VALUATION: PACKET 2
RELATIVE VALUATION, ASSET-BASED VALUATION AND PRIVATE COMPANY VALUATION

1/5/19

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The Essence of Relative Valuation (Pricing)

- 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…

- 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?

"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….

- 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…

Market value of equity

Market value for the firm
Firm value = Market value of equity
+ Market value of debt

Market value of operating assets of firm
Enterprise value (EV) = Market value of equity
+ Market value of debt
- Cash

$$\text{Multiple} = \frac{\text{Numerator = What you are paying for the asset}}{\text{Denominator = What you are getting in return}}$$

Revenues
a. Accounting revenues
b. Drivers
- # Customers
- # Subscribers
= # units

Earnings
a. To Equity investors
- Net Income
- Earnings per share
b. To Firm
- Operating income (EBIT)

Cash flow
a. To Equity
- Net Income + Depreciation
- Free CF to Equity
b. To Firm
- EBIT + DA (EBITDA)
- Free CF to Firm

Book Value
a. Equity
= BV of equity
b. Firm
= BV of debt + BV of equity
c. Invested Capital
= BV of equity + BV of debt - Cash

The Four Steps to Deconstructing Multiples

- 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

- 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

PE = Market Price per Share / 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

- 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

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

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

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

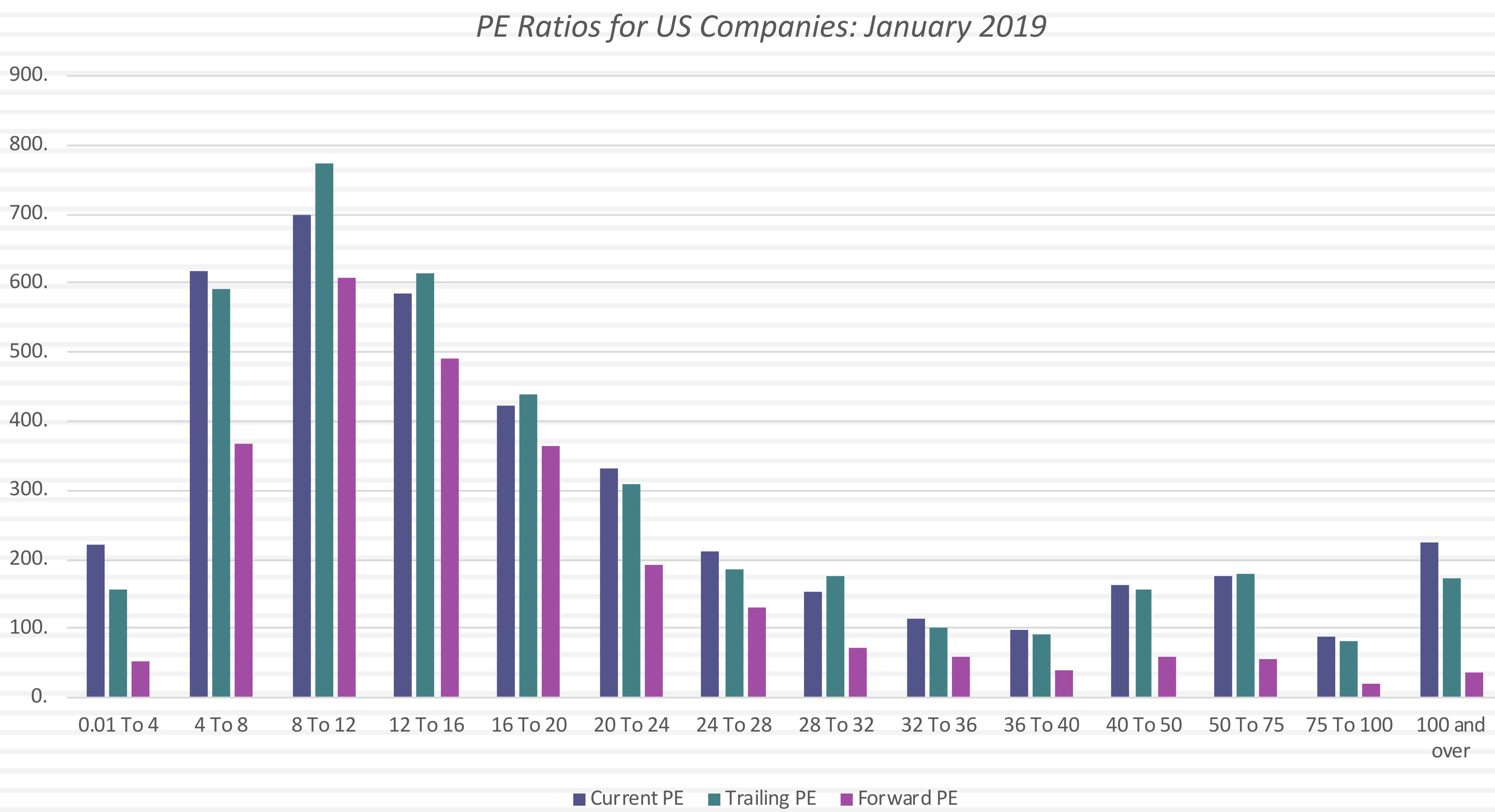
The bubbles and busts in housing prices has led investors to search for a multiple that they can use to determine when housing prices are getting out of line. One measure that has acquired adherents is the ratio of housing price to annual net rental income (for renting out the same house). Assume that 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

