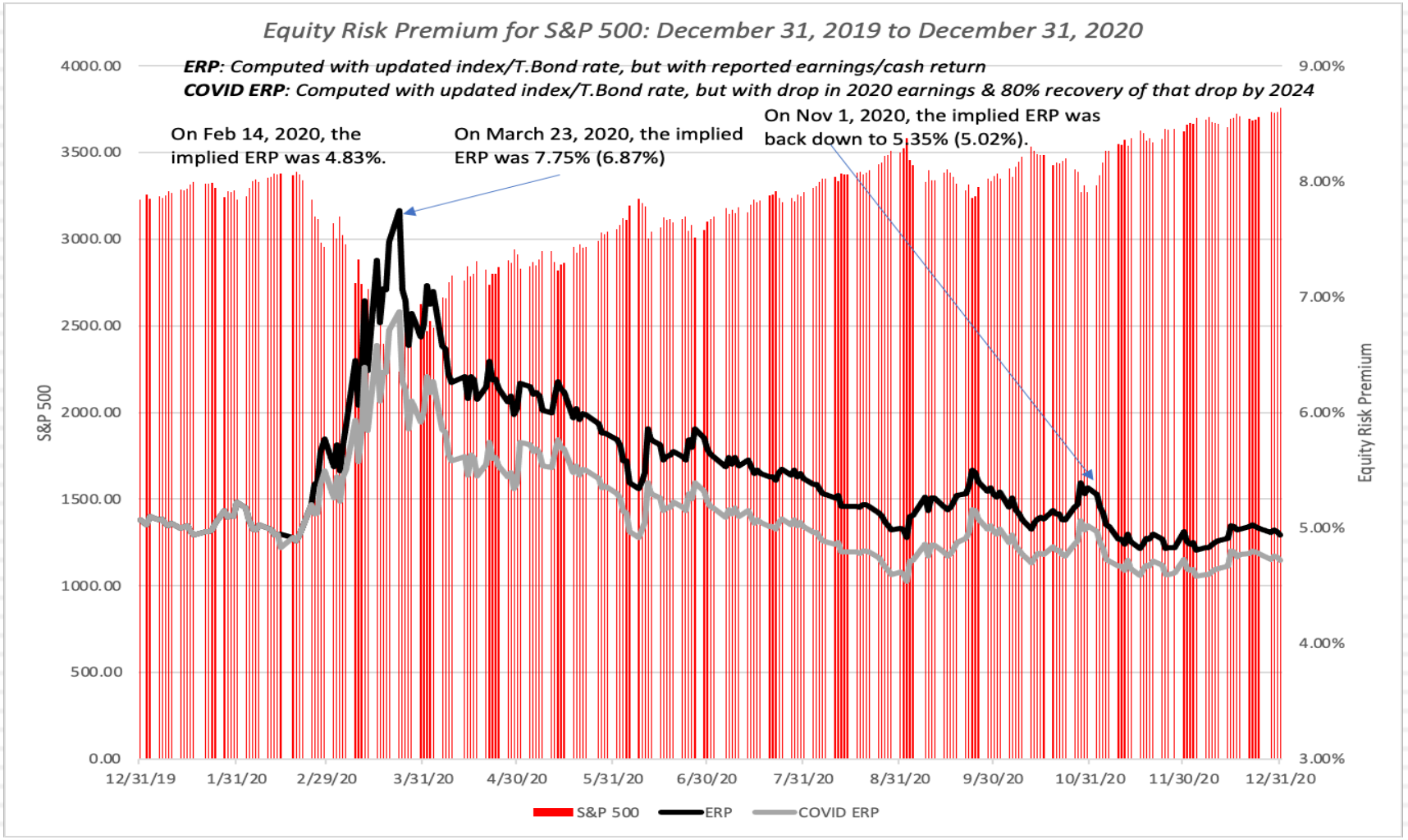
And in 2020.. COVID effects



An Updated Estimate: ERP in 2024

In the trailing 12 months, across all companies in the index.

Base year cash flow (last 12 mths)
Dividends (TTM): 69.69
+ Buybacks (TTM): 94.56
= Cash to investors (TTM): **164.25**

Expected earnings/cashflow growth in next 5 years
Earnings growth rate of 8.74% based upon analyst estimates for 2024 and 2025 and growth dropping to 3.88% over the following years.

Modified Payout
This computation assumes that the payout ratio changes over time to reflect a sustainable payout ratio = g/ROE, in the stable growth. The resulting ERP is 4.57%

Actual numbers | Forecasted numbers

	Last 12 months	2024	2025	2026	2027	2028	*Terminal Year*
Earnings	219.70	238.89	259.76	282.45	307.13	333.96	346.92
Cash Payout (%)	77.85%	77.85%	77.85%	77.85%	77.85%	77.85%	77.85%
Cash Return	164.25	185.97	202.21	219.88	239.09	259.97	270.06

Earnings and Cash flows grow @3.88% (set equal to risk free rate) a year forever.

S&P 500 on 1/1/24= **4769.83**

$$4769.83 = \frac{185.97}{(1+r)} + \frac{202.21}{(1+r)^2} + \frac{219.88}{(1+r)^3} + \frac{239.09}{(1+r)^4} + \frac{259.97}{(1+r)^5} + \frac{270.06}{(r-.0388)(1+r)^5}$$

