Class 4: Modern Finance and its Impact to the Real World

Financial Markets, Spring 2021, SAIF

Jun Pan

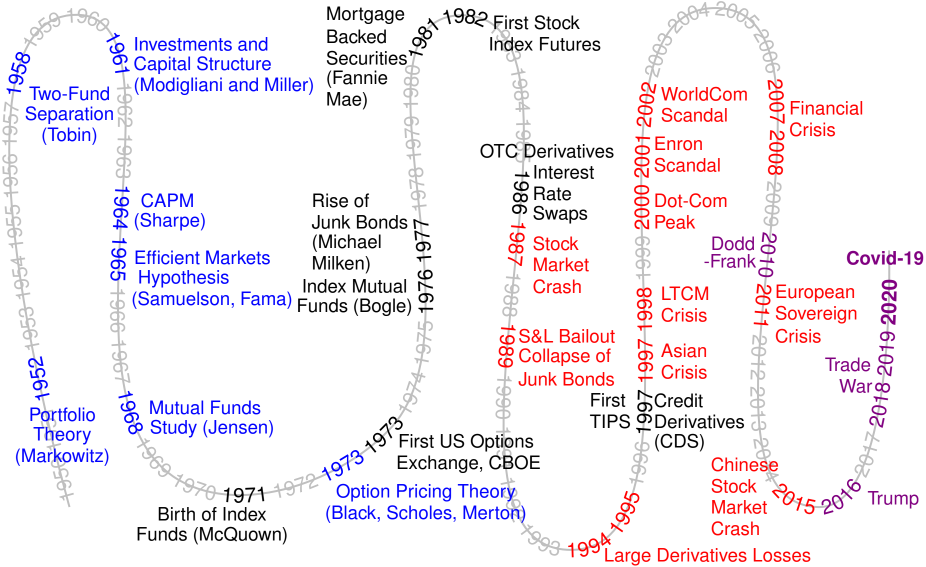
Shanghai Advanced Institute of Finance (SAIF)
Shanghai Jiao Tong University

May 15-16, 2021

Outline

- Since 1950s, modern finance theories developed by academics have transformed the way we understand, price, and manage financial risk:
  - The capital asset pricing model (CAPM) by Sharpe (1964) and Lintner (1965).
  - The Black-Scholes option pricing model by Black and Scholes (1973) and Merton (1973).
- Their applications in the real world have reshaped the practice of finance:
  - Quantitative investing in asset management.
  - Financial innovations and derivatives trading.
  - The rise of index mutual funds.

Modern Finance: Theory, Practice, and Lessons



Markowitz (1952)

- The beginning of modern finance.
- Introduces the concept of risk and return tradeoff.
- Risk is central to the process of investing.
- Forms the foundation for all subsequent theories on quantifying risk.

Harry M. Markowitz

1/3 of the prize

USA

City University of New York
New York, NY, USA

b. 1927

Tobin (1958)

- Two-fund separation: one risky and one riskfree.
- The optimal risky portfolio is the same for all mean-variance investors, regardless of his level of risk aversion.
- The level of risk aversion affects the relative allocation between the risky and riskfree.

James Tobin

Prize share: 1/1

Sharpe (1964)

- Brings Markowitz (1952) to equilibrium: all investors behave optimally and the markets clear.
- The optimal risky portfolio in Tobin (1958) becomes the market portfolio. The only risk that matters: systematic risk.
- The riskiness of a stock is measured not by its own variance, but its covariance with the market portfolio:

$$\beta^i = \text{cov}(R^i, R^M)/\text{var}(R^M)\,.$$

- The reward is proportional to the exposure to systematic risk:

$$E(R^i) - r_f = \beta^i \left(E(R^M) - r_f\right)\,.$$

William F. Sharpe

1/3 of the prize

USA

Stanford University
Stanford, CA, USA

b. 1934

Black and Scholes (1973) and Merton (1973)

- Path breaking framework: continuous-time arbitrage pricing.
- Establishes the foundation for financial innovations.
- An entirely new dimension of risk taking: the flexibility to take only the desired risk.
- The market prices of such "carved out" risk contain unique information, with the widely monitored fear gauge, VIX, as a prominent example.
- The multi-trillion dollar OTC derivatives market is another example.

