Benchmarking and Equity Premium
(Welch, Chapter 09)

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Mon Jun 20 21:53:17 2022

Maintained Assumptions

Perfect Markets

1. No differences in opinion.
2. No taxes.
3. No transaction costs.
4. No big sellers/buyers—infinitely many clones that can buy or sell.

With risk and risk aversion

▶ this chapter does not lean heavily on assumptions.

Corporate Key Question

- ► **What is your investors' cost of capital?**

- ► We need the **opportunity cost of capital**
    - ► to serve as the $E(r)$ in the PV formula.

Prerequisite Objective

- As a corporate manager, your task is to act on behalf of your investors.
- Are you the custodian of your owners' cash.
  - If not, who do you serve?

- To compute NPV, what is your investors' opportunity cost of capital?
  - Return their money if they can do better elsewhere!

Skype Your Investors and Ask?

- ▶ In public companies, there are often too many investors — different and diffuse.
    - ▶ Most have little investment in your company.
    - ▶ Most don't want to become informed.
    - ▶ Most just don't want to be bothered.
    - ▶ Often hard to even get them to vote *on-line*.

Reasonable Presumptions?

- ▶ What are good presumptions about them?
  - ▶ They are smart.
  - ▶ They are reasonably diversified — most holding something close to the overall stock market.
  - ▶ They want you to compare your projects to others that they could invest in elsewhere.

Preferences?

- ► What (project characteristics) do they like?
    - ► Do they care about your firm?
    - ► Do they care about you?
    - ► Do they care about employees?
    - ► Do they care about society?
    - ► Do they care about abortion? (which side?)
    - ► Do they care about politics?
    - ► Do they care about pollution?

Specific Preferences?

- ▶ Not 100% clear what investors (dis-)like.
- ▶ Most likely, we think they care about:
  - ▶ When will the payment come?
  - ▶ Is the project and payment risky or safe?
  - ▶ Is the market perfect? Is it liquid? Can they sell easily? Can they withdraw easily? How bad are their taxes?

Risk or Co-Risk?

- ► Do they care about how your project investment choices impact their overall portfolio?
    - ► If so, then how should you assess how a new project contributes to their portfolios?

Specific Term and Risk Preferences

- What are good benchmarks for your project's term and risk premia?

- When will the payments come?
    - $\longrightarrow$ Treasury Yield Curve
- Is your project "default-risky" like corporate equity?
    - $\longrightarrow$ Equity Premium

Equity Premium

$$\text{EQP} \equiv E(r_M) - r_F.$$

▶ The **equity premium** (or market risk premium):
  ▶ the difference between the *expected* RoR on the stock market and some risk-free RoR.
  ▶ View it as a *normalized* way of quoting the expected RoR on the stock market.

Risk-Free vs Risky Components

- ► Use leverage to split your (intermediate-risk) project into one project that is safer and one that is less safe.
- ► Then benchmark your safer and riskier components separately.
- ► Stocks pay off in the distant future.
- ► Bonds pay off in the future.
- ► Bills pay off soon.

Perhaps Better: A Corp Yield Curve?

► Should we compare our corporate projects to U.S. Treasuries??

► Maybe look at an equivalent corporate-bond yield curve instead of Treasury yield curve?

  ► **But take out the default premium.** Do not work with quoted numbers.

  ► Your investors will not earn default premium *on average*.

 ► Probably expected corp bond RoR is not super-greatly higher than that of U.S. Treasuries.

Equity vs Risk-free?

- ▶ Are there non-corporate contexts in which you care about the difference between the equity expected rate of return and the risk-free rate?

Good Project Benchmark?

- ▶ Where do you read off the risk-free rate?
- ▶ What is it today?
- ▶ Where do you read off the equity premium?
- ▶ What is it today?

Graph: Textbook Authors
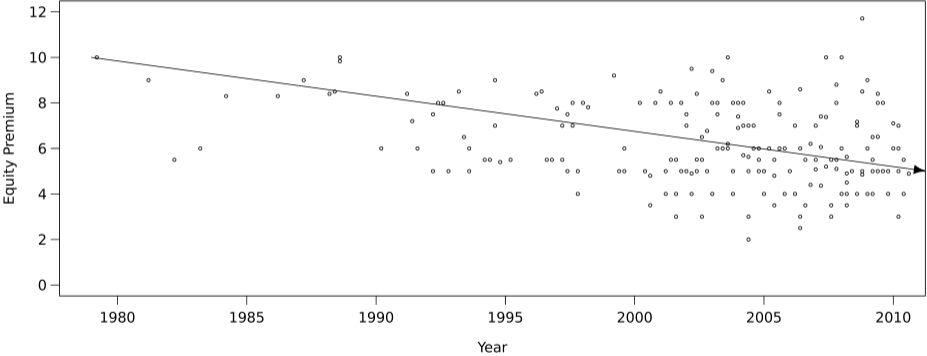
Comparability

- ▶ Benchmark returns (such as the equity premium) also depend on how you quote them.
  - ▶ Do investors care more about geometric or arithmetic rates of return?
  - ▶ Are cost-of-capital estimates more important for long-term projects or short-term projects?
  - ▶ **Watch out**: get $E(CF)$ in the PV numerator right! Do not apply $E(R)$ to *promised* cash flows.

