An Alternative to Insurance: Portfolio Management

- Diversification of ownership

From Crump 1874 book p. 94

There is an old saying that it is unadvisable to have all your eggs in one basket, a saw that is constantly quoted among both *bonâ fide* investors, as well as among speculators. A broker is not desirous that his clients who speculate should be interested very largely in one stock. He prefers to have the liability spread over the market, for obvious reasons. If a client fancies a particular stock, or has good reasons for believing it is about to improve, and he goes to his broker with a view to increase his stake, he will not receive the same encouragement as if he selected something else. The influence thus brought to bear arises from selfish motives, and proves again that the client should keep his own counsel. If he have no decided views himself, it is certain he had better do nothing, for speculation thus entered upon is doubly and childishly haphazard.

The more organized methods of speculation which prevail in these times, cause the public to be mulcted of their money in a much more wholesale manner than was the case formerly. They are now driven like sheep, or rather enticed into a pen,

A Later Insight

- If people are all like me, all calculating with the same data, all wanting to hold portfolios on the frontier, then then they all want to hold the same portfolio (and cash)
- So **THAT HAS TO BE THE MARKET PORTFOLIO**

Portfolio Diversification

- All that should matter to an investor is the performance of the entire portfolio

- Mean and variance of portfolio matter

- Law of large numbers means that spreading over many independent assets reduces risk, has no effect on expected return

Capital Asset Pricing Model (CAPM)

- CAPM Asserts that all investors hold their optimal portfolio

- Consequence of the mutual fund theorem: all investors hold the same portfolio of risky assets, the tangency portfolio

- Therefore the CAPM says that the tangency portfolio equals the market portfolio

