



FINC 201 Exam Tutorial

Tuesday 20 October

TODAY

Every exam topic, each with a worked question

01

Intro and TVM

Goal of the firm, PV and FV

02

Bonds

Pricing and yields

03

Stocks

DDM, Gordon growth, PVGO

04

Capital budgeting

Cash flows, NPV, IRR

05

Risk and return

Portfolios, beta, CAPM

06

WACC

Costs and weights

07

Debt policy

M&M, trade-off, pecking order

08

Payout policy

Dividends and buybacks

09

Financial planning

Pro formas, growth

10

Working capital

Cash cycle, credit

01

Foundations

The goal of the firm and the time value of money

INTRODUCTION

Managers should maximise shareholder value

TWO DECISIONS

Investment and financing

What real assets to buy (capital budgeting), and how to pay for them (financing). A good investment is worth more than it costs.

THE CATCH

Agency problems

Managers (agents) may pursue their own interests rather than shareholders' (principals). The resulting cost is an agency cost.

HOW SHAREHOLDERS KEEP MANAGERS ALIGNED

Performance-linked pay · board of directors · monitoring by analysts and lenders · threat of takeover · legal and ethical standards

TIME VALUE OF MONEY

A dollar today is worth more than a dollar tomorrow

Cash flow	Formula
Single sum	$FV = PV \times (1 + r)^t$ $PV = C / (1 + r)^t$
Perpetuity	$PV = C / r$
Growing perpetuity	$PV = C_1 / (r - g)$
Annuity (t years)	$PV = C \times [1/r - 1/(r(1 + r)^t)]$
Annuity due	$PV(\text{due}) = PV(\text{annuity}) \times (1 + r)$
Effective annual rate	$EAR = (1 + APR/m)^m - 1$

Real rate: $(1 + \text{nominal}) = (1 + \text{real}) \times (1 + \text{inflation})$

Three quick time value calculations

- (a) What is the present value of \$5,000 a year for 10 years, first payment in one year, at 6%?
- (b) A credit card charges 12% APR compounded monthly. What is the effective annual rate?
- (c) A scholarship pays \$2,000 next year, growing 3% a year forever. What is it worth today at 8%?

WORKED SOLUTION

Pick the formula that matches the cash flow

(A) ANNUITY

$$\begin{aligned} & 5,000 \times [1/0.06 - \\ & 1/(0.06 \times 1.06^{10})] \\ & = 5,000 \times 7.3601 \end{aligned}$$

\$36,800

(B) EAR

$$\begin{aligned} & (1 + 0.12/12)^{12} - 1 \\ & = 1.01^{12} - 1 \end{aligned}$$

12.68%

(C) GROWING PERPETUITY

$$\begin{aligned} & 2,000 / (0.08 - 0.03) \\ & = 2,000 / 0.05 \end{aligned}$$

\$40,000

WATCH OUT

Growing perpetuities use next year's cash flow (C_1), and only work when $r > g$.

02

Bond valuation

An annuity of coupons plus a final face value

BOND VALUATION

Bond prices move opposite to yields

$$\text{Price} = \text{Coupon} \times [1/y - 1/(y(1 + y)^t)] + \text{Face} / (1 + y)^t$$

y = yield to maturity per period · t = number of periods. Semi-annual: halve the coupon and the yield, double the periods.

Coupon rate > YTM

Price above face: a **premium** bond

Coupon rate = YTM

Price equals face: sells at **par**

Coupon rate < YTM

Price below face: a **discount** bond

Longer maturity → bigger price change for a given change in rates (more interest rate risk). Current yield = annual coupon ÷ price.

Price a semi-annual coupon bond

Face \$1,000

Coupon rate 6%, paid semi-annually

10 years to maturity

YTM 7%

- (a) What is the bond's price today?
- (b) Is it a premium or discount bond, and why?
- (c) What is its current yield?

WORKED SOLUTION

Convert everything to half-years first

PER PERIOD

$$\begin{aligned}\text{Coupon} &= 1,000 \times 6\% \div 2 \\ &= \$30\end{aligned}$$

$$y = 7\% \div 2 = 3.5\%$$

$$t = 10 \times 2 = 20$$

(A) PRICE

$$\begin{aligned}\text{PV coupons} &= 30 \times [1/0.035 - 1/(0.035 \times 1.035^{20})] \\ &= \$426.37\end{aligned}$$

$$\text{PV face} = 1,000 \div 1.035^{20} = \$502.57$$

$$\text{Price} = \$928.94$$

(B) DISCOUNT BOND

Coupon rate 6% < YTM 7%, so price < \$1,000.

(C) CURRENT YIELD

$$60 \div 928.94 = 6.46\%$$

03

Stock valuation

A share is worth the present value of its dividends

From one-year price to growth opportunities

Model	Formula
One period	$P_0 = (\text{Div}_1 + P_1) / (1 + r)$
Dividend discount	$P_0 = \sum \text{Div}_t / (1 + r)^t$
Constant growth (Gordon)	$P_0 = \text{Div}_1 / (r - g)$
Growth from reinvestment	$g = \text{ROE} \times \text{plowback ratio}$
Growth opportunities	$P_0 = \text{EPS}_1 / r + \text{PVGO}$

REARRANGED FOR R

$$r = \text{Div}_1 / P_0 + g$$

P/E RATIO

High P/E signals high PVGO, low risk, or both.

Value two shares with the growth model

(A) STEADY CO.

