

# 15.516x Financial Accounting

## Intangible Assets

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**Finance** at MIT

Where ingenuity drives results

# Tangible assets vs. intangible assets

- Move from tangible assets (Hertz's cars) to intangible assets.
- Tangible assets are things you can touch (e.g., inventory and PPE). Tangible assets have physical substance.
- Intangible assets are things you cannot touch (e.g., patents and brand value). Intangible assets do not have physical substance.

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# Intangible assets

- Investing in R&D and other intangible assets is conceptually similar to CAPEX.
- What are the rules for the costs of internally developed intangible assets under US GAAP?
  - The costs of internally developed intangible assets are expensed (as opposed to capitalized and put on balance sheet as an asset).
- Logic?
  - Future economic benefit not reliably measurable.
  - Compare to “tangible” asset like building
- Exceptions:
  - Certain software development expenditures
  - Intangibles purchased from another company (more later)

# Consider Microsoft's balance sheet at 6/30/2019 (\$billions)

	Book value
Total Liabilities	184
Total S/E	103
Total Liab & Equity	287

# Consider Microsoft's balance sheet at 6/30/2019 (\$billions)

## Let's estimate the market value of Microsoft's assets

	Book value	Market value
Total Liabilities	184	
Total S/E	103	
Total Liab & Equity	287	

# Consider Microsoft's balance sheet at 6/30/2019 (\$billions)

## Let's estimate the market value of Microsoft's assets

	Book value	Market value
Total Liabilities	184	
Total S/E	103	1,037
Total Liab & Equity	287	

← At 6/30/2019  
Microsoft has 7.643  
billion shares  
outstanding and its  
price is \$135.68.

# Consider Microsoft's balance sheet at 6/30/2019 (\$billions)

## Let's estimate the market value of Microsoft's assets

	Book value	Market value
Total Liabilities	184	184
Total S/E	103	1,037
Total Liab & Equity	287	

← Assume that market value of liabilities = book value. We will see in a later class that this assumption is reasonable.



# Consider Microsoft's balance sheet at 6/30/2019 (\$billions)

## Let's estimate the market value of Microsoft's assets

	Book value	Market value
Total Liabilities	184	184
Total S/E	103	1,037
Total Liab & Equity	287	1,221

← \$934 billion market value is missing from total assets.

As of June 2019 Microsoft had a market capitalization of \$1,037 billion, while their book value of equity was only \$103 billion.

How is it that \$934 billion of market value is missing from total assets and book value of equity?

- Valuable intangible assets are off-balance sheet
- Intangible assets include:
  - Intellectual property (Patents, Copyrights, Trademarks)
  - Licenses, Franchise rights
  - Brand value
  - Customer lists
  - Goodwill

# Intangible assets

- As noted above, under US GAAP, the costs of internally developed intangible assets are expensed (as opposed to capitalized and put on balance sheet as an asset).
- Exceptions:
  - Certain software development expenditures
  - Intangibles purchased from another company (more later)

# Accounting rules for capitalizing software development costs (not on exam)

- Costs are expensed in the research / preliminary development phase.
- Once development has reached a phase where completion of the software is likely, costs are capitalized.
- After costs are capitalized, they are expensed over the useful life of the software.
- The rules are slightly looser for software developed for internal use than for software developed for external customers.

# Variation in practice

Mulford and Roberts (2006) find that 71% of US software firms do not capitalize any of their software development costs.

- These companies in essence assume that all of the costs occur before the completion of the software is likely.

Although IFRS encourages capitalization of development costs more broadly, Mazzi, Slack, Tsalavoutas, and Tsoligkas (2019) find that over 60% of companies do not.

Bottom line: there is much discretion and judgement involved in whether and how much are capitalized.

- Intuition: Where does research stop and development begin?
- Benefits of expensing everything:
  - It is costly to keep track of what to capitalize, and
  - Investors do not complain about conservative expensing of R&D.

# Depreciation of PPE and Amortization of Intangibles

Suppose a company buys a server for \$100K. Assume that there is no residual value.

If the useful life is 5 years, how much depreciation expense per year?

**\$20K**

If the useful life is 2 years, how much depreciation expense per year?

**\$50K**

# Depreciation of PPE and Amortization of Intangibles

Suppose a company capitalizes \$100K of software costs. Assume that there is no residual value.

If the useful life is 5 years, how much **amortization** expense per year?

**\$20K**

If the useful life is 2 years, how much **amortization** expense per year?

**\$50K**

# Athena Health and Cerner

Healthcare information companies.

Business is electronic health records, billing, and other services to hospitals.

They are continually investing large amounts in software.

They use the software to provide services (“internal use software”).

