THE PRICE OF RISK: LOOKING BACK AND FORWARD!

Risk on, risk off…

The ”One” Metric

- Investors are often in search of a single metric that will tell them whether a market is under or over valued, and consequently whether they should buying or selling holdings in that market.
- With equities, the metric that has been in use the longest is the PE ratio, modified in recent years to the CAPE, where earnings are normalized (by averaging over time) and sometimes adjusted for inflation.
  - That metric, though, has been signaling that stocks are over valued for most of the last decade, a ten-year period when stocks delivered blockbuster returns.
  - The failures of the signal have been variously attributed to low interest rates, accounting mis-measurement of earnings (especially at tech companies), and by some, to animal spirits.
- In this post, I offer an alternative, albeit a more complicated, metric that I believe not only offers a more comprehensive measure of pricing levels, but also a barometer of the ups and downs in the market in 2020.

The Price of Risk

Risk Premium	This is the "extra" return you demand for investing in a risky investment. It will be a function of (a) how risk averse you are, with premium increasing with risk aversion. (b) how much risk is perceive in the investment, with premium higher for riskier investments.
Risk free Rate	Expected return on an investment with guaranteed cash flows

Basic Propositions

1. Risk premiums can be estimated: If you can observe the price that an investor pays for a risky asset, and are willing to estimate the expected cash flows on that asset, you can estimate the expected return on that asset and net out the risk free asset to arrive at a risk premium.
2. Risk premiums can and will change over time: Risk premiums are driven by risk aversion, and risk aversion itself can change over time. In fact, greed and fear, two big drivers of market prices, also affect risk aversion, with investors becoming more risk averse and charging higher premiums, when the fear factor becomes dominant.
3. When risk premiums change, prices will move: As risk premiums change, the prices that investors are willing to pay for risky assets will also change, with the two moving in opposite directions. Intuitively, if you want to earn a higher risk premium on an investment, holding cash flows fixed, you will pay less for that investment today.

Price of Risk in Bond Markets

The Default Spread

Corporate Bonds: The Price of Risk

- If you accept the proposition that a bond with default risk is riskier than an otherwise equivalent bond (same coupon and maturity) issued by a default-free entity, the price of risk in the bond market can be measured by looking at the differences in yields between the two bonds.

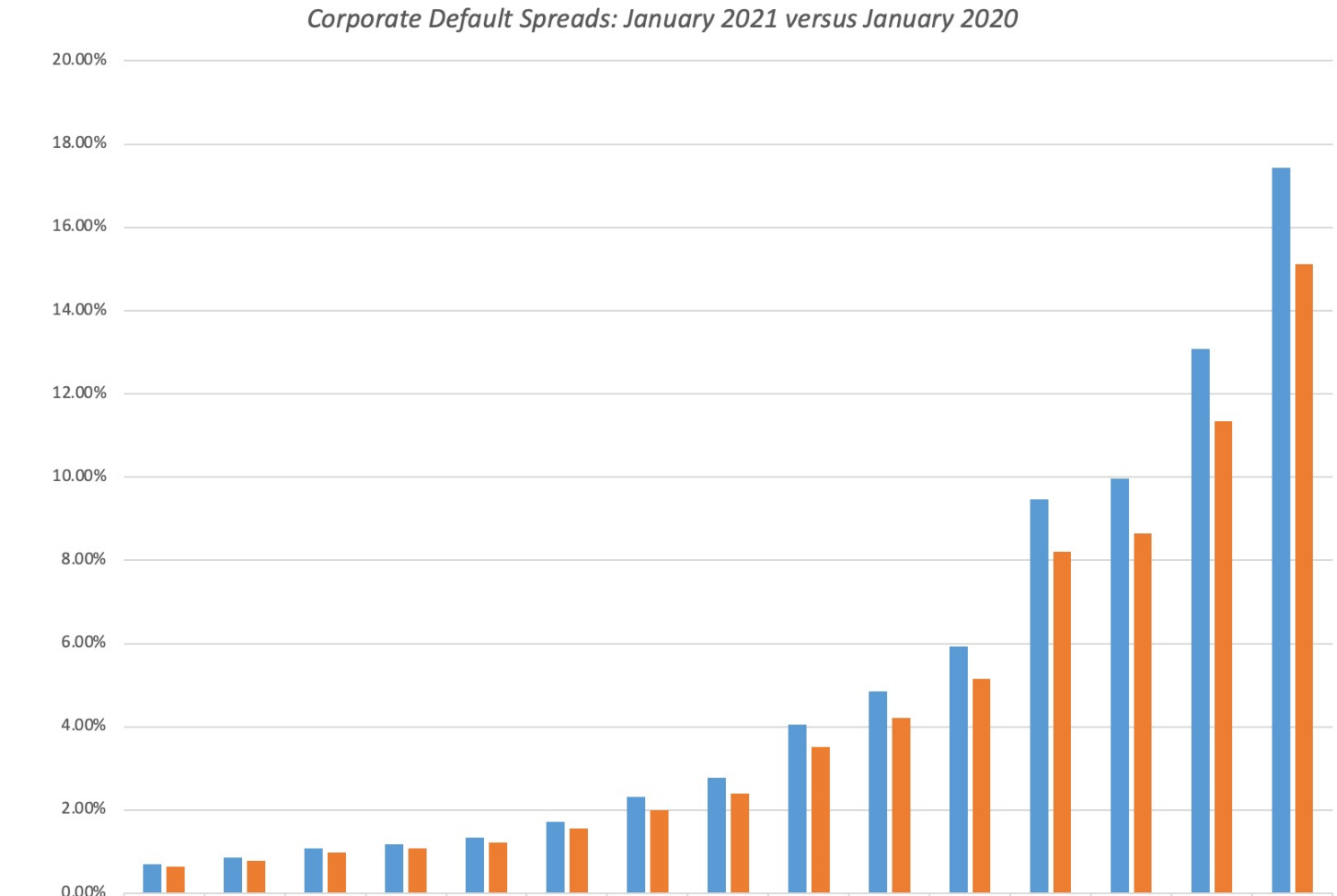
Yield to Maturity on a Bond: Mechanics and Intuition

The Intuition: If you the bond today, and the promised cash flows get delivered, this is the return you will earn on the bond over its maturity. If you pay a higher price, you will earn a lower expected return (yield to maturity).

$$\text{Bond Price today} = \frac{Coupon_1}{(1+r)} + \frac{Coupon_2}{(1+r)^2} + \frac{Coupon_3}{(1+r)^3} \ldots\ldots + \frac{Face\ Value\ of\ Bond}{(1+r)^n}$$

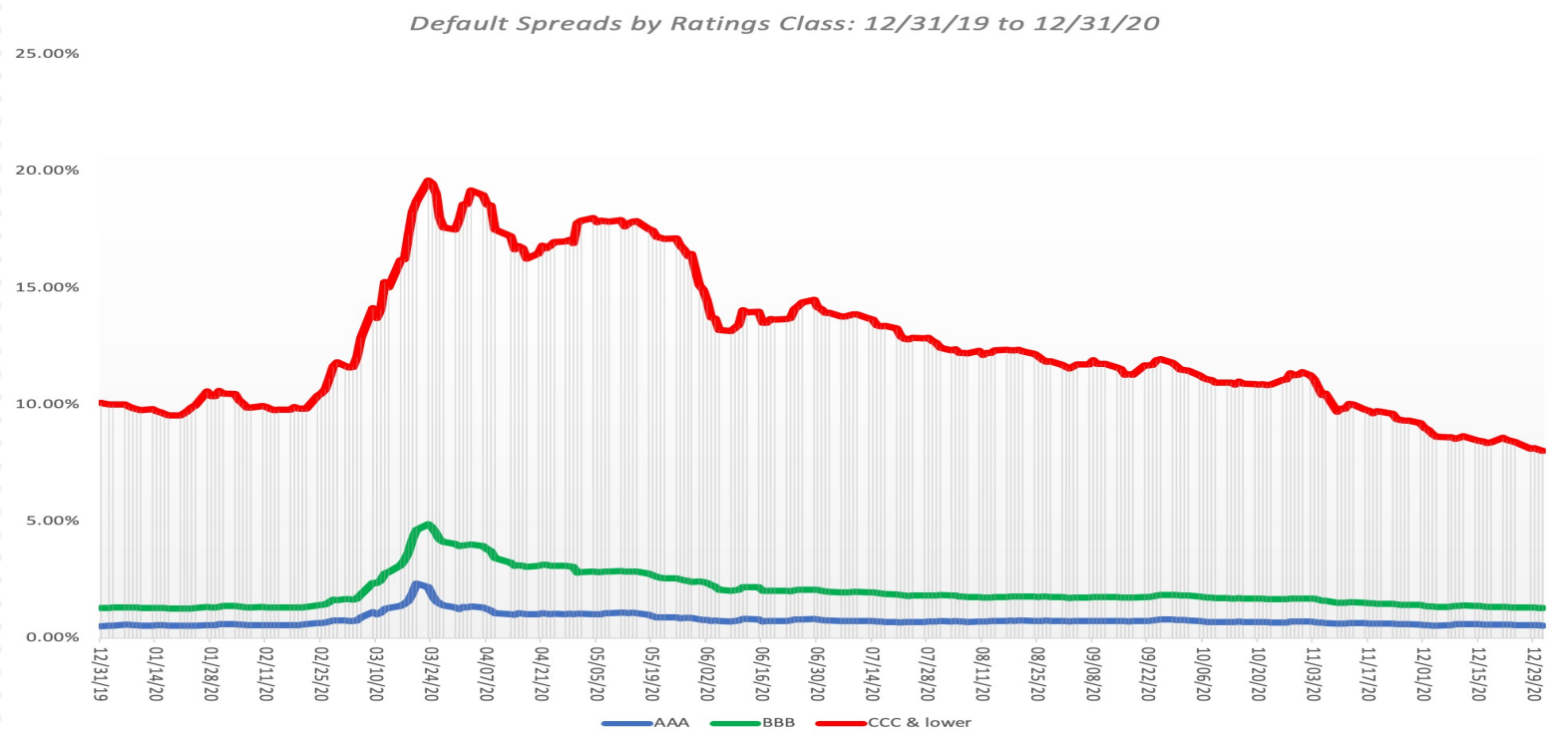
The Mechanics: The **yield to maturity** is that discount rate that yields a present value of cash flows = bond price today

