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

Financial Markets, Spring 2021, SAIF

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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

- Two-Fund Separation (Tobin)
- Investments and Capital Structure (Modigliani and Miller)
- CAPM (Sharpe)
- Efficient Markets Hypothesis (Samuelson, Fama)
- Portfolio Theory (Markowitz)
- First US Options Exchange, CBOE
- Mortgage Backed Securities (Fannie Mae)
- Option Pricing Theory (Black, Scholes, Merton)
- Index Mutual Funds (Bogle)
- Rise of Junk Bonds (Michael Milken)
- First Stock Index Futures
- S&L Bailout
- First TIPS
- WorldCom Scandal
- Global Financial Crisis
- Credit Derivatives (CDS)
- Enron Scandal
- DOT/Com Peak
- Financial Crisis
- Trade War
- Dodd-Frank
- S&L Bailout
- Large Derivatives Losses
- Chinese Stock Market Crash
- LTCM Crisis
- Joanne Pan

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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:

\[ \beta^i = \frac{\text{cov}(R^i, R^M)}{\text{var}(R^M)}. \]

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

\[ E(R^i) - r_f = \beta^i \left( E(R^M) - r_f \right). \]
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.
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 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.
Annual Net Flow in USD Billion

### Domestic Equity

![Bar Chart: Domestic Equity

#### World Equity

![Bar Chart: World Equity

#### Domestic Bond and Hybrid

![Bar Chart: Domestic Bond and Hybrid

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The Growth of Index Mutual Funds in the US

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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.”