



# Invest to Win

認識投資理論、  
找尋贏錢方程式

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**2021-10-20**

# **Outline :**

- 1. Defining Investment**
- 2. Unfolding Investment Theories**
- 3. Understanding Analytical Tools**
- 4. Applying Investment Strategies**
- 5. Deploying Trading Tactics**
- 6. Summary**



# Defining Investment

# The Dow Jones Industrial Average: 1896-2016

Human Innovation Always Trumps Fear

Log Scale

30000

20000

10000

8000

5000

4000

3000

2000

1000

800

500

400

300

200

100

80

60

50

40

30



- 1 1896 First Ford Automobile -- Assembled in Detroit
- 2 1897 Boston First Subway / Klondike Gold Rush
- 3 1898 The Spanish American War
- 4 1899 First Hague Conference
- 5 1900 Congress Establishes the Gold Standard
- 6 1901 McKinley Shot, T. Roosevelt becomes President
- 7 1902 Isthmian Canal Act -- Authorizes Panama Canal
- 8 1903 Wright Brothers -- First Powered Flights
- 9 1904 Russo-Japanese War
- 10 1905 Life Insurance Scandals -- Reform Legislation
- 11 1906 San Francisco Earthquake
- 12 1907 Financial Panic / Stock Market Crash
- 13 1908 Model T Ford is Introduced
- 14 1909 Admiral Robert E. Peary -- Reaches the North Pole
- 15 1910 Democrats Control House -- First Time Since 1894
- 16 1911 Supreme Court -- Orders Standard Oil Co. Dissolved
- 17 1912 Titanic Sinks
- 18 1913 First Income Tax -- 16th Amendment
- 19 1914 WW I -- in Europe / Federal Reserve Organized
- 20 1915 Lusitania -- Sunk by German Submarine
- 21 1916 Emergency Revenue Act -- Includes Estate Tax
- 22 1917 U.S. Formally Declares War on Germany
- 23 1918 World War I -- Ends / Daylight Savings Time
- 24 1919 18th Amendment, Prohibition -- Ratified
- 25 1920 19th Amendment, Women's Suffrage -- Ratified
- 26 1921 The First Restrictive Immigration Act
- 27 1922 Federal Narcotics Control Board -- "War on Drugs"
- 28 1923 First Transcontinental Flight / Japan Earthquake
- 29 1924 Ford Manufactures 10 Millionth Automobile
- 30 1925 "Scopes Monkey Trial"
- 31 1926 Revenue Act -- Reduces Income & Estate Taxes
- 32 1927 Lindbergh - First Nonstop Flight - New York to Paris
- 33 1928 Amelia Earhart - First Woman to Fly Atlantic
- 34 1929 Financial Panic -- Stock Market Crash -- Depression
- 35 1930 Smoot-Hawley Tariff Act

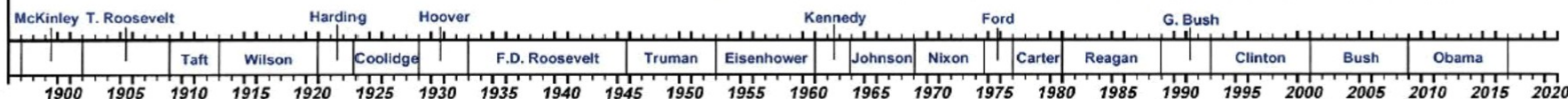
- 36 1931 Bank Panic -- Country-Wide Bank Closings
- 37 1932 Lindbergh Kidnaping / Reconstruction Finance Corp.
- 38 1933 The New Deal -- Begins / FDIC Established
- 39 1934 Securities & Exchange Commission -- Established
- 40 1935 Social Security Act -- Passed
- 41 1936 Drought in Western States -- "Dust Bowl"
- 42 1937 Hindenburg -- Destroyed
- 43 1938 The New Deal -- Ends / Fair Labor Standards Act
- 44 1939 World War II -- Begins in Europe / Great Depression
- 45 1940 France Falls -- German Occupation
- 46 1941 Pearl Harbor -- Attacked by Japanese
- 47 1942 Price Controls -- Begin / Battle of Midway / Guadalcanal
- 48 1943 Current Tax Payment Act, Withholding Taxes
- 49 1944 Normandy Invasion
- 50 1945 World War II -- Ends / Cold War -- Begins
- 51 1946 Stock Market Crash / Price Controls -- End
- 52 1947 Taft-Hartley Act / Marshall Plan
- 53 1948 Truman Upsets Dewey -- For Presidency
- 54 1949 Foreign Currencies Devalued
- 55 1950 The Korean War -- Begins
- 56 1951 First Commercial Color TV Broadcast
- 57 1952 Steel Workers Strike -- Despite Government Intervention
- 58 1953 The Korean War -- Ends / Wage & Salary Controls End
- 59 1954 St. Lawrence Seaway Bill -- Passed
- 60 1955 President Eisenhower -- Suffers a Heart Attack

- 61 1956 Suez Canal -- Crisis
- 62 1957 Sputnik I
- 63 1958 U.S. -- First Satellite Launched
- 64 1959 St. Lawrence Seaway -- Opened
- 65 1960 First Japanese Cars, Exported to U.S. / U2 Spy Plane Shot Down
- 66 1961 The Berlin Wall -- Built / Bay of Pigs -- Debacle
- 67 1962 The Cuban Missile Crisis / Steel Price Rollback
- 68 1963 John F. Kennedy Assassinated
- 69 1964 Vietnam War Begins -- Gulf of Tonkin Resolution
- 70 1965 The Great Inflation -- Begins
- 71 1966 Medicare -- Begins / U.S. Bombs North Vietnam -- First Time
- 72 1967 The Six Day War
- 73 1968 Tet Offensive / R.F. Kennedy & M.L. King -- Assassinated
- 74 1969 Apollo 11 -- U.S.A. on the Moon
- 75 1970 U.S. & South Vietnamese Invade Cambodia / Kent State

