



THE MACRO INPUTS OF VALUATION HUBRIS AND HAPPENSTANCE

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Updated: January 2013

The Macro Part of Company Valuation

2

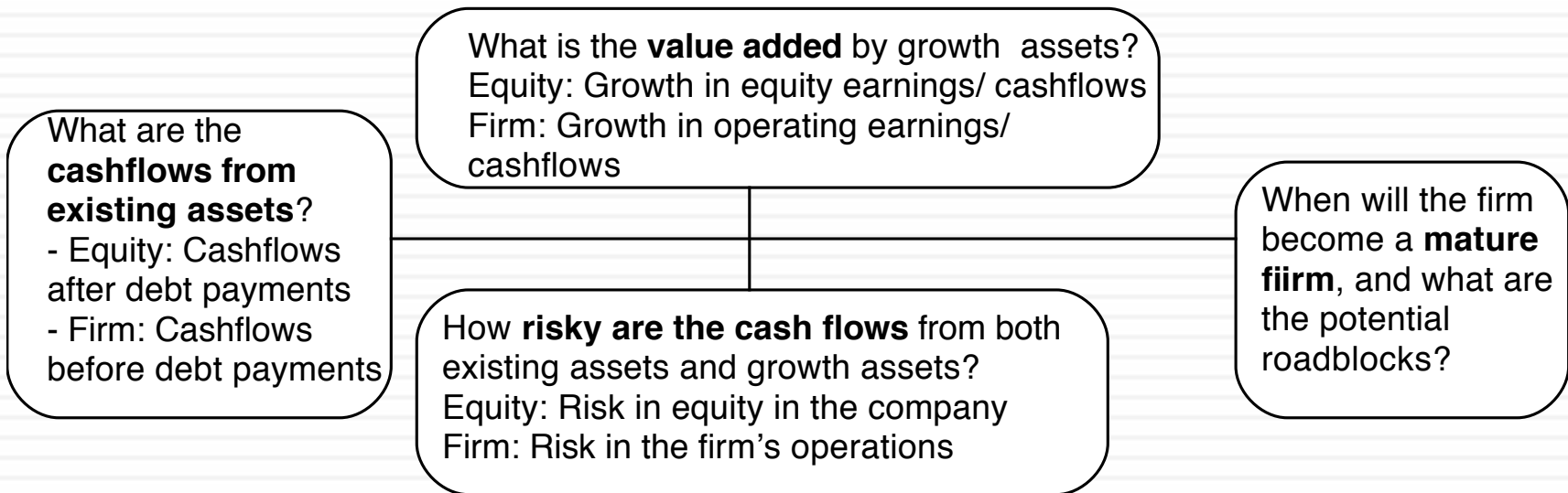
General
Inflation

Relative
Inflation

Overall Economic
Growth

Exchange
Rates

Political
Risk



Risk free Interest Rate

Risk Premiums for equity & debt

The Macro determinants of Discount Rates

3

- The discount rate that you use on a cash flow will reflect the risk of that cash flow, but the overall level is affected by macro economic variables. There are two key macro components to discount rates that have little to do with the asset that you are valuing and are set by the market.
- The first is the risk free rate, that is the base for your discount rate.
 - Risk free rate = Expected Inflation + Expected Real Interest Rate
 - The expected inflation will be a function of the currency you choose to do your analysis in
 - The expected real interest rate is set by the demand for & supply of capital in the real economy. It should increase if growth is expected to be robust and decrease if growth is anticipated to be anemic.
- The second is the risk premium that investors charge for investing in equity markets (the equity risk premium) or for lending money (default spreads).

I. A Riskfree Rate

4

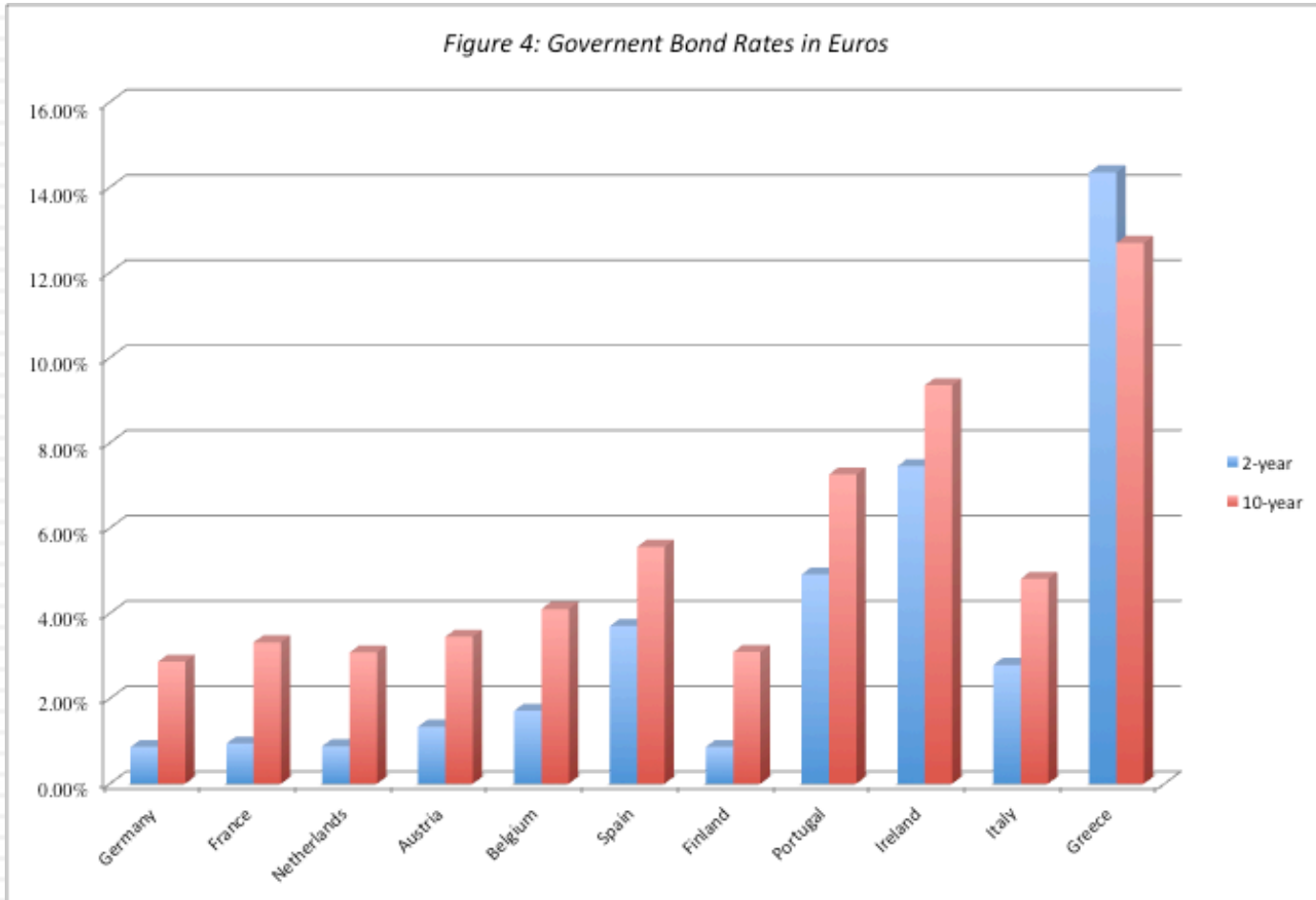
- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, then, it has to have
 - ▣ No default risk
 - ▣ No reinvestment risk
- 1. Currency matters: The risk free rate will vary across currencies.
- 2. Time horizon matters: Thus, the riskfree rates in valuation will depend upon when the cash flow is expected to occur and will vary across time.
- 3. Not all government securities are riskfree: Some governments face default risk and the rates on bonds issued by them will not be riskfree.