M1: Historical Geometric Averages

- ▶ Standing today, looking backwards for *x* years, how did stocks perform geometrically above bonds (and bills and inflation)?

- ▶ Is there a term premium for equity?
  - ▶ A: Not clear.

Graph: Historical Geometric RoRs
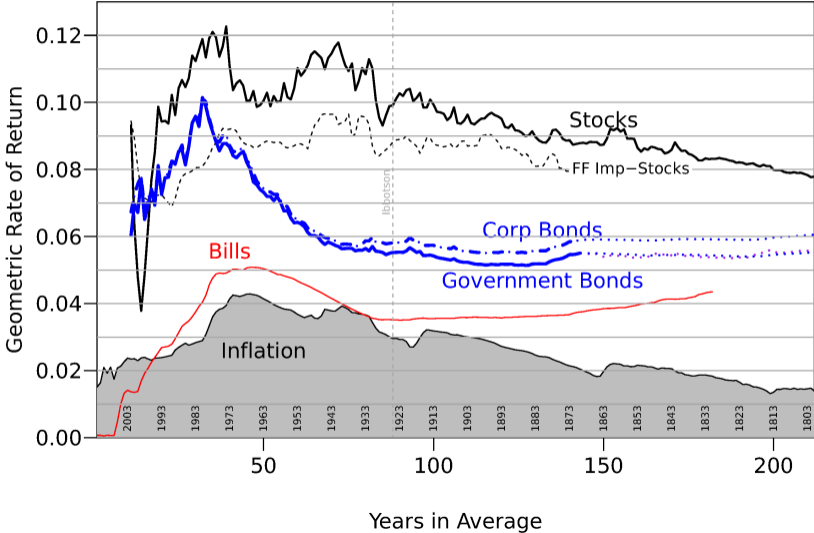
Reconciling Historical Equity Premia

- Arithmetic Equity Premium vs Short-Term Bonds **1926** to **2020**: $\approx 8.6\%$

- Minus Later Sample Period, starting **1970**: −1%

- Minus Long-Term T-Bonds Instead of Short-Term T-Bills: −4%

- Minus Use of Geometric Return: −1%

- ▶ Highest quotable historical equity premium: 8.6%
- ▶ Lowest quotable historical equity premium: 2.4%

- ▶ All numbers are consistent. Just different.
- ▶ Historical, not necessarily expected.

Peso Problem (*Black Swans / Tail Events*)

Question: What about rare shocks??

- ▶ **Peso Problem** (Academics), or
- ▶ **Black Swan** (Nassim Taleb).

(important in academia *and* practice!)

Peso Answer

- ▶ Peso problem can explain at most 1-2% of historical equity premium.
- ▶ Peso problem is not unimportant, but it was and is insurable with index options.
- ▶ The remaining risk (long-run unforeseen stagnation) is harder to insure.

M2: History Implication?

- ▶ Are high historical stock market returns indicative of higher or lower future stock market returns?

M3: Predicting EQP?

- ▶ Would high or low dividend yields predict higher future market RoRs? Theoretically? Practically? Today?
    - ▶ Theoretically, higher.
    - ▶ But not (strongly) according to empirical evidence.
    - ▶ Recently, D/P predicted negative equity premia!

M4: Equity Premium

- ▶ What equity premium would it take to attract investors into the stock market, assuming no gifted horses?
  - ▶ 1-2% per annum would seem reasonable.
  - ▶ 3% means ending up with twice as much money for an investment over 25 years. This seems ridiculously high.

M5: Couldn't We Just Ask Experts?

- It is *The blind leading the blind*.
- Where do you think they got their opinions from?

Big Survey of Educated Guesses

- PS: you need to adjust how different answers have quoted the equity premium.
    - Ordinary investors. — Tend to follow recent experience. 15%/year in 2000, maybe also in 2021.
    - McKinsey Corporate Consulting. — 5%
    - Social Security Admin. — 4%
    - CalPers — 5% (7% for stock market)
    - Professors of Finance. — 4% to 5.5%
    - Me? Ivo-san. 2%.
        - I have been badly wrong (too pessimistic) from 2014 to 2021!

