

# **NPV and Other Investment Criteria**

## **F305 Intermediate Corporate Finance**

Troy Adair  
Fall 2025

Slide Set A4 – NPV

## Reminder

Group request for final project due by Wednesday, Sep 10 at 5 PM.

If you're not enrolled in a group by then, I will do so by 5 PM on Friday, Sep 12.

# Overview

---

- Applying Capital Budget Decision Rules for “Straightforward” Cash Flows
- More Complex Situations (and When Some Capital Budgeting Decision Rules Break)
- Choosing Between Mutually Exclusive Projects
- A Look Ahead: Evaluating Ford’s 2025 Investment in EVs

# Applying Capital Budget Decision Rules for “Straightforward” Cash Flows

---

# Typical Capital Budgeting Decision Rules

- Net Present Value
- The Payback Rule
- The Discounted Payback
- The Average Accounting Return
- The Internal Rate of Return
- The Profitability Index

| Capital Budgeting Technique   | Large Firms | Small Firm |
|-------------------------------|-------------|------------|
| Net present value (NPV)       | 77%         | 40%        |
| Internal rate of return (IRR) | 75          | 40         |
| Payback period                | 64          | 66         |
| Accounting rate of return     | 57          | 44         |
| Profitability index           | 39          | 31         |

|    | B  | C           | D                          | E                                | F           | G                               | H          | I          | J          | K          | L          | M          |
|----|--|-------------|----------------------------|----------------------------------|-------------|---------------------------------|------------|------------|------------|------------|------------|------------|
| 1  | Period   | 0           | 1                          | 2                                | 3           | 4                               | 5          | 6          | 7          | 8          | 9          | 10         |
| 2  | Periodic Inflows                               |             | \$ 20,000                  | \$ 20,000                        | \$ 20,000   | \$ 20,000                       | \$ 20,000  | \$ 20,000  | \$ 20,000  | \$ 20,000  |            |            |
| 3  | Periodic Outflows                              |             | -\$14,000                  | -\$14,000                        | -\$14,000   | -\$14,000                       | -\$14,000  | -\$14,000  | -\$14,000  | -\$14,000  |            |            |
| 4  | Net Inflow                                     |             | \$ 6,000                   | \$ 6,000                         | \$ 6,000    | \$ 6,000                        | \$ 6,000   | \$ 6,000   | \$ 6,000   | \$ 6,000   | \$ -       | \$ -       |
| 5  | Capital Investments Flows                      | -\$30,000   |                            |                                  |             |                                 |            |            |            | \$2,000    |            |            |
| 6  | Net Expected Cash Flows                        | -\$30,000   | \$ 6,000                   | \$ 6,000                         | \$ 6,000    | \$ 6,000                        | \$ 6,000   | \$ 6,000   | \$ 6,000   | \$ 8,000   | \$ -       | \$ -       |
| 7  |  |             |                            |                                  |             |                                 |            |            |            |            |            |            |
| 8  | r  | 15.00%      |                            |                                  |             |                                 |            |            |            |            |            |            |
| 9  | Target Accounting Return                       | 20.00%      |                            |                                  |             |                                 |            |            |            |            |            |            |
| 10 |  |             |                            |                                  |             |                                 |            |            |            |            |            |            |
| 11 | NPV  | -\$2,422.27 | =NPV(C8,D6:M6)+C6          |                                  | REJECT      | =IF(C11<0, "REJECT", "ACCEPT")  |            |            |            |            |            |            |
| 12 | IRR  | 12.57%      | =IRR(C6:M6)                |                                  | REJECT      | =IF(C12<C8, "REJECT", "ACCEPT") |            |            |            |            |            |            |
| 13 | MIRR   | 11.03%      | =MIRR(C6:M6,C8,0.1)        |                                  | REJECT      | =IF(C13<C8, "REJECT", "ACCEPT") |            |            |            |            |            |            |
| 14 | Average Accounting Return                      | 21.43%      | =AVERAGE(D4:K4)/ABS(C5+K5) |                                  | ACCEPT      | =IF(C14<C9, "REJECT", "ACCEPT") |            |            |            |            |            |            |
| 15 | Profitability Index                            | 0.92        | =NPV(C8,D6:M6)/ABS(C6)     |                                  | REJECT      | =IF(C15<1, "REJECT", "ACCEPT")  |            |            |            |            |            |            |
| 16 |  |             |                            |                                  |             |                                 |            |            |            |            |            |            |
| 17 |  |             |                            |                                  |             |                                 |            |            |            |            |            |            |
| 18 | 6  |             |                            |                                  |             |                                 |            |            |            |            |            |            |
| 19 | Cumulative Cash Flows                          | \$ (30,000) | \$ (24,000)                | \$ (18,000)                      | \$ (12,000) | \$ (6,000)                      | \$ -       | \$ 6,000   | \$ 12,000  | \$ 20,000  | \$ 20,000  | \$ 20,000  |
| 20 | Switch Point                                   |             | -                          | -                                | -           | -                               | 4          | -          | -          | -          | -          | -          |
| 21 | Partial Year Flow to Get to Payback            |             | -                          | -                                | -           | -                               | 1.00       | -          | -          | -          | -          | -          |
| 22 | Payback  | 5.00        | ACCEPT                     | =IF(C22>B18, "REJECT", "ACCEPT") |             |                                 |            |            |            |            |            |            |
| 23 |  |             |                            |                                  |             |                                 |            |            |            |            |            |            |
| 24 | 6  |             |                            |                                  |             |                                 |            |            |            |            |            |            |
| 25 | Cumulative PV of CFs                           | \$ (30,000) | \$ (24,783)                | \$ (20,246)                      | \$ (16,301) | \$ (12,870)                     | \$ (9,887) | \$ (7,293) | \$ (5,037) | \$ (2,422) | \$ (2,422) | \$ (2,422) |
| 26 | Switch Point                                   |             | -                          | -                                | -           | -                               | -          | -          | -          | -          | -          | -          |
| 27 | Partial Year Flow to Get to Discounted Payback |             | -                          | -                                | -           | -                               | -          | -          | -          | -          | -          | -          |
| 28 | Discounted Payback                             | 999.00      | REJECT                     | =IF(C28>B24, "REJECT", "ACCEPT") |             |                                 |            |            |            |            |            |            |