Information at 12/31/2017 (\$millions):

	Athena	% of sales	Cerner	% of sales
Revenues	1,220	100.0%	5,142	100.0%
Software development costs	173	14.2%	605	11.8%
Software costs capitalized	83	6.8%	274	5.3%
Useful life	2 years		5 years	
Software amortization expense	71	5.8%	173	3.4%



# “Pro Forma” Capitalization of Software Development Costs

- We will now take the perspective of an analyst covering Athena and Cerner
  - Create “pro forma” estimates that adjust earnings assuming different accounting
  - Parallel to consulting or valuation: Adjust to make “apples to apples”
- Athena has a 2 year useful life, whereas Cerner has a 5 year useful life.
  - We are going to adjust Cerner “pro forma” to have a 2 year useful life.
  - To make the adjustment, we need 2 years of past data on software costs capitalized.
  - Could adjust Athena, but harder – will see why in example.
- What other costs does GAAP require expensing that an investor might argue for capitalizing?
  - R&D more generally
  - Marketing and advertising
  - Employee training

# Pro Forma Software Development Capitalization

How would this impact the accounting statements?

- First we gather Cerner's software costs capitalized for 2015-2017

	2015	2016	2017
Software costs capitalized	265	294	274

# Pro Forma Software Development Capitalization

How would this impact the accounting statements?

- First we gather Cerner's software costs capitalized for 2015-2017
- Now we assume that Cerner's software has a 2 year useful life (instead of 5 useful life)
- If the useful life is 2 years:
  - 2015 costs capitalized will be amortized over 2016 and 2017.

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	2015	2016	2017
Software costs capitalized	265	294	274
Amortize 2015 costs		132	132

50% of 2015 costs capitalized

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Amortize 2015 costs		132	132
Amortize 2016 costs			147

50% of 2016 costs capitalized

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	<b>2015</b>	<b>2016</b>	<b>2017</b>
Software costs capitalized	265	294	274
Amortize 2015 costs		132	132
Amortize 2016 costs			147
Total to be amortized			<b>279</b>

# Athena Health and Cerner pro forma

Healthcare information companies.

Business is electronic health records, billing, and other services to hospitals.

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# Take-Aways

- Intangible assets are a large part of firm value for technology companies like Microsoft.
- In general, investments in intangible assets are expensed under US GAAP.
- An exception is software development costs, but company practice varies greatly.
- We did an example of making software development expense comparable by adjusting Cerner's useful life assumptions.
- We will see in the acquisitions class that intangible assets go on balance sheet when a company buys them from another company.



# 15.516x Financial Accounting

## Statement of Cash Flows

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# This class: Statement of Cash Flows

Understand the purpose of the statement of cash flows

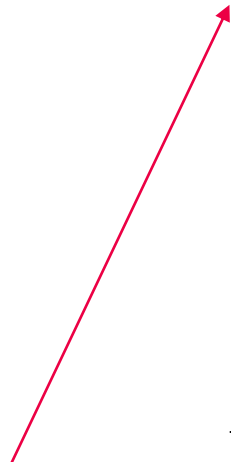
Understand the three sections of the statement

Understand how cash flow from operations reconciles with net income

# Motivation -- Recall Peters Company example

## $NI = CFO + \text{Accruals}$

Performance Measure	Year 1	Year 2	Total
Net Income.....	3	7	10
<b>Minus:</b> Cash Flow from Operations (CFO).....	8	2	10
Accruals.....	-5	5	0



Accruals “reverse”:  
Low accruals → higher future net income

# Motivation

## NI = CFO + Accruals (Example 2)

Performance Measure	Year 1	Year 2	Total
Net Income.....	7	3	10
<b>Minus:</b> Cash Flow from Operations (CFO).....	2	8	10
Accruals.....	5	-5	0

Accruals “reverse”:  
High accruals → lower future net income

Over the long-term, accruals sum to 0.

