
The Financial Facts of Life

In this part (consisting of three chapters), we maintain the assumptions of the previous chapter:

- We assume perfect markets, so we assume four market features:
 1. No differences in opinion.
 2. No taxes.
 3. No transaction costs.
 4. No big sellers/buyers—we have infinitely many clones that can buy or sell.
- We already allow for unequal rates of returns in each period.
- We already allow for uncertainty. So, we do *not* know in advance what the rates of return on every project are.
- **But we no longer assume risk-neutrality. We will henceforth also allow for risk aversion.**

The intent of this part of the course is to summarize the basics of an investments course within the context of our corporate finance course. We only have a few lectures available, in which we will have to cover a great deal of material:

1. Basic historical return patterns.
2. What risk aversion does.
3. How to measure risk and reward.
4. The CAPM formula and its inputs. How to use it.

The most important part for our corporate finance perspective is the $\mathcal{E}(\tilde{r})$ in the NPV formula. Of course, to become a real financier, you really should take a full investments course, and not just live with this summary. However, even if you have already taken an investments course, seeing the material here again could still be a useful reminder for you.

Asset Classes

Asset classes are convenient portfolios that try to represent a swath of investment types—though inaccurately so. Examples are:

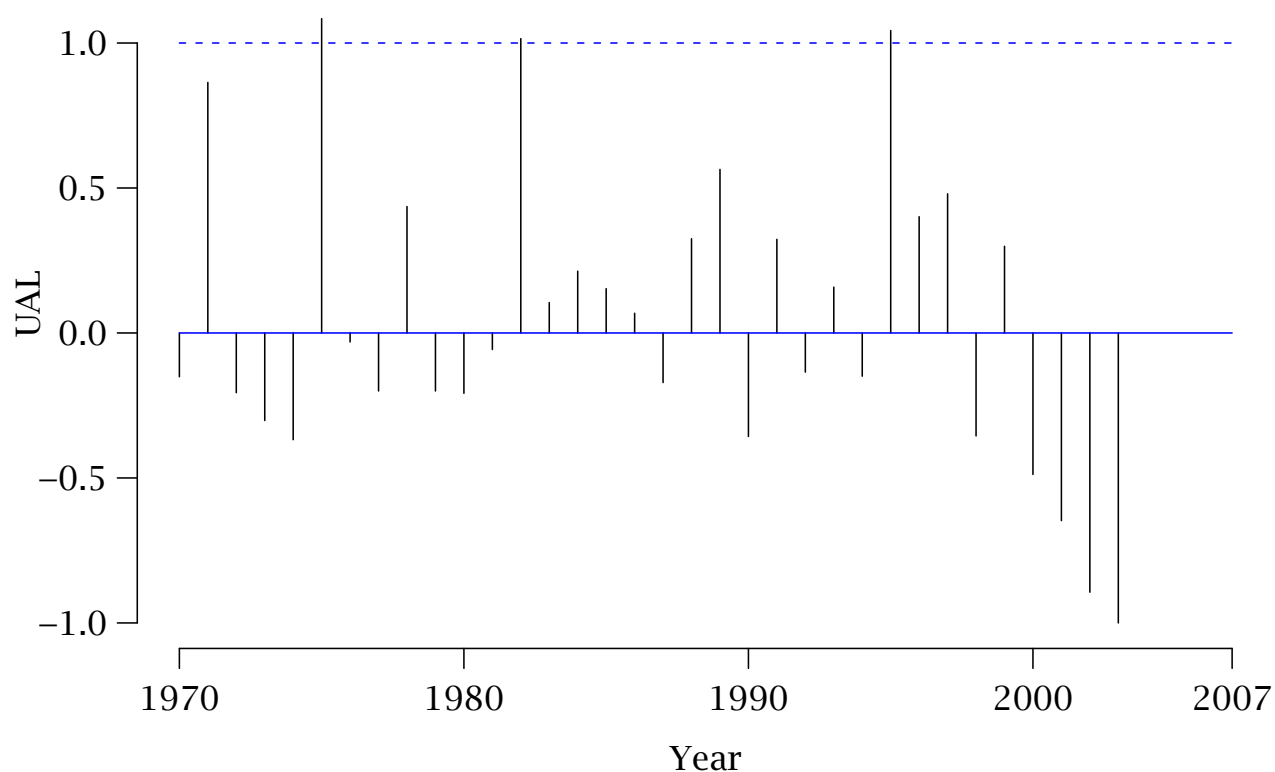
- Stocks
 - Large-firm stocks
- Bonds
 - Long-term bonds
 - Risky bonds
- Cash
- Foreign Stocks
- Foreign Bonds
- Real Estate
- Art
- Commodities
 - Precious Metals
 - Agricultural

