Corporate Finance

Lecture 4.2: Free Cash Flows

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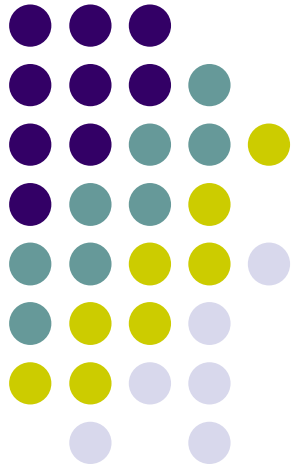

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Plan of this class

From valuing project to valuing firm: from PCF to FCF

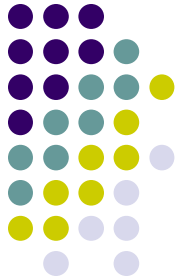
Forecasting FCF through Pro forma financial statements

Value of a firm

We now want to evaluate the value of a company using DCF/NPV method.

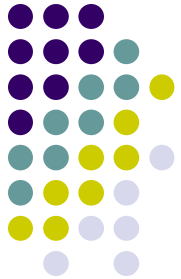
- Who receive the cash flows?
  - Investors: holders of the company's stock and debt
  - PV of firm's cash flows = PV of cash flows to stockholders + PV of cash flows to debtholders

Value of a Firm: equity + debt



- **Value of a Firm (V) = Market Value of Equity (E) + Market Value of Debt (D)**
  - E = NPV (cash flow to shareholders, cost of equity)
  - D = NPV (cash flow to debtholders, cost of debt)
- Issue: hard to separate the cash flows to equity and debt holder

Value of a Firm: consider the company as a whole



Value of a Firm = PV of the cash flows the firms is expected to generate now and in the future

Value of a company = NPV(CF, WACC)

CF: FCF

Discount rate: WACC (Weighted average cost of capital)

Cost of Capital

- The cost of capital or *discount rate for cash flows of a firm* is the a weighted average of the cost of equity and debt.

$$WACC = \frac{E}{V}\, E(R_E) + \frac{D}{V}\, E(R_D)$$

- If the company pays corporate tax at rate of τ:

$$WACC = \frac{E}{V}\, E(R_E) + \frac{D}{V}\, E(R_D)(1 - \tau)$$

  - We will explain why in later classes.

Optional: circularity problem

Calculating WACC requests E, D, V

Solution:

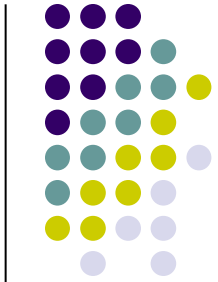
- Use a Target Capital Structure
- Simultaneous Equation/Iteration Approach
- Focus on Market Observables

Iterative approach

- Start with an estimate for E and D (e.g. multiples & book values)
- Compute WACC
- Compute updated E & D using DCF
- Compute updated WACC

- By continuous mapping theorem (CMT), you should be able to find the converging solution

Value of a Firm: consider the company as a whole

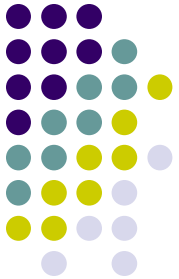


- NPV = FCF/(1+WACC)
- What is FCF?
- Treats the company as an entity and asks what are available cash flows to its investors.
- Notice that here we assume the company is fully equity-funded:
  - the tax shield effect is embedded in the WACC calculation

$$WACC = \frac{E}{V}\,E(R_E) + \frac{D}{V}\,E(R_D)(1-\tau)$$

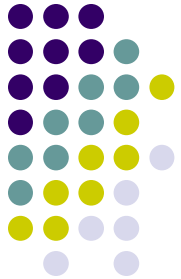
  - Will be our focus for the second term

Valuating a Firm



- Regarding the Company as a Project, **Free Cash Flow** is the *relevant* cash flow
- Free cash flow is generated from the firm's *continuing operations* and is *available for distribution (i.e., "free")* to the suppliers of capital (i.e., creditors, shareholders, etc.)
  - Free cash flow is related to the firm's business activities
  - It is unrelated to how the firm finances its operations
- Free cash flow is the *incremental after-tax cash flows* the firm would generate *if it had no debt*
- Source: financial statements
- Complication: NI has deducted interest expense payment