# More Complex Situations (and When Some Capital Budgeting Decision Rules Break)

---

# More Complex Situations

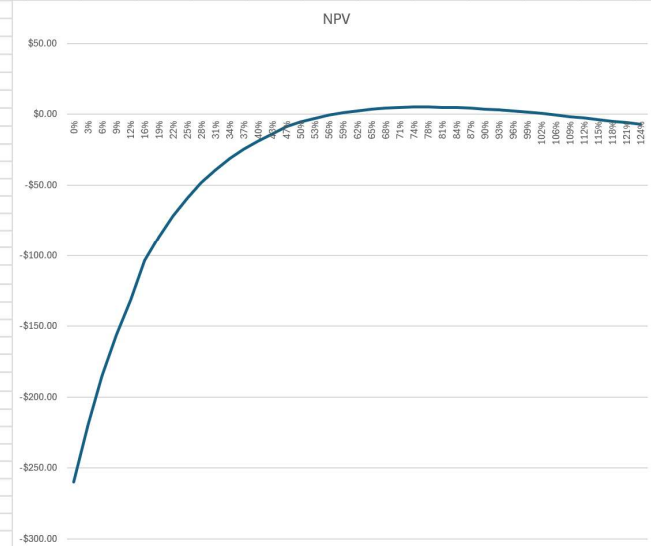
---

- NPV as a function of  $r$  is “smooth” as long as there is only 1 change in sign in the cash flow stream
- If there is more than 1 change in sign, there *can* be as many IRRs as there are changes in sign