# Motivation

Net income (NI) =

Cash flow from operations (CFO) + Accruals

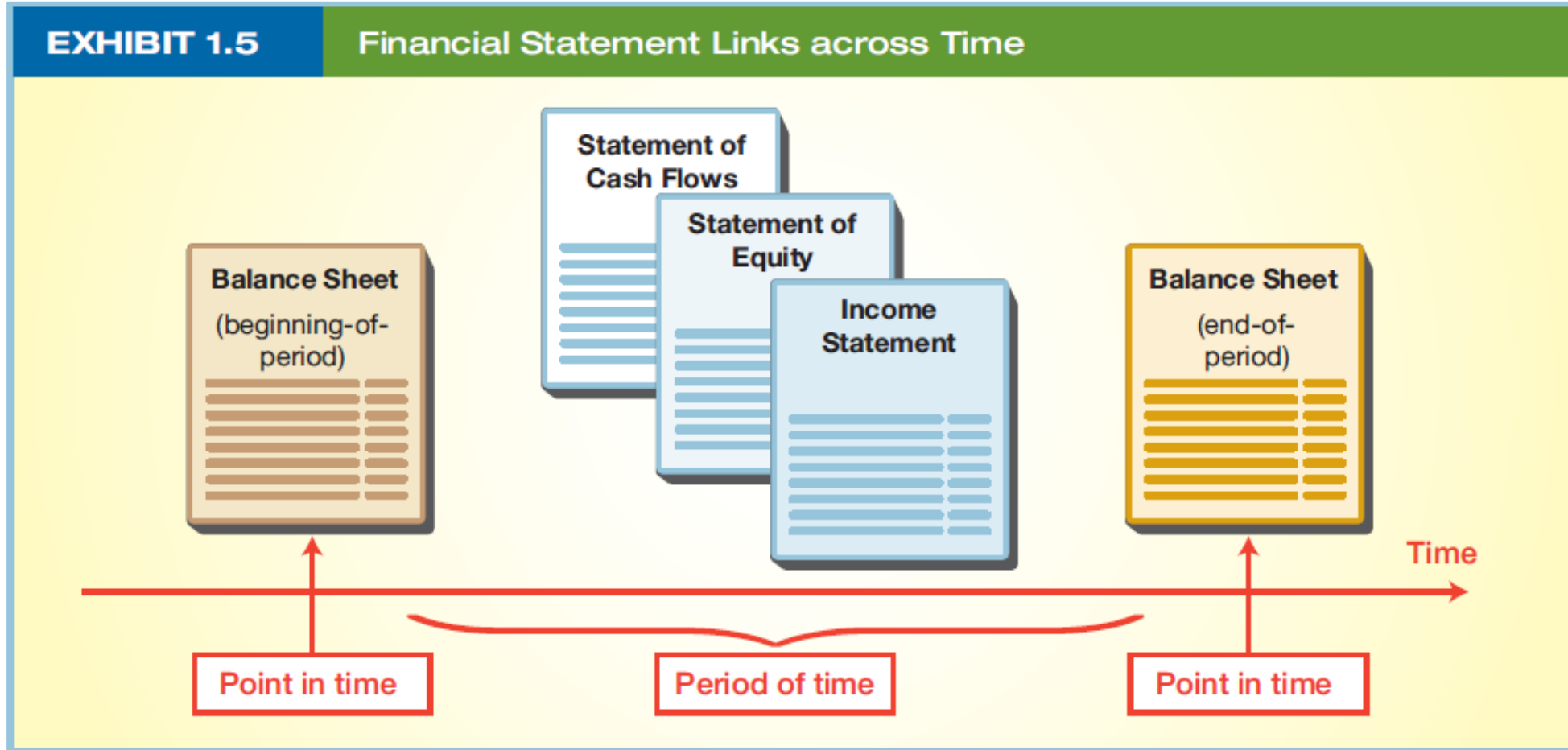
Accrual “stock-picking” strategy (not on exam):

- Buy low accrual stocks (Hi CFO/ Low NI): Type ‘A’
  - Higher future NI
- Sell high accrual stocks (Hi NI / Lo CFO): Type ‘B’
  - Lower future NI

Return to zero-investment / “hedge” strategy:

- What “should it be”? 0% if market understands future NI difference
- In practice: about 10% per year

# Recall Financial Statement Links



# Recall Peters company, year 1

	SCF	A/R	Prepd Rent	Inv	A/P	DefRev	WPay	Cont Cap	R/E	
1	24	Stock issue						24		
2	-12	Prepaid rent	12							
2A			- 6						- 6	Rent Exp
3				10	10					
4	20	Rev							24	Revenue
4A				-5					- 5	COGS
5	- 6	Wages					4		- 10	Wage exp
6	6	Def Rev				6				
7	-1	Div							-1	Dividend
EB	31	4	6	5	10	6	4	24	2	

# Financial statement links

$$A = L + SE$$

$$\Delta A = \Delta L + \Delta SE$$

$\Delta$  means change from last year to this year.

