CFA Institute

CFA® PROGRAM CHANGES

2019 MEMBERS' GUIDE TO PRACTITIONER-RELEVANT UPDATES

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Contents

Professionalism at the Forefront

Professionalism is at the core of CFA Institute. With purpose and professionalism, we can—over time—rebuild trust among investors and investment management professionals. When we earn trust, we earn a sustainable future for our profession.

When the new CFA® Program curriculum is released each year, we hear from members how valuable it is to have this book for continuing education. It is one of many offerings that help our members stay informed about the evolution of investment management and foster professionalism through continuing education.

This year, we introduce the first reading-length coverage of financial technology (fintech), covering artificial intelligence, machine learning applied to big data, and robo-advisers. A new reading examines the evolution of financial services into a profession, describes the expectations for asset management professionals, and outlines the challenges facing the profession. The reading will improve your understanding of ethical conduct, trust, and professionalism as the essential building blocks for a career in investment management. New cases in ethics will reinforce your understanding of ethical responsibilities in modern, fintech-affected work contexts.

The planned multi-year curriculum strategy to overhaul the Level III curriculum, which began last year with new teachings about asset allocation and fixed-income portfolio management, continues this year with the release of a series of four new readings in equity portfolio management. These readings replace the former single reading, with a major increase in scope, depth, and currency.

I applaud our members who are committed to new learning and the lifelong pursuit of knowledge and professionalism. I hope that you benefit from this year's curriculum book and use it as an opportunity to stay current.

Wishing you continued success!

Stephen Horan, CFA, CIPM
Managing Director, Credentialing

Ethical and Professional Standards

Applicable Readings

Application of the Code and Standards (Level II)

1 CE, 1 SER credit
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/application-code-standards

Professionalism in Investment Management (Level III)

by Colin McLean, FSIP, and Nitin Mehta, CFA
0.5 CE credit
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/professionalism-investment-management

What Changed in the 2019 Curriculum?

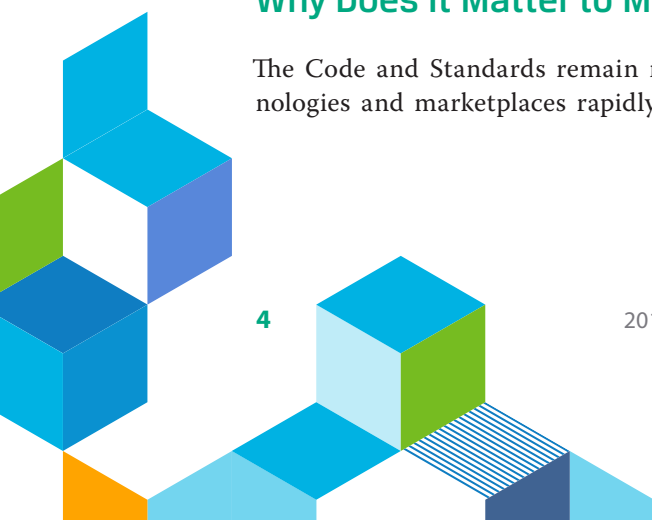
Two new readings improve readers' understanding of ethical conduct, trust, and professionalism as the essential building blocks for a career in investment management.

The first reading in this group, "Application of the Code and Standards," includes five case studies that challenge practitioners to evaluate firms' and individuals' policies and practices in light of the Code and Standards, identify violations and deficiencies, and recommend improvements in policy. Two new case studies within this reading address how the Code and Standards apply in workplaces affected by such technological innovations as cryptocurrency and crowdfunding.

The second reading, on professionalism, establishes expectations of—and challenges for—investment management professionals. "Professionalism in Investment Management" examines the importance of professions and explains how evolving professions can encourage in practitioners a deeper level of knowledge, a higher level of client focus, and greater client trust. The reading explains the role of CFA Institute as a professional body for the investment management profession.

Why Does It Matter to Members?

The Code and Standards remain relevant and valid even as technologies and marketplaces rapidly evolve. The new cases provide



members with an appealing way to engage with ethical decision making in a changing investment landscape.

The new reading on professionalism provides insight into the social, regulatory, and business forces that have been steadily driving the investment management industry to increasingly embody the attributes of a profession. The content should interest members who want to understand the roots of this trend and contribute to fostering it. The reading explains in more detail than in any prior curriculum content the functions of trust and ethics in investment practice and in elevating the value of members' services to clients. The information in this reading provides members with a clear understanding of what is expected of them as CFA charterholders.

Application of the Code and Standards

Learning Outcomes

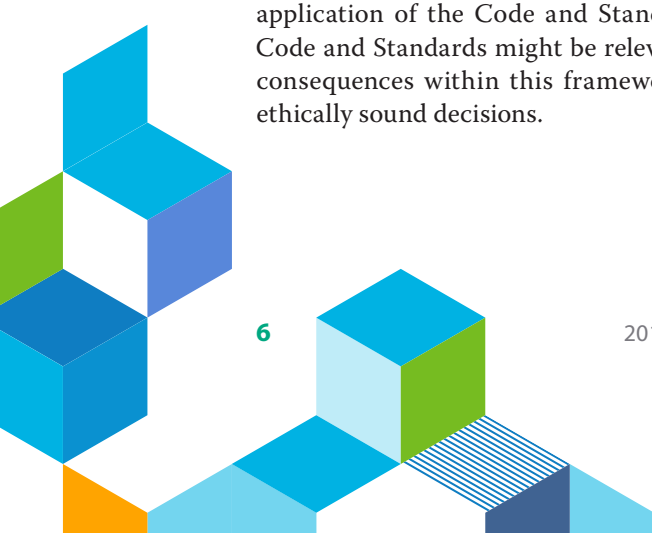
The candidate should be able to:

a. evaluate policies and practices for a firm and an individual in relation to the CFA Institute Code of Ethics and Standards of Professional Conduct;

b. explain the appropriate action to take in response to conduct that violates the CFA Institute Code of Ethics and Standards of Professional Conduct.

Introduction

This reading presents cases to illustrate how the CFA Institute Code of Ethics and Standards of Professional Conduct (Code and Standards) can be applied in situations where professional and ethical judgment is required. **Exhibit 1** presents a useful framework to help guide individuals in their ethical decision-making process and application of the Code and Standards. By identifying where the Code and Standards might be relevant and considering actions and consequences within this framework, individuals can make more ethically sound decisions.