- 76 1971 Wage & Price Controls
- 77 1972 Watergate -- Break-in / Munich Olympics Massacre
- 78 1973 U.S. Involvement in Vietnam -- Ends / Arab Oil Embargo
- 79 1974 President Nixon Resigns / ERISA Act -- Signed
- 80 1975 Saigon -- Falls / May Day -- Ends Fixed Commissions
- 81 1976 U.S. Bicentennial / Lockheed Aircraft -- Bribe Scandal
- 82 1977 Panama Canal Treaty -- Control to Panama in 2000
- 83 1978 Humphrey-Hawkins -- "Full Employment" Bill
- 84 1979 Three Mile Island -- Accident / Iran Hostage Crisis
- 85 1980 Iraq Invades Iran -- War / Hunt Brothers Silver Crisis
- 86 1981 Tax Cut -- Passed / Space Shuttle / President Reagan -- Shot
- 87 1982 Penn Square Bank -- Closed by Regulators / Falkland Islands War

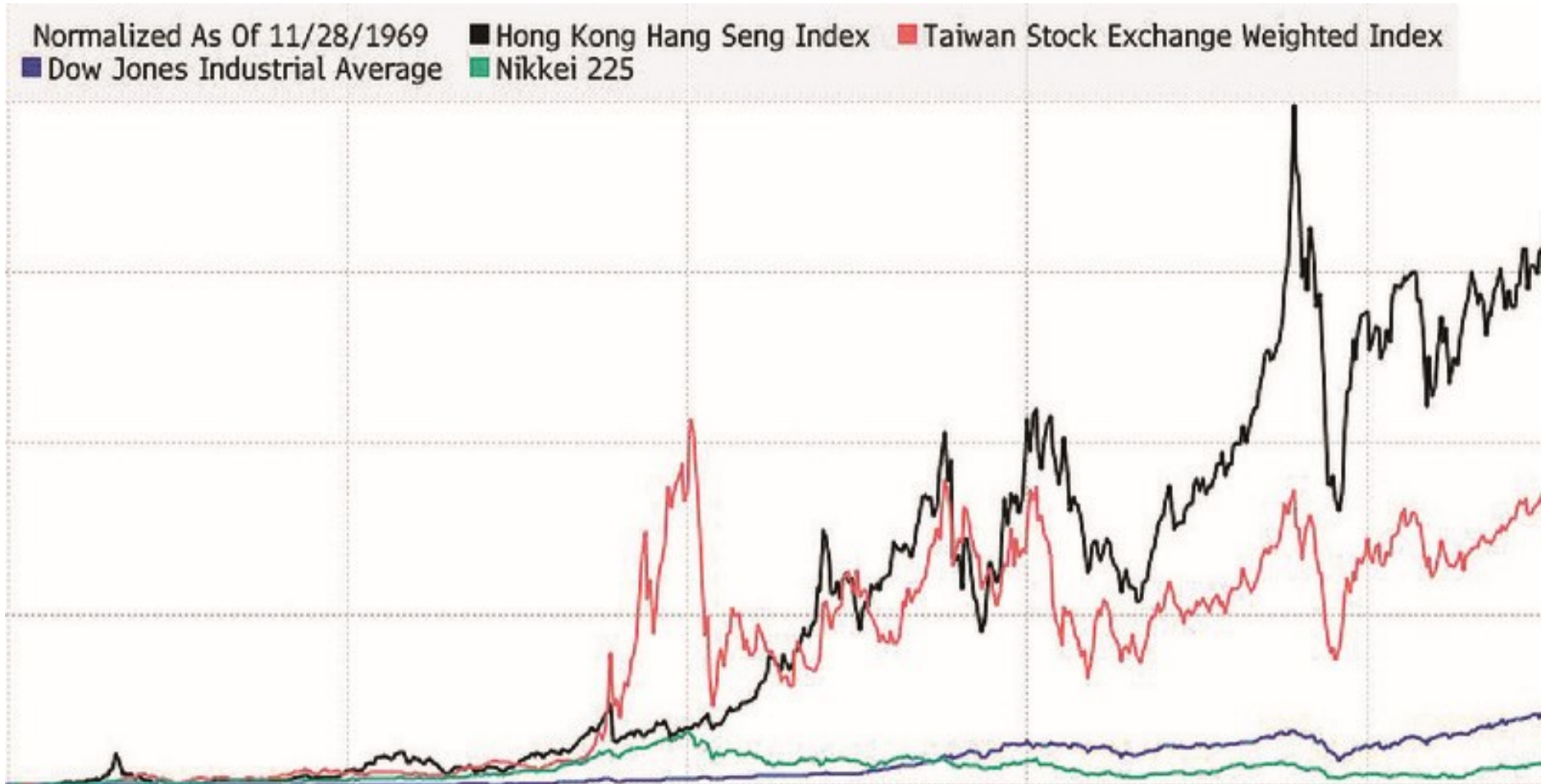
- 88 1983 Terrorist Bombing of U.S. Barracks -- Beirut / Grenada Invasion
- 89 1984 Run on Continental Bank
- 90 1985 Gramm-Rudman Act / U.S. Becomes a Debtor Nation
- 91 1986 Iran-Contra Affair / U.S. Attacks Libya / Chernobyl Accident
- 92 1987 Financial Panic / Stock Market Crash / Iraq Attacks USS STARK
- 93 1988 Terrorists Bomb N.Y. Bound Airliner -- Lockerbie, Scotland
- 94 1989 The Berlin Wall -- Opens / U.S. Invades Panama
- 95 1990 Iraq Invades Kuwait / German Unification
- 96 1991 The Gulf War / Soviet Union Collapse
- 97 1992 The Cold War -- Ends / Civil War in Bosnia
- 98 1993 Russian Revolt / World Trade Center -- Bombed
- 99 1994 Orange County Bankruptcy / NAFTA Instituted
- 100 1995 Oklahoma City -- Murrah Federal Building, Bombed
- 101 1996 Alan Greenspan's "Irrational Exuberance" Speech
- 102 1997 Asian Currency Crisis / Hong Kong & Global Stock Market Rout
- 103 1998 U.S. Intervenes to Support The Yen / African Embassies Bombed
- 104 1999 NATO Bombs Serbia / Y2K -- Millenium Scare / Columbine
- 105 2000 Bush - Gore Election Crisis / Terrorist Attack on USS COLE
- 106 2001 Terrorist Attack on World Trade Center & Pentagon / Enron
- 107 2002 War on Terror / Turmoil in the Middle East / Corporate Misconduct
- 108 2003 Iraq - Weapons Inspections / War in Iraq
- 109 2004 Global War on Terror
- 110 2005 Record High Oil Prices / Hurricane Katrina
- 111 2006 Housing Decline / Nuclear Weapons - North Korea & Iran
- 112 2007 Subprime Mortgage / Credit Debacle
- 113 2008 Credit Crisis / Financial Institution Failures
- 114 2009 War on Terror / Climate Debate / Healthcare
- 115 2010 Gulf Oil Spill / European Union Crisis / Massive Debt
- 116 2011 Debt Ceiling Crisis / U.S. Credit Downgrade
- 117 2012 European Debt / U.S. Fiscal Cliff
- 118 2013 Boston Bombing / Government Shutdown / NSA Leaks
- 119 2014 Rise of ISIS / Police Protests / Oil Price Decline
- 120 2015 Terror Attacks / Refugee Crisis / China Slowdown / Fed Rate Hike
- 121 2016 Brexit / Cuban Embassy Opened / Elections

