Anomalies: The Equity Premium Puzzle

SIEGEL AND THALER (1997)

Anomaly (Again)

[Siegel&Thaler] An empirical result qualifies as an ***anomaly*** if it is difficult to "rationalize" or if implausible assumptions are necessary to explain it within the paradigm.

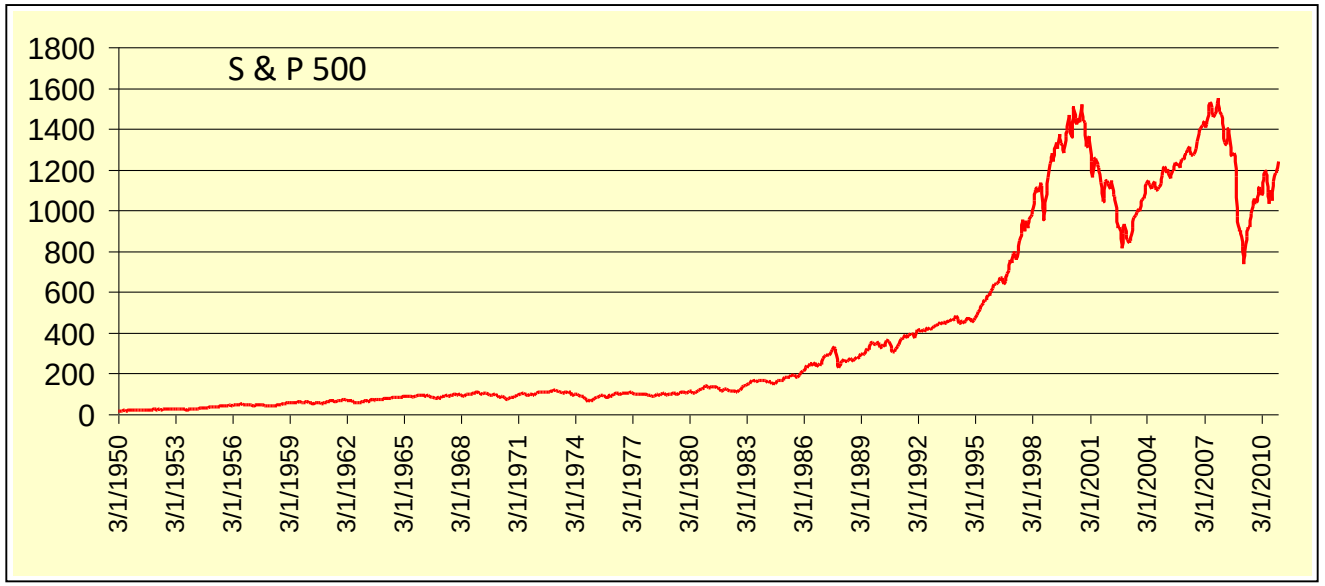
[A&D] ***Anomalies*** are empirical results that appear, until adequately explained, to run counter to market efficiency.