Corporate Bond Spreads: Jan 2021 vs Jan 2020



	Aaa/AAA	Aa2/AA	A1/A+	A2/A	A3/A-	Baa2/BBB	Ba1/BB+	Ba2/BB	B1/B+	B2/B	B3/B-	Caa/CCC	Ca2/CC	C2/C	D2/D
Spread 2021	0.69%	0.85%	1.07%	1.18%	1.33%	1.71%	2.31%	2.77%	4.05%	4.86%	5.94%	9.46%	9.97%	13.09%	17.44%
Spread 2020	0.63%	0.78%	0.98%	1.08%	1.22%	1.56%	2.00%	2.40%	3.51%	4.21%	5.15%	8.20%	8.64%	11.34%	15.12%

After a roller coaster ride in 2020

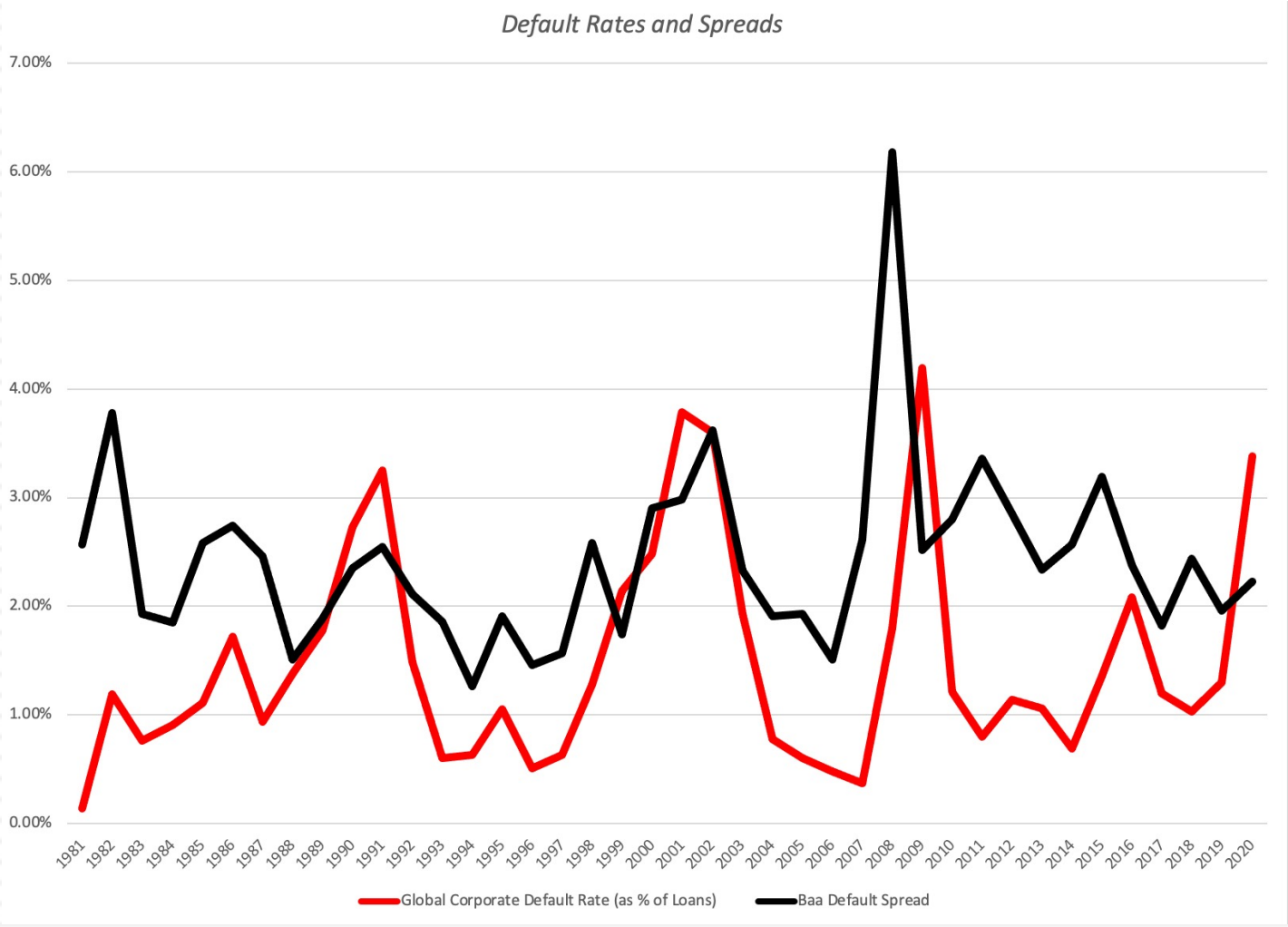


	Yields and Spreads on Corporates							
	Spread over 10-yr Treasury				*Yield on Corporate*			
S&P Bond Rating	12/31/19	2/14/20	3/20/20	12/31/20	12/31/19	2/14/20	3/20/20	12/31/20
AAA	0.63%	0.69%	1.43%	0.73%	2.55%	2.28%	2.35%	1.61%
AA	0.48%	0.72%	2.64%	0.80%	2.40%	2.31%	3.56%	1.68%
A	0.73%	0.80%	3.15%	0.84%	2.65%	2.39%	4.07%	1.72%
BBB	1.27%	1.33%	3.73%	1.57%	3.19%	2.92%	4.65%	2.45%
BB	1.85%	1.93%	7.45%	3.49%	3.77%	3.52%	8.37%	4.37%
B	3.40%	3.40%	10.74%	5.24%	5.32%	4.99%	11.66%	6.12%
CCC or lower	9.86%	9.65%	17.81%	10.83%	11.78%	11.24%	18.73%	11.71%

Are spreads too low? Comparing to history

Year	AAA	BBB	CCC& Lower
12/31/97	0.42%	0.93%	6.52%
12/31/98	0.62%	1.71%	9.22%
12/31/99	0.75%	1.53%	12.92%
12/31/00	0.98%	2.66%	16.29%
12/31/01	0.70%	2.22%	21.00%
12/31/02	1.02%	2.70%	20.69%
12/31/03	0.61%	1.30%	12.96%
12/31/04	0.55%	1.13%	7.99%
12/31/05	0.61%	1.21%	7.58%
12/31/06	0.56%	1.22%	6.20%
12/31/07	1.22%	2.45%	5.87%
12/31/08	3.43%	7.84%	16.75%
12/31/09	0.77%	2.48%	19.91%
12/31/10	0.66%	2.11%	10.18%
12/31/11	0.87%	3.15%	10.31%
12/31/12	0.64%	2.04%	11.04%
12/31/13	0.60%	1.74%	8.27%
12/31/14	0.65%	1.98%	7.57%
12/31/15	0.75%	2.41%	10.98%
12/31/16	0.71%	1.66%	14.37%
12/31/17	0.54%	1.28%	8.60%
12/31/18	0.78%	2.02%	7.67%
12/31/19	0.52%	1.30%	9.92%
12/31/20	0.55%	1.30%	12.61%
High	3.43%	7.84%	21.00%
Average	0.81%	2.10%	11.48%
Median	0.66%	1.86%	10.24%
Low	0.42%	0.93%	5.87%