Although the framework's components do not need to be addressed in the sequence shown, a review of the outcome should conclude the process. This review provides insights for improved decision making in the future.

Exhibit 1. A Framework for Ethical Decision Making

- Identify: Relevant facts, stakeholders and duties owed, ethical principles, conflicts of interest
- Consider: Situational influences, additional guidance, alternative actions
- Decide and act
- Reflect: Was the outcome as anticipated? Why or why not?

The cases that follow focus on identifying violations of the Code and Standards, taking necessary corrective actions, and developing a policy statement to help prevent future violations by a firm's employees. As you read through these cases, consider how applying the framework might have helped each individual in his or her decision making.

The full reading, worth 1 CE, 1 SER credit, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/application-code-standards

Professionalism in Investment Management

by Colin McLean, FSIP, and Nitin Mehta, CFA

Colin McLean, FSIP (United Kingdom). Nitin Mehta, CFA (United Kingdom).

Learning Outcomes

The candidate should be able to:

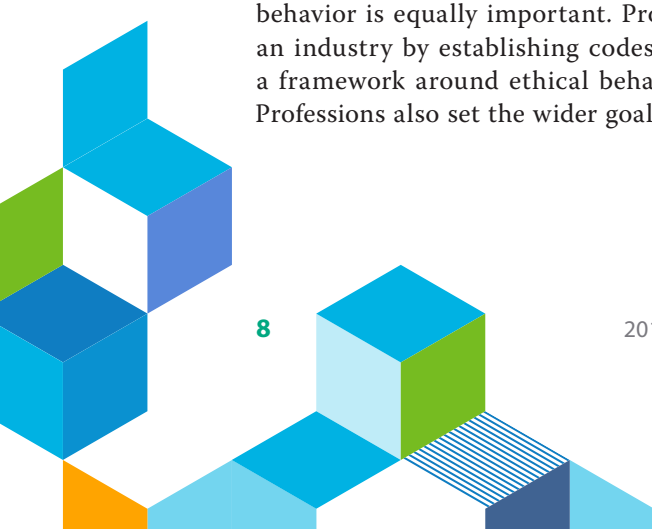
a. describe professions and how they establish trust;

b. explain professionalism in investment management;

c. describe expectations of and challenges for investment management professionals.

Introduction

The readings covering ethics and professional standards demonstrate that ethical behavior is central to creating trust. Professional behavior is equally important. Professions help maintain trust in an industry by establishing codes and setting standards that put a framework around ethical behavior and technical competence. Professions also set the wider goal of gaining and maintaining the



trust of society as a whole. In this regard, professions have a sense of purpose that society values.

This reading explains attributes of professions and establishes what is expected of an investment management professional. Professions are growing in size and number, partly as a result of government and regulator encouragement but also owing to demand from clients. Practitioners in some new areas of expertise are also choosing to serve clients within the framework of a profession to protect standards and gain public trust. The concept of professionalism is based on cultural norms, and interpretation of these norms varies by region and country. Such variation is a challenge to defining professionalism globally, but some universal aspects are common to most professions.

Section 2 of this reading describes professions in general and how they establish trust. Section 3 describes professionalism in investment management. Section 4 addresses expectations of investment management professionals, and Section 5 summarizes challenges for investment professionals. A summary of key points concludes the reading.

Summary

- A profession is an occupational group that has specific education, expert knowledge, and a framework of practice and behavior that underpins community trust, respect, and recognition.
- The requirement to uphold high ethical standards is one clear difference between professions and craft guilds or trade bodies.

- A primary goal of professions is to establish trust among clients and among society in general.
- Common characteristics of professions include normalization of practitioner behavior, service to society, client focus, high entry standards, a body of expert knowledge, encouragement and facilitation of continuing education, monitoring of professional conduct, collegiality, recognized overseeing bodies, and encouragement of member engagement.
- The investment management profession has become increasingly global, driven by the opening of capital markets, coordination of regulation across borders, and the emergence of technology.
- Investment management professionals are trusted to draw on a body of formal knowledge and apply that knowledge with care and judgment. In comparison to clients, investment professionals are also expected to have superior financial expertise, technical knowledge, and knowledge of the applicable laws and regulations.
- As a professional body, CFA Institute gathers knowledge from practicing investment professionals, conducts rigorous examinations, and ensures practitioner involvement in developing its codes and values.
- Investment management professionals are likely to encounter dilemmas, including those with ethical implications. Professionals should consider carefully how to determine the facts of the issue and assess the implications.
- The investment management profession faces challenges from several secular forces, including consumerism, regulation, globalization, demographics, and technological innovation.

The full reading, worth 0.5 CE credit, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/professionalism-investment-management

Portfolio Management and Wealth Planning

Applicable Readings

Fintech in Investment Management (Level I)

by Barbara J. Mack and Robert Kissell, PhD
1 CE credit
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/fintech-investment-management

Overview of the Asset Management Industry and Portfolio Management (Level III)

by Owen M. Concannon, CFA, and Vahan Janjigian, PhD, CFA
1 CE credit
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/overview-asset-management-industry-portfolio-management

Introduction to Equity Portfolio Management (Level III)

by James Clunie, PhD, CFA, and James Alan Finnegan, RMA, CFA
1 CE credit
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/introduction-equity-portfolio-management

Passive Equity Investing (Level III)

by David M. Smith, PhD, CFA, and Kevin K. Yousif, CFA
1.5 CE credits
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/passive-equity-investing

Active Equity Investing: Strategies (Level III)

by Bing Li, PhD, CFA, Yin Luo, CFA, and Pranay Gupta, CFA
2.5 CE credits
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/active-equity-investing-strategies

Active Equity Investing: Portfolio Construction (Level III)

by Jacques Lussier, CFA, and Marc R. Reinganum, PhD
3 CE credits
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/active-equity-investing-portfolio-construction

What Changed in the 2019 Curriculum?

Most notably, the 2019 CFA Program curriculum includes the first reading-length coverage of financial technology, or fintech, for Level I: "Fintech in Investment Management." (The same reading was also added to Level II for only the 2019 cycle so that Level II candidates could benefit from it.) Artificial intelligence, machine learning applied to big data, robo-advisers within wealth management—these are some of the fintech advances described in this reading that are having a significant impact on the global asset management industry. The reading further describes how the development of distributed ledger technology for recording, tracking, and storing transactions could affect the infrastructure of markets and the design and delivery of financial products and services. This reading provides a nontechnical guided tour through these headline topics, explaining key ideas and vocabulary.