Calculation of FCF



- Direct method:
  - Starts with Cash Sales and restates the Income Statement to include only cash charges and operating cash flows
- Indirect method:
  - Starts with **Net Income** and adjusts for **non-cash charges** and **non-operating cash flows** included in Net Income
  - Same logic as the Bottom-Top Approach for OCF
- We focus on the indirect method

Net Income

- Sales

  – Cost of goods sold (COGS)

  – Selling, general, and administrative expenses (SG&A)

  – Depreciation

  – Interest expenses

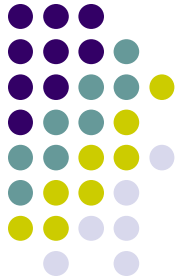
  – Taxes

  Net income

  $= (Sales - COGS - SG\&A - Depreciation - Interest) \times (1 - \tau)$

  $= EBIT \times (1 - \tau) - Interest \times (1 - \tau)$

NI to FCF



- Sales include:
  - Sales on credit (account receivable): revenue earned but no cash received
- Cost of goods sold:
  - Include trade credit (account payable): expenses owed but no cash paid
- Interest expense:
  - A financing term, not an operating term
- Taxes
  - Affected by tax deduction of financing term (e.g., interest) and non-cash terms (e.g., depreciation)

Free Cash Flow

FCF: the *incremental after-tax cash flows* the firm would generate *if it had no debt*

- Net income

  + ***After-tax*** interest expense

  + Depreciation

  } Adjustments for operating cash flow

  – Change in ***non-cash*** net working capital

  Net working capital = Current assets – Current liabilities

  – Capital expenditure

  CPX = Ending fixed assets – Beginning fixed assets + Depreciation

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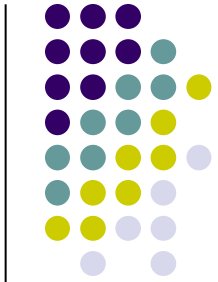
Free cash flow

Q: why are depreciation and interest treated differently?



In a equity-funded company,

Depreciation has two effects on cash flow

- Tax shield
- Non-cash adjustment

Interest payment has only one

- Non-cash adjustment

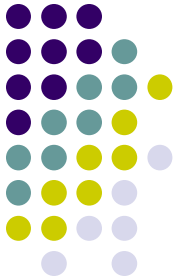
(Again, tax-shield effect is considered under WACC, we do not want to double consider it)

Q: why non-cash change in NWC?

PCF: cash is locked in the project

FCF: cash is part of the company's valuation. The equity/debtholder could obtain this part of the value by selling their equity/debt

Free Cash Flow



Net income

+ Non-cash charges
  - Depreciation
  - Amortization

+ (After-tax) net interest expense (interest expense – interest income)

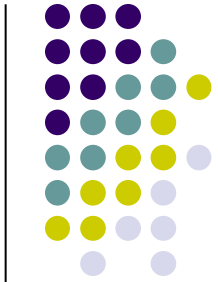
– ΔNWC: change in non-cash net working capital (= current assets – current liabilities)
  - Account receivables
  - Inventories
  - Other operating current assets
  - Account payables

– CPX: capital expenditure (ending PP&E – beginning PP&E + depreciation)

Free cash flow

$$= Net\ Income + (1-\tau) \cdot Interest + Depreciation - \Delta NWC - CPX \pm Other$$
$$= (1-\tau) \cdot EBIT + Depreciation - \Delta NWC - CPX \pm Other$$

Example: NI to FCF



- The financial statements of a firm at the end of 2017 are given in the table on the next slide
- The effective tax rate of this firm is 40%
- Compute Net Income and Free Cash Flow of this firm for 2017

Example: NI to FCF

Income Statement	2016	2017
Sales		59,000
Cost of goods sold (COGS)		22,800
Sales, general, and administration (SG&A)		12,000
Depreciation		250
Interest expense		1,100
Dividends		0

Balance Sheet	2016	2017
Cash	20,000	8,400
Account receivable	0	12,000
Inventory	0	34,700
Fixed assets	110,000	120,000
Account payable	0	18,000
Other current liabilities	0	13,460
Long-term debt	20,000	19,930

