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Handbook of the Economics of Finance

VOLUME 2B

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Financial Markets and Asset Pricing

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INTRODUCTION TO THE SERIES

The aim of the Handbooks in Economics series is to produce Handbooks for various branches of economics, each of which is a definitive source, reference, and teaching supplement for use by professional researchers and advanced graduate students. Each Handbook provides self-contained surveys of the current state of a branch of economics in the form of chapters prepared by leading specialists on various aspects of this branch of economics. These surveys summarize not only received results but also newer developments, from recent journal articles and discussion papers. Some original material is also included, but the main goal is to provide comprehensive and accessible surveys. The Handbooks are intended to provide not only useful reference volumes for professional collections but also possible supplementary readings for advanced courses for graduate students in economics.

KENNETH J. ARROW and MICHAEL D. INTRILIGATOR

PREFACE

Ten years ago we edited the first volume of the *Handbook of the Economics of Finance*, including both corporate finance (Volume 1A) and financial markets and asset pricing (Volume 1B). By summarizing the state of the art and pointing out as yet unresolved questions, this handbook quickly became one of the most cited volumes in Elsevier's Handbooks in Economics series. Encouraged by the resounding success of our first handbook, we decided to edit an additional volume to cover developments in the field since the first volume as well as important topics that were left out of Volume 1, again including both corporate finance (Volume 2A) and financial markets and asset pricing (Volume 2B).

Volume 2, in combination with Volume 1, presents the state of the art in finance sixty years after the revolution in modern finance pioneered by Fischer Black, Eugene Fama, Michael Jensen, Robert Lucas, Harry Markowitz, Robert Merton, Merton Miller, Franco Modigliani, John Muth, Steven Ross, Myron Scholes, William Sharpe, to mention only a few, and more than thirty years after this revolution was challenged by the field of behavioral finance pioneered by the work of Robert Schiller, Richard Thaler, Andrei Shleifer, and others. It comes at a time when much of the field is being challenged as a result of the financial crisis. The surveys are written by leaders in financial economics. They provide a comprehensive report on developments since Volume 1 in both theory and empirical research in finance at a level that, while rigorous, is nevertheless accessible to researchers not intimate with the field and doctoral students in economics, finance, and related fields. Like Volume 1, Volume 2 should prove an invaluable resource to researchers and an excellent pedagogical tool for teaching doctoral students.

CORPORATE FINANCE

Prior to about 1990, financial intermediaries made loans to businesses and households and held these loans until maturity. Starting in the 1970s, however, intermediaries began to form pools of loans and sell securities that are claims to the cash flows of these pools. Since then, the markets for such securitized loans have mushroomed in size and sharply increased in sophistication. Though the credit crisis led to a decrease in some forms of securitization, the value of outstanding securitized assets in 2011 exceeded by a substantial amount the value of outstanding marketable U.S. Treasury securities. This raised an issue for the theory of financial intermediation, which held that only intermediaries were able to make certain kinds of loans, because only they had the incentive to screen borrowers and monitor loan performance over the life of the loan.

Yet now precisely these types of loans, e.g., residential and commercial mortgages, are securitized by their originators and sold to others, potentially greatly reducing the originator's incentive to screen borrowers and monitor the loans. In addition to the phenomenal growth in the size of the market for securitized debt and the theoretical issues that securitization raises, interest in securitization was sparked by its central role in the recent financial crisis. Gary Gorton and Andrew Metrick provide a comprehensive survey of developments in this area in their essay entitled simply "Securitization" (Chapter 1). The essay includes an overview of the legal structure of securitization, statistics regarding the growth and performance of various categories of securitized loans, and surveys of both the theoretical and empirical literatures on the decision to securitize and the increase in securitization over the last 30 years. It concludes with a consideration of the important open questions in this area.