Test 1: A riskfree rate in US dollars!

5

- In valuation, we estimate cash flows forever (or at least for very long time periods). The right risk free rate to use in valuing a company in US dollars would be
 - a. A three-month Treasury bill rate (0.1%)
 - b. A ten-year Treasury bond rate (2%)
 - c. A thirty-year Treasury bond rate (3%)
 - d. A TIPs (inflation-indexed treasury) rate (1%)
 - e. None of the above
- When we use US treasury rates as risk free rates, what are we assuming about default risk in the US treasury?

Test 2: A Riskfree Rate in Euros



Test 3: A Riskfree Rate in \$R (Nominal Reails)

7

The Brazilian Government has ten-year \$R denominated bonds yielding 9.18% on January 1, 2013

Country	<i>Jan-13</i>	<i>Jan-12</i>	Country	<i>Jan-13</i>	<i>Jan-12</i>
Kenya	13.50%	NA	Poland	3.62%	5.96%
Nigeria	12.01%	15.27%	China	3.60%	3.44%
Pakistan	11.50%	13.01%	New Zealand	3.54%	3.81%
Greece	11.47%	37.09%	Thailand	3.54%	3.29%
Venezuela	10.05%	12.24%	Malaysia	3.50%	3.69%
Vietnam	9.84%	NA	Bulgaria	3.43%	5.22%
Brazil	9.18%	11.39%	Latvia	3.39%	6.50%
India	8.00%	8.36%	Australia	3.28%	3.93%
Portugal	6.98%	13.46%	South Korea	3.15%	3.80%
Romania	6.88%	NA	Qatar	2.68%	NA
Russia	6.85%	6.00%	Norway	2.12%	2.29%
Iceland	6.80%	NA	Belgium	2.05%	4.37%
Peru	6.76%	6.76%	France	1.99%	3.32%
Turkey	6.55%	NA	Czech Republic	1.87%	3.61%
South Africa	6.39%	8.20%	United Kingdom	1.82%	2.05%
Hungary	6.23%	10.73%	Canada	1.81%	2.01%
Colombia	5.55%	7.56%	United States	1.76%	1.99%
Chile	5.51%	5.58%	Austria	1.74%	3.24%
Mexico	5.29%	6.51%	Sweden	1.54%	1.71%
Spain	5.26%	5.43%	Finland	1.51%	2.40%
Indonesia	5.17%	6.08%	Netherlands	1.50%	2.31%
Slovenia	5.03%	NA	Denmark	1.38%	1.72%
Croatia	4.95%	7.41%	Germany	1.31%	1.92%
Ireland	4.53%	8.21%	Singapore	1.30%	1.60%
Italy	4.50%	6.92%	Euro Area	1.26%	NA
Philippines	4.40%	NA	Taiwan	1.17%	NA
Slovakia	4.31%	4.31%	Japan	0.79%	0.99%
Lithuania	4.09%	6.35%	Hong Kong	0.65%	1.57%
Israel	3.91%	4.54%	Switzerland	0.46%	0.71%

Brazil had sovereign ratings of Baa1 for both its local and foreign currency bonds

Sovereign Default Spread: Three paths to the same destination...

8

- Sovereign dollar or euro denominated bonds: Find sovereign bonds denominated in US dollars, issued by emerging markets. The difference between the interest rate on the bond and the US treasury bond rate should be the default spread. For instance, in January 2013, the US dollar denominated 10-year bond issued by the Brazilian government (with a Baa2 rating) had an interest rate of 2.5%, resulting in a default spread of 0.74% over the US treasury rate of 1.76% at the same point in time. (On the same day, the ten-year Brazilian BR denominated bond had an interest rate of 12%)
- CDS spreads: Obtain the default spreads for sovereigns in the CDS market. In January 2013, the CDS spread for Brazil in that market was 1.42%.
- Average spread: For countries which don't issue dollar denominated bonds or have a CDS spread, you have to use the average spread for other countries in the same rating class. For Brazil, with its Baa1 rating in January 2013, this would have yielded a default spread of 1.75%.

