충남대학교
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투자론

- *R*과 Excel을 통한 금융데이터 분석 -

9주차
효율적 시장가설

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Unit 01

Efficient Market Hypothesis

Overview

- Efficient Market Hypothesis (EMH)
- Empirical Evidence on EMH
- Implication of EMH
- Question and Practical Issues about EMH

Definition of Efficient Market Hypothesis

Definition

- A financial market is (informationally) efficient when market prices reflect all available information about value

Thus, the precise needs to answer two questions

1. What is “all available information”?
2. What does it mean to “reflect all available information”?

Definition of Efficient Market Hypothesis

- **Answer**

1. All available information includes:
   - Past prices – **Weak form**
   - Public information (prices, news, . . .) – **Semi-Strong Form**
   - All information including inside information – **Strong Form**
2. "Prices reflect all available information" means that financial transactions at market prices, using the available information, are zero NPV activities.

- **Question: Why should prices reflect available information?**

- **Answer: If not, there would be positive NPV trades.**

Example

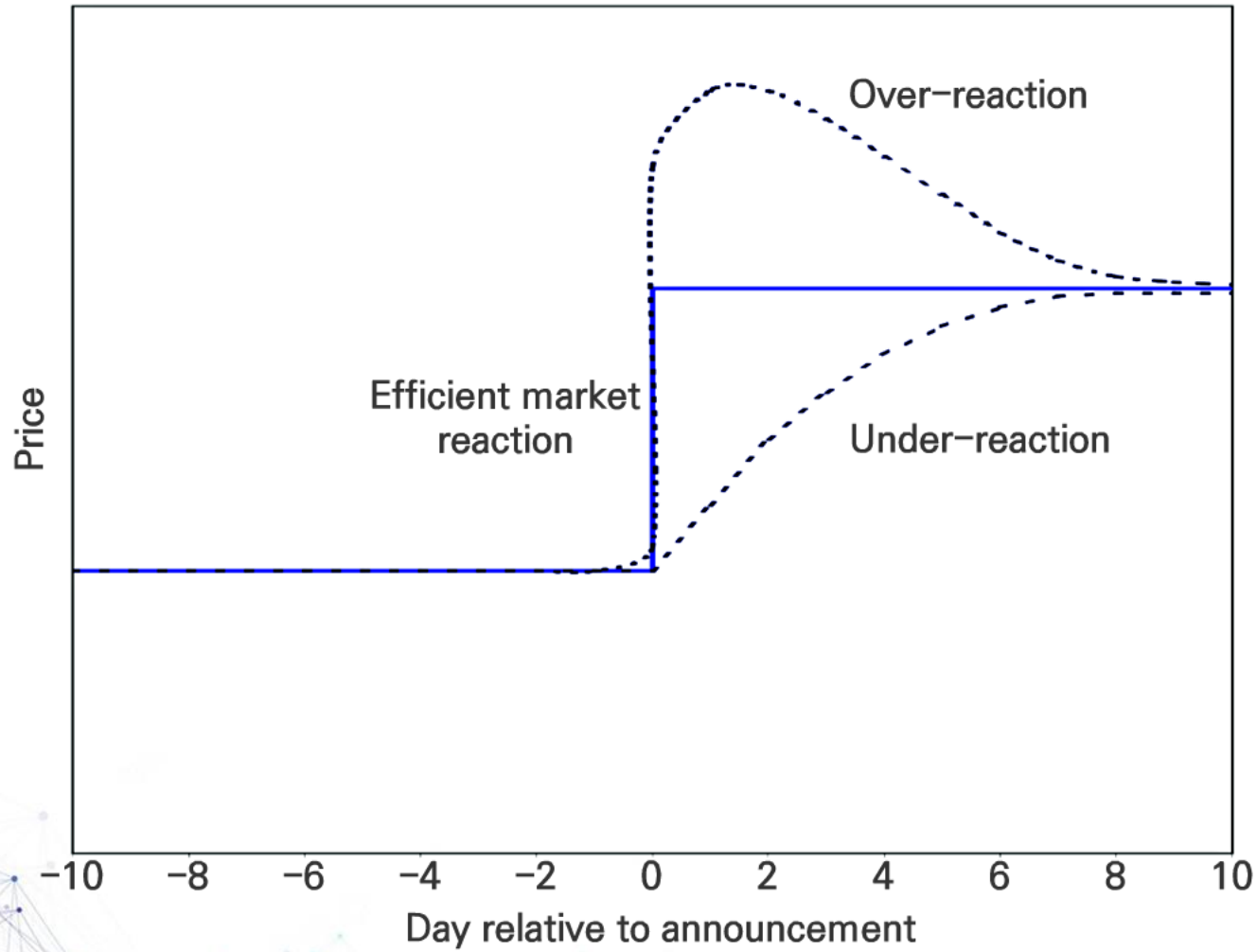
- **Suppose that Celltrion announces a new Covid-19 drug that could completely cure all existing patients. How should the share price of Celltrion react to this news?**

Consider three hypothetical paths for price adjustments

1. Increase immediately to a new equilibrium level
2. Increase gradually to the new equilibrium level
3. First over-shoot and then settle back to new equilibrium level

What do you think?

What do you think?



Versions of EMH

1. Weak-From Efficiency: Lack of Predictability

1. Price reflects all information contained in market trading data (past prices, volume, dividends, interest rates, etc.).
2. So an investor can not use past prices to identify mispriced securities.
3. Technical analysis:
   1) refers to the practice of using past patterns in stock prices (and trades) to identify future patterns in prices.
   2) is not profitable in a market which is at least weak form (i.e., weakly) efficient.

Supportive Evidence

Weak EMH is supported by the data

- Serial correlation in daily stock returns is close to zero.