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 = 8.48%

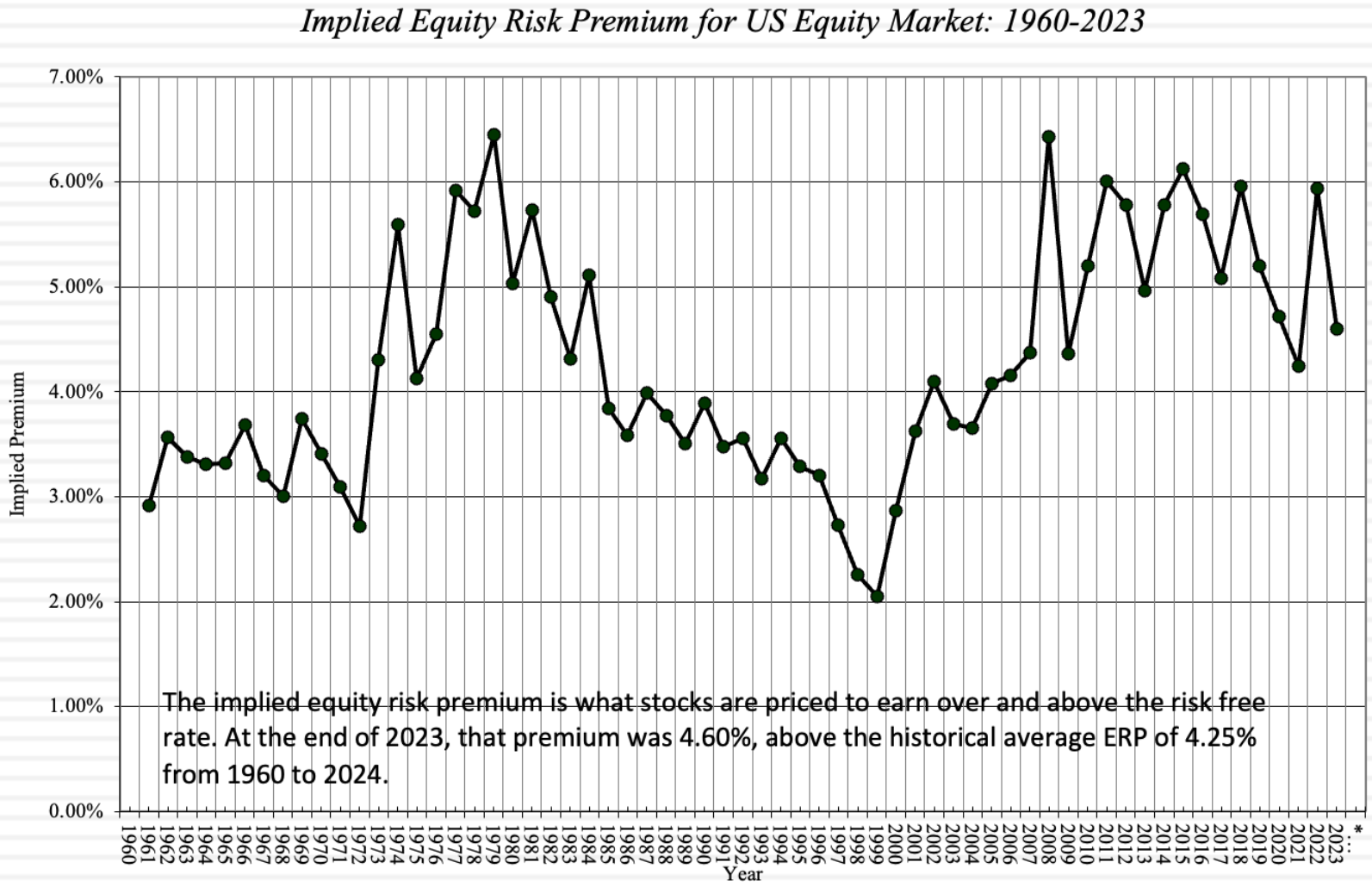
Minus

Risk free rate = T.Bond rate on 1/1/24= 3.88%

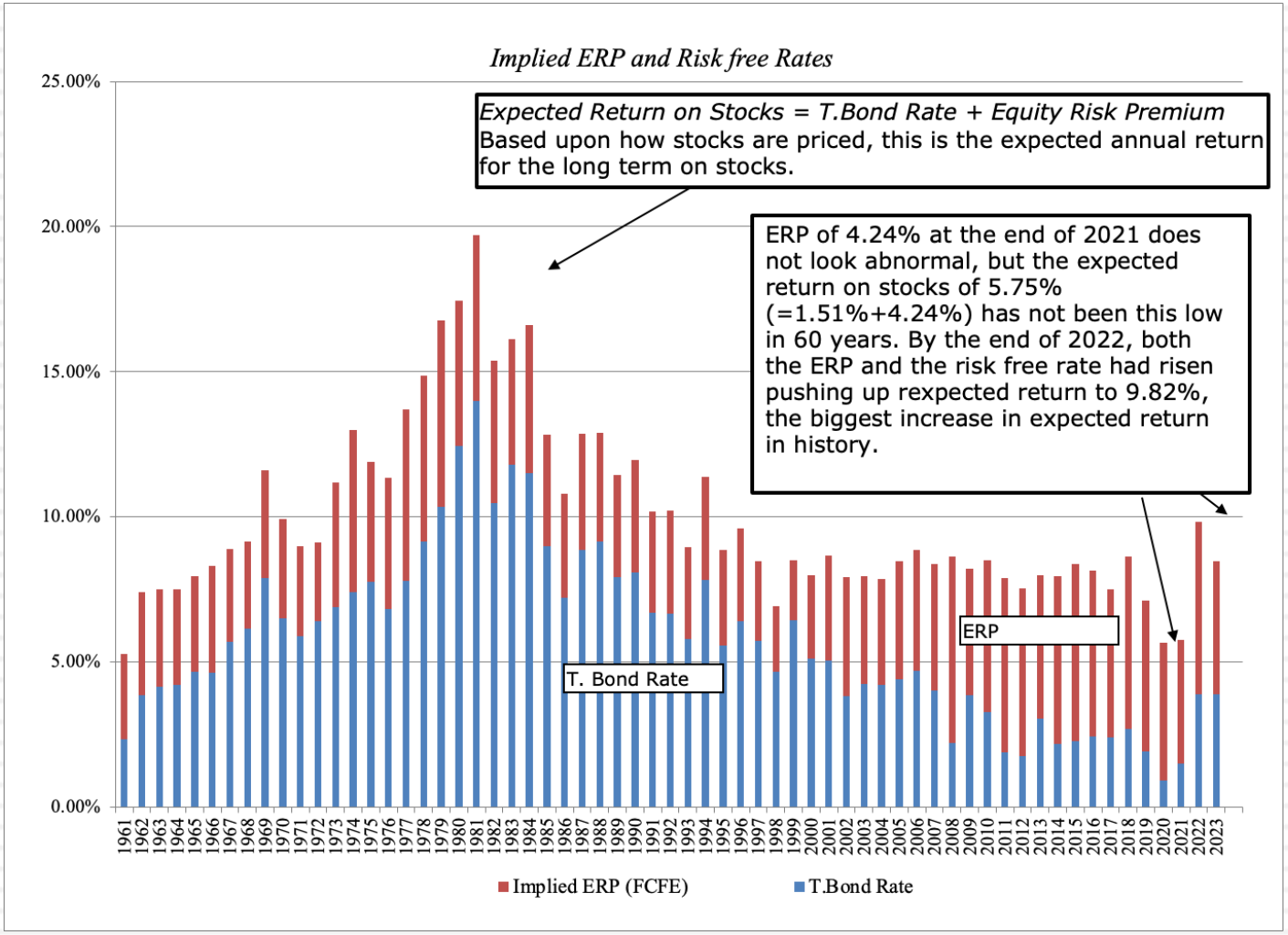
Equals

Implied Equity Risk Premium (1/1/24) = 8.48% - 3.88% = 4.60%

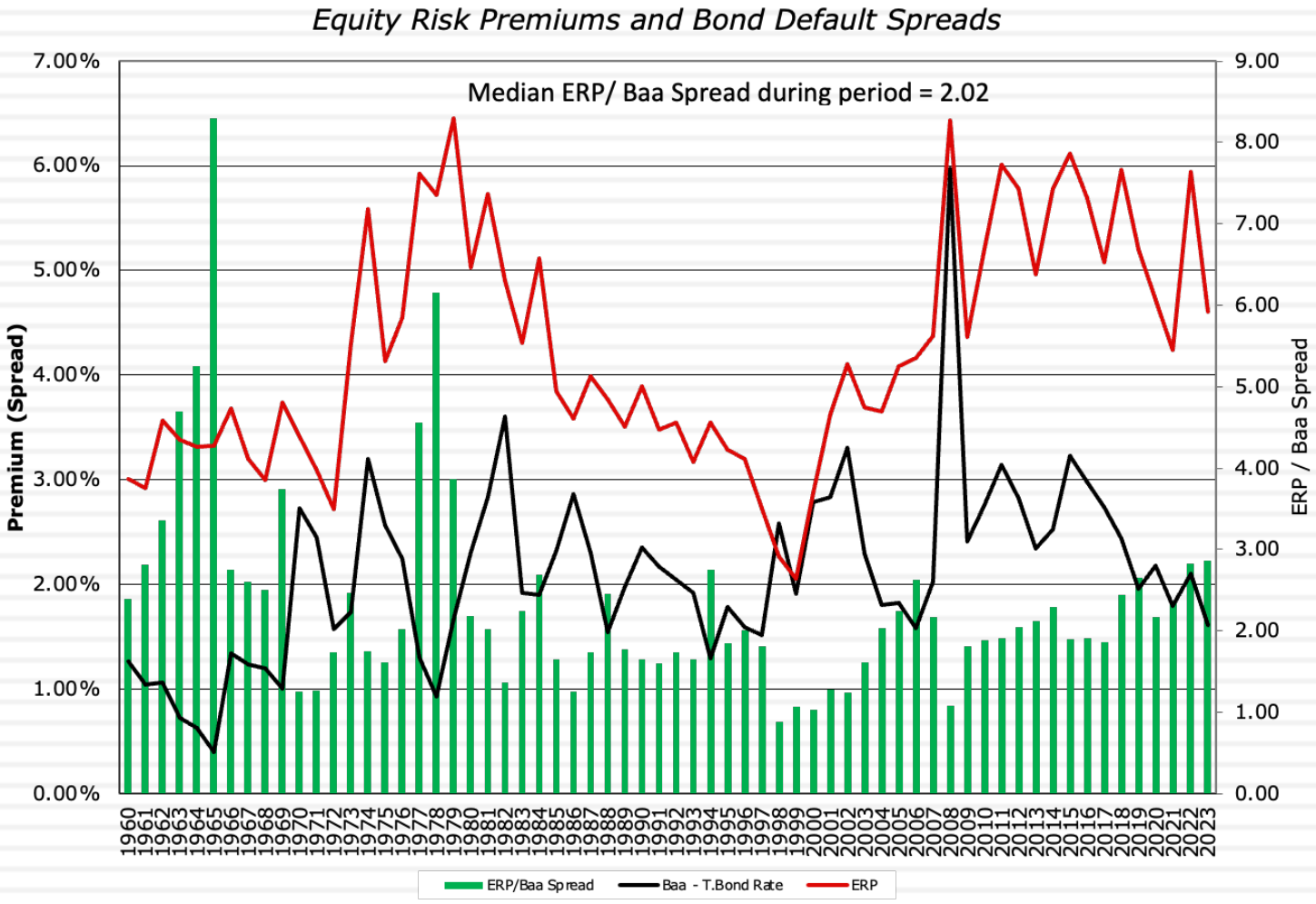
Implied Premiums in the US: 1960-2023



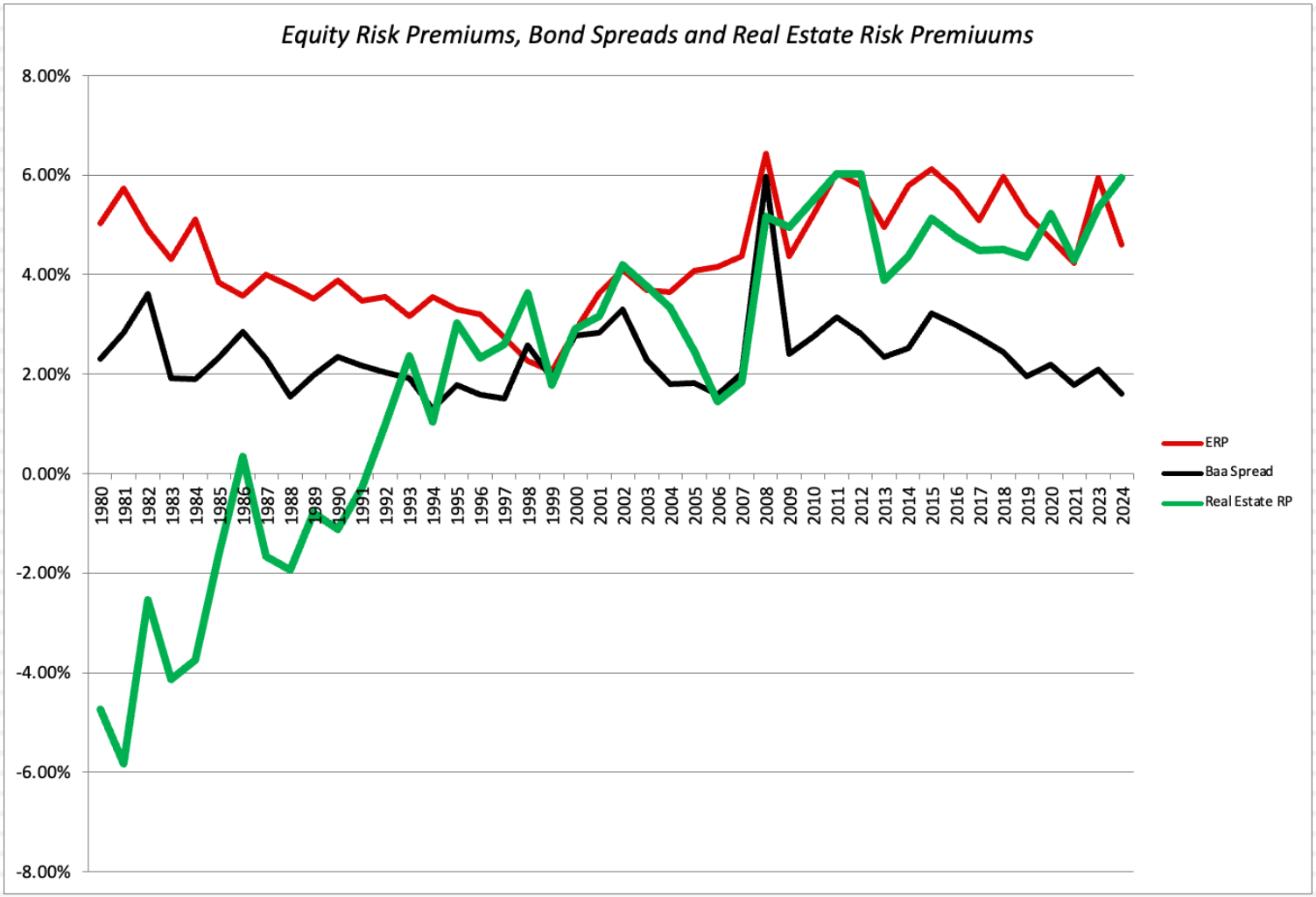
Implied Premium versus Risk Free Rate



Equity Risk Premiums and Bond Default Spreads



Equity Risk Premiums and Cap Rates (Real Estate)



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 a group used the arithmetic average premium (for stocks over T.Bills) for 1928-2023 of 8.32% to value stocks in January 2022, given the implied premium of 4.60%, 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.