Scatter, Apple vs S&P 500 Returns Monthly Feb 2000-Jan 2016
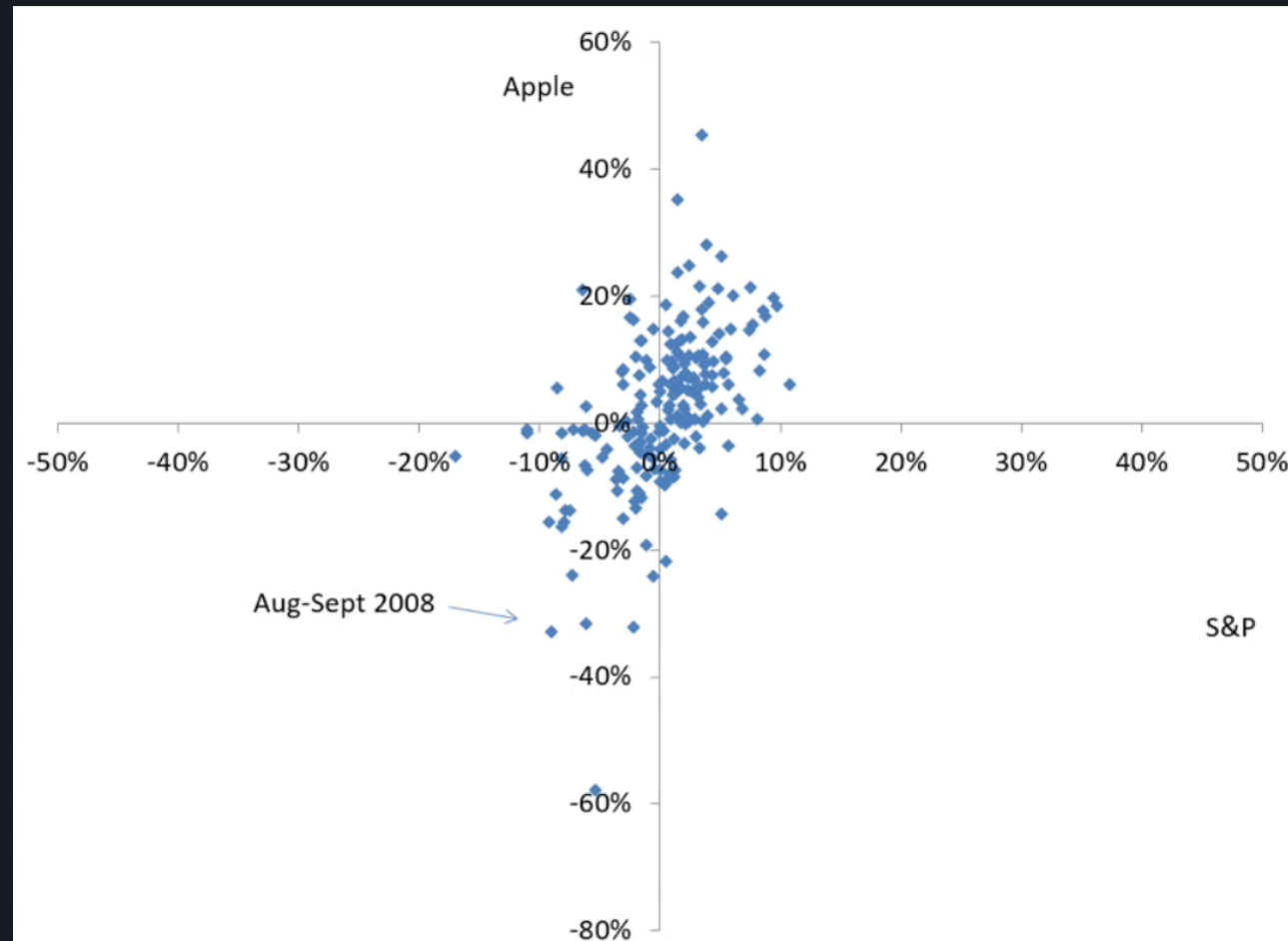