- 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

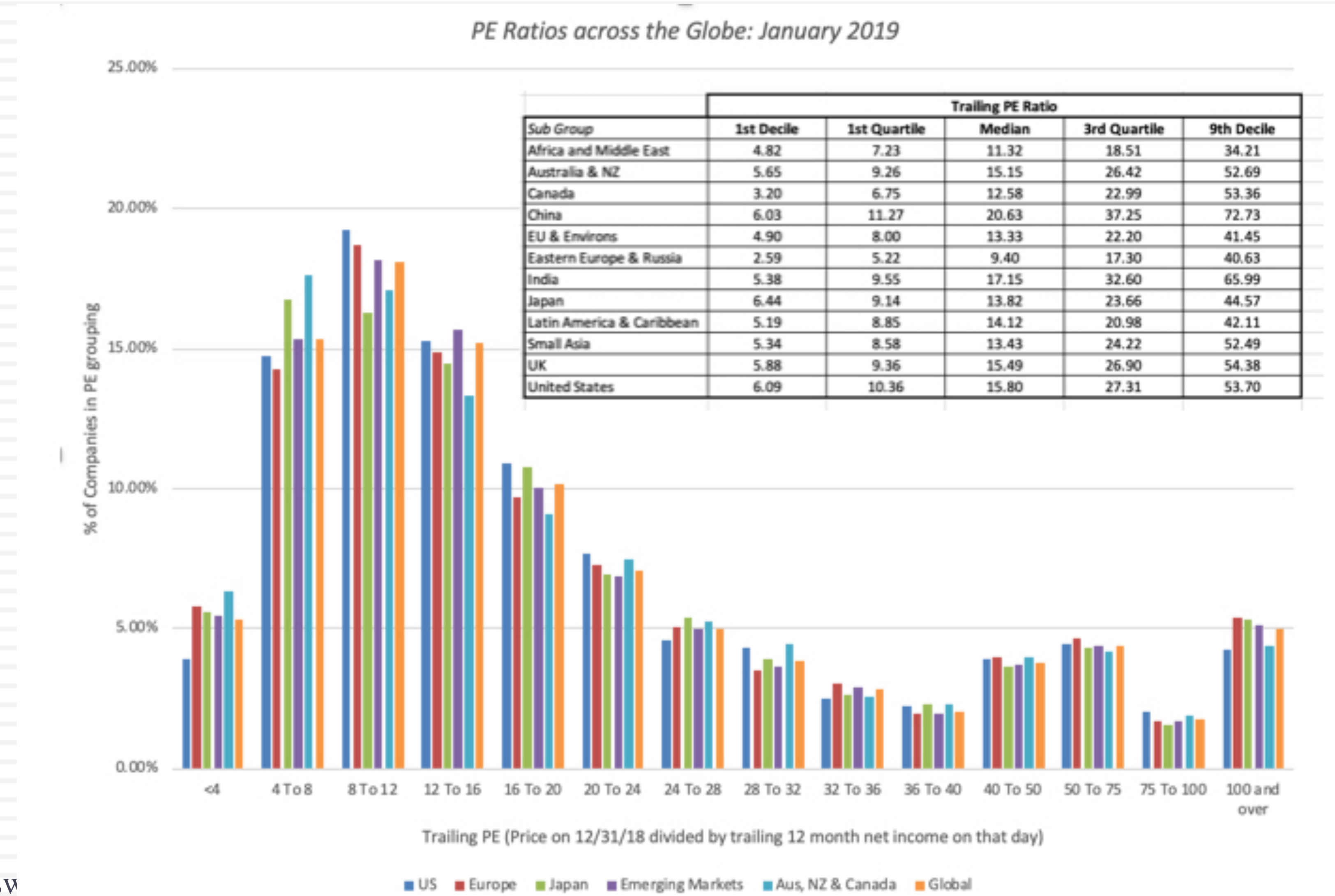


2. Making statistics "dicey"

	Current PE	Trailing PE	Forward PE
Number of firms	7,209	7,209	7,209
Number with PE	2,965	2,957	2,489
Average	77.18	35.33	26.91
Median	18.61	15.80	14.44
Minimum	0.68	1.94	2.65
Maximum	48700.00	3400.00	1769.64
Standard deviation	990.76	118.07	66.67
Standard error	18.20	2.17	1.34
Skewness	41.60	15.55	13.63
25th percentile	11.70	10.36	10.12
75th percentile	32.35	27.31	23.16