Net Income

- Sales: 59,000

  – Cost of goods sold (COGS): 22,800

  – Selling, general, and administrative expenses (SG&A): 12,000

  – Depreciation: 250

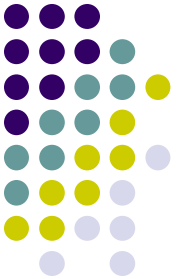
  – Interest expenses: 1,100

  – Taxes: Tax rate 40%

  Net income

  $NI = (59{,}000 - 22{,}800 - 12{,}000 - 250 - 1{,}100) \times (1 - 0.4) = 13{,}710$

Free Cash Flow



- Net income: 13,710

  + Depreciation: 250

  + After-tax interest expense: $1{,}100 \times (1 - 0.4) = 660$

  – Change in non-cash net working capital:

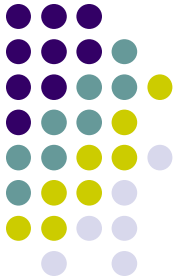
  $(12{,}000 + 34{,}700 - 18{,}000 - 13{,}460) - 0 = 15{,}240$

  – Capital expenditure

  $120{,}000 - 110{,}000 + 250 = 10{,}250$

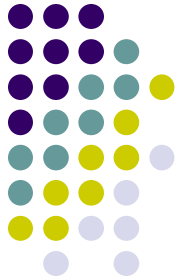
  Free cash flow: $13{,}710 + 250 + 660 - 15{,}240 - 10{,}250 = -10{,}870$

Note: Statement of Cash Flows



- Companies report the Accounting Statement of Cash Flow
- It records the sources and uses of funds, and reconciles cash balances
- One item in the statement is called “Cash flow from operating activities”
  - It is NOT the same as FCF
  - It omits cash flows related to investment (CPX)
  - It includes non-operating expenses and income (e.g., interest)

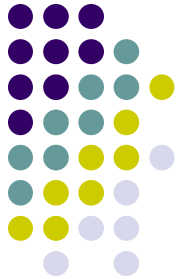
The Connections (Optional)



- Free cash flows are the funds *generated* by the firm's *business* (assets) and are available to pay the capital providers
  - e.g., lenders and shareholders
- Financial cash (out)flows are the funds *distributed* to the *security holders* of the firm
  - e.g. interest and principle payments, dividends, share repurchases
- The difference between the two funds is the change in cash holdings over the period

Free cash flows = Financial cash (out)flows + ΔCash

The Connections (Optional)



Free cash flow = Financial cash (out)flows + ΔCash

- FCF<0: Cash generated by operation is not enough to fund the new investment
  - Financial CF<0 (raise new funds)
  - Financial CF=0 (no external financing)⟶ ΔCash<0 (use up the existing cash holdings)
- FCF>0: Firm's operation generates more cash than the required amount for investment
  - Financial CF=0 & ΔCash>0 (retains more cash)
  - Financial CF>0 (distribute to security holders)

Example, cont. (Optional)

Income Statement	**2016**	**2017**
Sales		59,000
Cost of goods sold (COGS)		22,800
Sales, general, and administration (SG&A)		12,000
Depreciation		250
Interest expense		**1,100**
Dividends		0

Balance Sheet	**2016**	**2017**
Cash	20,000	8,400
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Fixed assets	110,000	120,000
Account payable	0	18,000
Other current liabilities	0	13,460
Long-term debt	**20,000**	**19,930**

Example, cont.

Free Cash Flow: **–10,870**

Interest Payment: $1{,}100 \times (1 - 0.4) = 660$

Change of Long-term Debt: 19,930 – 20,000 = –70

(Net) Financial cash (out)flow: 660 +70 = **730**

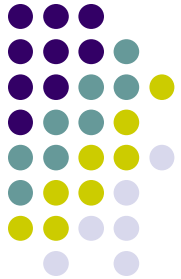
Change in cash balance: 8,400 – 20,000 = **–11,600**

Check the Cash Flow Identify:

–10,870 = 730+ (–11,600)

FORECASTING FCF

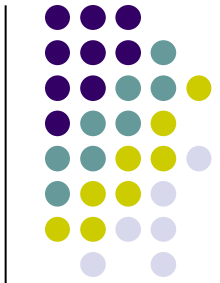
Pro forma financial statements



- Normally, we cannot directly forecast a project's future cash flows
- A common practice is to forecast the project's *pro forma* financial statements
- Pro forma financial statements are the project's
  - Balance sheet
  - Income statement
  - Statement of cash flow

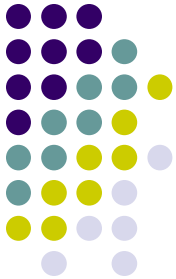
  based on the forecast of the project's future cash flows
- Pro forma means "as a matter of form"

Sales forecast



- Many items in the pro-forma statements are closely related to sales
- Sales forecast is the first step in the discounted cash flow (DCF) valuation and capital budgeting

How do we forecast sales?