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

An ERP for the Sensex

- Inputs for the computation
  - Sensex on 9/5/07 = 15446
  - Dividend yield on index = 3.05%
  - Expected growth rate - next 5 years = 14%
  - Growth rate beyond year 5 = 6.76% (set equal to riskfree rate)
- Solving for the expected return:

$$15446 = \frac{537.06}{(1+r)} + \frac{612.25}{(1+r)^2} + \frac{697.86}{(1+r)^3} + \frac{795.67}{(1+r)^4} + \frac{907.07}{(1+r)^5} + \frac{907.07(1.0676)}{(r-.0676)(1+r)^5}$$

- Expected return on stocks = 11.18%
- Implied equity risk premium for India = 11.18% - 6.76% = 4.42%

The evolution of Emerging Market Risk

Start of year	PBV (Developed)	PBV (Emerging)	ROE (Developed)	ROE (Emerging)	US T.Bond Rate	Growth Rate (Developed)	Growth Rate (Emerging)	Cost of Equity (Developed)	Cost of Equity (Emerging)	Differential
2004	2.00	1.19	10.81%	11.65%	4.25%	3.75%	4.75%	7.28%	10.55%	3.27%
2005	2.09	1.27	11.12%	11.93%	4.22%	3.72%	4.72%	7.26%	10.40%	3.14%
2006	2.03	1.44	11.32%	12.18%	4.39%	3.89%	4.89%	7.55%	9.95%	2.40%
2007	1.67	1.67	10.87%	12.88%	4.70%	4.20%	5.20%	8.19%	9.80%	1.60%
2008	0.87	0.83	9.42%	11.12%	4.02%	3.52%	4.52%	10.30%	12.47%	2.17%
2009	1.20	1.34	8.48%	11.02%	2.21%	1.71%	2.71%	7.35%	8.91%	1.56%
2010	1.39	1.43	9.14%	11.22%	3.84%	3.34%	4.34%	7.51%	9.15%	1.64%
2011	1.12	1.08	9.21%	10.04%	3.29%	2.79%	3.79%	8.52%	9.58%	1.05%
2012	1.17	1.18	9.10%	9.33%	1.88%	1.38%	2.38%	7.98%	8.27%	0.29%
2013	1.56	1.63	8.67%	10.48%	1.76%	1.26%	2.26%	6.01%	7.30%	1.29%
2014	1.95	1.50	9.27%	9.64%	3.04%	2.54%	3.54%	5.99%	7.61%	1.62%
2015	1.88	1.56	9.69%	9.75%	2.17%	1.67%	2.67%	5.94%	7.21%	1.27%
2016	1.99	1.59	9.24%	10.16%	2.27%	1.77%	2.77%	5.52%	7.42%	1.89%
2017	1.76	1.48	8.71%	9.53%	2.68%	2.18%	3.18%	5.89%	7.47%	1.58%
2018	1.98	1.66	11.23%	11.36%	2.68%	2.18%	3.18%	6.75%	8.11%	1.36%
2019	1.64	1.31	12.09%	11.35%	2.68%	2.18%	3.18%	8.22%	9.42%	1.19%
2020	2.26	1.64	10.41%	9.10%	1.92%	1.42%	2.42%	5.40%	6.49%	1.10%
2021	2.21	1.77	6.30%	7.31%	0.93%	0.43%	1.43%	3.09%	4.75%	1.67%
2022	2.31	1.67	13.22%	11.99%	1.51%	1.01%	2.01%	6.30%	7.99%	1.69%
2023	2.28	1.44	12.90%	10.93%	3.88%	3.38%	4.38%	7.56%	8.93%	1.37%

Discount Rates: III

Relative Risk Measures

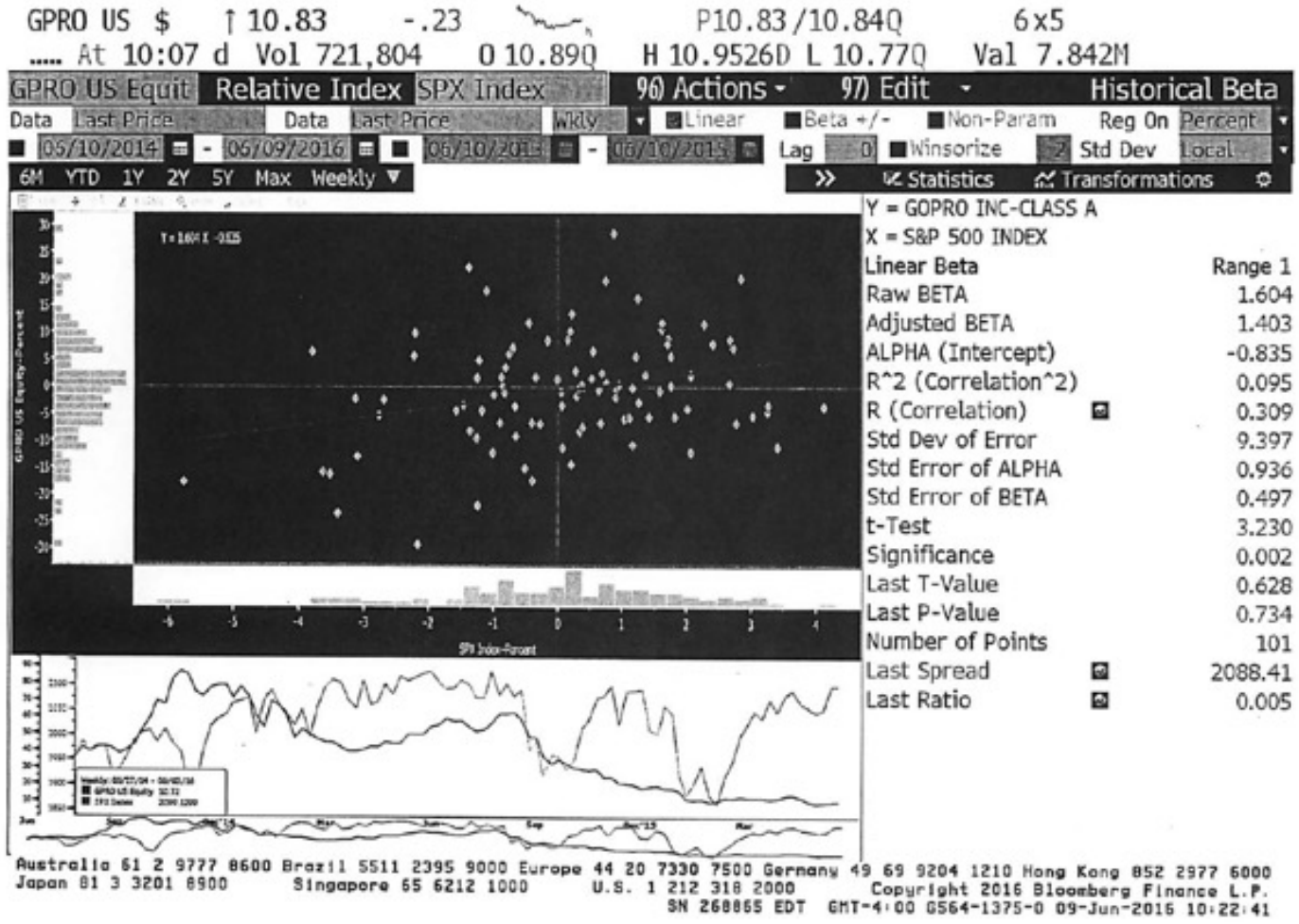
The CAPM Beta: The Most Used (and Misused) Risk Measure

- The standard procedure for estimating betas is to regress stock returns (Rj) against market returns (Rm) -