Just paid a dividend of \$2.00. Dividends grow 4% a year forever. Required return 10%.

What is the share price?

(B) GROWTH LTD.

Next year's EPS is \$5. It reinvests 40% of earnings at an ROE of 15%. Required return 10%.

Find the price and the PVGO.

WORKED SOLUTION

Always grow the dividend one year first

(A) STEADY CO.

$$\text{Div}_1 = 2.00 \times 1.04 = 2.08$$

$$P_0 = 2.08 / (0.10 - 0.04)$$

$$= 2.08 / 0.06$$

$$P_0 = \$34.67$$

(B) GROWTH LTD.

$$g = 15\% \times 0.40 = 6\%$$

$$\text{Div}_1 = 5 \times 0.60 = \$3.00$$

$$P_0 = 3 / (0.10 - 0.06) = \$75$$

$$\text{No-growth value} = 5 / 0.10 = \$50$$

$$\text{PVG0} = 75 - 50 = \$25$$

WATCH OUT

“Just paid” means Div_0 . Growth only adds value when ROE is above the required return.

04

Capital budgeting

Which cash flows to discount, and how

Four rules for discounting cash flows

1 Cash flows, not profits

Depreciation is not a cash flow; it only matters through tax.

2 Incremental cash flows

CF with project – CF without project. Include cannibalisation and opportunity costs; ignore sunk costs.

3 Match inflation

Nominal CF at the nominal rate; real CF at the real rate.

4 Separate financing

Don't subtract interest; the cost of financing is in the discount rate.

A project's cash flows have three parts

Capital investment

Outlay at T_0 ; after-tax salvage value at the end.

Operating cash flow

Cash revenue – cash expenses – taxes.

Working capital

Investment is an outflow; recovery at the end is an inflow.

$$OCF = EBIT \times (1 - T) + \text{Depreciation}$$

$$ATSV = \text{Salvage} - T \times (\text{Salvage} - \text{Book value})$$

EXAM QUESTION · 6 MARKS

After-tax salvage value

The manufacturing plant (\$11.6m) has an eight-year tax life, and DEL uses straight-line depreciation to zero. At the end of the project (end of Year 5) the plant will be sold for \$2.1 million. What is the after-tax salvage value of the plant?

Cost \$11.6m

Tax life 8 years

Sold after 5 years

Tax rate 30%

WORKED SOLUTION

Selling below book value creates a tax saving

STEP 1 · DEPRECIATION

$$\begin{aligned} 11.6 \div 8 \\ = \$1.45\text{m} / \text{yr} \end{aligned}$$

STEP 2 · BOOK VALUE, Y5

$$\begin{aligned} 11.6 - 5 \times 1.45 \\ = \$4.35\text{m} \end{aligned}$$

STEP 3 · ATSV

$$\begin{aligned} 2.1 + 0.30 \times (4.35 - 2.1) \\ = 2.1 + 0.675 \end{aligned}$$

$$\text{ATSV} = \$2.775\text{m}$$

Loss on sale of $\$2.25\text{m} \times 30\% = \$0.675\text{m}$ tax saving, added to the sale price.

McGilla Golf launches a new line of clubs

Item	Detail
New clubs	58,000 sets / yr for 7 years · price \$840 · variable cost \$440
High-priced clubs	Lose 9,900 sets / yr · price \$1,140 · variable cost \$740
Cheap clubs	Gain 11,400 sets / yr · price \$480 · variable cost \$250
Fixed costs	\$9,140,000 per year
Plant and equipment	\$28,980,000, straight-line over 7 years
Net working capital	\$1,340,000 at T0, recovered at the end
Already spent	Marketing study \$154,000 · R&D \$1,150,000
Tax · cost of capital	38% · 10%

Calculate the project's NPV.

WORKED SOLUTION · STEP 1

Initial outlay and incremental sales

T = 0 (\$M)

PPE -28.98

NWC -1.34

Total -30.32

DEPRECIATION

$28.98 \div 7$

$= \$4.14\text{m} / \text{yr}$

Product (\$m)	Units	Revenue	Var. cost
New clubs	58,000	+48.720	-25.520
High-priced	-9,900	-11.286	+7.326
Cheap	+11,400	+5.472	-2.850
Total		42.906	-21.044

Operating cash flow, years 1–7

$$\text{EBIT} = \text{REVENUE} - \text{VARIABLE COSTS} - \text{FIXED COSTS} - \text{DEPRECIATION}$$

$$= 42.906 - 21.044 - 9.140 - 4.140 = \$8.582\text{m}$$

$$\text{OCF} = \text{EBIT} \times (1 - T) + \text{DEPRECIATION}$$

$$= 8.582 \times (1 - 0.38) + 4.14 = \$9.461\text{m}$$

WATCH OUT

Fixed costs are deducted before tax. Depreciation is added back because it is not a cash outflow.

