

VI. Valuing Companies with “intangible” assets

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If capital expenditures are miscategorized as operating expenses, it becomes very difficult to assess how much a firm is reinvesting for future growth and how well its investments are doing.

What is the value added by growth assets?

What are the cashflows from existing assets?

The capital expenditures associated with acquiring intangible assets (technology, human capital) are mis-categorized as operating expenses, leading to incorrect accounting earnings and measures of capital invested.

How risky are the cash flows from both existing assets and growth assets?

It can be more difficult to borrow against intangible assets than it is against tangible assets. The risk in operations can change depending upon how stable the intangible asset is.

When will the firm become a mature firm, and what are the potential roadblocks?

Intangible assets such as brand name and customer loyalty can last for very long periods or dissipate overnight.

Lesson: Accounting rules are cluttered with inconsistencies...

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- If we start with accounting first principles, capital expenditures are expenditures designed to create benefits over many periods. They should not be used to reduce operating income in the period that they are made, but should be depreciated/amortized over their life. They should show up as assets on the balance sheet.
- Accounting is consistent in its treatment of cap ex with manufacturing firms, but is inconsistent with firms that do not fit the mold.
 - With pharmaceutical and technology firms, R&D is the ultimate cap ex but is treated as an operating expense.
 - With consulting firms and other firms dependent on human capital, recruiting and training expenses are your long term investments that are treated as operating expenses.
 - With brand name consumer product companies, a portion of the advertising expense is to build up brand name and is the real capital expenditure. It is treated as an operating expense.

Exhibit 11.1: Converting R&D expenses to R&D assets - Amgen

Step 1: Determining an amortizable life for R & D expenses. ①

How long will it take, on an expected basis, for research to pay off at Amgen? Given the length of the approval process for new drugs by the Food and Drugs Administration, we will assume that this amortizable life is 10 years.

Step 2: Capitalize historical R&D expense

Year	R&D Expense	Unamortized portion	Amortization this year
Current	3030.00	1.00	3030.00
-1	3266.00	0.90	2939.40
-2	3366.00	0.80	2692.80
-3	2314.00	0.70	1619.80
-4	2028.00	0.60	1216.80
-5	1655.00	0.50	827.50
-6	1117.00	0.40	446.80
-7	864.00	0.30	259.20
-8	845.00	0.20	169.00
-9	823.00	0.10	82.30
-10	663.00	0.00	0.00
		\$13283.60	\$1,694.10

④
 Current year's R&D expense = Cap ex = \$3,030 million
 R&D amortization = Depreciation = \$ 1,694 million
 Unamortized R&D = Capital invested (R&D) = \$13,284 million

Step 3: Restate earnings, book value and return numbers

	Unadjusted	Adjusted for R&D	Comments
Net Income	\$4,196	$4,196 + 3030 - 1694 = \$ 5,532$	Add current year's R&D and subtract R&D amortization
Book value of equity	\$17,869	$17,869 + 13,284 = \$ 31,153$	Add unamortized R&D from prior years
Return on Equity	$\frac{4196}{17869} = 23.48\%$	$\frac{5532}{31153} = 17.75\%$	Return on equity drops when book equity is augmented by R&D, even though net income rises.
Pre-tax Operating Income	\$5,594	$5,594 + 3030 - 1694 = \$ 6,930$	Add current year's R&D and subtract R&D amortization
Book value of invested capital	\$21,985	$\$21,985 + \$13,284 = \$35,269$	Add unamortized R&D from prior years
Pre-tax Return on Capital	$\frac{5594}{21985} = 25.44\%$	$\frac{6930}{35269} = 19.65\%$	Return on capital drops when capital is augmented by R&D, even though operating income rises.

Cap Ex = Acc net Cap Ex(255) +
Acquisitions (3975) + R&D (2216)

Current Cashflow to Firm

EBIT(1-t) = $7336(1-.28) = 6058$
 - Nt CpX = 6443
 - Chg WC 37
 = FCFF - 423
 Reinvestment Rate = $6480/6058 = 106.98\%$
 Return on capital = 16.71%

10. Amgen: Status Quo

Reinvestment Rate
60%

Expected Growth
in EBIT (1-t)
 $.60 * .16 = .096$
9.6%

Return on Capital
16%

Stable Growth

$g = 4\%$; Beta = 1.10;
Debt Ratio = 20%; Tax rate = 35%
Cost of capital = 8.08%
ROC = 10.00%;
Reinvestment Rate = $4/10 = 40\%$

Terminal Value₁₀ = $7300 / (.0808 - .04) = 179,099$

First 5 years

Growth decreases
gradually to 4%

Year	1	2	3	4	5	6	7	8	9	10
EBIT	\$9,221	\$10,106	\$11,076	\$12,140	\$13,305	\$14,433	\$15,496	\$16,463	\$17,306	\$17,998
EBIT (1-t)	\$6,639	\$7,276	\$7,975	\$8,741	\$9,580	\$10,392	\$11,157	\$11,853	\$12,460	\$12,958
- Reinvestment	\$3,983	\$4,366	\$4,785	\$5,244	\$5,748	\$5,820	\$5,802	\$5,690	\$5,482	\$5,183
= FCFF	\$2,656	\$2,911	\$3,190	\$3,496	\$3,832	\$4,573	\$5,355	\$6,164	\$6,978	\$7,775

Term Yr
18718
12167
4867
7300

Op. Assets 94214
+ Cash: 1283
- Debt 8272
= Equity 87226
- Options 479
Value/Share \$ 74.33

Cost of Capital (WACC) = $11.7\% (0.90) + 3.66\% (0.10) = 10.90\%$

Debt ratio increases to 20%
Beta decreases to 1.10

Cost of Equity
11.70%

Cost of Debt
 $(4.78\% + .85\%)(1-.35)$
= 3.66%

Weights
E = 90% D = 10%

Riskfree Rate:
Riskfree rate = 4.78%

+

Beta
1.73

x

Risk Premium
4%

Unlevered Beta for
Sectors: 1.59

D/E = 11.06%

On May 1, 2007,
Amgen was trading
at \$ 55/share

Lesson 2: And fixing those inconsistencies can alter your view of a company and affect its value

