

Business Fundamentals for Analytics

Financial Management

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Introduction



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Objectives (1 of 2)

- Explain the role of a financial manager in **corporate decision making** and the **value creation process**.
- Explain the **alternative investment rules** that are used to select investment projects.
- Describe the process of **estimating a project's estimated cash flows**, which are crucial inputs in the investment decision process.
- Explain **how stocks are valued** as the present value of all expected future dividends.



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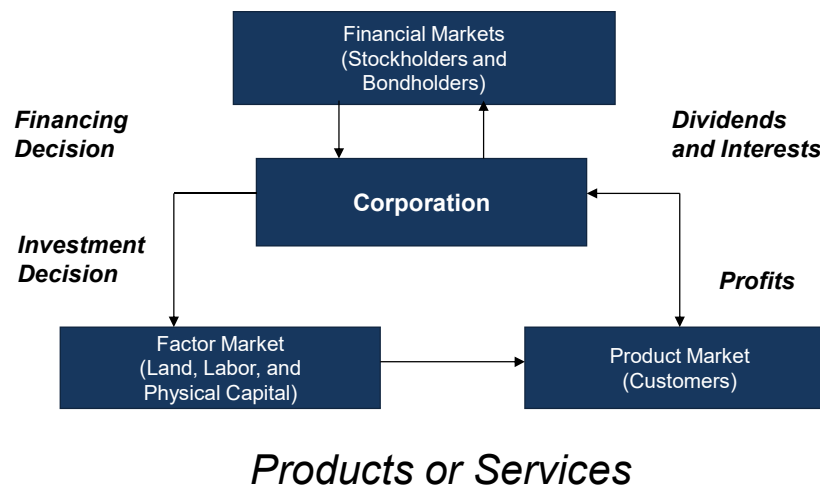
Objectives (2 of 2)

- Describe **how risk is measured** for financial instruments.
- Explain the relation between **risk** and **expected return** using **Capital Asset Pricing Model**.
- Estimate the **weighted average cost of capital** that determines the minimum rate of return that the corporation must earn on its invested capital to breakeven in economic terms.
- Estimate the **value of a firm** using the present value of projected free cash flows discounted at its weighted average cost of capital.
- Define the concepts of **Economic Value Added** and **Market Value Added** and explain how they relate to the goal of managing for value creation.