# Exploratory Calculator

|    | A                              | B  | C         | D                          | E        | F                                | G                                | H        | I        | J        | K        | L        | M        | N | O   | P   | Q         | R | S | T | U | V | W | X | Y | Z | AA | AB | AC | AD |
|----|--------------------------------|--|-----------|----------------------------|----------|----------------------------------|----------------------------------|----------|----------|----------|----------|----------|----------|---|-----|-----|-----------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| 1  |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   |     |     |           |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 2  |                                | CLEAR INPUTS                                   | Clear     |                            |          |                                  |                                  |          |          |          |          |          |          |   |     |     |           |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 3  |                                | Period   | 0         | 1                          | 2        | 3                                | 4                                | 5        | 6        | 7        | 8        | 9        | 10       |   | OBS | r   | NPV       |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 4  |                                | Net Inflow                                     |           | 640                        | -500     | 300                              | -500                             |          |          |          |          |          |          |   | 0   | 0%  | -\$260.00 |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 5  | Balance Sheet-Type Flows       | Capital Investments Flows                      | -200      |                            |          |                                  |                                  |          |          |          |          |          |          |   | 1   | 3%  | -\$219.64 |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 6  |                                | Net Expected Cash Flows                        | -\$200    | \$ 640                     | \$ (500) | \$ 300                           | \$ (500)                         | \$ -     | \$ -     | \$ -     | \$ -     | \$ -     | \$ -     |   | 2   | 6%  | -\$185.39 |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 7  |                                | r  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 3   | 9%  | -\$156.24 |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 8  |                                | Target Accounting Return                       |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 4   | 12% | -\$131.39 |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 9  |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 5   | 16% | -\$103.81 |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 10 |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 6   | 19% | -\$86.58  |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 11 |                                | NPV  | -\$260.00 | =NPV(C9:D7:M7)+C7          |          | REJECT                           | =IF(C12<0, "REJECT", "ACCEPT")   |          |          |          |          |          |          |   | 7   | 22% | -\$71.83  |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 12 |                                | IRR  | 56.96%    | =IRR(C7:M7)                |          | ACCEPT                           | =IF(C13<C9, "REJECT", "ACCEPT")  |          |          |          |          |          |          |   | 8   | 25% | -\$59.20  |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 13 |                                | MIRR   | 5.72%     | =MIRR(C7:M7,C9,0.1)        |          | ACCEPT                           | =IF(C14<C9, "REJECT", "ACCEPT")  |          |          |          |          |          |          |   | 9   | 28% | -\$48.39  |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 14 |                                | Average Accounting Return                      | -7.50%    | =AVERAGE(D5:K5)/ABS(C6+K6) |          | REJECT                           | =IF(C15<C10, "REJECT", "ACCEPT") |          |          |          |          |          |          |   | 10  | 31% | -\$39.14  |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 15 |                                | Profitability Index                            | (0.30)    | =NPV(C9,D7:M7)/ABS(C7)     |          | REJECT                           | =IF(C16<1, "REJECT", "ACCEPT")   |          |          |          |          |          |          |   | 11  | 34% | -\$31.24  |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 16 |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 12  | 37% | -\$24.51  |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 17 |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 13  | 40% | -\$18.78  |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 18 |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 14  | 43% | -\$13.94  |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 19 | Max Allowed Payback            |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 15  | 47% | -\$8.65   |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 20 |                                | Cumulative Cash Flows                          | \$ (200)  | \$ 440                     | \$ (60)  | \$ 240                           | \$ (260)                         | \$ (260) | \$ (260) | \$ (260) | \$ (260) | \$ (260) | \$ (260) |   | 16  | 50% | -\$5.43   |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 21 |                                | Switch Point                                   |           |                            |          | 2                                |                                  |          |          |          |          |          |          |   | 17  | 53% | -\$2.77   |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 22 |                                | Partial Year Flow to Get to Payback            |           |                            |          | 0.20                             |                                  |          |          |          |          |          |          |   | 18  | 56% | -\$0.60   |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 23 |                                | Payback  | 2.20      | REJECT                     |          | =IF(C23>B19, "REJECT", "ACCEPT") |                                  |          |          |          |          |          |          |   | 19  | 59% | \$1.14    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 24 |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 20  | 62% | \$2.51    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 25 | Max Allowed Discounted Payback |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 21  | 65% | \$3.55    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 26 |                                | Cumulative PV of CFs                           | \$ (200)  | \$ 440                     | \$ (60)  | \$ 240                           | \$ (260)                         | \$ (260) | \$ (260) | \$ (260) | \$ (260) | \$ (260) | \$ (260) |   | 22  | 68% | \$4.30    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 27 |                                | Switch Point                                   |           |                            |          | 2                                |                                  |          |          |          |          |          |          |   | 23  | 71% | \$4.80    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 28 |                                | Partial Year Flow to Get to Discounted Payback |           |                            |          | 0.20                             |                                  |          |          |          |          |          |          |   | 24  | 74% | \$5.07    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 29 |                                | Discounted Payback                             | 2.20      | REJECT                     |          | =IF(C29>B25, "REJECT", "ACCEPT") |                                  |          |          |          |          |          |          |   | 25  | 78% | \$5.13    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 30 |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 26  | 81% | \$4.98    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 31 |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 27  | 84% | \$4.68    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 32 |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 28  | 87% | \$4.25    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 33 |                                |  |           |                            |          |                                  | 104%                             |          |          |          |          |          |          |   | 29  | 90% | \$3.71    |   |   |   |   |   |   |   |   |   |    |    |    |    |
| 34 |                                |  |           |                            |          |                                  |                                  |          |          |          |          |          |          |   | 30  | 93% | \$3.07    |   |   |   |   |   |   |   |   |   |    |    |    |    |