$\Delta A$  means this year's assets minus last year's assets

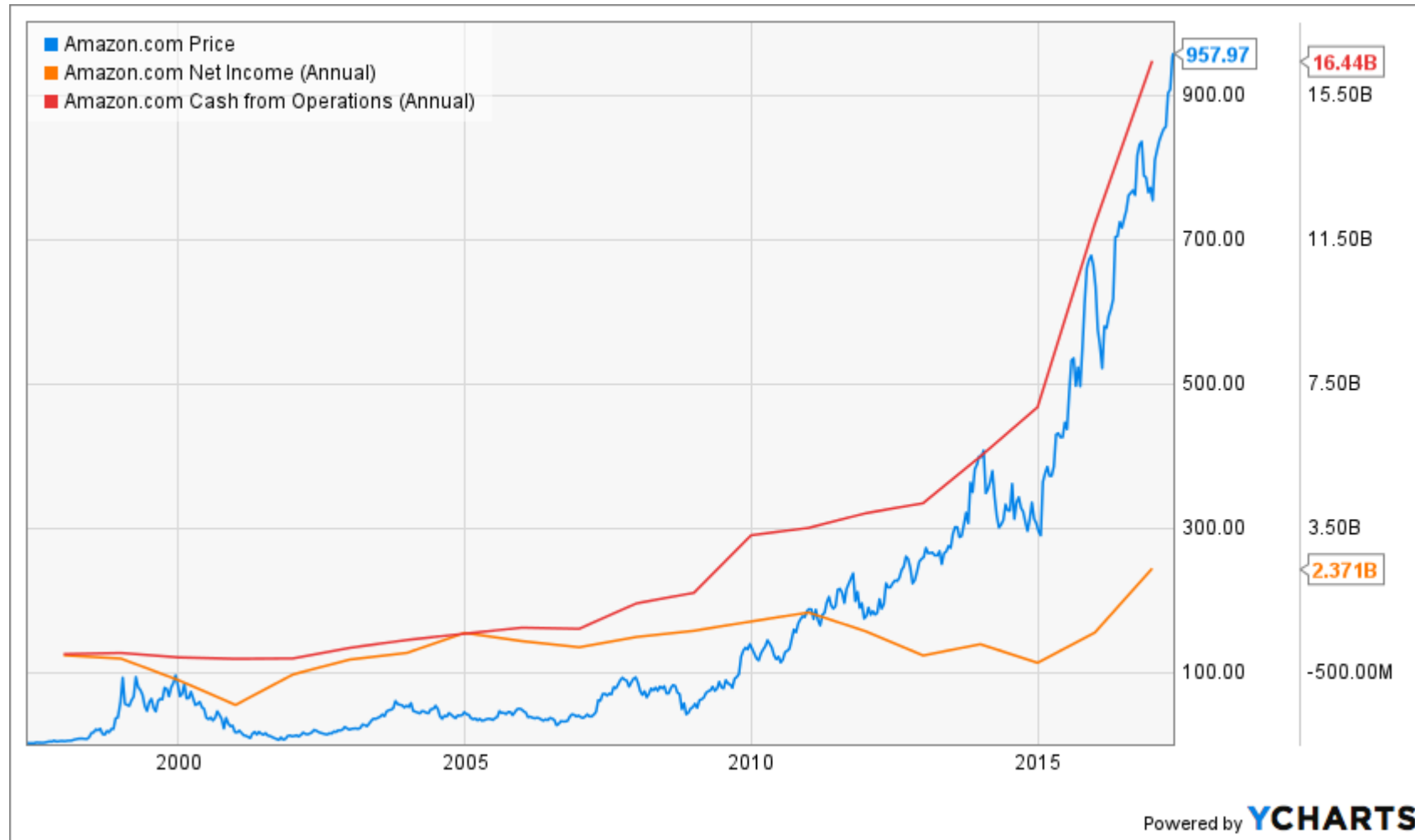
$$\Delta \text{Cash} = -\Delta \text{Non-Cash Assets} + \Delta L + \Delta SE$$



# Amazon's Performance

- How would you evaluate Amazon's performance from 2014 to 2016?
- How about over the last twenty years?
- Is Amazon a profitable company?

# Amazon's Performance



# Amazon's Performance

Measure	2016	2015	2014
Sales	135,987	107,006	88,988
Net Income	2,371	596	-241
Operating cash flow (CFO)	16,443	11,920	6,842
Investing cash flow	-9,876	-6,450	-5,065
Financing cash flow	-2,911	-3,763	4,432

# Statement of Cash Flows: Three Sections

1. **Operating**: Primary business activities
  - Selling goods or rendering services
  - Interest income, dividends received
2. **Investing**: Acquiring and selling productive assets
  - Acquisition and disposal of PPE
  - Purchase/sale of securities: other firms' stock or debt
3. **Financing**: Related to external sources of financing
  - Issuing stock or debt
  - Payment of dividends and repayment of debt

The statement sums to the actual change in cash and cash equivalents during the year