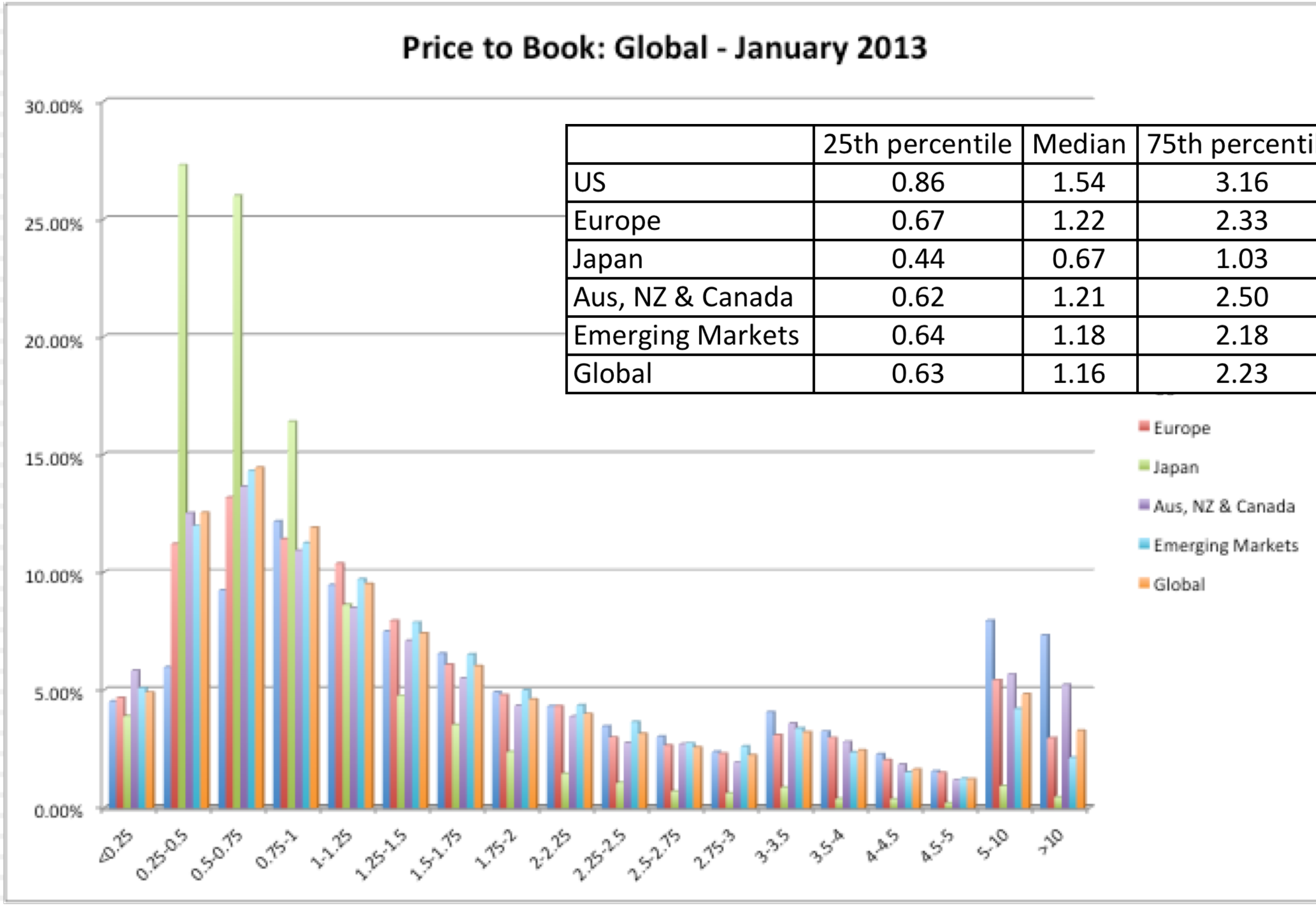
US firms in January 2019

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



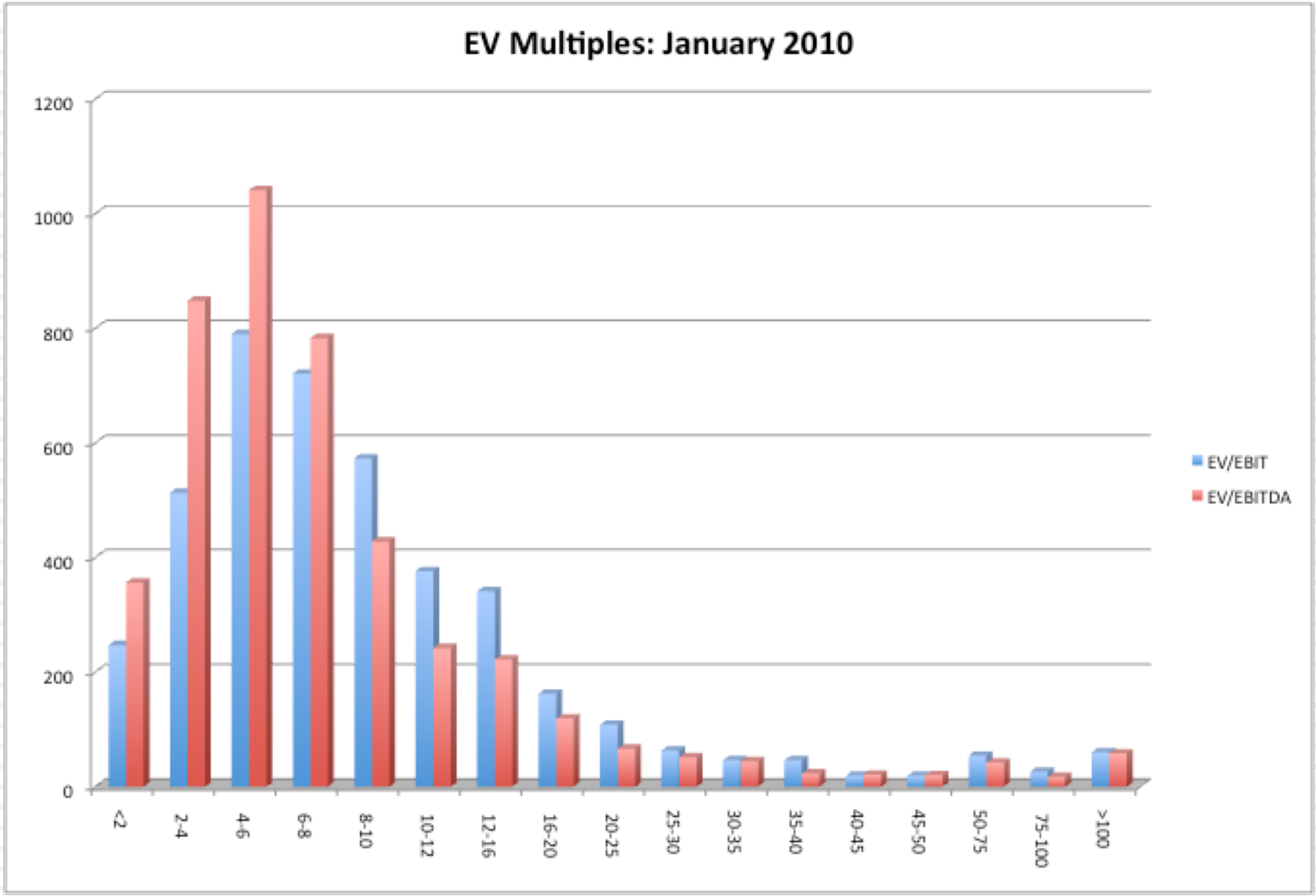
	Trailing PE Ratio				
Sub Group	1st Decile	1st Quartile	Median	3rd Quartile	9th Decile
Africa and Middle East	4.82	7.23	11.32	18.51	34.21
Australia & NZ	5.65	9.26	15.15	26.42	52.69
Canada	3.20	6.75	12.58	22.99	53.36
China	6.03	11.27	20.63	37.25	72.73
EU & Environs	4.90	8.00	13.33	22.20	41.45
Eastern Europe & Russia	2.59	5.22	9.40	17.30	40.63
India	5.38	9.55	17.15	32.60	65.99
Japan	6.44	9.14	13.82	23.66	44.57
Latin America & Caribbean	5.19	8.85	14.12	20.98	42.11
Small Asia	5.34	8.58	13.43	24.22	52.49
UK	5.88	9.36	15.49	26.90	54.38
United States	6.09	10.36	15.80	27.31	53.70

3a. And the differences are sometimes revealing… Price to Book Ratios across globe – January 2013