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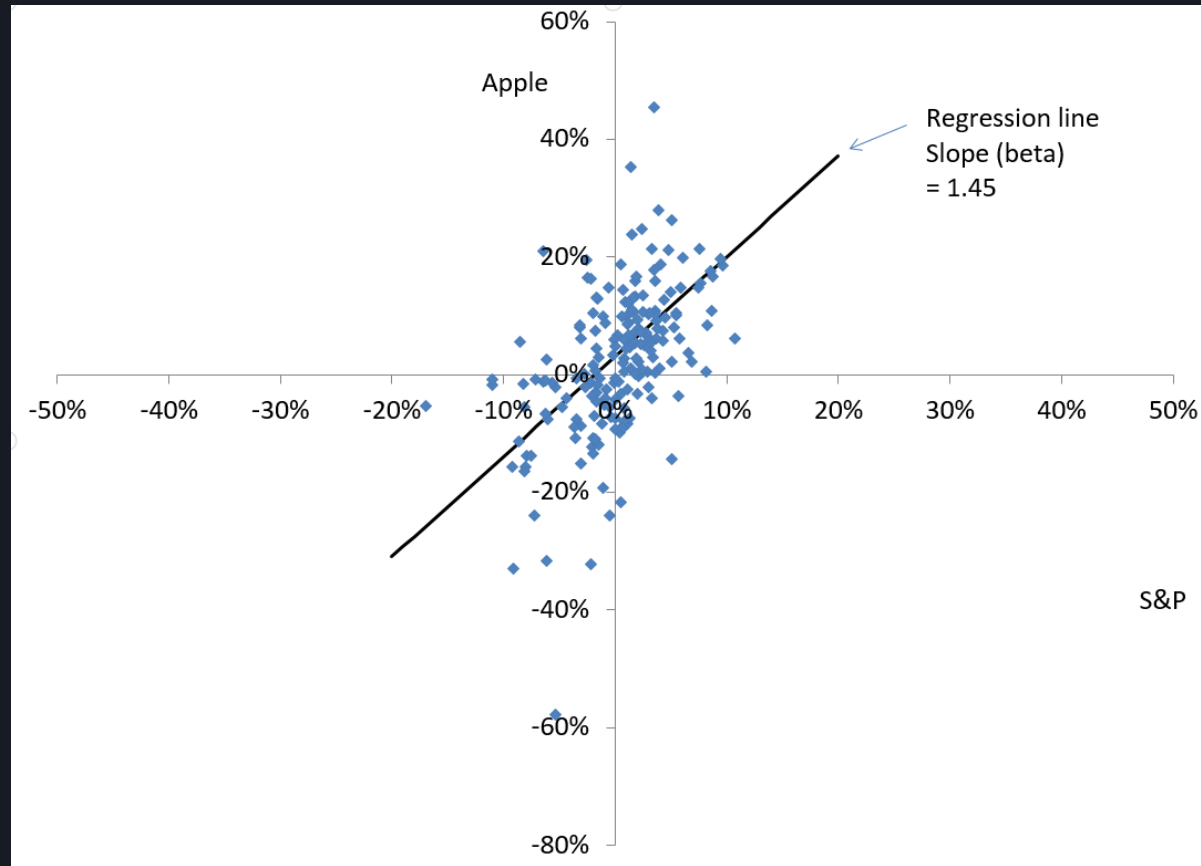
Beta