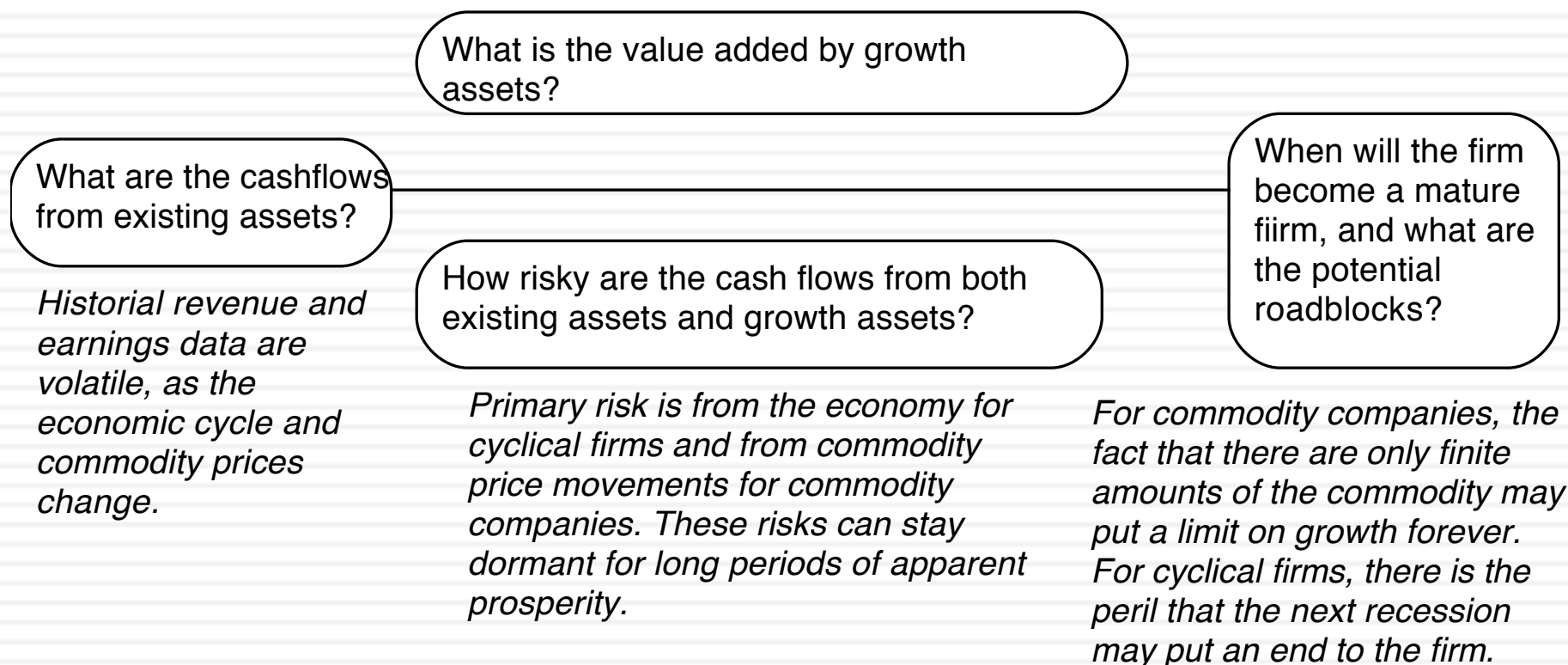
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	No R&D adjustment	R&D adjustment
EBIT	\$5,071	\$7,336
Invested Capital	\$25,277	\$33,173
ROIC	14.58%	18.26%
Reinvestment Rate	115.68%	106.98%
Value of firm	\$58,617	\$95,497
Value of equity	\$50,346	\$87,226
Value/share	\$42.73	\$74.33

VII. Valuing cyclical and commodity companies

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Company growth often comes from movements in the economic cycle, for cyclical firms, or commodity prices, for commodity companies.



Lesson 1: With “macro” companies, it is easy to get lost in “macro” assumptions...

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- With cyclical and commodity companies, it is undeniable that the value you arrive at will be affected by your views on the economy or the price of the commodity.
- Consequently, you will feel the urge to take a stand on these macro variables and build them into your valuation. Doing so, though, will create valuations that are jointly impacted by your views on macro variables and your views on the company, and it is difficult to separate the two.
- The best (though not easiest) thing to do is to separate your macro views from your micro views. Use current market based numbers for your valuation, but then provide a separate assessment of what you think about those market numbers.

Lesson 2: Use probabilistic tools to assess value as a function of macro variables...

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- If there is a key macro variable affecting the value of your company that you are uncertain about (and who is not), why not quantify the uncertainty in a distribution (rather than a single price) and use that distribution in your valuation.
- That is exactly what you do in a Monte Carlo simulation, where you allow one or more variables to be distributions and compute a distribution of values for the company.
- With a simulation, you get not only everything you would get in a standard valuation (an estimated value for your company) but you will get additional output (on the variation in that value and the likelihood that your firm is under or over valued)

Shell: A "Oil Price" Neutral Valuation: March 2016

Revenue calculated from prevailing oil price of \$40/barrel in March 2016
 Revenue = $39992.77 + 4039.40 \times \40
 = \$201,569

Compounded revenue growth of 3.91% a year, based on Shell's historical revenue growth rate from 2000 to 2015