Serial Correlation of Daily Return on Nine Stock Markets

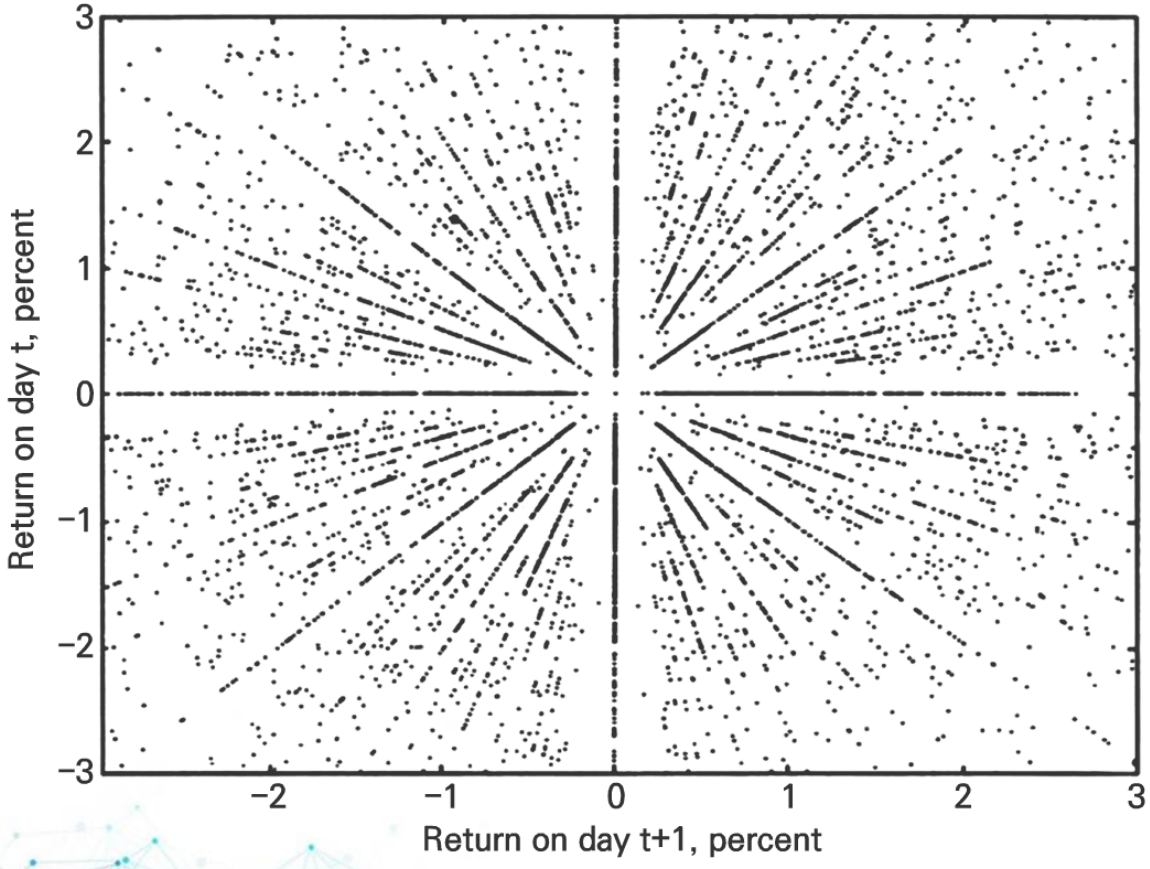
USA	0.03	UK	0.08
France	-0.01	Italy	-0.02
Germany	0.08	Holland	0.03
Belgium	-0.02	Switzerland	0.01
Sweden	0.06		

출처 : B.Solnik, "A Note on the Validity of the Random Walk for European Stock Price," Journal of Finance (December 1973)

Supportive Evidence

Weak EMH is supported by the data

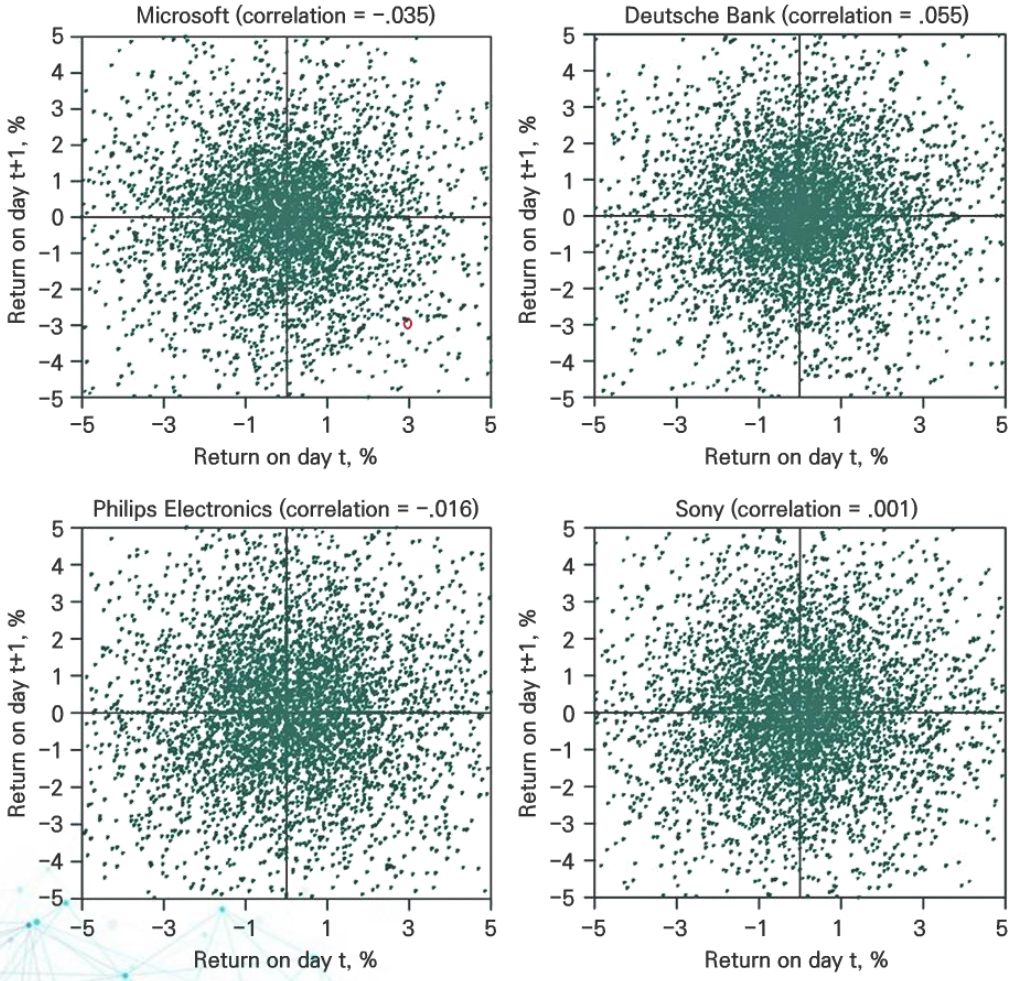
- Return on Two Successive Days for Weyerhaeuser(1963-1993)