VirtueofSelfishInvesting.com



# 50 years of Hang Seng Index (1969-2019)

Hang Seng Index returned 16700% in this period (annualized return 10.8%)



# Definition of Investment

- **Investment is the commitment of current financial resources in order to achieve higher gains in the future.**
- **The objectives: safety, income, capital gain, preserve purchasing power, get rich, ...**
- **Investment is decision making under uncertainty – there is calculated risk, no sure win**
- **The assets: cash, bonds, stocks, financial instruments, properties, artworks, antiques, human beings, ...**

**We limit the discussion to securities, esp stocks**

# Definition of Investment

- **2 stages of investment process:**
  - ✓ **Valuation - Decide on the future performances (risks, returns, comovements) of available securities;**
  - ✓ **Portfolio Mix - Design and choice of portfolio mix.**
- **Analytical tools deal with valuation issues, investment theories are more related to portfolio construction.**



# **Unfolding Investment Theories**



# **Economic Theories of Personal Investment**

- **Life Cycle Theories of Savings and Consumption**
  - ✓ **The life-cycle hypothesis (Modigliani and Brumberg, 1954):**

**an individual attempts to maximize his utility (personal well-being) by balancing a lifetime stream of earnings with a lifetime pattern of consumption.**
  - ✓ **The permanent income hypothesis (Friedman, 1957);**
  - ✓ **The relative income hypothesis (Dusenberry, 1949)**

# **Dow Theory (1896) of Technical Analysis**

- **The Dow Theory is a technical analysis framework that predicts the market is in an upward trend if one of its averages (DJIA) advances above a previous important high, accompanied or followed by a similar advance in the other average (DJTA).**
- **3 market movements – main movement, medium swing, short swing**
- **3 phases - accumulation, public participation (or absorption), distribution**
- **Question: Is it really a portfolio theory?**

# Theories based on Rational Expectations

- **The premise: individuals base their decisions on human rationality, information available to them, and their past experience.**
  - ✓ **Rational expectation is a major macroeconomic topic**
- **A mainstream macroeconomic theory, with contributors being Nobel prize laureates in Economic Sciences**
  - ✓ **Robert E. Lucas (1995), Thomas John Sargent (2011)**

# Theories based on Rational Expectations

## ➤ **Modern Portfolio Theory (MPT)**

- ✓ **Proposed by Harry Markowitz in 1952, awarded Nobel prize in 1990**
- ✓ **The premise:**
  1. **investors are risk averse, and prefer a portfolio with higher returns at a given risk level, or lower risk at a higher expected return**
  2. **Investment risk can be reduced by diversifying a portfolio through individual, unrelated securities**

# Theories based on Rational Expectations

## ➤ **Modern Portfolio Theory**

- ✓ **2 types of risks – systematic risk (market risk) which an investor has to bear, unsystematic risk (specific risk, idiosyncratic risk) which can be reduced by diversification**
- ✓ **investment risk is measured by standard deviation of the returns for a number of observations.**
- ✓ **Co-movements of assets are measured by the pairwise correlation of return changes.**

## The formulation is a convex quadratic programming problem:

A general Markowitz's portfolio with practical constraints could be:

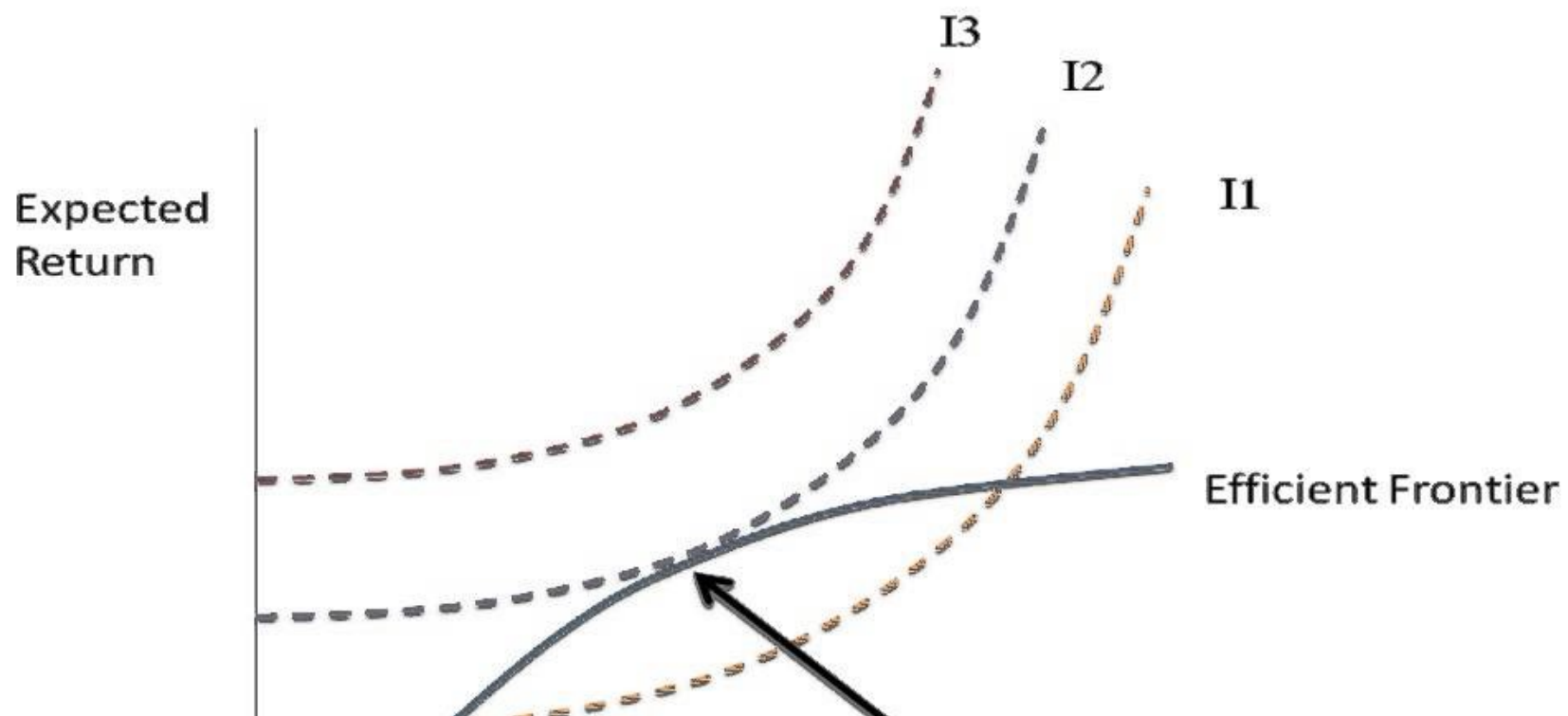
$$\begin{array}{ll} \underset{\mathbf{w}}{\text{maximize}} & \mathbf{w}^T \boldsymbol{\mu} - \lambda \mathbf{w}^T \boldsymbol{\Sigma} \mathbf{w} \\ \text{subject to} & \mathbf{w}^T \mathbf{1} = 1 \quad \text{budget} \\ & \mathbf{w} \geq \mathbf{0} \quad \text{no shorting} \\ & \|\mathbf{w}\|_1 \leq \gamma \quad \text{leverage} \\ & \|\mathbf{w} - \mathbf{w}_0\|_1 \leq \tau \quad \text{turnover} \\ & \|\mathbf{w}\|_\infty \leq u \quad \text{max position} \\ & \|\mathbf{w}\|_0 \leq K \quad \text{sparsity} \end{array}$$

where:

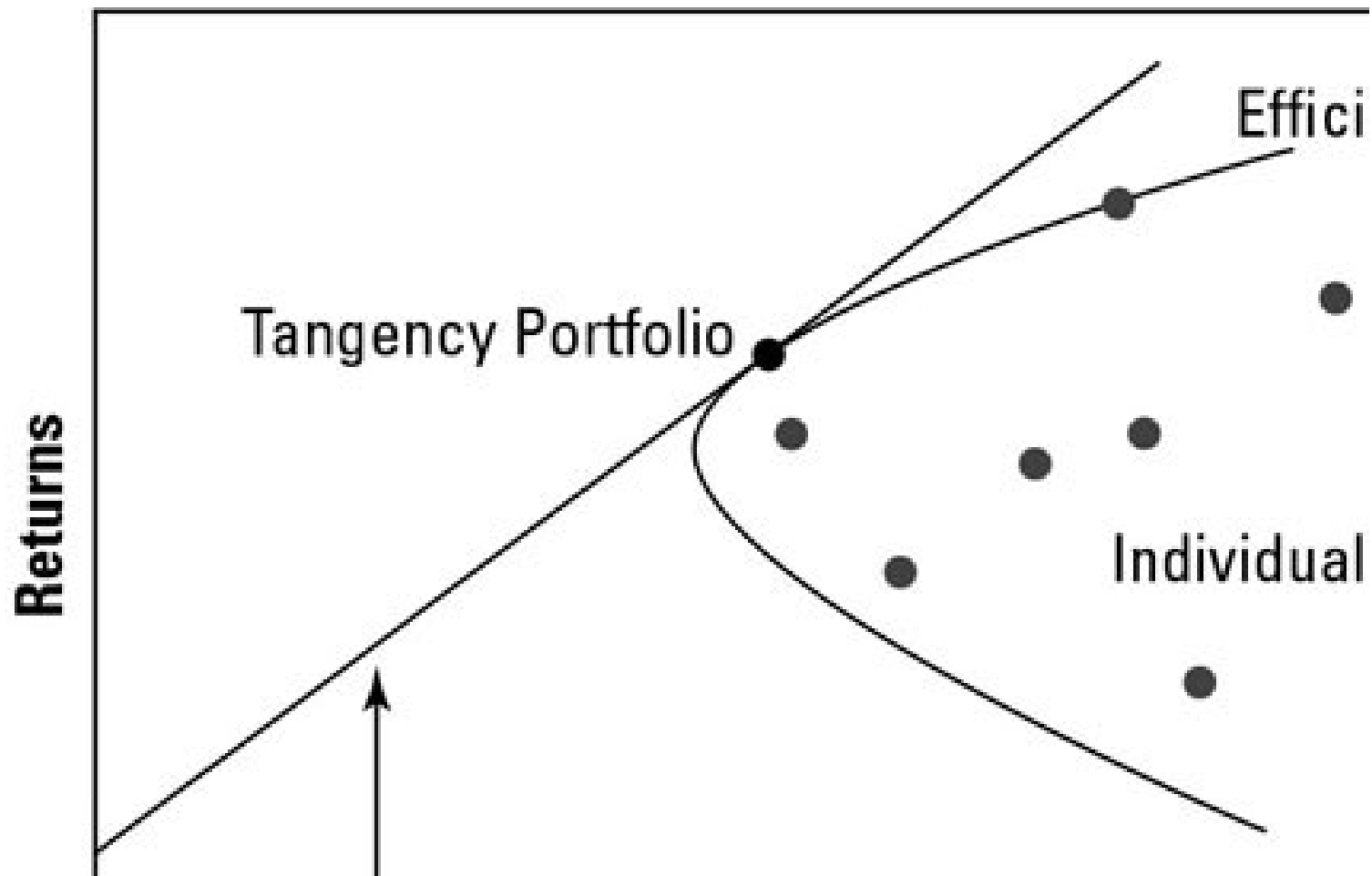
- $\gamma \geq 1$  controls the amount of shorting and leveraging

## Optimal Portfolio of risky assets for an investor:

### Finding the Best Portfolio – $\mu$ Borrowing or Lending



**Assuming investors' risk tolerance are the same, then the Optimal Portfolio of risky and risk-free assets with borrowing are on the CAL line**