# Amazon's Net Income and Cash Flow from Operations

	Year Ended December 31,		
	2016	2015	2014
CASH AND CASH EQUIVALENTS, BEGINNING OF PERIOD	15,890	14,557	8,658
OPERATING ACTIVITIES:			
Net income (loss)	2,371	596	(241)
Adjustments to reconcile net income (loss) to net cash from operating activities:			
Depreciation of property and equipment, including internal-use software and website development, and other amortization, including capitalized content costs	8,116	6,281	4,746
Stock-based compensation	2,975	2,119	1,497
Other operating expense, net	160	155	129
Other expense (income), net	(20)	250	59
Deferred income taxes	(246)	81	(316)
Excess tax benefits from stock-based compensation	(829)	(119)	(6)
Changes in operating assets and liabilities:			
Inventories	(1,426)	(2,187)	(1,193)
Accounts receivable, net and other	(3,367)	(1,755)	(1,039)
Accounts payable	5,030	4,294	1,759
Accrued expenses and other	1,724	913	706
Additions to unearned revenue	11,931	7,401	4,433
Amortization of previously unearned revenue	(9,976)	(6,109)	(3,692)
Net cash provided by (used in) operating activities	16,443	11,920	6,842

# Major Differences between Amazon CFO and Net Income

Exhibit 2 of the case shows that 2016 Net Income is \$2 billion, and Operating Cash Flows are \$16 billion. What are the major differences?

- |   |              |
|---|--------------|
| ■ Depreciation                                | \$8 billion  |
| ■ Stock-Based Compensation                    | \$3 billion  |
| ■ Changes in Operating Assets and Liabilities | \$4 billion  |
| ■ Inventories, A/R net and other              | -\$5 billion |
| ■ A/P, net unearned revenue and other         | \$9 billion  |

# Zsa Zsa Co – Depreciation Expense

Contra-Asset to record reduction in PPE Values

Assets			=	Liab	S/E
Cash	PPE	– AccDep	=		R/E
1/1/06 –20,000	20,000				
12/31/06		3,000			–3,000
12/31/07		3,000			–3,000
.		.			.
.		.			.
12/31/10		3,000			–3,000

Note that depreciation does not affect cash. Depreciation allocates expenses to periods to match the firm's use of PPE but does not require cash outflows!

# Depreciation expense in 2016

How much cash did Amazon pay for property, plant, and equipment in 2016? Use the BSE to account for the transaction.

Assets			=	Liab	S/E
Cash	PPE	– AccDep	=		R/E
-6,737	6,737				

Assuming a 5-year useful life and \$0 salvage value, use the BSE to account for depreciation on these assets in the next year.

1,347

-1,347

$(6,737 - 0)/5 = 1,347$  million per year



# Why is depreciation increasing over time?

More PP&E (gross) → more depreciation

The balance sheet indicates that PP&E (net) grew by \$8 billion in 2016.

The Investing section of the statement of cash flows indicates that over the last 3 years:

- Amazon purchased over \$16 billion in PP&E  
(sum of \$6.7, \$4.6, and \$4.9 billion).
- Amazon did not sell any material amounts of fixed assets

# Amazon's investing activities – Purchases of PP&E

## INVESTING ACTIVITIES:

Purchases of property and equipment, including internal-use software and website development, net	(6,737)	(4,589)	(4,893)
Acquisitions, net of cash acquired, and other	(116)	(795)	(979)
Sales and maturities of marketable securities	4,733	3,025	3,349
Purchases of marketable securities	(7,756)	(4,091)	(2,542)
Net cash provided by (used in) investing activities	<u>(9,876)</u>	<u>(6,450)</u>	<u>(5,065)</u>

# Why is depreciation increasing over time?

More PP&E (gross) → more depreciation

Why is Amazon growing its PPE?

Its sales have grown from \$88.9 billion to \$135 billion (24% annualized).

Amazon anticipates rapid future growth, and it needs to grow its fixed assets to support this growth.

# Big tech to get its head out of cloud frenzy (WSJ, Sept. 29, 2018)

The enormous, “hyperscale” networks owned by Alphabet Inc.’s Google, **Amazon.com**, Microsoft and Facebook **demand a staggering amount of capital expenditures.**

The four aforementioned companies **spent a total of \$34.7 billion in the first six months of this year—up 59% from the same period last year.**

# Effect of stock based compensation?

Use the BSE to account for paying an employee \$1,000 in cash.

Assets			=	Liab	S/E	
Cash	PPE	– AccDep	=		CC	+ R/E
-1,000						-1,000 (wage expense)

Use the BSE to account for selling \$1,000 in stock.

1,000					1,000	(stock issuance)
-------	--	--	--	--	-------	------------------

Use the BSE to account for paying an employee \$1,000 in stock.

1,000	-1,000	(wage expense)
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# What is working capital?

Working Capital is:

$\text{Current Assets} - \text{Current Liabilities}$

Non-Cash Working Capital is:

$\text{Current Assets} - \text{Cash} - \text{Current Liabilities}$

The non-cash working capital accounts we have covered are:

Accounts Receivable

Inventory

Prepaid Assets

Accounts Payable

Unearned Revenues

# Why do changes in working capital affect CFO?

Current assets example: Suppose Amazon buys \$1,000 of inventory for cash. Use the BSE to account for this transaction.