출처 : T. Crack and O. ledoit, "Robust Structure without Predictability: The 'Compass Rose' Pattern of the Stock Market." Journal of Finance (1996)

Supportive Evidence

Figure 13.1 Each dot shows a pair of return for a stock on two successive days between December 1991 and December 2014. The circled dot for Microsoft records ad daily return of +2.9% and then −2.9% on the next day. The scatter diagram shows no significant relationship between return on successive days



Versions of EMH

2. Semi-Strong Form: "Events" reflected immediately

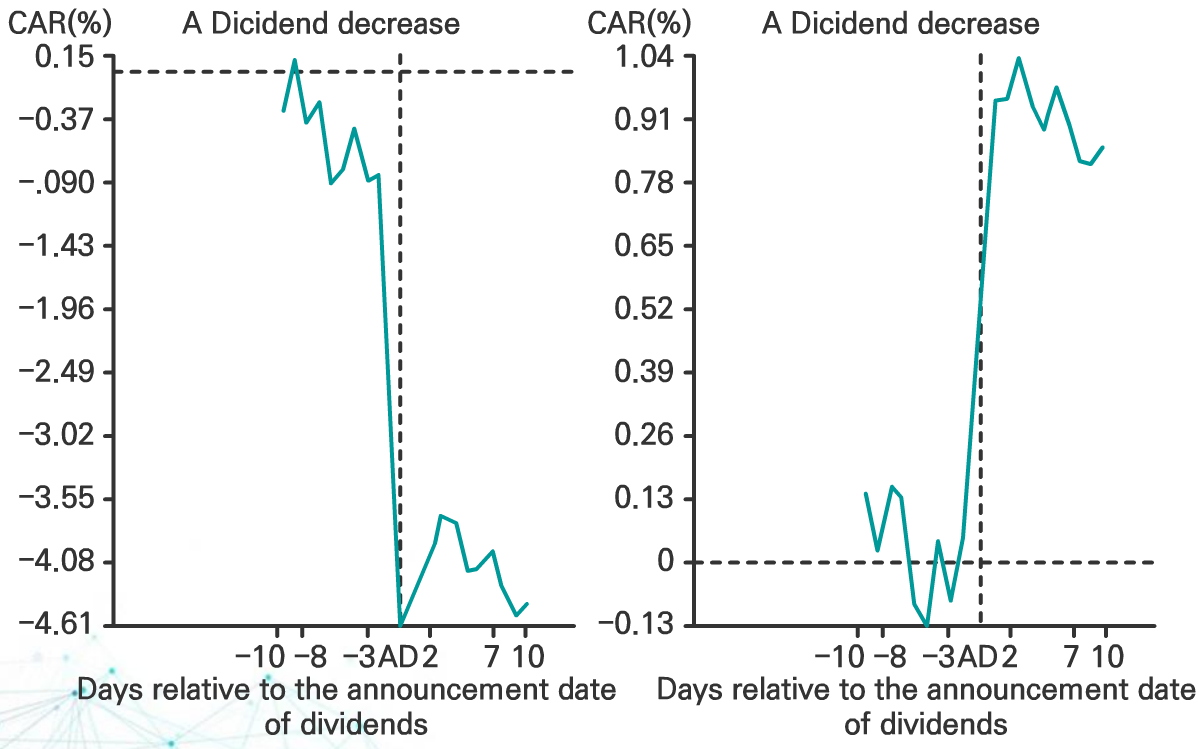
1. Price reflects all publicly available information.
2. So an investor can not use publicly available information to identify mispriced securities.
3. Fundamental analysis:
   1) refers to the practice of using financial statements, announcements, and other publicly available information about firms to pick stocks
   2) is not profitable in a market which is at least semi-strong form (i.e., semi-strongly) efficient.
4. If a market is semi-strong form efficient, then it is also weak form efficient since past prices and other past trading data are publicly available.

Supportive Evidence

Semi-Strong form EMH is supported by the data

- Price react to news quickly.