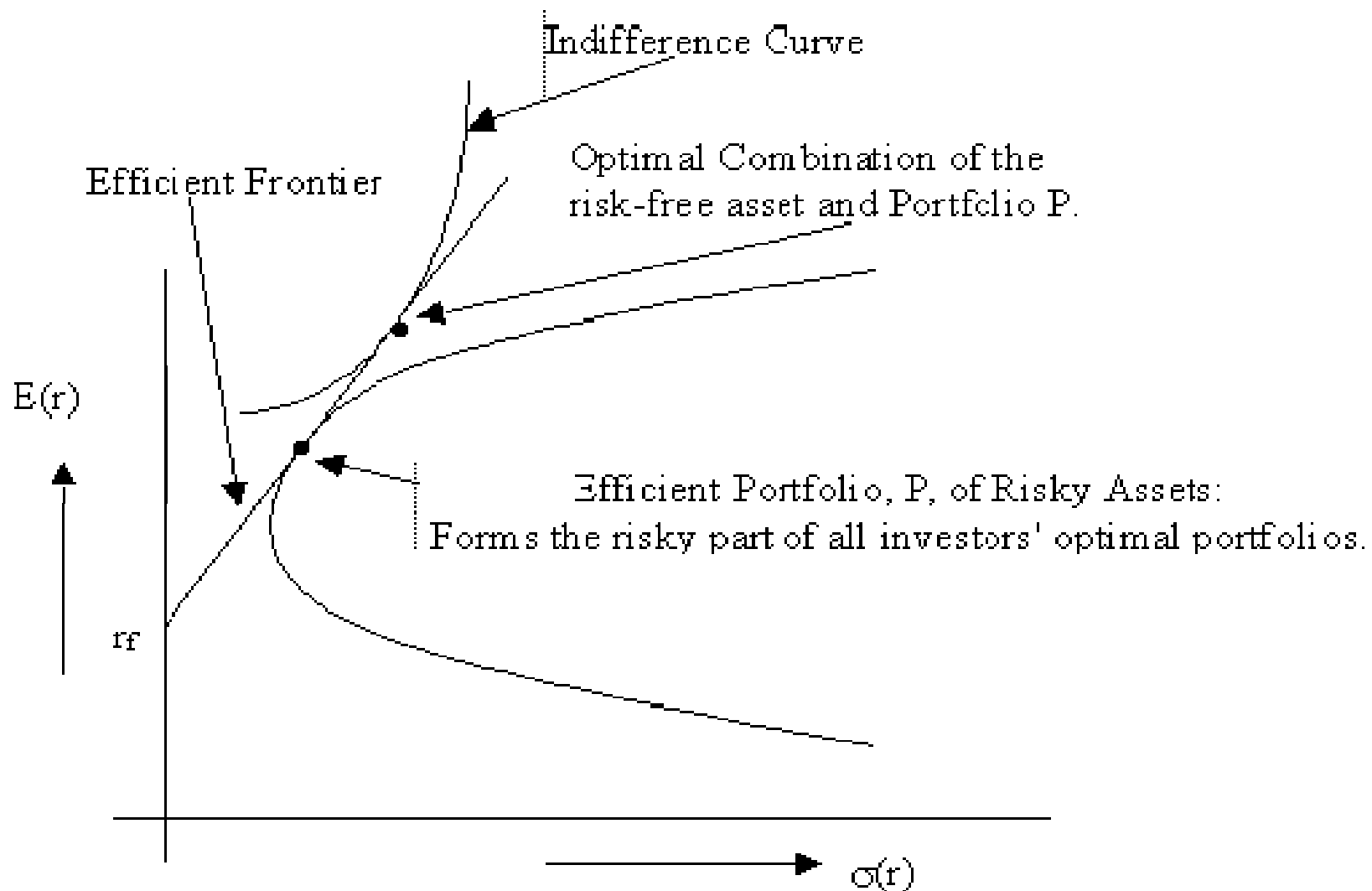


Figure: Optimal Portfolio Selection with Many Risky Assets and a Risk-free Asset

# Theories based on Rational Expectations

## ➤ **Efficient Market Hypothesis (EMH)**

- ✓ **Proposed by Bachelier (1900), Mandelbrot (1963), Samuelson (1965), and Eugene Fama in 1970 (Nobel 2013)**
- ✓ **The premise: stocks trade at their fair market value which reflect all information**
- ✓ **3 forms of market efficiency:**
  - **Weak-form: present share prices fully reflect all the data of past prices**
  - **Semi-strong form: share prices fully reflect all publicly available information in addition to all past information**
  - **Strong form: share prices fully reflect both publically available information and inside information**

# Theories based on Rational Expectations

## ➤ **Efficient Market Hypothesis (EMH)**

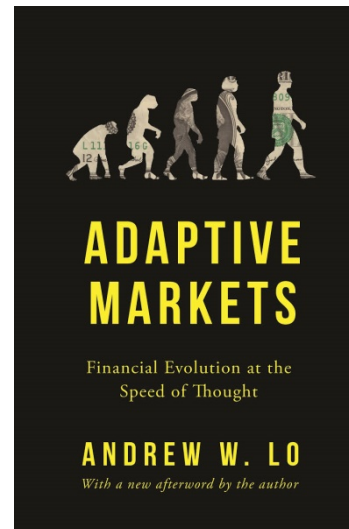
- ✓ **If market is weak-form efficient, technical analysis is of no use**
- ✓ **If market is semi-strong efficient, then an average investor cannot outperform the market**
- ✓ **Most stock markets are semi-strong efficient, including emerging markets**
  - **Stock price movements are random walk (Brownian motion), no serial correlation**
- ✓ **There are rare evidence on existence of strong-form efficient markets.**
- ✓ **Anomalies to market efficiency: calendar effects, investors' cognitive biases**

# Behavioral Finance Theories

- **Prominent advocates: Amos Tversky, Daniel Kahneman (Nobel 2002), Robert Shiller (Nobel 2013), Richard Thaler (Nobel 2017)**
- **Study the effects of psychological, cognitive, emotional, cultural and social factors on the decisions of individuals and institutions**
- **Examples of human biases: Loss Aversion, Herding Mentality, Mental Accounting, Overconfidence, illusion of control, Self Attribution Bias, Hindsight Bias, Confirmation Bias, Narrative Fallacy, Representative Bias, Framing Bias, Anchoring Bias, ...**

# Evolutionary Finance Theory

- **The theory proposes that economic processes evolve and that economic behavior is determined both by individuals and society as a whole.**
- **Theories: Self-organisation, complexity theory, path-finding**
- **Scholars: mostly from Europe, eg. Austrian Kurt Dopfer**

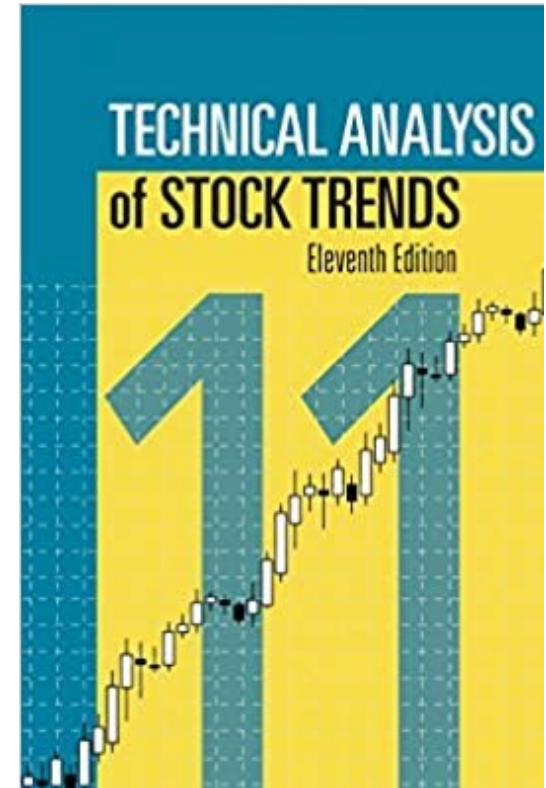




# **Understanding Analytical Tools**

# Technical Analysis

- **A methodology for forecasting the direction of stock prices through the study of past market data, primarily price and volume**
- **Can be dated back to 17<sup>th</sup> century in Holland – “Confusion of Confusions” by Joseph de la Vega**
- **Dow Theory (1986) – most famous one**
- **Reference: “Technical Analysis of Stock Trends (11/e)” by Robert D. Edwards and others**