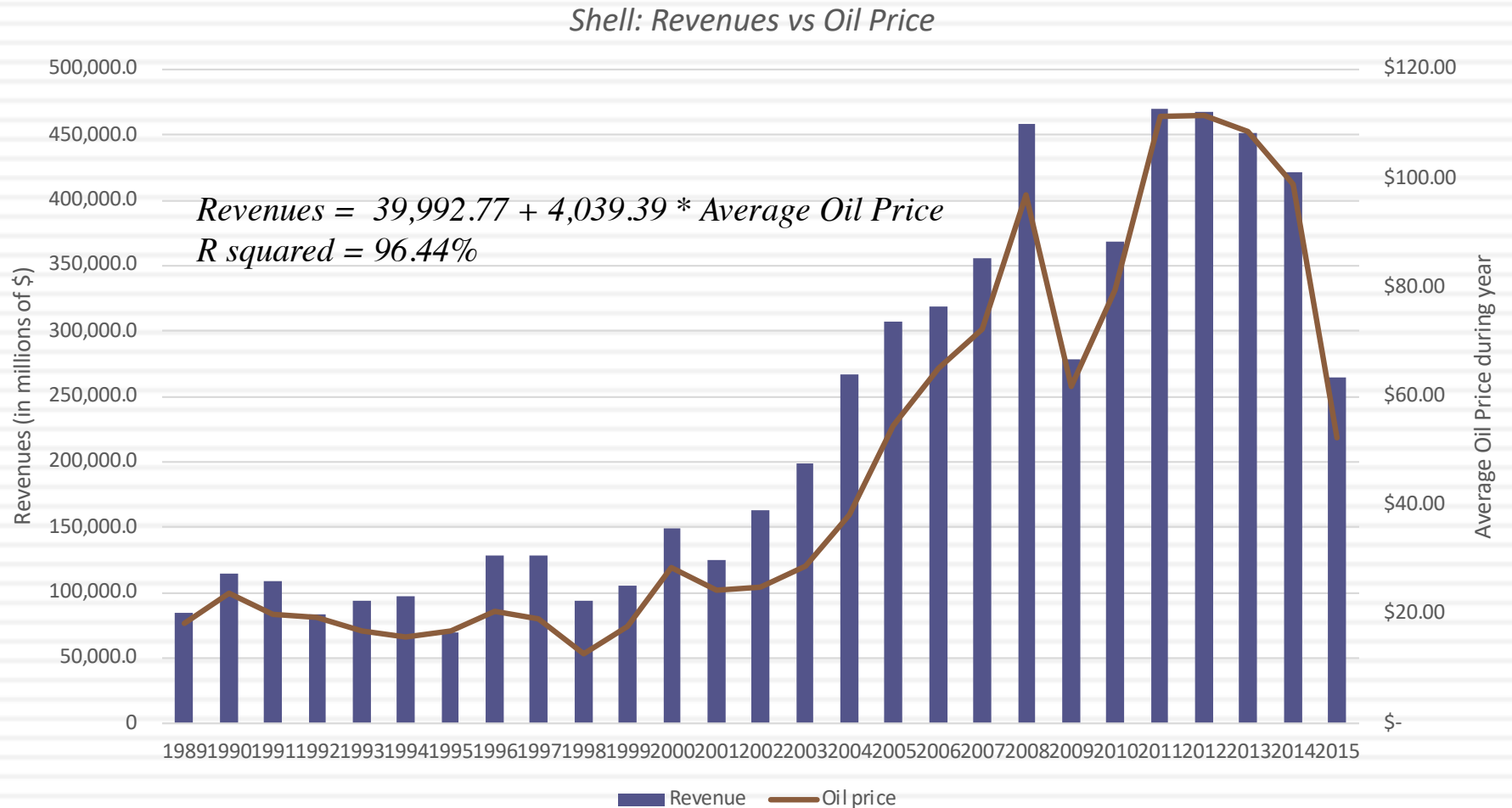
	Base Year	1	2	3	4	5	Terminal Year
Revenues	\$ 201,569	\$ 209,450	\$ 217,639	\$ 226,149	\$ 234,991	\$ 244,180	\$ 249,063
Operating Margin	3.01%	6.18%	7.76%	8.56%	8.95%	9.35%	9.35%
Operating Income	\$ 6,065.00	\$ 12,942.85	\$ 16,899.10	\$ 19,352.39	\$ 21,040.39	\$ 22,830.80	\$ 23,287.41
Effective tax rate	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%	30.00%
AT Operating Income	\$ 4,245.50	\$ 9,060.00	\$ 11,829.37	\$ 13,546.68	\$ 14,728.27	\$ 15,981.56	\$ 16,301.19
+ Depreciation	\$ 26,714.00	\$ 27,759	\$ 28,844	\$ 29,972	\$ 31,144	\$ 32,361	
- Cap Ex	\$ 31,854.00	\$ 33,099	\$ 34,394	\$ 35,738	\$ 37,136	\$ 38,588	
- Chg in WC		\$ 472.88	\$ 491.37	\$ 510.58	\$ 530.55	\$ 551.29	
FCFF		\$ 3,246.14	\$ 5,788.19	\$ 7,269.29	\$ 8,205.44	\$ 9,203.68	\$ 13,011.34
Terminal Value						\$ 216,855.71	
Return on capital							12.37%
Cost of Capital		9.91%	9.91%	9.91%	9.91%	9.91%	8.00%
Cumulated Discount Factor		1.0991	1.2080	1.3277	1.4593	1.6039	
Present Value		\$ 2,953.45	\$ 4,791.47	\$ 5,474.95	\$ 5,622.81	\$ 140,940.73	
Value of Operating Assets	\$ 159,783.41						
+ Cash	\$ 31,752.00						
+ Cross Holdings	\$ 33,566.00						
- Debt	\$ 58,379.00						
- Minority Interests	\$ 1,245.00						
Value of Equity	\$ 165,477.41						
Number of shares	4209.7						
Value per share	\$ 39.31						

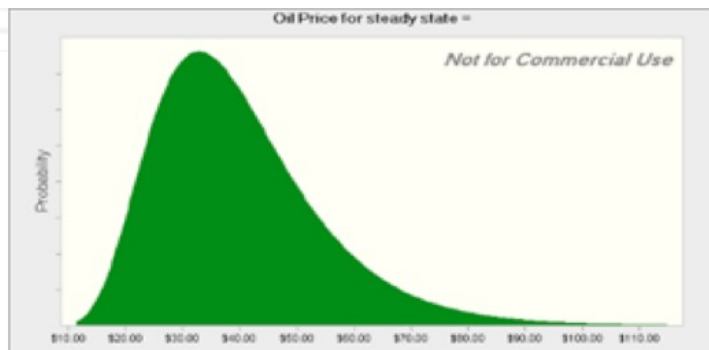
Operating margin converges on Shell's historical average margin of 9.35% from 200-2015

Return on capital reverts and stays at Shell's historic average of 12.37% from 200-2015

Added long term investments in joint ventures and subtracted out minority interest in consolidated holdings.

Shell's Revenues & Oil Prices





Revenue calculated from the oil price drawn from distribution

$$\text{Revenue} = 39992.77 + 4039.40 \times \text{Oil Price/Barrel}$$

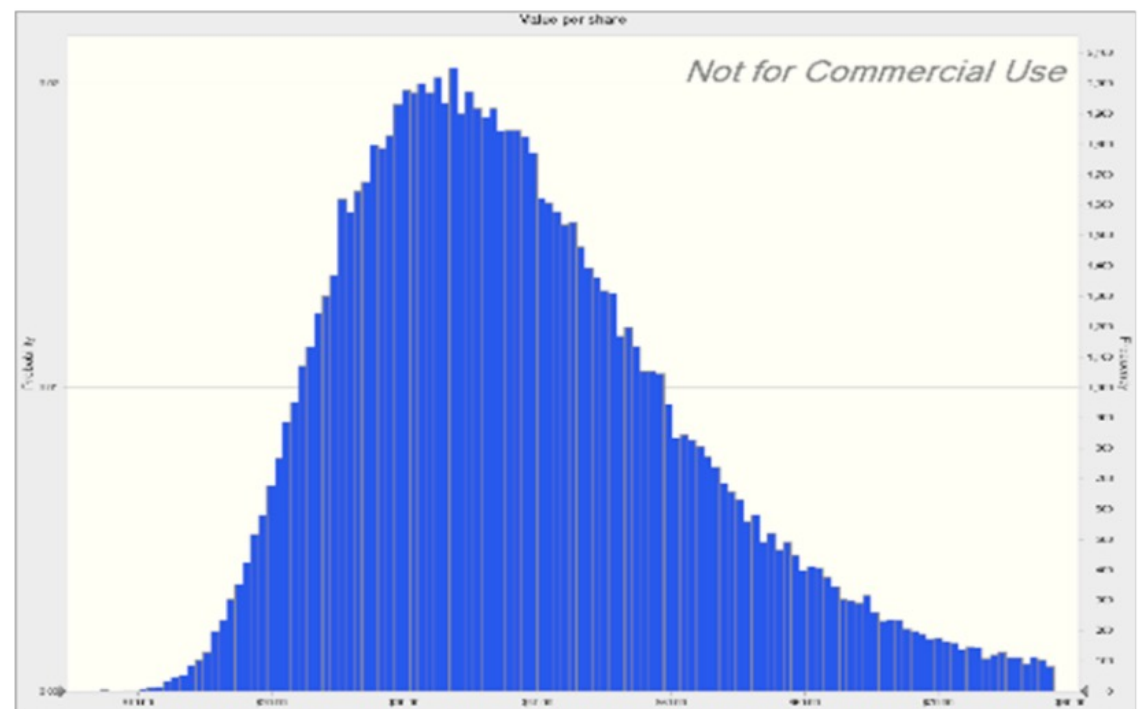
Pre-tax Operating Income based on revenue & selected margin