# Choosing Between Mutually Exclusive Projects

---

# Choosing Between Mutually Exclusive Projects

---

1<sup>st</sup> question: WHY are they mutually exclusive

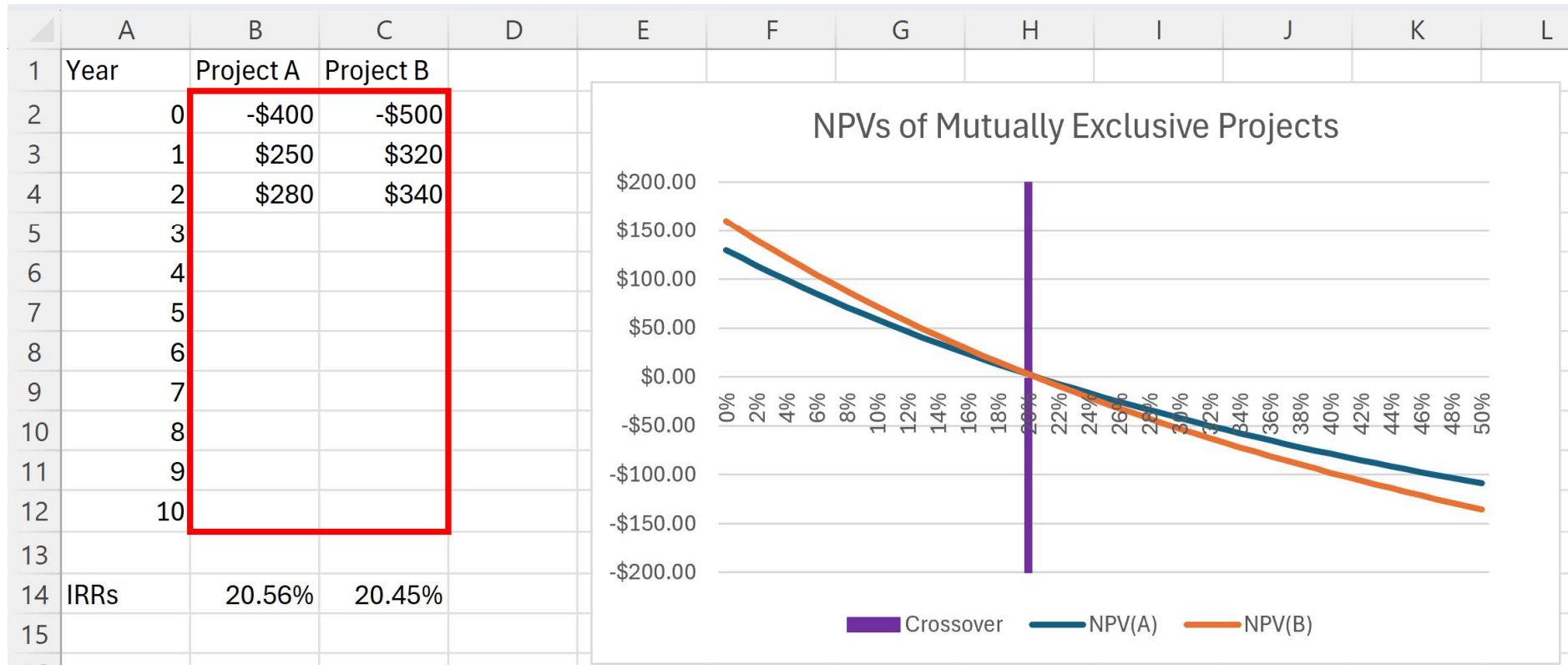
- NPV will always give you a “better” answer than any rate-based capital budgeting technique