"Overview of the Asset Management Industry and Portfolio Management" is the first reading in the CFA Program curriculum to cover asset managers as a segment of institutional investors. The reading describes how the asset management industry is structured, the markets and clients it serves, and the investment products it offers.

A series of four new readings in equity portfolio management replaces the former single reading with a major increase in scope, depth, and relevance. "Introduction to Equity Portfolio Management" provides an overview of the subject. Among the topics covered are the equity investment universe and how it is segmented, the roles of equities in investors' portfolios, and the effects of various costs on returns. The benefits, disadvantages, and types of corporate

engagement and activism by shareholders and equity managers across several key corporate aspects are discussed. Practitioners looking for information about where to position a portfolio on the passive–active spectrum will find the last section especially relevant.

"Introduction to Equity Portfolio Management" provides a structure for understanding the subsequent three readings in the Level III equity sequence. The first of those three readings—"Passive Equity Investing"—discusses the why and how of passive equity investing, covering institutional and private client perspectives. The third and fourth readings cover, respectively, active equity investing strategies and the related options for implementation. Compared with the reading it replaces, the new third reading, "Active Equity Investing: Strategies"—which still covers fundamental investment disciplines, based on human judgment and decision making—adds more extensive coverage of active quantitative equity investing. The fourth reading, "Active Equity Investing: Portfolio Construction," significantly extends previous content on modern practice in portfolio construction for active investors, touching as well on concepts related to measuring effectiveness in implementation. The new content acknowledges the varied needs and mandates of investors, covering products and strategies currently used in professional practice.

Why Does It Matter to Members?

Fintech has enabled the automation of routine tasks and has moved beyond the domain of quantitative asset management alone. By understanding and leveraging fintech, human advisers can combine their knowledge and expertise with the efficiencies of technology to inform the decisions they make for their clients. Additionally, investment managers need to understand how today's passive investment

strategies and investment products, as well as the array of active equity investing strategies and their investment vehicles, can be employed to achieve clients' objectives and how they may be used together to mitigate risk, enhance returns, and help clients reach their goals.

Fintech in Investment Management

by Barbara J. Mack and Robert Kissell, PhD

Barbara J. Mack is at Pingry Hill Enterprises, Inc. (USA). Robert Kissell, PhD, is at Kissell Research Group (USA).

Learning Outcomes

The candidate should be able to

a. describe "fintech";

b. describe big data, artificial intelligence, and machine learning;

c. describe fintech applications to investment management;

d. describe financial applications of distributed ledger technology.

Introduction

The meeting of finance and technology, commonly known as *fintech*, is changing the landscape of investment management. Advancements include the use of big data, artificial intelligence, and machine learning to evaluate investment opportunities, optimize portfolios, and mitigate risks. These developments are affecting not only quantitative

asset managers but also fundamental asset managers who make use of these tools and technologies to engage in hybrid forms of investment decision making.

Investment advisory services are undergoing changes with the growth of automated wealth advisers or "robo-advisers." Robo-advisers may assist investors without the intervention of a human adviser, or they may be used in combination with a human adviser. The desired outcome is the ability to provide tailored, actionable advice to investors with greater ease of access and at lower cost.

In the area of financial record keeping, blockchain and distributed ledger technology (DLT) are creating new ways to record, track, and store transactions for financial assets. An early example of this trend is the cryptocurrency bitcoin, but the technology is being considered in a broader set of applications.

This reading is divided into seven main sections, which together define fintech and outline some of its key areas of impact in the field of investment management. Section 2 explains the concept of and areas of fintech. Sections 3 and 4 discuss big data, artificial intelligence, and machine learning. Section 5 discusses data science, and Section 6 provides applications of fintech to investment management. Section 7 examines DLT. A summary of key points completes the reading.

Summary

- The term "fintech" refers to technological innovation in the design and delivery of financial services and products.
- Areas of fintech development include the analysis of large datasets, analytical techniques, automated trading, automated advice, and financial record keeping.

- Big data is characterized by the three Vs—volume, velocity, and variety—and includes both traditional and non-traditional (or alternative) datasets.
- Among the main sources of alternative data are data generated by individuals, business processes, and sensors.
- Artificial intelligence computer systems are capable of performing tasks that traditionally required human intelligence at levels comparable (or superior) to those of human beings.
- Machine learning (ML) computer programs are able to "learn" how to complete tasks, improving their performance over time with experience. Main types of ML include supervised and unsupervised learning.
- Natural language processing is an application of text analytics that uses insight into the structure of human language to analyze and interpret text- and voice-based data.
- Robo-advisory services are providing automated advisory services to increasing numbers of retail investors. Services include asset allocation, portfolio optimization, trade execution, rebalancing, and tax strategies.
- Big data and ML techniques may provide insights into real-time and changing market circumstances to help identify weakening or adverse trends in advance, allowing for improved risk management and investment decision making.
- Algorithmic traders use automated trading programs to determine when, where, and how to trade an order on the basis of prespecified rules and market conditions. Benefits include speed of executions, lower trading costs, and anonymity.

- Blockchain and distributed ledger technology (DLT) may offer a new way to store, record, and track financial assets on a secure, distributed basis. Applications include cryptocurrencies and tokenization. Additionally, DLT may bring efficiencies to post-trade and compliance processes through automation, smart contracts, and identity verification.

The full reading, worth 1 CE credit, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/fintech-investment-management

Overview of the Asset Management Industry and Portfolio Management

by Owen M. Concannon, CFA, and Vahan Janjigian, PhD, CFA

Owen Concannon, CFA, is at Neuberger Berman (USA). Vahan Janjigian, PhD, CFA, is at Greenwich Wealth Management, LLC (USA).

Learning Outcomes

The candidate should be able to:

a. describe the structure of the asset management industry;

b. discuss a portfolio management process that supports achieving asset owners' objectives;

c. discuss the elements of effective investment governance.

Introduction

The asset management industry serves as a critical link between providers and seekers of investment capital around the world. The industry provides professional investment services for a diverse client base

with varying objectives and risk tolerances. Asset managers have evolved with the global expansion of capital markets and will likely continue to evolve as technological advancements and demographic trends influence new innovations and opportunities.