Cumulative Abnormal Return(CAR)
before and after Dividend Announcements



Supportive Evidence

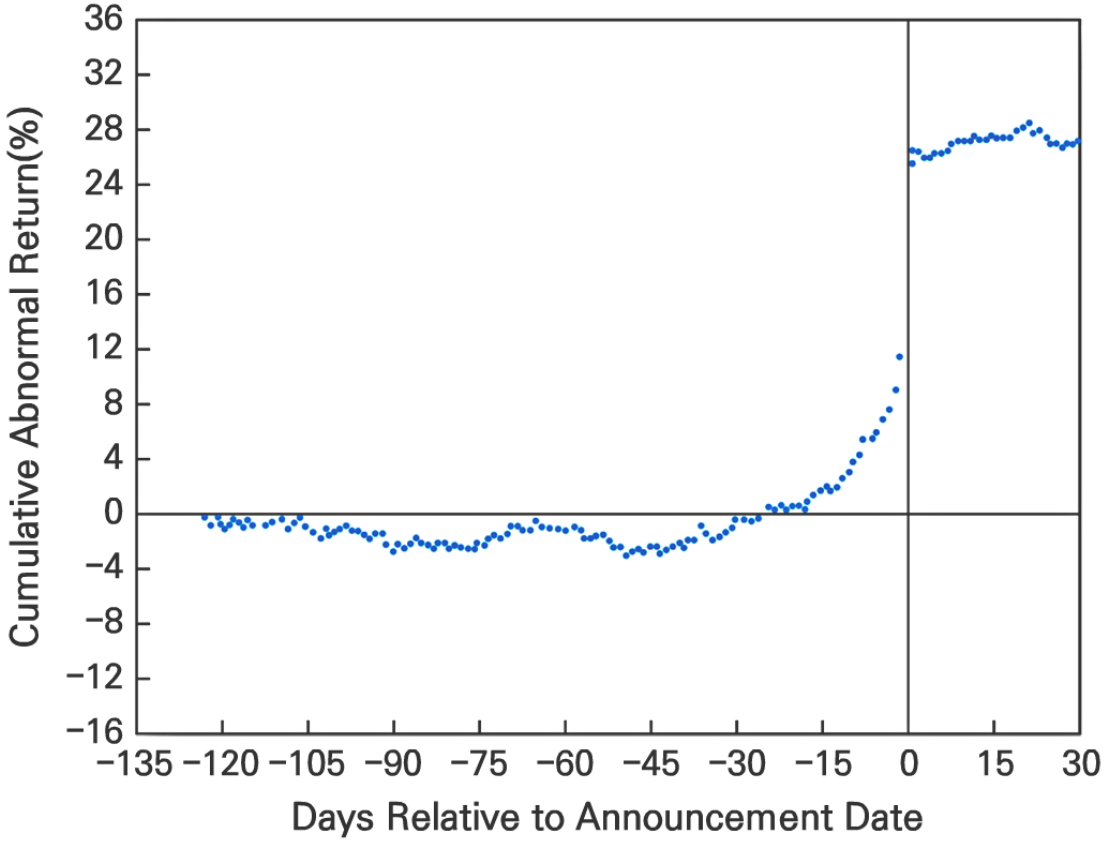


Figure -- Cumulative abnormal return before takeover attempts: target companies