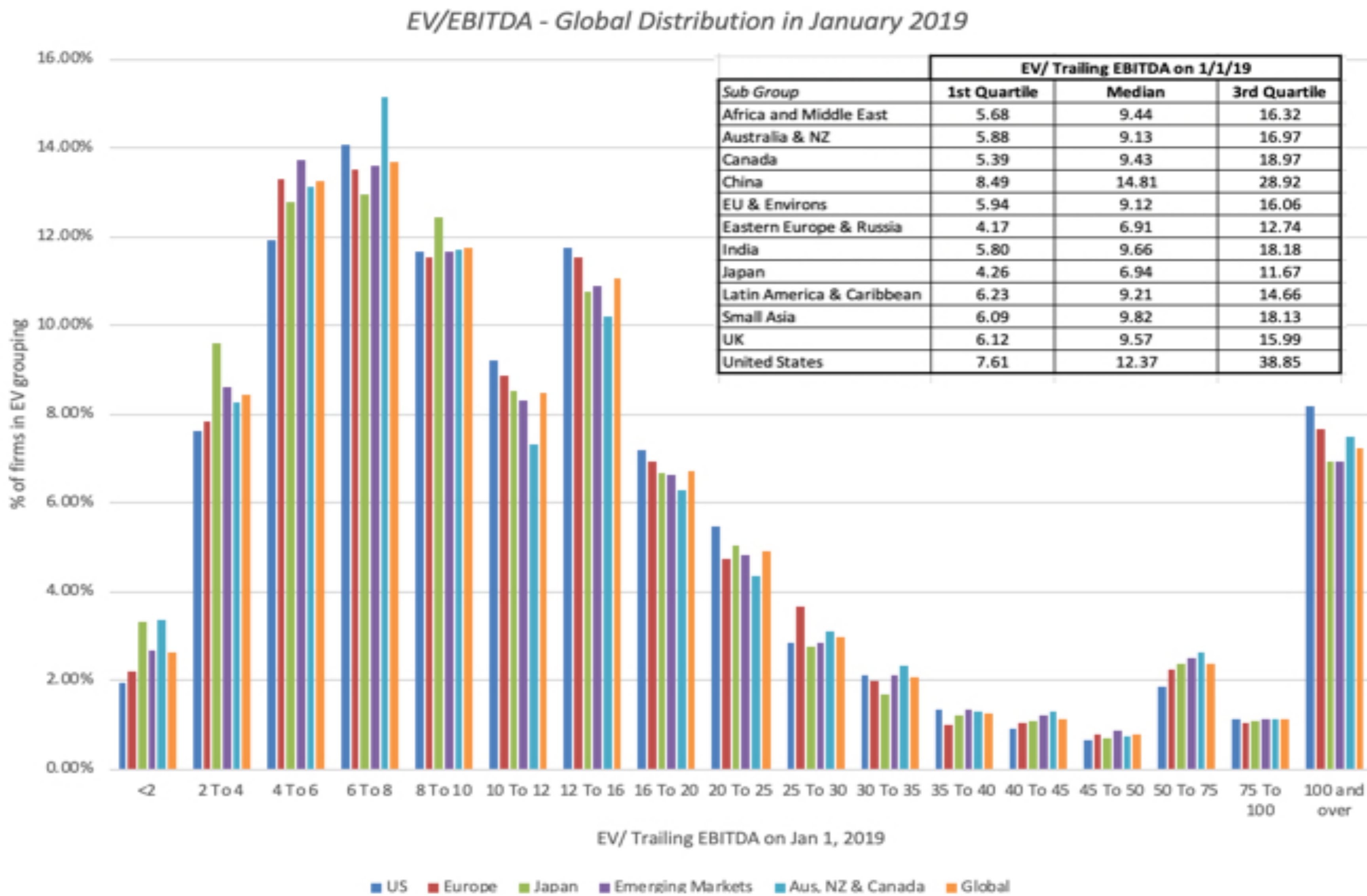


	25th percentile	Median	75th percentile
US	0.86	1.54	3.16
Europe	0.67	1.22	2.33
Japan	0.44	0.67	1.03
Aus, NZ & Canada	0.62	1.21	2.50
Emerging Markets	0.64	1.18	2.18
Global	0.63	1.16	2.23

4. Simplistic rules almost always break down…6 times EBITDA was not cheap in 2010…



But it may be in 2019, unless you are in Russia..



	EV/ Trailing EBITDA on 1/1/19		
Sub Group	**1st Quartile**	**Median**	**3rd Quartile**
Africa and Middle East	5.68	9.44	16.32
Australia & NZ	5.88	9.13	16.97
Canada	5.39	9.43	18.97
China	8.49	14.81	28.92
EU & Environs	5.94	9.12	16.06
Eastern Europe & Russia	4.17	6.91	12.74
India	5.80	9.66	18.18
Japan	4.26	6.94	11.67
Latin America & Caribbean	6.23	9.21	14.66
Small Asia	6.09	9.82	18.13
UK	6.12	9.57	15.99
United States	7.61	12.37	38.85

Analytical Tests

- What are the fundamentals that determine and drive these multiples?
  - Proposition 2: Embedded in every multiple are all of the variables that drive every discounted cash flow valuation - growth, risk and cash flow patterns.
- How do changes in these fundamentals change the multiple?
  - The relationship between a fundamental (like growth) and a multiple (such as PE) is almost never linear.
  - Proposition 3: It is impossible to properly compare firms on a multiple, if we do not know how fundamentals and the multiple move.

A Simple Analytical device

	Start with a basic intrinsic value model	*Divide both sides of the equation by the denominator of the multiple that you are trying to deconstruct,.*	You should end up with an intrinsic version of your multiple, which should relate it to fundamentals.
If Equity Multiple	Start with a dividend or FCFE model, preferably simple. Price= EPS * Payout / (r -g)	Divide your dividend or FCFE model by denominator of equity multiple. Price/Book = ROE * Payout / (r -g)	Intrinsic version of equity multiple, with drivers of value Price/Book = f(ROE, r, g, Payout)
If EV Multiple	Start with a operating asset value model, preferably simple. EV= EBIT (1-t) (1- RIR)/ (WACC -g)	Divide your operating asset model by denominator of EV multiple. EV/Sales = After-tax Operating Margin (1- RIR)/ (WACC -g)	Intrinsic version of EV multiple, with drivers of value EV/Sales = f(After-tax Operating Margin, RIR, WACC, g)

I . PE Ratios

- To understand the fundamentals, start with a basic equity discounted cash flow model.
  - With the dividend discount model,

$$P_0 = \frac{DPS_1}{r - g_n}$$

  - Dividing both sides by the current earnings per share,

$$\frac{P_0}{EPS_0} = PE = \frac{\text{Payout Ratio}*(1+g_n)}{r\text{-}g_n}$$

  - If this had been a FCFE Model,

$$P_0 = \frac{FCFE_1}{r - g_n}$$

$$\frac{P_0}{EPS_0} = PE = \frac{(\text{FCFE/Earnings})*(1+g_n)}{r\text{-}g_n}$$

Using the Fundamental Model to Estimate PE For a High Growth Firm

- The price-earnings ratio for a high growth firm can also be related to fundamentals. In the special case of the two-stage dividend discount model, this relationship can be made explicit fairly simply:

$$P_0 = \frac{EPS_0 * \text{Payout Ratio} * (1+g) * \left(1 - \frac{(1+g)^n}{(1+r)^n}\right)}{r-g} + \frac{EPS_0 * \text{Payout Ratio}_n * (1+g)^n * (1+g_n)}{(r-g_n)(1+r)^n}$$