And to default rates…



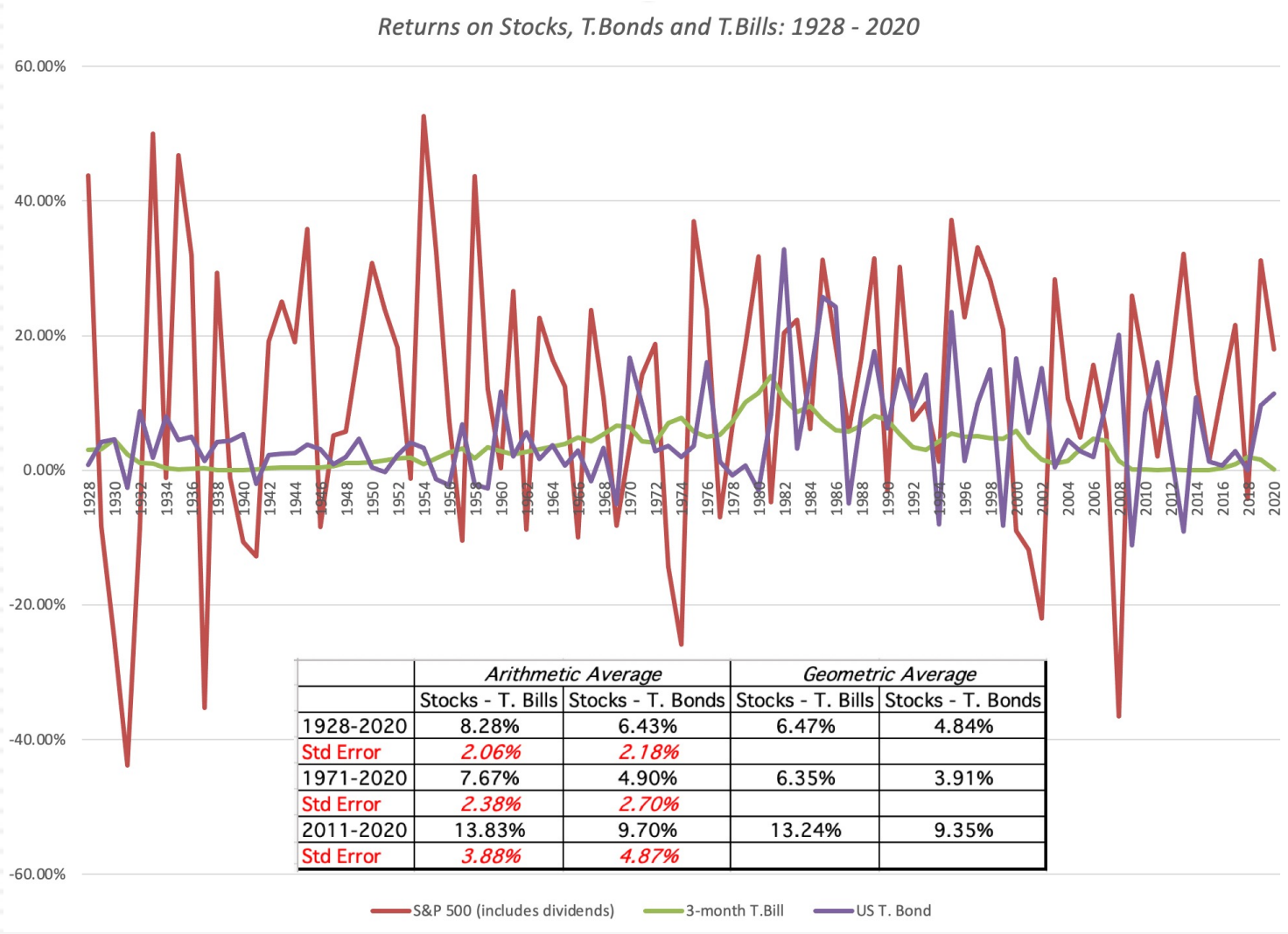
Price of Risk in Equity Risk Premiums

Backward looking versus Forward looking

Equities: The Price of Risk

- Equities are riskier than bonds (or at least most bonds), and it stands to reason that there is a price of risk bearing in the equity markets.
- While that price has a name, i.e., the equity risk premium, it is more difficult to observe and estimate than the default spread in bond markets. The simple reason is that unlike a bond, which comes with specified coupons, the cash flows that you receive when you buy stocks are neither pre-specified nor guaranteed.
- This difficulty in observing the equity risk premium leads many to look backwards, when asked to estimate the equity risk premium.

Historical ERP



	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2020	8.28%	6.43%	6.47%	4.84%
Std Error	*2.06%*	*2.18%*		
1971-2020	7.67%	4.90%	6.35%	3.91%
Std Error	*2.38%*	*2.70%*		
2011-2020	13.83%	9.70%	13.24%	9.35%
Std Error	*3.88%*	*4.87%*		

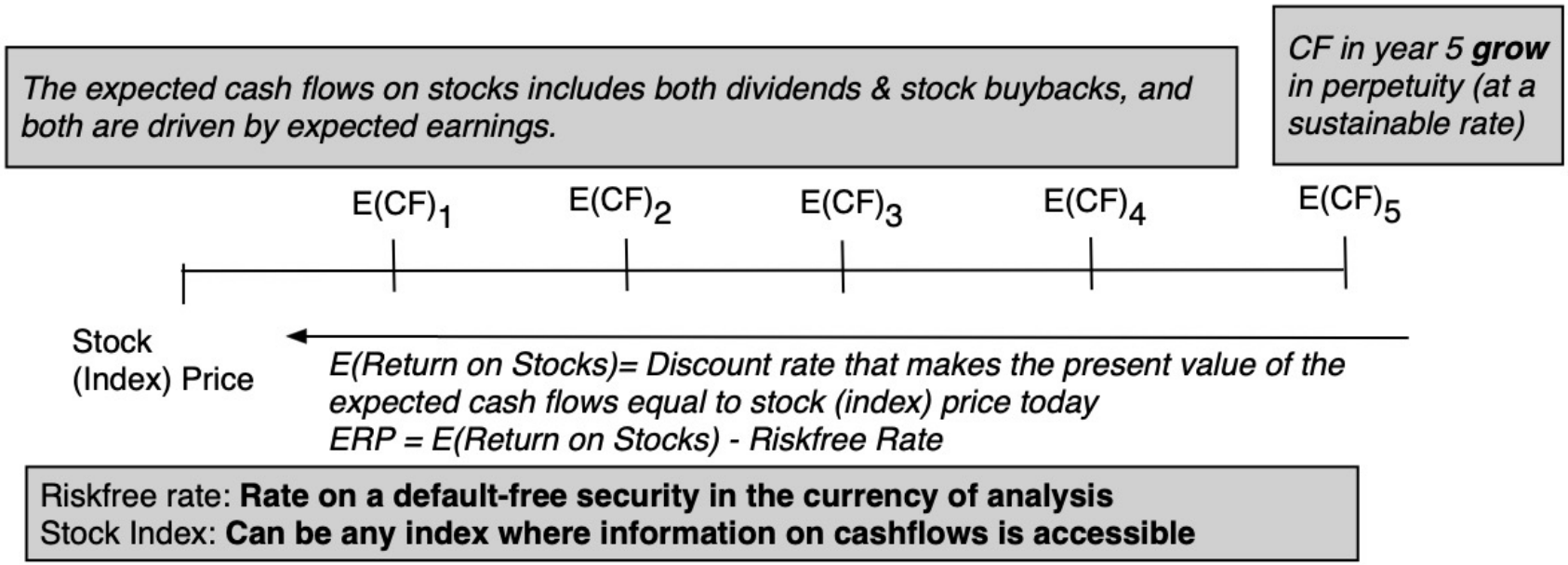
The perils of trusting the past…….

- 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 90 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%:

  Standard Error in Premium = 20%/√90 = 2.1%

- 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.

An Alternative…



The ERP on January 1, 2021

In 2020, COVID caused major drops in both earnings & cash return from 2019 levels

Expected earnings/cashflow growth in next 5 years
Earnings for next year based upon analyst estimates for 2021 and 10.15% growth in earnings from 2021-25, mostly a recovery from COVID drop in 2020.

Base year cash flow (last 12 mths)
Dividends (TTM): 58.89
+ Buybacks (TTM): 68.89
= Cash to investors (TTM): **127.78**

Actual numbers | Forecasted numbers

	2019	Last 12 months	2021	2022	2023	2024	2025	Terminal Year
Expected Earnings	$ 163.00	$123.35	138.55	152.62	168.11	185.18	203.98	205.88
Expected cash payout as % of earnings	89.76%	103.59%	89.09%	90.21%	91.33%	92.46%	93.58%	93.58%
Expected Dividends + Buybacks =	$ 146.31	$127.78	$123.43	$137.67	$153.54	$171.21	$190.88	192.66

Earnings and Cash flows grow @0.93% (set equal to risk free rate) a year forever.