출처 : Arthur Keown and John Pinkerton, “Merger Annouuncements and Insider Trading Activity,” Journal of Finance 36(September 1981)
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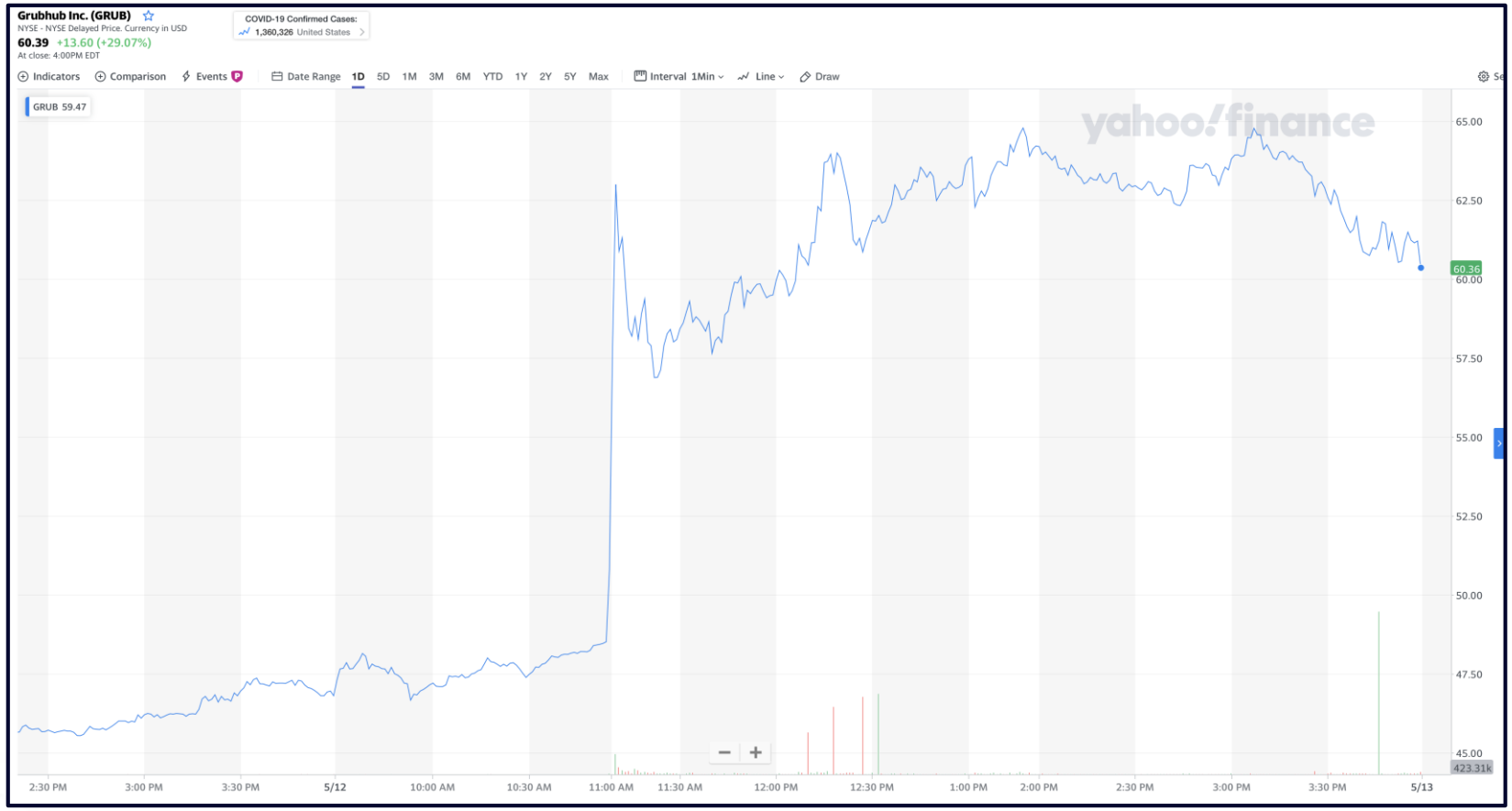
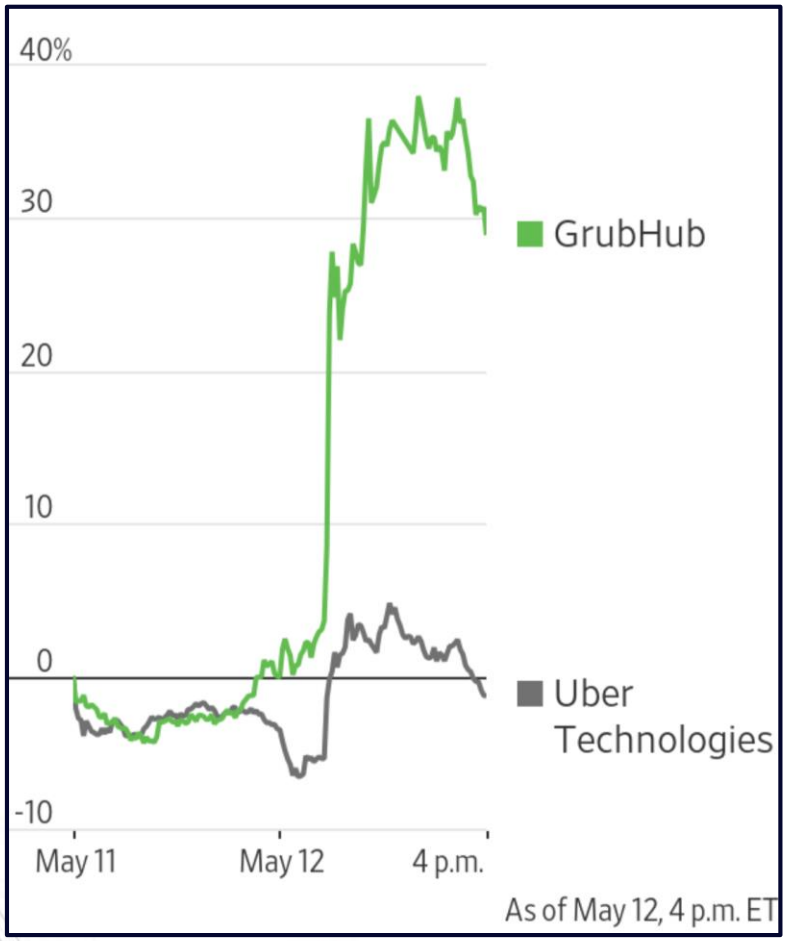
Supportive Evidence



