



UNIVERSITY OF CALGARY
HASKAYNE SCHOOL OF BUSINESS

Investments & Portfolio Management

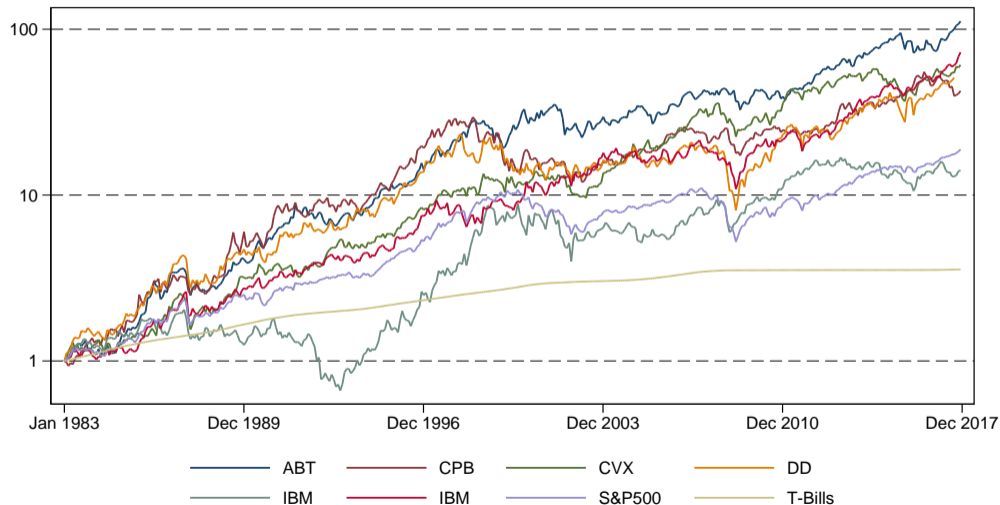
Market Efficiency

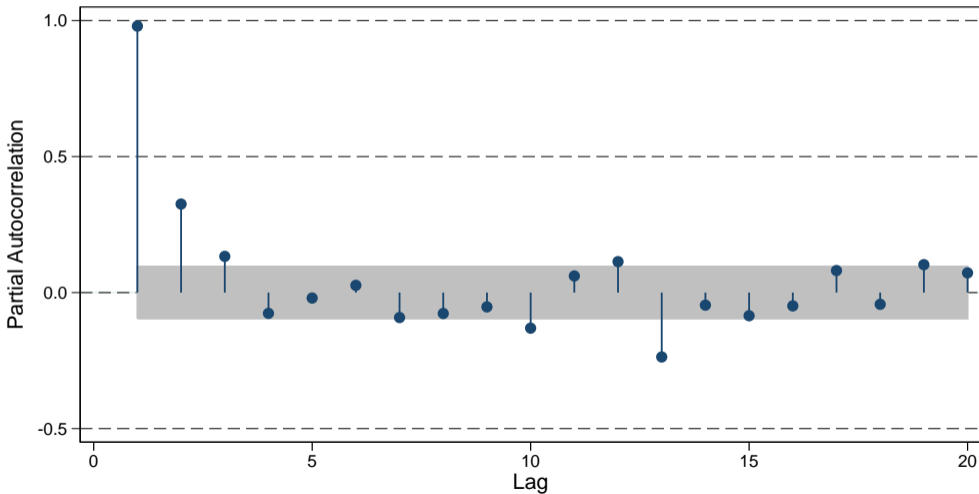
René Wells

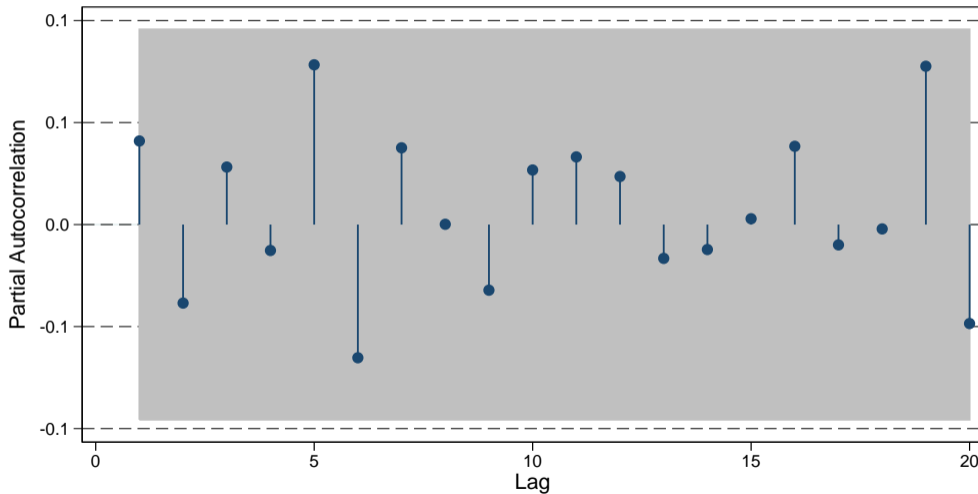
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Are cumulative returns 'erratic' ? (i.e. \sim random walk with drift)

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Informational efficiency refers to which extent financial markets incorporate completely, quickly, and rationally all available past and new information into the price of securities.

