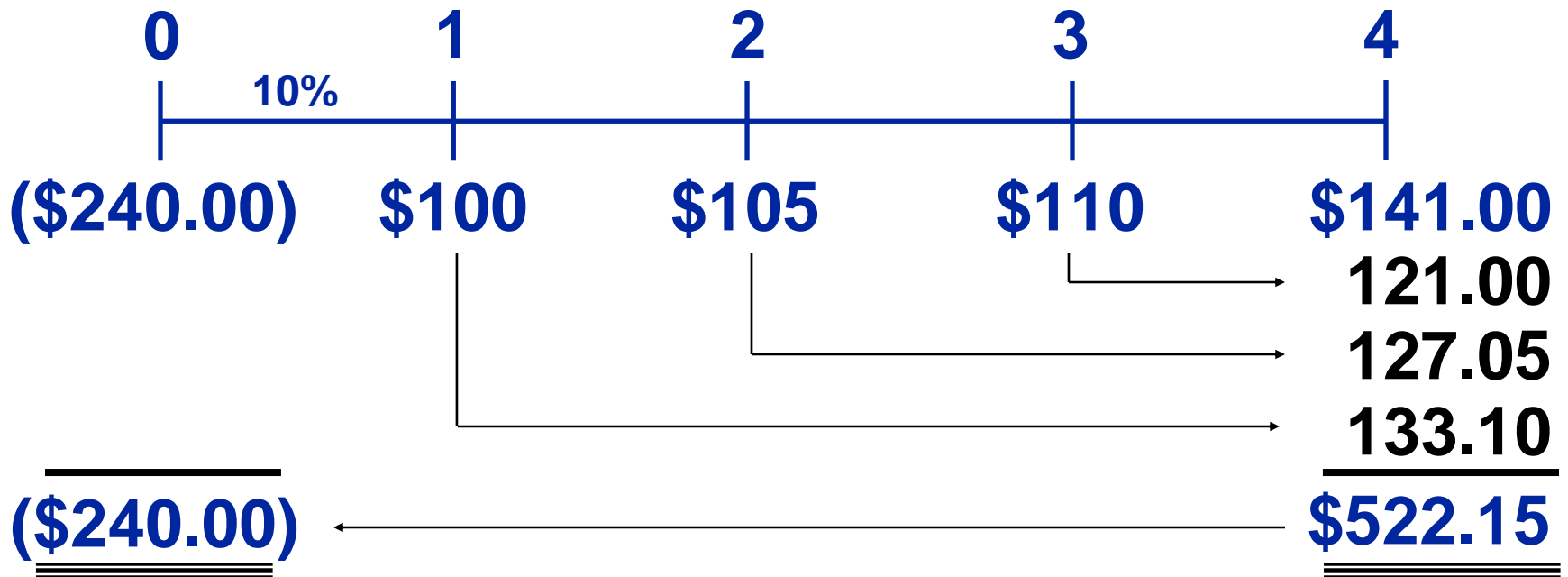
What is the meaning of an IRR of 0%?

Of an IRR of 10%?

Modified Internal Rate of Return (MIRR)

- Both NPV and IRR require a **reinvestment rate assumption**.
 - NPV assumes it is the *cost of capital*.
 - IRR assumes it is the *IRR rate*.
- Of the two, reinvestment at the cost of capital is the better assumption.
- **MIRR** forces reinvestment at the cost of capital.

MIRR (Cont.)



Spreadsheet Solution

	A	B	C	D
1				
2	10.0%		Project cost of capital	
3	\$ (240)		Cash flow 0 (000s)	
4	100		Cash flow 1 (000s)	
5	105		Cash flow 2 (000s)	
6	110		Cash flow 3 (000s)	
7	141		Cash flow 4 (000s)	
8				
9				
10	21.4%	=MIRR(A3:A7,A2,A2) (entered into Cell A10)		

Interpretation of the MIRR

- MIRR is interpreted in the same way as is IRR. In our example, MIRR = **21.4%** and the project cost of capital is **10%**, so the project is expected to contribute to shareholder wealth.
- Note that the value of the MIRR for any project falls in between the project cost of capital and IRR values.

Some Thoughts on Project Analysis

- Although NPV and IRR generally are perfect substitutes, there are yet other ROI measures that can be used; i.e., the profitability index.
- A thorough analysis will consider all profitability measures, plus examine input variable breakevens.
- However, the key to effective project analysis is the ability to *forecast the cash flows* with some confidence.

Capital Budgeting in NFP Businesses

- Measures thus far have focused on the *financial impact* of a project.
- Presumably, not-for-profit providers have important goals besides financial ones. Other considerations can be incorporated into the analysis by using:
 - The net present social value model.
 - Project scoring.

Net Present Social Value Model

- The **net present social value (NPSV)** model is based on the fact that the *total value* of a project equals its economic value (NPV) plus its social value.
- Thus, the present value of the future annual social values is added to the NPV to estimate the project's total value.

Project Scoring

- **Project scoring** uses a matrix to create a numerical “score” for projects that incorporates both financial and nonfinancial factors.
- Note the scores attached to projects are nonlinear in the sense that a project with a score of **14** is not necessarily twice as good a project with a score of **7**.

Discussion Items

What are the advantages and disadvantages of the net present social value model and project scoring?

Are they used in practice?

Post-Audit

- The **post-audit** is a formal process for monitoring a project's performance over time.
- It has several purposes:
 - Improve forecasts
 - Develop historical risk data
 - Improve operations
 - Reduce losses

Conclusion

- This concludes our discussion of ***Chapter 14*** (The Basics of Capital Budgeting).
- Although not all concepts were discussed in class, you are responsible for all of the material in the text.
- ? Do you have any questions?