One benefit of securitization discussed in the literature is that it can create securities that are relatively insulated from the problems associated with information asymmetries—or, at least, that was the view before the recent financial crisis. Information asymmetries play a central role in security issuance and in firm financing decisions. Yuliy Sannikov's essay, "Dynamic Security Design and Corporate Financing" (Chapter 2) examines how security design can reduce the inefficiencies that result from information asymmetries and moral hazard, especially the role played by dynamics. The dynamic security design literature has made considerable progress in recent years, and this chapter reports on that progress. It also shows how security design affects firms' operations and asset prices in a dynamic context.

Taxes are a constant in the lives of corporations and individuals. John Graham's essay, "Do Taxes Affect Corporate Decisions? A Review" (Chapter 3), surveys the considerable literature on how taxes affect firm financing policies, payout policies, risk management, and a host of other decisions which firms make. The chapter also considers the impact of taxes on multinational firms, which is a topic of considerable current interest. For each topic, the chapter shows the theoretical predictions and then addresses the empirical evidence. Not surprisingly, taxes do affect the actions of firms. However, a longstanding question is whether tax effects are of first-order importance. They would not be if firms can manage their affairs so that changes in tax rates have little effect on their value and operations. John Graham concludes that the extent to which taxes are of first-order importance is still an unresolved topic. He also points out that we do not understand why firms do not pursue tax benefits more aggressively.

Executives and corporations would, of course, like to minimize the tax paid on compensation. In "Executive Compensation: Where We Are, and How We Got There" (Chapter 4), Kevin Murphy reviews the evolution of executive compensation in the U.S. and shows that the role of the state has been an important determinant of executive compensation, both through changes in tax rules as well as through other rules, such as disclosure requirements and accounting rules, and the general political climate.

He points out that it is really not possible to understand the evolution of executive compensation without taking into account the role of the state. In particular, he shows that changes in the accounting and tax treatment of options are associated with dramatic changes in their use by corporations. Provocatively, he makes the case that options were used to such a dramatic extent in the 1990s and early 2000s because they mistakenly appeared to be free money given their accounting treatment. While such a conclusion poses a considerable challenge to corporate finance theories, Kevin Murphy's evidence cannot be ignored and shows that much work has to be done to understand the determinants of managerial compensation.

The theme in Kevin Murphy's chapter, that certain compensation schemes might be used because their true cost remains hidden, provides additional evidence that work that focuses on understanding why investors and managers appear to ignore some data and have a biased assessment of other data is important. These topics have been the domain of behavioral finance reviewed in Malcolm Baker and Jeffrey Wurgler's essay, "Behavioral Corporate Finance: An Updated Survey" (Chapter 5). They pay considerable attention to the part of the field that investigates how rational managers respond to securities mispricing, but they also review the literature on managers' biases. Their chapter ends by highlighting several open questions, such as whether behavioral factors explain why managers do not more aggressively pursue the tax benefits of debt.

While Kevin Murphy shows the importance of government regulation as a determinant of compensation policies in the U.S., Rafael LaPorta, Florencio Lopez-de-Silanes, and Andrei Shleifer focus on the large literature that they started with Robert Vishny on the role of laws, both formal laws and their enforcement, on finance. In their early work, they focused on the importance of the legal origin of a country and showed that countries with a common law legal origin generally have more developed finance than countries with a civil law legal origin. In their chapter for this volume, "Law and Finance After a Decade of Research" (Chapter 6), they review the current state of the evidence on the role of legal origin. They present a unified view of the existing evidence and address a number of criticisms that have been made of the claim that legal origins matter for the development of finance.

A ubiquitous issue in empirical research in corporate finance is the issue of endogeneity. Endogeneity shows up in many of the chapters in this volume. Over the recent past, the field of corporate finance has made much progress in its understanding of how to address endogeneity issues. In their chapter, "Endogeneity in Empirical Corporate Finance" (Chapter 7), Michael Roberts and Toni Whited provide an exposition and assessment of this literature. Focusing on different sources of endogeneity – omitted variables, simultaneity, and measurement error – this essay shows how a variety of econometric techniques can be used, including older approaches such as instrumental variables and newer ones such as regression discontinuity design and higher order moments estimators.