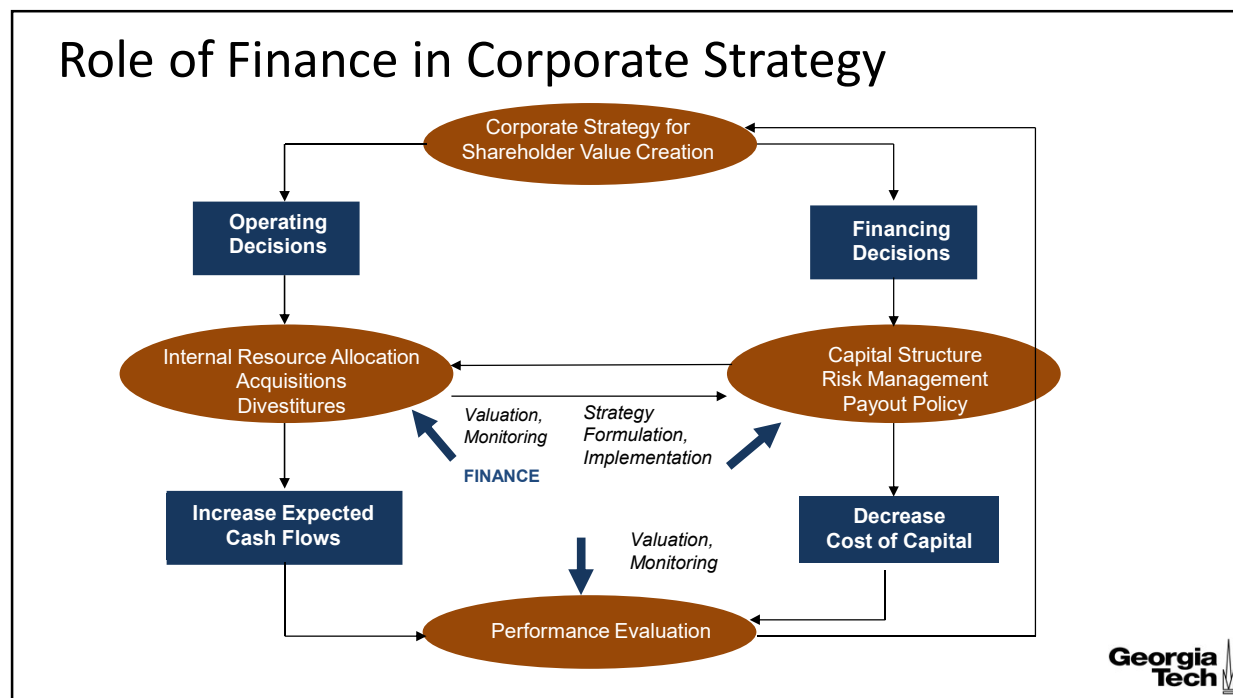


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The Value Creation Process



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Introduction- Part 2

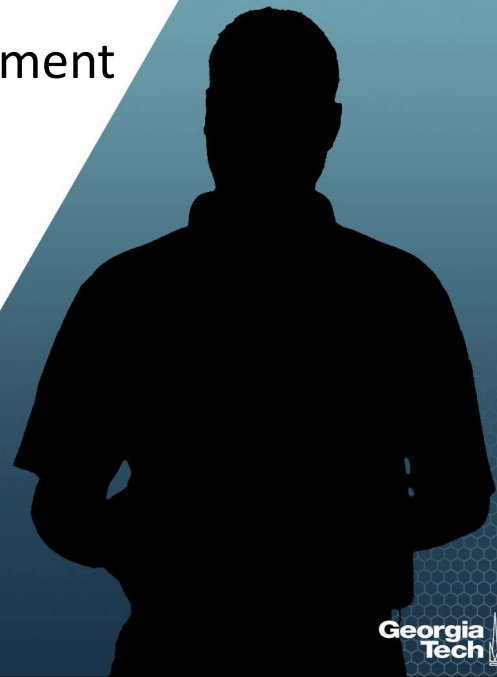
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The Goal of Financial Management

What is the ultimate goal of financial management?

- Maximize profit?
- Minimize costs?
- Maximize market share?
- Maximize shareholder wealth?



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What's So Special about the Shareholder?

- Shareholders are the owners of the corporation.
- The primary financial goal of any public corporation is to create economic value for its shareholders.
- Shareholders are residual claimants.
- They receive money only after:
 - suppliers have been paid.
 - wages to workers have been paid.
 - interest to bondholders have been paid.
 - taxes have been paid.
- If the shareholders are happy, so are the other stakeholders!



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Growing Our Lead

Driving long-term value for our owners through top-line growth, margin expansion, and prudent deployment of our capital

Consistently Delivering Superior Financial Results

- Continued revenue momentum and improved cost trajectory position Delta for top-line growth and margin expansion in 2019

Driving Efficiency and Transforming Our Fleet

- Evolving into a more efficient airline with fleet transformation and One Delta
- Non-fuel unit cost growth is expected to be ~1% in 2019

Generating Cash Flow and Delivering Shareholder Returns

- Strong operating cash flow funds reinvestment in fleet, product, and technology
- Committed to returning 70% of free cash flow to shareholders, including ~\$2.5 billion in 2019

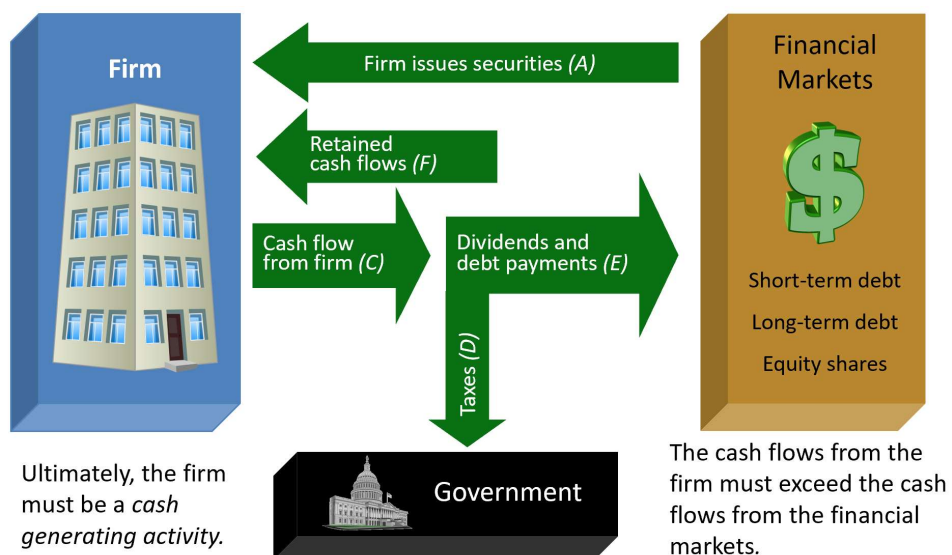
Note: Forward-looking non-GAAP financial measures. See additional information in Appendix.