Cash	Inventory
-\$1,000	\$1,000

Does this transaction affect cash?

Yes

Does this transaction affect net income?

No

We need to subtract \$1,000 from the net income to get CFO.

# Why do changes in working capital affect CFO?

Current liabilities example: Suppose Amazon sells \$1,000 of services and receives cash before providing the service. Use the BSE to account for this transaction.

Cash	Unearned Revenue
\$1,000	\$1,000

Does this transaction affect cash?

Yes

Does this transaction affect net income?

No

We need to add \$1,000 to net income to get CFO.



# To arrive at CFO from Net Income

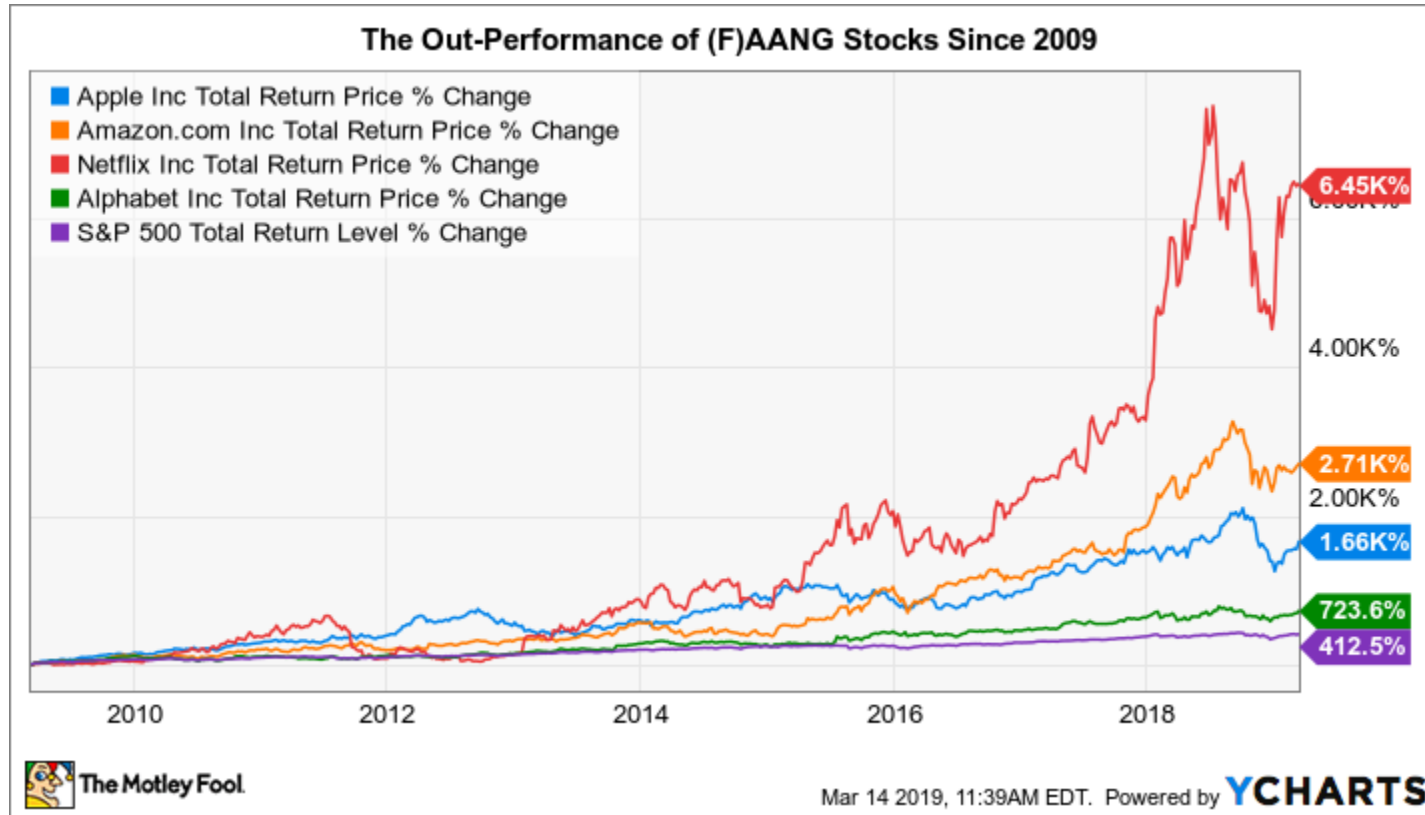
- Recall that  $CFO = NI - \text{Accruals}$ 
  - Starting with NI, add/subtract accruals to get CFO
  
- Start with Net Income
  - 1) **Add non cash expenses:** *expenses that reduce NI but did not require cash* (e.g., depreciation expense and stock compensation)
  - 2) **Add/Subtract:** any gains or losses associated with investing activities (e.g., PP&E disposal)
  - 3) **Add/Subtract:** changes in non-cash working capital accounts
  
- Arrive at CFO

# Amazon's NI to CFO

Measure	2016	2015	2014
Net Income	2,371	596	-241
Depreciation	8,116	6,281	4,746
Stock compensation	2,975	2,119	1,497
Other	(935)	367	(134)
Change in WC	3,916	2,557	974
Operating cash flow (CFO)	16,443	11,920	6,842

# FAANG Stocks

Facebook (FB), Amazon (AMZN), Apple (AAPL), Netflix (NFLX), and Alphabet (GOOG).