- No formula or method that applies to all situations!
- Some possible methods that we can consider:
  - Regressions against macroeconomic variables
  - Time series analysis
  - Theoretical estimation of growth rates
- IMPORTANT: None of above methods may work perfectly
- Analysts should choose their own method that is appropriate in the specific context

Preparation

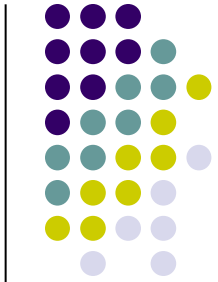
- Before any quantitative analysis work, analyst should have a good idea of the company's sales
  - What kind of products/services does the company sell, and who are the customers?
  - Does it heavily rely on one product, sector, or one large customer? Or does it diversify?
  - How sensitive are sales to economic conditions, energy prices, etc.?
  - The product life cycle, i.e., is it a growing, mature, or declining industry?

Inflation adjustment

- Sale = Number of units sold × Unit price
- Sales growth can be due to
  - Growth in number of units sold (i.e., growth in sales volume): Real growth in sales, or
  - Increase in unit price (i.e., inflation)
- It is important to distinguish between *nominal sales growth* and *real sales growth*
  - Normally, sales analysis should be done on *real* sales

$$Sales_{nominal} = Sales_{real} \times \frac{CPI_{current\ year}}{CPI_{base\ year}}$$

Example: Real vs. nominal sales



- A firm reported sales of $2 billion in 1998, $2.2 billion in 1999, and $2.5 billion in 2000
- CPI was 120 in 1998, 125 in 1999, and 132 in 2000

Real sales in 1998 =

Real sales in 1999 =

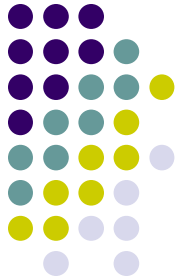
Real sale in 2000 =

What was the real sales growth in 1999 and 2000?

Real sales growth in 1999 =

Real sales growth in 2000 =

Method 1: Regression forecasting



- Outline of the regression method
  - Identify the macroeconomic variables that sales depend on (e.g., GDP, population, energy prices, level of industrial production, exchange rates, etc.)
  - Assume that you expect sales to depend on GDP
  - Convert all past sales to real sales, and compute *real sales growth*
  - Run a regression of *real sales growth* on *real GDP growth*

$$\frac{\Delta Real\ Sales_t}{Real\ Sales_{t-1}} = \alpha + \beta \frac{\Delta Real\ GDP_t}{Real\ GDP_{t-1}} + \varepsilon$$

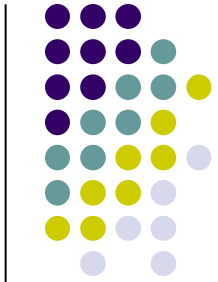
- Use the regression estimates to forecast *real sales growth* into the future
- Use estimates of real sales growth to obtain sales forecasts

Example: Regression & forecasting

- Sales of a firm, GDP, and CPI between 2015 and 2021 are given in the table
- Use 2010 as the base year; assume now we are at the beginning of 2022

	2015	2016	2017	2018	2019	2020	2021
Total Sales	16,410.00	20,317.00	24,991.00	31,519.00	38,420.00	42,895.00	47,061.00
GDP	6,383.00	6,704.00	7,096.00	7,392.00	7,818.00	8,255.00	8,681.00
CPI	139.60	143.80	147.60	151.70	156.00	160.10	162.60
Real Sales	16,410.00	19,723.60	23,636.47	29,004.96	34,380.97	37,402.51	40,404.15
Real Sales Growth		0.2019	0.1984	0.2271	0.1853	0.0879	0.0803
Real GDP	6,383.00	6,508.19	6,711.39	6,802.39	6,996.11	7,197.99	7,453.06
Real GDP Growth		0.0196	0.0312	0.0136	0.0285	0.0289	0.0354