- The CAPM implies that the expected return on the ith asset is determined from its beta

- Beta (β_i) is the regression slope coefficient when the return on the ith asset is regressed on the return on the market

Investment Companies as Providers of Diversification

- Investment trusts (before 1940s)
- Mutual funds (especially index funds)
- Closed end investment companies
- Unit investment trusts
  - All these institutions can enable small investors to overcome transactions cost and lumpiness problems in achieving diversified portfolios

Doubts about Diversification

- Complete diversification would imply holding much in fixed incomes, real estate, etc. But hasn't stock market outperformed these?

The (in a Sense Fallacious) Risk/Return Pyramid
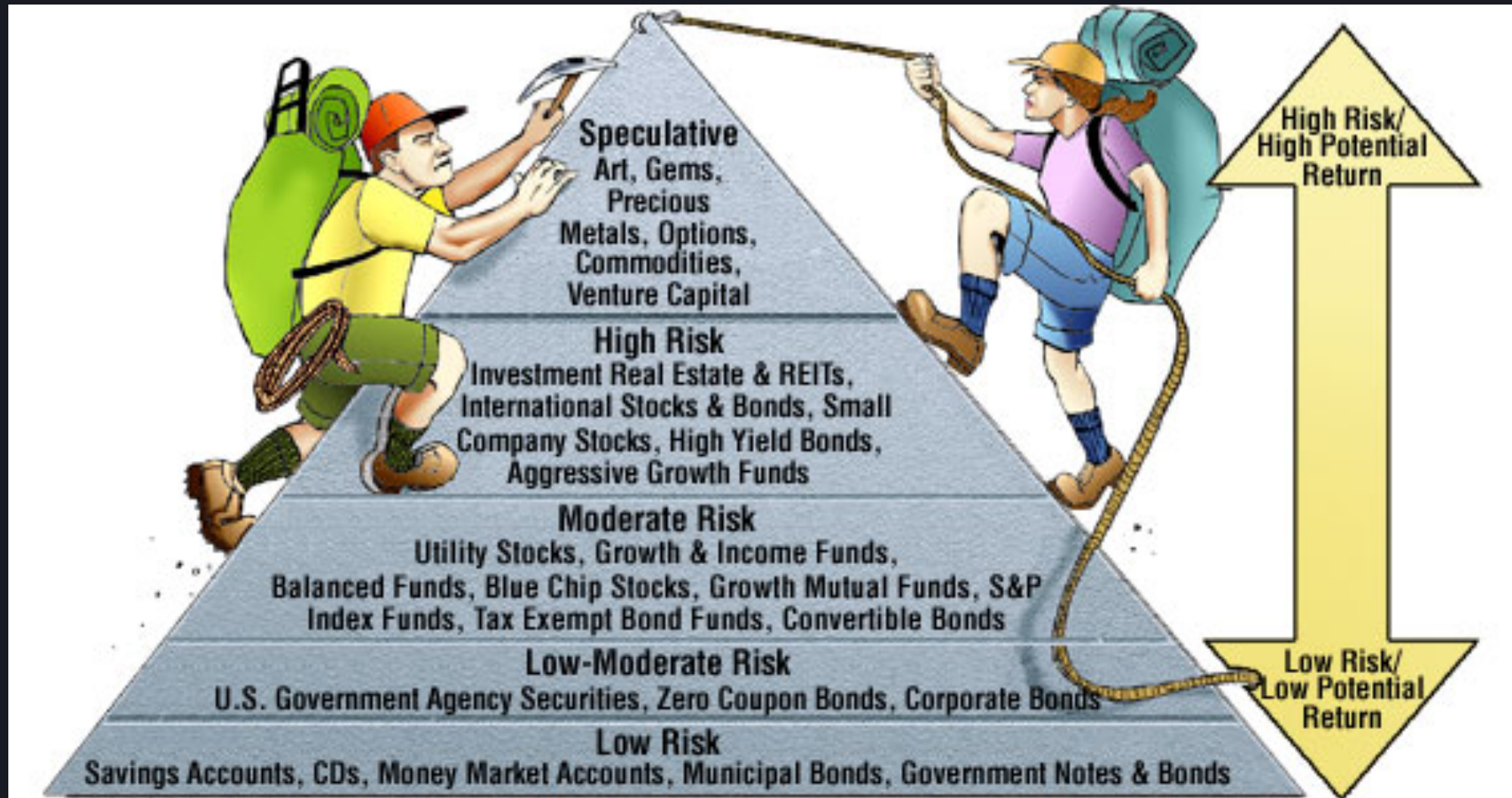
Equity Premium Puzzle