출처 : Yahoo,finance

Supportive Evidence

Share-price performance



출처 : FactSet

Supportive Evidence

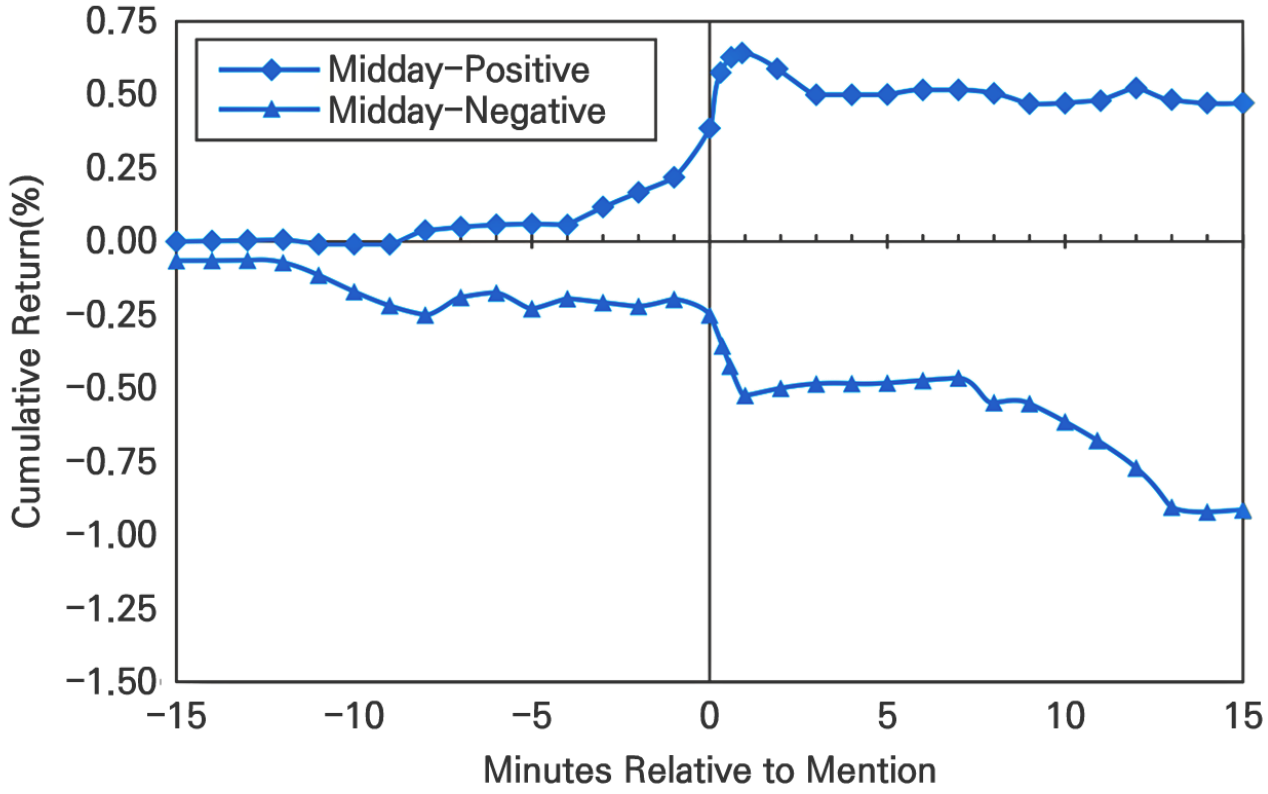


Figure -- Stock price reaction to CNBC reports. The figure shows the reaction of stock price to on-air stock reports during the "Midday Call" segment on CNBC. The chart plots cumulative returns begonnong 15 miutes before the stock report

출처 : Reprinted form J. A Busse and T. C. Green, "Market Efficiency in Real Time," Journal of Financial Economics 65(2022), p. 422. Copyright 2002, with permission form Elsevier

Example

Markt reaction to public announcement

- Stock XYZ Mining closed yesterday at 100. Morning paper reports: XYZ Mining has larger than expected reserves (extra value = $10 per share). Suppose this estimate is unanimously and immediately deemed valid and accurate. Stock jumps to 110 immediately (at the open); more likely 109.9 bid, 110.1 offered. ⇒ No trading is needed. News report “XYZ climbed to 110 today on announcement of a new gold mine.”

Example

Markt reaction to public announcement

- Suppose XYZ Mining stock only jumps to 104. Report might be suspicious (“XYZ known to exaggerate”). But if we deem the information reliable… Then, (1) A price of 104 for XYZ does not accurately reflect all the available information.
  (2) We can make trading profits by buying XYZ at 104 and holding until (a) the market realizes we’re right, or (b) XYZ pays out (in dividends or distributions) the value of the reserves. ⇒ (Semi-strong) efficiency is violated in the senses that 104 does not fully reflect the new information. We can make trading profits.

Versions of EMH

3. Strong-Form: All Available Information

- Price reflects all available information. If a market is strong form efficient, then it is also semi-strong and weak form efficient since all available information includes past prices and publicly available information.

Versions of EMH

3. Strong-Form: All Available Information

1. What is “private” information?

Information that you hold that is not reflected in the market price:

Two Types of Private Information:

a. “Inside information” = Info known to company management but not yet made public.

- Knowledge of an impending takeover bid.
- Knowledge that earnings are going to be lower than the street expects.

b. A private assessment based on public information.

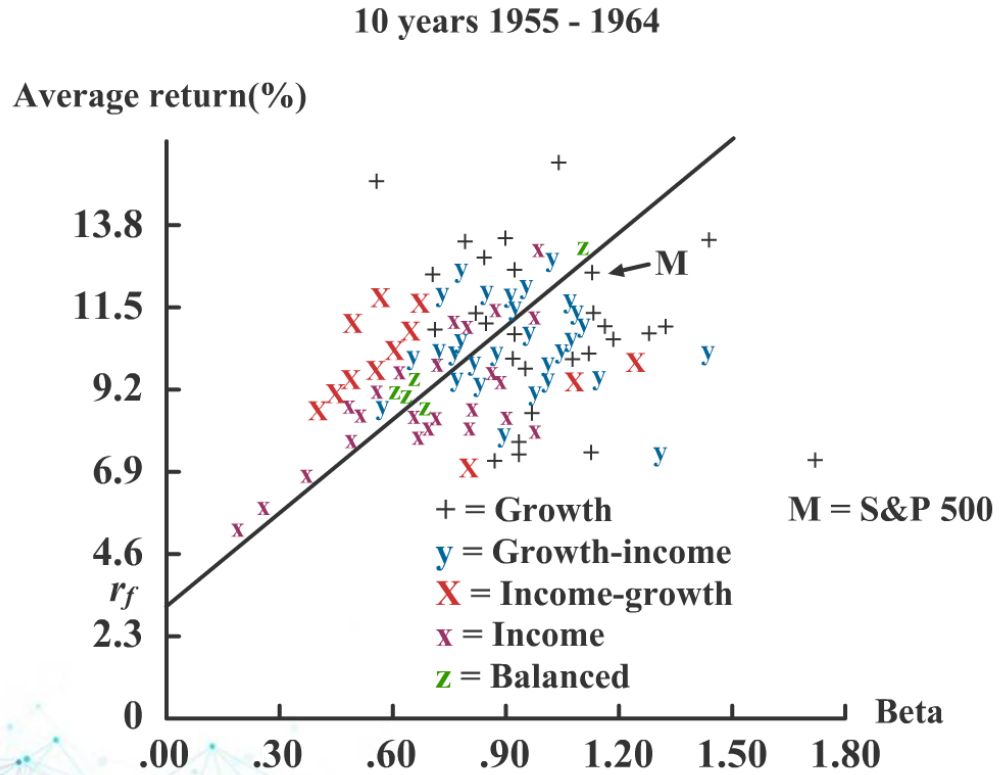
- An analyst’s report based on public accounting statements.