Example: Regression & forecasting



- $Sale\ Growth = \alpha + \beta \times GDP\ Growth + \varepsilon$
- In Excel: Use the tools "Data/Data Analysis/Regression"

Regression Statistics	
Multiple R	0.71
R Square	0.50
Adjusted R Square	0.38
Standard Error	0.05
Observations	6

	Coef.	Std. Err.	t Stat	P-value	Lower 95%	Upper 95%
Intercept (α)	0.3083	0.0750	4.1113	0.0147	0.1001	0.5165
GDP Growth (β)	-5.5292	2.7560	-2.0063	0.1153	-13.1810	2.1226

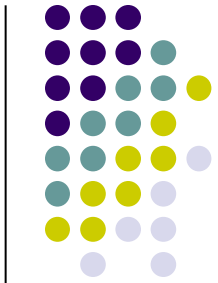
- Note: the p-value of β is too large, maybe a problem in forecast

Example: Regression & forecasting

- GDP growth and CPI forecast may be available from various of sources
- Suppose real GDP growth is forecasted to be 4% in 2022 and then 3.5% in 2023; inflation is expected to be 4% each year for the next two years

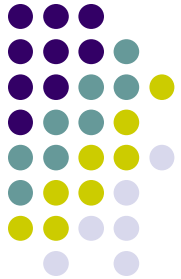
	2015	2021	2022	2023
Total Sales	16,410.00	47,061.00	53,207.97	61,687.68
CPI	139.60	162.60	169.10	175.87
Real Sales	16,410.00	40,404.15	43,924.64	48,966.23
Real Sales Growth		0.0803	0.0871	0.1148
Real GDP Growth		0.0354	0.0400	0.0350
α	0.3083			
β	-5.5292			
Inflation Forecast	0.0400			

Method 2: Time series analysis



- Sometimes, we examine past sales to identify trends that we expect to continue in the future
  - How have firm's *real sales* grown in the past – high growth or low growth?
  - Has growth been exponential or linear?
  - Is growth slowing down or speeding up?
  - …
- Use product life cycles to make judgement on how long trends will persist

Method 2: Time series analysis



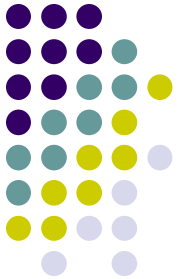
- Linear growth cycle:
  - i.e., stable growth: Large, mature firms/industries
  - e.g., General Electric

$$Real\ Sales_t = \alpha + \beta \times t + \varepsilon_t$$

- Exponential growth cycle:
  - Real sales increase at an increasing rate (e.g., Google, Microsoft, etc.)
  - High unsustainable growth rates

$$Real\ Sales_t = e^{\alpha+\beta\times t+\varepsilon_t}$$

Characteristics: constant percentage growth rate



Growth Rate (Derivative)

To find the growth rate, take the derivative of with respect to :

$$\frac{dx}{dt} = \frac{d}{dt}\left(e^{a+bt}\right)$$

Using the chain rule:

$$\frac{dx}{dt} = b \cdot e^{a+bt}$$

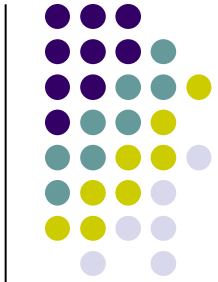
Now, rewrite as :

$$\frac{dx}{dt} = b \cdot x$$

Method 2: Time series analysis

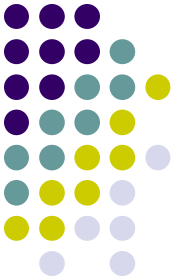
- Suppose you have real sales data for the past 20 years
- First, re-label years as $t = 0$ for the first year, $t = 2$ for the second year, and so on
- Run the appropriate regression
  - Linear growth: $Real\ Sales_t = \alpha + \beta \times t + \varepsilon_t$
  - Exponential growth: $Real\ Sales_t = e^{\alpha+\beta\times t+\varepsilon_t}$
- Forecast real sales growth, real sales, and nominal sales for the years to come (CPI forecasts still needed)