- US Geometric average real stock market return 1802-2012: 6.6% (Siegel *Stocks for the Long Run* 5th Edition 2014 Figure 1-1)

- US Geometric average real short-term governments return 1802-2012: 2.7% (Siegel Figure 1-1)

- Equity premium = 6.6%-2.7%=3.9%

- Puzzle: Why has equity premium been so high?

International Evidence

- Median real stock market appreciation rate for 39 countries 1926-96: 0.8% per year
- Real stock market appreciation rate for US 1926-96: 4.3% per year (Philippe Jorion and William Goetzmann, *Journal of Finance* 54:953-80, 1999.)
- So, US equity premium may reflect a selection bias

Short Sales

- Brokers can enable you to hold a negative quantity of a tradable asset: they borrow the security and sell it, escrow the proceeds, you receive the proceeds, owe the security
- Short sales in the United States were briefly abolished in September 2008 For a list of 799 stocks https://www.sec.gov/news/press/2008/2008-211.htm

Yale's Portfolio Moves Toward Risk-Return Efficiency
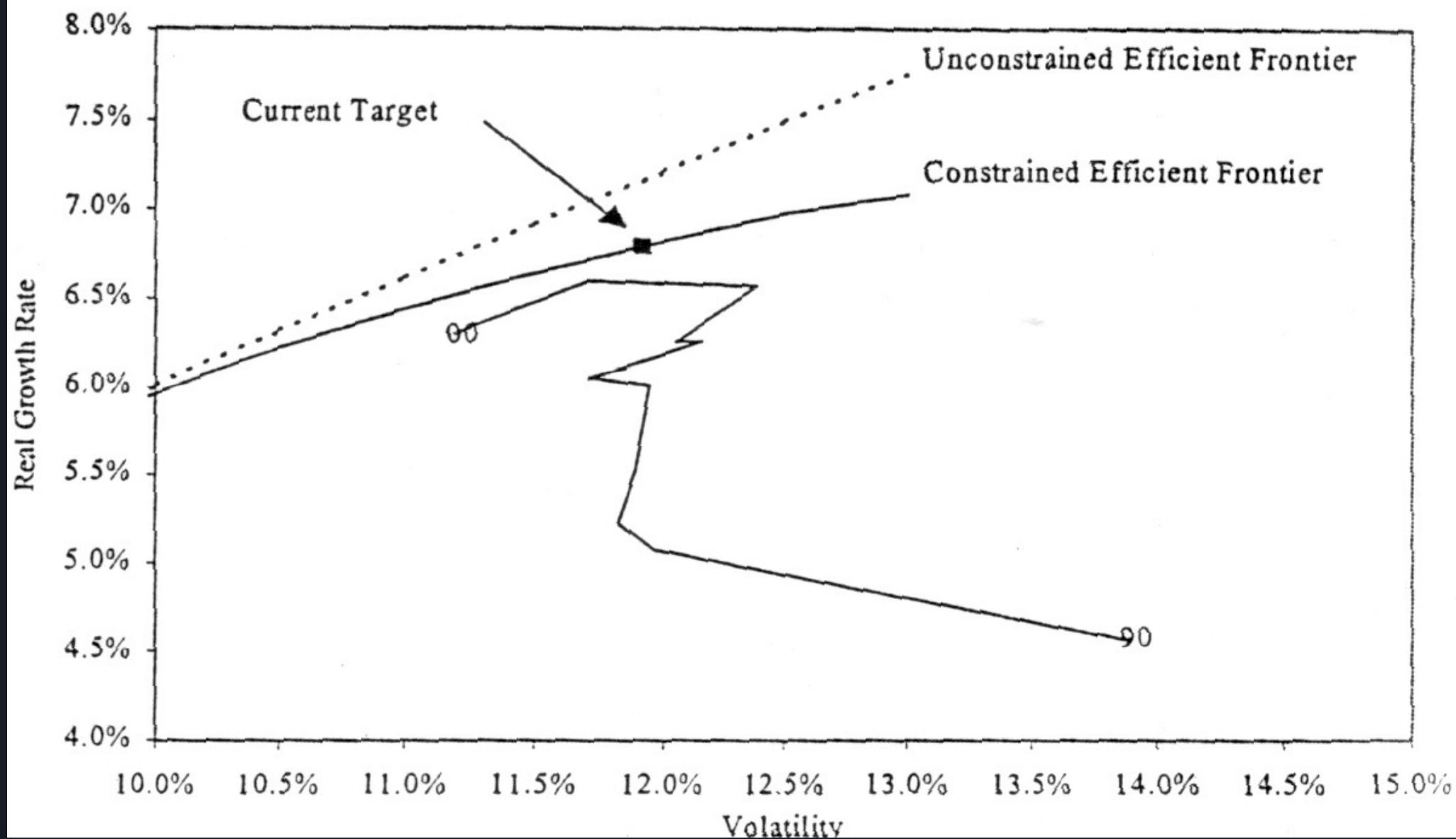
A Portfolio of a Risky and Riskless Asset

