Investment Valuation and Asset Pricing

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Models and Methods

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For my wife Karie and family Wes and Mary.

—James W. Kolari

For my wife Marja Leena and family Lauri, Erno, and Laura and Nicklas and grandchildren

Sebastian, Benjamin, and Vanessa.

—Seppo Pynnönen

with admiration and love.

Preface

A major change in the field of finance was marked by the advent of the Capital Asset Pricing Model (CAPM). Numerous authors are credited with this famous model of how asset prices are determined, including Treynor (1961, 1962), Sharpe (1964), Lintner (1965), Mossin (1966), and Black (1972). According to Black (1981) and recounted by French (2003), Jack Treynor is now recognized to have developed the first version of the CAPM as early as 1958 during a summer vacation to Colorado. As a former graduate of Harvard University, he shared his writings with John Lintner at Harvard in 1960. Never formally publishing his work, in the early 1960s he presented the CAPM as a graduate student at the Massachusetts Institute of Technology (MIT) to finance faculty, including Robert Merton.[1] A close friend and colleague was Fischer Black, with whom numerous discussions of the model likely led to Black's later work on the related zero-beta CAPM. Additionally, Jan Mossin was from Norway but attended Ph.D. studies at Carnegie Mellon University in the United States. Together, these students and professors worked contemporaeously on the fundamental relation between risk and return (or prices) of assets.

An important foundation underlying the CAPM is the mean-variance analyses of Markowitz (1952, 1959) and Tobin (1958). Harry Markowitz received his Ph.D. in Economics from the University of Chicago on portfolio theory. His work led to the fundamental concept of diversification in portfolio investments. By combining assets in a portfolio with returns that are less than perfectly correlated, investors can reduce risk as measured by the variance of returns. In theory, by varying expected returns, an infinite number of portfolios comprised of assets can be constructed that have minumum risk at different return levels. These portfolios trace out an *efficient frontier* in expected return/variance space. Relevant to the CAPM, total risk (or variance of returns) can be divided into diversifiable and nondiversifiable risks. It is the nondiversifiable portion of risk, known as *systematic risk*, that is the focus of the CAPM. Markowitz worked for some time at the Cowles Foundation of Yale University, where he met James Tobin, a Harvard trained economist and Yale professor. Tobin's insightful *separation principle* posited that risk-averse

[1] See Chapter 2 of Korajczyk (1999) for a reproduction of Treynor (1962).

investors seek: (1) efficient portfolios and (2) some optimum fraction of an efficient portfolio and a riskless asset as determined by their risk aversion. Importantly, these two investment decisions are separate from one another.

It is interesting that the lives of these early pioneers in asset pricing crossed paths with one another during the development of the CAPM. Their interaction was instrumental in the evolution of breakthroughs that transformed our thinking about risk and return in finance. Of course, it helps to be smart too! In this regard, Nobel Prizes in Economics were awarded to Tobin (1981), Markowitz (1990), and Sharpe (1990). Other contributors did not receive this honor due to death or nonpublication but are no less appreciated for their intellectual achievements. Certainly all of these notable scholars played important roles in shaping our understanding of modern finance. This book pays tribute to their accomplishments by retracing their steps in financial history.

Investments Valuation and Asset Pricing: Models and Methods is intended to fill a gap in undergraduate finance curriculums by providing an asset pricing text that is accessible to undergraduate students. The course is most suitable for senior finance students in the last year of their undergraduate studies. Also, it can be used in a graduate finance class, including Executive M.B.A. and Executive Business Education. The book has three unique features that set it apart from other finance textbooks.

1. Original published studies by researchers on the foundations of asset pricing are reviewed in chronological order over time. Retracing their steps in financial history, each chapter stays close to their authentic works, including quotations, examples, graphical exhibits, and empirical results. We want undergraduate students to gain a firm grasp of their achievements in the theory and practice of finance.
2. Important statistical concepts and methods relevant to the field of finance are covered. These statistical materials are crucial to learning asset pricing, which often employs statistical tests to evaluate different asset pricing models. Also, statistical skills are important tools for any finance professional.
3. Practical examples, questions, and problems are included in the text to help students check their learning and better understand the fundamentals of asset pricing.

The roadmap for our journey through the emergence and development of asset pricing is as follows.

- Chapter 1 reviews the diversification principles of Markowitz (1952, 1959).
- Chapter 2 introduces the basic assumptions of investor behavior and financial markets that are foundational to asset pricing models.
- Chapter 3 builds upon these principles by following Sharpe's (1964) derivation of the CAPM under equilibrium market conditions.
- Chapter 4 covers the CAPM market model that is used for empirical estimation using real world return data.

- Chapter 5 reviews the first extension of the CAPM known as the *zero-beta CAPM* by Black (1972).
- Chapter 6 overviews a number of other forms of the CAPM developed by researchers, including the intertemporal CAPM, international asset pricing model (IAPM), consumption CAPM (CCAPM), production CAPM (PCAPM), and conditional CAPM.
- Chapter 7 reviews the famous arbitrage pricing model (APT) by Ross (1976).
- Chapter 8 introduces the innovative Fama and French (1993) three-factor model.
- Chapter 9 expands the discussion to other multifactor models that have become increasingly popular over the past few decades.
- Chapter 10 reviews theory and evidence with respect to a recently proposed special case of the zero-beta CAPM dubbed the *ZCAPM* by Kolari, Liu, and Huang (2021).
- Chapter 11 applies asset pricing models to event studies that investigate the effects of market news announcements on stock returns.

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