Method 3: Theoretical analysis



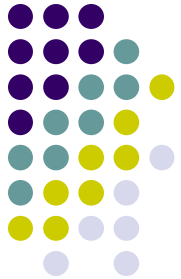
- A firm's growth rate g depends on
  - The percentage of reinvested earnings
  - The return earned on the firm's reinvestments, e.g., return on assets (ROA)
- High growth firms typically have low payout ratio (high investment ratios)
  - Payout ratio, b = Dividends/Net Income
  - Reinvestment (retention) ratio = 1 – Payout ratio = $1 - b$
- Low payout ratio allows these firms to reinvest in new projects, and grow faster

Method 3: Theoretical analysis



- Sustainable growth: Maximum growth feasible without external equity financing, while raising debt to maintain a constant debt/equity (D/E) ratio
  - g = ROE × (1 – b)
- Internal growth: Maximum growth feasible without any external financing
  - g = ROA x (1-b)

Example



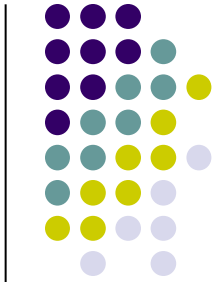
- In year 2017, a company has ROE of 9.76% and ROA of 4.18%. It paid out 46.38% of its earnings as a dividend
- Suppose that ROA, ROE, and payout ratio stay constant
- What is the growth rate that this company can achieve without issuing equity, but maintaining its current debt to equity ratio?

$$g = \text{ROE}(1\text{-b})$$

- What is the growth rate that this company can achieve without additional external financing?

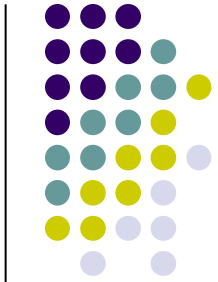
$$g = \text{ROE}(1\text{-a})$$

Comments



- So far, we learned how to forecast sales for individual firms
- Using the same techniques, we can often project industry sales first
- Then project the market share of the firm, considering
  - Entry or exit of competitors, market strategies, relative strength/weakness of the firm, etc.
- And finally, forecast the firm's sales by multiplying industry sales forecast to the projected market share

Projection of other items



- To construct a pro-forma income statement, we need to project
  - COGS, SG&A, etc.
- To forecast free cash flows, we also need to project
  - NWC (and hence ΔNWC), fixed assets (and hence capital expenditure and depreciation, etc.)

Projecting operating costs

- We focus on cost of goods sold (COGS) and selling, general, and administrative expenses (SG&A)
- We can combine them in the forecast
- If the company report depreciation as a component of these costs, we need to remove depreciation first from them
  - Depreciation is not directly linked to sales

Projecting operating costs

- It is important to distinguish between fixed and variable operating costs
  - Variable costs (VC) are proportional to level of sales
  - Fixed costs (FC) do not change with sales
- It is not advisable to project operating costs (OC) as a fixed percentage of sales
- Instead, OC = FC + (%VC) × Sales
  - %VC is the percentage of VC to Sales

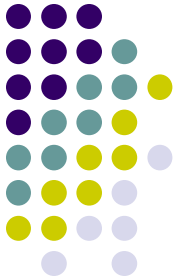
Projecting operating costs

- Consider a regression method:
- OC = FC + (%VC) × Sales
- Set up the analog regression:

$$OC_t = \alpha + \beta \times Sales_t + \varepsilon$$

- Use past data to estimate coefficients α and β: They will be the estimates of FC and %VC, respectively

Example



- Data of past sales and costs

Real Sales	Real Costs	Costs/Sales
177,594	163,877	92.28%
183,940	173,155	94.14%
199,493	184,325	92.40%
191,034	177,941	93.15%
176,090	169,152	96.06%
Average		93.60%

- If projected real sales are $205,000, then what are the projected operating costs based on the “percentage of sales” approach

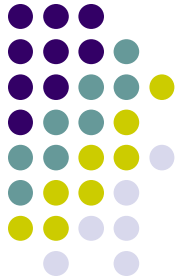
Example

	Coef.	Std. Err	*t*-Stat	*p*-value
Intercept	30,271.16	25,597.98	1.1825	0.3221
Sales	0.7726	0.1377	5.6089	0.0112

R-squared = 0.91

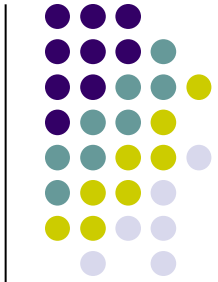
- Projected sales =
  - Projected fixed costs =
  - Projected variable costs =
  - Projected operating costs =