WORKED SOLUTION · STEP 3

Cash flow timeline and NPV

Year (\$m)	0	1	2	3-5	6	7
Plant (PPE)	-28.98					
NWC	-1.34					+1.34
OCF		9.46	9.46	9.46	9.46	9.46
Net CF	-30.32	9.46	9.46	9.46	9.46	10.80

$$\begin{aligned}\text{NPV} &= -30.32 + 9.461 \times [1/0.1 - 1/(0.1 \times 1.1^7)] + 1.34 / 1.1^7 \\ &= -30.32 + 46.059 + 0.688 \\ &= \text{\textbf{\$16.43m}} \ (\approx \text{\textbf{\$16,426,963}}) \rightarrow \text{accept}\end{aligned}$$

NPV and its rivals

Rule	Accept if	Pitfalls
NPV	$NPV > 0$	The benchmark: uses all cash flows, timing and risk
IRR	$IRR > \text{cost of capital}$	Lending vs borrowing flows, multiple IRRs, misranks mutually exclusive projects of different scale or timing
Payback	$\text{Payback} < \text{cut-off}$	Ignores cash flows after the cut-off and the time value of money
Profitability index	$PI > 0$ ($NPV \div \text{investment}$)	Useful for ranking under capital rationing; can misrank exclusive projects

IRR

The discount rate at which $NPV = 0$. For mutually exclusive projects, choose the higher NPV, not the higher IRR.

Apply all four rules to one project

Year	0	1	2	3
Cash flow	-1,000	400	500	400

Cost of capital 10% · payback cut-off 2 years

- (a) NPV (b) IRR (c) Payback period (d) Profitability index
(e) Do the rules agree? Which should you follow?

WORKED SOLUTION

Payback says reject; NPV says accept

(A) NPV

$$\begin{aligned} & -1,000 + 400/1.1 + 500/1.1^2 + 400/1.1^3 \\ & = -1,000 + 363.64 + 413.22 + 300.53 \\ & = \textbf{+\$77.39} \rightarrow \text{accept} \end{aligned}$$

(B) IRR

$$\begin{aligned} & \text{Solve } -1,000 + 400/(1+i) + 500/(1+i)^2 \\ & + 400/(1+i)^3 = 0 \\ & i = \textbf{14.3\%} > 10\% \rightarrow \text{accept} \end{aligned}$$

(C) PAYBACK

$$\begin{aligned} & \text{After 2 years: } 400 + 500 = 900 \\ & 2 + 100/400 = \textbf{2.25 years} \\ & > \text{2-year cut-off} \rightarrow \text{reject} \end{aligned}$$

(D) PROFITABILITY INDEX

$$\begin{aligned} & \text{NPV} \div \text{investment} \\ & = 77.39 \div 1,000 = \textbf{0.077} \\ & > 0 \rightarrow \text{accept} \end{aligned}$$

(e) Follow NPV: payback ignores the year-3 cash flow and the time value of money.

05

Risk and return

Only market risk is rewarded

The cost of capital is an opportunity cost

It is the return you could expect from investing in **equally risky** securities instead.

Market indices

- Dow Jones: 30 blue-chip US stocks
- S&P 500: 500 large US stocks
- NZX: NZ's stock exchange, itself a listed company

Measuring return

$$\text{Return} = (P_1 - P_0 + \text{Div}_1) / P_0$$

Capital gain plus dividend yield. With no dividend this reduces to $(P_1 - P_0) / P_0$.

RISK AND RETURN

Risk is how far returns stray from the average

Safe project

Opportunity cost = Treasury bill rate

Average-risk project

Opportunity cost = expected market return

VARIANCE AND STANDARD DEVIATION

$$\sigma^2 = \sum (r_i - \bar{r})^2 / (N - 1)$$

$$\sigma = \sqrt{\sigma^2}$$

Stocks · widest spread, roughly
-45% to +60%

Bonds · narrower, mostly -10%
to +20%

Bills · tightly packed, 0% to 15%

Diversification removes only part of the risk

Rational, risk-averse investors hold portfolios rather than single assets. Because stock prices don't move exactly together (correlation below 1), combining them cancels some of the ups and downs.

DIVERSIFIABLE

Unique risk

Also firm-specific or unsystematic. Disappears in a large portfolio, so it earns **no** extra return.

UNDIVERSIFIABLE

Market risk

Also systematic. Economy-wide, can't be diversified away, so investors demand a premium. Measured by beta.

Portfolio risk is less than the average risk

Stock	w	E(r)	σ
A	60%	12%	20%
B	40%	6%	10%

Correlation $\rho_{AB} = 0.3$

FORMULAS

$$E(r_p) = w_1 r_1 + w_2 r_2$$

$$\sigma_p^2 = w_1^2 \sigma_1^2 + w_2^2 \sigma_2^2$$

$$+ 2w_1 w_2 \rho \sigma_1 \sigma_2$$

EXPECTED RETURN

$$0.6 \times 12\% + 0.4 \times 6\% = 9.6\%$$

VARIANCE

$$0.6^2 \times 0.20^2 = 0.01440$$

$$0.4^2 \times 0.10^2 = 0.00160$$

$$2 \times 0.6 \times 0.4 \times 0.3 \times 0.20 \times 0.10$$

$$= 0.00288$$

$$\sigma_p^2 = 0.01888$$

$$\sigma_p = 13.7\% \text{ (vs 16\% weighted average)}$$

Beta measures sensitivity to the market

$$\beta_i = \text{Cov}(R_i, R_m) / \sigma_m^2 = \rho_{im} \sigma_i \sigma_m / \sigma_m^2 = \rho_{im} \sigma_i / \sigma_m$$

$$\beta = 1$$

Moves with the market (the market portfolio itself)