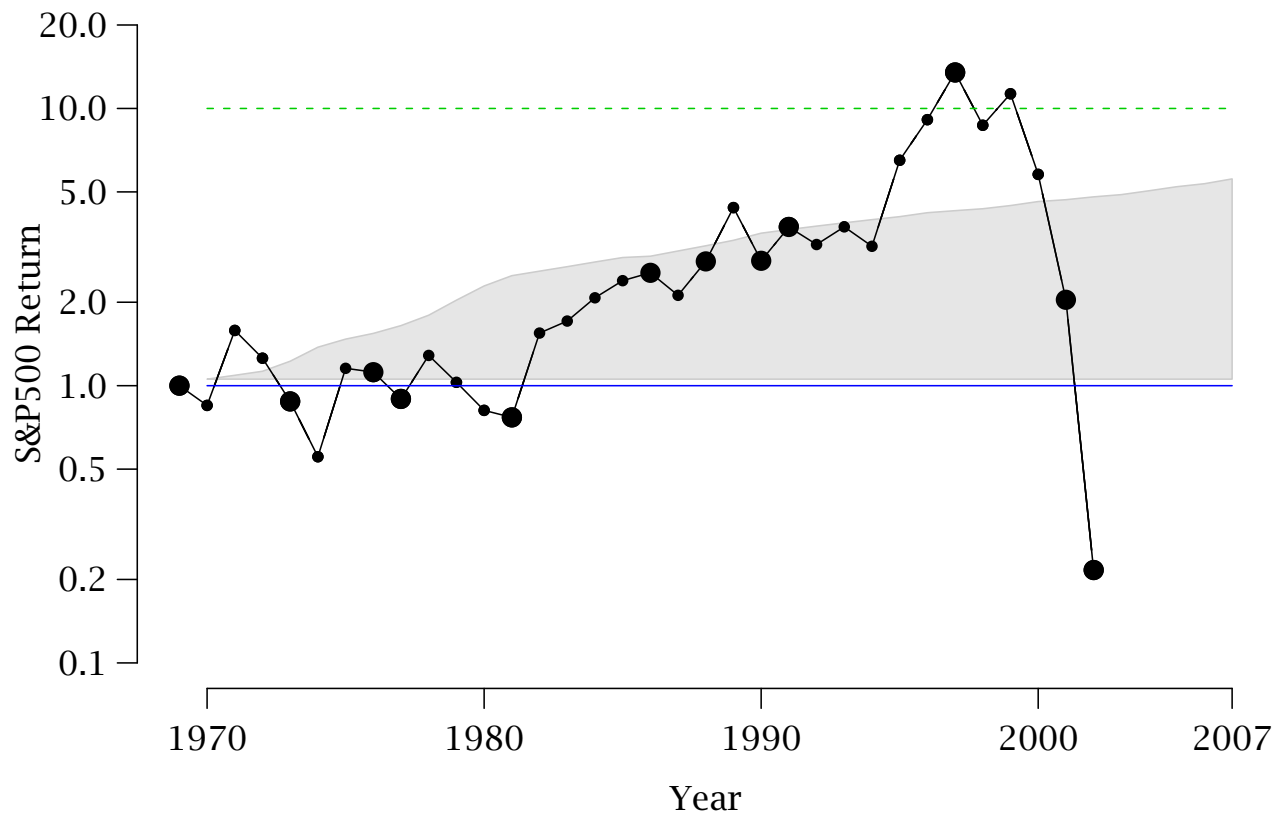
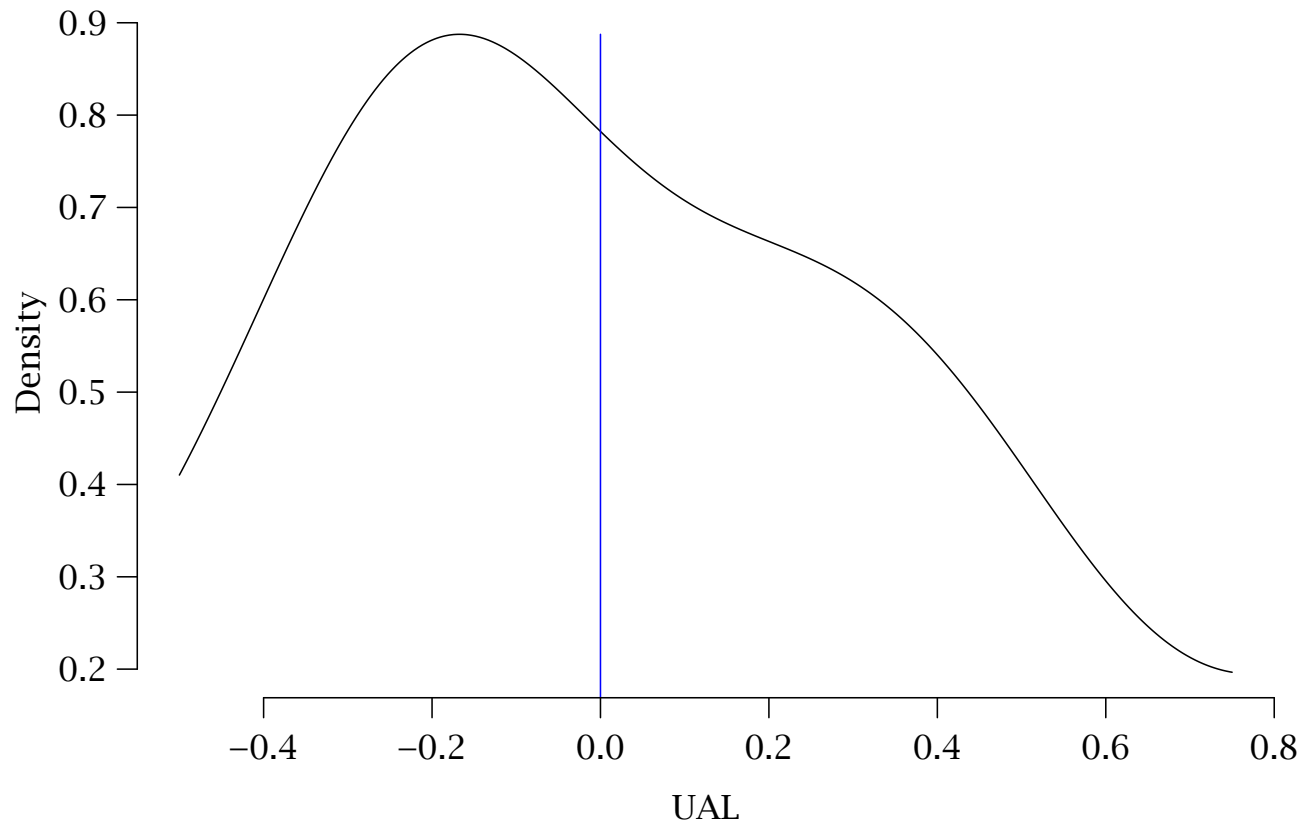
Graphical Representations of Historical Returns

