

Factor Investing: An Academic Perspective

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An overview of commonly used factor models and their evolution

1960–1989: The CAPM; the Chen-Roll-Ross (1986) model

1990–2014: The Fama-French (1993) three-factor model; the Carhart (1997) four-factor model

2015–: The Hou-Xue-Zhang (2015) q -factor model; the Fama-French (2015) five-factor model

You only hold the market as the risky asset

- The market is the only source of common variation in returns

The CAPM works poorly in the data: There are many other sources of common variation (anomalies that the CAPM cannot explain)

Earnings surprises (Ball and Brown 1968)

Size (Banz 1981) and value (Rosenberg, Reid, and Lanstein 1985)

Equity issues (Ritter 1991, Loughran and Ritter 1995)

Momentum (Jegadeesh and Titman 1993)

Accruals (Sloan 1996)

Idiosyncratic volatility (Ang, Hodrick, Xing, and Zhang 2006)

Investment (Cooper, Gulen, and Schill 2008)

Profitability (Hou, Xue, and Zhang 2015)

Hou, Xue, and Zhang (2016) examine 437 anomaly variables:

#Significant	NYSE-VW	ABM-EW
Momentum	37	50
Value versus growth	31	38
Investment	27	36
Profitability	33	47
Intangibles	26	29
Trading frictions	7	16
Total	161	216

Regardless of where you stand in the mispricing versus factors debate, holding the market alone is not optimal

The Chen-Roll-Ross (1986) six-factor model:

- Industrial production growth, changes in the Treasury bill rate, unexpected inflation, default premium, term premium, and the market factor

Adrian, Etula, and Muir (2014): The broker-dealer leverage factor

Non-tradeable factors; mixed evidence on empirical performance

The Fama-French (1993) three-factor model:

- Market, size, and value

The Carhart (1997) four-factor model:

- Market, size, value, and momentum

Both models are largely empirical (statistical) in nature, alas

The q -factor Model

With Fama and French's (2015) "endorsement"

The Hou-Xue-Zhang (2015) q -factor model:

- Market, size, **investment**, and **profitability** (return on equity)
- Why? The NPV rule implies:

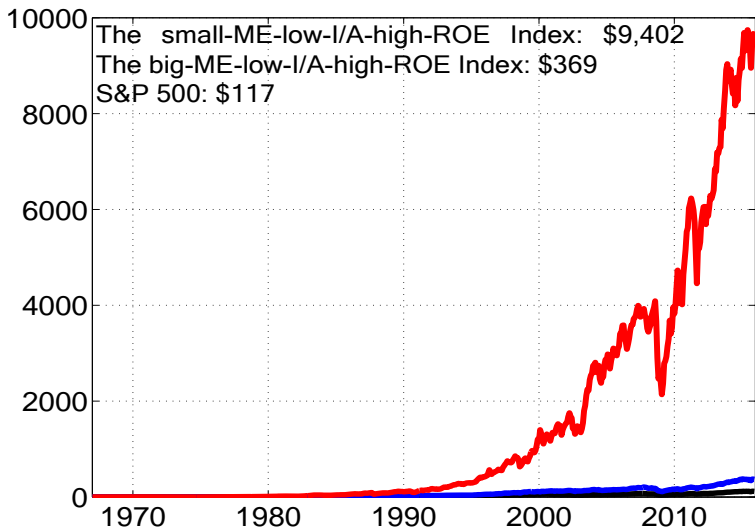
$$\text{Discount rate} = \text{Profitability}/\text{investment costs}$$

Fama and French (2015) add two "new" factors that resemble our q -factors into their original three-factor model:

- Market, size, value, **investment**, and **profitability**
- With some evidence that value is redundant

The q -factor model predates the five-factor model by 3–6 years; the q -factors also dominate CMA and RMW in factor spanning tests

Cumulative return with \$1 initial investment, January 1967–December 2015



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