This reading is divided into three main sections. Section 2 provides an overview of the structure of the global asset management industry, examining major client segments and investment product types. In addition, several macro industry trends shaping the future of the asset management industry are explored. Section 3 examines an overall portfolio management process that balances asset owner objectives and the investment opportunity set. Section 4 examines the fundamentals of investment governance, and a summary of key points completes the reading.

Summary

- The asset management industry is highly competitive, with industry firms ranging from "pure-play" independent asset managers to diversified commercial banks, insurance companies, and brokerages that offer asset management services in addition to their core business activities.
- Asset managers are increasingly offering other strategies beyond traditional market-cap-weighted exposures. One such strategy is smart beta, which involves the use of simple, transparent, rules-based strategies as a basis for investment decisions.
- Traditional managers generally focus on long-only equity, fixed-income, and multi-asset investment strategies, while alternative asset managers focus on hedge fund, private equity, and venture

capital strategies. Increasingly, the line between traditional and alternative managers has blurred.

- The majority of asset management firms are privately owned. Portfolio managers who have personal capital invested in their firms or investment strategies are often viewed favorably by potential investors.
- Asset managers who focus on individual investors typically package investment strategies through highly regulated pooled vehicles (e.g., mutual funds or exchange-traded funds). Institutional-focused managers typically package their investment strategies in less regulated and more customizable product structures (e.g., separately managed accounts and limited partnerships).
- Institutional investors include several major segments: pension plans (both defined benefit and defined contribution), sovereign wealth funds, banks, insurance companies, and endowments and foundations.
- Among the major investment products offered by asset managers are mutual funds, separately managed accounts, exchange-traded funds, hedge funds, and private equity/venture capital funds.
- Three key trends in the asset management industry include the growth of passive investing, "big data" in the investment process, and the emergence of robo-advisers in private wealth management.
- The portfolio management process includes the construction, monitoring, and revision of an asset owner's or asset manager's portfolio. The process is represented by a sequence of activities that begins with understanding the asset owner's entire circumstances—including objectives, constraints, and other preferences—and forms the basis for structuring a portfolio and

formulating other portfolio decisions, such as investing passively or actively.

- The portfolio management process rests on a foundation of good investment governance, which includes the assignment of decision-making responsibilities to qualified individuals and the oversight of processes.

The full reading, worth 1 CE credit, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/overview-asset-management-industry-portfolio-management

Introduction to Equity Portfolio Management

by James Clunie, PhD, CFA, and James Alan Finnegan, RMA, CFA

James Clunie, PhD, CFA (United Kingdom). James Alan Finnegan, RMA, CFA (USA).

Learning Outcomes

The candidate should be able to:

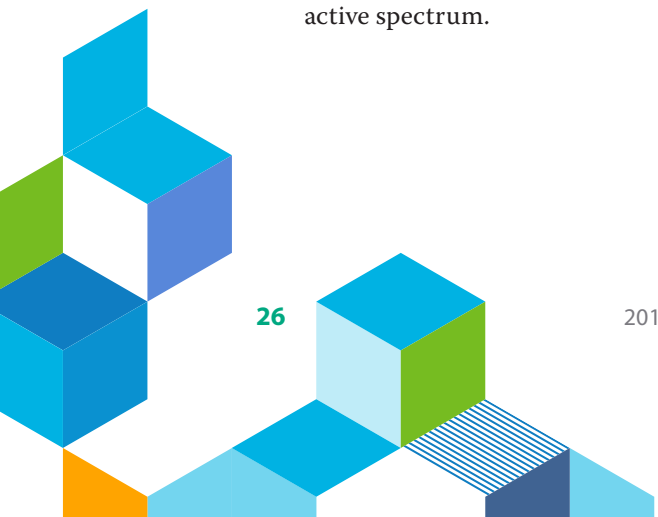
a. describe the roles of equities in the overall portfolio;

b. describe how an equity manager's investment universe can be segmented;

c. describe the types of income and costs associated with owning and managing an equity portfolio and their potential effects on portfolio performance;

d. describe the potential benefits of shareholder engagement and the role an equity manager might play in shareholder engagement;

e. describe rationales for equity investment across the passive–active spectrum.



Introduction

Equities represent a sizable portion of the global investment universe and thus often represent a primary component of investors' portfolios. Rationales for investing in equities include potential participation in the growth and earnings prospects of an economy's corporate sector as well as an ownership interest in a range of business entities by size, economic activity, and geographical scope. Publicly traded equities are generally more liquid than other asset classes and thus may enable investors to more easily monitor price trends and purchase or sell securities with low transaction costs.

This reading provides an overview of equity portfolio management. Section 2 discusses the roles of equities in a portfolio. Section 3 discusses the equity investment universe, including several ways the universe can be segmented. Section 4 covers the income and costs in an equity portfolio. Section 5 discusses shareholder engagement between equity investors and the companies in which they invest. Section 6 discusses equity investment across the passive–active investment spectrum. A summary of key points completes the reading.

Summary

This reading provides an overview of the roles equity investments may play in the client's portfolio, how asset owners and investment managers segment the equity universe for purposes of defining an investment mandate, the costs and obligations of equity ownership (including shareholder engagement) and issues relevant to the

decision to pursue active or passive management of an equity portfolio. Among the key points made in this reading are the following:

- Equities can provide several roles or benefits to an overall portfolio, including capital appreciation, dividend income, diversification with other asset classes, and a potential hedge against inflation.
- The inclusion of equities in a portfolio can be driven by a client's goals or needs. Portfolio managers often consider the following investment objectives and constraints when deciding to include equities (or asset classes in general, for that matter) in a client's portfolio: *risk objective; return objective; liquidity requirement; time horizon; tax concerns; legal and regulatory factors*; and *unique circumstances.*
- Investors often segment the equity universe according to (1) size and style; (2) geography; and (3) economic activity.
- Sources of equity portfolio income include dividends; securities lending fees and interest; dividend capture; covered calls; and cash-covered puts (or cash-secured puts).
- Sources of equity portfolio costs include management fees; performance fees; administration fees; marketing/distribution fees; and trading costs.
- Shareholder engagement is the process whereby companies engage with their shareholders. The process typically includes voting on corporate matters at general meetings and other forms of communication, such as quarterly investor calls or in-person meetings.
- Shareholder engagement can provide benefits for both shareholders and companies. From a company's perspective, shareholder

engagement can assist in developing a more effective corporate governance culture. In turn, shareholder engagement may lead to better company performance to the benefit of shareholders (as well as other stakeholders).

