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"

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**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

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**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

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**Testing for Efficient Capital Markets**

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

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

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**Testing for Efficient Capital Markets**

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- **Semi-strong form:** publicly available information
  - includes weak form as special case

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**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,
  \[ E[R(it)\mid \phi(t-1)] \text{, where } \phi(t-1) \text{ represents information available to the market at time } t-1 \]

- then deviations of actual returns from expected returns (unexpected returns) should be random
  \[ \epsilon(it) = R(it) - E[R(it)\mid \phi(t-1)] \]

Weak form tests:
Information in past prices

Autocorrelation tests on returns:
assume that equilibrium expected returns are constant over time
\[ E[R(it)\mid \phi(t-1)] = E[R(i)] \]
\[ \text{corr}[R(t), R(t-k)] = 0 \]
random walk for (log) prices

Weak form tests:
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Autocorrelation tests on returns:
assume that equilibrium expected returns are constant over time
\[ E[R(it)\mid \phi(t-1)] = E[R(i)] \]
\[ \text{corr}[R(t), R(t-k)] > 0 \]
price rises are persistent

Weak form tests:
Information in past prices

Autocorrelation tests on returns:
assume that equilibrium expected returns are constant over time
\[ E[R(it)\mid \phi(t-1)] = E[R(i)] \]
\[ \text{corr}[R(t), R(t-k)] < 0 \]
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 (0.05 to 0.15)
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

Example of Bid-Ask Effect

![Graph showing bid-ask effect]

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 Filter Rule

![Graph showing filter rule]

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

**Filter rule vs. buy-and-hold strategy:**

assumes that equilibrium expected returns are positive every period

\[ \mathbb{E}[R(t)|\phi(t-1)] > 0 \]

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

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

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**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