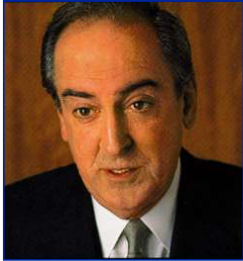
Source: Delta Investor Day 2018 Presentation

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The Firm and Financial Markets



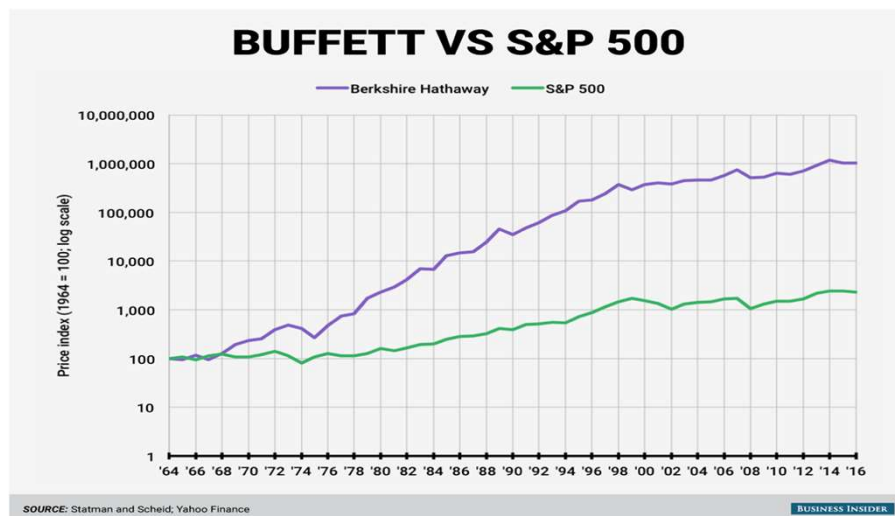
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“Management doesn't get paid to make the shareholders comfortable. We get paid to make the shareholders rich.”

Roberto Goizueta
Chairman and CEO, Coca-Cola

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Capital Investments Analysis- Part 1