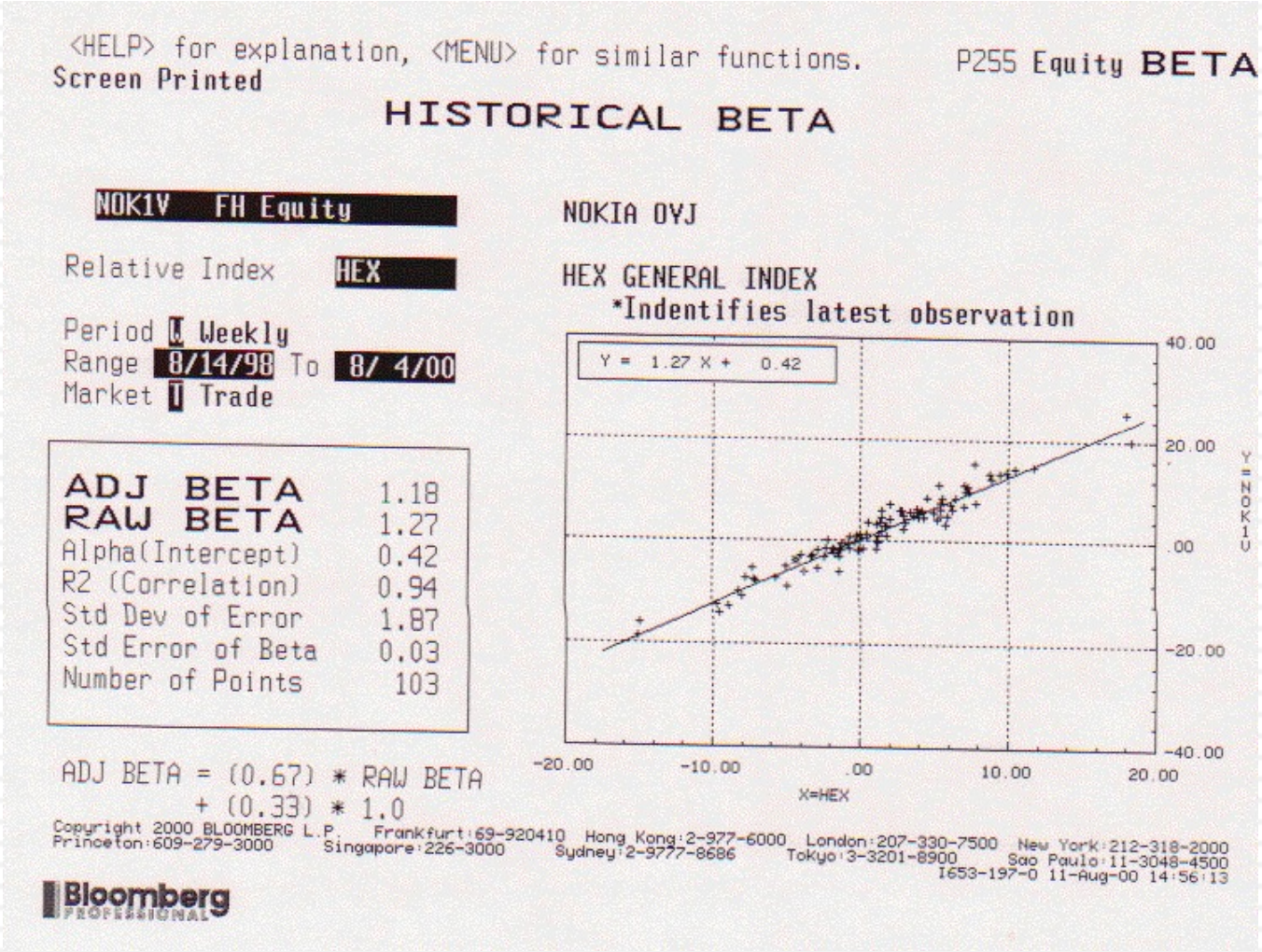
  Rj = a + b Rm

  where a is the intercept and b is the slope of the regression.
- The slope of the regression corresponds to the beta of the stock, and measures the riskiness of the stock.
- This beta has three problems:
  - It has high standard error
  - It reflects the firm's business mix over the period of the regression, not the current mix
  - It reflects the firm's average financial leverage over the period rather than the current leverage.

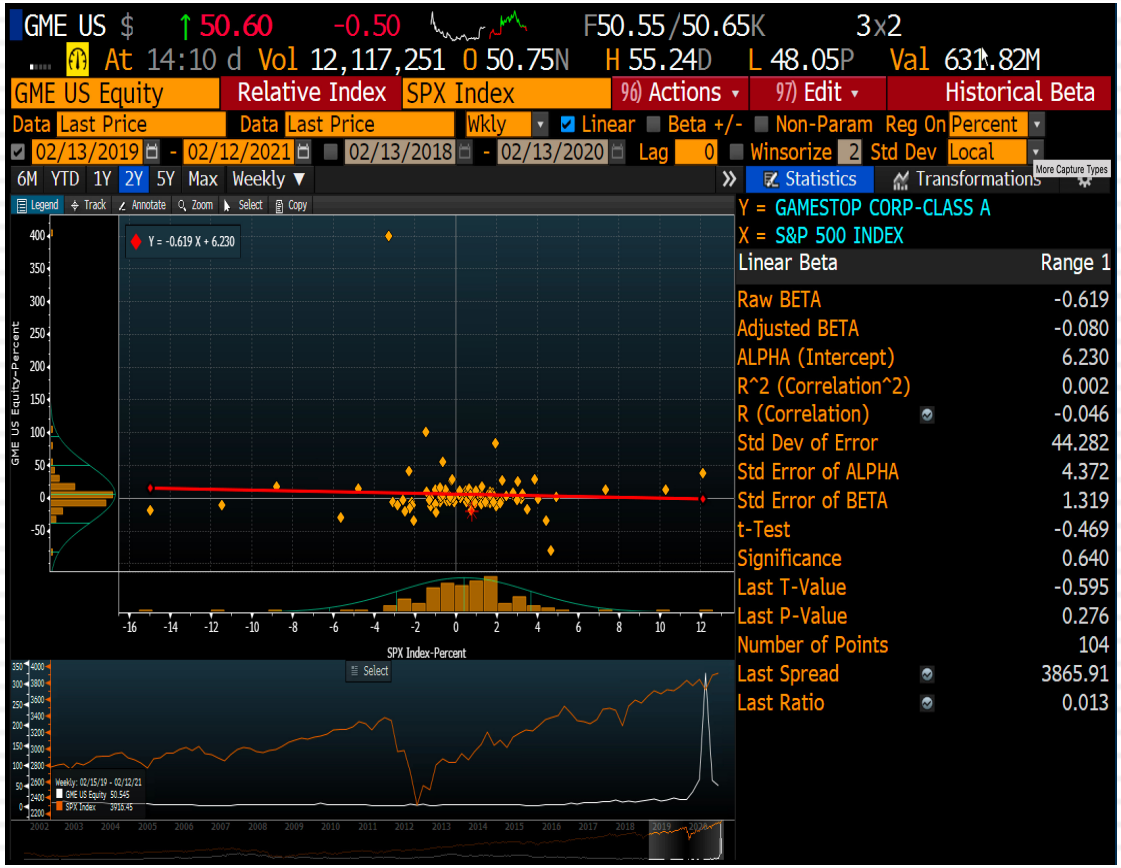
Unreliable, when it looks bad..



Or when it looks good..