- Disadvantages of shareholder engagement include costs and time involved, pressure on a company to meet near-term share price or earnings targets, possible selective disclosure of information, and potential conflicts of interest.
- Activist investors (or activists) specialize in taking stakes in companies and creating change to generate a gain on the investment.
- The participation of shareholders in general meetings, also known as general assemblies, and the exercise of their voting rights are among the most influential tools available for shareholder engagement.
- The choice of using active management or passive management is not an "either/or" (binary) alternative but rather a decision involving a passive–active spectrum. Investors may decide to position their portfolios across the passive–active spectrum based on their confidence to outperform, client preference, suitable benchmarks, client-specific mandates, risks/costs of active management, and taxes.

The full reading, worth 1 CE credit, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/introduction-equity-portfolio-management

Passive Equity Investing

by David M. Smith, PhD, CFA, and Kevin K. Yousif, CFA

David M. Smith, PhD, CFA, is at the University at Albany, New York (USA).
Kevin K. Yousif, CFA, is at LSIA Wealth & Institutional (USA).

Learning Outcomes

The candidate should be able to:

a. discuss considerations in choosing a benchmark for a passively managed equity portfolio;

b. compare passive factor-based strategies to market-capitalization-weighted indexing;

c. compare different approaches to passive equity investing;

d. compare the full replication, stratified sampling, and optimization approaches for the construction of passively managed equity portfolios;

e. discuss potential causes of tracking error and methods to control tracking error for passively managed equity portfolios;

f. explain sources of return and risk to a passively managed equity portfolio.

Introduction

This reading provides a broad overview of passive equity investing, including index selection, portfolio management techniques, and the analysis of investment results.

Although they mean different things, passive equity investing and indexing have become nearly synonymous in the investment industry. Indexing refers to strategies intended to replicate the performance of benchmark indexes, such as the S&P 500 Index, the Topix 100, the FTSE 100, and the MSCI All-Country World Index. The main advantages of indexing include low costs, broad diversification, and tax efficiency. Indexing is the purest form of a more general idea: passive investing. Passive investing refers to any rules-based, transparent, and investable strategy that does not involve identifying mispriced individual securities. Unlike indexing, however, passive investing can include investing in a changing set of market segments that are selected by the portfolio manager.

Studies over the years have reported support for passive investing. Renshaw and Feldstein (1960) observe that the returns of professionally managed portfolios trailed the returns on the principal index of that time, the Dow Jones Industrial Average. They also conclude that the index would be a good basis for what they termed an "unmanaged investment company." French (2008) indicates that the cost of passive investing is lower than the cost of active management.

Further motivation for passive investing comes from studies that examine the return and risk consequences of stock selection, which involves identifying mispriced securities. This differs from asset allocation, which involves selecting asset class investments that are, themselves, essentially passive indexed-based portfolios. Brinson, Hood, and Beebower (1986) find a dominant role for asset allocation rather than security selection in explaining return variability. With

passive investing, portfolio managers eschew the idea of security selection, concluding that the benefits do not justify the costs.

The efficient market hypothesis gave credence to investors' interest in indexes by theorizing that stock prices incorporate all relevant information—implying that after costs, the majority of active investors could not consistently outperform the market. With this backdrop, investment managers began to offer strategies to replicate the returns of stock market indexes as early as 1971.

In comparison with passive investing strategies, active management of an investment portfolio requires a substantial commitment of personnel, technological resources, and time spent on analysis and management that can involve significant costs. Consequently, passive portfolio fees charged to investors are generally much lower than fees charged by their active managers. This fee differential represents the most significant and enduring advantage of passive management.

Another advantage is that passive managers seeking to track an index can generally achieve their objective. Passive managers model their clients' portfolios to the benchmark's constituent securities and weights as reported by the index provider, thereby replicating the benchmark. The skill of a passive manager is apparent in the ability to trade, report, and explain the performance of a client's portfolio. Gross-of-fees performance among passive managers tends to be similar, so much of the industry views passive managers as undifferentiated apart from their scope of offerings and client-servicing capabilities.

Investors of passively managed funds may seek market return, otherwise known as beta exposure, and do not seek outperformance, known as alpha. A focus on beta is based on a single-factor model: the capital asset pricing model.

Since the turn of the millennium, passive factor-based strategies, which are based on more than a single factor, have become more prevalent as investors gain a different understanding of what drives

investment returns. These strategies maintain the low-cost advantage of index funds and provide a different expected return stream based on exposure to such factors as style, capitalization, volatility, and quality.

This reading contains the following sections. Section 2 focuses on how to choose a passive benchmark, including weighting considerations. Section 3 looks at how to gain exposure to the desired index, whether through a pooled investment, a derivatives-based approach, or a separately managed account. Section 4 describes passive portfolio construction techniques. Section 5 discusses how a portfolio manager can control tracking error against the benchmark, including the sources of tracking error. Section 6 introduces methods a portfolio manager can use to attribute the sources of return in the portfolio, including country returns, currency returns, sector returns, and security returns. This section also describes sources of portfolio risk. A summary of key points concludes the reading.

Summary

This reading explains the rationale for passive investing as well as the construction of equity market indexes and the various methods by which investors can track the indexes. Passive portfolio managers must understand benchmark index construction and the advantages and disadvantages of the various methods used to track index performance.

Among the key points made in this reading are the following:

- Active equity portfolio managers who focus on individual security selection have long been unsuccessful at beating benchmarks

and have charged high management fees to their end investors. Consequently, passive investing has increased in popularity.

- Passive equity investors seek to track the return of benchmark indexes and construct their portfolios to reflect the characteristics of the chosen benchmarks.
- Selection of a benchmark is driven by the equity investor's objectives and constraints as presented in the investment policy statement. The benchmark index must be rules-based, transparent, and investable. Specific important characteristics include the domestic or foreign market covered, the market capitalization of the constituent stocks, where the index falls in the value–growth spectrum, and other risk factors.
- The equity benchmark index weighting scheme is another important consideration for investors. Weighting methods include market-cap weighting, price weighting, equal weighting, and fundamental weighting. Market cap-weighting has several advantages, including the fact that weights adjust automatically.
- Index rebalancing and reconstitution policies are important features. Rebalancing involves adjusting the portfolio's constituent weights after price changes, mergers, or other corporate events have caused those weights to deviate from the benchmark index. Reconstitution involves deleting names that are no longer in the index and adding names that have been approved as new index members.
- Increasingly, passive investors use index-based strategies to gain exposure to individual risk factors. Examples of known equity risk factors include Capitalization, Style, Yield, Momentum, Volatility, and Quality.