$$\text{Pre-tax Operating Income} = \text{Revenues} \times \text{Operating Margin}$$

Value Shell based on operating income, assuming other assumptions (tax rate, revenue growth, cost of capital)



Percentiles:	Forecast values
0%	\$6.55
10%	\$23.90
20%	\$27.73
30%	\$30.89
40%	\$33.88
50%	\$36.99
60%	\$40.28
70%	\$44.22
80%	\$49.24
90%	\$57.49
100%	\$197.11





VALUE, PRICE AND INFORMATION: CLOSING THE DEAL

Value versus Price

Are you valuing or pricing?

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Tools for intrinsic analysis

- Discounted Cashflow Valuation (DCF)
- Intrinsic multiples
- Book value based approaches
- Excess Return Models

Tools for "the gap"

- Behavioral finance
- Price catalysts

Tools for pricing

- Multiples and comparables
- Charting and technical indicators
- Pseudo DCF

Value of cashflows,
adjusted for time
and risk

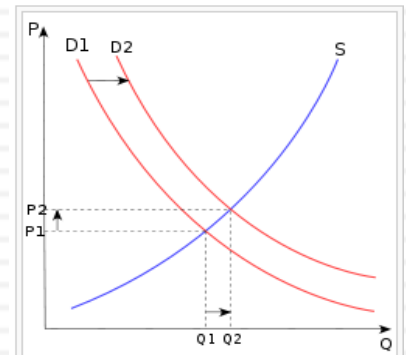
INTRINSIC
VALUE

Value

THE GAP
Is there one?
Will it close?

Price

PRICE



Drivers of intrinsic value

- Cashflows from existing assets
- Growth in cash flows
- Quality of Growth

Drivers of "the gap"


- Information
- Liquidity
- Corporate governance

Drivers of price

- Market moods & momentum
- Surface stories about fundamentals

Test 1: Are you pricing or valuing?

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**5369 La Jolla Mesa Dr**
La Jolla, CA 92037
Status: Active

\$995,000
Price

3
Beds


2.5
Baths



1,440 Sq. Ft.
\$691 / Sq. Ft.



   


Built: 1955 Lot Size: 3,000 Sq. Ft. On Redfin: 12 days Favorite X-Out Share... Tour Home

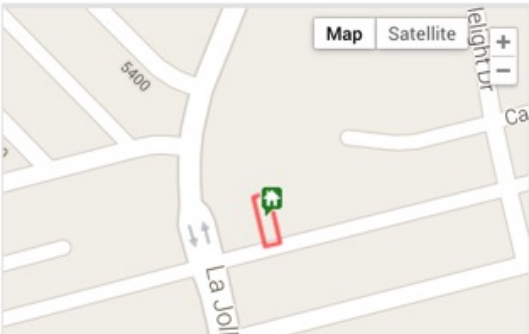
Overview Property Details Tour Insights Property History Public Records Activity Schools Neighborhood & Offer Insights Similar Homes



1 of 25  

Lisa Padilla
REDFIN Real Estate Agent
★★★★★
47 client reviews
\$8,726 commission refund

[Ask Lisa a Question](#) or [Start an Offer](#)


1 of 4 Redfin Agents in this area

Test 2: Are you pricing or valuing?

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Rating
Buy

Europe
Switzerland

Biotechnology
Biotechnology

Company
BB BIOTECH

Reuters
BION.S

Bloomberg
BION SW

Exchange
SWX

Ticker
BION

Date

13 August 2013

Forecast Change

Price at 12 Aug 2013 (CHF)	124.00
Price Target (CHF)	164.50
52-week range (CHF)	128.40 - 84.90

Strong sector and stock-picking continue

Impressive performance

Over the past two years, BB Biotech shares have roughly tripled, which could tempt investors to take profits. However, this performance has been well backed by a deserved revival of the biotech industry, encouraging fundamental news, M&A, and increased money flow into health care stocks. In addition, BBB returned to index outperformance by modifying its stock-picking approach. Hence, despite excellent performance, the shares still trade at a 23% discount to the net asset value of the portfolio. Hence, the shares are an attractive value vehicle to capture growth opportunities in an attractive sector.

Biotech industry remains attractive

With the re-rating of the pharma sector, investors have also showed increased interest in biotech stocks. Established biotech stocks have delivered encouraging financial results and approvals, while there has also been substantial industry consolidation, which is not surprising in times of "cheap" money and high liquidity. BB Biotech remains an attractive vehicle to capture the future potential of the biotech sector. In addition, investors benefit from a 23% discount to NAV and attractive cash distribution policy of 5% yield p.a. Hence, we reiterate our Buy on BB Biotech shares.

BB Biotech shares remain attractive

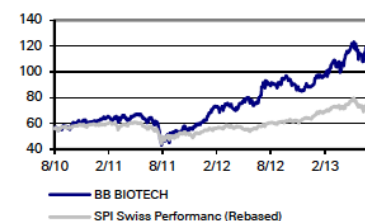
In the first 6M of 2013, BB Biotech increased its NAV by 36%, which marks good outperformance against the Nasdaq Biotech Index (NBI)'s 27%. This is a remarkable performance after 2012 when BBB's NAV increase of 45% also