# Netflix earnings: Where accounting meets showbiz (Barrons 8/24/18)

This trailblazer's earnings are largely a creation of accounting practices. As Netflix pours piles of cash into original shows, its cash flow is quite negative.

Netflix has earnings on its income statement, amid the negative cash flow, because accounting rules allow showbiz companies to capitalize their production expenses.

(Note: R&D is expensed, but investment in original shows is capitalized.)

# Netflix vs. Amazon 2016 (amounts as a % of sales)

Measure	Netflix	Amazon
Net Income	2.1%	1.7%
Operating cash flow (CFO)	-16.7%	12.1%
Sales (billions)	\$8.8	\$136.0

This is an example of a “common-size” financial statement.  
Because Amazon is much larger than Netflix, we scale NI and CFO by sales to compare them.

# What is Amazon doing with its CFO?

Measure	2016	2015	2014
Beginning cash	15,890	14,557	8,658
Operating cash flow (CFO)	16,443	11,920	6,842
Investing cash flow	-9,876	-6,450	-5,065
Financing cash flow	-2,911	-3,763	4,432
Ending cash	19,334	15,890	14,557

# What is Amazon doing with its CFO?

Investing?

They are buying lots of fixed assets

They also bought some marketable securities.

# What is Amazon doing with its CFO?

Financing?

Not paying dividends

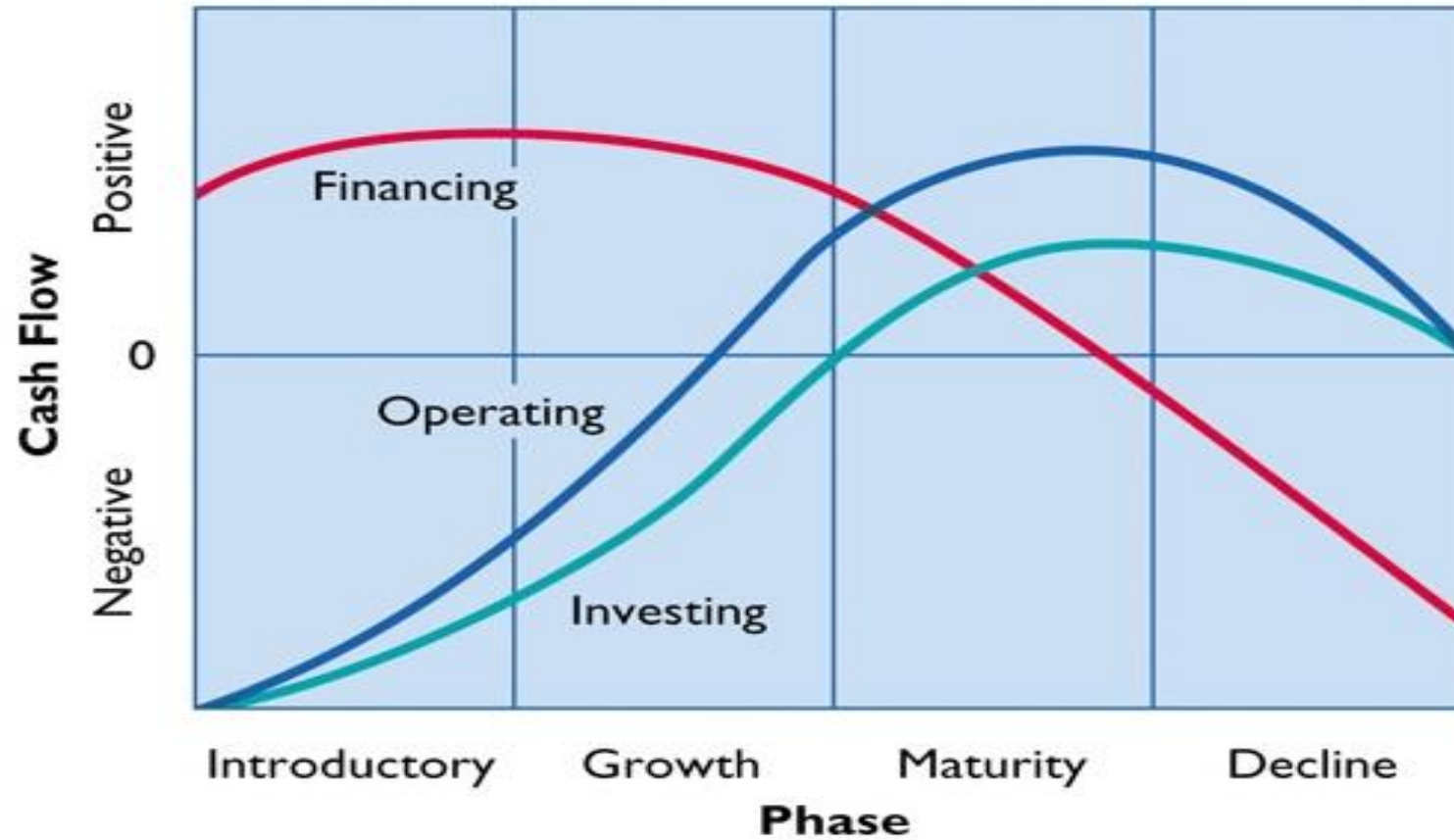
Raised over \$6 billion in debt in 2014... Why when they have a lot of cash?

