

FIN 411 -- Efficient Capital Markets

Important concept: No free lunch

You were taught (in STR 401) that competitive markets prevent firms from earning "monopoly profits"

Efficient Capital Markets

Characteristics of capital markets:

standardized commodities (little product differentiation)

- claims on future cash flows
- differ by timing, risk & liquidity

many participants, both buying and selling

- competition on "both" sides of the market
- even if a particular security isn't sold by a government or corporation (e.g., discount bonds), creative people like investment bankers will create them if there is enough demand

Efficient Capital Markets

More characteristics of capital markets:

costs of trading are small in organized markets (stock exchanges, dealer markets for bonds)

costs of obtaining information are small (WSJ for students is about \$.30/day)

- looks like a good candidate for a highly competitive market

Testing for Efficient Capital Markets

Definitions: Prices reflect information available at time $t-1$

Weak form: information in past prices, $p(t-1), \dots, p(t-k)$

Testing for Efficient Capital Markets

Definitions: Prices reflect information available at time $t-1$

Semi-strong form: publicly available information

includes weak form as special case

Testing for Efficient Capital Markets

Definitions: Prices reflect information available at time $t-1$

Strong form: private/inside information

includes semi-strong form as special case

Testing for Efficient Capital Markets

Must have some model (hypothesis) about "normal" rates of return to assets to perform a test of efficient markets

- model of equilibrium expected returns, $E[R(it)|\phi(t-1)]$, where $\phi(t-1)$ represents information available to the market at time $t-1$
- then deviations of actual returns from expected returns (unexpected returns) should be random
 $\varepsilon(it) = R(it) - E[R(it)|\phi(t-1)]$

Testing for Efficient Capital Markets

Deviations of actual returns from expected returns (unexpected returns) should be random

$$\varepsilon(it) = R(it) - E[R(it)|\phi(t-1)]$$

- all tests of efficient markets are joint tests of the model of equilibrium expected returns, $E[R(it)|\phi(t-1)]$

Weak form tests: Information in past prices

Autocorrelation tests on returns:

assume that equilibrium expected returns are constant over time

$$E[R(it)|\phi(t-1)] = E[R(i)]$$

$$\text{corr}[R(t), R(t-k)] = 0$$

random walk for (log) prices

Weak form tests: Information in past prices

Autocorrelation tests on returns:

assume that equilibrium expected returns are constant over time

$$E[R(it)|\phi(t-1)] = E[R(i)]$$

$$\text{corr}[R(t), R(t-k)] > 0$$

price rises are persistent

Weak form tests: Information in past prices

Autocorrelation tests on returns:

assume that equilibrium expected returns are constant over time

$$E[R(it)|\phi(t-1)] = E[R(i)]$$

$$\text{corr}[R(t), R(t-k)] < 0$$

price reversals are common (over-reaction)

Weak form tests: Information in past prices

Facts: autocorrelations of daily & monthly stock returns are low

slightly negative at lag 1 for small (less liquid) stocks (-.03 to -.06)

slightly positive at lag 1 for large capitalization (more liquid) stocks (.01 to .05)

**Weak form tests:
Information in past prices**

Autocorrelations are slightly positive for portfolios of stocks (.05 to .15)

probably due to nonsynchronous trading: information comes in at 2:15 P.M.

but it takes a while for some stocks to trade, so the S&P 500 seems to react slowly

it reflects "last trade" prices, some of which are stale

**Weak form tests:
Information in past prices**

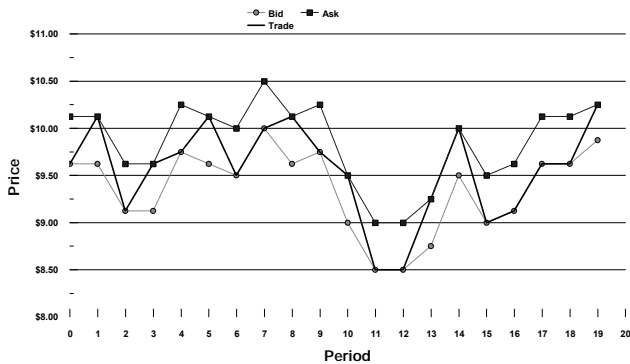
Bid-ask spreads cause negative autocorrelations

If the last trade was buyer-initiated (ask price), it will be "high" (at the top of the spread)

the next trade has a 50% chance of being a buy or sell

so the price would be expected to be in the middle of the spread

Example of Bid-Ask Effect



**Weak form tests:
Information in past prices**

Bid-ask spreads cause negative autocorrelations

► an expected drop in the stock price (from the top of the spread to the middle)

No profit opportunity (except for the specialist, who is providing inventory services)

**Weak form tests:
Information in past prices**

Filter rule tests:

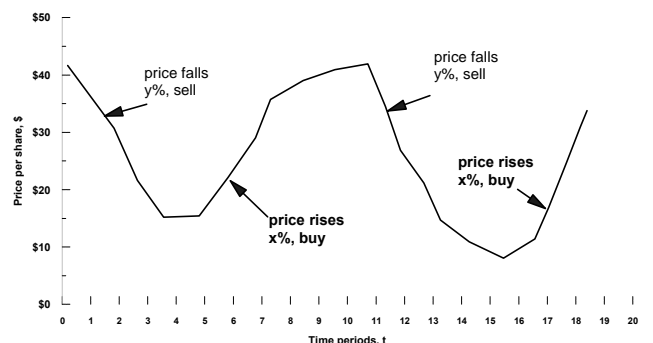
(try to take advantage of momentum)

- buy after prices rise x%
- sell after prices fall by y%

Tests show that these work best for very small filters, implying a lot of trading (probably picking up bid-ask bounce)

► after transactions costs, and risk adjustment, there are no profit opportunities compared with a buy-and-hold strategy

Example of Filter Rule



**Weak form tests:
Information in past prices**

Filter rule vs. buy-and-hold strategy:

assumes that equilibrium expected returns are positive every period

$$E[R(it)|\phi(t-1)] > 0$$

B&H implies that you never want to sell a stock

B&H is a passive (no information) investment strategy

**Weak form tests:
Information in past prices**

Important parts of Efficient Markets tests:

1. explicit/implicit model of "normal" returns
 - probably want to adjust/control for the risk of the active trading strategy
2. compare active strategy (based on information) with passive strategy
3. control for costs of implementing the active strategy
 - net out incremental transactions costs
 - net out costs of acquiring/processing information