Getting to a risk free rate in nominal \$R

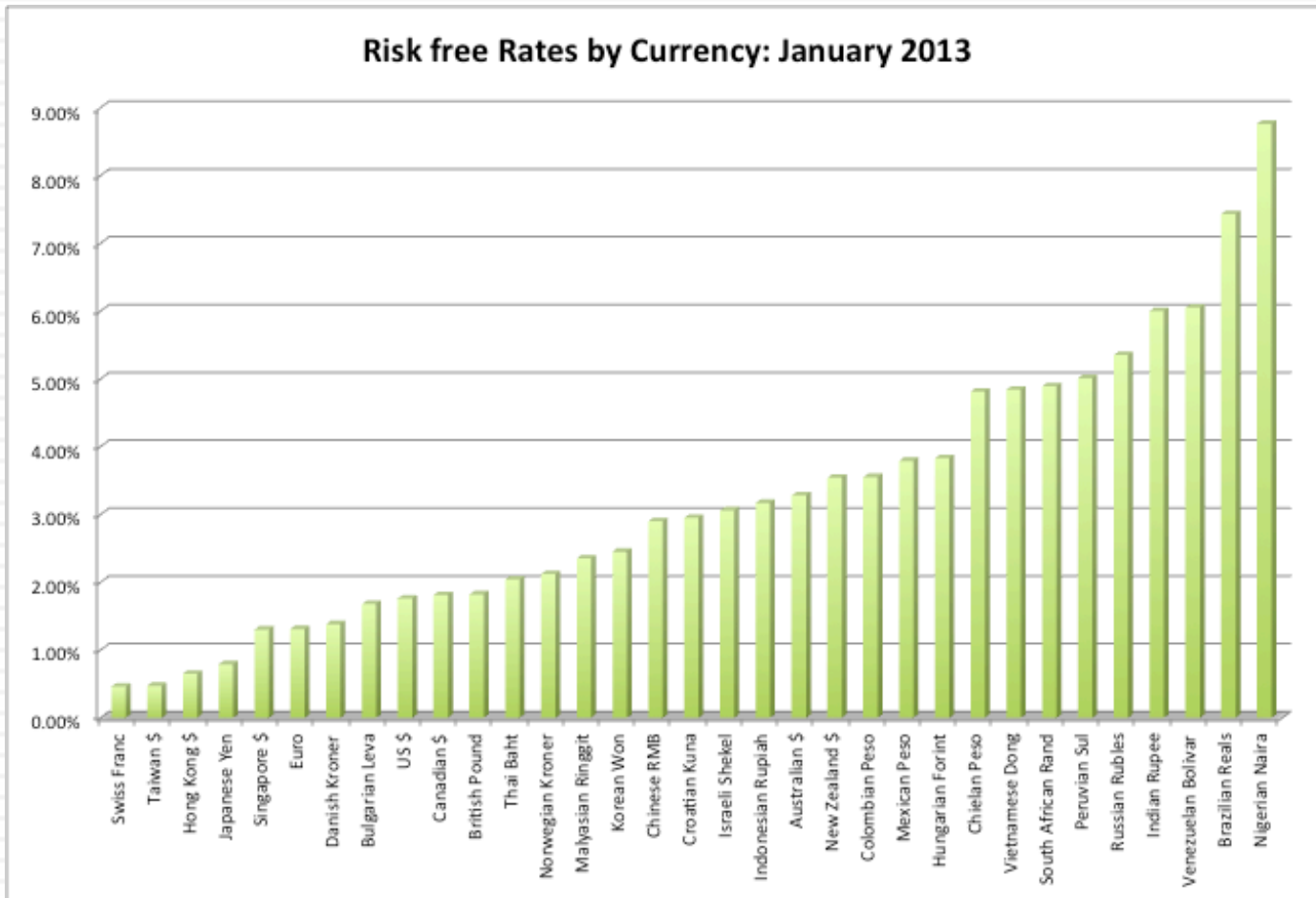
9

- The Brazilian government bond rate in nominal reais in January 2013 was 9.18%. To get to a riskfree rate in nominal reais, we can use one of three approaches.
 - Approach 1: Government Bond spread
 - The 2020 Brazil bond, denominated in US dollars, has a spread of 0.74% over the US treasury bond rate.
 - Riskfree rate in \$R = $9.18\% - 0.74\% = 8.44\%$
 - Approach 2: The CDS Spread
 - The CDS spread for Brazil on January 1, 2013 was 1.42%.
 - Riskfree rate in \$R = $9.18\% - 1.42\% = 7.76\%$
 - Approach 3: The Rating based spread
 - Brazil has a Baa2 local currency rating from Moody's. The default spread for that rating is 1.75%
 - Riskfree rate in \$R = $9.18\% - 1.75\% = 7.43\%$

Why do risk free rates vary across currencies?

January 2013 Risk free rates

10



Currency Invariance: Tata Motors as an illustration

11

$$(1.125) * (1.01 / 1.04) - 1 = .0925$$

	In Indian Rupees	In US \$
Risk free Rate	5.00%	2.00%
Expected inflation rate	4.00%	1.00%
Cost of capital		
- High Growth	12.50%	9.25%
- Stable Growth	10.39%	7.21%
Expected growth rate		
- High Growth	12.01%	8.78%
- Stable Growth	5.00%	2.00%
Return on Capital		
- High Growth	17.16%	13.78%
- Stable Growth	10.39%	7.21%
Value per share	Rs 614	\$12.79/share (roughly Rs 614 at current exchange rate)

II. Risk Premiums

12

- The equity risk premium is the premium that investors demand for investing in an average risk investment, relative to the riskfree rate.
- As a general proposition, this premium should be
 - ▣ increase with the risk aversion of the investors in that market
 - ▣ increase with the riskiness of the “average” risk investment
- The default spread is the premium that lenders charge for lending you money. While it should reflect your credit risk as a borrower, the level of this spread will
 - ▣ Increase with the risk aversion of lenders in the market
 - ▣ Increase with the risk in the overall economy

Equity Risk Premiums

The ubiquitous historical risk premium

13

- The historical premium is the premium that stocks have historically earned over riskless securities.
- While the users of historical risk premiums act as if it is a fact (rather than an estimate), it is sensitive to
 - ▣ How far back you go in history...
 - ▣ Whether you use T.bill rates or T.Bond rates
 - ▣ Whether you use geometric or arithmetic averages.
- For instance, looking at the US:

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2012	7.65%	5.88%	5.74%	4.20%
	2.20%	2.33%		
1962-2012	5.93%	3.91%	4.60%	2.93%
	2.38%	2.66%		
2002-2012	7.06%	3.08%	5.38%	1.71%
	5.82%	8.11%		

The perils of trusting the past.....