Key changes

Target Price 106.50 to 164.50 ↑ 54.5%

Source: Deutsche Bank

Price/price relative

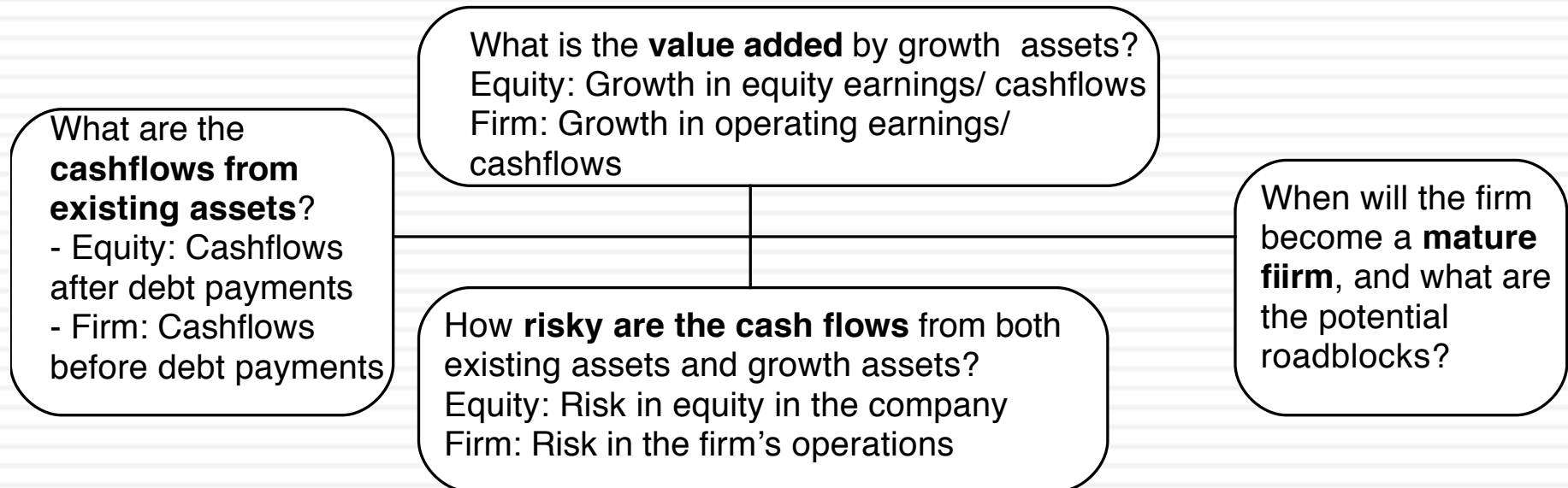


Performance (%)	1m	3m	12m
Absolute	-1.4	5.4	37.4
SPI Swiss Performance IX	0.5	-1.4	26.4

Source: Deutsche Bank

The drivers of value

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The determinants of price

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Mood and Momentum

Price is determined in large part by mood and momentum, which, in turn, are driven by behavioral factors (panic, fear, greed).

Liquidity & Trading Ease

While the value of an asset may not change much from period to period, liquidity and ease of trading can, and as it does, so will the price.

The Market Price

Incremental information

Since you make money on price changes, not price levels, the focus is on incremental information (news stories, rumors, gossip) and how it measures up, relative to expectations

Group Think

To the extent that pricing is about gauging what other investors will do, the price can be determined by the "herd".

Three views of “the gap”

	View of the gap	Investment Strategies
The Efficient Marketer	The gaps between price and value, if they do occur, are random.	Index funds
The “value” extremist	You view pricers as dilettantes who will move on to fad and fad. Eventually, the price will converge on value.	Buy and hold stocks where value < price
The pricing extremist	Value is only in the heads of the “eggheads”. Even if it exists (and it is questionable), price may never converge on value.	(1) Look for mispriced securities. (2) Get ahead of shifts in demand/momentum.

The “pricers” dilemma..

- No anchor: If you do not believe in intrinsic value and make no attempt to estimate it, you have no moorings when you invest. You will therefore be pushed back and forth as the price moves from high to low. In other words, everything becomes relative and you can lose perspective.
- Reactive: Without a core measure of value, your investment strategy will often be reactive rather than proactive.
- Crowds are fickle and tough to get a read on: The key to being successful as a pricer is to be able to read the crowd mood and to detect shifts in that mood early in the process. By their nature, crowds are tough to read and almost impossible to model systematically.

The valuer's dilemma and ways of dealing with it...

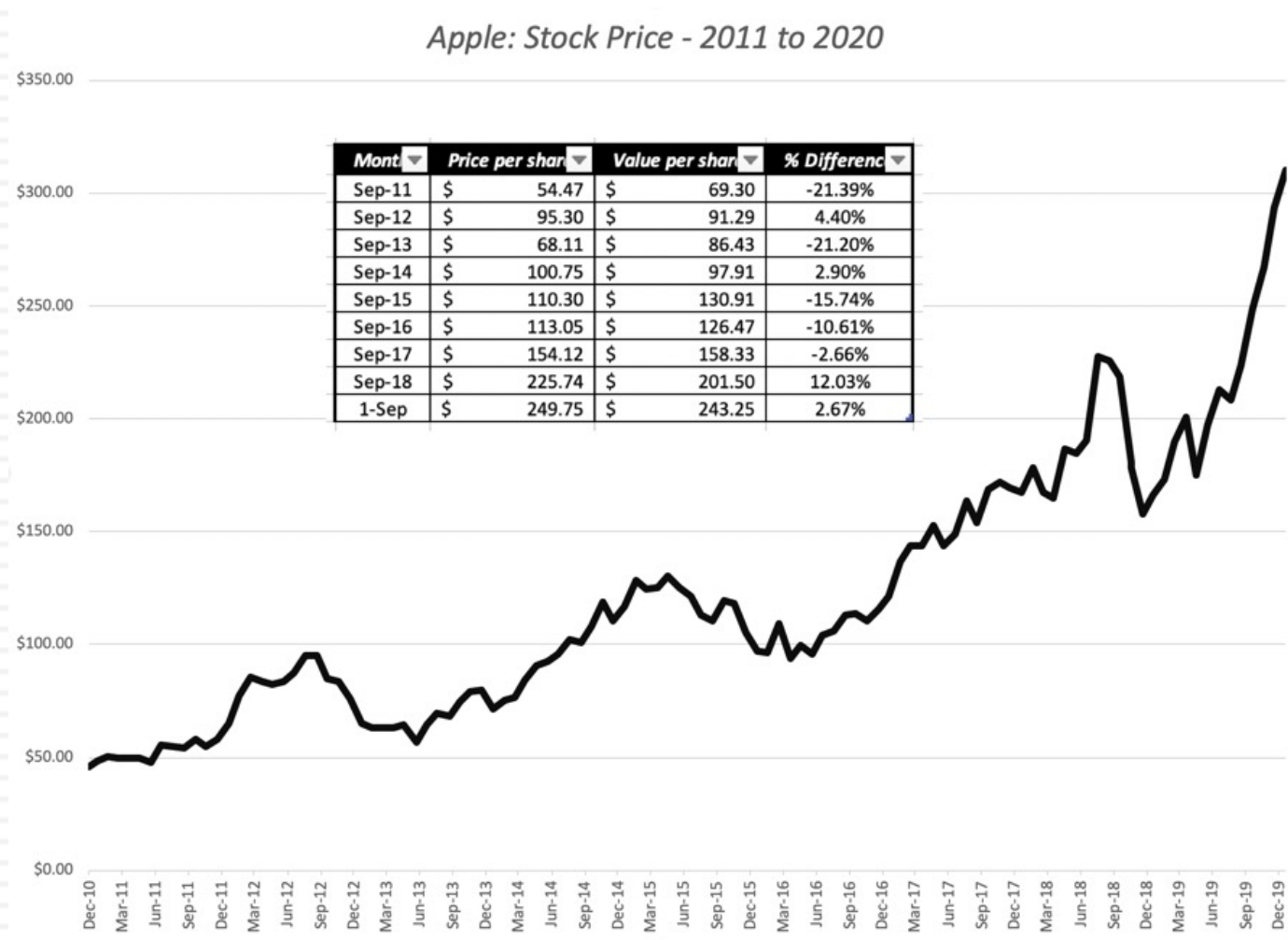
- Uncertainty about the magnitude of the gap:
 - ▣ Margin of safety: Many value investors swear by the notion of the “margin of safety” as protection against risk/uncertainty.
 - ▣ Collect more information: Collecting more information about the company is viewed as one way to make your investment less risky.
 - ▣ Ask what if questions: Doing scenario analysis or what if analysis gives you a sense of whether you should invest.
 - ▣ Confront uncertainty: Face up to the uncertainty, bring it into the analysis and deal with the consequences.
- Uncertainty about gap closing: This is tougher and you can reduce your exposure to it by
 - ▣ Lengthening your time horizon
 - ▣ Providing or looking for a catalyst that will cause the gap to close.