$$\beta > 1$$

Amplifies market moves: riskier, higher required return

$$\beta < 1$$

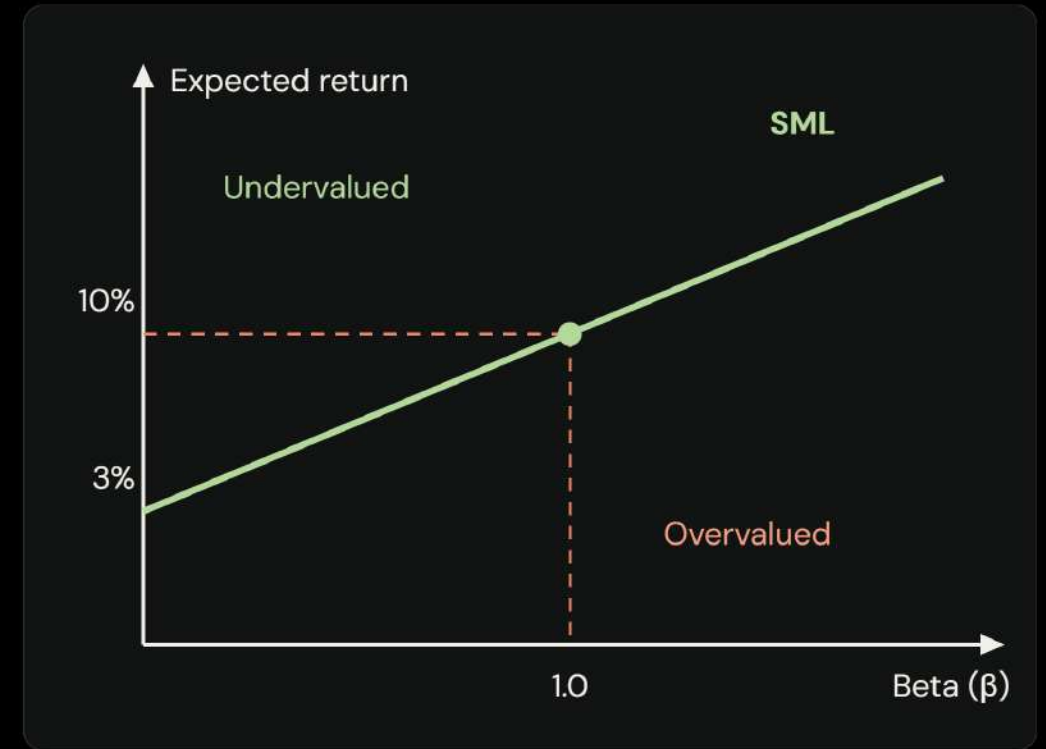
Dampens market moves: defensive, lower required return

Estimated as the slope from regressing the asset's returns on the market's returns.

CAPM prices market risk along the SML

$$r = r_f + \beta (r_m - r_f)$$

- $r_m - r_f$ is the market risk premium
- The SML plots CAPM: expected return against beta
- Above the line: return too high for its risk → undervalued
- Below the line: return too low → overvalued



06

Weighted average cost of capital

The benchmark return for the whole firm

WACC

One rate that blends every source of finance

Firms fund long-term activities with long-term debt, preferred stock and common equity. Management needs the overall cost as a **benchmark for new investments** and to **value the company as a whole**.

$$\begin{aligned} \text{WACC} &= (D/V) \times r_d \times (1 - T_c) \\ &+ (P/V) \times r_p \\ &+ (E/V) \times r_e \\ V &= D + P + E \end{aligned}$$

WACC

Each component needs a cost and a weight

Component	Cost (r)	Market value
Debt	YTM on existing bonds	# bonds × bond price
Preferred	$r_p = \text{Dividend} \div \text{Price}$	# pref. shares × price
Equity	CAPM: $r_f + \beta (r_m - r_f)$	# shares × share price
	or DDM: $r_e = D_1 / P_0 + g$	

$$V = E + P + D$$

Always weight by **market values**, not book values.

Defence Electronics Ltd (DEL)

DEL is considering a five-year overseas plant on land it already owns (after-tax value \$3.9m today, \$4.7m in five years). The plant costs \$11.6m and needs \$643,000 of NWC at Year 0.

Security	Market data
Debt	Market value \$33,950,000 · coupon 6.5% · YTM 6.75% · 25 years · \$1,000 par · semi-annual
Common shares	641,000 outstanding at \$79 · beta 1.23
Preference shares	37,000 outstanding at \$96 · \$6.30 annual dividend
Market	Market risk premium 6.75% · risk-free rate 3.8%
Tax	30%

(a) Calculate DEL's WACC.

WORKED SOLUTION · STEP 1

Cost and market value of each component

Source	Cost	Market value	\$m
Debt	YTM = 6.75%	given	33.950
Equity	$3.8\% + 1.23 \times 6.75\% = 12.10\%$	$641,000 \times \$79$	50.639
Preferred	$6.30 \div 96 = 6.56\%$	$37,000 \times \$96$	3.552
Total V			88.141

WATCH OUT

6.75% is already the market risk premium ($r_m - r_f$). Don't subtract the risk-free rate again.

Weight the costs and add them up

D / V

$$33.95 \div 88.141 = 38.5\%$$

E / V

$$50.639 \div 88.141 = 57.5\%$$

P / V

$$3.552 \div 88.141 = 4.0\%$$

$$\begin{aligned} \text{WACC} &= 0.385 \times 6.75\% \times (1 - 0.30) + 0.040 \times 6.56\% + 0.575 \times 12.10\% \\ &= 1.82\% + 0.26\% + 6.95\% \end{aligned}$$

$$\text{WACC} = 9.04\%$$

07

Debt policy

Does the mix of debt and equity change firm value?