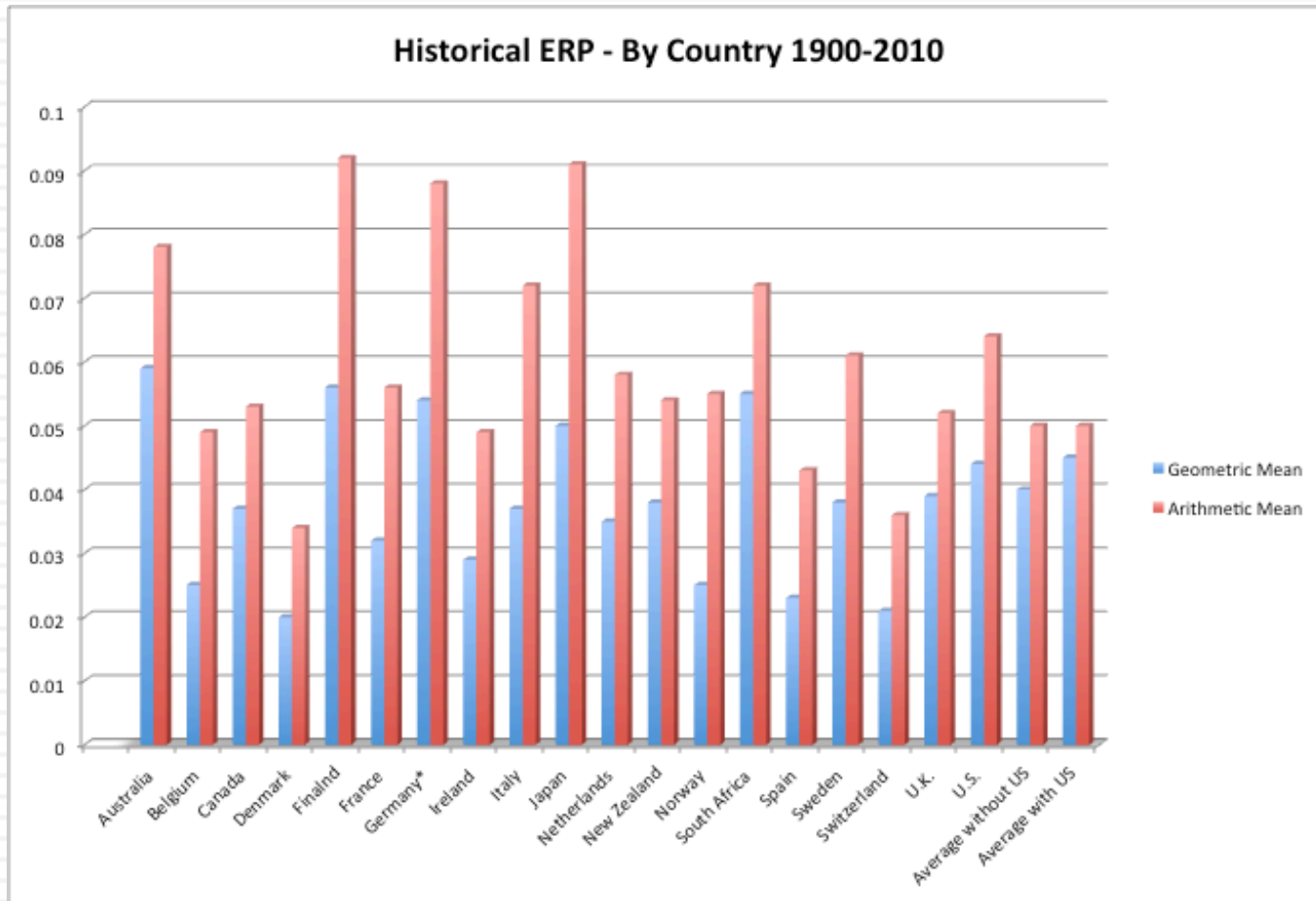
14

- Noisy estimates: Even with long time periods of history, the risk premium that you derive will have substantial standard error. For instance, if you go back to 1928 (about 80 years of history) and you assume a standard deviation of 20% in annual stock returns, you arrive at a standard error of greater than 2%:

$$\text{Standard Error in Premium} = 20\%/\sqrt{80} = 2.26\%$$

- Survivorship Bias: Using historical data from the U.S. equity markets over the twentieth century does create a sampling bias. After all, the US economy and equity markets were among the most successful of the global economies that you could have invested in early in the century.

Risk Premium for a Mature Market? Broadening the sample



The simplest way of estimating an additional country risk premium: The country default spread

16

- Default spread for country: In this approach, the country equity risk premium is set equal to the default spread for the country, estimated in one of three ways:
 - The default spread on a dollar denominated bond issued by the country. Brazil's 10 year \$ denominated bond at the start of 2013 was trading at an interest rate of 2.60%, a default spread of 0.84% over the US treasury bond rate of 1.76%.
 - The ten year CDS spread for Brazil of 1.42%
 - Brazil's sovereign local currency rating is Baa2. The default spread for a Baa2 rated sovereign is about 1.75%.
- This default spread is added on to the mature market premium to arrive at the total equity risk premium for Brazil, assuming a mature market premium of 5.80%.
 - Country Risk Premium for Brazil = 1.75%
 - Total ERP for Brazil = 5.80% + 1.75% = 7.55%

An equity volatility based approach to estimating the country total ERP

17

- This approach draws on the standard deviation of two equity markets, the emerging market in question and a base market (usually the US). The total equity risk premium for the emerging market is then written as:
 - Total equity risk premium = Risk Premium_{US} * $\sigma_{\text{Country Equity}} / \sigma_{\text{US Equity}}$
- The country equity risk premium is based upon the volatility of the market in question relative to U.S market.
 - Assume that the equity risk premium for the US is 5.80%.
 - Assume that the standard deviation in the Bovespa (Brazilian equity) is 21% and that the standard deviation for the S&P 500 (US equity) is 18%.
 - Total Equity Risk Premium for Brazil = 5.80% (21%/18%) = 6.77%
 - Country equity risk premium for Brazil = 6.77% - 5.80% = 0.97%

A melded approach to estimating the additional country risk premium

18

- Country ratings measure default risk. While default risk premiums and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads.
- Another is to multiply the bond default spread by the relative volatility of stock and bond prices in that market. Using this approach for Brazil in January 2013, you would get:
 - Country Equity risk premium = Default spread on country bond* $\frac{\sigma_{\text{Country Equity}}}{\sigma_{\text{Country Bond}}}$
 - Standard Deviation in Bovespa (Equity) = 21%
 - Standard Deviation in Brazil government bond = 14%
 - Default spread on C-Bond = 1.75%
 - Brazil Country Risk Premium = 1.75% (21%/14%) = 2.63%
 - Brazil Total ERP = Mature Market Premium + CRP = 5.80% + 2.63% = 8.43%

