Discounted Cash Flow: Free Cash Flow

Michael R. Roberts
William H. Lawrence Professor of Finance
The Wharton School, University of Pennsylvania

Last Time

Discounted Cash Flow (DCF)

- Decision making
  - NPV rule
  - IRR
  - Payback
- Practical approach

This Time

Discounted Cash Flow (DCF)

- Free Cash Flow

Free Cash Flow

Recall: Two components to NPV

Recall: Two components to NPV

1. Free Cash Flows

Recall: Two components to NPV

1. Free Cash Flows
2. Discount Rate

Recall: Two components to NPV

1. Free Cash Flows
2. Discount Rate

FCF = (Revenue

FCF = (Revenue – Costs

$$FCF = (Revenue – Costs – Depreciation)$$

$$FCF = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C)$$

$$\text{FCF} = \overbrace{(\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C)}^{\substack{\text{Unlevered Net Income} \\ \text{Net Operating Profit After Taxes (NOPAT)} \\ \text{Earnings Before Interest After Taxes (EBIAT)}}}$$

$$\text{FCF} = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C) + \text{Depreciation}$$

$$\text{FCF} = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C) + \text{Depreciation} - \text{Capital Expenditures}$$

$$\text{FCF} = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C)$$
$$+ \text{Depreciation} - \text{Capital Expenditures}$$
$$- \text{Change in Net Working Capital}$$

FCF = (Revenue – Costs – Depreciation) x (1 – t_C)
+ Depreciation – Capital Expenditures
– Change in Net Working Capital

Lesson: FCF is the residual cash flow left over after **all** of the project's requirements have been satisfied and implications accounted for.

$$\begin{aligned}FCF = {} & (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C) \\ & + \text{Depreciation} - \text{Capital Expenditures} \\ & - \text{Change in Net Working Capital}\end{aligned}$$

Lesson: FCF is the cash flow that can be distributed to the financial claimants (e.g., debt and equity) of the project or company

$$\text{FCF} = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C)$$
$$+ \text{Depreciation} - \text{Capital Expenditures}$$
$$- \text{Change in Net Working Capital}$$

Lesson: FCF is **not** the same as accounting cash flow from the statement of cash flows (SCF) but we can derive FCF from the SCF.

$$\text{FCF} = (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C)$$
$$+ \text{Depreciation} - \text{Capital Expenditures}$$
$$- \text{Change in Net Working Capital}$$

Lesson: FCF is more precisely unlevered free cash flow to distinguish it from free cash flow to equity (FCFE) or levered free cash flow.

$$
\begin{aligned}
\text{FCFE} = {} & (\text{Revenue} - \text{Costs} - \text{Depreciation}) \times (1 - t_C) \\
& + \text{Depreciation} - \text{Capital Expenditures} \\
& - \text{Change in Net Working Capital} \\
& - \text{Interest} \times (1 - t_C) \\
& + \text{Net Borrowing}
\end{aligned}
$$

$$FCFE = FCF - Interest \times (1 - t_C) + Net\ Borrowing$$

$$\text{FCFE} = \text{FCF} - \text{Interest} \times (1 - t_C) + \text{Net Borrowing}$$