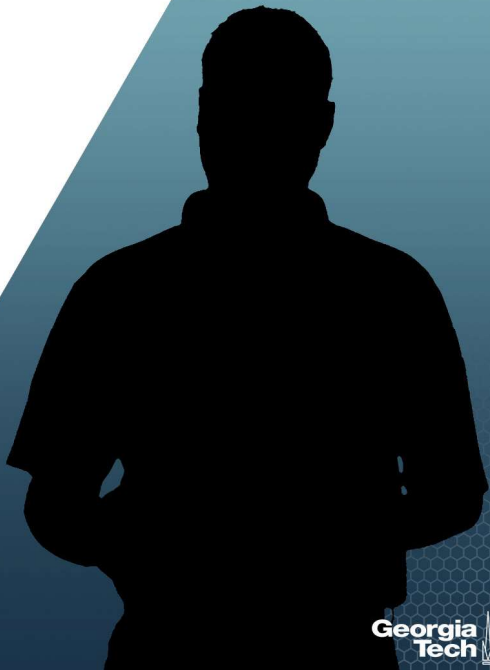


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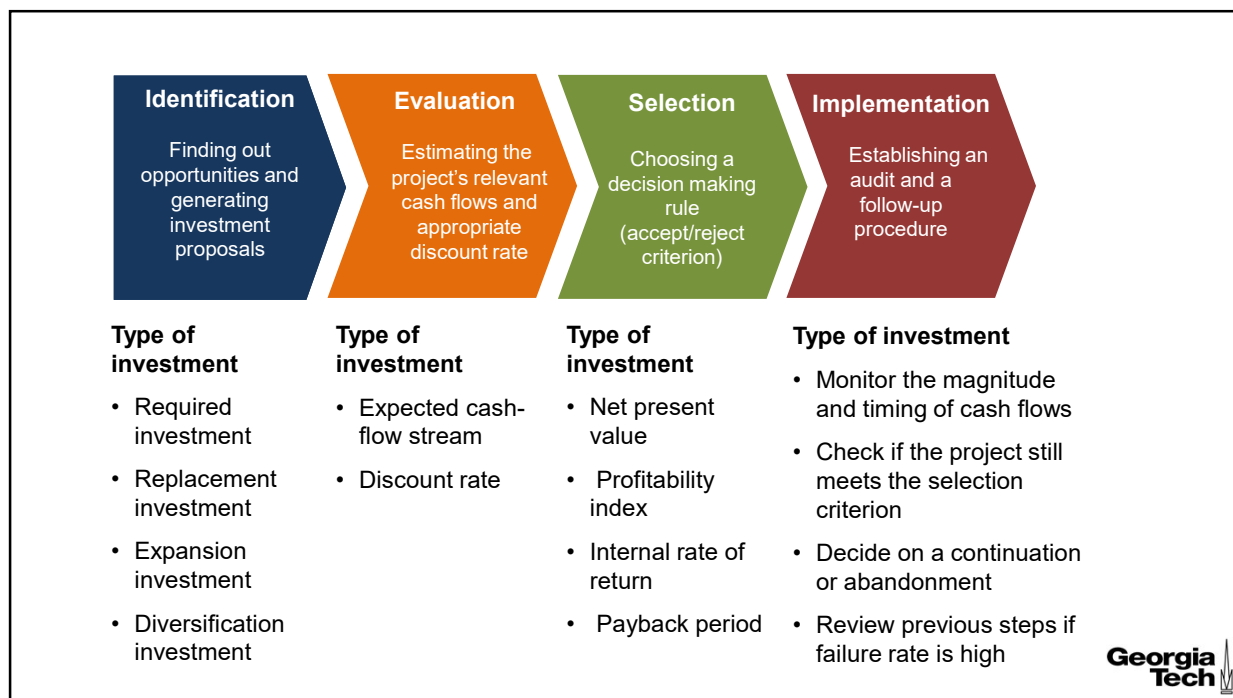
Capital Budgeting

The process of determining exactly which assets to invest in and how much to invest is called capital budgeting decision or capital expenditure decision or capital investment decision.



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Statement of Cash Flows

Home Depot for Period ending 2/3/2019	
CASH PROVIDED FROM OPERATIONS (in millions \$)	
Net Earnings	11,121
Reconciliation of net earnings to net cash	1,917
Net Cash provided by operations	13,038
CASH FLOW FROM INVESTING ACTIVITIES	
Capital expenditures	(2,442)
Others (purchase of investments etc.)	24
Net cash used in investing activities	(2,416)
CASH FLOW FROM FINANCING ACTIVITIES	
Repurchase of Common Stock	0
Cash Dividends Paid	(4,704)
Net borrowing	2,037
Other Cash Flows	(9,727)
Total cash flow from financing activities	(12,420)
Effect of exchange rate changes	(19)
CASH AND CASH EQUIVALENT	(1,817)

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Evaluating Long-Term Investment Projects

Most investments that corporations make are long-term in nature. We need a method for evaluating the financial benefits for these long-term investments.

To do this we need to understand the concept of the time value of money.

- A dollar today is worth more than a dollar in the future.
- But how much more and what does it depend upon?

Suppose your uncle offers a choice between receiving \$1,000 today or \$1,500 in five years. Which option would you accept if your opportunity cost of capital were $r=10\%$?



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Capital Investments Analysis – Part
2



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Future Values (1 of 3)

The first method for deciding which option is best is to calculate the future value of investing the \$1,000 payment at your opportunity cost of capital for 5 years.



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Future Values (2 of 3)

Using an opportunity cost of capital $r = 10\%$, the future value of your investment is calculated in the following table:

Because the amount you will have after 5 years is greater than the \$1,000 today offered by your uncle, you are better off accepting the \$1,000 today and investing it at $r = 10\%$ for the next 5 years

Year (t)	Beginning Balance	Interest ($r = 10\%$)	Ending Balance
1	1,000.00	100.00	1,100.00
2	1,100.00	110.00	1,210.00
3	1,210.00	121.00	1,331.00
4	1,331.00	133.10	1,464.00
5	1,464.00	146.41	1,610.51

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Future Values (3 of 3)

- The general formula for finding the **future value**, FV_t , of an investment of PV dollars today is:

$$FV_t = PV \times (1+r)^t$$

- Verify that the above formula works for $PV = \$1,000$, $r = 10\%$ and $t = 5$ years.
- Use the FV formula to decide which option you should accept if $r = 5\%$.