Robert C. Merton

Prize share: 1/2

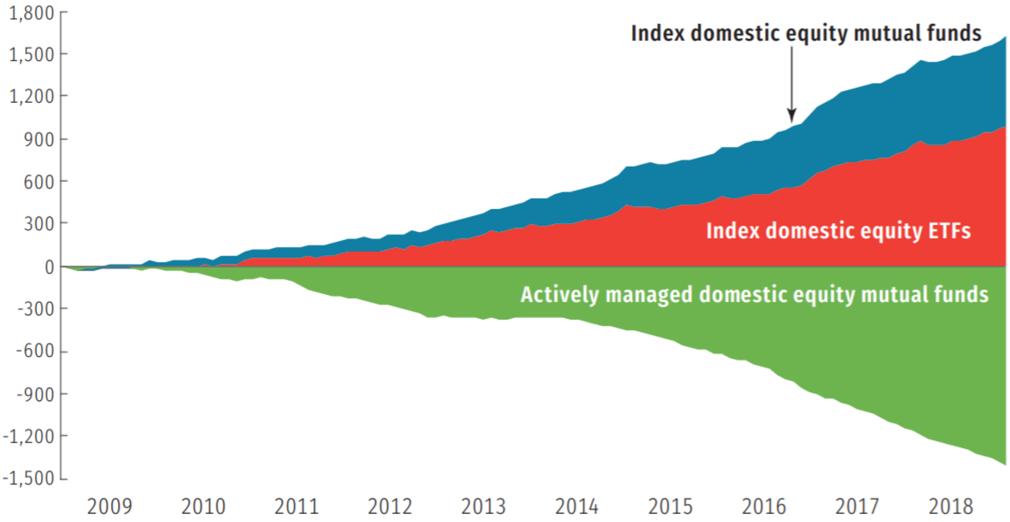
Myron S. Scholes

ze share: 1/2

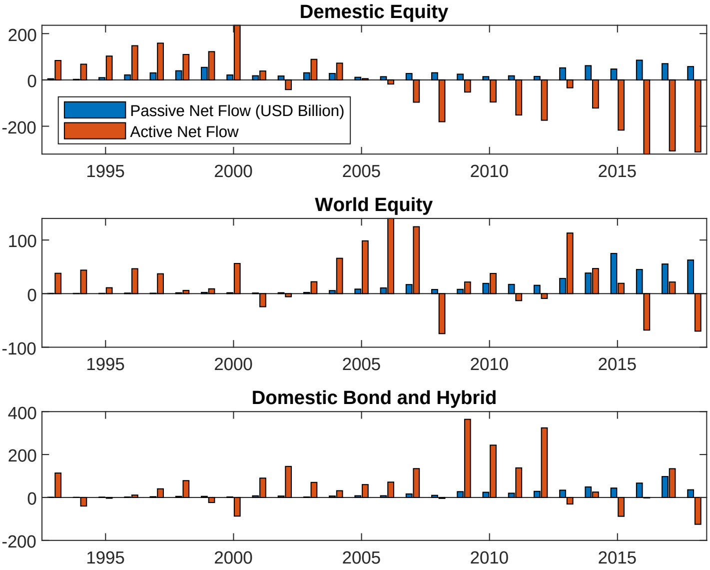
The Birth of Index Mutual Funds

- John Bogle, founder of The Vanguard Group, wrote in 2011:
  - On August 31, 1976, the first index mutual fund was born.
  - Passive outpacing active: *derogated and ridiculed.*
  - Money raised: \$11.3 million, a 93% shortfall from the \$150 million target.
  - By 2011,
    - Vanguard funds modeled on the S&P 500 Index: \$200 billion.
    - Vanguard Total Stock Market Index Funds: \$180 billion.
- Investors have voted for index funds with their wallets; they continue to do so.
- Eight years later in 2019, Mr. Bogle passed away:
  - Vanguard 500 Index: \$448 billion,
  - Vanguard Total Stock Market Index: \$757 billion.

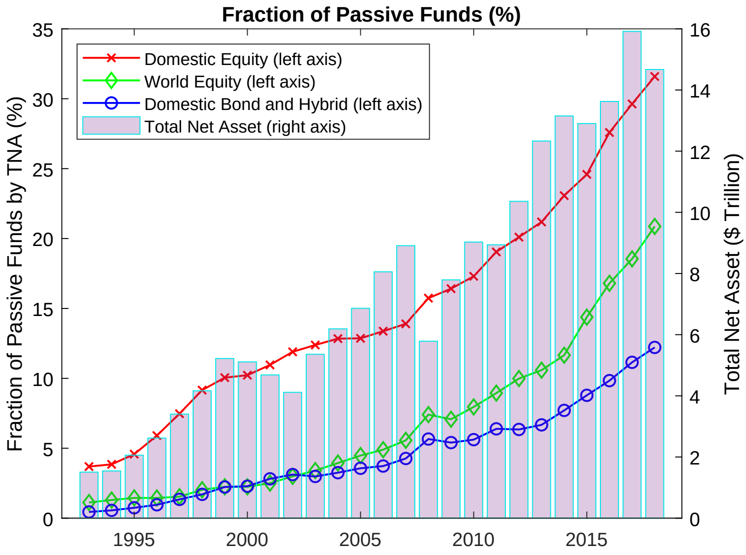
Cumulative Flow in US Equity Mutual Funds Since 2009



Annual Net Flow in USD Billion



The Growth of Index Mutual Funds in the US



From Finance Theory to Financial Practice

- Reshaping an industry takes years, even decades:
  - The slow, but persistent rise of indexing and factor investing.
  - Emergence of Vanguard ($5.3 trillion) and BlackRock ($5.98 trillion).
  - Perfect examples of how academic research can lead the industry practice.
- What to learn from such examples?
  - We learn to appreciate the power of academic insights.
  - Root your practice firmly in the rigor of finance theory.
  - Bogle credited his success to the support from Nobel laureate Paul Samuelson:

    "Samuelson was much more forceful, strengthening my backbone for the hard task that lay ahead: taking on the industry establishment."