7-1A

(Book does this illustration for the S&P500 stock market index.)

1970	-15.10%	1980	-20.80%	1990	-35.70%	2000	-48.80%
1971	86.40%	1981	-5.70%	1991	32.30%	2001	-64.70%
1972	-20.60%	1982	101.50%	1992	-13.50%	2002	-89.40%
1973	-30.20%	1983	10.50%	1993	15.80%	2003	-100.00%
1974	-36.80%	1984	21.30%	1994	-14.90%	2004	-
1975	108.40%	1985	15.30%	1995	104.30%		
1976	-3.10%	1986	6.80%	1996	40.10%	Average	+4.7%
1977	-20.00%	1987	-17.10%	1997	48.00%	Std Dev	± 50.7%
1978	43.60%	1988	32.50%	1998	-35.50%		
1979	-20.00%	1989	56.40%	1999	29.90%		





Arithmetic Rates of Returns

7-1B

Q1: PS: Is the average rate of return on an investment a good representation of the long-run rate of return that a buy-and-hold investor receives?

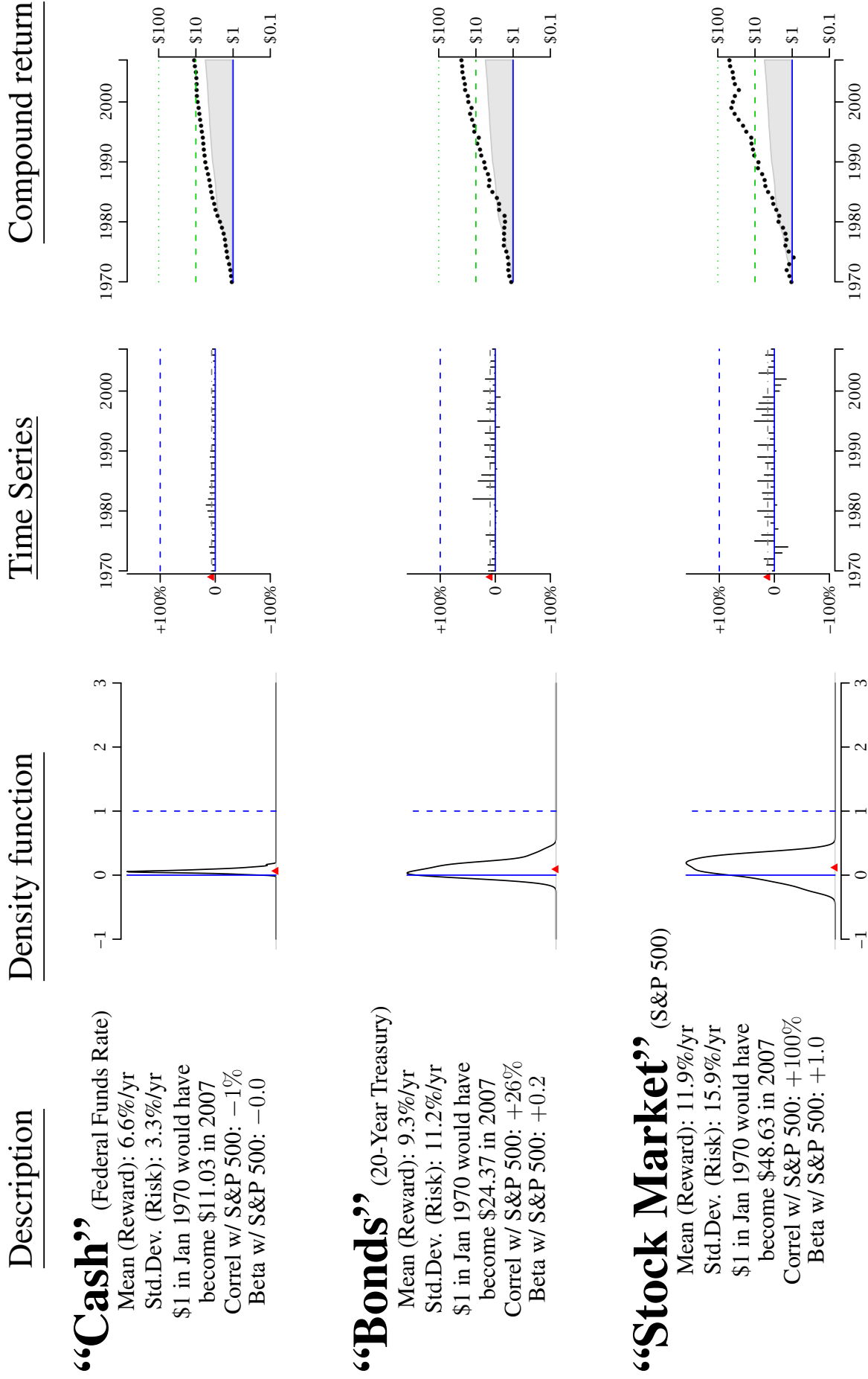
Q2: Compare two assets, A and B. They had equal average rates of return. However, A had a higher standard deviation than B. You are not risk-averse. Which investment would have earned you more money?