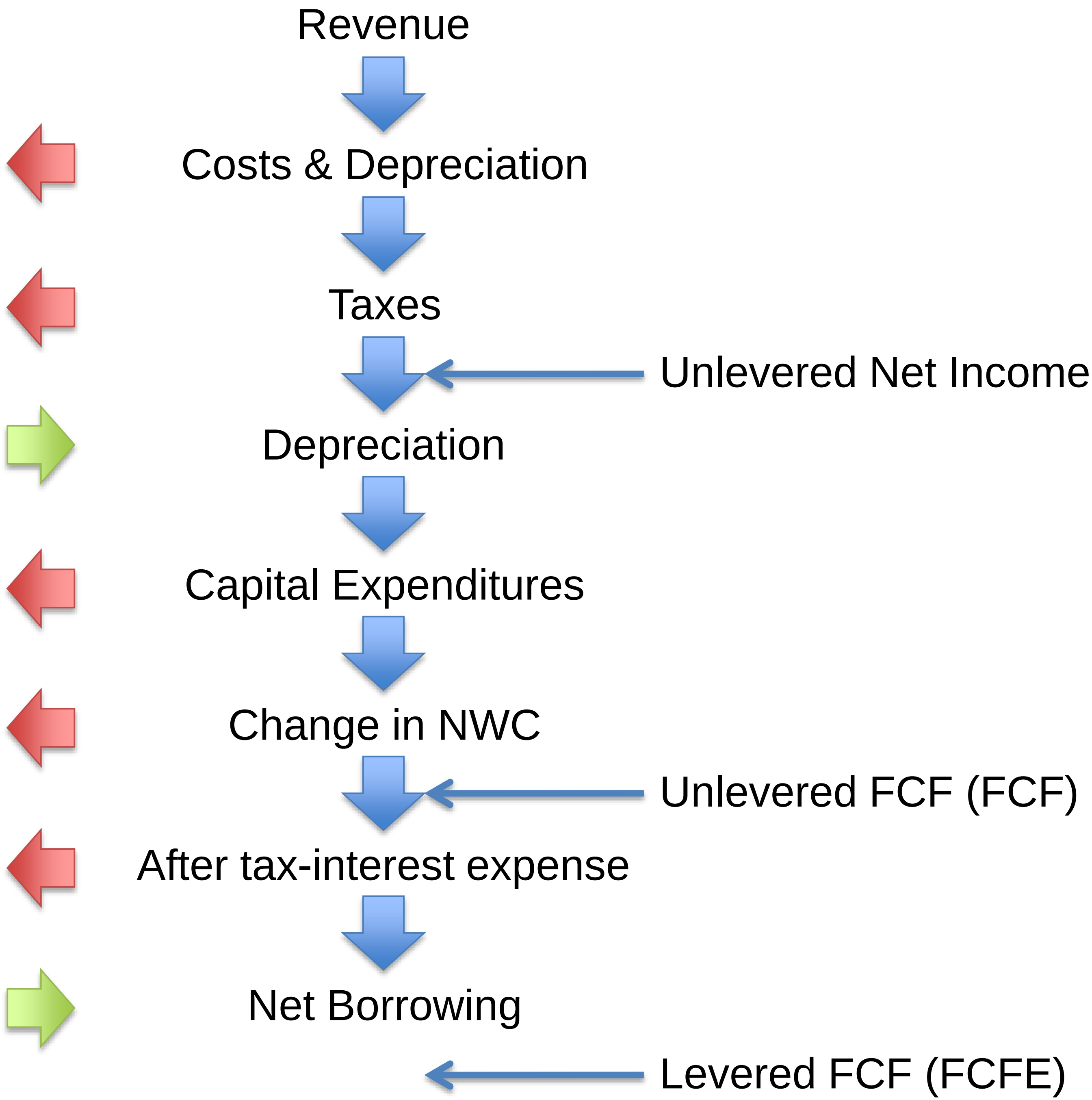
Lesson: FCFE is residual cash flow left over after **all** of the project's requirements have been satisfied, implications accounted for, *and* all debt financing has been satisfied