Remarks



- Using the regression analysis to project costs, we assume that firm's cost structure will remain the same
- What if firm was operating inefficiently in the past, but is planning improvements?
- One alternative is to use industry average estimates (analyze competitors)

Percentage of sales approach



- Many items in the income statement and balance sheet often vary depending on a firm's (project's) sales

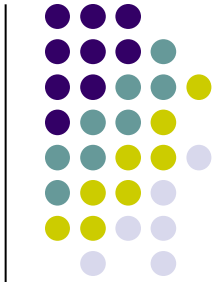
  e.g., working capital items, variable costs

- If the ratios of these items to sales remain stable over time, then we can predict them once sales forecast is available

Projecting NWC items

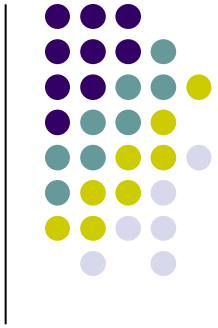
- The following ratios provide clues on firm's credit policy, inventory policy, etc.
  - $Avg.\ Collection\ Period = \frac{Account\ Receivables}{Sales} \times 365$
  - $Inventory\ Days = \frac{Inventory}{COGS} \times 365$
  - $Avg.\ Payable\ Period = \frac{Account\ Payables}{Operating\ Costs} \times 365$

Projecting NWC items



- Use the past ratios to project future ratios and NWC items
- We need to assume that these ratios are stationary over time
  - $Projected\ A/R = \frac{Projected\ Avg,Collection\ Period}{365} \times Projected\ Sales$
  - $Projected\ Inventory = \frac{Projected\ Inventory\ Days}{365} \times Projected\ COGS$
  - $Projected\ A/P = \frac{Projected\ Avg.Payable\ Period}{365} \times Projected\ Operating\ Costs$

Projecting fixed assets

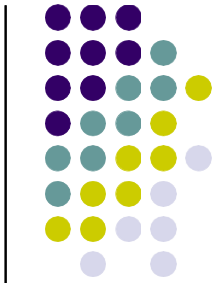


- Fixed assets are difficult to project because although they depend on sales, the relation is not always linear
  - Suppose the firm is currently operating its plant and machinery at 70% capacity
  - It can increase production and sales without adding fixed assets
  - On the other hand, if it is operating at (close to) 100% capacity, it will need to buy fixed assets
  - Unfortunately, we do not observe utilization rates

Projecting fixed assets

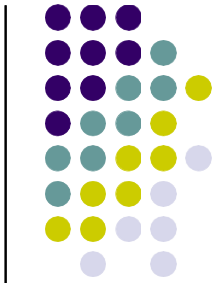
- Two types of capital expenditures
  - **Expansion** of productivity capacity is undertaken when:
    - Current capacity utilization is close to 100%, and/or
    - Management is buying PP&E in anticipation of future sales growth
  - **Maintenance** of current productive capacity (replacement needs)
    - It is not equal to depreciation, which is an accounting concept

Projecting expansion of capacity



- GFA turnover = Sales/Gross fixed assets
  - Examine how this ratio varies over time
  - Compare firm's GFA turnover with that of its competitors
- Useful clues on firm's capacity utilization
  - Suppose GFA turnover declined from 4 to 3.2
  - What does it indicate?

Projecting expansion of capacity



- Suppose capacity utilization is almost 100%
  - Firm needs new assets to generate new sales
  - Projected GFA = Projected Sales/GFA-turnover
- Note: A firm can add new capacity even when it is operating less than 100% capacity
  - Why? In anticipation of future growth
  - Therefore, always read firm's "Annual Report" to find out the firm's capital expenditure plans

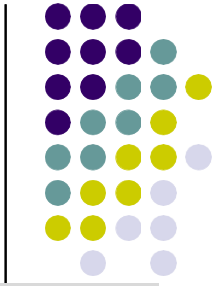
Example

- A firm had sales of $1 million
- The GFA turnover for the firm is 1.35, while comparable firms in the industry have a GFA-turnover of 1.70
- Compute the maximum sales the firm can achieve without expanding capacity? Assume that comparable firms are operating at 100% capacity utilization