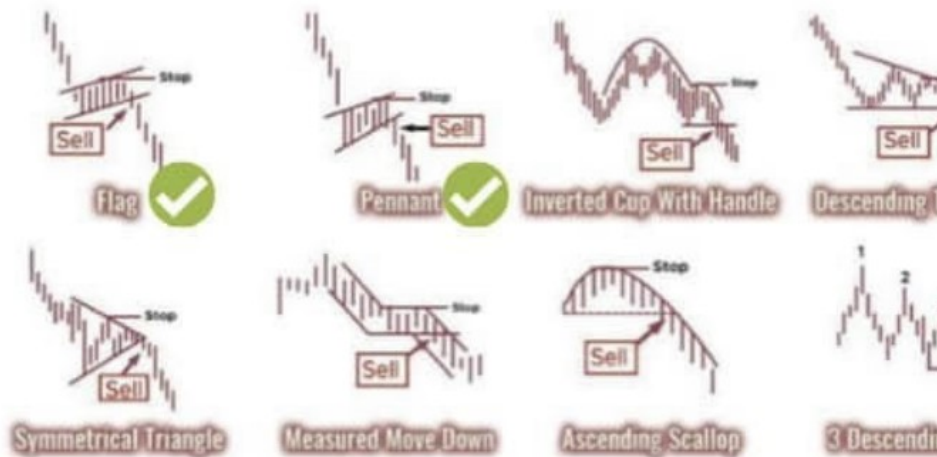


# CHART PATTERNS IN TECHNICAL ANALYSIS — CHEAT SHEET —

## BULLISH PATTERNS (GOING UP)



## BEARISH PATTERNS (GOING DOWN)



## REVERSAL PATTERNS



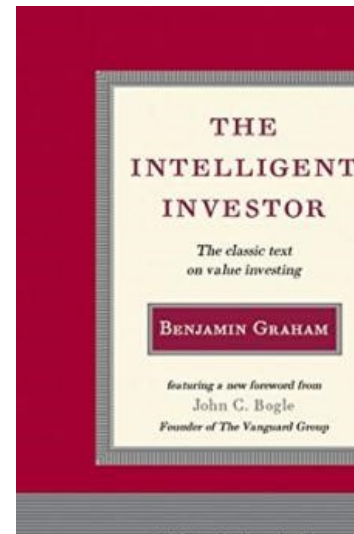
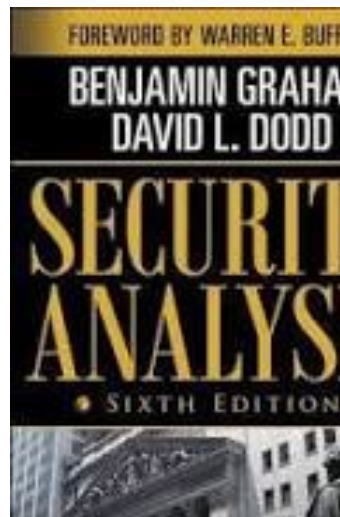


# Fundamental Analysis

- **Fundamental analysis is a method of evaluating the intrinsic value of an asset by examining and analysing the economic, social and financial factors that could influence its price in the future.**
- **If the calculated fair value (intrinsic) is higher than the market price, the stock is deemed to be undervalued and a buy recommendation is given.**
- **Quantitative factors: revenues, earnings, future growth, return on equity, profit margins, and other financial data available in a company's financial statements**
- **Qualitative factors: quality of key executives, management style, entrepreneurship, brand recognition, patents, proprietary technology, etc that cannot be quantified.**

# Fundamental Analysis

- **Widely adopted by professional investors**
- **Usually associated with value investment**
- **Key figures: Benjamin Graham, John Templeton, Warren Buffett**
- **Key publications: Security Analysis (1934), The Intelligent Investor (1949).**



# Fundamental Analysis

- **Modigliani–Miller theorem (Nobel 1985 & 1990) on company value and cost of capital**
  - ✓ 1.  $V_U = V_L$  value of a firm is independent of its cost (equity/bond) structure ;
  - ✓ 2.  $r_E = r_0 + \frac{D}{E}(r_0 - r_D)$ 
    - expected return on equity = expected return on no-leverage firm plus debt-proportional excess return
  
- **Value of a company (DCF Model)**
  - = Present Value of Future Cashflows
  - = Value of No-growth + Present Value of Growth Opportunities
  - = Book Value + PVGO

# Quantitative Analysis

- **Most models are derived from Modern Portfolio Theory**
- **Capital Asset Pricing Model (Treynor 1961, Sharpe 1964, Lintner 1965)**
  - ✓ **William Sharpe was awarded Nobel prize in 1990**

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f)$$

where:

- $E(R_i)$  is the expected return on the capital asset
  - $R_f$  is the risk-free rate of interest such as interest arising from government bonds
  - $\beta_i$  (the *beta*) is the *sensitivity* of the expected excess asset returns to the expected excess market returns
- $$\beta_i = \frac{\text{Cov}(R_i, R_m)}{\text{Var}(R_m)} = \rho_{i,m} \frac{\sigma_i}{\sigma_m}$$
- $E(R_m)$  is the expected return of the market
  - $E(R_m) - R_f$  is sometimes known as the *market premium* (the difference between the expected return on the market and the risk-free rate of return).
  - $E(R_i) - R_f$  is also known as the *risk premium*