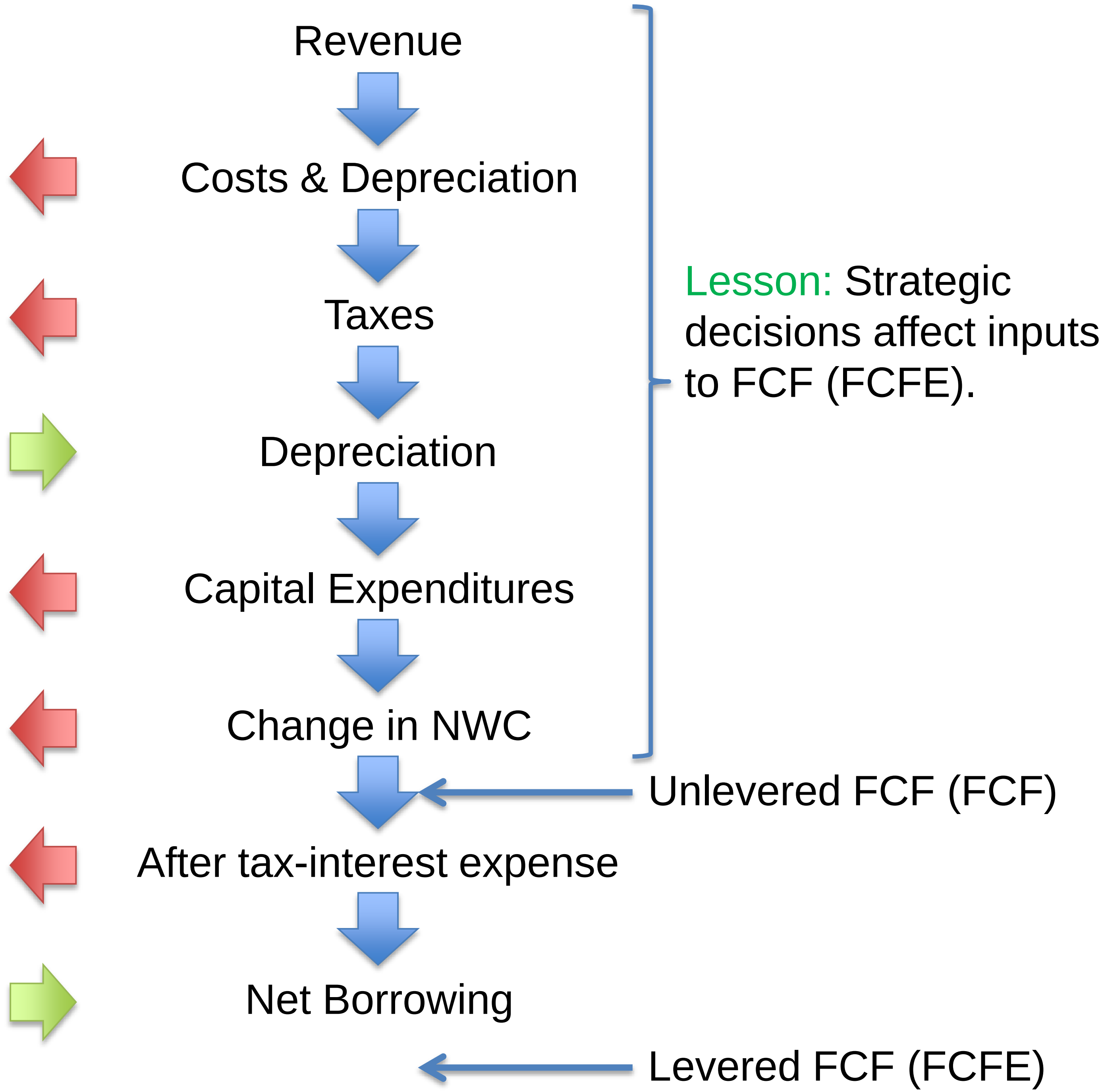
$$\text{FCFE} = \text{FCF} - \text{Interest} \times (1 - t_C) + \text{Net Borrowing}$$