Modigliani and Miller, with and without tax

No tax

1. Firm value is not affected by leverage

$$VL = D + E = VU$$

2. Leverage raises risk and return to shareholders

$$r_e = r_a + (D/E)(r_a - r_d)$$

With corporate tax

1. Firm value rises with leverage (interest tax shield)

$$VL = VU + T_c \times D$$

2. The tax shield offsets some of the rise in equity risk

$$r_e = r_a + (D/E)(1 - T_c)(r_a - r_d)$$

MM, Inc. moves from all-equity to 35% debt

6,000 shares at \$58

EBIT \$39,600 forever

Debt at 7%

No taxes

100% payout

Ms Brown owns 100 shares

- (a) What is Ms Brown's cash flow under the current all-equity structure?
- (b) What is her cash flow under the proposed structure if she keeps all 100 shares?
- (c) The firm converts, but she prefers all-equity. Show how she can unlever her shares.

WORKED SOLUTION · (A) AND (B)

Leverage raises Ms Brown's cash flow

(A) ALL EQUITY

No debt → all EBIT is paid out

$$\begin{aligned}\text{EPS} &= 39,600 \div 6,000 \\ &= \$6.60\end{aligned}$$

$$\text{CF} = 6.60 \times 100$$

\$660

(B) 35% DEBT

$$V = 58 \times 6,000 = \$348,000$$

$$D = 0.35 \times 348,000 = \$121,800$$

$$\text{Buyback} = 121,800 \div 58 = 2,100 \text{ shares}$$

$$\text{Interest} = 121,800 \times 7\% = \$8,526$$

$$\text{NI} = 39,600 - 8,526 = \$31,074$$

$$\text{EPS} = 31,074 \div 3,900 = \$7.97$$

$$\text{CF} = 7.9677 \times 100$$

\$796.77

WORKED SOLUTION · (C)

Homemade unlevering: sell 35%, lend the cash

1 · SELL 35 SHARES

$$0.35 \times 100 = 35$$

$$35 \times \$58 = \$2,030$$

2 · LEND AT 7%

$$2,030 \times 0.07$$

$$= \$142.10 \text{ interest}$$

3 · KEEP 65 SHARES

$$65 \times \$7.9677$$

$$= \$517.90 \text{ dividends}$$

$$517.90 + 142.10 = \$660$$

Exactly her all-equity cash flow. She can undo the firm's leverage herself, so leverage doesn't change firm value.

Apex Innovations moves from $D/E = 0.2$ to all-equity

40,000 shares at \$100

EBIT \$200,000 forever

Debt at 4%

No taxes

New shares repay the debt

Mr Anderson owns 200 shares

- (a) What is his cash flow under the current structure (100% payout)?
- (b) What is his cash flow under the all-equity structure, still holding 200 shares?
- (c) He prefers $D/E = 0.2$. Explain how he can re-lever to replicate it.

Current structure: interest comes out first

CAPITAL STRUCTURE

$$D/E = 0.2 \rightarrow D = 0.2E$$

$$D/V = 0.2E \div 1.2E = 16.7\%$$

$$E/V = 83.3\%$$

CASH FLOW

$$E = \$100 \times 40,000 = \$4,000,000$$

$$D = 0.2 \times 4,000,000 = \$800,000$$

$$\text{Interest} = 4\% \times 800,000 = \$32,000$$

$$NI = 200,000 - 32,000 = \$168,000$$

$$EPS = 168,000 \div 40,000 = \$4.20$$

$$CF = 4.20 \times 200$$

\$840

WORKED SOLUTION · (B)

All-equity: issue shares, repay the debt

EQUITY GOES FROM 83% TO 100%

$$\text{New shares} = 800,000 \div 100$$

$$= 8,000$$

$$\text{Outstanding} = 40,000 + 8,000$$

$$= 48,000$$

NO INTEREST TO PAY

$$\text{NI} = \$200,000$$

$$\text{EPS} = 200,000 \div 48,000$$

$$= \$4.17$$

$$\text{CF} = 4.1667 \times 200$$

\$833.33

Lower cash flow, but lower risk: less leverage means less return to shareholders.

WORKED SOLUTION · (C)

Homemade leverage: borrow and buy more shares

1 · BORROW

$$0.2 \times (200 \times \$100) \\ = \$4,000 \text{ at } 4\%$$

2 · BUY SHARES

$$4,000 \div 100 = 40 \\ 200 + 40 = 240 \text{ shares}$$

3 · NET CASH FLOW

$$4.1667 \times 240 = 1,000 \\ - 4,000 \times 0.04 = -160$$

$$\text{CF} = \$840$$

Same as before the restructure. Personal D/E = $4,000 \div (200 \times 100) = 0.2$.

CORRECTION TO THE ORIGINAL WORKING

Interest is $4,000 \times 0.04 = \$160$, not $4,000 \times 0.4$.

