Investment Evolution

Innovations in Finance

Conventional Wisdom circa 1950

"Once you attain competency, diversification is undesirable. One or two, or at most three or four, securities should be bought. Competent investors will never be satisfied beating the averages by a few small percentage points."

Gerald M. Loeb, *The Battle for Investment Survival,* 1935

Analyze securities one by one. Focus on picking winners. Concentrate holdings to maximize returns.

Broad diversification is considered undesirable.

The Role of Stocks

James Tobin
Nobel Prize in Economics, 1981

Separation Theorem:
1. Form portfolio of risky assets.
2. Temper risk by lending and borrowing.

Shifts focus from security selection to portfolio structure.

"Liquidity Preference as Behavior Toward Risk," *Review of Economic Studies,* February 1958.

Single-Factor Asset Pricing Risk/Return Model

William Sharpe
Nobel Prize in Economics, 1990

Capital Asset Pricing Model: Theoretical model defines risk as market beta, or the covariance of a security with the overall market.

A stock's expected return is proportional to the stock's market beta.

Theoretical model for evaluating the risk and expected return of securities and portfolios.

Efficient Markets Hypothesis

Eugene F. Fama[1]

Extensive research on stock price patterns.

Extensive research on stock price patterns.

Develops Efficient Markets Hypothesis, which asserts that prices reflect values and information accurately and quickly. It is difficult if not impossible to capture returns in excess of market returns without taking greater than market levels of risk.

1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970

Diversification and Portfolio Risk

Harry Markowitz
Nobel Prize in Economics, 1990

Diversification reduces risk.

Assets evaluated not by individual characteristics but by their effect on a portfolio. An optimal portfolio can be constructed to maximize return for a given standard deviation.

Investments and Capital Structure

Merton Miller and Franco Modigliani
Nobel Prizes in Economics, 1990 and 1985

Theorem relating corporate finance to returns.

A firm's value is unrelated to its dividend policy.

Dividend policy is an unreliable guide for stock selection.

Behavior of Securities Prices

Paul Samuelson, MIT
Nobel Prize in Economics, 1970

Market prices are the best estimates of value.

Price changes follow random patterns. Future share prices are unpredictable.

"Proof That Properly Anticipated Prices Fluctuate Randomly," *Industrial Management Review,* Spring 1965.

First Major Study of Manager Performance

Michael Jensen, 1965
A.G. Becker Corporation, 1968

First studies of mutual funds (Jensen) and of institutional plans (A.G. Becker Corp.) indicate active managers underperform indices.

Becker Corp. gives rise to consulting industry with creation of "Green Book" performance tables comparing results to benchmarks.

1. Member of the board of directors of the general partner of, member of the Investment Research Committee of, and consultant to Dimensional Fund Advisors LP.

Innovations in Finance

A Major Plan First Commits to Indexing

New York Telephone Company invests $40 million in an S&P 500 Index fund.

The first major plan to index.

Helps launch the era of indexed investing.

“Fund spokesmen are quick to point out you can’t buy the market averages. It’s time the public could.”

Burton G. Malkiel, *A Random Walk Down Wall Street,* 1973 ed.

Nobel Prize Recognizes Modern Finance

Economists who shaped the way we invest are recognized, emphasizing the role of science in finance.

William Sharpe for the Capital Asset Pricing Model.

Harry Markowitz for portfolio theory.

Merton Miller for work on the effect of firms’ capital structure and dividend policy on their prices.

The Size Effect

Rolf Banz

Analyzed NYSE stocks, 1926-1975.

Finds that, in the long term, small companies have higher expected returns than large companies and behave differently.

The Birth of Index Funds

John McQuown[1],
Wells Fargo Bank, 1971;
Rex Sinquefield,
American National Bank, 1973

Banks develop the first passive S&P 500 Index funds.

1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990

Options Pricing Model

Fischer Black, Robert Merton[2], and Myron Scholes[3]
Nobel Prize in Economics, 1997

The development of the Options Pricing Model allows new ways to segment, quantify, and manage risk.

The model spurs the development of a market for alternative investments.

Database of Securities Prices since 1926

Roger Ibbotson[3] and
Rex Sinquefield,
Stocks, Bonds, Bills, and Inflation

An extensive returns database for multiple asset classes is first developed and will become one of the most widely used investment databases.

The first extensive, empirical basis for making asset allocation decisions changes the way investors build portfolios.

Variable Maturity Strategy Implemented

Eugene F. Fama[4]

With no prediction of interest rates, Eugene Fama develops a method of shifting maturities that identifies optimal positions on the fixed income yield curve.

“The Information in the Term Structure,” *Journal of Financial Economics* 13, no. 4 (December 1984): 509-28.

1. Member of the board of directors of the general partner of Dimensional Fund Advisors LP.
2. Member of the Investment Research Committee of and consultant to Dimensional Fund Advisors LP.
3. Independent director of Dimensional's US Mutual Funds, which refers to The DFA Investment Trust Company, DFA Investment Dimensions Group Inc., Dimensional Investment Group Inc. and Dimensional Emerging Markets Value Fund Inc.
4. Member of the board of directors of the general partner of, member of the Investment Research Committee of, and consultant to Dimensional Fund Advisors LP.