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Future Values in Excel

$PV = \$1,000$

$r = 10\%$

$t = 5$ years

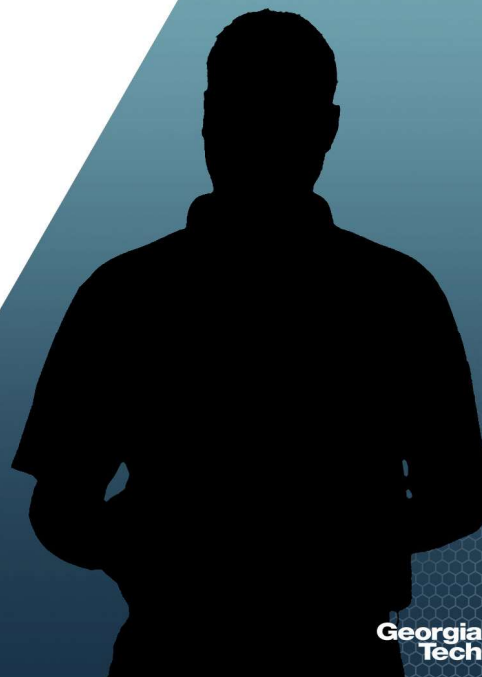
PV	\$1,000					
r	10%					
t	5					
			Equation		Answer	
Future Value (FV)			= FV(C3,C4,,-C2)		\$1,610.51	



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Present Values (1 of 4)

- A more common method for evaluating your investment alternatives is to calculate present values.
- The present value is the amount of money you would need to invest today in order to duplicate some future dollar amount.



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Present Values (2 of 4)

- For example, how much money would you need to invest today to duplicate the \$1,500 payment in 5 years offered to you uncle? Assume your opportunity cost of capital is $r = 10\%$.
- To answer this question, we can rearrange the formula for future values to arrive at a formula for present values:

$$PV = \frac{FV_t}{(1 + r)^t}$$



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Present Values (3 of 4)

- Using the present value formula, we can calculate the present value of the \$1,500 payment as follows:

$$PV = \frac{1,500}{(1.10)^5} = \$931.38$$

- Since the present value is only \$931.38, you are better off accepting your uncle's offer of \$1,000 today.



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Present Values (4 of 4)

- By accepting the \$1,000 today you can do the following:
 - Invest \$931.38 at $r = 10\%$ for 5 years. After 5 years it will be worth \$1,500.
 - Enjoy a nice dinner at your favorite restaurant with the remaining \$68.62.
- Which option has the higher present value if your opportunity cost of capital is $r = 5\%$?



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Present Values in Excel

- FV = \$1,500
- $r = 10\%$
- $t = 5$ years

FV	\$1,500				
r	10%				
t	5				
			Equation		Answer
Present Value (PV)			= PV(C3,C4,,-C2)		\$931.38



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Capital Investments Analysis –
Part 3



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Finding Unknown Interest Rates in Excel

- Zachary's parents anticipate that a college education will cost \$80,000 when he enters school in 18 years. They presently have \$10,000 to invest.
- What rate of return must they earn to cover the cost of his education?

PV	\$10,000				
t	18				
FV	\$80,000				
			Equation		Answer
Interest Rate			= RATE(J15,,J14,-J16)		12.25%



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Finding an Unknown Number of Periods in Excel

- Holly is saving to buy a \$20,000 speedboat to take to the lake. She has \$16,000 in an account paying 6 percent annual interest.
- How long will it be before she will have enough to buy the boat?

	PV	\$16,000			
	r	6%			
	FV	\$20,000			
			Equation		Answer
Number of Periods			= NPER(J15,,J14,-J16)		3.83



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Present Value of an Annuity

- Skye just won first prize in the Colossal Lottery. He can choose between \$50,000 in cash now, or its equivalent paid out in ten annual payments at an interest rate of 12%.
- What will his annual payments be under the second alternative?

$$PMT = \frac{(r * PV)}{[1 - (1+r)^{-t}]}$$

$$PMT = \frac{(.12 * 50,000)}{[1 - (1+.12)^{-10}]}$$

$$PMT = \$8,849.21$$



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Present Value of an Annuity In Excel

- Skye just won first prize in the Colossal Lottery. He can choose between \$50,000 in cash now, or its equivalent paid out in ten annual payments at an interest rate of 12%.
- What will his annual payments be under the second alternative?

