BEE/CSS 371 Business of Technology
Winter 2017
Lecture 11

Nicole Hamilton

https://faculty.washington.edu/kd1uj

Today's agenda

1. Basic accounting
2. Time value of money

Basic accounting

Basic accounting concepts

1. Entity.
2. Going concern.
3. Monetary.
4. Matching or Accrual basis.
5. Accounting period.
6. Revenue recognition.
7. Historical costs.
8. Materiality.
9. Conservatism.

Sources: Spiller & Gosman, *Financial Accounting: Basic Concepts*, pp 22-25, and Ittelson, *Financial Statements*, pp 25-26.

Entity. Accounting reports and records are for the entity, not the people or groups concerned with it.

Going concern. The entity is assumed to remain in operation. There is no need to focus on liquidation values.

Monetary. Money is used to measure accounting events. Fluctuations in the value of the dollar can be ignored.

Historical costs. Assets and claims are recorded at original prices.

Matching or Accrual basis. Net income is best measured by matching costs against revenues.

Accounting period. Economic activity is assumed to be divisible into time periods.

Revenue recognition. Revenue should be recognized only when it's earned and can be measured.

Conservatism. Losses reported when they are probable, gains are reported only after they actually happen.

Materiality. All transactions that would materially affect the financial condition must be reported.

Main accounting statements

1. Balance sheet.
2. Income statement.

Balance sheet

Assets = Equities

Assets = Liabilities + Owner's equity

An equity is an ownership interest, e.g., your parents' equity in their homes.

If the business has assets, someone must have a claim on them. They're paid for with equity or debt.

The balance sheet

Most liquid

Assets		*Liabilities & owners' equity*	
Cash	a	Accounts payable	k
Accounts receivable	b	Accrued expenses	L
Inventory	c	Current portion of debt	m
Prepaid expenses	d	Income taxes payable	n
Current assets	e = a + b + c + d	Current liabilities	o = k + L + m + n
Other assets	f	Long-term debt	p
Fixed assets at cost	g	Capital stock	q
Accumulated depreciation	h	Retained earnings	r
Net fixed assets	i = g - h	Shareholder's equity	s = q + r
Total assets	j = e + f + i	Total liabilities & equity	t = o + p + s

Least liquid

Current assets

Assets which are expected to be turned into cash *within one year*.

Includes:

- Cash
- Accounts receivable
- Inventory
- Marketable securities
- Prepaid expenses
- Other assets readily convertible into cash

Current liabilities

Debts or other obligations due *within one year*.

Working capital

Money the business has to work with in the short term.

Working capital =

Current assets – Current liabilities

The following alphabetical list was obtained from the accounting department at Vortex, Inc. as of Dec 31, 2016.

Accounts payable	$10,000	Inventories	$8,000
Accounts receivable	12,000	Land	100,000
Accrued mortgage interest	2,000	Mortgage debt	60,000
Buildings	500,000	Patents	20,000
Capital stock	50,000	Prepaid insurance	1,000
Cash	7,000	Temporary investments	5,000
Equipment	125,000	Retained earnings	?
Estimated taxes owed	12,000	Wages payable	2,000

Prepare a proper balance sheet and determine the proper amount to be shown as retained earnings.

Assets		
Current assets		
Cash	7000	
Accounts receivable	12000	
Inventories	8000	
Prepaid insurance	1000	
Temporary investments	5000	33000
Long-term assets		
Buildings	500000	
Equipment	125000	
Land	100000	
Patents	20000	745000
Total assets		778000

Liabilities		
Current liabilities		
Accounts payable	10000	
Accrued mortgage interest	2000	
Estimated taxes owed	12000	
Wages payable	2000	26000
Long term liabilities		
Mortgage debt	60000	60000
Total liabilities		86000
Stockholder's equity		
Capital stock	50000	
Retained earnings	**642000**	692000
Total liabilities and equity		778000

Income statement

An income statement is also called a profit and loss statement or a *P&L*.

Income statement

Net sales	a
Cost of goods sold (COGS)	b
Gross margin	c = a - b
Sales & marketing	d
Research & development	e
General & administrative	f
Operating expenses	g = d + e + f
Income from operations	h = c - g
Interest income	i
Income taxes	j
Net income	k = h + i - j

Costs vs. Expenses

Costs are amounts spent to create inventory.