The existing literature shows that strong investor protection has historically been associated with a healthier IPO market. The health of the IPO market is critical for the venture capital industry as it offers a valuable source of exit for the venture capitalists. Marco Da Rin, Thomas Hellman, and Manju Puri review the existing research on venture capital. Their chapter, "A Survey of Venture Capital Research" (Chapter 8), provides a comparison and evaluation of the databases used in the field of venture capital research. They assess the literature that investigates how venture capital firms help the firms they finance. Recent work on how venture capital firms are organized is reviewed as well.

The next two chapters address issues that are prominent in developing countries. First, Vikas Mehrotra and Randall Mork address the costs and benefits of family firm structures in their essay, "Entrepreneurship and the Family Firm" (Chapter 9). They review the existing literature on the negative and positive externalities on the economy of dynastic family firms. They show that the importance of these firms is less in the most developed countries because of all the steps taken by the governments in these countries to regulate and constrain large, family-controlled business groups. They also address the evidence on the positive and negative impact of family firms on entrepreneurship. Second, Meghana Ayyagari, Asli Demirguc-Kunt, and Vojislav Maksimovic review the theoretical and empirical research on the role of finance in developing countries. Their chapter, "Financing in Developing Countries" (Chapter 10), presents the existing stylized facts from the literature and reviews how the role of finance for firms differs in these countries, because firms in these countries operate in a different legal, financial, and institutional framework than firms in high income countries. While much of the literature has focused on larger firms, the chapter also reviews the literature and evidence on how small and medium-sized firms finance themselves in developing countries. The chapter highlights a number of areas where further research is needed.

Economists have for decades studied the development of financial systems (financial markets and the financial intermediation sector) and its link to economic growth. Most of this research focuses on markets and traditional forms of intermediation found in developed economies such as banks. In their essay, "Financial Intermediation, Markets, and Alternative Financial Sectors" (Chapter 11), Franklin Allen, Elena Carletti, Jun Qian, and Patricio Valenzuela argue that confining attention to such traditional financial systems leaves out a large segment of many systems that is especially important for small and medium sized firms. These businesses constitute the majority of firms in most economies and are the main drivers of economic growth in emerging economies. The segment of financial systems on which many of these firms depend for their funding is known as "alternative finance" and includes internal finance, funds from family and friends, private credit agencies, and trade credits, among others. This survey illuminates the role of alternative financing channels in corporate finance and economic growth and compares its importance for various types of firms and in various countries to that of market and bank provided finance. The chapter concludes with suggestions for obtaining and utilizing firm-level data to improve our understanding of the role of alternative finance in economic growth.

FINANCIAL MARKETS AND ASSET PRICING

The Euler equations of consumption that link a consumer's marginal rate of substitution in consumption with the return of any financial asset provide the theoretical foundation of most extant asset pricing models. In her essay titled "Advances in Consumption-Based Asset Pricing: Empirical Tests" (Chapter 12), Sydney Ludvigson surveys the growing body of empirical work that evaluates today's leading consumption-based asset pricing theories using formal estimation, hypothesis testing, and model comparison. In addition to summarizing the findings and current debate, Ludvigson provides an accessible description of a few key econometric methodologies for evaluating consumption-based models and calls for greater emphasis on methodologies that facilitate the comparison of multiple competing models, all of which are potentially misspecified, while calling for reduced emphasis on individual hypothesis tests of whether a single model is specified without error.

In his essay titled "Bond Pricing and the Macroeconomy" (Chapter 13), Gregory Duffee addresses the time-series and cross-sectional properties of Treasury bond prices. He points out that the idea that Treasury bond prices should be determined primarily by the macroeconomy—current and expected inflation, output, and consumption—is grounded in both casual economic intuition and state-of-the-art models. Yet, after a comprehensive discussion of the spectrum of term structure theories, Duffee points out several open questions and concludes with a sobering message: "There is almost certainly a macroeconomic model that reproduces the behavior of nominal bond yields through mechanisms that withstand close scrutiny. We just haven't discovered it yet."