	PV	\$50,000				
	r	12%				
	t	10				
				Equation		Answer
	Payment Amount			= PMT(J15,J16,-J14)		\$8,849.21



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Net Present Value

Most investments made by corporations are long-term in nature and generate cash flows for many years in the future. The most common method for evaluating these long-term investments as Net Present Value (NPV):

$$NPV = C_0 + \frac{C_1}{1+r} + \frac{C_2}{(1+r)^2} + \dots + \frac{C_T}{(1+r)^T}$$

C_0, C_1, C_2, \dots are cash flows at 0, 1, 2, etc.



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Net Present Value (Cont'd)

The NPV measures the value created for shareholders by the investment project.

- If $NPV > 0$, then the project increases shareholder value and should be accepted.
- If $NPV < 0$, the project destroys shareholder value and should be rejected.

Because of the need to make large investments up front, the early cash flows are typically negative for most investment projects.



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Net Present Value: An Illustration

Consider the following investment projects :

Project	Future Cash Flows			
	t=0	t=1	t=2	t=3
A	-100	125	0	0
B	-200	100	100	100
C	-300	0	0	500

What is the net present value created by each of these investment projects for $r=5\%$, $r=15\%$, and $r=25\%$?



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Capital Investments Analysis- Part 4



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Net Present Value: An Illustration

Consider the following investment projects :

Project	Future Cash Flows			
	t=0	t=1	t=2	t=3
A	-100	125	0	0
B	-200	100	100	100
C	-300	0	0	500

What is the net present value created by each of these investment projects for $r=5\%$, $r=15\%$, and $r=25\%$?



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Net Present Value

Project	$r=5\%$	$R=15\%$	$R=25\%$
A	\$19.05	\$8.70	\$ 0.00
B	72.32	28.32	-4.80
C	131.92	28.76	-44.00

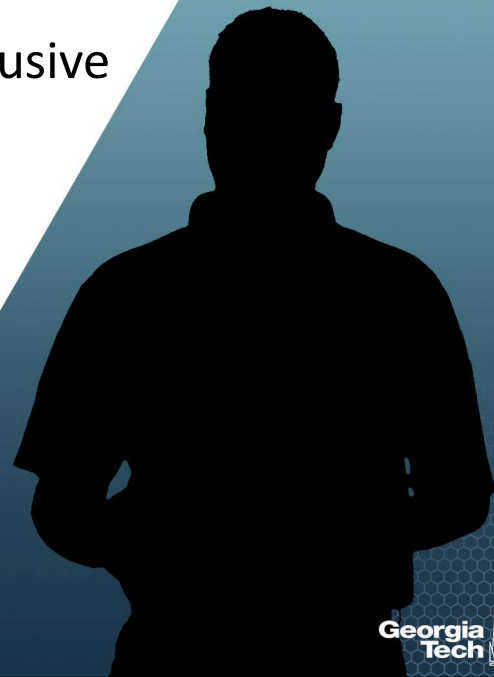
$$\text{Net Present Value (B)} = \frac{100}{(1.05)} + \frac{100}{(1.05)^2} + \frac{100}{(1.05)^3} - 200 = 72.32$$


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Independent vs. Mutually Exclusive Projects

Independent: Acceptance or rejection is independent of the acceptance or rejection of other projects.

Mutually Exclusive: Can accept “A” or you can accept “B” or you can reject both of them, but cannot accept both of them.



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Payback Period

A project's payback period is the number of periods (usually measured in years) required for the sum of the project's expected cash flows to equal its initial cash outlay. In other words, the payback period is the time it takes for a firm to recover its initial investment.

Payback for Project “A” =

Payback for Project “B” =

Payback for Project “C” =



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Internal Rate of Return

A project's internal rate of return (IRR) is the discount rate that makes the net present value (NPV) of the project equal to zero:

$$NPV = C_0 + \frac{C_1}{1 + IRR} + \frac{C_2}{(1 + IRR)^2} + \dots + \frac{C_T}{(1 + IRR)^T} = 0$$

Accept the project if IRR is greater than the cost of capital.



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Internal Rate of Return

Project	IRR
A	25.0%
B	23.4%
C	18.5%



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Capital Investments Analysis- Part 5



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Internal Rate of Return

Project	IRR
A	25.0%
B	23.4%
C	18.5%



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Profitability Index

The present value of an investment's future cash flows divided by its initial cost. Also called benefit/cost ratio.