  - For a firm that does not pay what it can afford to in dividends, substitute FCFE/Earnings for the payout ratio.
- Dividing both sides by the earnings per share:

$$\frac{P_0}{EPS_0} = \frac{\text{Payout Ratio} * (1+g) * \left(1 - \frac{(1+g)^n}{(1+r)^n}\right)}{r - g} + \frac{\text{Payout Ratio}_n * (1+g)^n * (1+g_n)}{(r - g_n)(1+r)^n}$$

A Simple Example

- Assume that you have been asked to estimate the PE ratio for a firm which has the following characteristics:

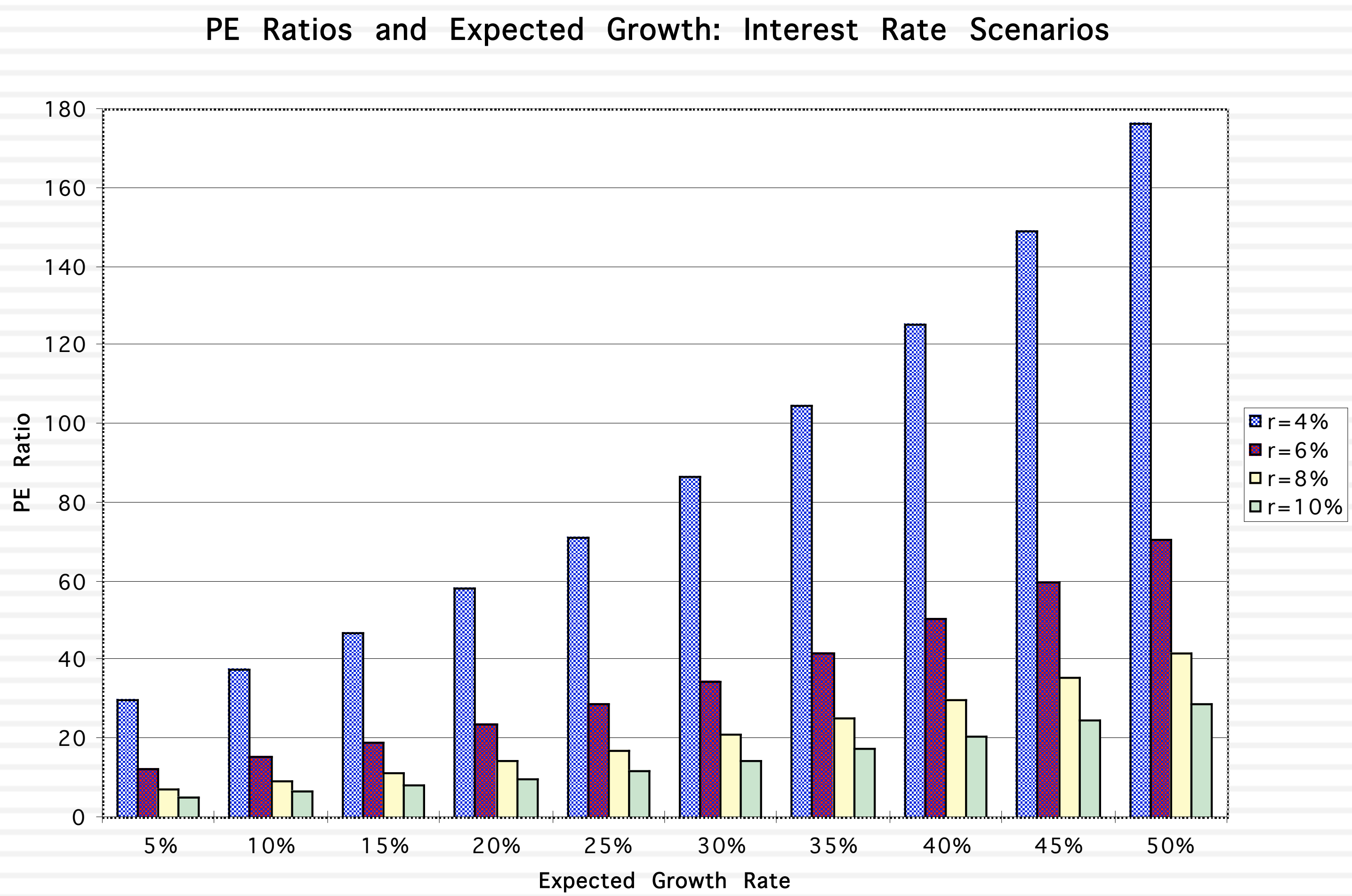
Variable	*High Growth Phase*	*Stable Growth Phase*
Expected Growth Rate	25%	8%
Payout Ratio	20%	50%
Beta	1.00	1.00
Number of years	5 years	Forever after year 5