Country Risk Premium January 2013

Canada	0.00%	5.80%
USA	0.00%	5.80%
N. America	0.00%	5.80%

Argentina	9.00%	14.80%
Belize	15.00%	20.80%
Bolivia	4.88%	10.68%
Brazil	2.63%	8.43%
Chile	1.05%	6.85%
Colombia	3.00%	8.80%
Costa Rica	3.00%	8.80%
Ecuador	10.50%	16.30%
El Salvador	4.88%	10.68%
Guatemala	3.60%	9.40%
Honduras	7.50%	13.30%
Mexico	2.25%	8.05%
Nicaragua	9.00%	14.80%
Panama	2.63%	8.43%
Paraguay	6.00%	11.80%
Peru	2.63%	8.43%
Uruguay	3.00%	8.80%
Venezuela	6.00%	11.80%
Latin America	3.38%	9.18%

Belgium	1.05%	6.85%
Germany	0.00%	5.80%
Portugal	4.88%	10.68%
Italy	2.63%	8.43%
Luxembourg	0.00%	5.80%
Austria	0.00%	5.80%
Denmark	0.00%	5.80%
France	0.38%	6.18%
Finland	0.00%	5.80%
Greece	10.50%	16.30%
Iceland	3.00%	8.80%
Ireland	3.60%	9.40%
Netherlands	0.00%	5.80%
Norway	0.00%	5.80%
Slovenia	2.63%	8.43%
Spain	3.00%	8.80%
Sweden	0.00%	5.80%
Switzerland	0.00%	5.80%
Turkey	3.60%	9.40%
UK	0.00%	5.80%
W. Europe	1.05%	6.85%

Angola	4.88%	10.68%
Botswana	1.50%	7.30%
Egypt	7.50%	13.30%
Kenya	6.00%	11.80%
Mauritius	2.25%	8.05%
Morocco	3.60%	9.40%
Namibia	3.00%	8.80%
Nigeria	4.88%	10.68%
Senegal	6.00%	11.80%
South Africa	2.25%	8.05%
Tunisia	3.00%	8.80%
Zambia	6.00%	11.80%
Africa	4.29%	10.09%

Albania	6.00%	11.80%
Armenia	4.13%	9.93%
Azerbaijan	3.00%	8.80%
Belarus	9.00%	14.80%
Bosnia & Herzegovina	9.00%	14.80%
Bulgaria	2.63%	8.43%
Croatia	3.00%	8.80%
Czech Republic	1.28%	7.08%
Estonia	1.28%	7.08%
Georgia	4.88%	10.68%
Hungary	3.60%	9.40%
Kazakhstan	2.63%	8.43%
Latvia	3.00%	8.80%
Lithuania	2.25%	8.05%
Moldova	9.00%	14.80%
Montenegro	4.88%	10.68%
Poland	1.50%	7.30%
Romania	3.00%	8.80%
Russia	2.25%	8.05%
Slovakia	1.50%	7.30%
Ukraine	9.00%	14.80%
E. Europe & Russia	2.68%	8.48%

Bahrain	2.25%	8.05%
Israel	1.28%	7.08%
Jordan	4.13%	9.93%
Kuwait	0.75%	6.55%
Lebanon	6.00%	11.80%
Oman	1.28%	7.08%
Qatar	0.75%	6.55%
Saudi Arabia	1.05%	6.85%
United Arab Emirates	0.75%	6.55%
Middle East	1.16%	6.96%

Bangladesh	4.88%	10.68%
Cambodia	7.50%	13.30%
China	1.05%	6.85%
Fiji Islands	6.00%	11.80%
Hong Kong	0.38%	6.18%
India	3.00%	8.80%
Indonesia	3.00%	8.80%
Japan	1.05%	6.85%
Korea	1.05%	6.85%
Macao	1.05%	6.85%
Malaysia	1.73%	7.53%
Mongolia	6.00%	11.80%
Pakistan	10.50%	16.30%
Papua New Guinea	6.00%	11.80%
Philippines	3.60%	9.40%
Singapore	0.00%	5.80%
Sri Lanka	6.00%	11.80%
Taiwan	1.05%	6.85%
Thailand	2.25%	8.05%
Vietnam	7.50%	13.30%
Asia	1.55%	7.35%

Australia	0.00%	5.80%
New Zealand	0.00%	5.80%
Australia & NZ	0.00%	5.80%

Black #: Total ERP
Red #: Country risk premium
AVG: GDP weighted average

Operation based CRP: Single versus Multiple Emerging Markets

20

- Single emerging market: Embraer, in 2004, reported that it derived 3% of its revenues in Brazil and the balance from mature markets. The mature market ERP in 2004 was 5% and Brazil's CRP was 7.89%.

	Revenues	Total ERP	CRP
US and other mature markets	97%	5.00%	0.00%
Brazil	3%	12.89%	8%
Embraer		5.24%	0.24%

- Multiple emerging markets: Ambev, the Brazilian-based beverage company, reported revenues from the following countries during 2011.

	Revenues	%	Total ERP	CRP
Argentina	19	9.31%	15.00%	9.00%
Bolivia	4	1.96%	10.88%	4.88%
Brazil	130	63.73%	8.63%	2.63%
Canada	23	11.27%	6.00%	0.00%
Chile	7	3.43%	7.05%	1.05%
Ecuador	6	2.94%	12.75%	6.75%
Paraguay	3	1.47%	12.00%	6.00%
Peru	12	5.88%	9.00%	3.00%
Ambev	204		9.11%	3.11%

Extending to a multinational: Regional breakdown Coca Cola's revenue breakdown and ERP in 2012

21

<i>Region</i>	<i>Revenues</i>	<i>Total ERP</i>	<i>CRP</i>
Western Europe	19%	6.67%	0.67%
Eastern Europe & Russia	5%	8.60%	2.60%
Asia	15%	7.63%	1.63%
Latin America	15%	9.42%	3.42%
Australia	4%	6.00%	0.00%
Africa	4%	9.82%	3.82%
North America	40%	6.00%	0.00%
Coca Cola	100%	7.14%	1.14%