S&P 500 on 1/1/21= **3756.07**

$$3756.07 = \frac{123.43}{(1+r)} + \frac{137.67}{(1+r)^2} + \frac{153.54}{(1+r)^3} + \frac{171.21}{(1+r)^4} + \frac{190.88}{(1+r)^5} + \frac{190.88\,(1.0093)}{(r-.0093)(1+r)^5}$$

The last term in this equation is the expected index level at the end of year 5 (capturing price appreciation)

Solve for r

r = Implied Expected Return on Stocks = 5.65%

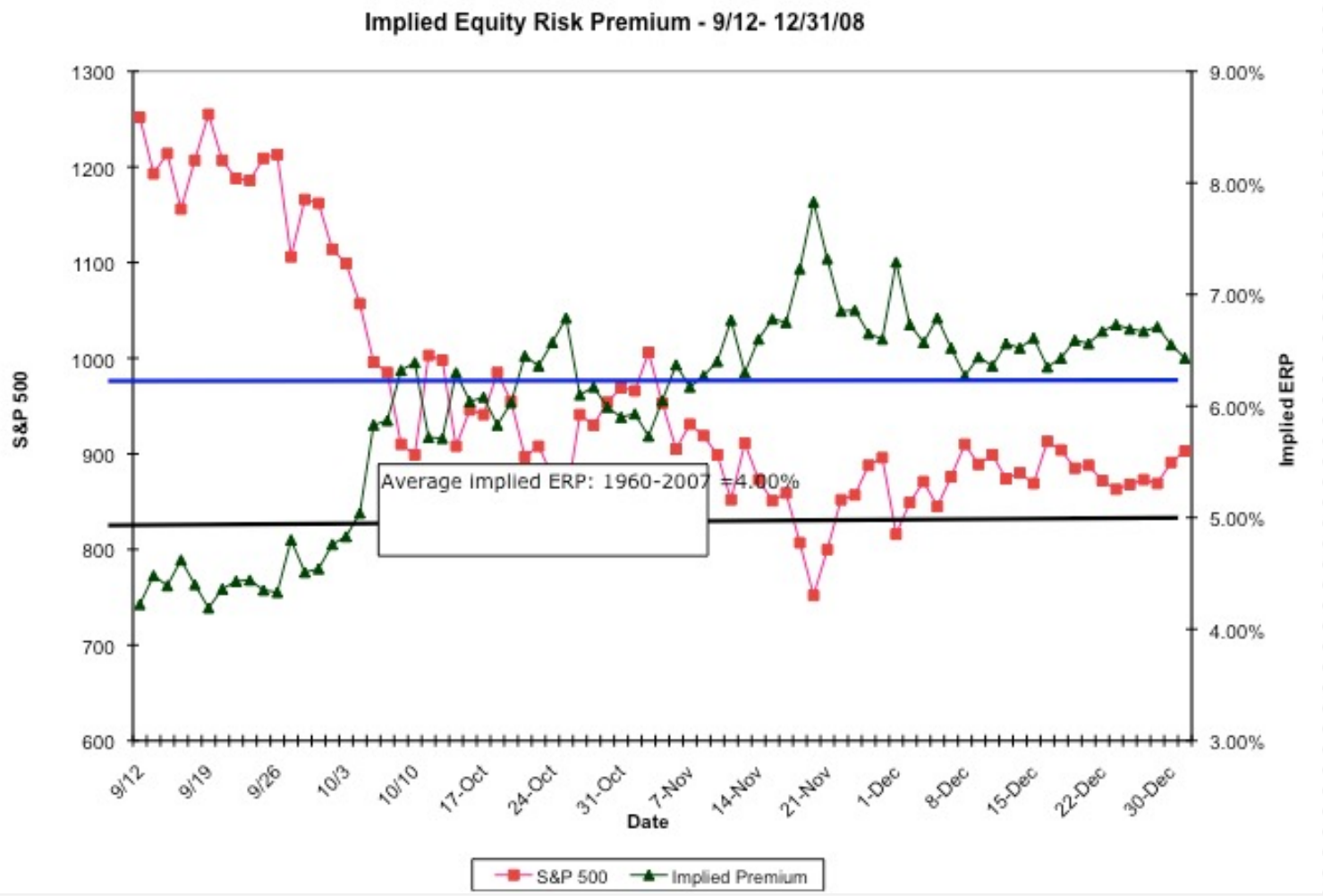
Minus

Risk free rate = T.Bond rate on 1/1/21= 0.93%

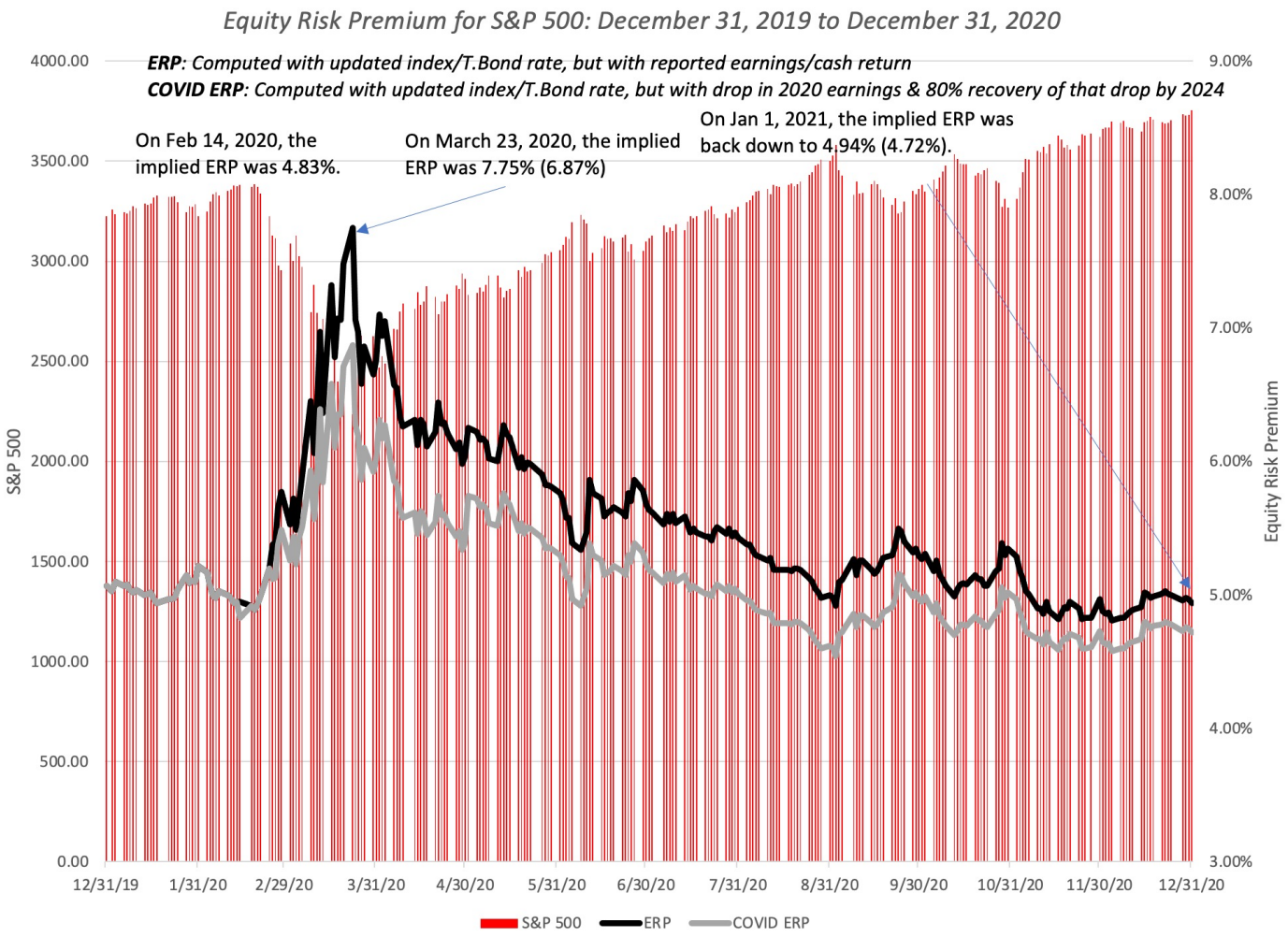
Equals

Implied Equity Risk Premium (1/1/21) = 5.65% - 0.93% = 4.72%

The Anatomy of a Crisis: Implied ERP from September 12, 2008 to January 1, 2009



And a more recent crisis… A wild ride in 2020