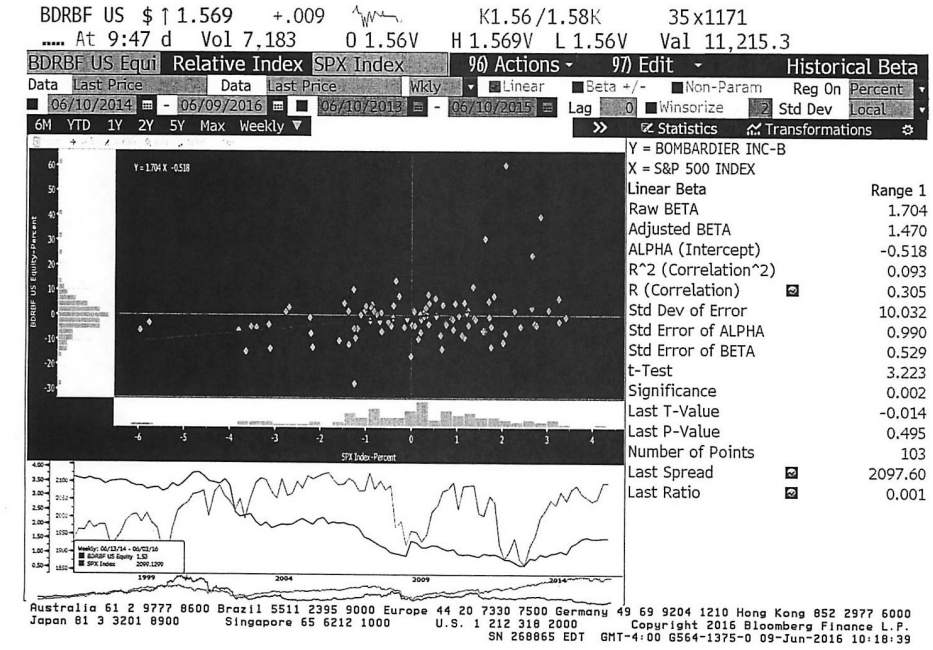
One slice of history..

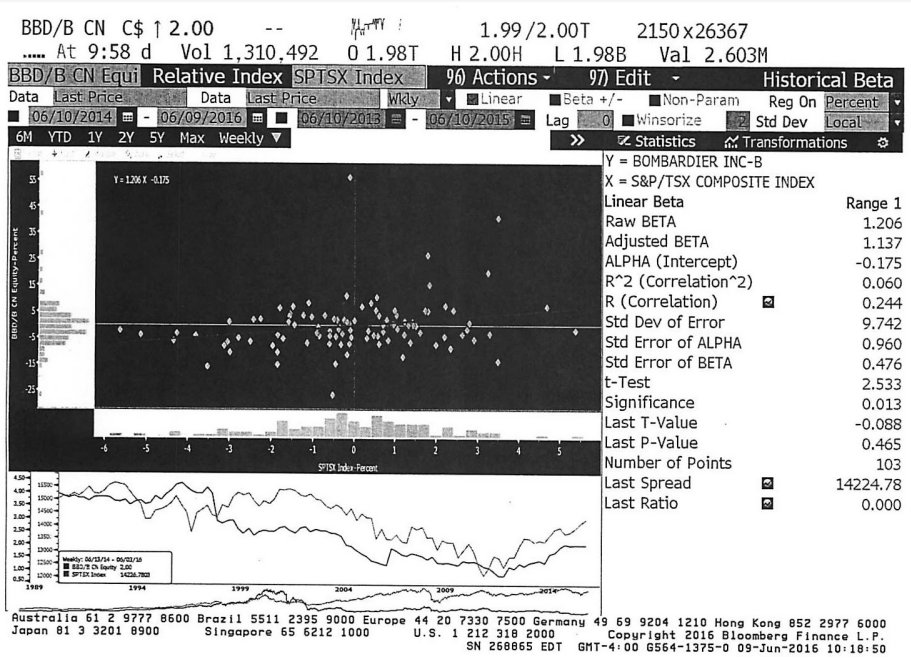


During 2019 and 2020, GME was an extraordinarily volatile stock, as short sellers and long only investors fought out a battle.

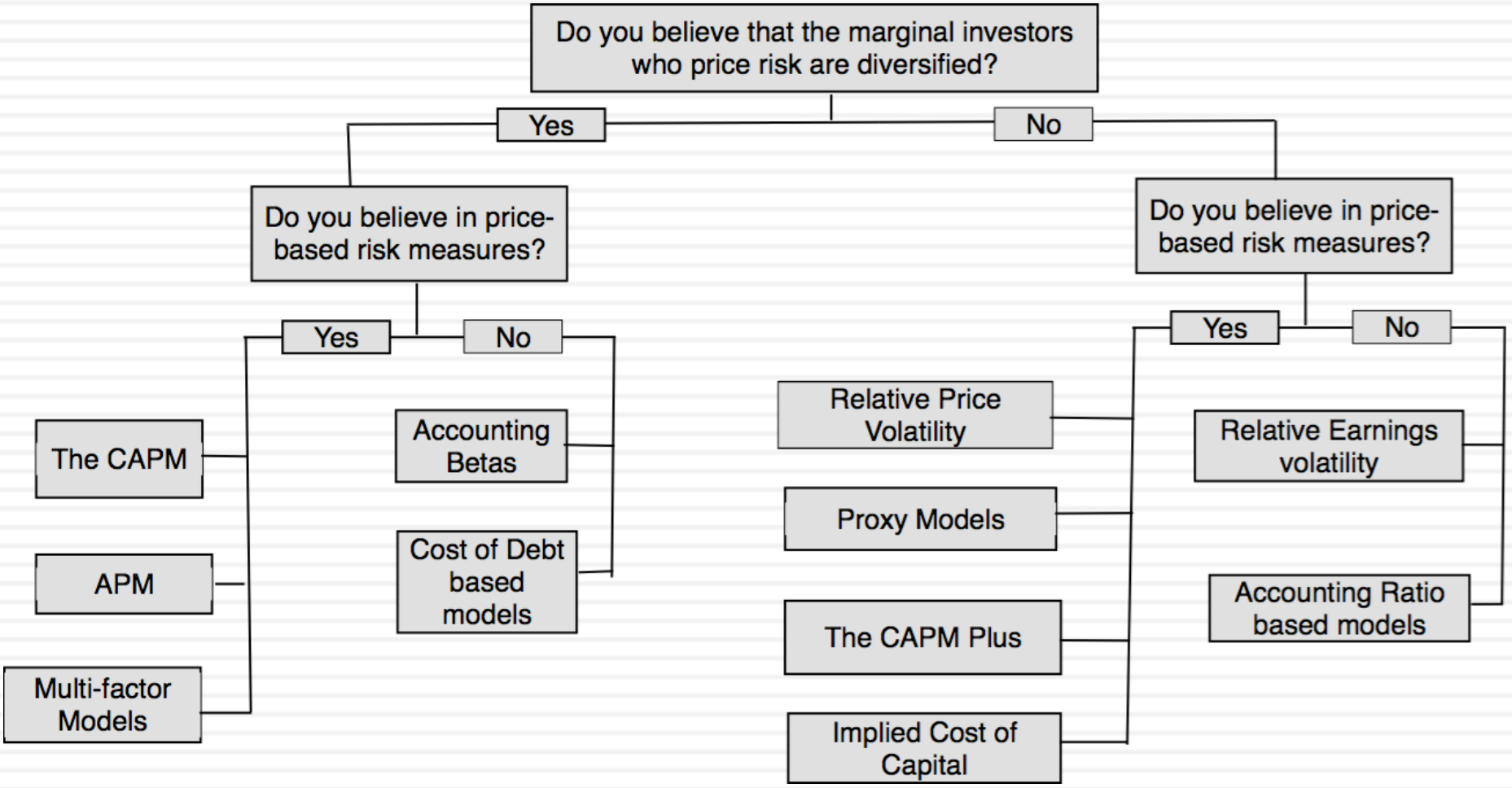
Aswath Damodaran

And subject to game playing





Measuring Relative Risk: You don't like betas or modern portfolio theory? No problem.