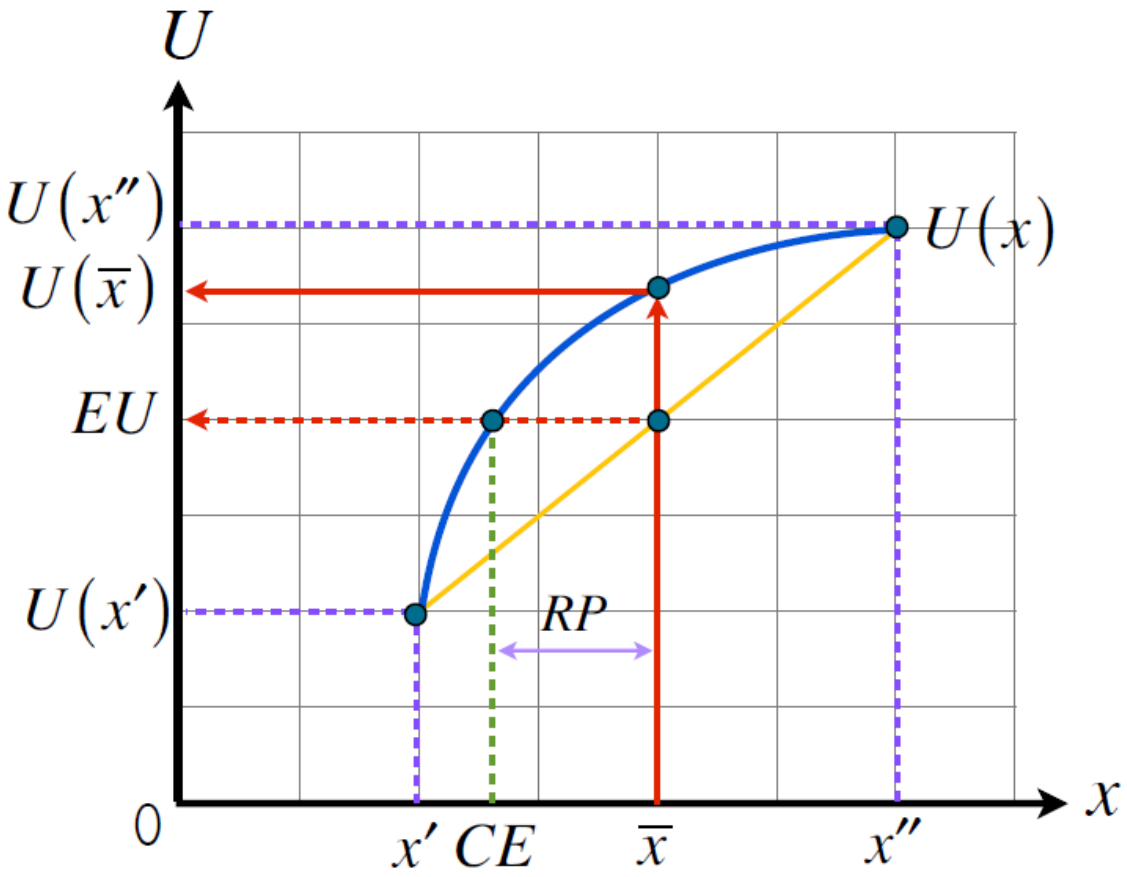
[A&D] Since all tests of market efficiency require the use of an asset pricing model, efficiency tests are by their nature joint hypothesis tests (market efficiency and a risk-adjustment technique). Rejection implies either inefficiency or an inappropriate risk-adjustment method (or perhaps both).

Introduction

$1,000 in 1925 would become

- $12,720 at the end of 1995 with Treasury bills
- $842,000 at the end of 1995 with a (value-weighted) portfolio of stocks





Previously we have known that …

- Economists deal with risk using Expected Utility Theory. A person uses expected utility to choose among various prospects.
- For a Bernoulli utility function $u(x) = \frac{x^{1-A}}{1-A}$, the parameter A represents the coefficient of relative risk aversion.
- If A increases,
  - The function will be more curved
  - The person becomes more risk-averse
  - For a given prospect, certainty equivalent will be smaller
  - For a given prospect, risk premium will be larger.

The Puzzle

The difference in returns, 3.7 percent vs. 10.1 percent, is strikingly large.

Mehra and Prescott (1985) obtained the value of *A* to be between 30 – 40, which they concluded was much too high

A Note:

There are 3 factors involved in the Expected Utility Theory

- equity premium
- risk
- paremeter *A*

Changing one factor causes changes in the others from the theory.

Given the premium and risk from actual data, one can only change the value of parameter *A* to make them fit with the Expected Utility Theory.