Strategies for managing the risk in the “closing” of the gap

- The “karmic” approach: In this one, you buy (sell short) under (over) valued companies and sit back and wait for the gap to close. You are implicitly assuming that given time, the market will see the error of its ways and fix that error.
- The catalyst approach: For the gap to close, the price has to converge on value. For that convergence to occur, there usually has to be a catalyst.
 - If you are an activist investor, you may be the catalyst yourself. In fact, your act of buying the stock may be a sufficient signal for the market to reassess the price.
 - If you are not, you have to look for other catalysts. Here are some to watch for: a new CEO or management team, a “blockbuster” new product or an acquisition bid where the firm is targeted.

An example: Apple – Price versus Value (my estimates) from 2011 to 2020


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A closing thought...

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VALUATION: PACKET 2

RELATIVE VALUATION, ASSET-BASED VALUATION AND PRIVATE COMPANY VALUATION

1/23/22

Aswath Damodaran
Updated: January 2022

The Essence of Relative Valuation (Pricing)

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- In relative valuation, the value of an asset is compared to the values assessed by the market for similar or comparable assets.
- To do relative valuation then,
 - we need to identify comparable assets and obtain market values for these assets
 - convert these market values into standardized values, since the absolute prices cannot be compared This process of standardizing creates price multiples.
 - compare the standardized value or multiple for the asset being analyzed to the standardized values for comparable asset, controlling for any differences between the firms that might affect the multiple, to judge whether the asset is under or over valued

Relative valuation is pervasive...

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- Most asset valuations are relative.
- Most equity valuations on Wall Street are relative valuations.
 - ▣ Almost 85% of equity research reports are based upon a multiple and comparables.
 - ▣ More than 50% of all acquisition valuations are based upon multiples
 - ▣ Rules of thumb based on multiples are not only common but are often the basis for final valuation judgments.
- While there are more discounted cashflow valuations in consulting and corporate finance, they are often relative valuations masquerading as discounted cash flow valuations.
 - ▣ The objective in many discounted cashflow valuations is to back into a number that has been obtained by using a multiple.
 - ▣ The terminal value in a significant number of discounted cashflow valuations is estimated using a multiple.

Why relative valuation?

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“If you think I’ m crazy, you should see the gu
lives across the hall”

Jerry Seinfeld talking about Kramer in a Seinfeld episode



“ A little inaccuracy sometimes saves tons of explanation”

H.H. Munro

“ If you are going to screw up, make sure that you have
lots of company”

Ex-portfolio manager

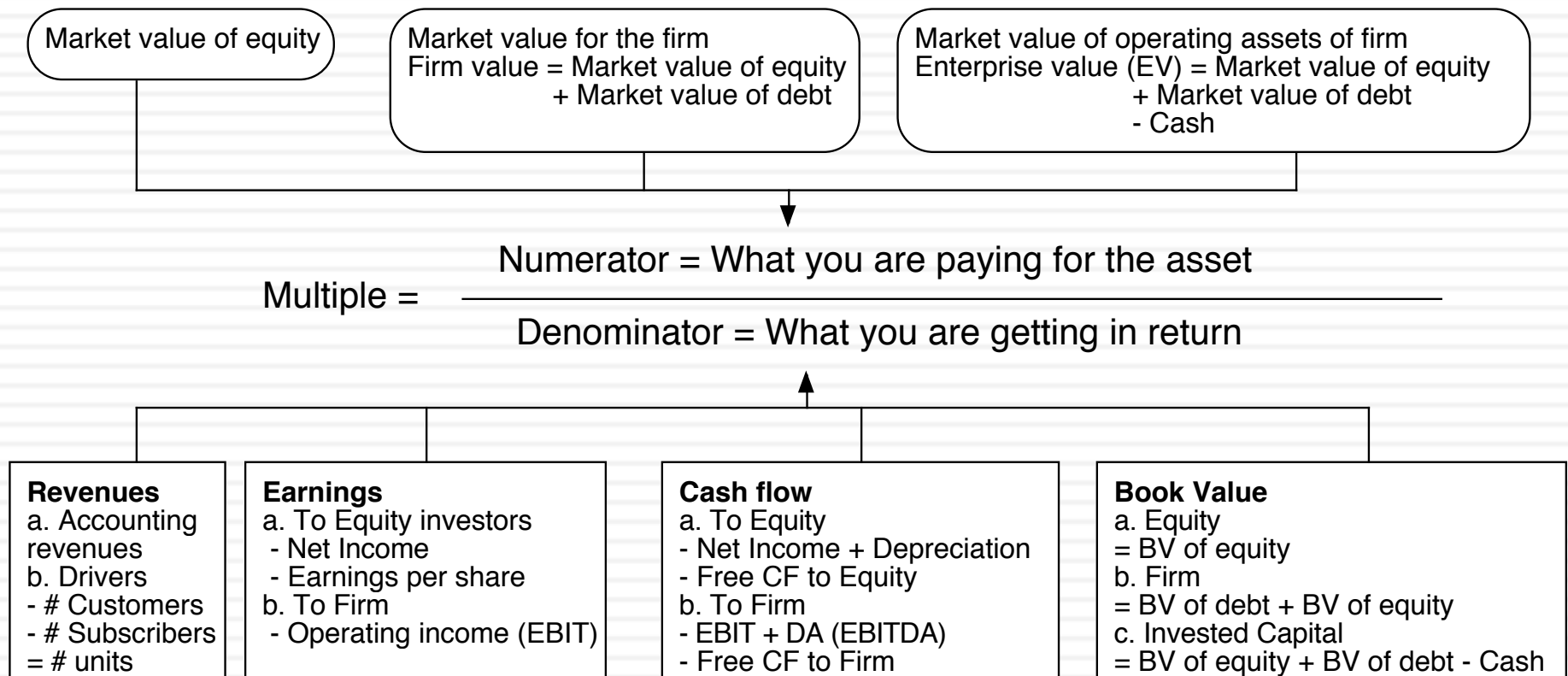
The Market Imperative....