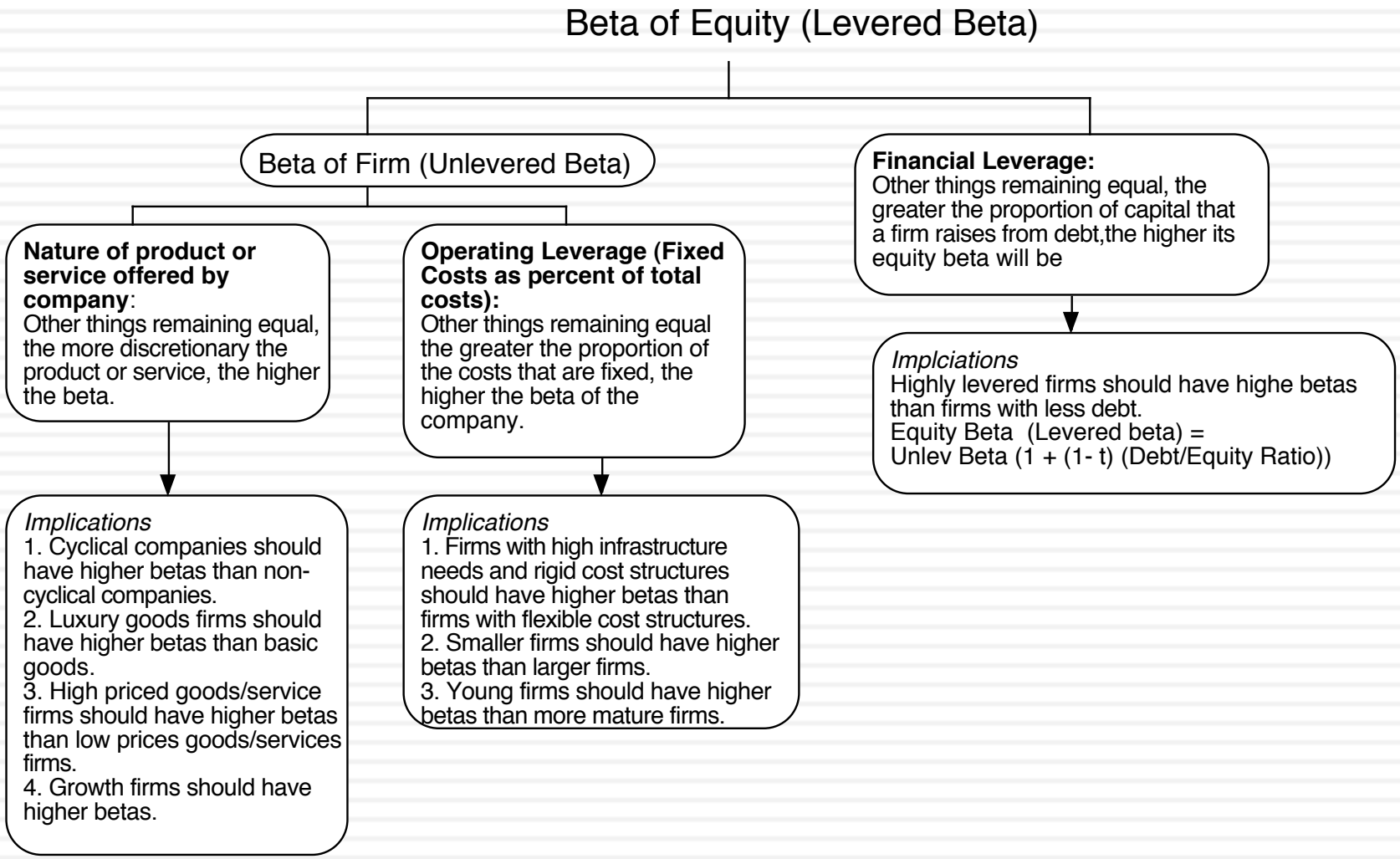
Don't like the diversified investor focus, but okay with price-based measures

1. Relative Standard Deviation
   - Relative Volatility = Std dev of Stock/ Average Std dev across all stocks
   - Captures all risk, rather than just market risk
2. Proxy Models
   - Look at historical returns on all stocks and look for variables that explain differences in returns.
   - You are, in effect, running multiple regressions with returns on individual stocks as the dependent variable and fundamentals about these stocks as independent variables.
   - This approach started with market cap (the small cap effect) and over the last two decades has added other variables (momentum, liquidity etc.)
3. CAPM Plus Models
   - Start with the traditional CAPM (Rf + Beta (ERP)) and then add other premiums for proxies.

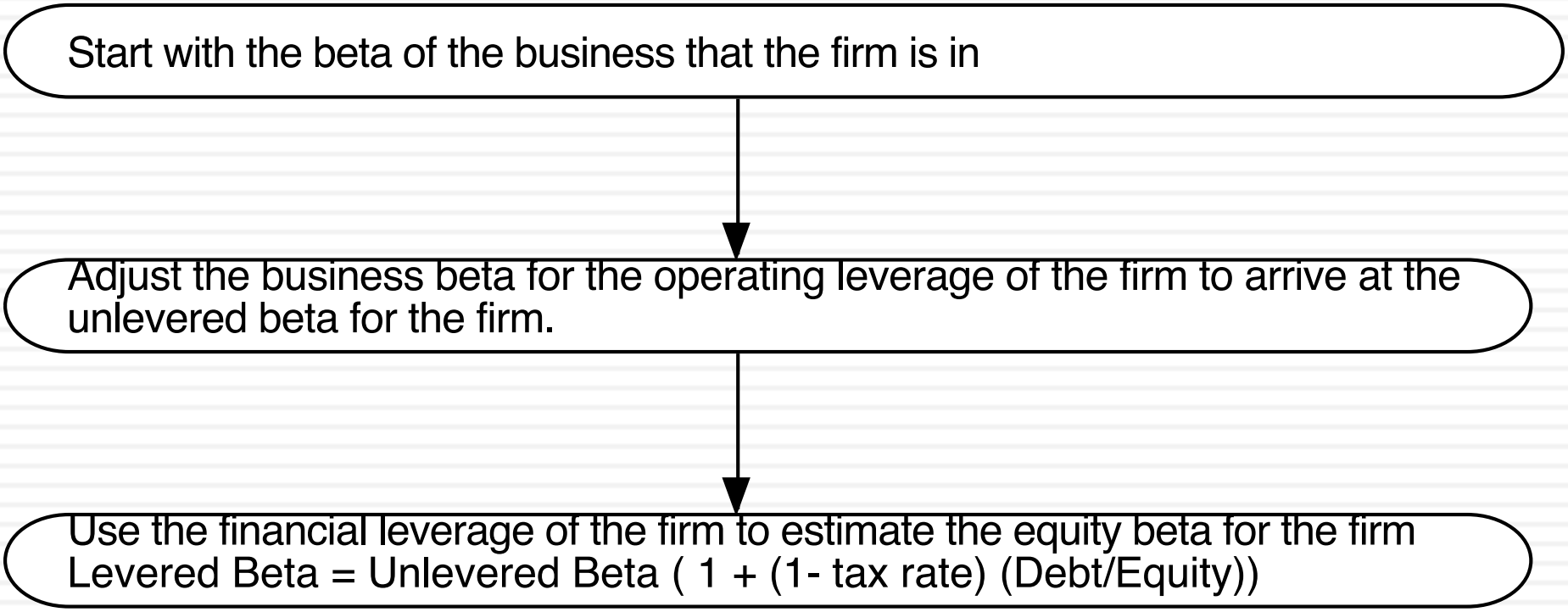
Don’t like the price-based approach..