# Quantitative Analysis

- **Security Market Line (SML):**

$$\text{SML} : E(R_i) = R_f + \beta_i(E(R_M) - R_f).$$

- **Security Market Line is where “fair value” of securities lie. If the expected return of a security is above the SML, the security is undervalued.**
- **CAPM is a single-factor model for asset pricing**

# Quantitative Analysis

- **Stephen Ross (1976) developed the Arbitrage Pricing Theory, a generalized multi-factor model for asset pricing:**

$$\mathbb{E}(r_j) = r_f + \lambda_{j1}RP_1 + \lambda_{j2}RP_2 + \cdots + \lambda_{jn}RP_n$$

where

- $RP_n$  is the risk premium of the factor,
- $r_f$  is the risk-free rate,

That is, the expected return of an asset  $j$  is a linear function of the asset's sensitivities to the  $n$  factors.

- **The factors can be any economic indicators**

# Quantitative Analysis

## ➤ Fama-French 3-Factor Models (1992)

$$r = R_f + \beta(R_m - R_f) + b_s \cdot SMB + b_v \cdot HML + \alpha$$

- ✓  $r$  is the portfolio's expected rate of return,
- ✓  $R_f$  is the risk-free return rate,
- ✓  $R_m$  is the return of the market portfolio
- ✓ "three factor"  $\beta$  is analogous to the classical  $\beta$  but not equal to it,
- ✓ SMB stands for "Small [market capitalization] Minus Big" and HML for "High [book-to-market ratio] Minus Low"; they measure the historic excess returns of small caps over big caps and of value stocks over growth stocks.

## ➤ The Fama–French three-factor model explains over 90% of the diversified portfolios returns

# Quantitative Analysis

- **Carhart four-factor model (1997): add a momentum factor (MOM), which is long prior-month winners and short prior-month losers**
- **Fama-French 5-Factor Models (2013): add profitability and investment factors**
- **Returns-based style analysis: uses style indices rather than market factors**
  - ✓ Styles: large/small, value/growth etc



# **A.I. Analysis**

- **New developments?**
- **Neural networks v.2?**
- **Algorithmic trading v.2?**
- **Is it for risk-management or price-discovery?**



# Applying Investment Strategies

# Risk Profiling – Know Yourself

- **Risk Profile** – the evaluation of an individual's willingness and ability to take risks
- **Risk Capacity** – the (financial) risk you can afford to take
- **Risk Tolerance** – the (physiological) risk you are willing to take
- **Risk Required** – the (market) risk you need to take in order to (possibly) achieve the expected return



# Set Investment Policy

- **Investment Objectives – return expectation, periodic cash needs**
- **Investment Horizon – how long**
- **Risk tolerance**
- **Investment Constraints - responsible investment (ESG), liquidity needs**
- **Choice of markets, asset classes, and benchmarks**
- **Asset allocation and portfolio construction**
- **Portfolio review and rebalancing**

# Markets and Assets

- **Markets – global vs local, developed vs emerging**
- **Assets – equities, bonds, mutual funds, ETFs, derivatives, precious metals, collections, ...**
- **Industries / Sectors – established vs start-ups, recurrent income type, cyclical business, ...**
- **Companies – blue chips vs SMEs**

# Portfolio Construction

- **Asset allocation - > security selection -> market timing**
- **Heuristic vs optimization**
- **Active vs passive**
- **Index titling vs Core-satellite**

# Market Timing

- **Brinson, Hood and Beebower (1991): attributes of portfolio returns –**
  - 91.5% Asset Allocation**
  - 4.6% Security Selection**
  - 2.1% Market Timing**
  - 1.8% Other Factors**

# Rebalancing

- **Strategic asset allocation – adjust around the “neutral” policy portfolio**
- **Tactical asset allocation – change satellite holdings**
- **Buy and hold vs constant mix vs constant proportion**
  - ✓ **Constant mix – reduce higher return holdings to normal weighting**
  - ✓ **Constant proportion – increase risky holdings when they return more, and vice versa**
    - \$ Stock Investments =  $M \times (TA - F)$
    - where:
    - M = Investment multiplier (More Risk = Higher M)
    - TA = Total portfolio assets
    - F = Allowable floor (minimum safety reserve)



# Lif-cycle Investment

- **Assumes an investor's risk tolerance decreases with age**
- **Start with a “neutral” portfolio defined by age, then reduce the equity weighting over time**
- **Decision on the bond-equity weightings:**
  - "100-minus age" rule
  - “70-minus age" rule
  - Shiller rule – accelerating increase of bond over time, eg. 85% equity at age 25, 71% at age 35, 26% at age 55.



# Deploying Trading Tactics

# Trading Tactics

- **Market timing activities – do they really work?**
- **Trending vs Contrarian – buy at breakthroughs vs buy at troughs**
- **Long term trade – trading in and out on quality stocks**
- **Theme investing – another version of trending, chasing after fashionable stocks?**



# Summary

# Summary

- **Investment is a must for everyone, the question is invest in what asset (bank saving is a low-risk investment)**
- **Investment is a science, with human elements**
- **Investment requires discipline and hard work**
- **Long term investment return reflects the market's economic growth**
- **Warren Buffett's Golden Rules of Investing:**
  - Rule No. 1: Never Lose Money
  - Rule No. 2: Never Forget Rule No. 1



**Thanks!**