- For passive investors, portfolio tracking error is the standard deviation of the portfolio return net of the benchmark return.
- Indexing involves the goal of minimizing tracking error subject to realistic portfolio constraints.
- Methods of pursuing passive investing include the use of such pooled investments as mutual funds and exchange-traded funds (ETFs), a do-it-yourself approach of building the portfolio stock-by-stock, and using derivatives to obtain exposure.
- Conventional open-end index mutual funds generally maintain low fees. Their expense ratios are slightly higher than for ETFs, but a brokerage fee is usually required for investor purchases and sales of ETF shares.
- Index exposure can also be obtained through the use of derivatives, such as futures and swaps.
- Building a passive portfolio by full replication, meaning to hold all the index constituents, requires a large-scale portfolio and high-quality information about the constituent characteristics. Most equity index portfolios are managed using either a full replication strategy to keep tracking error low, are sampled to keep trading costs low, or use optimization techniques to match as closely as possible the characteristics and performance of the underlying index.
- The principal sources of passive portfolio tracking error are fees, trading costs, and cash drag. Cash drag refers to the dilution of the return on the equity assets because of cash held. Cash drag can be exacerbated by the receipt of dividends from constituent stocks and the delay in getting them converted into shares.

- Portfolio managers control tracking error by minimizing trading costs, netting investor cash inflows and redemptions, and using equitization tools like derivatives to compensate for cash drag.
- Many index fund managers offer the constituent securities held in their portfolios for lending to short sellers and other market participants. The income earned from lending those securities helps offset portfolio management costs, often resulting in lower net fees to investors.
- Investor activism is engagement with portfolio companies and recognizing the primacy of end investors. Forms of activism can include expressing views to company boards or management on executive compensation, operational risk, board governance, and other value-relevant matters.
- Successful passive equity investment requires an understanding of the investor's needs, benchmark index construction, and methods available to track the index.

The full reading, worth 1.5 CE credits, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/passive-equity-investing

Active Equity Investing: Strategies

by Bing Li, PhD, CFA, Yin Luo, CFA, and Pranay Gupta, CFA

Bing Li, PhD, CFA, is at Yuanyin Asset Management (Hong Kong). Yin Luo, CFA, is at Wolfe Research (USA). Pranay Gupta, CFA, is at Allocationmetrics Limited (Hong Kong).

Learning Outcomes

The candidate should be able to:

a. compare fundamental and quantitative approaches to active management;

b. analyze bottom-up active strategies, including their rationale and associated processes;

c. analyze top-down active strategies, including their rationale and associated processes;

d. analyze factor-based active strategies, including their rationale and associated processes;

e. analyze activist strategies, including their rationale and associated processes;

f. describe active strategies based on statistical arbitrage and market microstructure;

g. describe how fundamental active investment strategies are created;

h. describe how quantitative active investment strategies are created;

i. discuss equity investment style classifications.

Introduction

This reading provides an overview of active equity investing and the major types of active equity strategies. The reading is organized around a classification of active equity strategies into two broad approaches: fundamental and quantitative. Both approaches aim at outperforming a passive benchmark (for example, a broad equity market index), but they tend to make investment decisions differently. Fundamental approaches stress the use of human judgment in processing information and making investment decisions, whereas quantitative approaches tend to rely more heavily on rules-based quantitative models. As a result, some practitioners and academics refer to the fundamental, judgment-based approaches as "discretionary" and to the rules-based, quantitative approaches as "systematic."

This reading is organized as follows. Section 2 introduces fundamental and quantitative approaches to active management. Section 3 discusses bottom-up, top-down, factor-based, and activist investing strategies. Section 4 describes the process of creating fundamental active investment strategies, including the parameters to consider as well as some of the pitfalls. Section 5 describes the steps required to create quantitative active investment strategies, as well as the pitfalls in a quantitative investment process. Section 6 discusses style

classifications of active strategies and the uses and limitations of such classifications. A summary of key points completes the reading.

Summary

This reading discusses the different approaches to active equity management and describes how the various strategies are created. It also addresses the style classification of active approaches.

- Active equity management approaches can be generally divided into two groups: fundamental (also referred to as discretionary) and quantitative (also known as systematic or rules-based). Fundamental approaches stress the use of human judgment in arriving at an investment decision, whereas quantitative approaches stress the use of rules-based, quantitative models to arrive at a decision.
- The main differences between fundamental and quantitative approaches include the following characteristics: approach to the decision-making process (subjective versus objective); forecast focus (stock returns versus factor returns); information used (research versus data); focus of the analysis (depth versus breadth); orientation to the data (forward looking versus backward looking); and approach to portfolio risk (emphasis on judgment versus emphasis on optimization techniques).
- The main types of active management strategies include bottom-up, top-down, factor-based, and activist.
- Bottom-up strategies begin at the company level, and use company and industry analyses to assess the intrinsic value of the

company and determine whether the stock is undervalued or overvalued relative to its market price.

- Fundamental managers often focus on one or more of the following company and industry characteristics: business model and branding, competitive advantages, and management and corporate governance.
- Bottom-up strategies are often divided into value-based approaches and growth-based approaches.
- Top-down strategies focus on the macroeconomic environment, demographic trends, and government policies to arrive at investment decisions.
- Top-down strategies are used in several investment decision processes, including the following: country and geographic allocation, sector and industry rotation, equity style rotation, volatility-based strategies, and thematic investment strategies.
- Quantitative equity investment strategies often use factor-based models. A factor-based strategy aims to identify significant factors that drive stock prices and to construct a portfolio with a positive bias towards such factors.
- Factors can be grouped based on fundamental characteristics—such as value, growth, and price momentum—or on unconventional data.
- Activist investors specialize in taking meaningful stakes in listed companies and influencing those companies to make changes to their management, strategy, or capital structures for the purpose of increasing the stock's value and realizing a gain on their investment.