Riskfree rate = T.Bond Rate = 6%

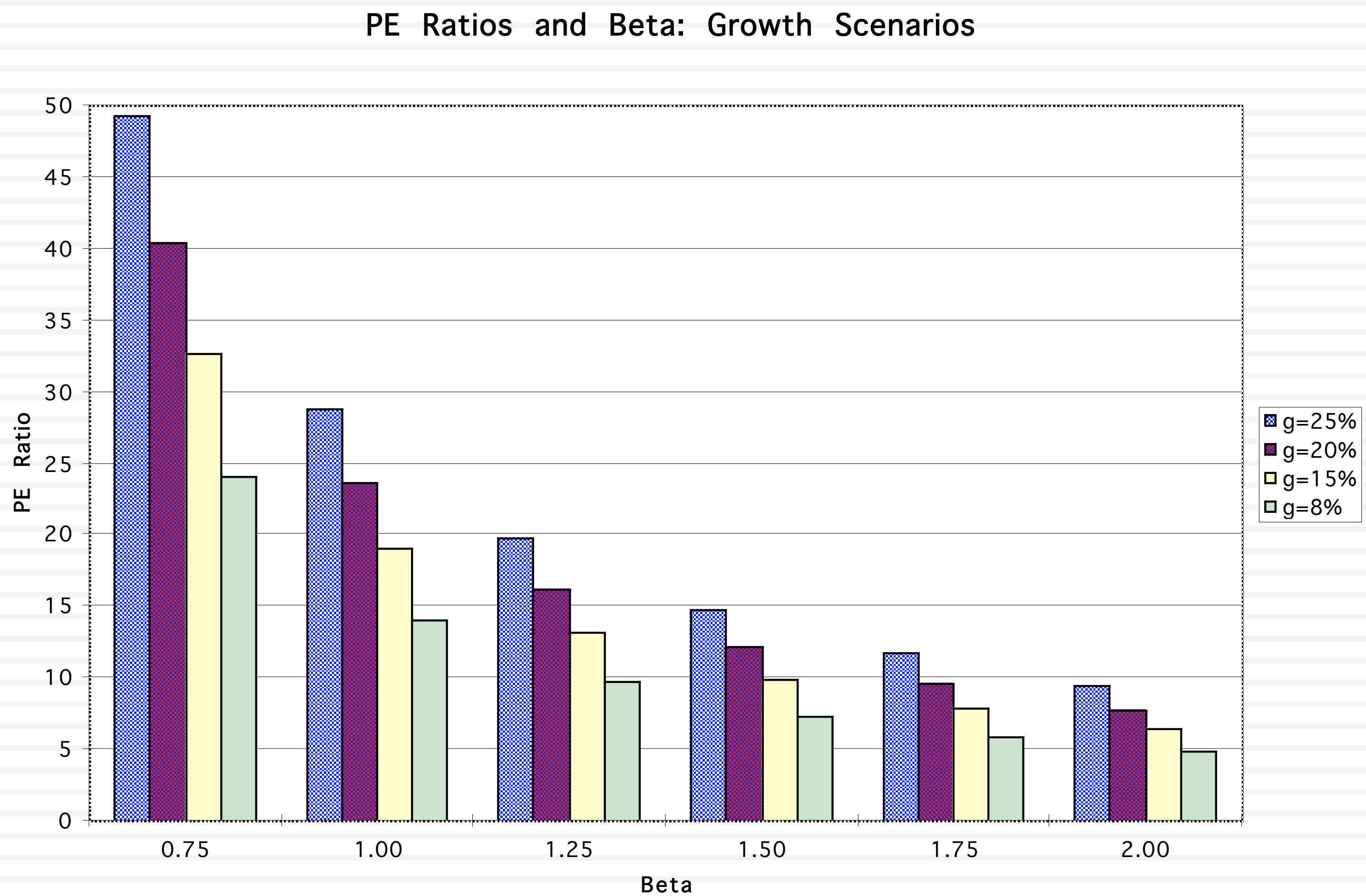
Required rate of return = 6% + 1(5.5%)= 11.5%

$$\frac{P_0}{EPS_0} = \frac{.20*(1.25)*\left(1 - \frac{(1.25)^5}{(1.115)^5}\right)}{.115-.25} + \frac{.50*(1.25)^5*(1.08)}{(.115-.08)(1.115)^5} = 28.75$$

a. PE and Growth: Firm grows at x% for 5 years, 8% thereafter

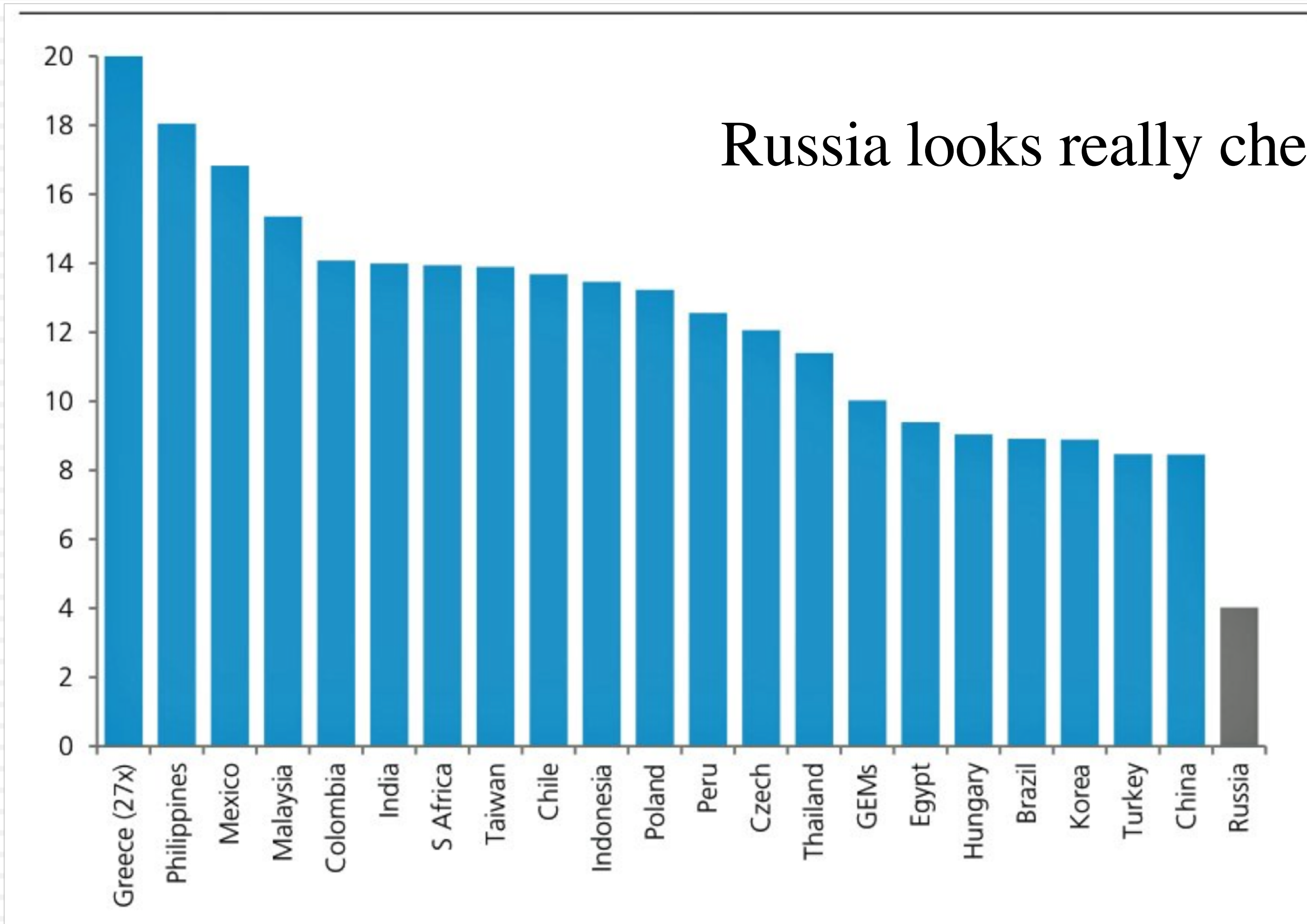


b. PE and Risk: A Follow up Example



Example 1: Comparing PE ratios across Emerging Markets- March 2014 (pre- Ukraine)

Russia looks really cheap, right?