Trade-off theory: tax shields vs distress costs

$$V_L = V_U + PV(\text{tax shield}) - PV(\text{costs of financial distress})$$

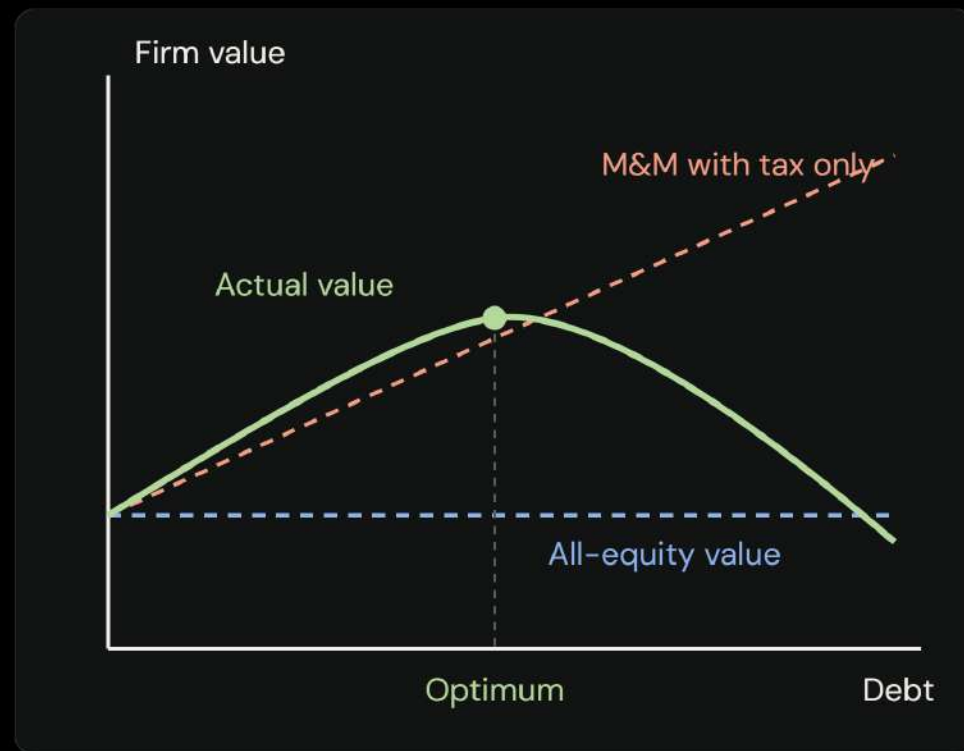
Direct costs

Legal and administrative costs of bankruptcy

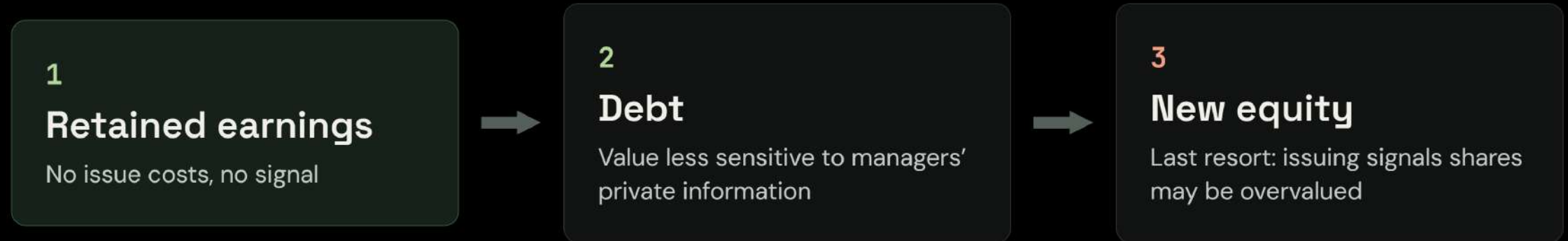
Indirect costs

Lost customers and staff, underinvestment, risk-shifting games between shareholders and lenders

Firms with safe, tangible assets and taxable profits should borrow more.



Pecking order: internal funds first, equity last



WHY: ASYMMETRIC INFORMATION

Managers know more than investors. When a firm issues shares, investors suspect they are overpriced, so the price falls on announcement. Explains why profitable firms often borrow less: they don't need outside money.

08

Payout policy

How firms return cash to shareholders

Three ways to pay shareholders

Cash dividend

Cash paid per share to everyone who holds stock before the ex-dividend date.

Stock dividends and splits

More shares, no cash.
Each share is worth proportionally less.

Share repurchases

Buybacks: cash goes only to shareholders who choose to sell.

In a perfect market the share price falls by the dividend on the ex-dividend date. Unless a payout or split conveys new information, investor wealth is unchanged.

PAYOUT POLICY

Managers smooth dividends because they signal

Smoothing and signalling

Dividends are kept steady and managers are reluctant to change them. Investors read a change as management's forecast of future earnings.

Payment patterns

Constant: a fixed amount or fixed % of earnings.

Residual: pay out whatever earnings are left after funding the optimal capital budget.

RESIDUAL POLICY

$$\text{Distributions} = \text{NI} - (\text{target equity ratio} \times \text{total capital budget})$$

Does dividend policy affect value? Three views

NO EFFECT

Irrelevance (M&M)

- Investors indifferent between dividends and capital gains
- Want cash? Sell shares. Don't? Reinvest the dividend
- Relies on no taxes or trading costs

INCREASES VALUE

Signalling · bird in hand

- Dividend rises signal sustainable higher earnings
- Price jump may reflect higher future EPS, not love of dividends
- Dividends seen as less risky than future gains

DECREASES VALUE

Tax preference

- If dividends are taxed more than capital gains, investors prefer low payout
- Firms can convert dividends into gains (e.g. buybacks)
- More after-tax cash stays with shareholders

EXAM QUESTION · 12 MARKS

Mars Plastic goes ex-dividend tomorrow

\$1 dividend per share · 20,000
shares outstanding

Market-value BS	\$
Cash	200,000
Fixed assets	1,800,000
Equity	2,000,000

- (a) What price is it selling for today?
- (b) What price tomorrow? Ignore taxes.
- (c) Instead it announces a \$20,000 buyback. What happens to the price on announcement?
- (d) Show the price after the repurchase.
- (e) Show the dividend's effect on an investor with 1,000 shares.