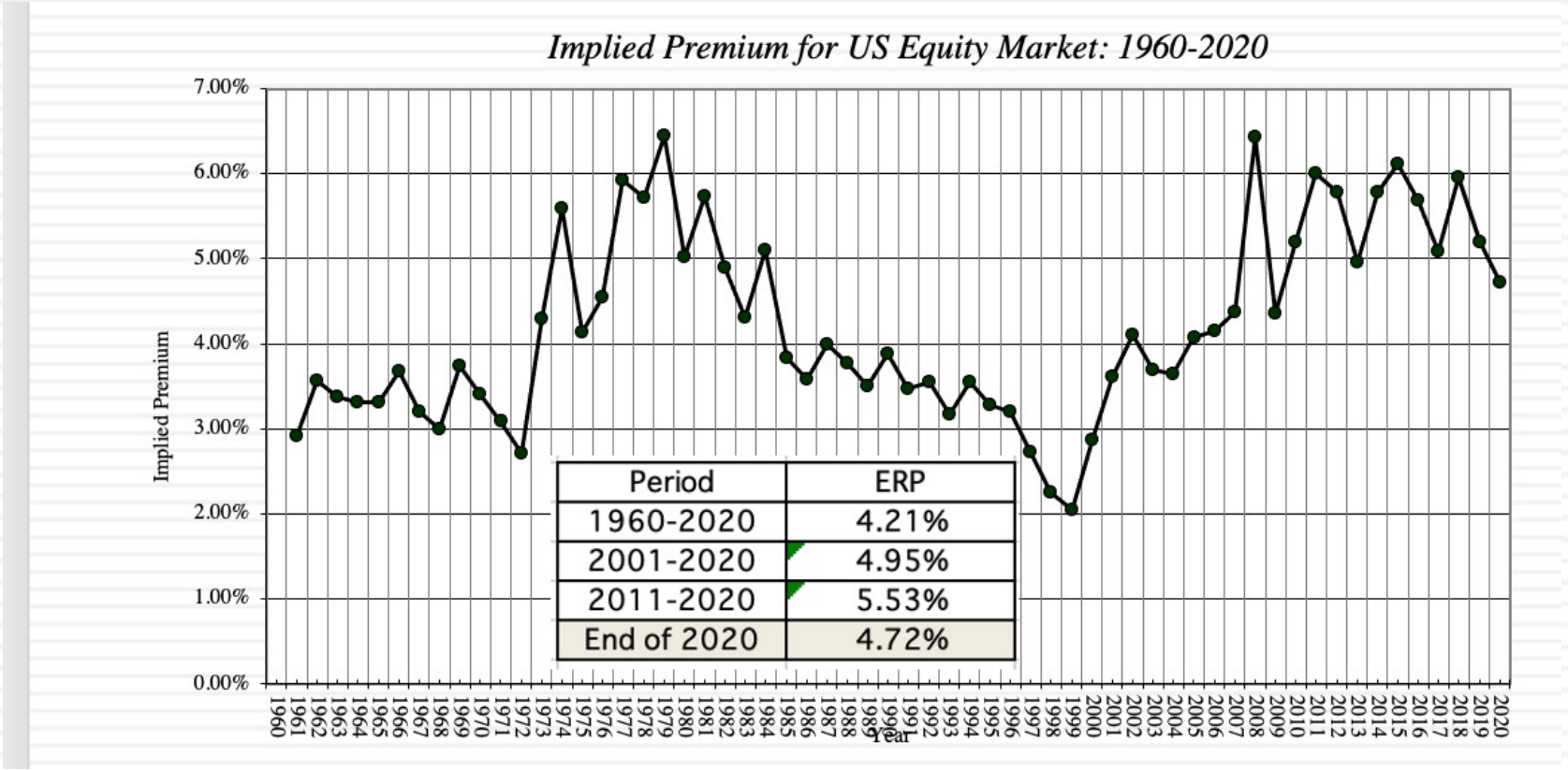
ERP and Market Judgments

Backward looking versus Forward looking

A Market Gauge?

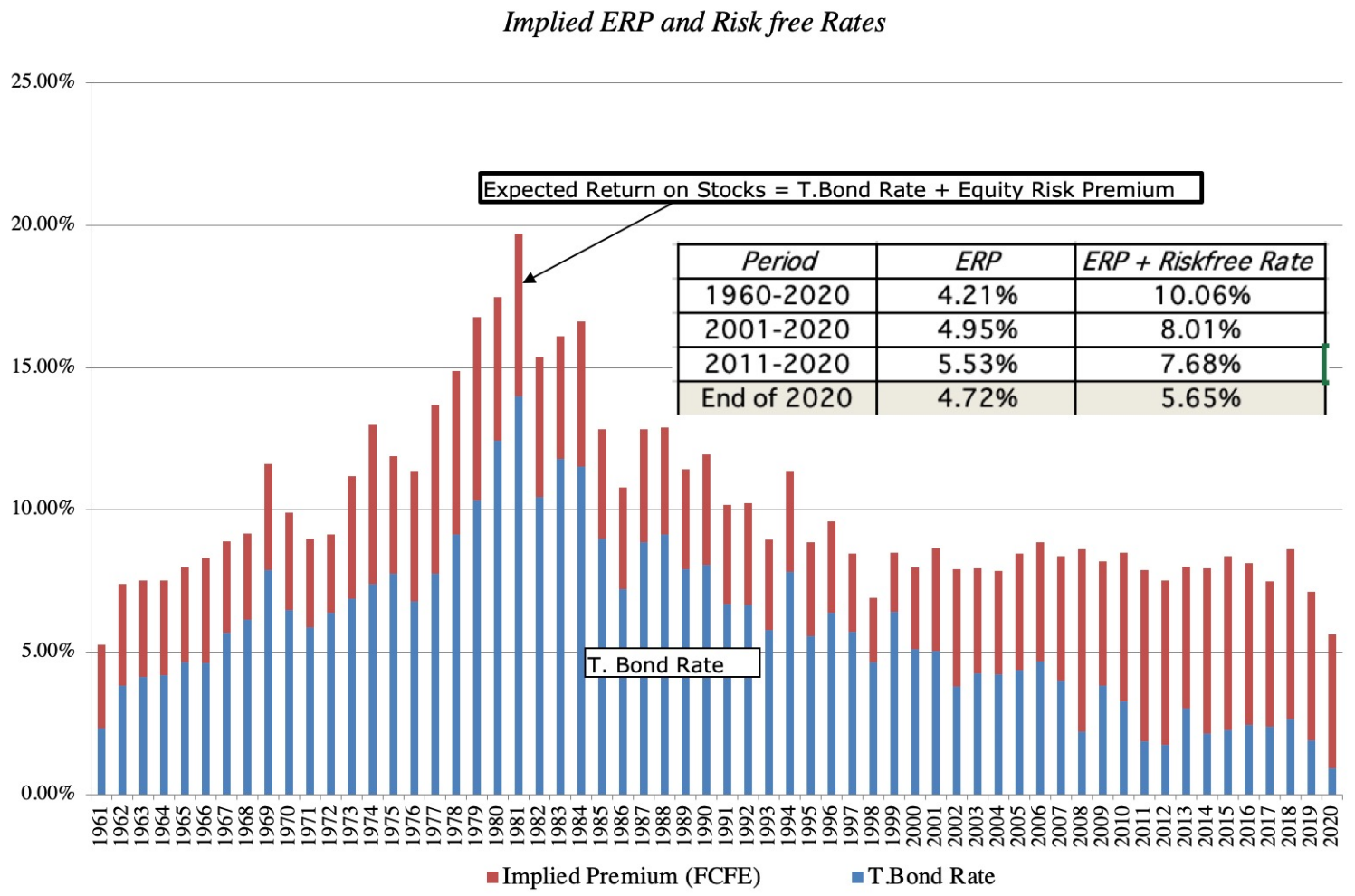
- As we are engulfed by talk of market bubbles and corrections, it is worth nothing that any question about the overall market can really be reframed as a question about the implied equity risk premium.
  - If you believe that the current implied equity risk premium is too low, you are in effect also saying that stocks are overvalued, just as a judgment that the equity risk premium is too high is equivalent to arguing that stocks are undervalued.
  - So, at 4.72%, is the equity risk premium too low and is the market in a bubble?