The mutual fund industry has grown into one of the largest financial intermediaries with 23 trillion dollars of assets under management worldwide and over 12 trillion dollars in the U.S. alone. Almost half of American families own mutual funds and over half of the assets of defined contribution pension plans and individual retirement plans are invested in mutual funds. In addition to the open-end and closed-end mutual funds, the industry has recently witnessed the rapid growth of exchange-traded funds (EFTs) sector funds, life-cycle funds, and alternative investments, such as hedge funds and private equity vehicles with an appetite for risk-taking through highly levered trades.

This proliferation of investment trading vehicles makes the evaluation of their performance more important than ever. Wayne Ferson points out several forces that have contributed to the renaissance in the investment performance literature. One important factor is that demand for research on managed portfolio performance has increased as mutual funds and related investment vehicles have become more important to investors. Another is the decrease in the costs of production through the proliferation and ready availability of data bases.

In his essay titled "Investment Performance: A Review and Synthesis" (Chapter 14), Ferson critically overviews the current methods for measuring investment performance and offers a number of suggestions for improving performance measurement in future research. He starts with returns-based measures and then addresses holdings-based measures which emerged later and are now becoming popular. Finally, Ferson reviews recent research on the performance of mutual funds, hedge funds, pension funds, and other investment vehicles and discusses fund manager incentives and behavior.

In their complementary essay titled "Mutual Funds" (Chapter 15), Ned Elton and Martin Gruber discuss open-end and closed-end mutual funds and exchange-traded funds, emphasizing data problems and potential biases, and critically review the spectrum of evaluation measures used in the industry. They discuss the actual performance of active open-end mutual equity and bond funds, the predictability of fund performance, expense ratios, and fund flows. Elton and Gruber conclude by discussing closed-end funds and ETFs.

The opacity of hedge funds and the limited availability of data present a special challenge to the evaluation of their performance. In their essay titled "Hedge Funds" (Chapter 16), William Fung and David Hsieh discuss the wide spectrum of hedge-fund strategies and trace their performance and capital formation. Fung and Hsieh point out that the arrival of commercially available databases and the realization that different-sounding fund strategies can expose investors to the same limited set of risk factors have profoundly impacted investors' perception of hedge fund investments. In addition, these events may have also shaped the way hedge fund management companies develop their products, shifting from targeting out-sized returns from leveraged bets to emphasizing the value of survival and, in turn, risk management. Fung and Hsieh conclude that on average hedge fund returns are mostly risk premia and that some possibly small additional return, or "alpha", may be compensation for bearing risks that have not yet been identified.

In their essay titled "Financial Risk Measurement for Financial Risk Management" (Chapter 17), Torben Andersen, Tim Bollerslev, Peter Christoffersen, and Francis Diebold provide a comprehensive and in-depth discussion of the measurement of market risk. They propose flexible methods that exploit recent developments in financial econometrics and stress powerful, yet parsimonious, models that are easily estimated. Andersen, Bollerslev, Christoffersen, and Diebold emphasize the need for deeper understanding of the links between market risk and macroeconomic fundamentals, focusing primarily on links among equity return volatilities, real growth, and real growth volatilities.

The US real estate bubble that led to the international financial crisis of 2007-2009 brought home the realization that price bubbles are unpredictable, contagious, and potentially catastrophic. In their essay titled "Bubbles, Financial Crises, and Systemic Risk" (Chapter 18), Marcus Brunnermeier and Martin Oehmke provide a historical account and insightful economic analysis of bubbles, financial crises, and systemic risk. They emphasize the amplification and propagation mechanisms of financial crises and their implications regarding the measurement of systemic risk. Brunnermeier and Oehmke challenge the reader with a number of important research questions: How do bubbles start and what determines the dynamics of how they burst? Should central banks fight bubbles, which sort of bubbles, and how? What is the role of financial frictions? Which data should be collected for financial stability and enhanced measurement of systemic risk? Their essay goes a long way towards addressing these questions.