WORKED SOLUTION · (A)–(D)

Dividend vs repurchase: price per share

(A) TODAY

$$P_0 = 2,000,000 \div 20,000 \\ = \$100$$

(B) EX-DIVIDEND

$$2,000,000 - 1 \times 20,000 = 1,980,000 \\ P_1 = 1,980,000 \div 20,000 = \$99$$

(C) BUYBACK ANNOUNCED

Under M&M it conveys no new information

$$P = 2,000,000 \div 20,000 = \$100$$

(D) AFTER REPURCHASE

$$\text{Bought back} = 20,000 \div 100 = 200 \\ P = 1,980,000 \div 19,800 = \$100$$

WORKED SOLUTION · (E)

The investor's wealth doesn't change

1,000 shares	Before	After dividend
Share price	\$100	\$99
Shares held	1,000	1,000
Value of shares	\$100,000	\$99,000
Dividend received	–	\$1,000
Total wealth	\$100,000	\$100,000

Illustrates dividend irrelevance

09

Financial planning

Pro formas, growth and external financing

Plans set goals and benchmarks

GOAL OF THE FIRM

Maximise shareholder wealth through good investment in fixed assets, a sound capital structure and a sensible payout policy.

MORE THAN 12 MONTHS

Long-term planning

Pro forma statements, growth and external financing.

NEXT 12 MONTHS

Short-term planning

Working capital: current assets and current liabilities.

Sales drive the forecast; a plug balances it

Pro forma

Projected financial statements

Percentage of sales

Items forecast in proportion to the sales forecast

Balancing item (plug)

The variable that adjusts so the plan is consistent

$\text{Net income} = \text{Retained earnings} + \text{Dividends}$

$\text{New assets} = \text{Retained earnings} + \text{External financing}$

$\text{External financing} = \text{New equity} + \text{New debt}$

Faster growth needs outside money

Low growth

Internal financing may exceed the investment needed:
a surplus.

High growth

Retained earnings fall short, so the firm goes to the
capital market.

Measure	Formula
Required external financing	$g \times \text{initial net assets} - \text{retained earnings}$
Internal growth rate	$\text{RE} \div \text{net assets} = \text{plowback} \times \text{ROA}$
Sustainable growth rate	$(\text{RE} + \text{new debt}) \div \text{net assets} = \text{plowback} \times \text{ROE}$

Delta Corporation forecasts 30% sales growth

Using the percentage of sales method, prepare the 2023 pro forma income statement and balance sheet. Delta keeps its 50% payout ratio and issues no more debt.

Income statement (\$000)	2022
Revenue	2,200
Cost of goods sold	1,200
Depreciation	20
EBIT	980
Interest	15
EBT	965
Tax (40%)	386.0
Net income	579.0
Dividends (50%)	289.5

Balance sheet (\$000)	2021	2022
Net working capital	150	176
Net fixed assets	200	242
Total assets	350	418
Long-term debt	150	170
Shareholders' equity	200	248
Total L&E	350	418

2023 pro forma income statement (\$000)

Item	Working	2023
Revenue	$2,200 \times 1.3$	2,860.0
COGS	$(1,200 \div 2,200) \times 2,860$	1,560.0
Depreciation	$(20 \div 2,200) \times 2,860$	26.0
EBIT	$2,860 - 1,560 - 26$	1,274.0
Interest	debt fixed → unchanged	15.0
EBT	$1,274 - 15$	1,259.0
Tax	$0.40 \times 1,259$	503.6
Net income	$1,259 - 503.6$	755.4
Dividends	0.50×755.4	377.7
Retained earnings	$755.4 - 377.7$	377.7

2023 pro forma balance sheet (\$000)

Item	Working	2023
Net working capital	$(176 \div 2,200) \times 2,860$	228.8
Net fixed assets	$(242 \div 2,200) \times 2,860$	314.6
Total assets	$228.8 + 314.6$	543.4
Long-term debt	held fixed	170.0
Equity (plug)	$543.4 - 170$	373.4
Total L&E		543.4

CHECK THE PLUG

Retained earnings alone would lift equity to $248 + 377.7 = 625.7$. Required external financing = $(543.4 - 418) - 377.7 = -252.3$: a surplus. Equity of 373.4 assumes the \$252.3k surplus is paid out (e.g. a buyback).