Things to watch out for

1. Aggregation across regions. For instance, the Pacific region often includes Australia & NZ with Asia
2. Obscure aggregations including Eurasia and Oceania

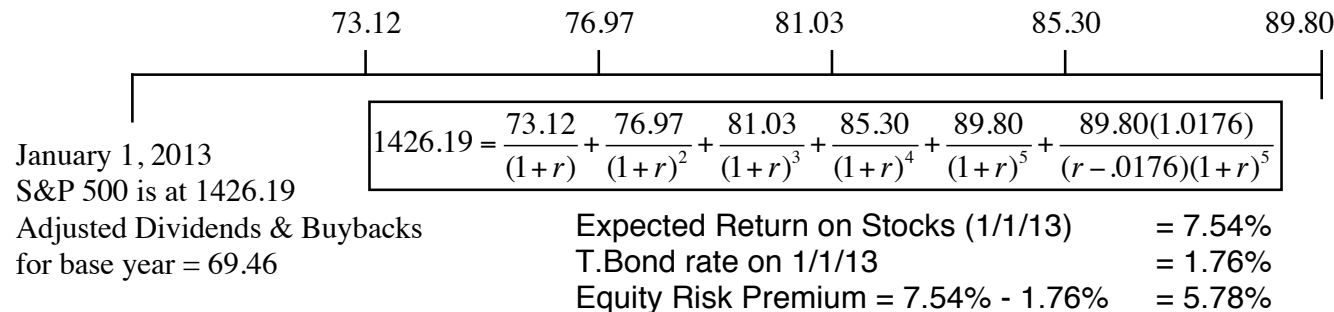
Implied Equity Risk Premiums

- On January 1, 2013, the S&P 500 was at 1426.19, essentially unchanged for the year. And it was a year of macro shocks – political upheaval in the Middle East and sovereign debt problems in Europe. The treasury bond rate dropped below 2% and buybacks/dividends surged.

In 2012, the actual cash returned to stockholders was 72.25. Using the average total yield for the last decade yields 69.46

Analysts expect earnings to grow 7.67% in 2013, 7.28% in 2014, scaling down to 1.76% in 2017, resulting in a compounded annual growth rate of 5.27% over the next 5 years. We will assume that dividends & buybacks will grow 5.27% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 1.76%, the same rate as the entire economy (= riskfree rate).

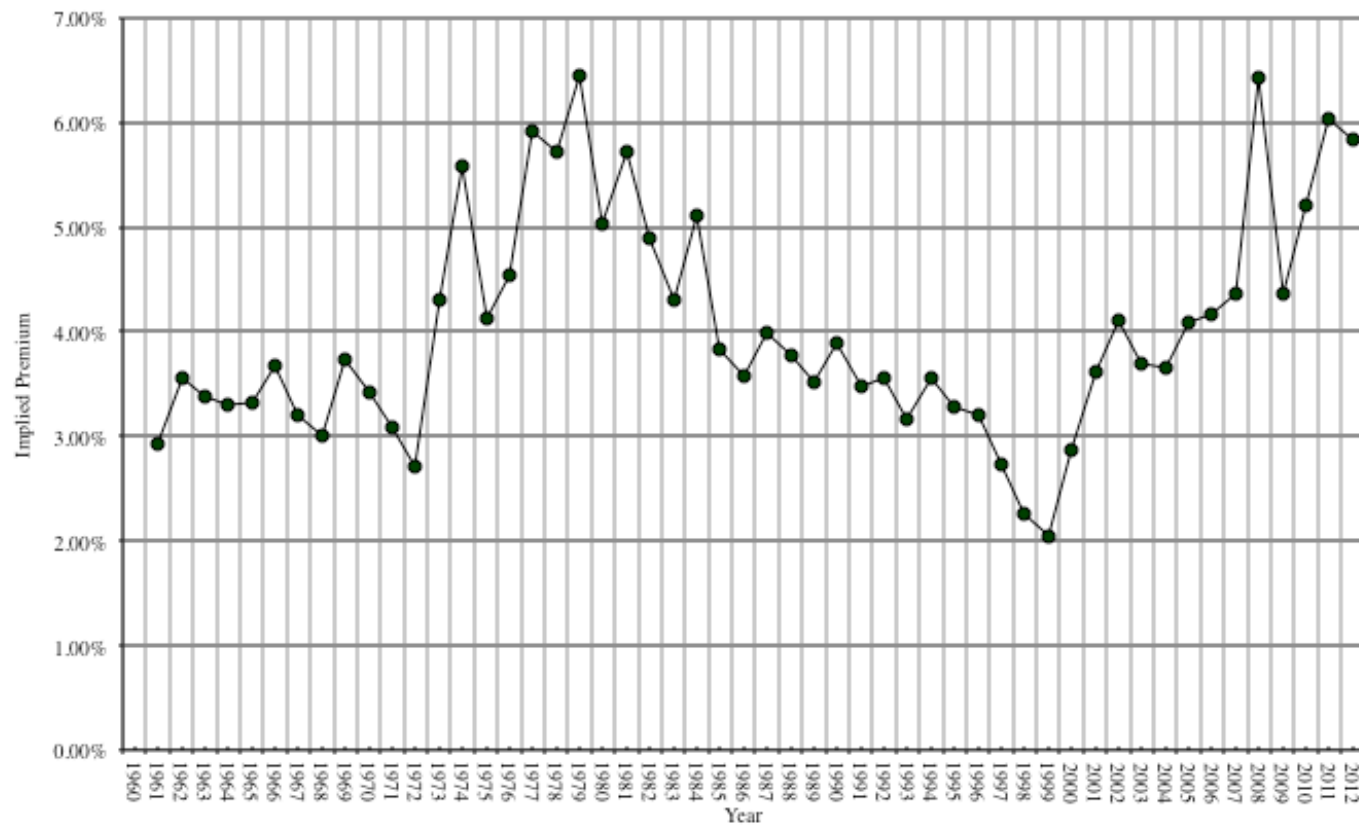


Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: S&P, Media reports, Factset, Thomson-Reuters