Comparison to History



Period	ERP
1960-2020	4.21%
2001-2020	4.95%
2011-2020	5.53%
End of 2020	4.72%

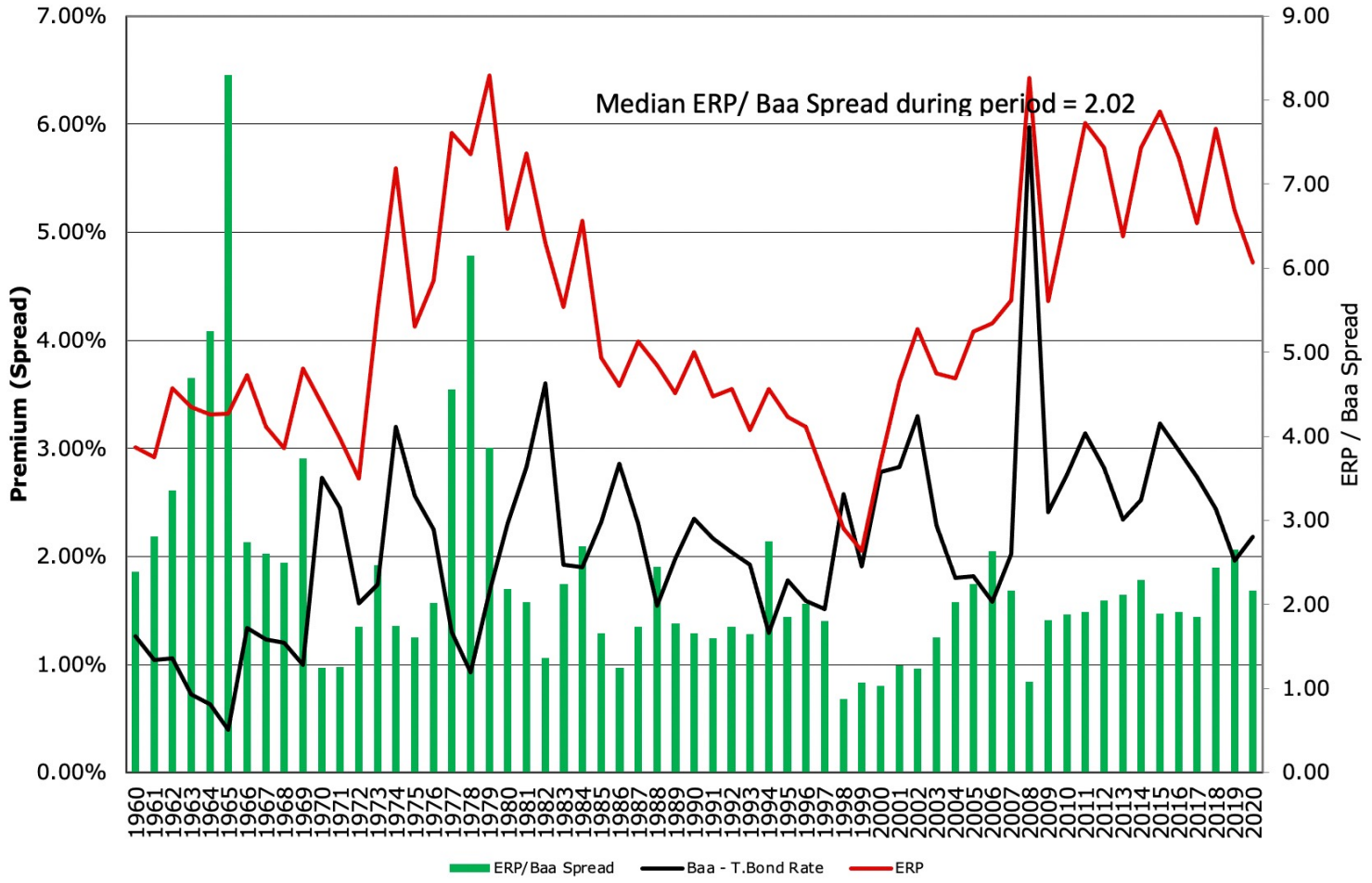
But....



Period	ERP	ERP + Riskfree Rate
1960-2020	4.21%	10.06%
2001-2020	4.95%	8.01%
2011-2020	5.53%	7.68%
End of 2020	4.72%	5.65%

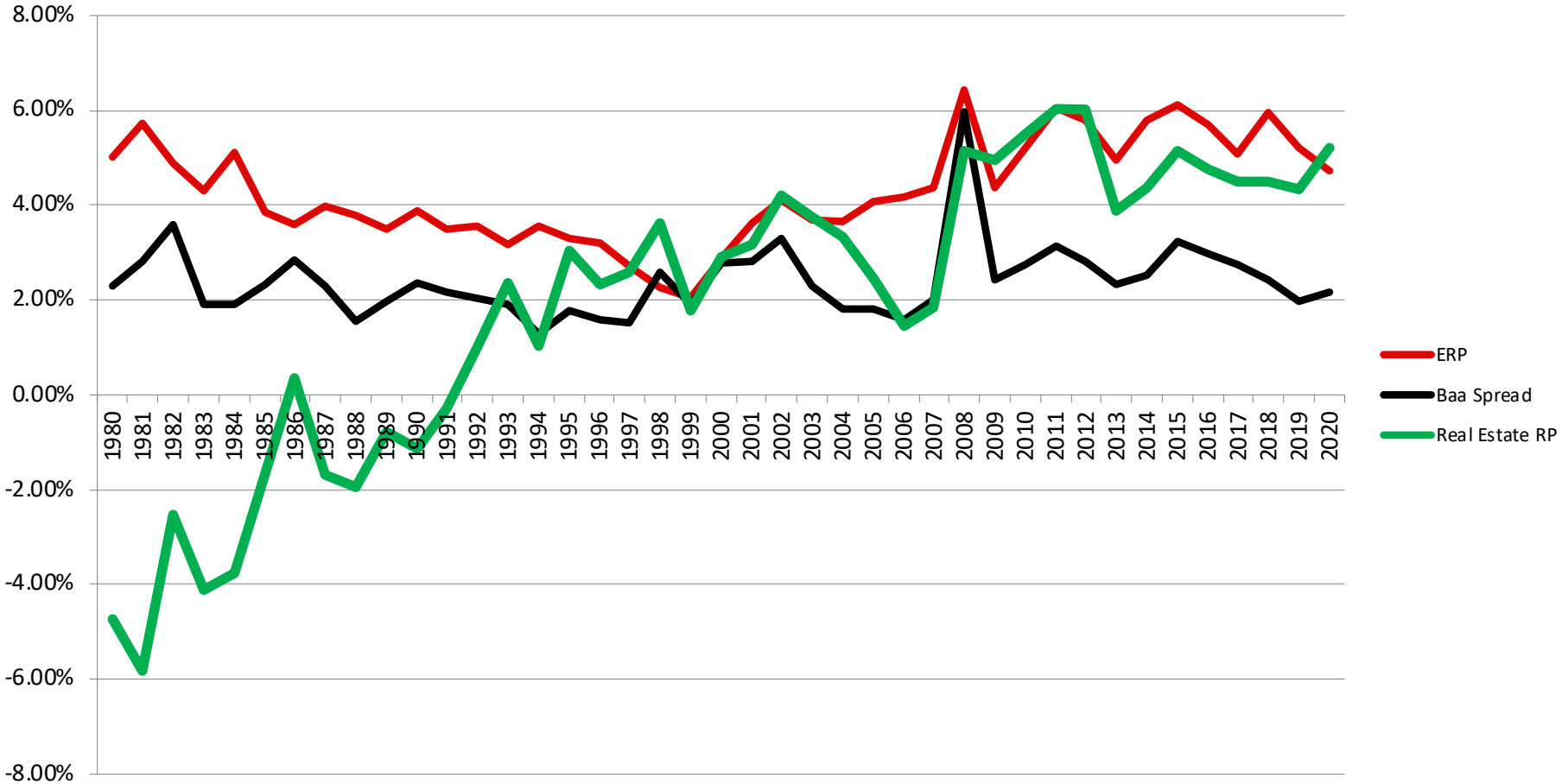
Equity Risk Premiums and Bond Default Spreads

Figure 16: Equity Risk Premiums and Bond Default Spreads



Equity Risk Premiums and Cap Rates (Real Estate)

Figure 18: Equity Risk Premiums Bond Spreads and Real Estate RP



ERP in Valuation: Choices and Consequences

Backward looking versus Forward looking

Why implied premiums matter?

- In many investment banks, it is common practice (especially in corporate finance departments) to use historical risk premiums (and arithmetic averages at that) as risk premiums to compute cost of equity. If all analysts in the department used the arithmetic average premium (for stocks over T.Bills) for 1928-2020 of 8.28% to value stocks in January 2021, given the implied premium of 4.72%, what are they likely to find?
  a. The values they obtain will be too low (most stocks will look overvalued)
  b. The values they obtain will be too high (most stocks will look under valued)
  c. There should be no systematic bias as long as they use the same premium to value all stocks.
- What if analysts are using the historical geometric average premium of 4.83% from 1928 to 2020 as their ERP?

Which equity risk premium should you use?

If you assume this	Premium to use
Premiums revert back to historical norms and your time period yields these norms	Historical risk premium
Market is correct in the aggregate or that your valuation should be market neutral	Current implied equity risk premium
Marker makes mistakes even in the aggregate but is correct over time	Average implied equity risk premium over time.

Predictor	Correlation with implied premium next year	Correlation with actual return- next 5 years	Correlation with actual return – next 10 years
Current implied premium	0.763	0.427	0.500
Average implied premium: Last 5 years	0.718	0.326	0.450
Historical Premium	-0.497	-0.437	-0.454
Default Spread based premium	0.047	0.143	0.160