Expenses are for R&D, marketing and administrative needs of the business.

Expenses versus assets

An expense is a cost that decreases assets or increases liabilities.

An expense reduces net income and thus, the tax you pay.

Buying an asset merely exchanges one type of asset (e.g., cash) for another (e.g., a computer).

If the expected lifetime of the asset is more than a year, you're often required to spread the cost out as a yearly expense, called ***depreciation***.

Depreciation

A ***non-cash*** expense.

Example: You buy a $10K machine you expect to use for 10 years before it will need replacement.

You're *using up* 1/10th of it every year = $1K/yr.

To allow for this, you deduct that amount used up from your income.

But you don't spend cash. You just use up an asset you already own.

You've been given the following alphabetical list from the accounting department at Big Yellow Pencil Corporation, representing their activity for the year ending December 31, 2015. Construct a proper income statement, filling in the missing amounts.

Cost of goods sold	600,000.00
General & administrative	80,000.00
Gross margin	
Income before tax	
Income from operations	
Income taxes	70,000.00
Interest income	15,000.00
Net income	
Operating expenses	
Research & development	150,000.00
Revenue	1,300,000.00
Sales & marketing	20,000.00

Revenue	1,300,000	
Cost of goods sold	600,000	
Gross margin		**700,000**
Sales & marketing	20,000	
Research & development	150,000	
General & administrative	80,000	
Operating expenses		**250,000**
Income from operations		**450,000**
Interest income	15,000	
Income before tax		**465,000**
Income taxes	70,000	
Net income		**395,000**

Cash flow

Cash flow

Beginning cash	a
Cash receipts	b
Cash disbursements	c
Cash from operations	d = b -c
Fixed asset purchases	e
Net borrowings	f
Income taxes paid	g
Sale of stock	h
Ending cash	i = a + d - e + f - g + h

Cash flow

To convert from net income to cash flow, must adjust for transactions that affected net income but not cash.

Cash transactions

Reduces cash

- Paying salaries
- Paying for equipment or inventory
- Paying off a loan or an invoice

Increases cash

- Borrowing from a bank
- Selling stock
- Collecting accounts receivable
- Reducing inventories or other assets and getting paid in cash

Non-cash

- Shipping product to a customer on credit
- Receiving supplies from a vendor on credit
- Paying employees with stock
- Depreciation expense

Converting from Net Income to Cash Flow

Net Income
\+ Depreciation
\- Increase in Inventories
\- Increase in Accounts Receivables
\- Increase in Other Current Assets
\+ Increase Current Liabilities
\- Capital Spending
= Cash Flow

Google cash flow

Period Ending:	Trend	12/31/2013	12/31/2012
Net Income		**$12,920,000**	**$10,737,000**
Cash Flows-Operating Activities			
Depreciation		$3,939,000	$2,962,000
Net Income Adjustments		$1,831,000	$2,022,000
Changes in Operating Activities			
Accounts Receivable		($1,307,000)	($787,000)
Changes in Inventories		($234,000)	$301,000
Other Operating Activities		($696,000)	($833,000)
Liabilities		$2,206,000	$2,217,000
Net Cash Flow-Operating		**$18,659,000**	**$16,619,000**