- Statistical arbitrage (or "stat arb") strategies use statistical and technical analysis to exploit pricing anomalies and achieve superior returns. Pairs trading is an example of a popular and simple statistical arbitrage strategy.
- Event-driven strategies exploit market inefficiencies that may occur around corporate events such as mergers and acquisitions, earnings announcements, bankruptcies, share buybacks, special dividends, and spinoffs.
- The fundamental active investment process includes the following steps: define the investment universe; prescreen the universe; understand the industry and business; forecast the company's financial performance; convert forecasts into a target price; construct the portfolio with the desired risk profile; and rebalance the portfolio according to a buy and sell discipline.
- Pitfalls in fundamental investing include behavioral biases, the value trap, and the growth trap.
- Behavioral biases can be divided into two groups: cognitive errors and emotional biases. Typical biases that are relevant to active equity management include confirmation bias, illusion of control, availability bias, loss aversion, overconfidence, and regret aversion.
- The quantitative active investment process includes the following steps: define the investment thesis; acquire, clean, and process the data; backtest the strategy; evaluate the strategy; and construct an efficient portfolio using risk and trading cost models.
- The pitfalls in quantitative investing include look-ahead and survivorship biases, overfitting, data mining, unrealistic turnover assumptions, transaction costs, and short availability.

- An investment style generally splits the stock universe into two or three groups, such that each group contains stocks with similar characteristics. The common style characteristics used in active management include value, size, price momentum, volatility, high dividend, and earnings quality. A stock's membership in an industry, sector, or country group is also used to classify the investment style.
- Two main approaches are often used in style analysis: a returns-based approach and a holdings-based approach. Holdings-based approaches aggregate the style scores of individual holdings, while returns-based approaches analyze the investment style of portfolio managers by comparing the returns of the strategy to those of a set of style indexes.

The full reading, worth 2.5 CE credits, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/active-equity-investing-strategies

Active Equity Investing: Portfolio Construction

by Jacques Lussier, CFA, and Marc R. Reinganum, PhD

Jacques Lussier, CFA, is at IPSOL Capital (Canada). Marc R. Reinganum, PhD (USA).

Learning Outcomes

The candidate should be able to:

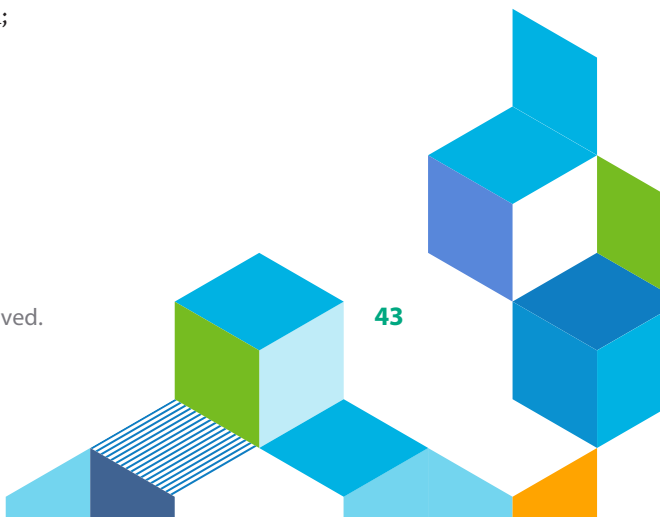
a. describe elements of a manager's investment philosophy that influence the portfolio construction process;

b. discuss approaches for constructing actively managed equity portfolios;

c. distinguish between Active Share and active risk and discuss how each measure relates to a manager's investment strategy;

d. discuss the application of risk budgeting concepts in portfolio construction;

e. discuss risk measures that are incorporated in equity portfolio construction and describe how limits set on these measures affect portfolio construction;



f. discuss how assets under management, position size, market liquidity, and portfolio turnover affect equity portfolio construction decisions;

g. evaluate the efficiency of a portfolio structure given its investment mandate;

h. discuss the long-only, long extension, long/short, and equitized market-neutral approaches to equity portfolio construction, including their risks, costs, and effects on potential alphas.

Introduction

Active equity investing is based on the concept that a skilled portfolio manager can both identify and differentiate between the most attractive securities and the least attractive securities—typically relative to a pre-specified benchmark. If this is the case, why is a portfolio—a collection of securities—even necessary? Why shouldn't the portfolio manager just identify the most attractive security and invest all assets in this one security? Or in a long/short context, why not buy the "best" security and sell the "worst" one? Although very simple, this one-stock approach is not likely to be optimal or even feasible. No manager has perfect foresight, and his predictions will likely differ from realized returns. What he predicted would be the "best security" may quite likely turn out *not* to be the best. Active equity portfolio managers, even those with great skill, cannot avoid this risk. Security analysis is the process for ranking the relative attractiveness of securities, whereas portfolio construction is about selecting the securities to be included and carefully determining what percentage of the portfolio is to be held in each security—balancing superior

insights regarding predicted returns against some likelihood that these insights will be derailed by events unknown or simply prove to be inaccurate.

Active managers rely on a wide array of investment strategies and methodologies to build portfolios of securities that they expect to outperform the benchmark. The challenges faced by active managers are similar whether they manage long-only traditional strategies, systematic/quantitative strategies, or long/short opportunistic strategies. Managers may differ in their investment style, operational complexity, flexibility of investment policy, ability to use leverage and short positions, and implementation methodologies, but predictions about returns and risk are essential to most active equity management styles.

In Section 2, we introduce the "building blocks" of portfolio construction, and in Section 3, we discuss the different approaches to portfolio construction. In Sections 4 and 5, we discuss risk budgeting concepts relevant to portfolio construction and the measures used to evaluate portfolio risk. Section 6 looks at how issues of scale may affect portfolio construction. Section 7 addresses the attributes of a well-constructed portfolio. Section 8 looks at certain specialized equity strategies and how their approaches to portfolio construction may differ from a long-only equity strategy. The reading concludes with a summary.

Summary

Active equity portfolio construction strives to make sure that superior insights about forecasted returns get efficiently reflected in realized portfolio performance. Active equity portfolio construction is about thoroughly understanding the return objectives of a portfolio,

as well as its acceptable risk levels, and then finding the right mix of securities that balances predicted returns against risk and other impediments that can interfere with realizing these returns. These principles apply to long-only, long/short, long-extension, and market-neutral approaches. Below, we highlight the discussions of this reading.

