International Management Studies

3rd Class

(September 24, 2024)

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2. Efficient Market Hypothesis in the International Finance Markets and How to Invest to Earn Excess Returns

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I. Efficient Market Hypothesis and How to earn Excess Return in the Investment

Efficient market hypothesis was introduced by Eugene Fama in 1966.

Two main claims are associated with the Efficient Market Hypothesis (EMH).

First of all, the price changes are nearly random in the financial markets. Secondly, the prices ***reflect*** the economic fundamentals.

I. Efficient Market Hypothesis

What Is the Efficient Market Hypothesis (EMH)?

The efficient market hypothesis (EMH), alternatively known as the efficient market theory, is a hypothesis that states that share prices reflect all available information and consistent alpha generation is impossible.

According to the EMH, stocks always trade at their fair value on exchanges, making it impossible for investors to purchase undervalued stocks or sell stocks for inflated prices.[1] Therefore, it should be impossible to outperform the overall market through expert stock selection or market timing, and the only way an investor can obtain higher returns is by purchasing riskier investments.

Introduction

- An efficient capital market is a market that is efficient in processing information.
- In other words, the market **quickly** and **correctly** adjusts to new information.
- In an information of efficient market, the prices of securities observed at any time are based on "correct" evaluation of all information available at that time.
- Therefore, in an efficient market, prices immediately and fully reflect available information.

KEY TAKEAWAYS

- The efficient market hypothesis (EMH) or theory states that share prices reflect all information.
- The EMH hypothesizes that stocks trade at their fair market value on exchanges.
- Proponents of EMH posit that investors benefit from investing in a low-cost, passive portfolio.
- Opponents of EMH believe that it is possible to beat the market and that stocks can deviate from their fair market values.

Understanding the Efficient Market Hypothesis (EMH)

Although it is a cornerstone of modern financial theory, the EMH is highly controversial and often disputed. Believers argue it is pointless to search for undervalued stocks or to try to predict trends in the market through either fundamental or technical analysis.

Theoretically, neither technical nor fundamental analysis can produce risk-adjusted excess returns (alpha) consistently, and only inside information can result in outsized risk-adjusted returns.[1]

Weak, semi-strong, and strong-form tests [edit]

In Fama's influential 1970 review paper, he categorized empirical tests of efficiency into "weak-form", "semi-strong-form", and "strong-form" tests.[2]