CalPERS: Shrugworthy?

- CalPERS has to decide what their expected (geometric) RoR should be.
  - they used a geo market premium of 7% in 2019.
  - which was then 5% above prevailing Treasury bond!
  - If this seems unrealistic to you—to me, too.
  - But lowering this estimate meant California would have had to set aside money for unfunded pension obligations *today*.
  - Politicians prefer to leave optimistic estimates as is, and kick the can down the line to their successors.

CalPERS: Problem Dimension

- 0.25%/year difference on $300 billion:
- $\approx$ $750 million.

- Can pay for a lot of political projects
  - ...and hordes of equity-premium consultants!
  - me, me, me, me ...

Time Variation?

- ▶ Many individuals give equity premium forecasts which depend on the forecasting interval.
  - ▶ like a belief that market is over- or under-valued, and they can predict the market.
- ▶ Expected value forecasts *should* not change dramatically from year to year.
  - ▶ based on technology, competition, preferences.
  - ▶ P should adjust rapidly, but *not* $E(R)$!

M6: ROR/ICC

Accounting Models (RoR) and/or ICC.

Time-Dependence

- ▶ Everyone agrees/knows that the SD(R) is much higher than the E(R) for market and most other equity.
  - ▶ SD(R) on the order of 15% to 20% per annum.
  - ▶ But which mean equity premium E(R) is right?
  - ▶ 1%? 3%? 6%? (per annum)

- ▶ Be reasonable. Be consistent. Pray.

Combining Assets and Claims

- The following are very general aspects.
  - They will also hold in the next chapter with more specific models.

Firm Is "Debt Plus Equity"

- ▶ The profits generated by the firm's assets are distributed to its debt and equity holders.
- ▶ You can think of a firm's assets as consisting of a portfolio of debt and equity.
  - ▶ DT: dollar value of the firm's debt.
  - ▶ EQ: dollar value of the firm's equity.
  - ▶ FM: dollar value of the firm's total assets.
  - ▶ PS: simplification, this omits non-financial liabilities, which here were rolled into financial debt.

$$FM \equiv DT + EQ$$

$$w_{DT} = \left(\frac{DT}{DT + EQ}\right) \ , \ w_{EQ} = \left(\frac{EQ}{DT + EQ}\right)$$

$$w_{FM} = w_{EQ} + w_{DT} = 1$$

$$r_{FM} = w_{DT} \cdot r_{DT} + w_{EQ} \cdot r_{EQ}$$

Linear Functions

▶ A linear function $f()$ means

$$f(a + b) = f(a) + f(b) .$$

▶ For us, the following is important:

  ▶ Portfolios are linear combinations: $r_P = w_A \cdot r_A + w_B \cdot r_B$

  ▶ Firms consist of debt and equity $FM = DT + EQ$.

    ▶ (Firms are linear combinations of non-linear contracts.)

  ▶ Expectations are linear functions: $E(r_A) + E(r_B) = E(r_{A+B})$.

▶ Variance and standard deviation are not linear.

Asset Debt Costs of Capital

- ▶ Fortunately, firms care about (luckily easier-to-assess) *asset* cost of capital, not just the *equity* cost of capital.

$$E(R_{FM}) = w_{DT} \cdot E(R_{DT}) + w_{EQ} \cdot E(R_{EQ})$$

- ▶ If not too highly levered, well-collateralized, *safe* corporate debt should have $E(R)$ only modestly above the US Treasury or other corporate debt.
- ▶ Of course, $E(R_{DT})$ must be *expected* yield, not *quoted*.

- ► Firms can value-weight their debt and equity cost of capital. So, if...
  - ► cost of capital of similar **Debt**: 5% (perhaps 6% quoted),
  - ► cost of capital of similar **Equity**: 10%,
  - ► and their project is 80% debt and 20% equity,
  - ► then their cost of capital is $\approx 6\%$.

$$E(R) \approx 80\% \cdot 5\% + 20\% \cdot 10\% = 6\%.$$

See also NPV Applications

- ▶ You can average costs of capital,
- ▶ but you cannot assume that one applies to the other.
  - ▶ especially important in acquisitions and vastly different projects!
  - ▶ E.g., investing in a US Treasury bond requires a different cost of capital than investing in an equity option.

Pricing a Condo?

▶ If you want to price a condominium, which risk-free rate and equity premium should you use?

Common Sense

- Don't be stupid!
- First use common sense (appropriate tools), not formulas (hammers)!

- ▶ To price a condo, use other condos and not the stock market.
- ▶ If many other Xs have been bought and sold (at arms length), in a highly-liquid market, then Xs are better benchmarks.
- ▶ Find the best benchmarks!