Comparing Investments By Themselves

7-1B

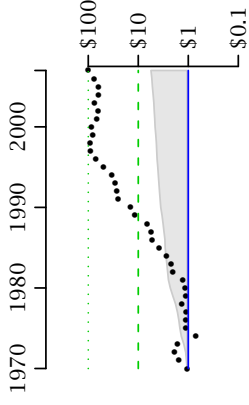
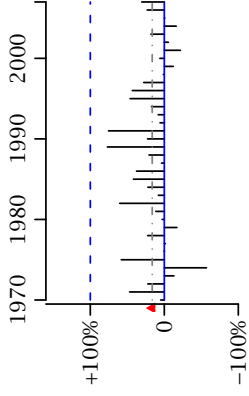
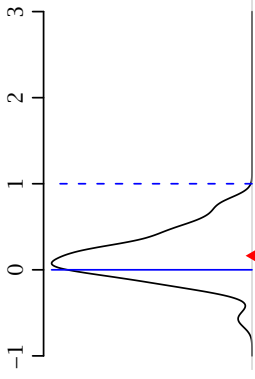
We now use coordinate systems of the same dimension to compare investments.

Figure 1: Comparative Investment Performance, 1970–2007



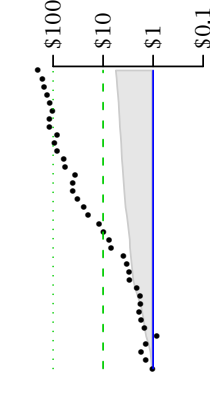
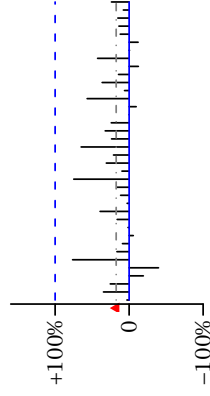
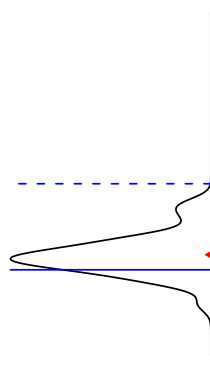
CocaCola (KO)

Mean (Reward): 16.3%/yr
Std.Dev. (Risk): 27.6%/yr
\$1 in Jan 1970 would have become \$99.97 in 2007
Correl w/ S&P 500: +62%
Beta w/ S&P 500: +1.1



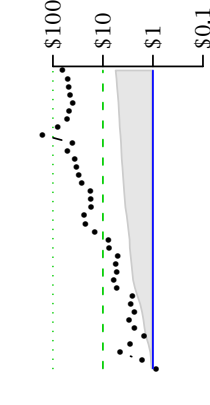
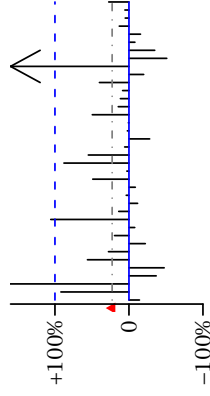
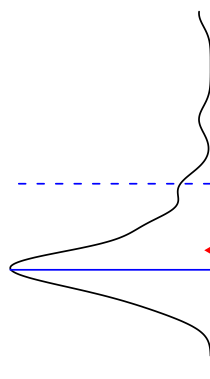
PepsiCo (PEP)

Mean (Reward): 17.5%/yr
Std.Dev. (Risk): 24.6%/yr
\$1 in Jan 1970 would have become \$202.05 in 2007
Correl w/ S&P 500: +57%
Beta w/ S&P 500: +0.9



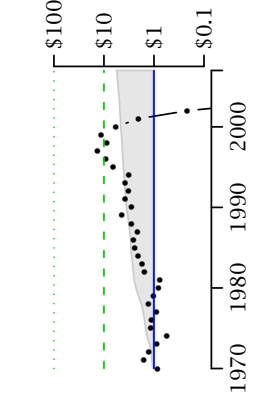
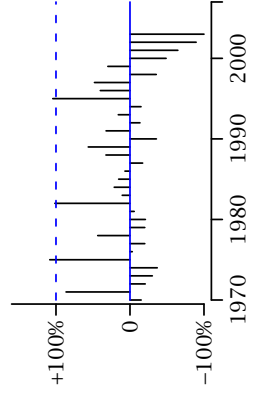
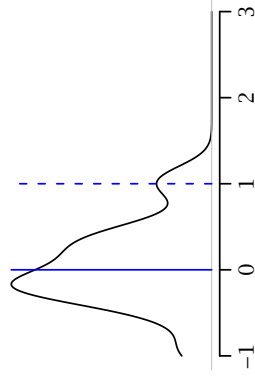
Sony (SNE)