Evidence

Strong form EMH has mixed evidence

- Money managers cannot consistently outperform

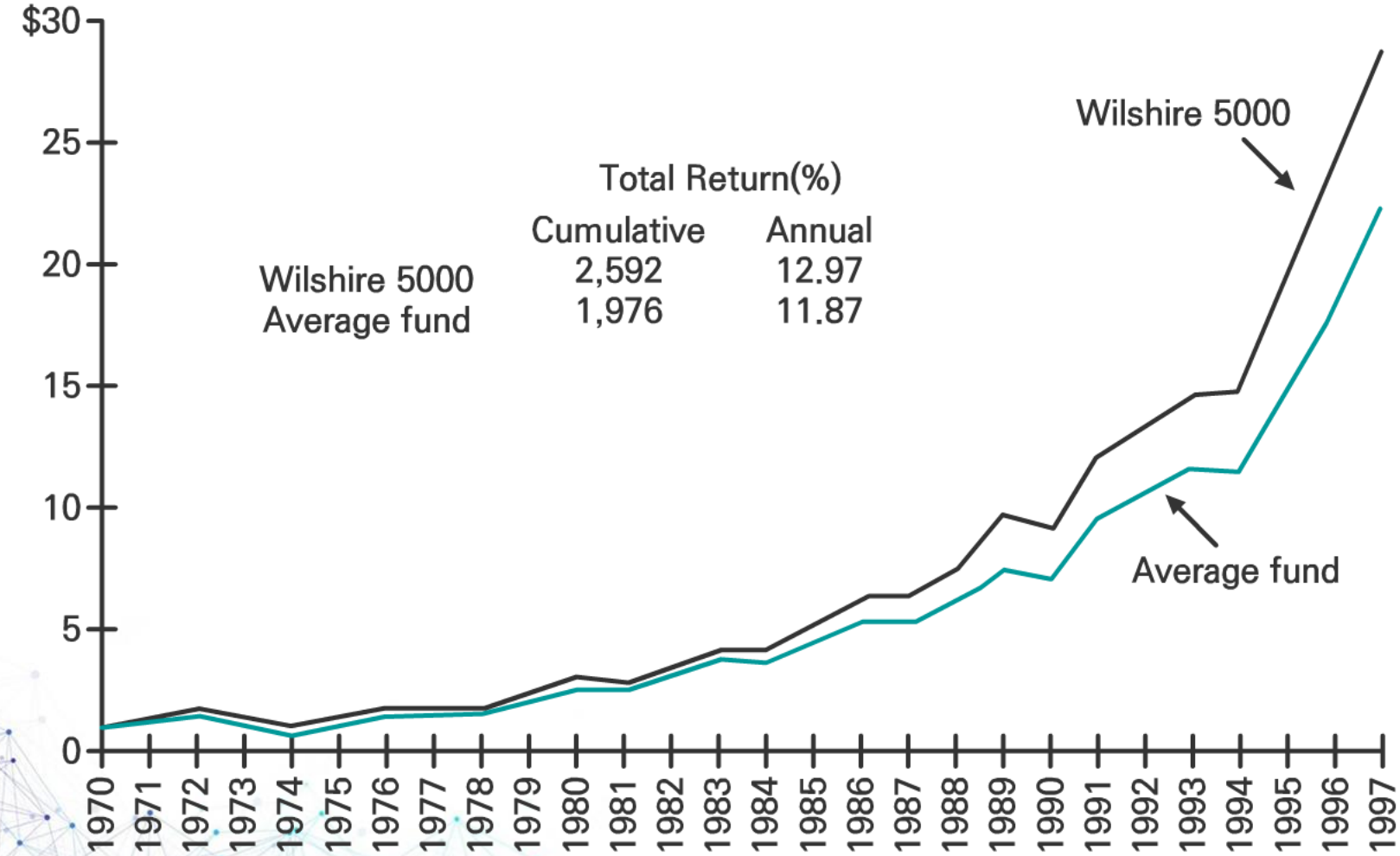
Mutual Fund Performance (Gross of Expenses)



출처 : M. Jensen, "Risk, the Pricing of Capital Assets, and the Evaluation of Invest Performance." Journal of Business (April 1969).

Evidence

Performance of Average Equity Mutual Funds



Evidence

운용사 수익률순위

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▪유형 국내주식형 인덱스주식코스피200 ▪기간구분 5년 SEARCH

[기준일 : 2020.05.08]

순위	운용사	펀드수	설정액 (억원)	순자산 (억원)	수익률 (%)	유형초과 (%)	차트
		348	113,434	155,691	6.75		
1	대신자산운용	13	776	789	12.07	5.32	
2	마이다스에셋자산운용	1	160	189	10.98	4.23	
3	이스트스프링자산운용	4	2,048	2,134	7.71	0.96	
4	미래에셋자산운용	8	24,258	27,548	7.62	0.87	
5	한화자산운용	14	7,110	7,592	7.25	0.50	
6	삼성자산운용	45	20,235	56,456	6.76	0.01	
7	교보악사자산운용	38	14,911	14,619	6.68	-0.07	
8	우리자산운용	9	361	354	6.67	-0.08	
9	케이비자산운용	20	14,285	14,928	6.54	-0.20	
10	한국투자신탁운용	20	6,177	7,607	6.12	-0.63	
11	멀티에셋자산운용	11	54	51	6.10	-0.65	
12	키움투자자산운용	34	6,760	9,363	6.07	-0.68	
13	유진자산운용	7	248	217	5.91	-0.84	
14	디비자산운용	4	239	213	5.37	-1.38	
15	아이비케이자산운용	21	423	430	5.01	-1.74	

출처 : 교수자 제공

Evidence

운용사 수익률순위

Home > Ranking > 운용사 수익률순위

유형: 국내주식형 / 액티브주식일반 | 기간구분: 5년 | SEARCH

[기준일 : 2020.05.08]