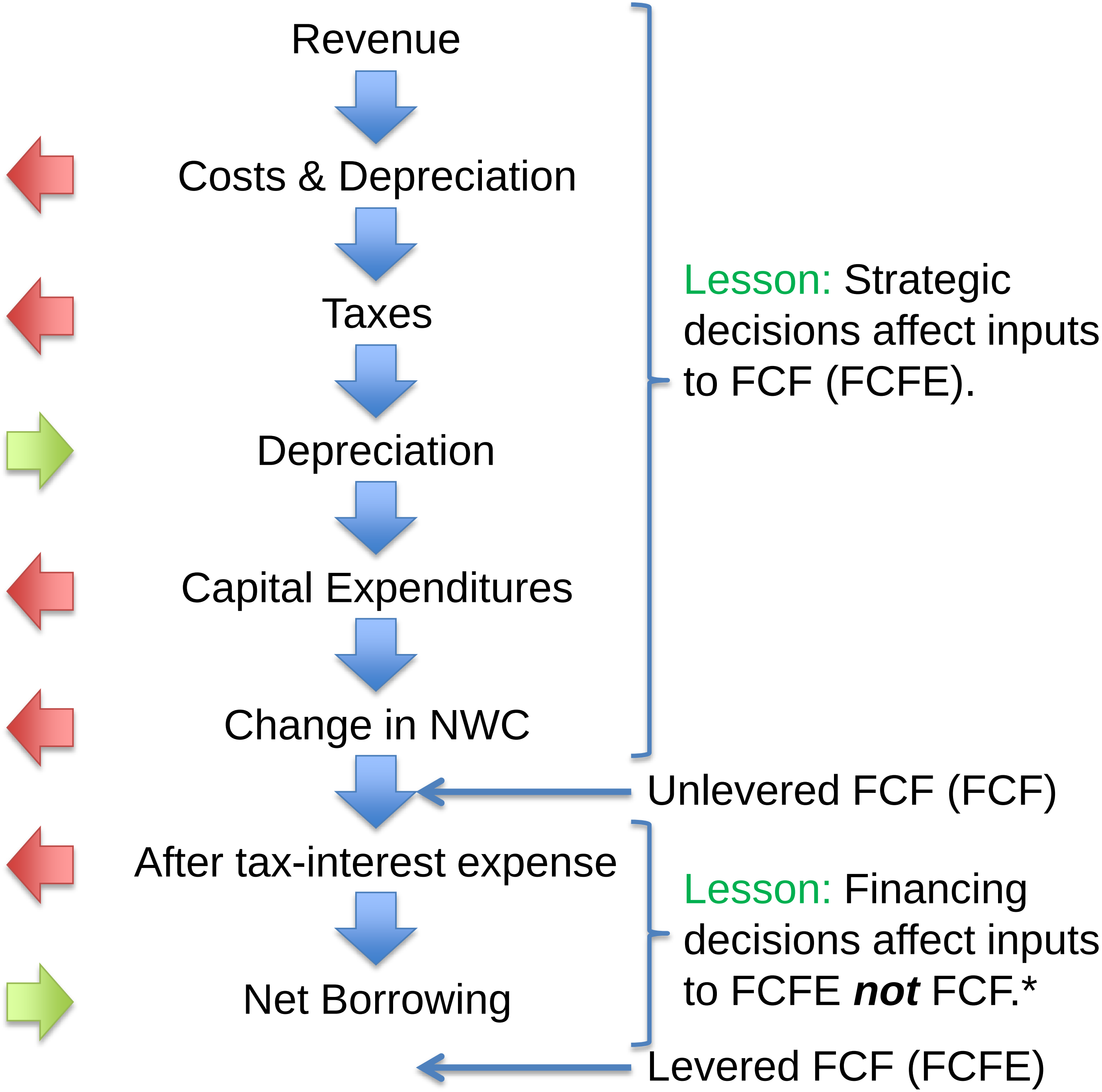
Lesson: FCFE is the cash flow that can be distributed to the shareholders (i.e., equity) of the project or company

$$\text{FCFE} = \text{FCF} - \text{Interest} \times (1 - t_C) + \text{Net Borrowing}$$

Lesson: FCF is more precisely levered free cash flow because it is affected by the choice of leverage (i.e., debt)


Revenue
Costs & Depreciation
Taxes
Unlevered Net Income
Depreciation
Capital Expenditures
Change in NWC
Unlevered FCF (FCF)
After tax-interest expense
Net Borrowing
Levered FCF (FCFE)


Revenue
Costs & Depreciation
Taxes
Depreciation
Capital Expenditures
Change in NWC
After tax-interest expense
Net Borrowing
Lesson: Strategic decisions affect inputs to FCF (FCFE).
Unlevered FCF (FCF)
Levered FCF (FCFE)


Revenue
Costs & Depreciation
Taxes
Depreciation
Capital Expenditures
Change in NWC
Unlevered FCF (FCF)
After tax-interest expense
Net Borrowing
Levered FCF (FCFE)
Lesson: Strategic decisions affect inputs to FCF (FCFE).
Lesson: Financing decisions affect inputs to FCFE *not* FCF.*

Summary

Lessons

- NPV is a decision rule that quantifies the value implications of decisions
  - Positive NPV implies value increasing
  - Negative NPV implies value decreasing

Coming up next

- Discounted Cash Flow (DCF)
  - Forecast Drivers