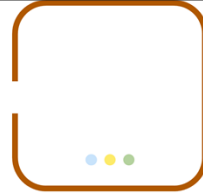


EFFICIENT MARKETS AND BEHAVIORAL FINANCE



Topics Covered

13-2

- We Always Come Back to NPV
- What is an Efficient Market?
 - Random Walk
 - Efficient Market Theory
- The Evidence Against Market Efficiency
- Behavioral Finance
- The Five Lessons of Market Efficiency

Return to NPV

13-3

- NPV employs discount rates
- These discount rates are risk adjusted
- The risk adjustment is a byproduct of market established prices
- Adjustable discount rates change asset values

Return to NPV

13-4

Example

The government is lending you \$100,000 for 10 years at 3% and only requiring interest payments prior to maturity. Since 3% is obviously below market, what is the value of the below market rate loan?

$$\begin{aligned} \text{NPV} &= \text{amount borrowed} - \text{PV of interest pmts} \\ &\quad - \text{PV of loan repayment} \end{aligned}$$

Return to NPV

13-5

Example

The government is lending you \$100,000 for 10 years at 3% and only requiring interest payments prior to maturity. Since 3% is obviously below market, what is the value of the below market rate loan?

Assume the market return on equivalent risk projects is 10%.

$$\begin{aligned} \text{NPV} &= 100,000 - \left[\sum_{t=1}^{10} \frac{3,000}{(1.10)^t} \right] - \frac{100,000}{(1.10)^{10}} \\ &= 100,000 - 56,988 \\ &= \$43,012 \end{aligned}$$

Random Walk Theory

13-6

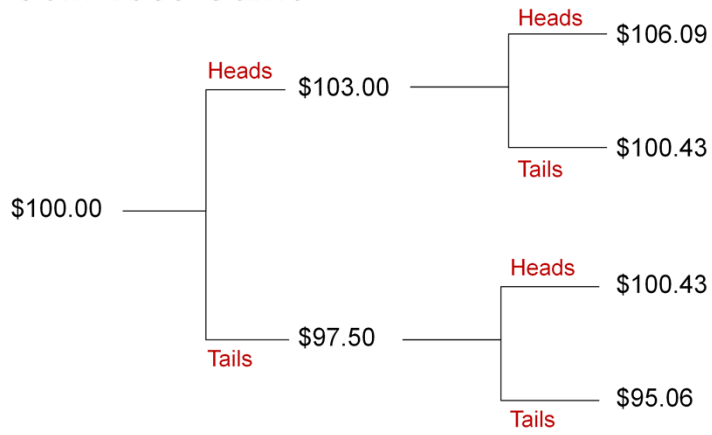
- The movement of stock prices from day to day DO NOT reflect any pattern
- Statistically speaking, the movement of stock prices is random (*skewed positive over the long term*)



Random Walk Theory

13-7

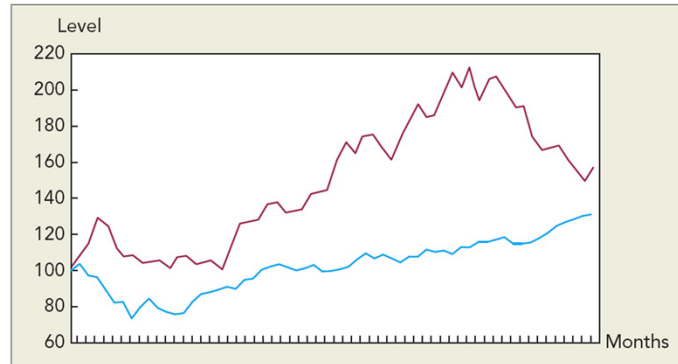
Coin Toss Game



Random Walk Theory

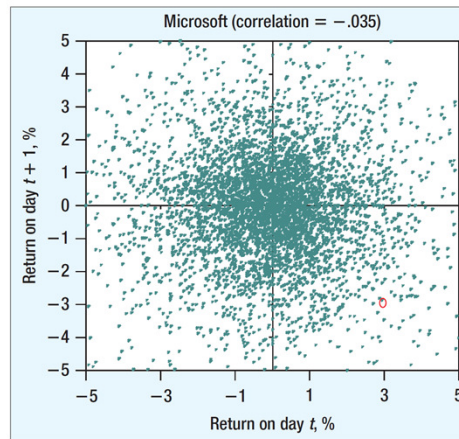
13-8

S&P 500 five year trend?
or
5 years of the coin toss game?