- 'Information' is without limitation (expectations of investors about the future, anticipated future changes in economic variables, investors' preferences, and any changes thereof).
- The efficient market hypothesis (EMH) states that security prices already reflect all known information in any given time (but not necessarily 'insider information').

Operational efficiency refers to which extent financial markets support the trading activities of investors (buying and selling securities) in an efficient manner (i.e. low transaction costs, high liquidity, convenience, completion of transactions, etc).

- High operational efficiency facilitates informational efficiency, and vice versa.

Allocative efficiency refers to which extent financial markets allocate capital to its highest and best use (notably to foster economic growth and high standards of living).

- High informational and operational efficiencies facilitates allocative efficiency.

The 1900 PhD thesis of Louis Bachelier introduces the Brownian motion as a stochastic process (i.e. a Wiener process) describing stock returns to value stock options.

- So, early on the scientific insight suggested it was hopeless to try predicting future returns from past returns. However, this knowledge was lost for nearly 60 years, until it was 'rediscovered' by Paul Samuelson after the said thesis been translated into English.

Irving Fisher and John Maynard Keynes, preeminent economists, found stock returns confusing.

- Fisher said, just nine days before the 1929 market crash, "stock prices have reached what looks like a permanently high plateau".
- Keynes as portfolio manager initially used a top-down macro approach with nearly total loss twice, but later moved successfully to value investing.

Watch Ben Bernanke comments about U.S. house prices just prior to the great recession.

Since the forces driving the economy, and therefore firms' profits, are moving slowly from one year to the next and imperceptibly from one day to the next, why stock returns vary so much?

Samuelson (1965a), 'Proof that properly anticipated prices fluctuate randomly', shows that if securities markets function well security prices and returns are random one period to the next.

- This is counter-intuitive to what some would see as a well-managed market.
- Of note, some prices eventually converge (e.g. a bond getting close to and on maturity).

The intuition of the theory is straightforward, assuming well-informed and competitive markets.

- Assuming security prices already reflect all information, only the arrival of new information can change prices. But as soon as new information becomes available, investors have an incentive to compete in analyzing it and trading on it quickly (and the assumption holds).
- Of note, it is the unexpected component of the news that is new information, since the expected component of the news has already been incorporated in the asset price.
- As arrival and significance of new information is random, asset prices fluctuate randomly, despite the prices being 'fair' and approximate fundamental values at any point in time.

However, the extent to which the theory works as expected is an empirical question.

Market participants as active competitors

- A sufficiently large number of market participants (individual investors, institutional investors, security analysts, arbitrageurs, etc.) actively following markets and ready to competitively trade is expected to positively influence market efficiency, and vice versa.

Market structure: availability of information along with quality and enforcement of regulations

- More informationally 'transparent' markets are expected to be more efficient (e.g. data on stocks traded on public exchanges is more available than data on bonds traded OTC).
- High quality financial disclosure by issuers is expected to improve availability, reliability and timeliness of information, and therefore positively influences market efficiency.
- Active regulators enforcing sensible regulations improve market efficiency.

Ease of trading and the burden of costs

- Arbitrage not be unduly restricted (short selling is, despite contributing to price discovery).
- Trading and processing information costs limit efficiency as they have to be recovered.

Fama (1970) suggests three tests of the EMH, having given rise to 'three forms' of EMH.

	Market Prices Reflect:		
	Past Market Data	Public Information	Private Information
Weak form	✓		
Semi-strong form	✓	✓	
Strong form	✓	✓	✓

If, when using one of the above information sets, abnormal returns (i.e. realized returns less expected returns) can be earned consistently, the corresponding form of EMH does not hold.

- The weak and semi-strong forms are generally found to hold, but not the strong form.

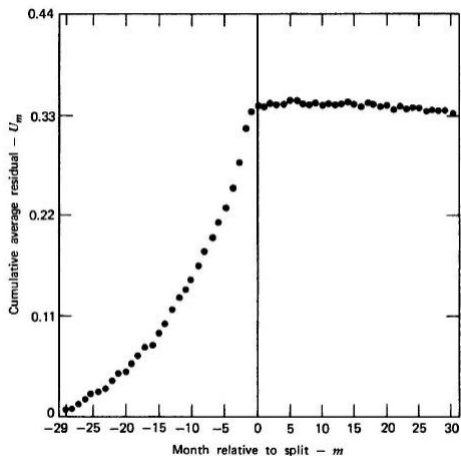
Events studies test how quickly and completely new information is assimilated into asset prices.