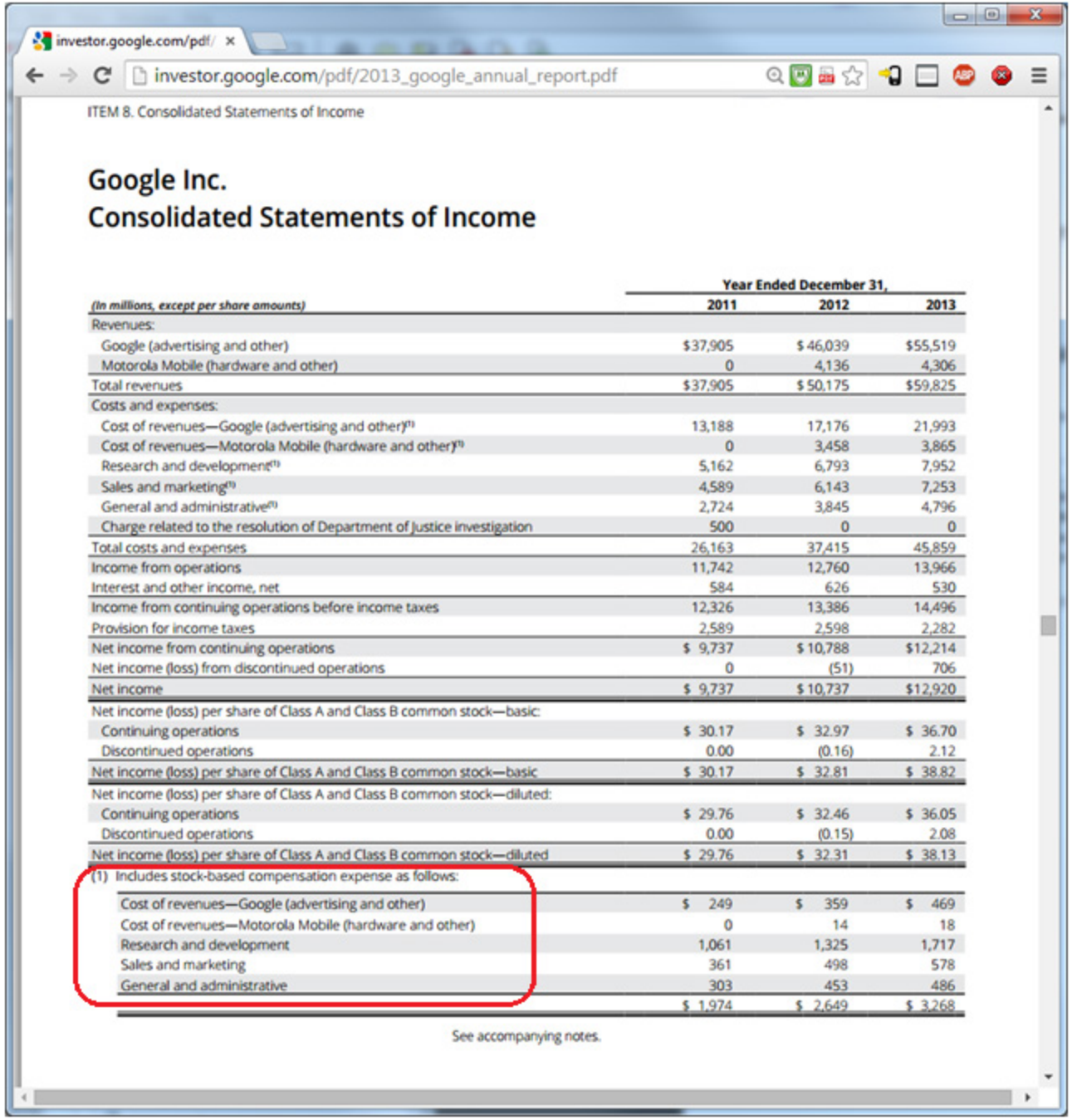
Cash Flows-Investing Activities			
Capital Expenditures		($7,358,000)	($3,273,000)
Investments		($7,398,000)	$785,000
Other Investing Activities		$1,077,000	($10,568,000)
Net Cash Flows-Investing		**($13,679,000)**	**($13,056,000)**
Cash Flows-Financing Activities			
Sale and Purchase of Stock		($781,000)	($287,000)
Net Borrowings		($557,000)	$1,328,000
Other Financing Activities		$0	$0
Net Cash Flows-Financing		**($857,000)**	**$1,229,000**
Effect of Exchange Rate		($3,000)	$3,000
Net Cash Flow		**$4,120,000**	**$4,795,000**

Lots of miscellaneous buckets.
Not clear what was in them.