The Puzzle

With *A* at 30,

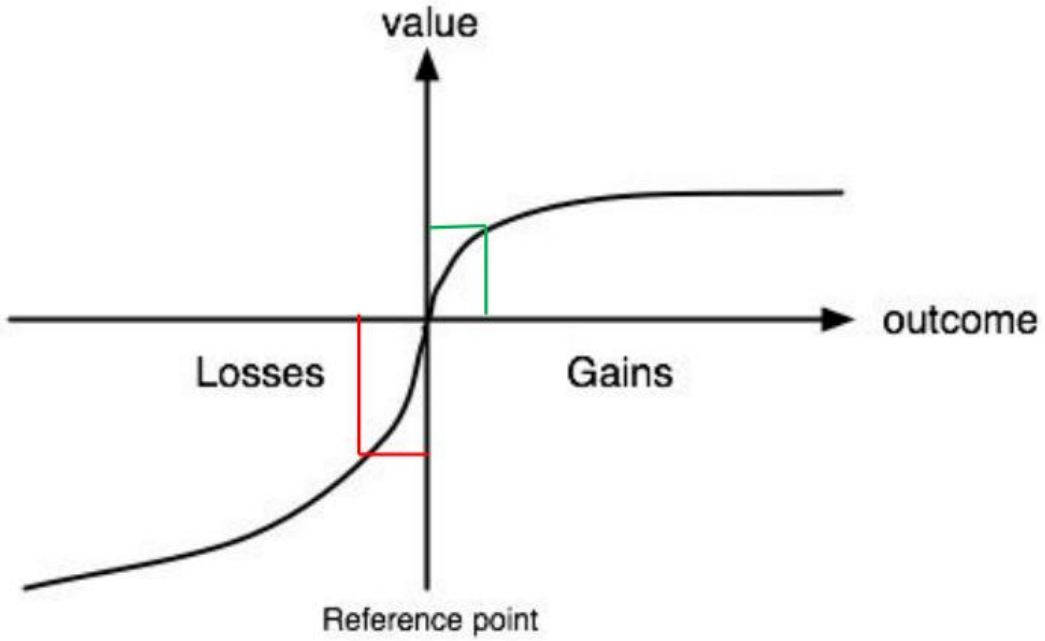
- Suppose you own $100
- If you face a gamble with
  - 50% chance to make your wealth becomes $200 (+$100)
  - and 50% to make your wealth becomes $50 (-$50)
- You would be willing to pay $49 to avoid this gamble
- This means you prefer $51 with certainty than the gamble, which seems absurd.

See our excel file from Lecture 7 again!

To Solve the Puzzle …

There are two broad approaches to explaining the equity premium puzzle

- First, empirical approach
- Second, theoretical approach



Theoretical Explanations

Myopic Loss Aversion

- Benartzi and Thaler (1995): All investors are assumed to get utility from the *changes* in the value of their portfolios
- Moreover, investors are “loss aversion” – Losses are assumed to hurt significantly more than gains yield pleasure
- With these, people just avoid investing in assets with fluctuating returns (or prices), which help keep the premium of the stocks persistently high for a long period of time

Theoretical Explanations

Myopic Loss Aversion

- People can avoid net hurt from assets with fluctuating returns by ***not*** evaluating their investment frequently
- The evaluation period that makes stocks and bonds equally attractive is about 13 months
- Implication: If people did concentrate on long-term results, they would invest more in stocks

Commentary (1)

Is equity premium a puzzle?

Eugene Fama (1991):

- "… a large equity premium is not necessarily a puzzle; high risk aversion may be a fact. Roughly speaking, a large equity premium says that consumers are extremely averse to small negative consumption shocks. This is in line with the perception that consumers live in morbid fear of recessions, even though, at least in the post war period, recessions are associated with small changes in consumption."

Consumers and investors may make mistakes. If you think that the equity premium is partially derived from other people's mistakes and fears, then you might find equities very attractive

Note: Past returns are no guarantee of future returns

Overconfident Investors, Predictable Returns, and Excessive Trading

DANIEL AND HIRSHLEIFER (2015)

Overconfidence

[Daniel&Hirshleifer] ***Overconfidence*** means having mistaken valuations and believing in them too strongly.

Related observations include

- ***Illusion of control*** describes the tendency for people to behave as if they might have some control when in fact they have none.
- The ***planning fallacy*** describes the tendency for people to overestimate their rate of work or to underestimate how long it will take them to get things done.
- The ***better-than-average*** effect: Svenson's (1981) found that 93% of American drivers rate themselves as better than the median.
- ***Comparative optimism***: Some researchers have claimed that people think good things are more likely to happen to them than to others, whereas bad events were less likely to happen to them than to others.

Source: https://en.wikipedia.org/wiki/Overconfidence_effect

Evidence on Trading Patterns and Return Predictability

The notion of market efficiency is based on the idea that when investors in frictionless asset markets compete with one another, securities will be priced to fully reflect all publicly available information.

However, …

1) In a frictionless market, one can show that rational individuals should not agree to disagree.