Major steps of an event study

- Select the type of event to study (i.e. carefully develop an operational description);
- Construct a prior (i.e. how capital markets are expected to react when such event occur);
- Find as many clean occurrences of the event as possible (minimize confounding news);
- Using event dates for corresponding firms, process the data:
 - ▶ Estimate the expected returns around the event date for each firm (-/+ days);
 - ▶ Calculate the cumulative abnormal returns in the event window (-/+ days) and plot;
 - ▶ Perform statistical analysis to determine statistical significance;
- Analyze and interpret the data against your prior, and then reach conclusions.

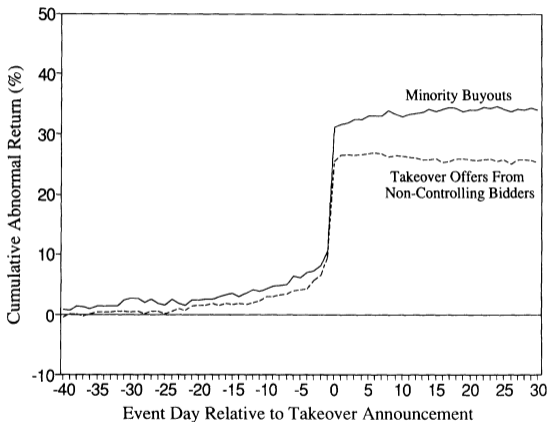
Indicators of high semi-strong form market efficiency

- Quick response: prices jump immediately (on average);
- No post announcement drift: no incremental abnormal returns after news (on average).



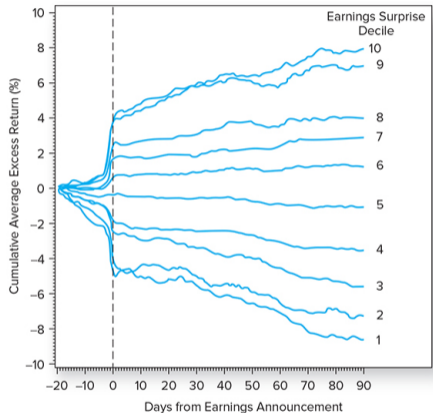
Source: Fama, Fischer, Jensen and Roll (1969)

- No post announcement drift (but pre announcement leakage?)



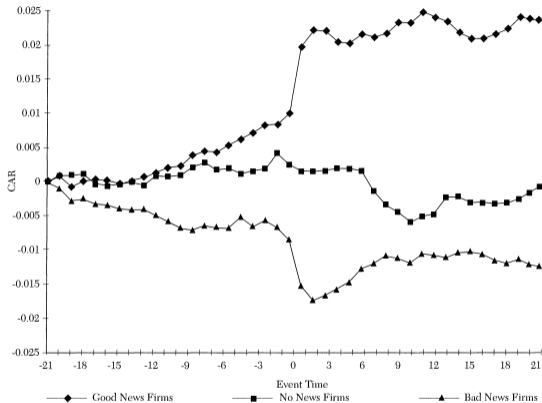
Source: Smith and Amoako-Adu (1992)

- No post announcement drift and market distinguishes type of bidder.



Source: Rendelman, Jones, and Latané (1982)

- Some post announcement drift (some pre announcement leakage?)



Source: MacKinley (1997)

- Some post announcement drift, but less than in Rendelman, Jones, and Latané.

Very difficult to test, notably since using an asset pricing model is required.

Weak form

- Weak or no serial correlation
- But momentum

Semi-strong form

- Numerous anomalies have been found, some appears to be returns to risk (like SMB and HML), some disappear over time, some appear to result from eager data mining.

Strong form

- Using insider information has shown abnormal returns can be earned and get you in jail.

Since active portfolio managers by and large have failed to earn abnormal returns on a consistent basis, if at all (i.e. no superior performance, nor 'skill') one has to conclude that mature markets are very informationally efficient (on average, since 'bubbles' occur, etc.).

Concept checks

- Suggest to do concept checks 1 to 5 (solutions provided at the end of the chapter).

Exercises

- Suggest 11-11 and 11-12.
- Solutions follow next slides, and Excel solution file is available in D2L.

Market	8.0%
Actual stock return	7.0%
Expected stock return	8.9%
Abnormal stock return	-1.9%

Rf	1.00%
Market	1.50%
Beta	2
Mrk cap	100,000,000
Cf	1,000,000
ECf	2,000,000
ER	2.00%
Surprise	1.00%
Return	3.00%
ER	2.00%
Surprise	-1.00%
Return	1.00%