Mean (Reward): 22.7%/yr
Std.Dev. (Risk): 64.2%/yr
\$1 in Jan 1970 would have become \$64.15 in 2007
Correl w/ S&P 500: +36%
Beta w/ S&P 500: +1.5



United (UAL)

Mean (Reward): 4.7%/yr
Std.Dev. (Risk): 50.7%/yr
\$1 in Jan 1970 would have become \$0.00 in 2007
Correl w/ S&P 500: +56%
Beta w/ S&P 500: +1.7



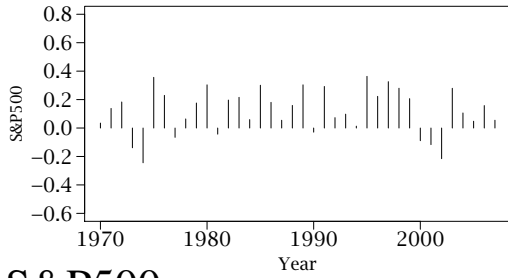
Description

Density function

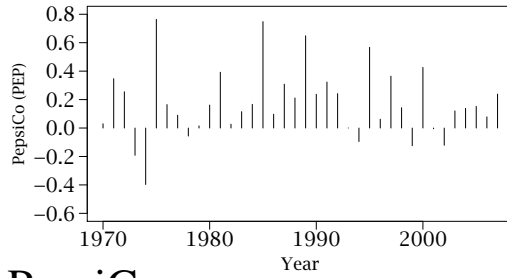
Time series

Compound return

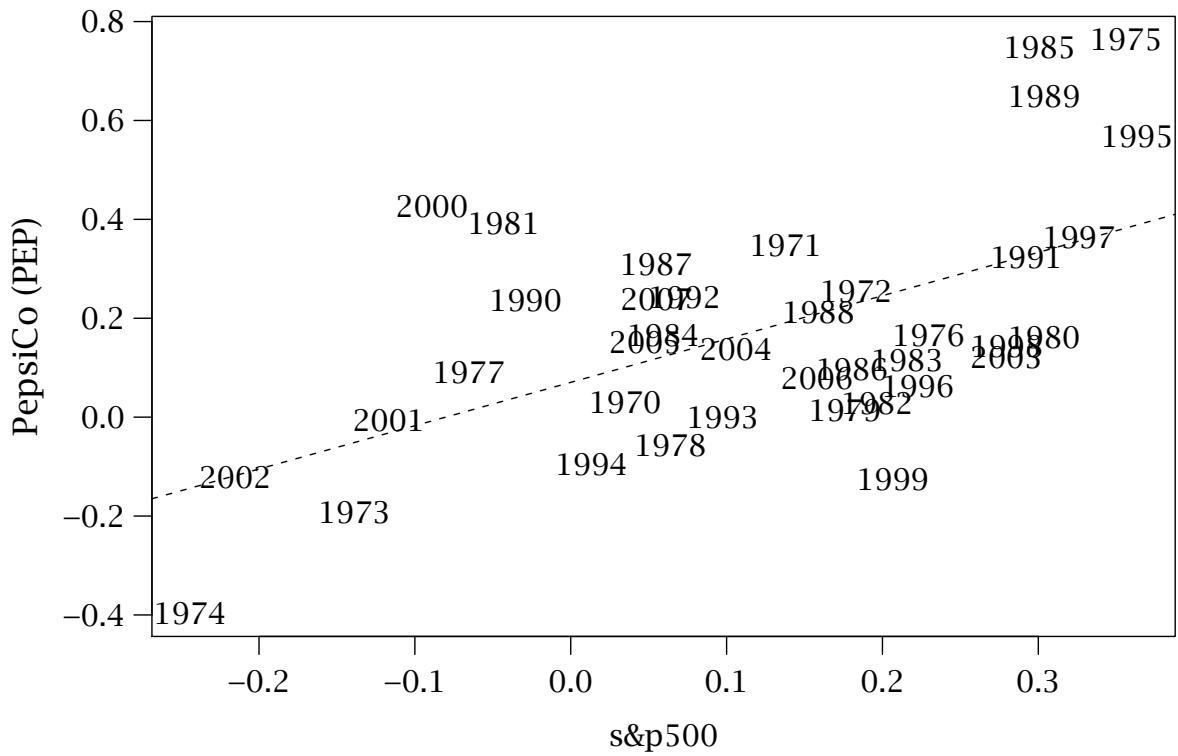
Correlation



S&P500



PepsiCo



Patterns

7-1D

- **Q3:** Which asset classes offered higher average rates of returns?
- **Q4:** Which asset classes (and stocks) were riskier?
- **Q5:** Could you have lost your shirt?
- **Q6:** Is there a risk-return relationship?
- **Q7:** Do assets with a positive average rate of return always make you money?
- **Q8:** Do stocks move together? Intuitively, can we exploit non-synchronicity?
- **Q9:** Is there anything special to multiple-stock investments?
- **Q10:** Can we trust history

History vs. Future — AGAIN

7-1E

- Finance has one huge advantage relative to other fields of economics—we have data!
- Statisticians often pretend historical distribution (means, standard deviations, betas, etc.) are representative of the future distribution. That is, one should not pretend that we can judge a powerball gamble's outcome by how it did last week, but that we can judge a powerball risk and reward by how it did over the last many thousands of weeks.

[if we know the physics of ball drawing, we don't even need any history. we can then work out the expected risk and expected reward mathematically. alas, we do *not* know the underlying physics of financial investments, so we work with historical data.]

- Historical data is very helpful—but it can also mislead if it is not used carefully.
- Correlations and variances are more “stable” (“reliable”) than average rates of returns.

Market Institutions

7-2

- Brokers: Retail B vs. Prime B. (Execution and Margin.)
- Market vs. Limit orders.
- Various modifications: Fill-or-kill, Good for the day, etc.
- Exchanges and non-Exchanges. In-person or computerized, batched auction or continuous, electronic crossing. OTC. (Pink sheets.)