# Typical Capital Budgeting Decision Rules

---

- Net Present Value \$
- The Payback Rule Time
- The Discounted Payback Time
- The Average Accounting Return %
- The Internal Rate of Return %
- The Profitability Index %

# Mutually Exclusive Projects



# A Look Ahead: Evaluating Ford's 2025 Investment in EVs

---

Ford announced a \$5 billion total investment in US electric vehicle (EV) production, with approximately \$2 billion dedicated to a new assembly plant and production system in Louisville, Kentucky, and another \$3 billion for a battery plant in Michigan. This investment will support the development of a new, more affordable midsize EV pickup truck, expected to launch in 2027, and features a new, flexible "universal EV platform" and a tree-like assembly system designed to dramatically increase efficiency and speed. The initiative aims to create or secure nearly 4,000 U.S. jobs and strengthen the domestic supply chain. [🔗](#)



**FORD MOTOR COMPANY AND SUBSIDIARIES**  
**CONSOLIDATED BALANCE SHEETS**  
(in millions)

|  | December 31,<br>2023 | December 31,<br>2024 |
|--|----------------------|----------------------|
| <b>ASSETS</b>  |                      |                      |
| Cash and cash equivalents (Note 9)   | \$ 24,862            | \$ 22,935            |
| Marketable securities (Note 9)   | 15,309               | 15,413               |
| Ford Credit finance receivables, net of allowance for credit losses of \$256 and \$247 (Note 10) | 46,425               | 51,850               |
| Trade and other receivables, less allowances of \$64 and \$84                                    | 15,601               | 14,723               |
| Inventories (Note 11)  | 15,651               | 14,951               |
| Other assets   | 3,633                | 4,602                |
| <b>Total current assets</b>  | <b>121,481</b>       | <b>124,474</b>       |
| Ford Credit finance receivables, net of allowance for credit losses of \$626 and \$617 (Note 10) | 55,650               | 59,786               |
| Net investment in operating leases (Note 12)   | 21,384               | 22,947               |
| Net property (Note 13)   | 40,821               | 41,928               |
| Equity in net assets of affiliated companies (Note 14)   | 5,548                | 6,821                |
| Deferred income taxes (Note 7)   | 16,985               | 16,375               |
| Other assets   | 11,441               | 12,865               |
| <b>Total assets</b>  | <b>\$ 273,310</b>    | <b>\$ 285,196</b>    |
| <b>LIABILITIES</b>   |                      |                      |
| Payables   | \$ 25,992            | \$ 24,128            |
| Other liabilities and deferred revenue (Note 15 and Note 24)                                     | 25,870               | 27,782               |
| Debt payable within one year (Note 18)   |                      |                      |
| Company excluding Ford Credit  | 477                  | 1,756                |
| Ford Credit  | 49,192               | 53,193               |
| <b>Total current liabilities</b>   | <b>101,531</b>       | <b>106,859</b>       |
| Other liabilities and deferred revenue (Note 15 and Note 24)                                     | 28,414               | 28,832               |
| Long-term debt (Note 18)   |                      |                      |
| Company excluding Ford Credit  | 19,467               | 18,898               |
| Ford Credit  | 80,095               | 84,675               |
| Deferred income taxes (Note 7)   | 1,005                | 1,074                |
| <b>Total liabilities</b>   | <b>230,512</b>       | <b>240,338</b>       |
| <b>EQUITY</b>  |                      |                      |
| Common Stock, par value \$0.01 per share (3,893 million shares issued of 6 billion authorized)   | 41                   | 41                   |
| Class B Stock, par value \$0.01 per share (71 million shares issued of 530 million authorized)   | 1                    | 1                    |
| Capital in excess of par value of stock  | 23,128               | 23,502               |
| Retained earnings  | 31,029               | 33,740               |
| Accumulated other comprehensive income/(loss) (Note 22)  | (9,042)              | (9,639)              |
| Treasury stock   | (2,384)              | (2,810)              |
| <b>Total equity attributable to Ford Motor Company</b>   | <b>42,773</b>        | <b>44,835</b>        |
| Equity attributable to noncontrolling interests  | 25                   | 23                   |
| <b>Total equity</b>  | <b>42,798</b>        | <b>44,858</b>        |
| <b>Total liabilities and equity</b>  | <b>\$ 273,310</b>    | <b>\$ 285,196</b>    |