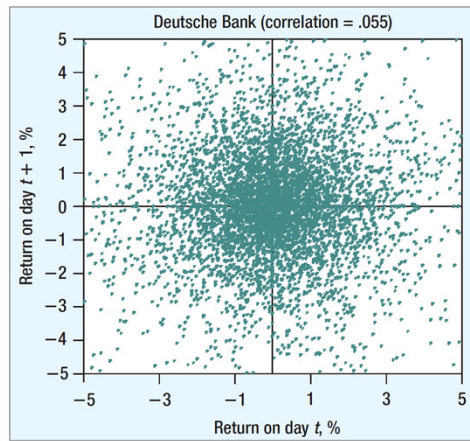
Random Walk Theory

13-9



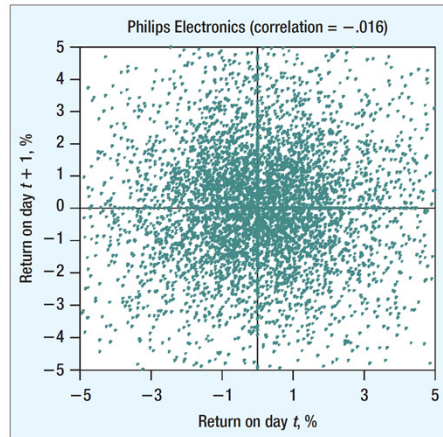
Random Walk Theory

13-10



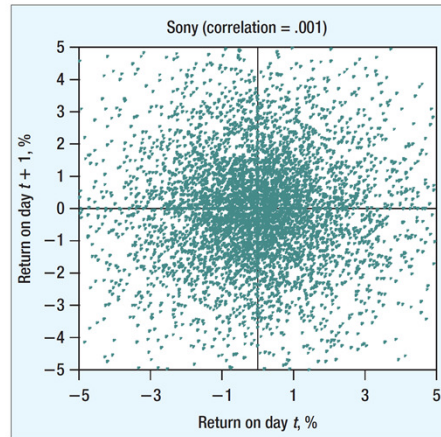
Random Walk Theory

13-11



Random Walk Theory

13-12



Efficient Market Theory

13-13



Cycles disappear once identified

Efficient Market Theory

13-14

- **Weak Form Efficiency**
 - Market prices reflect all historical information
- **Semi-Strong Form Efficiency**
 - Market prices reflect all publicly available information
- **Strong Form Efficiency**
 - Market prices reflect all information, both public and private

Efficient Market Theory

13-15

Fundamental Analysts

- Research the value of stocks using NPV and other measurements of cash flow

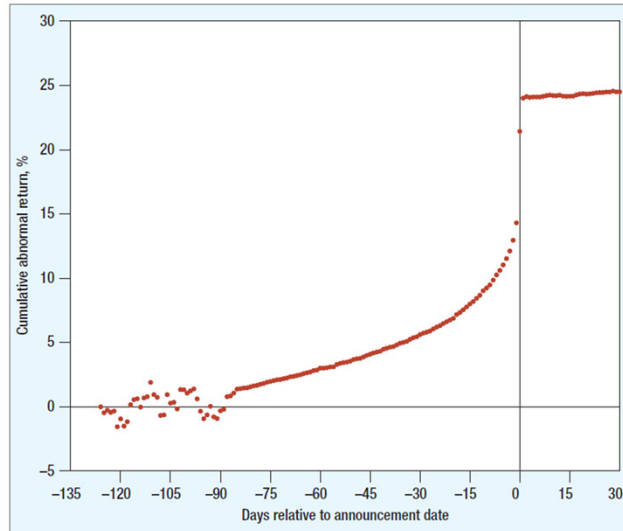
Adjusted stock return = return on stock – return on market index

Expected return = $\alpha + \beta \times$ return on market index

Expected return = actual stock return - expected stock return
 $= \tilde{r} - (\alpha - \beta \tilde{r}_m)$