$r = 5\%$

$$\text{PI for "A"} = (100 + 19.05) / (100) = 1.19$$

$$\text{PI for "B"} = (200 + 72.32) / (200) = 1.36$$

$$\text{PI for "C"} = (300 + 131.92) / (300) = 1.44$$



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NPV, IRR, PI in Excel

CF ₀	-200	
CF ₁	100	
CF ₂	100	
CF ₃	100	
r	5.00%	
NPV	72.32	NPV(B7,B4:B6)+B3
IRR	23%	IRR(B3:B6)
PI	1.36	PI=(NPV+(-B3))/(-B3)



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Problems with IRR

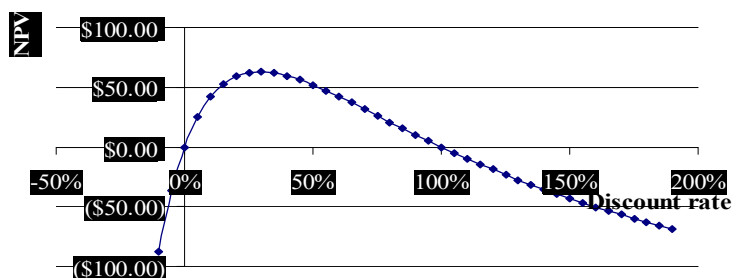
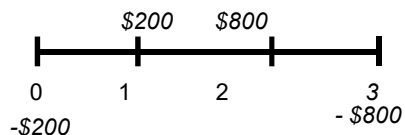
- Multiple IRRs Can Exist
- The Scale Problem
- The Timing Problem

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Multiple IRRs

There are two IRRs for this project:



Which one
should we use?

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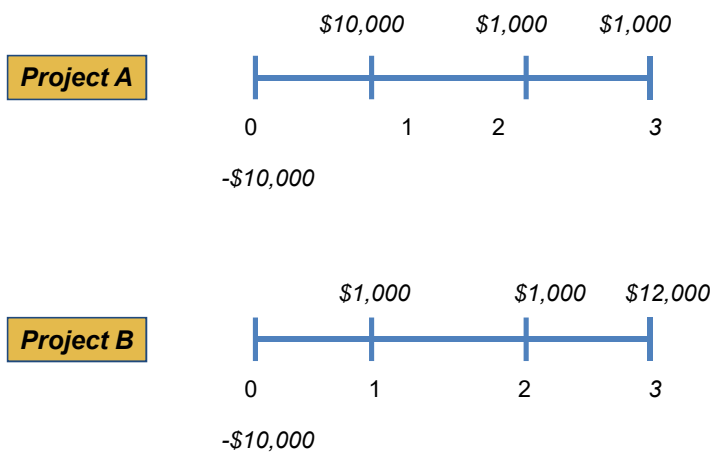
The Scale Problem

- Would you rather make 100% or 50% on your investments?
- What if the 100% return is on a \$1 investment, while the 50% return is on a \$1,000 investment?



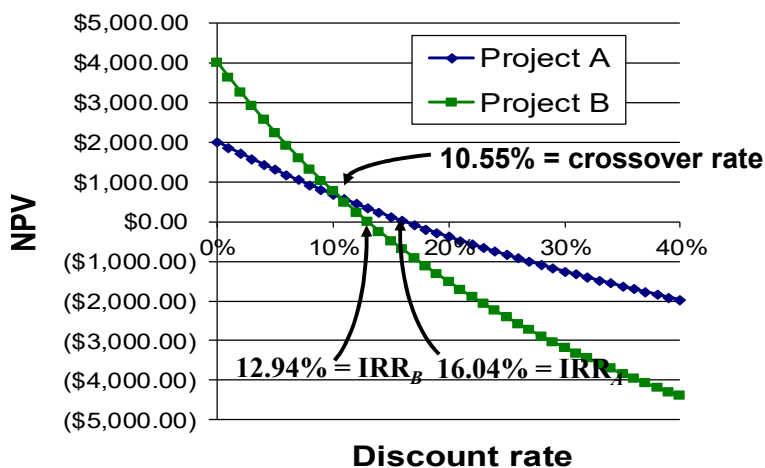
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The Timing Problem



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The Timing Problem

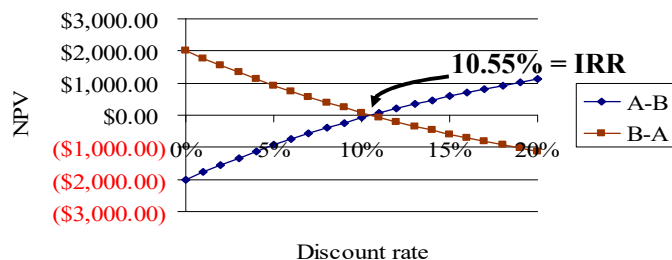


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Calculating the Crossover Rate