Period Ending:	Trend	12/31/2013	12/31/2012
Net Income		**$12,920,000**	**$10,737,000**
Cash Flows-Operating Activities			
Depreciation		$3,939,000	$2,962,000
Net Income Adjustments		$1,831,000	$2,022,000
Changes in Operating Activities			
Accounts Receivable		($1,307,000)	($787,000)
Changes in Inventories		($234,000)	$301,000
Other Operating Activities		($696,000)	($833,000)
Liabilities		$2,206,000	$2,217,000
Net Cash Flow-Operating		**$18,659,000**	**$16,619,000**

Answers in the annual report.

http://investor.google.com/proxy.html



Google Inc.
Consolidated Statements of Income

(In millions, except per share amounts)	Year Ended December 31, 2011	2012	2013
Revenues:			
Google (advertising and other)	$37,905	$ 46,039	$55,519
Motorola Mobile (hardware and other)	0	4,136	4,306
Total revenues	$37,905	$ 50,175	$59,825
Costs and expenses:			
Cost of revenues—Google (advertising and other)[1]	13,188	17,176	21,993
Cost of revenues—Motorola Mobile (hardware and other)[1]	0	3,458	3,865
Research and development[1]	5,162	6,793	7,952
Sales and marketing[1]	4,589	6,143	7,253
General and administrative[1]	2,724	3,845	4,796
Charge related to the resolution of Department of Justice investigation	500	0	0
Total costs and expenses	26,163	37,415	45,859
Income from operations	11,742	12,760	13,966
Interest and other income, net	584	626	530
Income from continuing operations before income taxes	12,326	13,386	14,496
Provision for income taxes	2,589	2,598	2,282
Net income from continuing operations	$ 9,737	$ 10,788	$12,214
Net income (loss) from discontinued operations	0	(51)	706
Net income	$ 9,737	$ 10,737	$12,920
Net income (loss) per share of Class A and Class B common stock—basic:			
Continuing operations	$ 30.17	$ 32.97	$ 36.70
Discontinued operations	0.00	(0.16)	2.12
Net income (loss) per share of Class A and Class B common stock—basic	$ 30.17	$ 32.81	$ 38.82
Net income (loss) per share of Class A and Class B common stock—diluted:			
Continuing operations	$ 29.76	$ 32.46	$ 36.05
Discontinued operations	0.00	(0.15)	2.08
Net income (loss) per share of Class A and Class B common stock—diluted	$ 29.76	$ 32.31	$ 38.13
(1) Includes stock-based compensation expense as follows:			
Cost of revenues—Google (advertising and other)	$ 249	$ 359	$ 469
Cost of revenues—Motorola Mobile (hardware and other)	0	14	18
Research and development	1,061	1,325	1,717
Sales and marketing	361	498	578
General and administrative	303	453	486
	$ 1,974	$ 2,649	$ 3,268

See accompanying notes.

Some employees were paid with stock rather than cash

Net income (loss) per share of Class A and Class B common stock—diluted:
Continuing operations
Discontinued operations
Net income (loss) per share of Class A and Class B common stock—diluted

(1) Includes stock-based compensation expense as follows:

Cost of revenues—Google (advertising and other)
Cost of revenues—Motorola Mobile (hardware and other)
Research and development
Sales and marketing
General and administrative

You've opened a new bakery with an initial investment of $80,000. You project it should generate $6,000/mo in sales the first 3 months, then $10,000/mo after that. Operating costs are expected to be $10,000/mo the first 3 months due to advertising and other startup expenses, then fall to $7,000/mo after that. You plan disbursements of $22,000/mo to pay invoices for equipment and other capital purchases each of the next 6 months.

Create a cash flow schedule for the first 6 months. What is your operating income for the first 6 months? Will you run out of cash during that time? How close will you come?

Amounts are in thousands of dollars.

Month	1	2	3	4	5	6	Total
Starting cash	80	54	28	2	(17)	(36)	
Sales	6	6	6	10	10	10	48
Operating costs	(10)	(10)	(10)	(7)	(7)	(7)	(51)
Operating income	(4)	(4)	(4)	3	3	3	(3)
Equipment	(22)	(22)	(22)	(22)	(22)	(22)	(132)
Ending cash	54	28	2	(17)	(36)	(55)	

Ratios

ratios

Liquidity. Tests the firm's ability to pay current liabilities with current assets. A firm or an individual is *liquid* if they have a lot of cash and near-cash assets.

Margins. Tests the firm's ability to generate profits from operations.

Profitability. Tests the firm's ability to generate profits as a return on the assets employed, either the total assets or just the stockholders' equity.