Source: Datastream, IBES, UBS GEMs Strategy

Example 2: An Old Example with Emerging Markets: June 2000

Country	*PE Ratio*	*Interest Rates*	*GDP Real Growth*	*Country Risk*
Argentina	14	18.00%	2.50%	45
Brazil	21	14.00%	4.80%	35
Chile	25	9.50%	5.50%	15
Hong Kong	20	8.00%	6.00%	15
India	17	11.48%	4.20%	25
Indonesia	15	21.00%	4.00%	50
Malaysia	14	5.67%	3.00%	40
Mexico	19	11.50%	5.50%	30
Pakistan	14	19.00%	3.00%	45
Peru	15	18.00%	4.90%	50
Phillipines	15	17.00%	3.80%	45
Singapore	24	6.50%	5.20%	5
South Korea	21	10.00%	4.80%	25
Thailand	21	12.75%	5.50%	25
Turkey	12	25.00%	2.00%	35
Venezuela	20	15.00%	3.50%	45

Regression Results

- The regression of PE ratios on these variables provides the following –

PE = 16.16 - 7.94 Interest Rates

+ 154.40 Growth in GDP

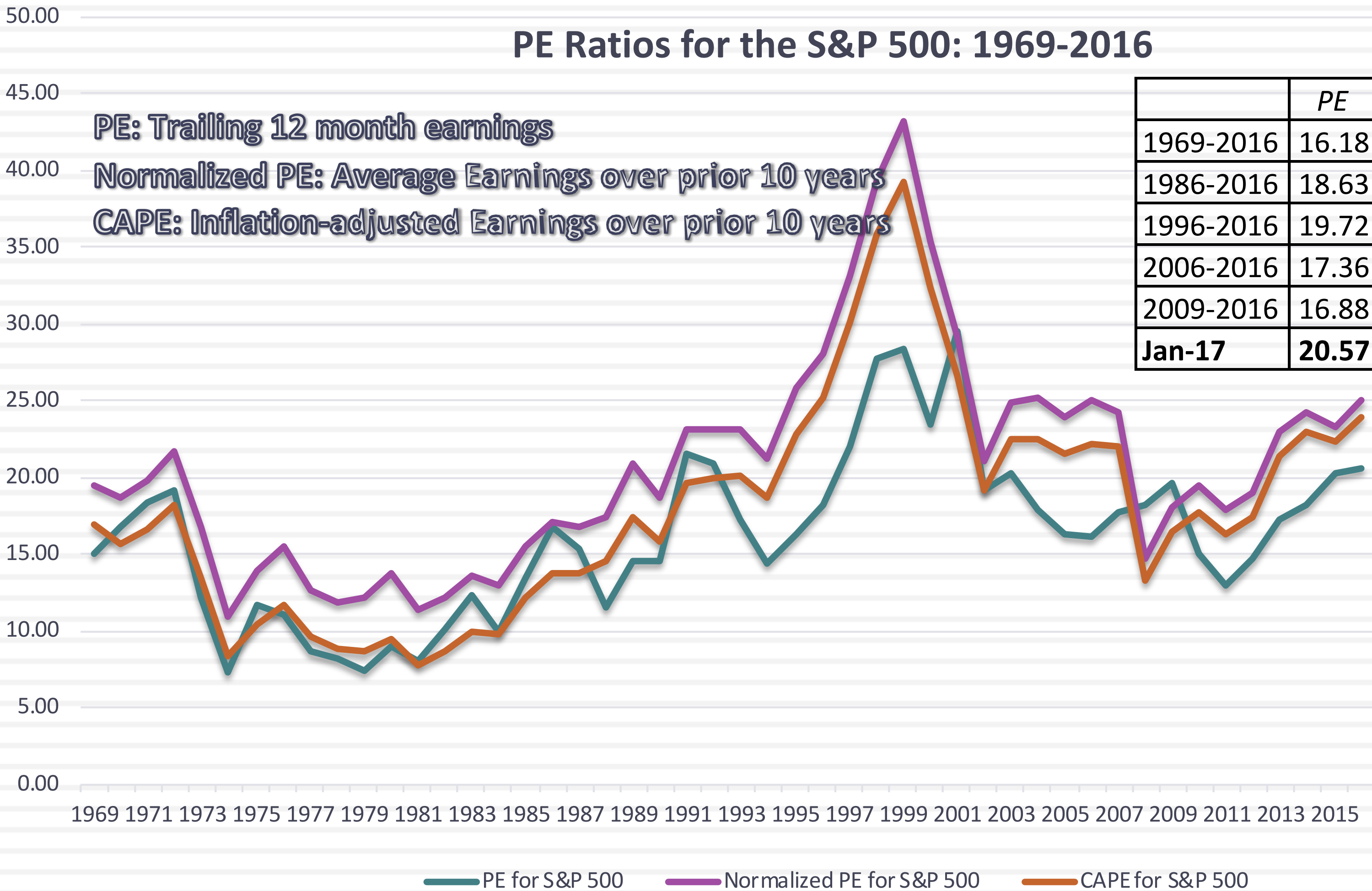
- 0.1116 Country Risk

R Squared = 73%

Predicted PE Ratios

Country	PE Ratio	Interest Rates	GDP Real Growth	Country Risk	Predicted PE
Argentina	14	18.00%	2.50%	45	13.57
Brazil	21	14.00%	4.80%	35	18.55
Chile	25	9.50%	5.50%	15	22.22
Hong Kong	20	8.00%	6.00%	15	23.11
India	17	11.48%	4.20%	25	18.94
Indonesia	15	21.00%	4.00%	50	15.09
Malaysia	14	5.67%	3.00%	40	15.87
Mexico	19	11.50%	5.50%	30	20.39
Pakistan	14	19.00%	3.00%	45	14.26
Peru	15	18.00%	4.90%	50	16.71
Phillipines	15	17.00%	3.80%	45	15.65
Singapore	24	6.50%	5.20%	5	23.11
South Korea	21	10.00%	4.80%	25	19.98
Thailand	21	12.75%	5.50%	25	20.85
Turkey	12	25.00%	2.00%	35	13.35
Venezuela	20	15.00%	3.50%	45	15.35