- If we start with the same prior beliefs, yet we disagree, this suggests that at least one party has information that the other party should be taking more fully into account.
- The fact that another investor is willing to take the opposite side of my trade should suggest to me that this investor knows something I do not know.
- For this reason, after a single round of trading, everyone should hold the market portfolio. Investors should not bet against each other, each expecting to beat the counterparties.

2) Moreover, in an efficient market, a trading strategy based on existing information cannot be used to earn abnormal profits. However, it is now a well-accepted empirical finding that asset markets do display strong patterns of return predictability.

Excessive Trading

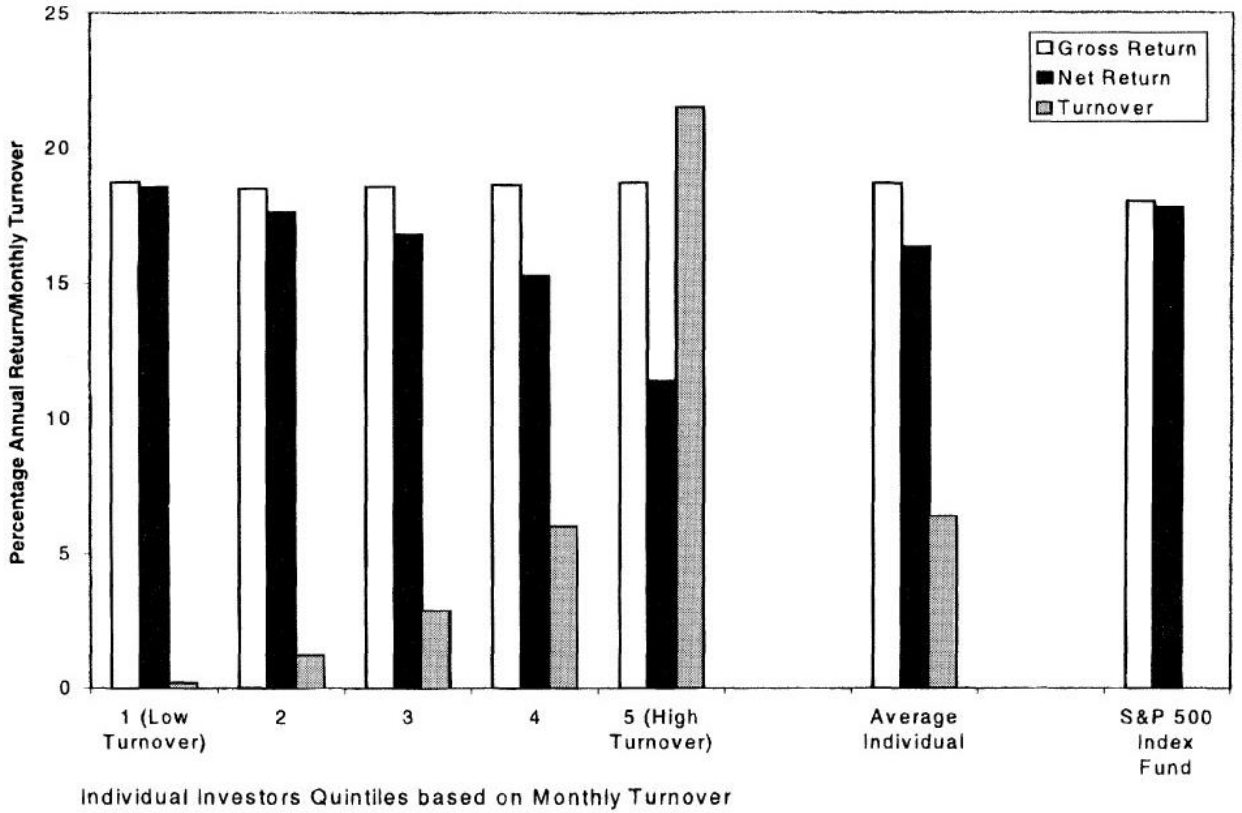
A financial trade requires that two parties agree to disagree in the sense that at a given price one party believes it is a good idea to see the asset while the other party believes it is a good idea to buy it.

Of course, there are possible reasons to trade other than disagreement, such as liquidity motives or to rebalance portfolio, but such motives for trade are relatively limited, and do not seem to explain the magnitudes of trade, or the willingness of investors to incur the large transaction costs to make such trades.