Leverage. Measures the fraction of all the firm's assets financed with debt rather than shareholder's equity.

Google ratios

Period Ending:	Trend	12/31/2013	12/31/2012
Liquidity Ratios			
Current Ratio		458%	422%
Quick Ratio		455%	418%
Cash Ratio		369%	335%
Profitability Ratios			
Gross Margin		57%	59%
Operating Margin		23%	25%
Pre-Tax Margin		24%	27%
Profit Margin		22%	21%
Pre-Tax ROE		17%	19%
After Tax ROE		15%	15%

Liquidity

$$\text{Current ratio} = \frac{\text{Current assets}}{\text{Current liabilities}}$$

$$\text{Quick ratio} = \frac{\text{Cash} + \text{Cash equivalents} + \text{Marketable securities} + \text{Accounts Receivable}}{\text{Current liabilities}}$$

$$\text{Cash ratio} = \frac{\text{Cash}}{\text{Current liabilities}}$$

Margins

$$\text{Gross margin} = \frac{\text{Revenue} - \text{COGS}}{\text{Revenue}}$$

$$\text{Operating margin} = \frac{\text{Income from operations}}{\text{Revenue}}$$

$$= \frac{\text{Revenue} - \text{COGS} - \text{Operating Expenses}}{\text{Revenue}}$$

$$\text{Pre-tax margin} = \frac{\text{Net income}}{\text{Revenue}}$$

Profitability

Return on Equity

$$\text{Pre-tax ROE} = \frac{\text{Earnings before tax}}{\text{Shareholder's equity}}$$

$$\text{After-tax ROE} = \frac{\text{Net income}}{\text{Shareholder's equity}}$$

Return on Investment

$$\text{ROI} = \frac{\text{Net income}}{\text{Total assets}}$$

Leverage

$$\text{Debt-to-equity} = \frac{\text{Total liabilities}}{\text{Shareholder's equity}}$$

Concept of leverage

Controlling a larger asset by borrowing part of the value.

Examples: Buying a home with a mortgage or stock on margin.

If you have a lot of debt relative to your assets, you are said to be highly *leveraged*.

Called leverage because it *multiplies* the effects of any changes in the value of the asset.

Image source: http://createthemovement.com/the-power-of-an-idea/

Example: Buy a home that goes up 12%

	No mortgage	**90% mortgage**
Purchase price	$ 500,000.00	$ 500,000.00
Mortgage	-	450,000.00
Cash invested	500,000.00	50,000.00
Sale price	560,000.00	560,000.00
Cash returned	560,000.00	110,000.00
Profit	60,000.00	60,000.00
Return on investment	12%	120%

By controlling 10x as much asset as you have cash to pay for, you multiply your potential return on investment by 10x.

But what if it goes down 12%

	No mortgage	**90% mortgage**
Purchase price	$ 500,000.00	$ 500,000.00
Mortgage	-	450,000.00
Cash invested	500,000.00	50,000.00
Sale price	440,000.00	440,000.00
Cash returned	440,000.00	(10,000.00)
Profit	(60,000.00)	(60,000.00)
Return on investment	-12%	-120%

You owe money just to get out of the deal. You have to pay $10K to sell. You are *underwater*.

You've decided to buy a house for $300K with a 90% mortgage. Ignoring interest and other expenses, if you then immediately sell it for $360K, what is your ROI?

If you'd paid cash, what would your ROI have been? Why is an example of leverage?

	No mortgage	90% mortgage
Purchase price	300,000	300,000
Mortgage	-	270,000
Cash invested	300,000	30,000
Sale price	360,000	360,000
Cash returned	360,000	90,000
Profit	60,000	60,000
Return on investment	20%	200%

With a 90% mortgage, you've multiplied the effects of any changes in the value of the house.

Time value of money

A dollar today is worth more than a dollar promised tomorrow.

We *discount* the future.

Terminology

Interest is money paid for the use of borrowed money.

Principal is the amount borrowed.

Interest rate is the interest payable at the *end* of a period divided by the money owed at the *beginning* of a period. Usually expressed as a %.

Compounding

Simple interest is calculated by multiplying the interest rate x principal x number of periods.

Compound interest is interest added to the principal at the end of each period so that it also earns interest.