Example 3: PE ratios for the S&P 500 in January 2017

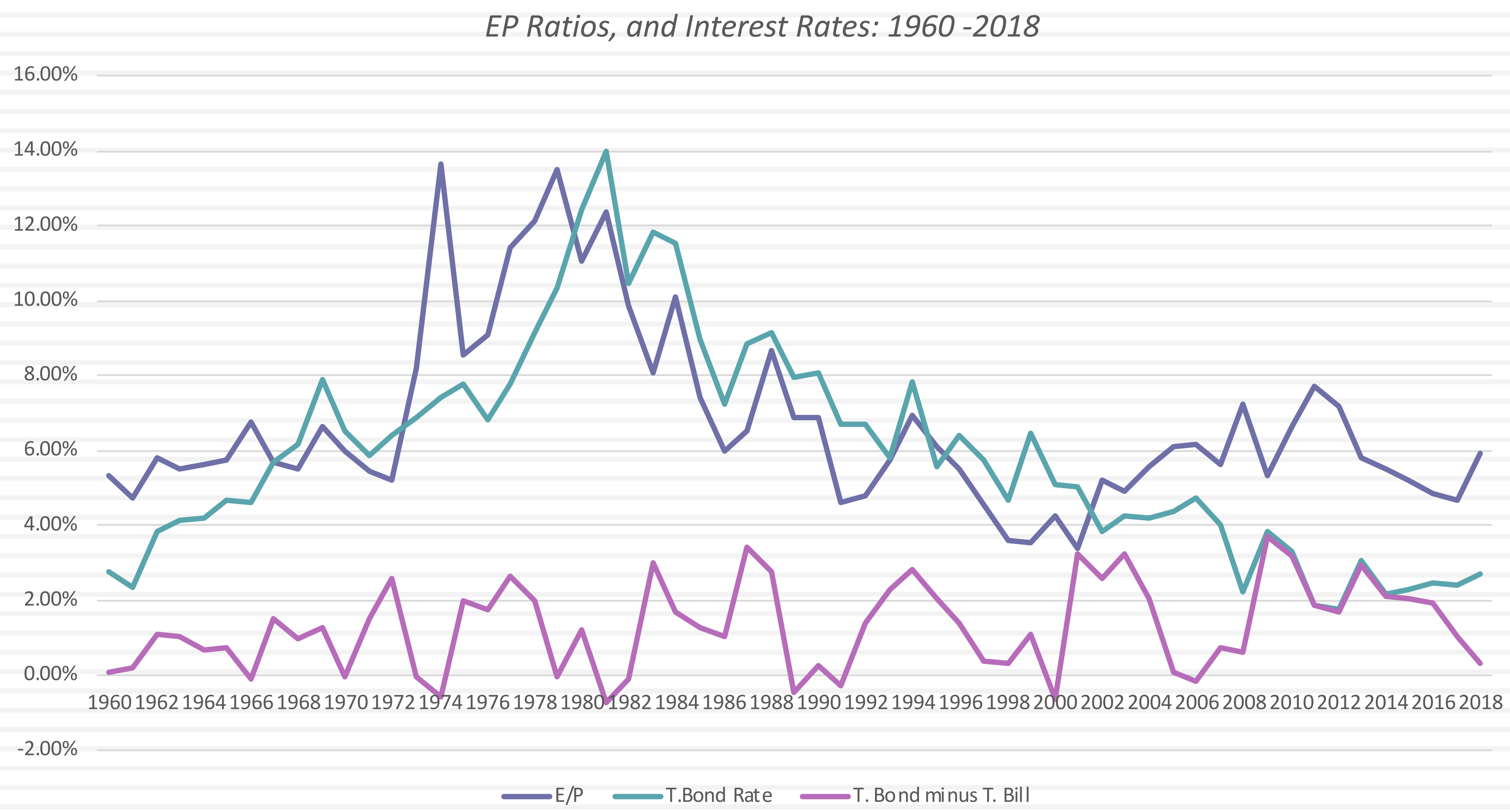


	PE	*Normalized PE*	*CAPE*
1969-2016	16.18	20.80	18.03
1986-2016	18.63	24.04	21.55
1996-2016	19.72	25.60	23.40
2006-2016	17.36	21.27	19.66
2009-2016	16.88	20.72	19.24
Jan-17	**20.57**	**25.00**	**23.91**

Is low (high) PE cheap (expensive)?

- A market strategist argues that stocks are expensive because the PE ratio in 2017 is high relative to the average PE ratio across time. Do you agree?
  a. Yes
  b. No
- If you do not agree, what factors might explain the higher PE ratio today?
- Would you respond differently if the market strategist has a Nobel Prize in Economics?

E/P Ratios , T.Bond Rates and Term Structure



Regression Results

	E/P	T.Bond Rate	T. Bond minus T. Bill
E/P	1.0000		
T.Bond Rate	0.6431	1.0000	
T. Bond minus T. Bill	-0.1388	-0.0944	1.0000

Correlation between E/P and interest rates

- In the following regression, using 1960-2018 data, we regress E/P ratios against the level of T.Bond rates and a term structure variable (T.Bond - T.Bill rate)

  EP Ratio = 0.0376 + 0.5325 T.Bond Rate - 0.1595 (T.Bond Rate - T.Bill Rate)
  (5.84) (6.22) (-0.78)

  R squared = 41.97%

- Going back to 2008, this is what the regression looked like:

  E/P = 2.56% + 0.7044 T.Bond Rate – 0.3289 (T.Bond Rate-T.Bill Rate)
  (4.71) (7.10) (1.46)

  R squared = 50.71%

  The R-squared has dropped and the differential with the T.Bill rate has lost significance. How would you read this result?