Implied Premiums in the US: 1960-2012

23

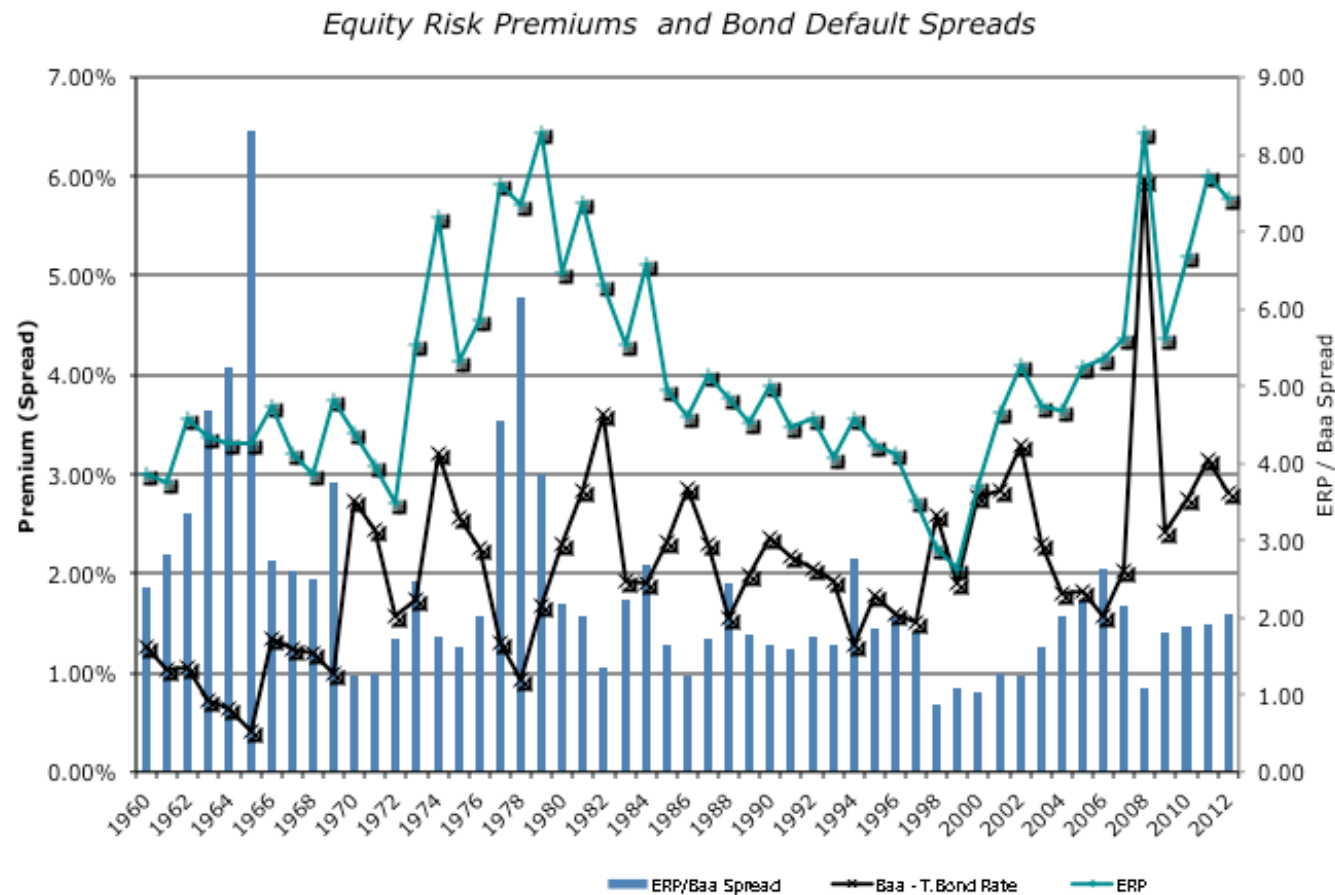
Implied Premium for US Equity Market



Bond Default Spreads

The market price for lending risk

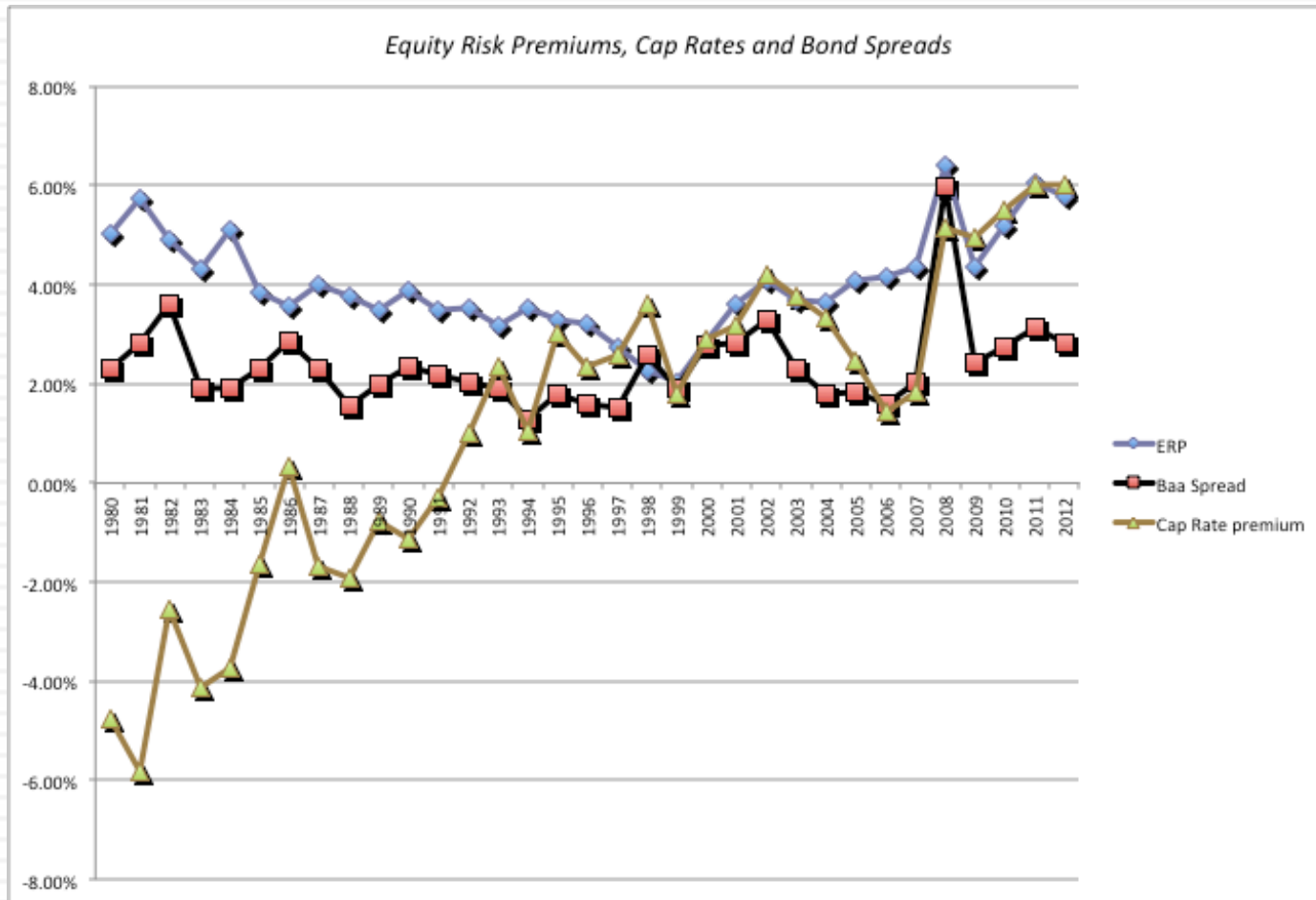
24



Cap Rates in Real Estate

Every risky asset market has a “risk” premium

25



The Macro Effects on Cash flows

26

- The expected cash flows on an asset or company are determined partly by the company's choices and partly by macro variables.
- Thus, the earnings growth for a company will be higher, other things remaining equal, if the economy grows faster.
- In the same vein, earnings and cash flows will be affected (and not always by the same amount) by the overall level of inflation as well as relative inflation (i.e., inflation in the goods/services that the company either consumes or produces, relative to overall inflation).
- Finally, exchange rate movement can have positive or negative effects on earnings and cash flows.

Rule 1: Be macro consistent

Discount rate and Cash flow assumptions

27

- The risk free rate that you used to estimate your discount rate already incorporates assumptions about inflation and real growth. The cash flows that you use should reflect the same expectations.
- If you mismatch inflation or real growth assumptions, you will mis value companies.
 - If you build in higher expectations of inflation and real growth into your cash flows than you have incorporated into your discount rate, you will over value companies.
 - If you build in lower expectations of inflation and real growth into your cash flows than you have incorporated into your discount rate, you will under value companies.
- **Bottom line:** It is more important that you be consistent in your inflation/ growth assumptions than that you are right.

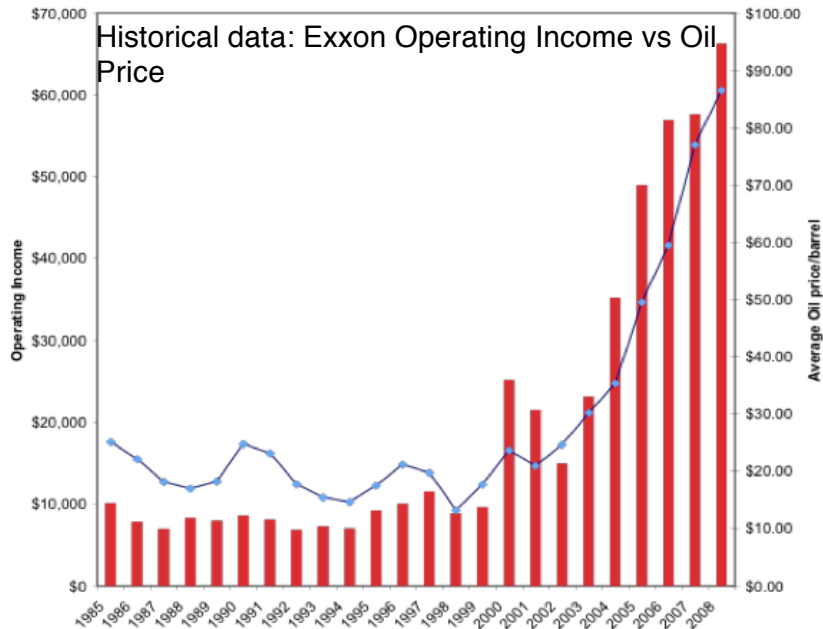
Rule 2: Keep your focus

Don't let the macro drown the micro

28

- When you are asked to value a company, you should keep your focus on what drives that value. If you bring in your specific macro views into the valuation, the value that you obtain for a company will be a joint result of what you think about the company and your macro views.