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		1,726	119,240	101,733	-16.29		
1	유경피에스지자산운용	9	135	146	13.22	29.51	
2	마이다스에셋자산운용	32	1,320	1,592	3.80	20.09	
3	에이치디씨자산운용	10	216	183	2.51	18.80	
4	프랭클린템플턴투자신탁운용	25	559	453	-0.38	15.91	
5	엔에이치아문디자산운용	93	3,100	3,089	-1.16	15.13	
6	비엔케이자산운용	24	396	350	-2.09	14.20	
7	칸서스자산운용	12	482	472	-2.92	13.37	
8	맥쿼리투자신탁운용	39	916	909	-3.39	12.90	
9	교보악사자산운용	28	774	671	-3.41	12.88	
10	브이아이자산운용	39	829	953	-3.67	12.62	
11	우리글로벌자산운용	8	624	574	-4.60	11.69	
12	디지비자산운용	8	20	19	-4.61	11.68	
13	키움투자자산운용	76	1,100	1,042	-5.76	10.53	
14	한화자산운용	55	3,825	3,243	-5.76	10.53	
15	베어링자산운용	29	198	187	-7.41	8.88	
16	흥국자산운용	10	265	221	-7.75	8.54	
17	피델리티자산운용	13	183	169	-7.77	8.52	
18	아이비케이자산운용	44	760	727	-7.84	8.46	
19	플러스자산운용	5	164	146	-8.60	7.69	
20	에셋플러스자산운용	48	1,982	2,010	-8.62	7.67	
21	삼성자산운용	109	2,980	2,551	-8.79	7.51	
22	한국투자신탁운용	106	12,874	11,078	-10.05	6.24	

출처 : 교수자 제공

Evidence

운용사 수익률순위

Home > Ranking > 운용사 수익률순위

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		67	5,631	5,830	0.14		
1	하나유비에스자산운용	17	1,320	1,578	20.36	20.23	
2	디비자산운용	17	1,174	1,149	2.89	2.75	
3	미래에셋자산운용	32	3,133	3,099	1.48	1.34	

출처 : 교수자 제공

Evidence against EMH

Against weak form

1) returns over short horizons (momentum)
2) returns over long horizon (return reversal)

Against semi-strong form

- predictors (mostly financial ratios) of broad market returns do seem to have predicting power (controversial as it can be interpreted as the risk-return trade off)

Evidence against EMH

Problem of testing market efficiency

- The joint hypothesis problem is the problem that testing for market efficiency is difficult, or even impossible. Any attempts to test for market (in)efficiency must involve **asset pricing models** so that there are expected returns to compare to real returns. It is not possible to measure 'abnormal' returns without expected returns predicted by pricing models. Therefore, anomalous market returns may reflect market inefficiency, an inaccurate asset pricing model or both. In sum, the joint hypothesis problem implies that market efficiency per se is not testable.

Implications of EMH

Implications for the Fund Management

- Technical Analysis
  - Success depends on a sluggish response of stock prices to supply-and-demand factors
  - Weak-form efficiency
    - ✓ Relative Strength
    - ✓ Resistance Levels

Implications of EMH

Implications for the Fund Management

Example -- Resistance Levels

Consider stock XYZ, which traded for several months at a price of $72 and then declined to $65. If the stock eventually begins to increase in price, $72 is considered a resistance level (according to this theory) because investors who bought originally at $72 will be eager to sell their shares as soon as they can break even on their investment. Therefore, at prices near $72 a wave of selling pressure would exist. Such activity imparts a type of "memory“ to the market that allows past price history to influence current stock prospects.

Implications of EMH

Implications for the Fund Management

- Fundamental Analysis
  - Seek firms that are misplaced
  - Find poorly run firms that are not as bad as the market thinks
  - Semi-strong form efficiency and fundamental analysis

Implications of EMH

Implications for the Fund Management

- Active Management
  - An expensive strategy
  - Suitable for very large portfolios
- Passive Management
  - No attempts to outsmart the market
  - Accept EMH
  - Index Funds and ETFs
  - Very low cost

Implications of EMH

Implications for Resource Allocation

- Inefficient markets à systematic resource misallocation
  - Overvalued securities can raise capital too cheaply
  - Undervalued securities may pass up profitable opportunities because cost of capital is too high
  - Efficient market ≠ perfect foresight market

Implications of EMH

Summary

1. Trust market prices
   - Buying and selling assets are zero NPV activities.
   - Market prices give best estimate of value for projects.
   - Firms receive “fair” value for securities they issue.
2. Read into prices
   - If market price reflects all available information, we can extract information from prices.

Implications of EMH

Summary

3. There are no financial illusions
   - Market price reflects value only from an asset's payoff.
     It is not easy to trick the market.
4. Value comes from economic rents such as
   - superior information
   - superior technology
   - access to cheap resources
   - etc.

How Efficient are Financial Markets?

- Bulk of evidence is that overall markets are efficient, i.e., the marginal benefits of acting on information (the profit to be made) do not exceed the marginal costs.
- So, do not blindly follow your broker's stock tips, they may be useless, and financially oriented online bulletins and chat-room recommendations may even contain misleading information!!!
- Still, There seem to be enough anomalies to warrant search for underpricing: i.e., from technical analysis.

How Efficient are Financial Markets?

Conclusion

- (Quote from “Efficiently Inefficient” by Pedersen) Markets are as neither perfectly efficient nor completely inefficient. Rather, they are inefficient enough that money managers can be compensated for their costs through the profits of their trading strategies and efficient enough that the profits after costs do not encourage additional active investing.

Exercise Problem 1

Suppose that, after conducting an analysis of past stock prices, you come up with the following observations. Which would appear to contradict the weak form of the efficient market hypothesis? Explain.

a. The average rate of return is significantly greater than zero.

b. The correlation between the return during a given week and the return during the following week is zero.

c. One could have made superior returns by buying stock after a 10% rise in price and selling after a 10% fall.

d. One could have made higher-than-average capital gains by holding stocks with low dividend yields.

Exercise Problem 2

Which of the following (hypothetical) observations would most contradict the proposition that the stock market is weakly efficient? Explain.

a. Over 25% of mutual funds outperform the market on average.

b. Insiders earn abnormal trading profits.

c. Every January, the stock market earns abnormal returns.

Exercise Problem 3

An index model regression applied to past monthly returns in Ford's stock price produces the following estimates, which are believed to be stable over time:

$$r_F = 0.10\% + 1.1 r_M$$

If the market index subsequently rises by 8% and Ford's stock price rises by 7%, what is the abnormal change in Ford's stock price?