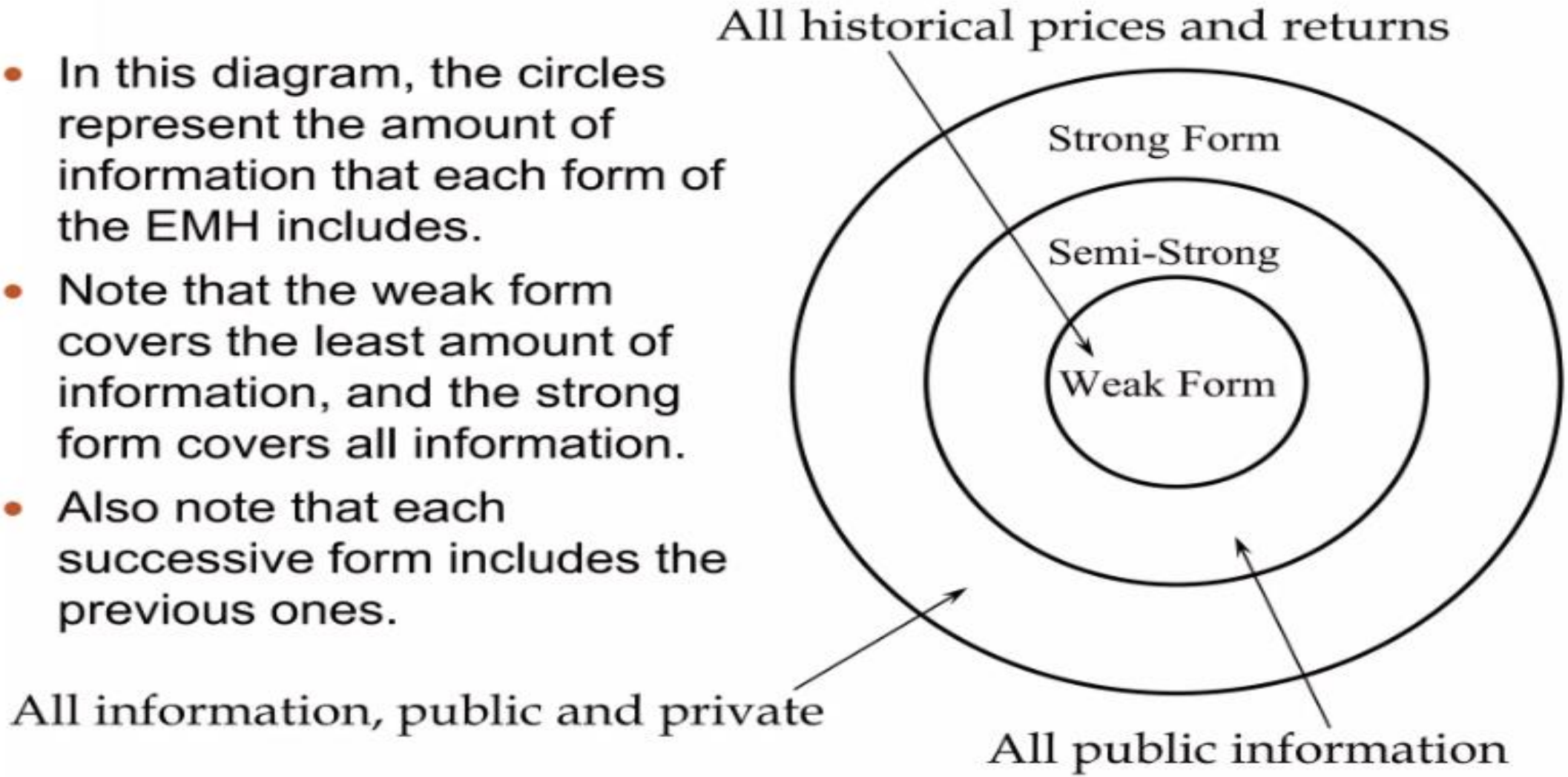
These categories of tests refer to the information set used in the statement "prices reflect all available information." Weak-form tests study the information contained in historical prices. Semi-strong form tests study information (beyond historical prices) which is publicly available. Strong-form tests regard private information.[2]

The Efficient Markets Hypothesis

- The Efficient Markets Hypothesis (EMH) is made up of three progressively stronger forms:
  - Weak Form
  - Semi-strong Form
  - Strong Form

The EMH Graphically

- In this diagram, the circles represent the amount of information that each form of the EMH includes.
- Note that the weak form covers the least amount of information, and the strong form covers all information.
- Also note that each successive form includes the previous ones.



The Weak Form

- The weak form of the EMH says that past prices, volume, and other market statistics provide no information that can be used to predict future prices.
- If stock price changes are random, then past prices cannot be used to forecast future prices.
- Price changes should be random because it is information that drives these changes, and information arrives randomly.
- Prices should change very quickly and to the correct level when new information arrives (see next slide).
- This form of the EMH, if correct, repudiates technical analysis.
- Most research supports the notion that the markets are weak form efficient.

The Semi-strong Form

- The semi-strong form says that prices fully reflect all publicly available information and expectations about the future.
- This suggests that prices adjust very rapidly to new information, and that old information cannot be used to earn superior returns.
- The semi-strong form, if correct, repudiates fundamental analysis.
- Most studies find that the markets are reasonably efficient in this sense, but the evidence is somewhat mixed.