- **Bottom line:** If you have macro views, provide them separately. You should be as macro-neutral as you can be, in your company valuations.
- **Follow up:** If you find macro risk dominating your thoughts, deal with it frontally.

Valuing a commodity company - Exxon in Early 2009



Regressing Exxon's operating income against the oil price per barrel from 1985-2008:

$$\text{Operating Income} = -6,395 + 911.32 (\text{Average Oil Price}) \quad R^2 = 90.2\%$$

(2.95) (14.59)

Exxon Mobil's operating income increases about \$9.11 billion for every \$ 10 increase in the price per barrel of oil and 90% of the variation in Exxon's earnings over time comes from movements in oil prices.

Estimate normalized income based on current oil price ①

At the time of the valuation, the oil price was \$ 45 a barrel. Exxon's operating income based on this price is

$$\text{Normalized Operating Income} = -6,395 + 911.32 (\$45) = \$34,614$$

Estimate return on capital and reinvestment rate based on normalized income ②

This operating income translates into a return on capital of approximately 21% and a reinvestment rate of 9.52%, based upon a 2% growth rate.

$$\text{Reinvestment Rate} = g / \text{ROC} = 2 / 21\% = 9.52\%$$

$$\text{Value of operating assets} = \frac{34,614(1 - .38)(1 - .0952)}{(.0818 - .02)} = \$320,472 \text{ million}$$

Exxon's cost of capital ④

Exxon has been a predominantly equity funded company, and is expected to remain so, with a debt ratio of only 2.85%. Its cost of equity is 8.35% (based on a beta of 0.90) and its pre-tax cost of debt is 3.75% (given AAA rating). The marginal tax rate is 38%.

$$\text{Cost of capital} = 8.35\% (.9715) + 3.75\% (1 - .38) (.0285) = 8.18\%$$

Expected growth in operating income ③

Since Exxon Mobile is the largest oil company in the world, we will assume an expected growth of only 2% in perpetuity.

Exxon Mobil Valuation: Simulation

30