Liquidity is closely related to systemic risk, bubbles, and financial crises. How should we measure liquidity? How does liquidity relate to underlying market imperfections and other asset characteristics? How does liquidity affect expected asset returns? In their essay titled "Market Liquidity: Theory and Empirical Evidence" (Chapter 19), Dimitri Vayanos and Jiang Wang survey the theoretical and empirical literature on market liquidity. Vayanos and Wang discuss market liquidity through the lens of a unified theory that recognizes participation costs, transactions costs, asymmetric information, imperfect competition, funding constraints, and search.

The market has responded to systemic risk, bubbles, and financial crises with the introduction of credit default swaps (CDSs) with payoffs contingent on the default of one or more companies, countries, or other entities, and related derivatives such as collateralized debt obligations (CDOs). The total notional principal underlying outstanding contracts peaked at $58 trillion in December 2007 and has since fallen to $30 trillion. In their essay titled "Credit Derivatives" (Chapter 20), John Hull and Alan White explain how the main types of credit derivatives work and how they are valued. Central to the valuation of credit derivatives is the estimation of the probability that reference entities default. They discuss the risk-neutral (implied) probabilities of default used to calculate the value of credit derivatives and consider the difference between real-world (physical) and risk-neutral default probabilities. Hull and White conclude with a discussion of the role of credit derivatives, particularly their opacity, in the 2007-2009 financial crisis and the US regulatory response requiring standardized credit derivatives to be cleared through central clearing parties.

Household finance—the normative and positive study of how households use financial markets to achieve their objectives—has received a lot of attention over the past decade and has become a field with its own identity, style and agenda. Do households behave rationally? Are the households' frequently observed suboptimal financial choices the result of mistakes or systematic behavioral biases? Which mistakes are most harmful and which households tend to commit the largest mistakes? These are only some of the important questions which Luigi Guiso and Paolo Sodini address in their comprehensive essay titled "Household Finance: An Emerging Field" (Chapter 21), relying on the ready availability of portfolio, mortgage, credit card debt, and other micro-data on household finances. Guiso and Sodini call for further research on the extent to which financial markets evolve in the interest of households and regulations on consumer protection.

In the next essay titled "The Behavior of Individual Investors" (Chapter 22), Brad Barber and Terrance Odean further pursue the trading behavior of individual investors. They document that individual investors underperform low cost index funds, sell winning investments while holding losing investments, are heavily influenced by limited attention and past return performance in their purchase decisions, engage in naïve reinforcement learning by repeating past behaviors that coincided with pleasure while avoiding past behaviors that generated pain, and tend to hold undiversified stock portfolios. Barber and Odean conclude by pointing out the welfare losses of these behavioral aberrations.

In modern asset pricing theories, the adjustment of future cash flows for time and risk is conveniently represented with the stochastic discount factor. In the final essay titled "Risk Pricing over Alternative Investment Horizons" (Chapter 23), Lars Hansen explores the "term structure of risk prices" by constructing elasticities that show how expected returns over different investment horizons respond to changes in exposure to macroeconomic shocks. Hansen also explores ways to compare explicit valuation models with varied specifications of investor preferences and beliefs, asymmetric information, solvency constraints, and incomplete markets, particularly in the presence of idiosyncratic income shocks.

We hope that the essays included in the current volume complement the earlier volume of the *Handbook of the Economics of Finance* and further stimulate research.

We thank the series editors, Kenneth Arrow and Michael Intriligator, and our editorial project manager, Kathleen Paoni, for their invaluable support throughout this project.

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CONTENTS