5

- Relative valuation is much more likely to reflect market perceptions and moods than discounted cash flow valuation. This can be an advantage when it is important that the price reflect these perceptions as is the case when
 - ▣ the objective is to sell a security at that price today (as in the case of an IPO)
 - ▣ investing on “momentum” based strategies
- With relative valuation, there will always be a significant proportion of securities that are under valued and over valued.
- Since portfolio managers are judged based upon how they perform on a relative basis (to the market and other money managers), relative valuation is more tailored to their needs
- Relative valuation generally requires less information than discounted cash flow valuation (especially when multiples are used as screens)

Multiples are just standardized estimates of price...

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The Four Steps to Deconstructing Multiples

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- Define the multiple
 - In use, the same multiple can be defined in different ways by different users. When comparing and using multiples, estimated by someone else, it is critical that we understand how the multiples have been estimated
- Describe the multiple
 - Too many people who use a multiple have no idea what its cross sectional distribution is. If you do not know what the cross sectional distribution of a multiple is, it is difficult to look at a number and pass judgment on whether it is too high or low.
- Analyze the multiple
 - It is critical that we understand the fundamentals that drive each multiple, and the nature of the relationship between the multiple and each variable.
- Apply the multiple
 - Defining the comparable universe and controlling for differences is far more difficult in practice than it is in theory.

Definitional Tests

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- Is the multiple consistently defined?
 - Proposition 1: Both the value (the numerator) and the standardizing variable (the denominator) should be to the same claimholders in the firm. In other words, the value of equity should be divided by equity earnings or equity book value, and firm value should be divided by firm earnings or book value.
- Is the multiple uniformly estimated?
 - The variables used in defining the multiple should be estimated uniformly across assets in the “comparable firm” list.
 - If earnings-based multiples are used, the accounting rules to measure earnings should be applied consistently across assets. The same rule applies with book-value based multiples.

Example 1: Price Earnings Ratio: Definition

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$PE = \text{Market Price per Share} / \text{Earnings per Share}$

- There are a number of variants on the basic PE ratio in use. They are based upon how the price and the earnings are defined.

Price: is usually the current price

is sometimes the average price for the year

EPS: EPS in most recent financial year

EPS in trailing 12 months

Forecasted earnings per share next year

Forecasted earnings per share in future year

Example 2: Staying on PE ratios

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- Assuming that you are comparing the PE ratios across technology companies, many of which have options outstanding. What measure of PE ratio would yield the most consistent comparisons?
 - a. Price/ Primary EPS (actual shares, no options)
 - b. Price/ Fully Diluted EPS (actual shares + all options)
 - c. Price/ Partially Diluted EPS (counting only in-the-money options)
 - d. Other

Example 3: Enterprise Value /EBITDA Multiple

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- The enterprise value to EBITDA multiple is obtained by netting cash out against debt to arrive at enterprise value and dividing by EBITDA.

$$\frac{\text{Enterprise Value}}{\text{EBITDA}} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt} - \text{Cash}}{\text{Earnings before Interest, Taxes and Depreciation}}$$

1. Why do we net out cash from firm value?
2. What happens if a firm has cross holdings which are categorized as:
 - ▣ Minority interests?
 - ▣ Majority active interests?

Example 4: A Housing Price Multiple

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The bubbles and busts in housing prices has led investors to search for a multiple that they can use to determine when housing prices are getting out of line. One measure that has acquired adherents is the ratio of housing price to annual net rental income (for renting out the same house). Assume that you decide to compute this ratio and compare it to the multiple at which stocks are trading. Which valuation ratio would be the one that corresponds to the house price/rent ratio?

- a. Price Earnings Ratio
- b. EV to Sales
- c. EV to EBITDA
- d. EV to EBIT

Descriptive Tests

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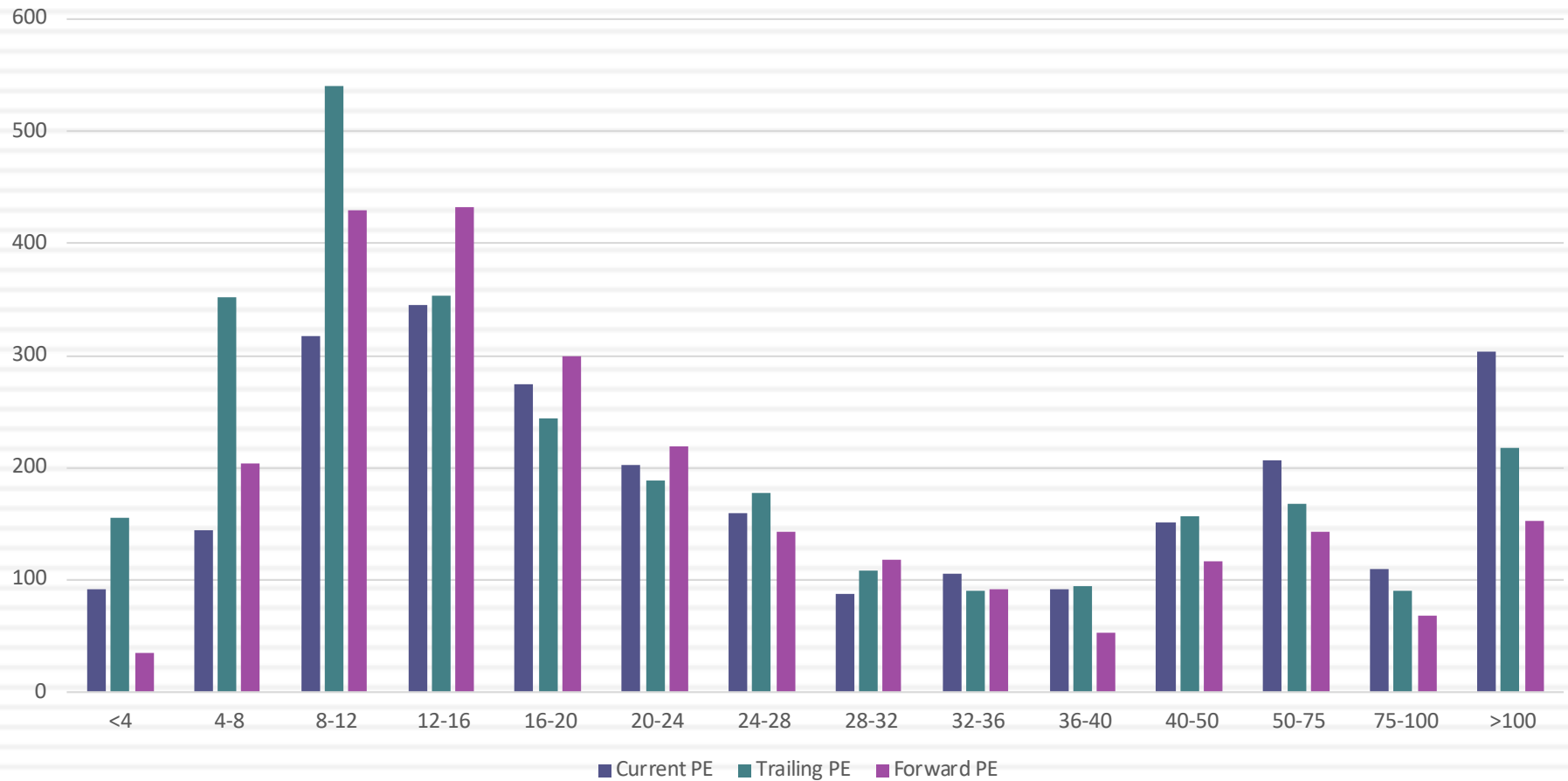
- What is the average and standard deviation for this multiple, across the universe (market)?
- What is the median for this multiple?
 - The median for this multiple is often a more reliable comparison point.
- How large are the outliers to the distribution, and how do we deal with the outliers?
 - Throwing out the outliers may seem like an obvious solution, but if the outliers all lie on one side of the distribution (they usually are large positive numbers), this can lead to a biased estimate.
- Are there cases where the multiple cannot be estimated? Will ignoring these cases lead to a biased estimate of the multiple?
- How has this multiple changed over time?