Efficient Market Theory

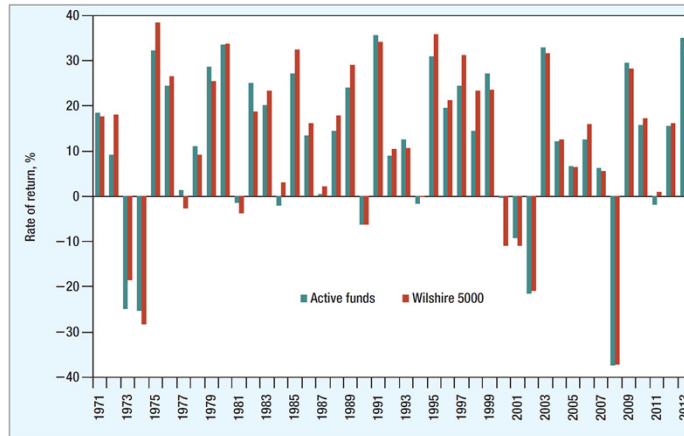
13-16



Efficient Market Theory

13-17

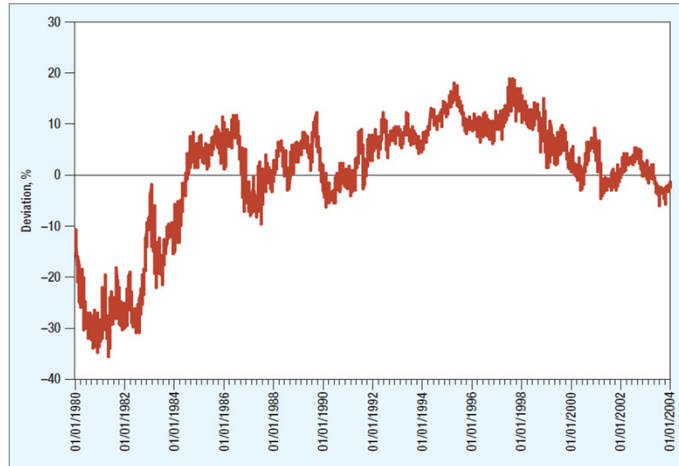
Average Annual Return on Mutual Funds and the Market Index



Price Anomalies

13-18

Log Deviations From Royal Dutch Shell/Shell T&T Parity, 1980 - 2004



Efficient Market Theory

13-19

2014 Market Correction

$$PV(\text{stocks})_{\text{Dec 2014}} = \frac{\text{Div}}{r - g} = \frac{350}{.060 - .040} = \$17,500 \text{ bil}$$

$$PV(\text{stocks})_{\text{growth drops}} = \frac{\text{Div}}{r - g} = \frac{350}{.060 - .035} = \$14,000 \text{ bil}$$

Efficient Market Theory

13-20

2000 Dot.Com Boom

$$PV(\text{index})_{\text{March 2000}} = \frac{\text{Div}}{r - g} = \frac{154.6}{.092 - .08} = 12,883$$

$$PV(\text{index})_{\text{October 2002}} = \frac{\text{Div}}{r - g} = \frac{154.6}{.092 - .074} = 8,589$$

Efficient Market Theory

13-21

1987 Stock Market Crash

$$PV(\text{index})_{\text{pre-crash}} = \frac{\text{Div}}{r - g} = \frac{16.7}{.114 - .10} = 1193$$

$$PV(\text{index})_{\text{post-crash}} = \frac{\text{Div}}{r - g} = \frac{16.7}{.114 - .096} = 928$$

Behavioral Finance

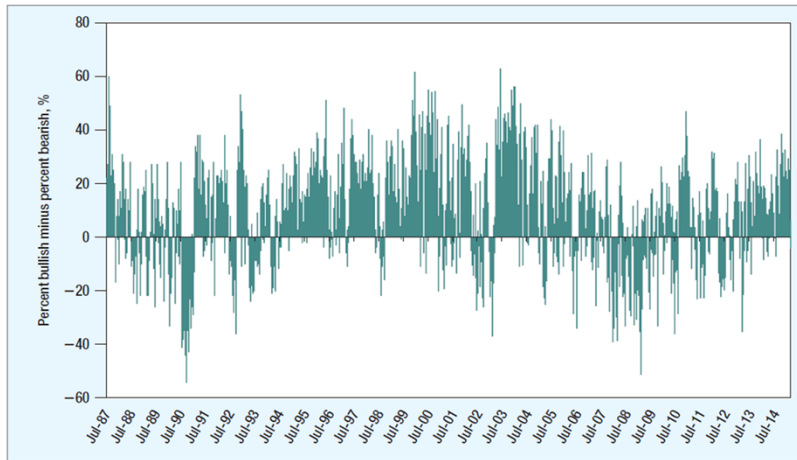
13-22

- Attitudes towards risk
- Beliefs about probabilities
- Sentiment
- Limits to arbitrage
- Incentive problems and the subprime crisis

Behavioral Finance

13-23

Spread between Bullish and Bearish Investors



Lessons of Market Efficiency

13-24

- Markets have no memory
- Trust market prices
- Read the entrails
- The *do it yourself* alternative
- Seen one stock, seen them all