Some repayments on debt

In 2016 cash increased from \$14 billion to \$19 billion in cash – perhaps saving cash for an acquisition (Whole Foods?)



# Impact of Product Life Cycle on Cash Flows



Where is Amazon on this graph?

# Amazon focus on Free Cash Flow

“Our financial focus is on long-term, sustainable growth in free cash flows.

Free cash flows are driven primarily by increasing operating income and efficiently managing working capital and cash capital expenditures.”

Definition:

Operating cash flow – capital expenditures = Free cash flow

# Free Cash Flow

Operating cash flow – capital expenditures = Free cash flow

Amazon:

\$16.4 billion – \$6.7 billion = \$9.7 billion

This is an example of a non-GAAP performance measure.

What does free cash flow mean?

It is the change in cash that can be paid to debtholders and stockholders.

What if it were negative (as in Netflix)?

The company either has to use existing cash or raise extra cash from debtholders and stockholders.

# Non-GAAP Performance Measures

Free cash flow is an example of a non-GAAP performance measure.

Operating cash flow and capital expenditures are GAAP performance measures:

- They are required to be shown on financial statements
- They are required to be computed according to GAAP

Amazon's free cash flow is an example of a non-GAAP performance measure:

- It is not required ; Amazon voluntarily discloses it.
- It can be computed in a variety of ways.

More on non-GAAP performance measures in upcoming classes.

# Netflix vs. Amazon 2016 (amounts as a % of sales)

Measure	Netflix	Amazon
Net Income	2.1%	1.7%
Operating cash flow (CFO)	-16.7%	12.1%
Investing cash flow	0.6%	-7.3%
Financing cash flow	12.5%	-2.1%
Free cash flow	-18.8%	7.1%
Sales (billions)	\$8.8	\$136.0

## Tesla Hits the Bull's-Eye (WSJ Oct. 25, 2018)

“Thanks largely to stretched accounts payable, Tesla even generated record free cash flow of \$881 million.”

What does “Thanks to stretched accounts payable” mean?

- By not paying off accounts payable, Tesla increased CFO.

Why does “stretched accounts payable” increase free cash flow (FCF)?

- Since free cash flow = CFO – capital expenditures, Tesla also increased FCF.

# Summary

SCF summarizes the sources and uses of cash

- Often useful in analyzing a company's growth, financial health, etc.
- Way to evaluate managerial performance: is net income backed up by CFO?

CFO needed for long-term survival of a firm

- Future investments are paid for through CFO
- You can't pay bills with net income! Liquidity matters

## Ode to Cash Flow

Though my bottom line is black,  
I am flat upon my back  
My cash flows out  
and my customers pay slow.  
The growth of my receivables  
is almost unbelievable;  
The result is certain – unremitting woe!  
And I hear the banker utter  
an ominous low mutter,  
“Watch cash flow!”

Source: H. S. Bailey, cited in R. Green “Are More Chryslers in the Offing?” Forbes (2) 1981, p. 69.



# Practice transactions

Goal: Arrive at CFO, starting from NI

Selling PPE is an investing cash flow

	NI	CFO	Adjust. to NI (CFO - NI)
1. Incur \$100 in depreciation expense.	-100	0	+100
2. Sell \$200 PPE with \$100 acc. dep. for \$200.	+100	0	-100
3. Sell \$100 on account (ignore COGS).	+100	0	-100
4. Collect \$100 account receivable.	0	+100	+100
5. Receive \$100 for goods to be delivered.	0	+100	+100
6. Deliver \$100 in goods (ignore COGS).	+100	0	-100