10

Working capital management

Financing strategy, the cash cycle and credit

How much long-term finance should cover?

$$\text{NWC} = \text{Current assets} - \text{Current liabilities}$$

Cash and securities · receivables · inventory · payables · short-term loans

A · Relaxed

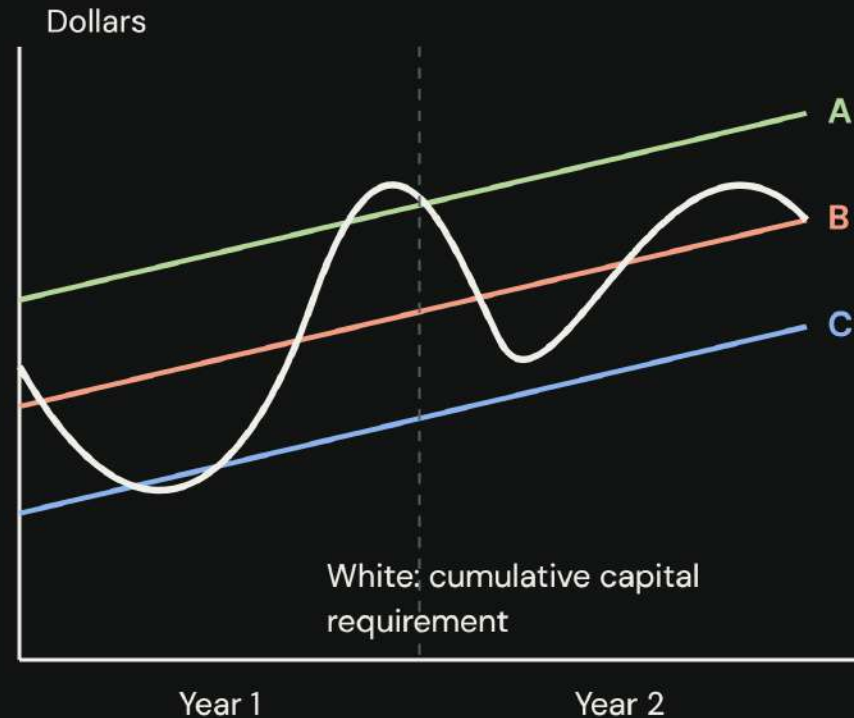
Long-term funds always exceed needs; surplus held in securities.

B · Middle

Borrow short-term at peaks, invest surplus in troughs.

C · Restrictive

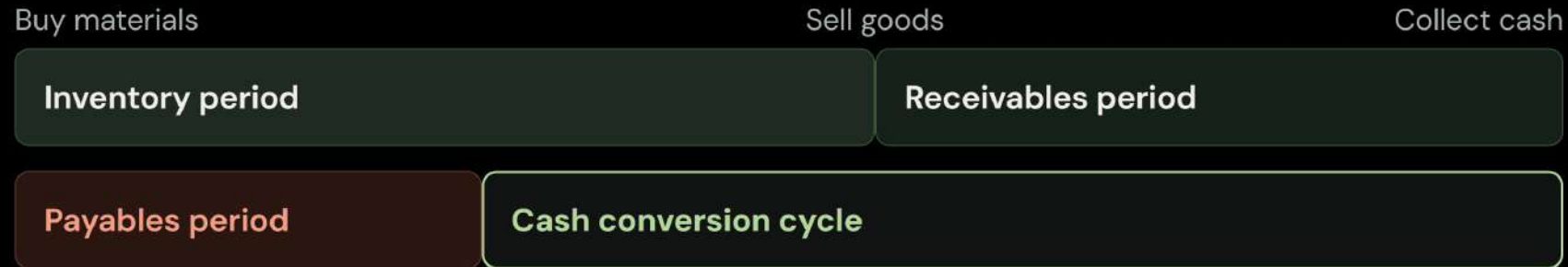
Long-term funds cover only the minimum; always a short-term borrower.



WORKING CAPITAL

The cash conversion cycle

The number of days between paying suppliers for materials and collecting cash from customers. A shorter cycle ties up less cash.



Measure	Formula
Inventory period	$\text{Average inventory} \div (\text{COGS} / 365)$
Receivables period	$\text{Average receivables} \div (\text{Sales} / 365)$
Payables period	$\text{Average payables} \div (\text{COGS} / 365)$
Cash conversion cycle	$\text{Inventory} + \text{Receivables} - \text{Payables}$

PRACTICE QUESTION · CASH CONVERSION CYCLE

How long is the cash tied up?

Given (\$000)	
Sales	3,650
COGS	2,190
Avg inventory	300
Avg receivables	400
Avg payables	150

WORKED SOLUTION

$$\text{COGS per day} = 2,190 \div 365 = 6$$

$$\text{Sales per day} = 3,650 \div 365 = 10$$

$$\text{Inventory} = 300 \div 6 = 50 \text{ days}$$

$$\text{Receivables} = 400 \div 10 = 40 \text{ days}$$

$$\text{Payables} = 150 \div 6 = 25 \text{ days}$$

$$\text{CCC} = 50 + 40 - 25$$

$$\text{CCC} = 65 \text{ days}$$

To shorten it: hold less inventory, collect from customers faster, or pay suppliers later.

Trade credit is expensive money

TERMS "2/10, NET 30"

2% discount if paid within 10 days; otherwise the full amount is due in 30. Skipping the discount = borrowing 98 for 20 extra days at a cost of 2.

$$(1 + 2/98)^{(365/20)} - 1$$

≈ 44.6% a year

MANAGING THE OTHER ITEMS

- Credit policy: credit terms, credit analysis, collection policy
- Inventory: balance carrying costs against order and stock-out costs
- Cash: hold enough for transactions; invest surplus in marketable securities
- Cash budget: forecast inflows and outflows to spot shortfalls early

SHORT-TERM FINANCING OPTIONS

Bank loans and lines of credit · commercial paper · secured loans against receivables or inventory · stretching payables



Questions?

Good luck in the FINC 201 exam