The Strong Form

- The strong form says that prices fully reflect all information, whether publicly available or not.
- Even the knowledge of material, non-public information cannot be used to earn superior results.
- Most studies have found that the markets are not efficient in this sense.

Summary of Tests of the EMH

- Weak form is supported, so technical analysis cannot consistently outperform the market.
- Semi-strong form is mostly supported , so fundamental analysis cannot consistently outperform the market.
- Strong form is generally not supported. If you have secret ("insider") information, you CAN use it to earn excess returns on a consistent basis.
- Ultimately, most believe that the market is very efficient, though not perfectly efficient. It is unlikely that any system of analysis could consistently and significantly beat the market (adjusted for costs and risk) over the long run.

II. Valuation Methods

1. Relative Valuation Methods

2. Absolute Valuation Methods

In stock investment, **1) relative valuation and 2) absolute valuation** are two distinct approaches to determining the value of a company or stock. Here's how they differ:

1. Relative Valuation
This approach compares a company's value to that of other similar companies or industry benchmarks. It relies on market-based metrics like:

- Price-to-Earnings (P/E) ratio: Compares the stock's price to its earnings.
- Price-to-Book (P/B) ratio: Compares the stock price to its book value.
- EV/EBITDA ratio: Compares a company's enterprise value to its earnings before interest, taxes, depreciation, and amortization.
- Price-to-Sales (P/S) ratio: Compares the stock's price to it salaes.

In relative valuation, investors look at how a company is priced compared to its peers, believing that similar companies should trade at similar multiples. It's useful when comparing businesses in the same industry.

2. Absolute Valuation

Absolute valuation tries to determine the intrinsic value of a company by focusing on its fundamentals, independent of market conditions. Methods include:

- Discounted Cash Flow (DCF): Calculates the present value of a company's expected future cash flows.
- Dividend Discount Model (DDM): Evaluates a company based on the present value of its future dividend payments.

This method aims to determine what a stock **should be worth**, based on its own financial performance, without comparing it to others.

<Key Difference>:
- Relative valuation relies on comparisons with other companies.
- Absolute valuation focuses on a company's intrinsic worth based on its own data.

Both approaches are used to make informed decisions, often complementing each other depending on the investor's strategy.

Cases of relative valuation

www.money.cnn.com

www.inveting.com

www.bloomberg.com

About NVDA

NVIDIA Corp. engages in the design and manufacture of computer graphics processors, chipsets, and related multimedia software. It operates through the following segments: Graphics Processing Unit (GPU) and Compute & Networking. The Graphics segment includes GeForce GPUs for gaming and PCs, the GeForce NOW game streaming service and related infrastructure, Quadro and NVIDIA RTX GPUs for enterprise workstation graphics, virtual GPU, or vGPU, software for cloud-... **read more**

Sector	Electronic Technology
Industry	Semiconductors
Employees	29,600
Founded	1993

Key stock statistics

1-day range	117.60 – 119.95
52-week range	39.23 – 140.76
Market cap	2.92T
P/E ratio	55.94x
Next earnings date	Nov 13, 2024
Dividend yield	0.03%
Ex-dividend date	Sep 11, 2024
Dividend pay date	Oct 2, 2024

Insights Learn

Market cap: $2922.50B

A market capitalization above $200 billion places NVDA in the **mega-capitalization** category.

Apple 222.50 -0.27 (-0.12%)

consecutive years

Prev. Close	222.77	Market Cap	3.38T	P/E Ratio	33.71
Open	223.58	Shares Outstanding	15,204,137,000	Return on Assets	30.6%
Day's Range	221.91 - 224.04	Revenue	385.6B	Return on Equity	160.6%
52 wk Range	164.07 - 237.23	Net Income	101.96B	Gross Profit Margin	46.0%
Volume	36,766,619	EPS	6.6	Price/Book	50.77
Average Vol. (3m)	57,187,577	EPS Growth Forecast	Unlock	EBITDA	Unlock
1-Year Change	26.61%	Next Earnings Date	Oct 24, 2024	EV/EBITDA	Unlock
Book Value / Share	Unlock	Dividend (Yield)	1.00 (0.45%)	Beta	1.24
Fair Value	Unlock	Dividends Payment Streak	Unlock		
Fair Value Upside	Unlock	RSI(14)	50.46		

III. Time Value of Money

Time Value of Money (TVM)

['tīm 'val-(,)yü əv 'mə-nē]

The concept that a sum of money is worth more now than the same sum will be at a future date due to its earnings potential in the interim.