1. Accounting risk measures: To the extent that you don’t trust market-priced based measures of risk, you could compute relative risk measures based on
   - Accounting earnings volatility: Compute an accounting beta or relative volatility
   - Balance sheet ratios: You could compute a risk score based upon accounting ratios like debt ratios or cash holdings (akin to default risk scores like the Z score)
2. Qualitative Risk Models: In these models, risk assessments are based at least partially on qualitative factors (quality of management).
3. Debt based measures: You can estimate a cost of equity, based upon an observable costs of debt for the company.
   - Cost of equity = Cost of debt * Scaling factor
   - The scaling factor can be computed from implied volatilities.

Determinants of Betas & Relative Risk



In a perfect world… we would estimate the beta of a firm by doing the following



Adjusting for operating leverage…

- Within any business, firms with lower fixed costs (as a percentage of total costs) should have lower unlevered betas. If you can compute fixed and variable costs for each firm in a sector, you can break down the unlevered beta into business and operating leverage components.
  - Unlevered beta = Pure business beta * (1 + (Fixed costs/ Variable costs))
- The biggest problem with doing this is informational. It is difficult to get information on fixed and variable costs for individual firms.
- In practice, we tend to assume that the operating leverage of firms within a business are similar and use the same unlevered beta for every firm.

Adjusting for financial leverage…

- Conventional approach: If we assume that debt carries no market risk (has a beta of zero), the beta of equity alone can be written as a function of the unlevered beta and the debt-equity ratio

  $\beta_L = \beta_u (1+ ((1-t)D/E))$

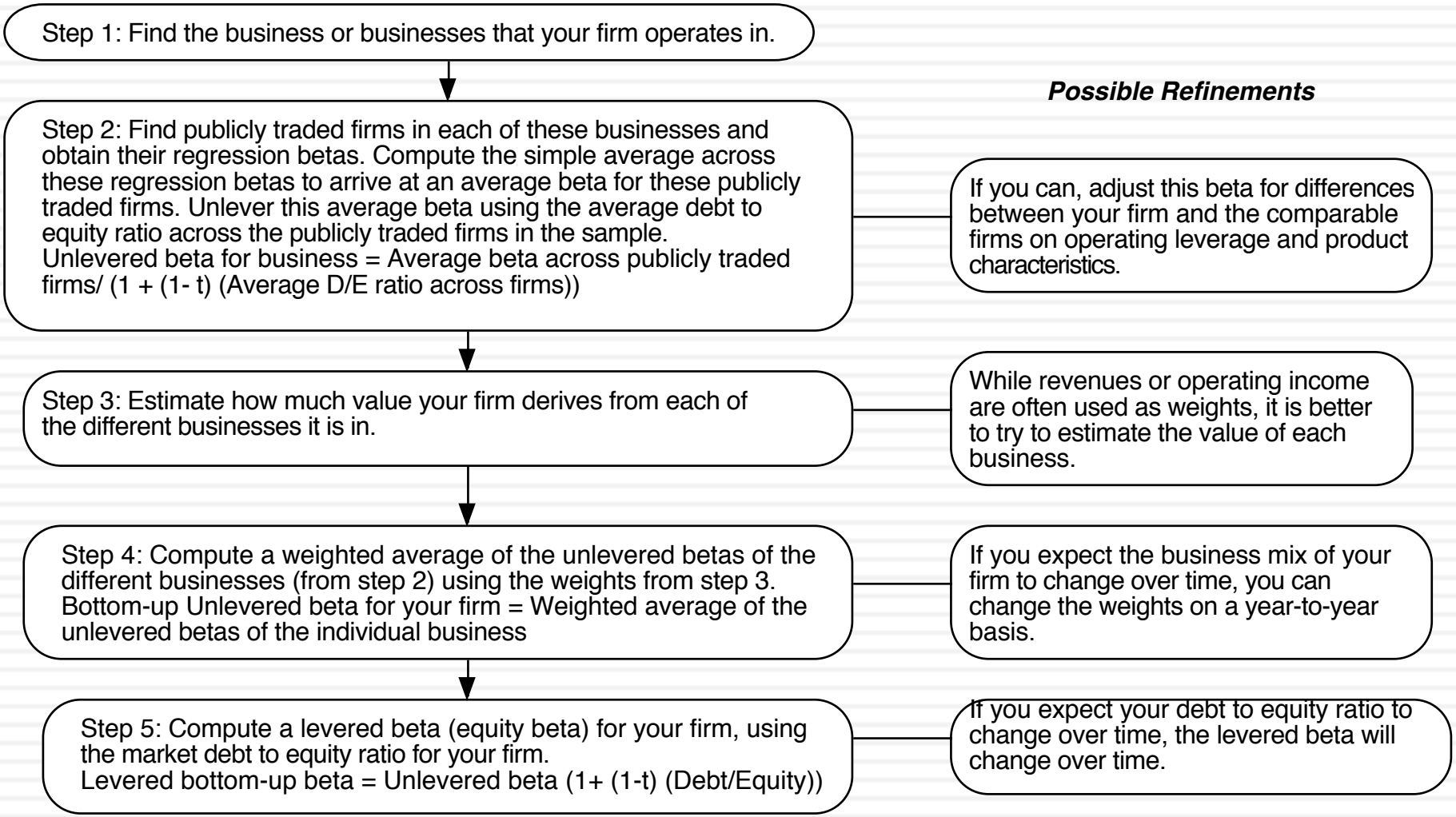
  In some versions, the tax effect is ignored and there is no (1-t) in the equation.

- Debt Adjusted Approach: If beta carries market risk and you can estimate the beta of debt, you can estimate the levered beta as follows:

  $\beta_L = \beta_u (1+ ((1-t)D/E)) - \beta_{debt} (1-t) (D/E)$

  While the latter is more realistic, estimating betas for debt can be difficult to do.

Bottom-up Betas



Why bottom-up betas?

- Less Noisy: The standard error in a bottom-up beta will be significantly lower than the standard error in a single regression beta. Roughly speaking, the standard error of a bottom-up beta estimate can be written as follows:

$$\text{Std error of bottom-up beta} = \frac{\text{Average Std Error across Betas}}{\sqrt{\text{Number of firms in sample}}}$$

- Updated: The bottom-up beta can be adjusted to reflect changes in the firm's business mix and financial leverage. Regression betas reflect the past.
- Don't need prices: You can estimate bottom-up betas even when you do not have historical stock prices. This is the case with initial public offerings, private businesses or divisions of companies.