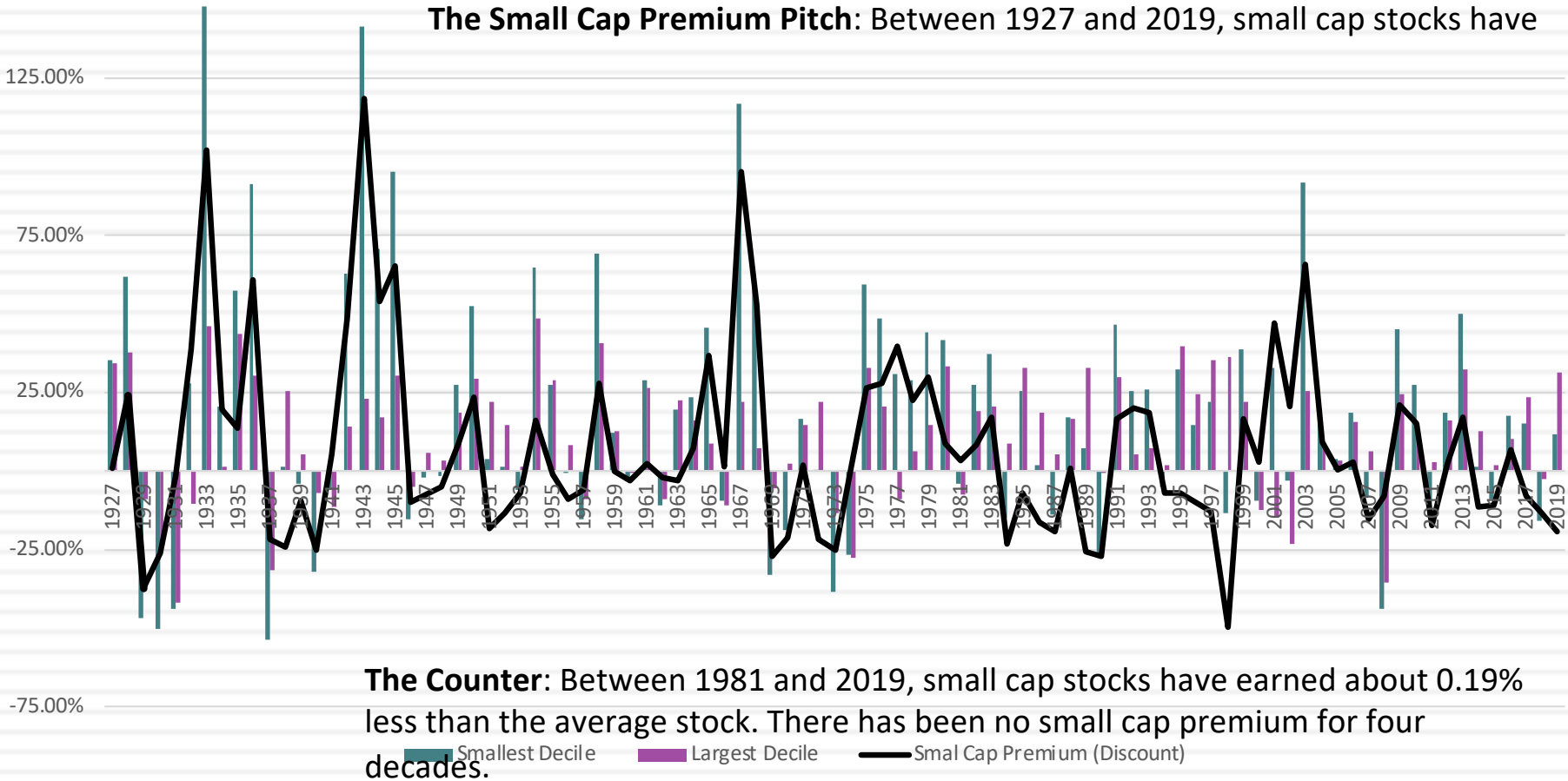
Extensions of the ERP

Backward looking versus Forward looking

The Ubiquitous Small Cap Premium

Figure 4: The Small Cap Premium from 1927 to 2019: Smallest versus Largest Deciles

The Small Cap Premium Pitch: Between 1927 and 2019, small cap stocks have



The Counter: Between 1981 and 2019, small cap stocks have earned about 0.19% less than the average stock. There has been no small cap premium for four decades.

And an implied ERP approach to estimating it…

- The implied ERP for the S&P 500, composed of large cap stocks, as of January 2021, was4.72%.
- On January 1, 2021, the S&P 600, S&P's small cap index was trading at 1118.93, with aggregated dividends and buybacks amounting to 2.02% (22.60 in index terms) of the index in the trailing 12 months. Earnings were expected to bounce back in 2021 and 2022, before settling into lower growth. Allowing for an increase in cash payout, as the growth rate decreases over time, yields the following equation:

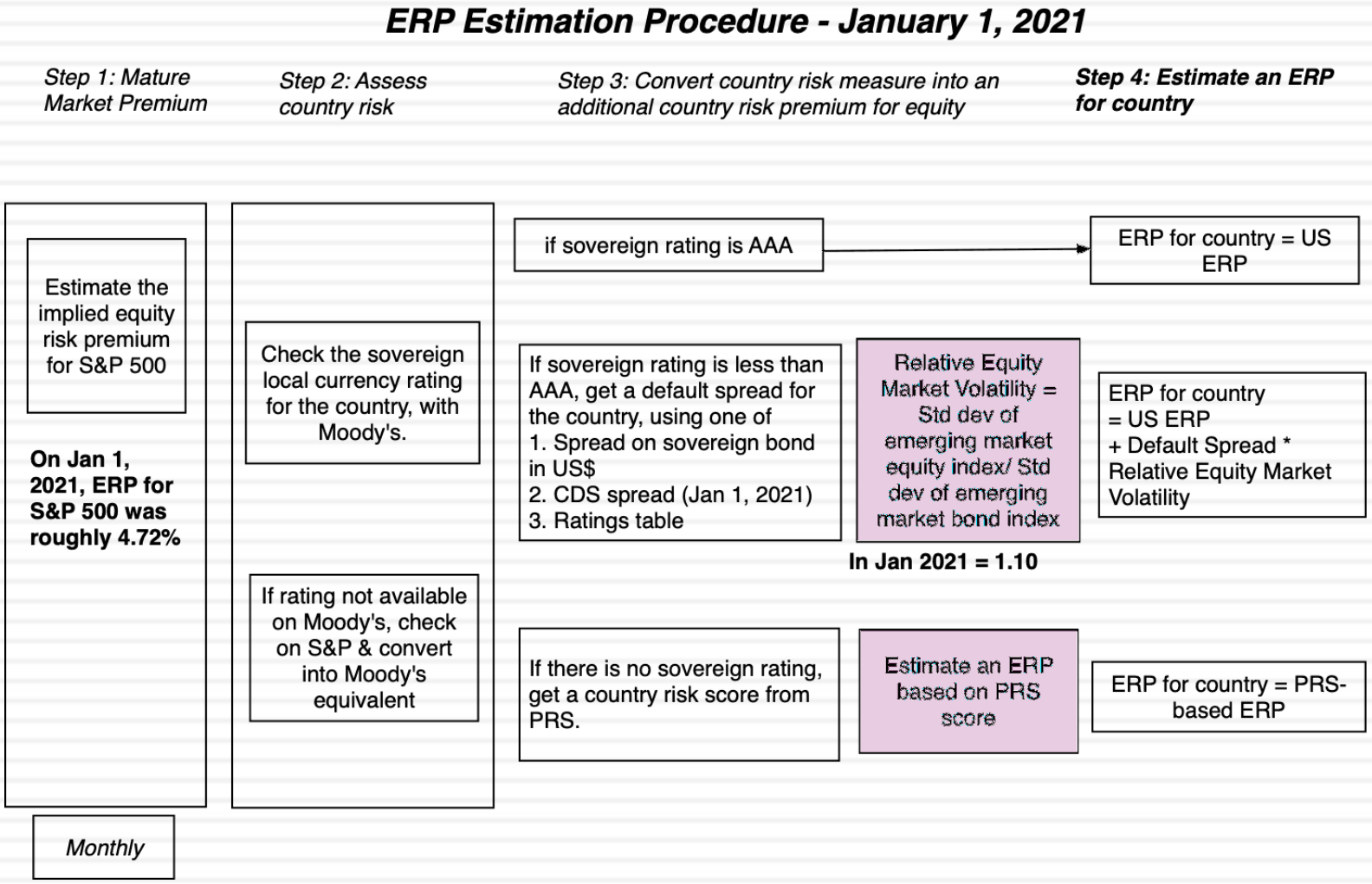
$$1118.93 = \frac{34.83}{(1+r)} + \frac{46.67}{(1+r)^2} + \frac{55.47}{(1+r)^3} + \frac{64.43}{(1+r)^4} + \frac{73.55}{(1+r)^5} + \frac{73.55\ (1.0093)}{(r-.0093)(1+r)^5}$$

- Solving for the expected return, we get:
  - Expected return on small cap stocks = 6.86%
  - Implied equity risk premium for small cap stocks = 6.86% -0.93% = 5.93%
- Small cap premium in January 2021 = 5.93% - 4.72% = 1.21%
- Small cap premium in January 2020 = 4.00% - 5.24% = -1.24%

Expanding to a global mindset: An approach for estimating equity risk premiums for other markets

- 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 2021, you would get:
  - Country Equity risk premium = Default spread on country bond* $\sigma_{\text{Country Equity}} / \sigma_{\text{Country Bond}}$
    - Standard Deviation in Bovespa (Equity) = 30%
    - Standard Deviation in Brazil government bond = 20%
    - Default spread for Brazil= 2.65%
  - Brazil Country Risk Premium = 2.65% (30%/20%) = 3.98%
  - Brazil Total ERP = Mature Market Premium + CRP = 4.72% + 3.98% = 8.70%