|    | A                                | B         | C                  | D         | E           | F         | G         | H         | I         | J         | K         | L         |  |
|----|----------------------------------|-----------|--------------------|-----------|-------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|--|
| 1  | Example: Ford 2025 EV Investment |           | (Informed) Guesses |           |             |           |           |           |           |           |           |           |  |
| 2  |                                  |           |                    |           |             |           |           |           |           |           |           |           |  |
| 3  | Period                           | 0         | 1                  | 2         | 3           | 4         | 5         | 6         | 7         | 8         | 9         | 10        |  |
| 4  | Units                            |           | 15,000             | 75,000    | 100,000     | 200,000   | 250,000   | 300,000   | 300,000   | 300,000   | 300,000   | 300,000   |  |
| 5  | Price per Unit                   |           | \$ 30,000          | \$ 30,000 | \$ 30,000   | \$ 30,000 | \$ 30,000 | \$ 30,000 | \$ 30,000 | \$ 30,000 | \$ 30,000 | \$ 30,000 |  |
| 6  | Profit Margin                    |           | 15%                | 15%       | 15%         | 15%       | 15%       | 15%       | 15%       | 15%       | 15%       | 15%       |  |
| 7  | Gross Profits (\$Millions)       |           | \$ 68              | \$ 338    | \$ 450      | \$ 900    | \$ 1,125  | \$ 1,350  | \$ 1,350  | \$ 1,350  | \$ 1,350  | \$ 1,350  |  |
| 8  | Capital Investments (\$Millions) | -\$5,000  |                    |           |             |           | -2000     |           |           |           |           |           |  |
| 9  | Net Expected Cash Flows          | -\$5,000  | \$ 68              | \$ 338    | \$ 450      | \$ 900    | \$ (875)  | \$ 1,350  | \$ 1,350  | \$ 1,350  | \$ 1,350  | \$ 1,350  |  |
| 10 |                                  |           |                    |           |             |           |           |           |           |           |           |           |  |
| 11 |                                  |           |                    |           |             |           |           |           |           |           |           |           |  |
| 12 | r                                | 8.50%     |                    | r         | NPV         |           |           |           |           |           |           |           |  |
| 13 |                                  |           |                    | 1%        | \$ 2,100.93 |           |           |           |           |           |           |           |  |
| 14 | NPV                              | -\$693.33 |                    | 2%        | \$ 1,616.88 |           |           |           |           |           |           |           |  |
| 15 | IRR                              | 6.15%     |                    | 3%        | \$ 1,173.50 |           |           |           |           |           |           |           |  |
| 16 | MIRR                             | 7.59%     |                    | 4%        | \$ 766.88   |           |           |           |           |           |           |           |  |
| 17 |                                  |           |                    | 5%        | \$ 393.53   |           |           |           |           |           |           |           |  |

NPV

\$3,000.00

\$2,000.00

Up Next

---

# Making Capital Investment Decisions

## Chapter 10