PORTFOLIO

RISKY ASSET	RISKLESS ASSET
x dollars	1-x dollars
return r_1	return r_f

PORTFOLIO EXPECTED VALUE $\qquad r = xr_1 + (1-x)r_f$

PORTFOLIO VARIANCE $\qquad x^2 \, \mathrm{var}(return_1)$

PORTFOLIO STANDARD DEVIATION $\qquad \sigma = \left| \dfrac{r - r_f}{r_1 - r_f} \right| \sigma(return_1)$
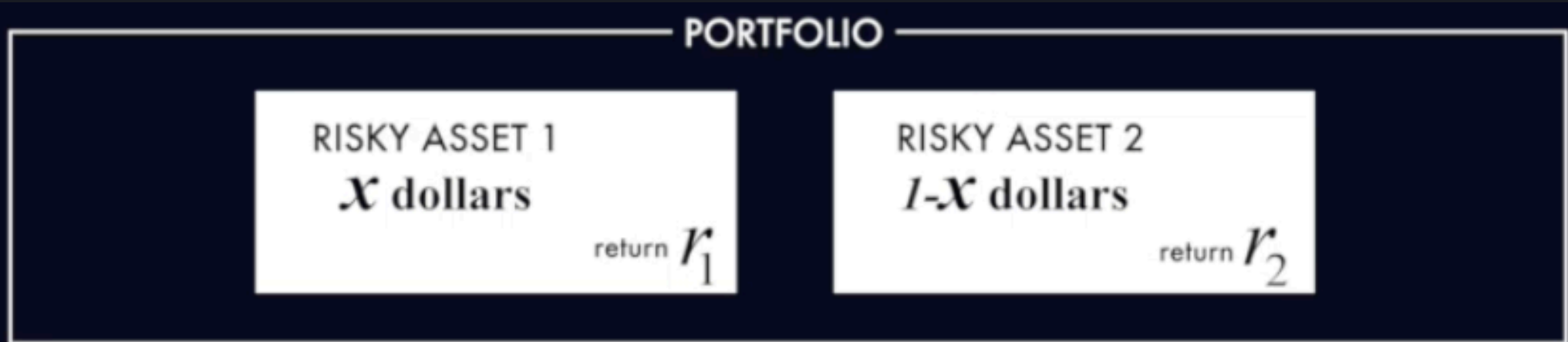
A Portfolio of 2 Risky Assets
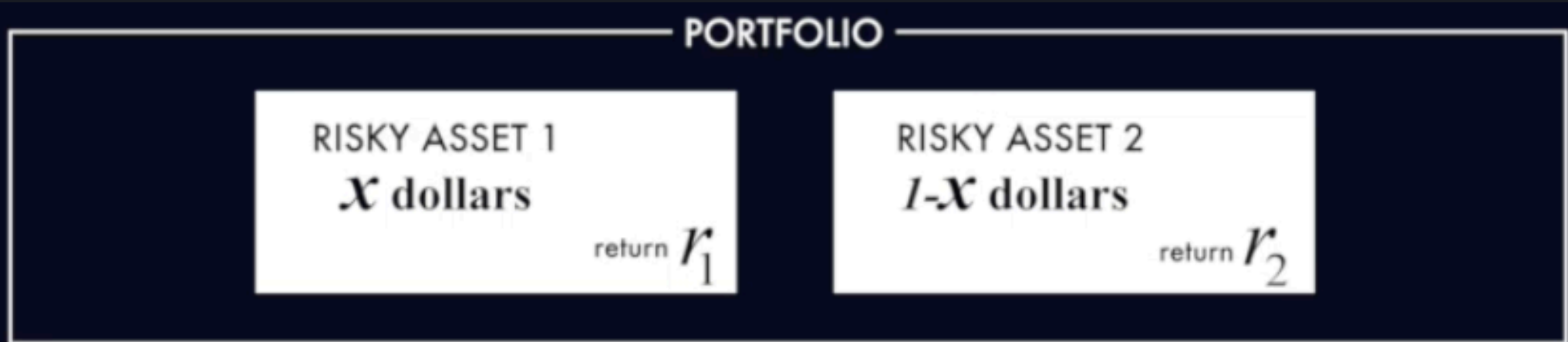
PORTFOLIO

RISKY ASSET 1
X dollars

return r_1

RISKY ASSET 2
1-X dollars

return r_2

PORTFOLIO EXPECTED VALUE

$$r = x_1 r_1 + (1-x_1)r_2$$

PORTFOLIO VARIANCE

$$x_1^2 \operatorname{var}(return_1) + (1-x_1)^2 \operatorname{var}(return_2) + 2x_1(1-x_1)\operatorname{cov}(return_1, return_2)$$

A Portfolio of 2 Risky Assets

PORTFOLIO

RISKY ASSET 1

X dollars

return r_1

RISKY ASSET 2

$1-X$ dollars

return r_2

PORTFOLIO EXPECTED VALUE

$$r = x_1 r_1 + (1-x_1)r_2$$

PORTFOLIO VARIANCE

$$x_1^2 \operatorname{var}(return_1) + (1-x_1)^2 \operatorname{var}(return_2) + 2x_1(1-x_1)\operatorname{cov}(return_1, return_2)$$

Efficient Portfolio Frontier Stocks and Bonds

Expected Annual Return (y-axis: 8% to 16%)
Standard Deviation of Annual Return (x-axis: 5% to 20%)