Projecting replacement of capacity

- This information may be found from the “Notes to Financial Statements”
- Simple (crude) method:
  - For all past years, find out how much CPX was for replacement of productive capacity
  - Compute past growth rate of the replacement CPX; then its average
  - Assume that, in the future, CPX needed for replacement will grow at this average growth rate

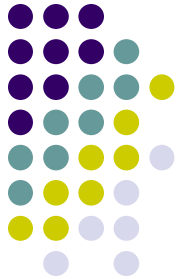
Reconcile pro-forma financial statements



Balance Sheet	
Cash and Marketable Securities	Debt
Other Current Assets	Equity
Gross Fixed Assets	Stocks
Accumulated Depreciation	Accumulated Retained Earnings
Net Fixed Assets	
Total Assets	**Total Liabilities and Equity**

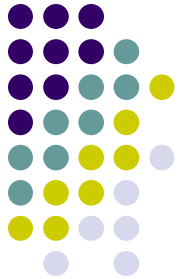
Income Statement
Sales
Costs
Depreciation
Interest Expense
Interest Income
Taxes
Net Income
Dividend
Retained Earnings

How to reconcile statements



- When valuing a firm, we care about its future *operations*
- We want to project the operating-related items
  - e.g., sales, COGS, A/R, A/P, etc.
- We cannot change operating-related items to make the balance sheet balance and to maintain the relationship between income statement and balance sheet
- We must use the **financing side** items

The concept of PLUG



- We consider a candidate for the plug from three financing activities
  - Change in cash account
  - Change in long-term debt
  - Change in equity (including dividends)
  - Any combination of these items can also be a plug

- Free cash flow (excluding ΔCash) = Financial cash flow + ΔCash

- The choice of a plug reflects a firm's financial policy
- From a financial viewpoint, it tells us how the firm finances its shortfalls and what it does with its excess cash

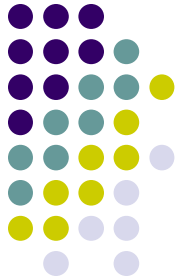
A simple example

- The current financial statements of a company are given below
- Assume all operating items change with sales proportionally
- Sales are expected to increase 20%

Income Statement	
Sales	1,000
Costs	800
Net Income	200

Balance Sheet			
Assets	500	Debt	250
		Equity	250
Total Assets	500	Liability & Equity	500

A simple example

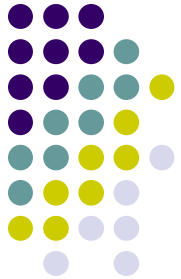


- Assume stable D/E ratio
  - Net income is $240, while equity increases by only $50, and debt increases by $50
  - There must be a dividend of $240 (= $240 – $50 + $50)
  - Dividend is the PLUG

Income Statement	
Sales	1,200
Costs	960
Net Income	240

Balance Sheet			
Assets	600	Debt	300
		Equity	300
Total Assets	600	Liability & Equity	600

A simple example

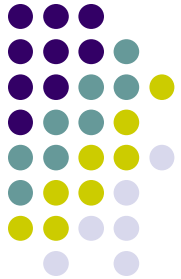


- Now assume no dividend payout
  - All $240 net income becomes retained earnings, and equity increases by $240
  - To balance, the debt account must post $110
  - So, debt must be repaid by 250 – 110 = $140
  - Debt retirement is now the PLUG

Income Statement	
Sales	1,200
Costs	960
Net Income	240

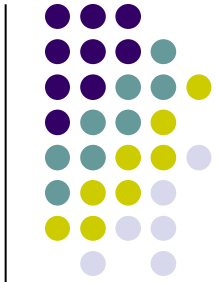
Balance Sheet			
Assets	600	Debt	110
		Equity	490
Total Assets	600	Liability & Equity	600

Other aspects of forecasting



- To be able to make accurate forecasts, we must understand
  - The operating and financial characteristics of the firm
    - Cost structure, working capital policies, asset needs, etc.
- Ratio analysis helps understand these characteristics
  - Have the ratios changed over time (time-series analysis)
  - How do them compare with competitor's ratios (cross-sectional analysis)

Scope of ratio analysis



- Ratios are based on financial statements
- Four categories of ratios
  - Liquidity
  - Leverage
  - Asset use or efficiency
  - Profitability