Investopedia

Time Value of Money Formula

The basic time value of money formula doesn't calculate "TVM" itself. Instead, it shows the change in the value of money over time. It calculates the future value of a sum of money based on:

- Its present value
- Interest rate
- Number of compounding periods per year
- Number of years

Based on these variables, the TVM formula is:

$$FV = PV\left(1 + \frac{i}{n}\right)^{n \times t}$$

where:

$FV = \text{Future value of money}$

$PV = \text{Present value of money}$

$i = \text{Interest rate}$

$n = \text{Number of compounding periods per year}$

$t = \text{Number of years}$

Example

Assume a sum of $10,000 is invested for one year at 10% interest compounded annually. The future value of that money is:

$$\begin{aligned} FV &= \$10,000 \times \left(1 + \frac{10\%}{1}\right)^{1\times 1} \\ &= \$11,000 \end{aligned}$$

The formula can also be rearranged to find the value of the future sum in present-day dollars. For example, the present-day dollar amount compounded annually at 7% interest that would be worth $5,000 one year from today is:

$$\begin{aligned} PV &= \left[\frac{\$5,000}{\left(1 + \frac{7\%}{1}\right)}\right]^{1\times 1} \\ &= \$4,673 \end{aligned}$$

Future Value Basics

If you choose Option A and invest the total amount at a simple annual rate of 4.5%, the future value of your investment at the end of the first year is $10,450. We arrive at this sum by multiplying the principal amount of $10,000 by the interest rate of 4.5% and then adding the interest gained to the principal amount:

$$\$10,000 \times 0.045 = \$450$$

$$\$450 + \$10,000 = \$10,450$$

You can also calculate the total amount of a one-year investment with a simple manipulation of the above equation:

$$OE = (\$10,000 \times 0.045) + \$10,000 = \$10,450$$

where:

$$OE = \text{Original equation}$$

$$\text{Manipulation} = \$10,000 \times [(1 \times 0.045) + 1] = \$10,450$$

$$\text{Final Equation} = \$10,000 \times (0.045 + 1) = \$10,450$$

Effects of Compounding Periods on FV

The number of compounding periods has a dramatic effect on the TVM calculations. Taking the $10,000 example above, if the number of compounding periods is increased to quarterly, monthly, or daily, the ending future value calculations are:

- Quarterly Compounding:

$$FV = \$10,000 \times \left(1 + \frac{10\%}{4}\right)^{4\times 1} = \$11,038$$

- Monthly Compounding:

$$FV = \$10,000 \times \left(1 + \frac{10\%}{12}\right)^{12\times 1} = \$11,047$$

- Daily Compounding:

$$FV = \$10,000 \times \left(1 + \frac{10\%}{365}\right)^{365\times 1} = \$11,052$$

This shows that the TVM depends not only on the interest rate and time horizon but also on how many times the compounding calculations are computed each year.

Present Value Basics

If you received $10,000 today, its present value would, of course, be $10,000 because the present value is what your investment gives you now if you were to spend it today. If you were to receive $10,000 in one year, the present value of the amount would not be $10,000 because you do not have it in your hand now, in the present.

To find the present value of the $10,000 you will receive in the future; you need to pretend that the $10,000 is the total future value of an amount you invested today. In other words, to find the present value of the future, $10,000, we need to find out how much we would have to invest today in order to receive that $10,000 in one year.