- 100% Stocks
- 50% Stocks, 50% Bonds
- 25% Stocks, 75% Bonds
- 100% Bonds
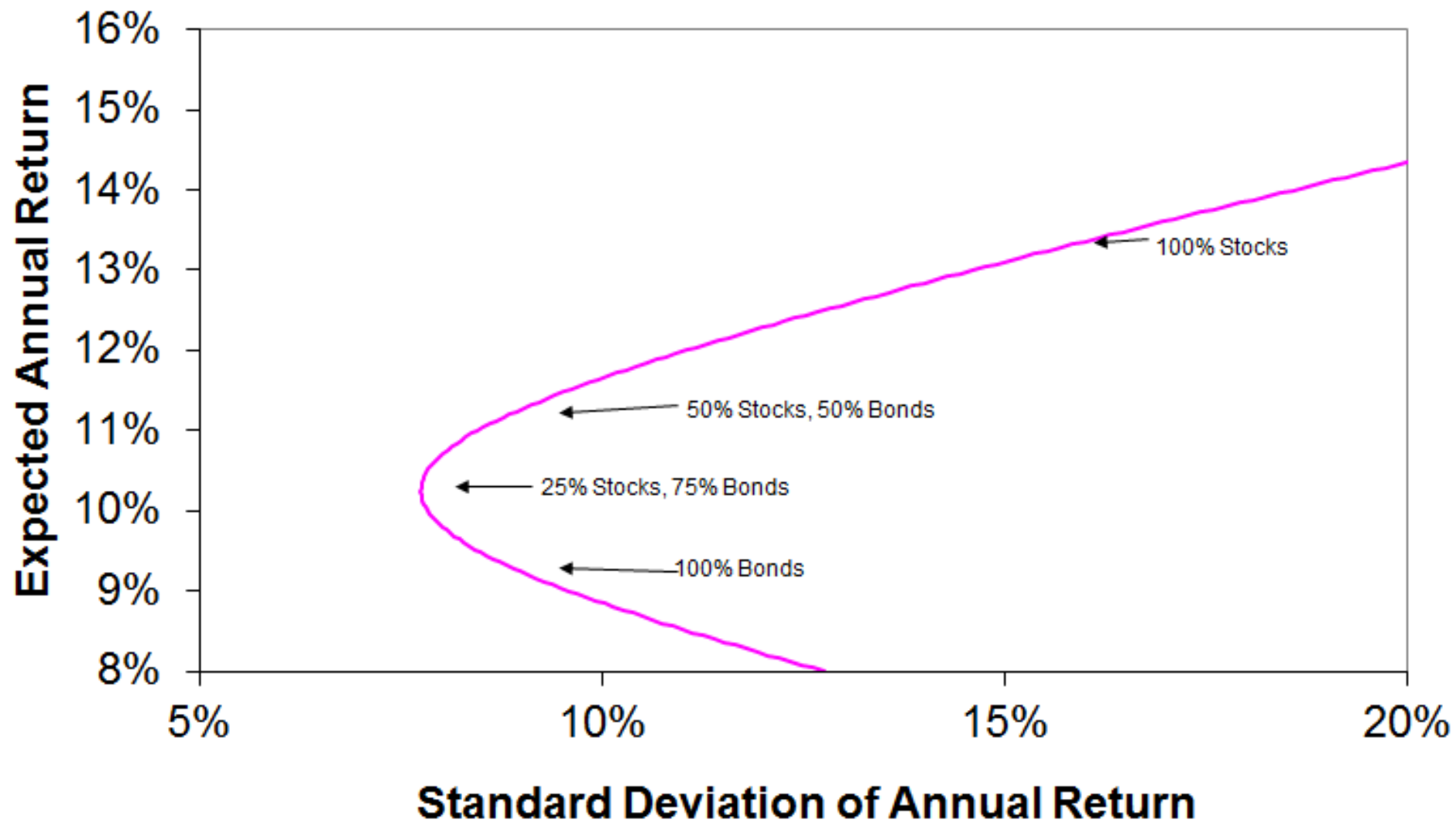
Efficient Portfolio Frontier With and Without Oil