1. Multiples have skewed distributions...

US company PE Ratios

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PE ratios for US Companies in January 2022



2. Making statistics “dicey”

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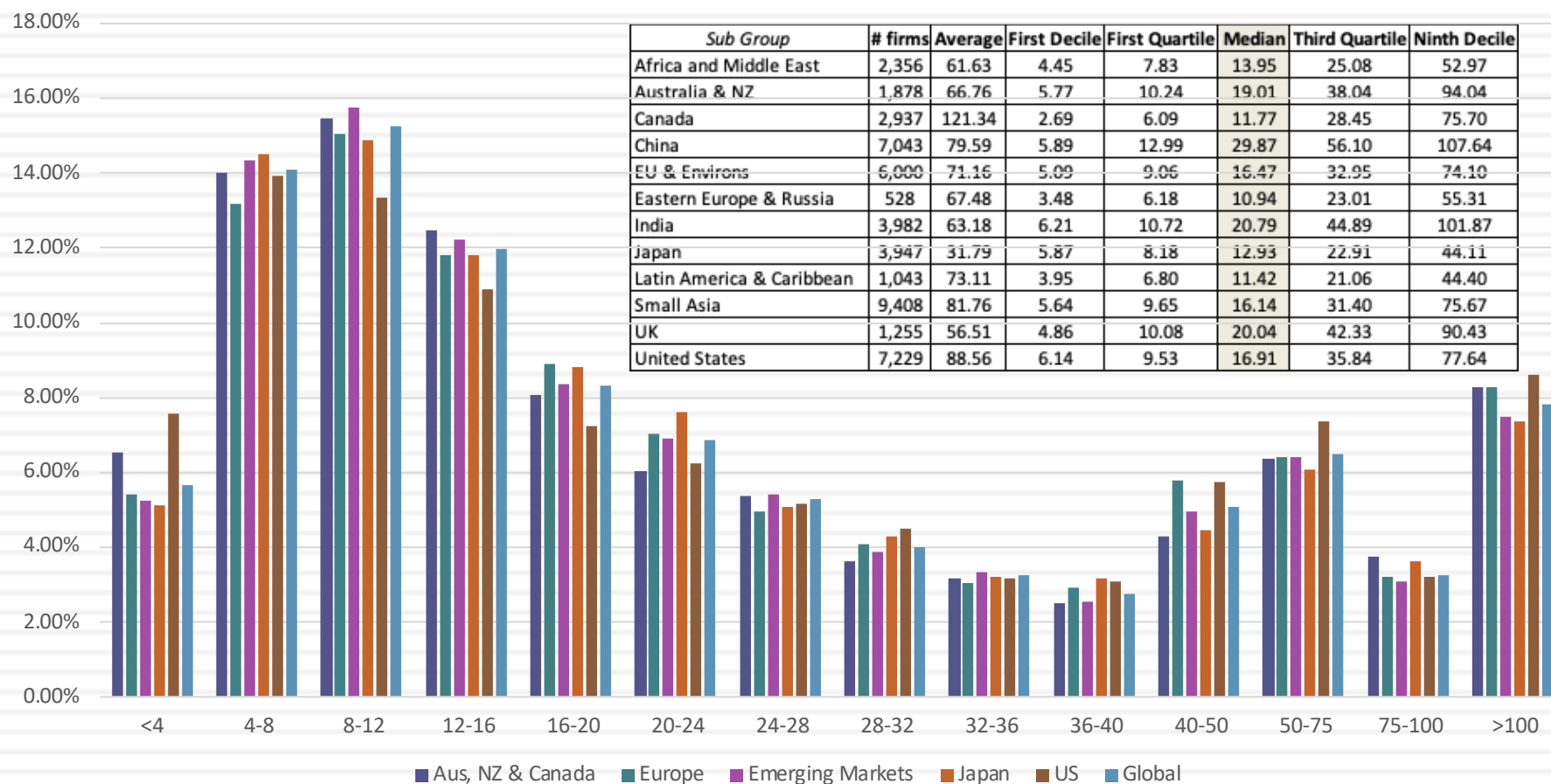
	Current PE	Trailing PE	Forward PE
Number of firms	7229	7229	7229
Firms with PE	2592	2940	2506
Average	90.90	88.56	61.25
First Quartile	13.09	9.53	11.53
Median	13.09	9.53	11.53
Third Quartile	35.84	35.84	31.84
Maximum	37557.14	25357.78	41290.00

US firms in January 2022

3. Markets have a lot in common : Comparing Global PEs

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PE Ratios, by Geography, in January 2022



3a. And the differences are sometimes revealing...

Price to Book Ratios across globe – January 2013

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