To calculate the present value or the amount that we would have to invest today, you must subtract the (hypothetical) accumulated interest from the $10,000. To achieve this, we can discount the future payment amount ($10,000) by the interest rate for the period. In essence, all you are doing is rearranging the future value equation above so that you may solve for present value (PV). The above future value equation can be rewritten as follows:

$$\mathrm{PV} = \frac{\mathrm{FV}}{(1+i)^n}$$

An alternate equation would be:

$$\mathrm{PV} = \mathrm{FV} \times (1+i)^{-n}$$

where:

$\mathrm{PV} = \text{Present value (original amount of money)}$

$\mathrm{FV} = \text{Future value}$

$i = \text{Interest rate per period}$

$n = \text{Number of periods}$

Calculating TVM Manually: An Example

Imagine you're a key decision-maker in your organization and two projects are proposed:

- Project A is predicted to bring in $2 million in one year.
- Project B is predicted to bring in $2 million in two years.

Before running the calculation, you know that the time value of money states the $2 million brought in by Project A is worth more than the $2 million brought in by Project B, simply because Project A's earnings are predicted to happen sooner.

To prove it, here's the calculation to compare the present value of both projects' predicted earnings, using an assumed four percent discount rate:

Project A:

$$PV = FV / [\ 1 + (i / n)\ ]^{(n \times t)}$$

$$PV = 2{,}000{,}000 / [\ 1 + (.04 / 1)\ ]^{(1 \times 1)}$$

$$PV = 2{,}000{,}000 / [\ 1 + .04\ ]^{1}$$

$$PV = 2{,}000{,}000 / 1.04$$

$$PV = \$1{,}923{,}076.92$$

Project B:

$$PV = FV / [\ 1 + (i / n)\ ]^{(n \times t)}$$

$$PV = 2{,}000{,}000 / [\ 1 + (.04 / 1)\ ]^{(1 \times 2)}$$

$$PV = 2{,}000{,}000 / [\ 1 + .04\ ]^{2}$$

$$PV = 2{,}000{,}000 / 1.04^{2}$$

$$PV = 2{,}000{,}000 / 1.0816$$

$$PV = \$1{,}849{,}112.43$$

Uneven Cash Flows

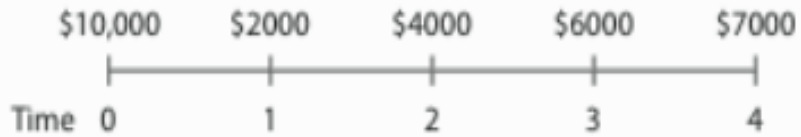


Figure 1.9: Uneven Cash Flows

Consider the cash flow stream shown in Figure 1.9. Even though the cash flows all come at even intervals, because they are not of equal size this cannot be considered an annuity. It is also not a perpetuity because of its finite length. This cash flow stream falls in the broad category called *uneven cash flows*. Unfortunately, there is no simplified method for finding the future or present value of an uneven cash flow stream. When all of the cash flows are different, we have to discount or compound each individual flow separately using the present/future value approach that we used for single sums and then add them together. For example, to find the present value of the cash flow stream shown in Figure 1.9 at a 10% discount rate, we would perform the calculations shown in Table 1.1.

Table 1.1

Present Value of Uneven Cash Flows

Period	CF	Keystrokes	PV (CF)
0	10,000	None needed (time 0 CF)	$10,000.00
1	2,000	2000 FV, 1 N, 10 I/Y; solve PV	1,818.18
2	4,000	4000 FV, 2 N, 10 I/Y; solve PV	3,305.79
3	6,000	6000 FV, 3 N, 10 I/Y; solve PV	4,507.89
4	7,000	7000 FV, 4 N, 10 I/Y; solve PV	4,781.09
PV of Cash Flow Streams: Sum PV of CFs 0–4			$24,412.94

Question as to the Market Efficient Theory

Question regarding Time Value of Money