The excessive trading of individual investors can be called the ***active investing puzzle***. Individual investors trade individual stocks actively, and on average lose money by doing so.

Barber and Odean (2000) find from a sample of 78,000 clients of a large discount brokerage firm from 1991 – 1996. The results are in the following figure.

Figure 1: **Monthly Turnover and Annual Return of Individual Investors**



Source: Barber and Odean (2000), Figure 1. The white bar (black bar) represents the gross (net) annualized geometric mean return for February 1991 through January 1997 for individual investor quintiles based on monthly turnover (grey bar). The net return on the S&P 500 Fund is that earned by the Vanguard Index 500.

Excessive Trading

A range of evidence from a wide variety of sources suggests that overconfidence provides a natural explanation for the active investing puzzle.

Overconfidence causes investors to trade more aggressively even in the face of transaction costs or adverse expected payoffs.

Individual investors tend to trade more after they experience high stock returns.

Overconfidence and excessive trading does not disappear as investors who have experienced high returns attribute this to their skill and become more overconfident, while investors who experience low returns attribute it to bad luck rather than experiencing an offsetting fall in their overconfidence level.

Return Predictability

It is possible to generate an abnormal returns by anomaly portfolios.

1. “Small Minus Big (SMB)” portfolio captures the small firm effect.
2. “High Minus Low (HML)” portfolio captures the excess returns of stocks with high book-to-market ratios.
3. “Up Minus Down (UMD)” portfolio captures the price momentum.
4. “ISsUance (ISU)” portfolio longs firms that repurchased stock, shorts firms that issued new equity.
5. “ACcRual (ACR)” portfolio longs firms with lowest ratio of accruals to earnings, shorts firms with highest accruals to earnings.
6. “Betting-Against-Beta (BAB)” portfolio longs firms with low betas, shorts firms with high betas.
7. “Idiosyncratic-VOLatility (IVOL)” portfolio longs firms with the lowest idiosyncratic volatility of daily returns, shorts the highest idiosyncratic volatility stocks.

Table 1

Anomaly-based Strategy Sharpe Ratios

Portfolio weights (%)								*Sharpe ratio*
Mkt-Rf	*SMB*	*HML*	*UMD*	*ISU*	*ACR*	*BAB*	*IVOL*	
100.0	—	—	—	—	—	—	—	0.39
34.9	18.7	46.4	—	—	—	—	—	0.76
25.8	10.5	33.0	30.7	—	—	—	—	1.07
8.0	4.5	33.9	17.7	26.8	9.1	—	—	1.37
7.7	12.4	13.8	4.5	18.0	10.2	9.5	24.0	1.78

Notes: This table presents the realized optimal strategy Sharpe ratios from 1963:07 to 2014:05 for a set of long-short portfolios based on a set of anomalies taken from the finance literature: Market-minus-Riskfree (Mkt-Rf) is the market index portfolio from Fama and French (1993); "Small Minus Big" (SMB) and "High Minus Low" (HML) are two other Fama and French (1993) portfolios; "Up Minus Down" (UMD) is the Carhart (1997) price momentum portfolio; "ISsUance" (ISU) and "ACcRual" (ACR) are long-short portfolios based on the Daniel and Titman (2006) cumulative issuance and Sloan (1996) accruals measures, respectively; "Betting-Against-Beta" (BAB) is a Frazzini and Pedersen (2014) portfolio; and finally "Idiosyncratic-VOLatility" (IVOL) is a Ang et al. (2006) portfolio. See text for details.

Note: The Sharpe ratio here is the ratio of the annualized excess return to the annualized return standard deviation of the portfolio.

Return Predictability

The existence of overconfident investors help explain empirical evidence in this paper, for example

- Overconfident investors may overreact to information or a signal that is perceived as private, resulting in overreaction and correction. This causes momentum and reversal.
- Overconfident investors may overestimate the precision of the private signal, create overvaluation to some stocks and allow fundamental/price ratios to be predictors of future returns.
- Model with both rational and overconfident investors also displays excessive disagreement because overconfident investors insist on relying too heavily on the signals they possess and then will trade against rational investors who do not overweight the signals' precision.