- Regulation: Congress, SEC, Exchanges(?!).
- Seeing the order book is huge advantage. ☛ 
- Mutual Funds (more funds than stocks today!)
- Open-end vs. closed-end distinction.
- Investment companies under the 1940 Act: UITs, open-end=mutual fund in the US, closed-end.
- Many other investment vehicles, e.g., hedge funds, private equity funds, venture capital funds, ADRs, trust funds, etc. 
- ☛
- Entry of corporate securities into the financial markets: IPOs, underwriters, reverse mergers, SEOs.
- Exit of corporate funds from the financial markets: Dividends, repurchases, delisting, limited liability, financial distress.

The Egg Approach to Investing

7-NA

The insights of investments apply to business products, just as they apply to financial investments.

Your problem: Choose a portfolio of products. Some products have higher likelihood of selling, others have lower likelihood of selling. For your customers, products have a fashion aspect—some types will be highly desirable, others less so. They can be imperfect substitutes for one another. (perfect markets: there are a large number of sellers and buyers.)

Basket:

- **Q11:** What do you care about?

- **Q12:** Should you purchase just the most likely product seller?

- **Q13:** Should you go out of the business entirely?

- **Q14:** Should you purchase a mix of different products?

Risk Contribution and Appropriate Reward

7-NA

Risk Contribution:

- Consider a completely different type of product, which is very risky in itself. That is, you do not think it will sell.

Q15: If you have purchased just the most likely product seller, what is your risk of having one completely different product in your basket?

Equilibrium:

- **Q16:** How much would you be willing to pay for the completely different type of product on the margin?

The CAPM is a model that tells us how risk and reward are related to
[1] how individual products are expected to perform, and
[2] how individual products are different from others.

Homework Assignment

1. Reread Chapter 7.
2. Read Chapter 8.
3. Hand in all Chapter 7 end-of-chapter problems, due in 7 days.