Innovations in Finance

1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017

1993: Multifactor Asset Pricing Model and Value Effect

Eugene Fama[1] and Kenneth French[1]

Improves on the single-factor asset pricing model (CAPM).

Identifies market, size, and "value" factors in returns.

Develops the three-factor asset pricing model, an invaluable asset allocation and portfolio analysis tool.

"Common Risk Factors in the Returns on Stocks and Bonds," *Journal of Financial Economics* 33, no. 1 (February 1993): 3-56.

1995: International Size Effect

Steven L. Heston, K. Geert Rouwenhorst, and Roberto E. Wessels

Find evidence of higher average returns to small companies in twelve international markets.

"The Structure of International Stock Returns and the Integration of Capital Markets," *Journal of Empirical Finance* 2, no. 3 (September 1995): 173-97.

1997: Inflation-Protected Bonds

The Treasury conducts the first auction of Treasury Inflation-Protected Securities (TIPS), thus allowing US investors to invest for long periods with minimal default risk and inflation risk.

2002: Improved Bond Market Transparency

National Association of Securities Dealers (NASD) introduces Trade Reporting and Compliance Engine (TRACE), which requires the reporting of US corporate bond trades. This data greatly improved transparency in the corporate bond market and allows researchers to study trading costs in the US corporate bond market.

2012: Profitability

Eugene F. Fama[1], Kenneth R. French[1], and Robert Novy-Marx[2]

Motivated by valuation theory, academic research identifies profitability as a new dimension of expected returns.

2013: Nobel Prize Recognizes Asset Pricing Research

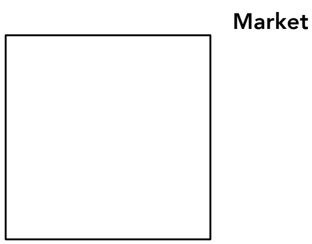
Three US academics jointly receive the award for their individual contributions to the empirical analysis of asset prices.

Eugene F. Fama[1], Lars Peter Hansen, and Robert J. Shiller,

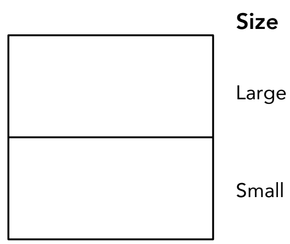
1. Member of the board of directors of the general partner of, member of the Investment Research Committee of, and consultant to Dimensional Fund Advisors LP.
2. Member of Dimensional Fund Advsiors LP's Investment Research Committee and consultant to Dimensional Fund Advisors LP.

Advancements in Research

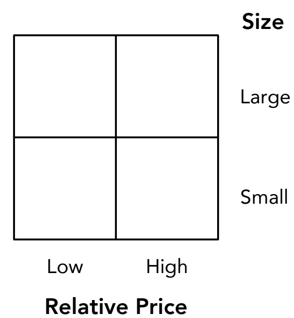
Single-Factor Model (1963)



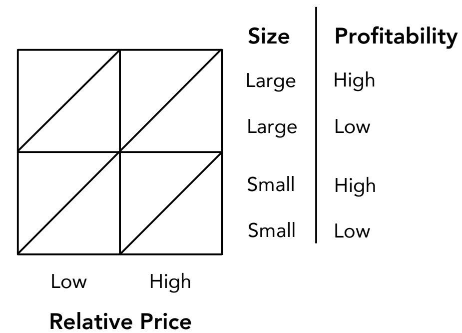
Size Effect (1981)



Value Effect (1991)



Profitability (2012)



The size effect is the tendency of small cap stocks to outperform large cap stocks over the long term. The value effect is the tendency of stocks with lower price-to-book ratios (value stocks) to outperform stocks with higher price-to-book ratios over the long term. Profitability refers to the tendency of higher-profitability stocks to outperform lower-profitability stocks. Profitability is measured as operating income before depreciation and amortization minus interest expense scaled by book. Relative price is the price of a security as it compares to another.

Investment Management

Conventional Management

- Attempts to identify mispricing in securities
- Relies on forecasting to select “undervalued” securities or time markets
- Generates higher expenses, trading costs, and risks

Index Management

- Allows commercial index to determine strategy
- Attempts to match index performance, restricting which securities to hold and when to trade
- Prioritizes low tracking error over higher expected returns

An Alternate Approach

- Gains insights about markets and returns from academic research
- Structures portfolios along the dimensions of expected returns
- Adds value by integrating research, portfolio structure, and implementation

Efficient Markets Hypothesis

Eugene F. Fama

The Hypothesis States:

- Current prices incorporate all available information and expectations.
- Current prices are the best approximation of intrinsic value.
- Price changes are due to unforeseen events.
- “Mispricings” can occur but not in predictable patterns that can lead to consistent outperformance.

The Hypothesis Does not State:

- All investors are rational.
- Prices are always right.
- Prices should be stable.
- Professional money managers can’t earn higher than market returns.

Eugene F. Fama, “Efficient Capital Markets: A Review of Theory and Empirical Work,” *Journal of Finance* 25, no. 2 (May 1970): 383-417.
Eugene F. Fama, “Foundations of Finance,” *Journal of Finance* 32, no. 3 (June 1977): 961-64.