A Template for Estimating the ERP



ERP : Jan 2021

Andorra	Caa1	7.26%	11.98%	Italy	Baa3	2.13%	6.85%
Austria	Aa1	0.38%	5.10%	Jersey	Aaa	0.00%	4.72%
Belgium	Aa3	0.59%	5.31%	Liechtenstein	Aaa	0.00%	4.72%
Cyprus	Ba2	2.91%	7.63%	Luxembourg	Aaa	0.00%	4.72%
Denmark	Aaa	0.00%	4.72%	Malta	A2	0.82%	5.54%
Finland	Aa1	0.38%	5.10%	Netherlands	Aaa	0.00%	4.72%
France	Aa2	0.48%	5.20%	Norway	Aaa	0.00%	4.72%
Germany	Aaa	0.00%	4.72%	Portugal	Baa3	2.13%	6.85%
Greece	Ba3	3.49%	8.21%	Spain	Baa1	1.55%	6.27%
Guernsey	Aaa	0.00%	4.72%	Sweden	Aaa	0.00%	4.72%
Iceland	A2	0.82%	5.54%	Switzerland	Aaa	0.00%	4.72%
Ireland	A2	0.82%	5.54%	Turkey	B2	5.33%	10.05%
Isle of Man	Aa3	0.59%	5.31%	UK	Aa3	0.59%	5.31%
				Western Europe		**0.84%**	**5.56%**

Canada	Aaa	0.00%	4.72%
United States	Aaa	0.00%	4.72%
North America		**0.00%**	**4.72%**

Caribbean		**5.31%**	**10.03%**

Argentina	Ca	11.62%	16.34%
Belize	Caa3	9.68%	14.40%
Bolivia	B2	5.33%	10.05%
Brazil	Ba2	2.91%	7.63%
Chile	A1	0.68%	5.40%
Colombia	Baa2	1.84%	6.56%
Costa Rica	B2	5.33%	10.05%
Ecuador	Caa3	9.68%	14.40%
El Salvador	B3	6.30%	11.02%
Guatemala	Ba1	2.42%	7.14%
Honduras	B1	4.36%	9.08%
Mexico	Baa1	1.55%	6.27%
Nicaragua	B3	6.30%	11.02%
Panama	Baa1	1.55%	6.27%
Paraguay	Ba1	2.42%	7.14%
Peru	A3	1.16%	5.88%
Suriname	Caa3	9.68%	14.40%
Uruguay	B1	4.36%	9.08%
Venezuela	C	19.18%	23.90%
Latin America		**3.99%**	**8.71%**

Country	Rating	*CRP*	*ERP*
Angola	Caa1	7.26%	11.98%
Benin	B2	5.33%	10.05%
Botswana	A2	0.82%	5.54%
Burkina Faso	B2	5.33%	10.05%
Cameroon	B2	5.33%	10.05%
Cape Verde	B2	5.33%	10.05%
Congo (DR)	Caa1	7.26%	11.98%
Congo (Rep of)	Caa2	8.72%	13.44%
Côte d'Ivoire	Ba3	3.49%	8.21%
Egypt	B2	5.33%	10.05%
Ethiopia	B2	5.33%	10.05%
Gabon	Caa1	7.26%	11.98%
Ghana	B3	6.30%	11.02%
Kenya	B2	5.33%	10.05%
Mali	Caa1	7.26%	11.98%
Morocco	Ba1	2.42%	7.14%
Mozambique	Caa2	8.72%	13.44%
Namibia	Ba3	3.49%	8.21%
Niger	B3	6.30%	11.02%
Nigeria	B2	5.33%	10.05%
Rwanda	B2	5.33%	10.05%
Senegal	Ba3	3.49%	8.21%
South Africa	Ba2	2.91%	7.63%
Swaziland	B3	6.30%	11.02%
Tanzania	B2	5.33%	10.05%
Togo	B3	6.30%	11.02%
Tunisia	B2	5.33%	10.05%
Uganda	B2	5.33%	10.05%
Zambia	Ca	11.62%	16.34%
Africa		**4.94%**	**9.66%**

Albania	B1	4.36%	9.08%
Armenia	Ba3	3.49%	8.21%
Azerbaijan	Ba2	2.91%	7.63%
Belarus	B3	6.30%	11.02%
Bosnia & Herzegovina	B3	6.30%	11.02%
Bulgaria	Baa1	1.55%	6.27%
Croatia	Ba1	2.42%	7.14%
Czech Republic	Aa3	0.59%	5.31%
Estonia	A1	0.68%	5.40%
Georgia	Ba2	2.91%	7.63%
Hungary	Baa3	2.13%	6.85%
Kazakhstan	Baa3	2.13%	6.85%
Kyrgyzstan	B2	5.33%	10.05%
Latvia	A3	1.16%	5.88%
Lithuania	A3	1.16%	5.88%
Macedonia	Ba3	3.49%	8.21%
Moldova	B3	6.30%	11.02%
Montenegro	B1	4.36%	9.08%
Poland	A2	0.82%	5.54%
Romania	Baa3	2.13%	6.85%
Russia	Baa3	2.13%	6.85%
Serbia	Ba3	3.49%	8.21%
Slovakia	A2	0.82%	5.54%
Slovenia	A3	1.16%	5.88%
Tajikistan	B3	6.30%	11.02%
Ukraine	B3	6.30%	11.02%
Uzbekistan	Baa2	1.84%	6.56%
E. Europe & Russia		**2.08%**	**6.80%**

Abu Dhabi	Aa2	0.48%	5.20%
Bahrain	B2	5.33%	10.05%
Iraq	Caa1	7.26%	11.98%
Israel	A1	0.68%	5.40%
Jordan	B1	4.36%	9.08%
Kuwait	A1	0.68%	5.40%
Lebanon	C	19.18%	23.90%
Oman	Ba3	3.49%	8.21%
Qatar	Aa3	0.59%	5.31%
Ras Al Khaima	Aaa	0.00%	4.72%
Saudi Arabia	A1	0.68%	5.40%
Sharjah	Baa2	1.84%	6.56%
United Arab Emirates	Aa2	0.48%	5.20%
Middle East		**1.53%**	**6.25%**

Country	*PRS*	*CRP*	*ERP*
Algeria	57.25	8.72%	13.44%
Brunei	80	0.82%	5.54%
Gambia	63.75	6.30%	11.02%
Guinea	53.5	11.62%	16.34%
Guinea-Bissau	62	7.26%	11.98%
Guyana	65.75	5.33%	10.05%
Haiti	52.75	11.62%	16.34%
Iran	59.25	8.72%	13.44%
Korea, D.P.R.	50.75	11.62%	16.34%
Liberia	53.5	11.62%	16.34%
Libya	58.25	8.72%	13.44%
Madagascar	63.25	6.30%	11.02%
Malawi	58.75	8.72%	13.44%
Myanmar	63.75	6.30%	11.02%
Sierra Leone	58.75	8.72%	13.44%
Somalia	50.5	11.62%	16.34%
Sudan	38.25	19.18%	23.90%
Syria	47	19.18%	23.90%
Yemen, Republic	50	19.18%	23.90%
Zimbabwe	52.25	11.62%	16.34%

Bangladesh	Ba3	3.49%	8.21%
Cambodia	B2	5.33%	10.05%
China	A1	0.68%	5.40%
Fiji	Ba3	3.49%	8.21%
Hong Kong	Aa3	0.59%	5.31%
India	Baa3	2.13%	6.85%
Indonesia	Baa2	1.84%	6.56%
Japan	A1	0.68%	5.40%
Korea	Aa2	0.48%	5.20%
Laos	Caa2	8.72%	13.44%
Macao	Aa3	0.59%	5.31%
Malaysia	A3	1.16%	5.88%
Maldives	B3	6.30%	11.02%
Mauritius	Baa1	1.55%	6.27%
Mongolia	B3	6.30%	11.02%
Pakistan	B3	6.30%	11.02%
Papua New Guinea	B2	5.33%	10.05%
Philippines	Baa2	1.84%	6.56%
Singapore	Aaa	0.00%	4.72%
Solomon Islands	B3	6.30%	11.02%
Sri Lanka	Caa1	7.26%	11.98%
Taiwan	Aa3	0.59%	5.31%
Thailand	Baa1	1.55%	6.27%
Vietnam	Ba3	3.49%	8.21%

Australia	Aaa	0.00%	4.72%
Cook Islands	B1	4.36%	9.08%
New Zealand	Aaa	0.00%	4.72%
Australia & NZ		**0.00%**	**4.72%**

Blue: Moody's Rating
Red: Added Country Risk
Green #: Total ERP

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

Region	*Revenues*	*Total ERP*	*CRP*
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 wit*
2. *Obscure aggregations including Eurasia and Oceania*

The Bottom Line

- The price of risk is a market-set number in any risky asset market, and it will move up and down depending upon investor risk aversion and concerns/hopes about the economy.
- Since the price of risk is market-set and dynamic, it makes little sense to estimate it by looking backwards at historical data, especially given the noise in stock returns. The implied ERP is a dynamic, forward-looking estimate of the risk premium in equity markets.
- Using the implied ERP approach also provides insights on market timing, asset allocation and a clear-eyed measure of premiums like the small cap or illiquidity premiums often attached to discount rates.