Compute the IRR for either project "A-B" or "B-A"

	(\$10,000)	(\$10,000)	\$0	\$0
	\$10,000	\$1,000	9000	(\$9,000)
	\$1,000	\$1,000	\$0	\$0
	\$1,000	\$12,000	(\$11,000)	\$11,000



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Capital Investments Analysis- Part 6



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NPV versus IRR

- NPV and IRR will generally give the same decision

Exceptions:

- Non-conventional cash flows – cash flow signs change more than once
- Mutually exclusive projects
 - Initial investments are substantially different
 - Timing of cash flows is substantially different



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Additional Problem

Two projects have the expected cash flows shown below. The projects have similar risk characteristics and their cost of capital is 10%.

Expected Cash Flows		
End of Year	Project A	Project B
Now	\$(2,000,000)	\$(2,000,000)
1	200,000	1,400,000
2	1,200,000	1,000,000
3	1,700,000	400,000



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Problem (Cont'd)

1. Calculate the NPV of each project. According to the NPV rule, which project should be accepted if they are independent? If they are mutually exclusive?
2. Calculate the payback period of each project. If the two projects are mutually exclusive, which project should be accepted?
3. Calculate the IRR of each project. Which project should be accepted if they are independent? If they are mutually exclusive?
4. Calculate the profitability index of each project. Which project should be accepted if they are independent? If they are mutually exclusive?
5. Based on your previous answers, which criterion leads to the best investment decision if the projects are independent? If they are mutually exclusive?



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Problem (Solution)



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The Drivers of Value Creation

EVALUATION METHOD	INPUTS REQUIRED FOR:		DECISION RULE		DOES THE RULE ADJUST CASH FLOWS FOR:		IS THE RULE CONSISTENT WITH THE MAXIMIZATION OF THE FIRM'S EQUITY VALUE?
	Calculation	Decision	Accept	Reject	Time?	Risk?	
Net present value (NPV)	* Cash flows * Cost of capital (k)	* NPV	NPV>0	NPV<0	Yes	Yes	Yes, a project's NPV is a measure of the value the project creates or destroys.
Profitability index (PI)	* Cash flows * Cost of capital (k)	* PI	PI>1	PI<1	Yes	Yes	Yes, but may fail to select the project with the highest NPV when projects are mutually exclusive.
Internal rate of return (IRR)	* Cash flows	* IRR * Cost of capital (k)	IRR>k	IRR<k	Yes	Yes	Yes, but may fail when: * Projects are mutually exclusive * Cash flows change sign more than once.
Payback period (PP)	* Cash flows	* PP * Cutoff period	PP<Cutoff period	PP>Cutoff period	No	No	No



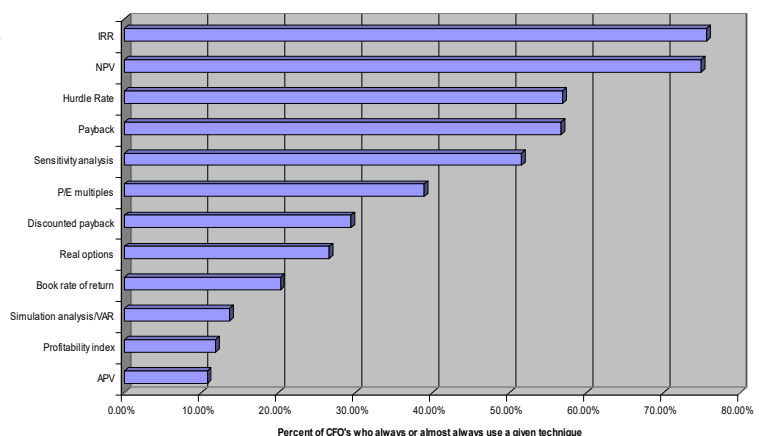
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Popularity of Different Capital Budgeting Methods

Survey evidence on the popularity of different capital budgeting methods.

- We report the percentage of CFOs who always or almost always use a particular technique.
- IRR represents Internal Rate of Return, NPV is Net Present Value, P/E is the Price to Earnings ratio, VAR is value at risk and APV is Adjusted Present Value.

The survey is based on the responses of 392 CFOs.



Source: Graham, J.R., Harvey, C.R., 2001. How do CFOs make Capital Budgeting and Capital Structure Decisions. *Journal of Applied Corporate Finance*, 15(1), p. 8-23.

