On the Essential Role of Finance Science in Finance Practice in Asset Management

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GPIF Finance Awards March 29, 2017

Overview of Remarks

- Well-functioning financial system is essential for sustainable economic growth and development
- Financial innovation drives improvement of the financial system; finance science, technology, and economic need drives financial innovation
- 1950s-1960s finance becomes a science
- 1970s how finance science and finance practice become inexorably linked. Crisis combined with new scientific research can breed implementation of innovation which leads to an improved financial system
- 1980-2010 selected developments in finance science and finance practice
- Future trends and innovations in finance science and practice

Finance Becomes a Science 1950s-1960s

- 1953 Diversification – Markowitz Mean-Variance Portfolio Theory
- 1958 Hedging – Tobin risk-free asset in portfolio theory
- 1958 Corporate finance capital structure and payout policy – Miller and Modigliani
- 1960-3 First comprehensive individual stock return data base, Chicago Center for Research in Security Prices
- 1963-5 Efficient Market Hypothesis – Fama; Samuelson
- 1965 Risk-based differences in expected returns - Sharpe-Lintner-Mossin Capital Asset Pricing Model (CAPM)
- 1965-70 Testing of various institutional investor performance using CAPM – Jensen, Roll
- 1969-71 Multi-period and continuous-time dynamic portfolio optimization theory – Hakansson; Leland; Merton; Samuelson

Major Financial and Economic Crisis 1970s: Risk Explosion and Stagflation in USA

- Multi-dimensional explosion of volatilities in the western economies reflected in financial systems
- Fall of Bretton Woods currency system
- First oil crisis in 1973-4 and a second one in 1979
- Double-digit inflation in the US highest since Civil War
- Double-digit interest rates, highest since Civil War
- No mortgage money: Regulation Q -5% deposit interest cap
- High unemployment ~9%:
- “Stagflation” unknown, and still unsolved, economic disease
- Stock market fell 50% in real terms mid 1973 – 1974
- 1973-1975 recession was really a 1970s recession because its effects extended into the 1980s

Risk Explosion 1970s Drives an Explosion of Financial Innovation in USA--Later Adopted Throughout the World--Finance Science and Practice Become Inexorably Linked

- Option exchange: financial value insurance
- Financial futures for currencies, interest rates, stocks
- NASDAQ , first electronic stock market
- Money market funds, high-yield and floating rate bonds
- Index funds Stage Coach Fund 1970 & Vanguard 1975
- TIAA-CREF international diversification in stocks 1972
- ERISA 1974 modern employer-funded pension system in US
- May Day 1975 permitted negotiated commissions on stock trading
- Debt securitization and creation of a national mortgage market
- Interest rate swap – eliminates the largest bank risk
- Eliminate destructive regulations: deposit rate ceilings
- Foundation set for globalization of capital markets: and global diversification
- Finance science: existing and breakthrough quantitative models and data bases were essential for implementing these innovations

Finance Science in 1970s Selected

- 1970-73 Insurance – option pricing theory – Black-Scholes; Merton
- 1972-73 Empirical rejection CAPM – Black, Jensen, Scholes; Fama and McBeth; Friend and Blume
- 1973 Intertemporal CAPM [ICAPM] – multi-risk premia-Merton
- 1973-76 Production theory for derivative securities – Dynamic replication – Merton
- 1973-76 Credit-pricing corporate bonds, loan guarantees, deposit insurance – Black-Scholes; Merton; Brennan and Schwartz
- 1976 Arbitrage Pricing Asset Pricing Model [APT] – Ross
- 1977 Real options theory – Myers
- 1979 Consumption-based Asset Pricing Model [CCAPM] – Breeden

The Ito Stochastic Calculus was the Key Mathematical Tool Used to Develop the Modeling of Much of Modern Finance Which Has Been a Driver of Financial Innovation for the Past 5 Decades

Thank you, Professor Kiyoshi Ito

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Financial Science and Finance Practice Asset Management – 1980-2010

- 1980s Benchmarking performance
- 1981 Diversification – Dimensional founded to provide small cap exposure to institutions
- 1985-1990 Interest rate models – Cox, Ingersoll and Ross; Vasicek; Hull and White, Heath, Jarrow and Morton
- 1992 Multi-factor empirical model and factor investing – Fama and French
- 1993-99 Exchange traded funds [ETF]
- 1990-2010 Behavioral finance – Kahneman and Tversky, Thaler
- 1995-2010 Statistical arbitrage/high-frequency trading

Future Trends and Innovations in Asset Management-All Require Finance Science

- Goals-based investing to improve performance
- Integrated risk-balance sheet approach to wealth management – Lifetime Integrated Financial Experience [LIFE]
- Financial and technological innovation in the future: FinTech opportunities and challenges for wealth management
- Trust is the innovation implementation model for global wealth management in the future
- Synthetic debt – creating risk free and credit risk
- Forward-looking distributions drawn from option and other security prices
- Systemic risk – measurement and management
- Big data with AI
- Mass customization
- Solution based approach vs product orientation
- Finance principle-based approach to product design
- Applications to public finance and macro…open market operations automated
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Speaker Profile

Robert C. Merton is the School of Management Distinguished Professor of Finance at the MIT Sloan School of Management and University Professor Emeritus at Harvard University. He was the George Fisher Baker Professor of Business Administration (1988–98) and the John and Natty McArthur University Professor (1998–2010) at Harvard Business School. After receiving a Ph.D. in Economics from MIT in 1970, Merton served on the finance faculty of MIT's Sloan School of Management until 1988 at which time he was J.C. Penney Professor of Management. He is currently Resident Scientist at Dimensional Holdings, Inc., where he is the creator of Target Retirement Solution, a global integrated retirement-funding solution system

Merton received the Alfred Nobel Memorial Prize in Economic Sciences in 1997 for a new method to determine the value of derivatives. He is past president of the American Finance Association, a member of the National Academy of Sciences, and a Fellow of the American Academy of Arts and Sciences.

Merton has also been recognized for translating finance science into practice. He received the inaugural Financial Engineer of the Year Award from the International Association for Quantitative Finance (formerly International Association of Financial Engineers), which also elected him a Senior Fellow. He received the 2011 CME Group Melamed-Arditti Innovation Award, and the 2013 WFE Award for Excellence from World Federation of Exchanges. A Distinguished Fellow of the Institute for Quantitative Research in Finance ('Q Group') and a Fellow of the Financial Management Association, Merton received the Nicholas Molodovsky Award from the CFA Institute. He is a member of the Halls of Fame of the Fixed Income Analyst Society, Risk, and Derivative Strategy magazines. Merton received Risk's Lifetime Achievement Award for contributions to the field of risk management and the 2014 Lifetime Achievement Award from the Financial Intermediation Research Society.

Merton's research focuses on finance theory, including lifecycle and retirement finance, optimal portfolio selection, capital asset pricing, pricing of derivative securities, credit risk, loan guarantees, financial innovation, the dynamics of institutional change, and improving the methods of measuring and managing macro-financial risk. Merton received a B.S. in Engineering Mathematics from Columbia University, a M.S. in Applied Mathematics from California Institute of Technology and a Ph.D. in Economics from Massachusetts Institute of Technology and holds honorary degrees from fifteen universities.