- The four main building blocks of portfolio construction are the following:
  - Overweight, underweight, or neutralize rewarded factors: The four most recognized factors known to offer a persistent return premium are Market, Size, Value, and Momentum.
  - Alpha skills: Timing factors, securities, and markets. Finding new factors and enhancing existing factors.
  - Sizing positions to account for risk and active weights.
  - Breadth of expertise: A manager's ability to consistently outperform his benchmark increases when that performance can be attributed to a larger sample of independent decisions. Independent decisions are uncorrelated decisions.
- Managers can rely on a combination of approaches to implement their core beliefs:
  - Systematic vs. discretionary
    - Systematic strategies incorporate research-based rules across a broad universe of securities.
    - Discretionary strategies integrate the judgment of the manager on a smaller subset of securities.

  - Bottom up vs. top down
    - A bottom-up manager evaluates the risk and return characteristics of individual securities. The aggregate of these risk and return expectations implies expectations for the overall economic and market environment.
    - A top-down manager starts with an understanding of the overall market environment and then projects how the expected environment will affect countries, asset classes, sectors, and securities.
  - Benchmark aware vs. benchmark agnostic
- Portfolio construction can be framed as an optimization problem using an objective function and a set of constraints. The objective function of a systematic manager will be specified explicitly, whereas that of a discretionary manager may be set implicitly.
- Risk budgeting is a process by which the total risk appetite of the portfolio is allocated among the various components of portfolio choice.
- Active risk (tracking error) is a function of the portfolio's exposure to systematic risks and the level of idiosyncratic, security-specific risk. It is a relevant risk measure for benchmark-relative portfolios.
- Absolute risk is the total volatility of portfolio returns independent of a benchmark. It is the most appropriate risk measure for portfolios with an absolute return objective.
- Active Share measures the extent to which the number and sizing of positions in a manager's portfolio differ from the benchmark.

- Benchmark-agnostic managers usually have a greater level of Active Share and most likely have a greater level of active risk.
- An effective risk management process requires that the portfolio manager
  - determine which type of risk measure is most appropriate,
  - understand how each aspect of the strategy contributes to its overall risk,
  - determine what level of risk budget is appropriate, and
  - effectively allocate risk among individual positions/factors.
- Risk constraints may be either formal or heuristic. Heuristic constraints may impose limits on
  - concentration by security, sector, industry, or geography;
  - net exposures to risk factors, such as Beta, Size, Value, and Momentum;
  - net exposures to currencies;
  - the degree of leverage;
  - the degree of illiquidity;
  - exposures to reputational/environmental risks, such as carbon emissions; and
  - other attributes related to an investor's core concerns.
- Formal risk constraints are statistical in nature. Formal risk measures include the following:
  - Volatility—the standard deviation of portfolio returns
  - Active risk—also called *tracking error* or *tracking risk*

  - Skewness—a measure of the degree to which return expectations are non-normally distributed
  - Drawdown—a measure of portfolio loss from its high point until it begins to recover
  - Value at risk (VaR)—the minimum loss that would be expected a certain percentage of the time over a certain period of time given the modeled market conditions, typically expressed as the minimum loss that can be expected to occur 5% of the time
  - CVaR (expected tail loss or expected shortfall)—the average loss that would be incurred if the VaR cutoff is exceeded
  - IVaR—the change in portfolio VaR when adding a new position to a portfolio
  - MVaR—the effect on portfolio risk of a change in the position size. In a diversified portfolio, it may be used to determine the contribution of each asset to the overall VaR.
- Portfolio management costs fall into two categories: explicit costs and implicit costs. Implicit costs include delay and slippage.
- The costs of managing assets may affect the investment strategy and the portfolio construction process.
  - Slippage costs are significantly greater for smaller-cap securities and during periods of high volatility.
  - A strategy that demands immediate execution is likely to incur higher market impact costs.
  - A patient manager can mitigate market impact costs by slowly building up positions as liquidity becomes available, but he exposes himself to greater volatility/trend price risk.

- A well-constructed portfolio exhibits
  - a clear investment philosophy and a consistent investment process,
  - risk and structural characteristics as promised to investors,
  - a risk-efficient delivery methodology, and
  - reasonably low operating costs.
- Long/short investing is a compromise between
  - reducing risk and not capturing fully the market risk premium,
  - expanding the return potential from alpha and other risk premiums at the potential expense of increasing active risk, and
  - achieving greater diversification and higher costs and complexity.

The full reading, worth 3 CE credits, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/active-equity-investing-portfolio-construction

Quantitative Methods

Applicable Reading

Multiple Regression and Machine Learning (Level II)

by Sanjiv R. Das, PhD, Richard A. DeFusco, PhD, CFA, Dennis W. McLeavey, CFA, Jerald E. Pinto, PhD, CFA, and David E. Runkle, PhD, CFA
3.5 CE credits
Access to the full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/multiple-regression-machine-learning

What Changed in the 2019 Curriculum?

The 2019 curriculum cycle introduced the first content on machine learning, with a 12-page expansion of a prior reading on regression analysis.

Machine learning is having a major impact on the investment management industry, extending from strategy and investment decision making to the trading function. For example, machine learning algorithms are being used to extract information from the prodigious quantities of data being generated in real time by financial markets, businesses, governments, individuals, and satellite imaging. Some asset managers are leveraging such data to gain information and insights that may give them a competitive edge. Others are incorporating machine learning integrally in investment processes. Even traditional investment analysts are being called on to evaluate how companies may be leveraging this technology.

This new content begins in Section 7 of the reading; members who do not need a refresher on regression analysis can begin their reading with that section. We recommend that it be read in conjunction with "Fintech in Investment Management," which provides the larger picture into which machine learning fits.

Why Does It Matter to Members?

This reading will help members understand advances in technology that are affecting investment processes at many asset management firms. Readers will gain much of the vocabulary needed for understanding data science–related discussions.

Multiple Regression and Machine Learning

by Sanjiv R. Das, PhD, Richard A. DeFusco, PhD, CFA, Dennis W. McLeavey, CFA, Jerald E. Pinto, PhD, CFA, and David E. Runkle, PhD, CFA

Sanjiv R. Das, PhD, is at Santa Clara University (USA). Richard A. DeFusco, PhD, CFA, is at the University of Nebraska-Lincoln (USA). Dennis W. McLeavey, CFA, is at the University of Rhode Island (USA). Jerald E. Pinto, PhD, CFA, is at CFA Institute (USA). David E. Runkle, PhD, CFA, is at Trilogy Global Advisors (USA).

Learning Outcomes

The candidate should be able to:

a. formulate a multiple regression equation to describe the relation between a dependent variable and several independent variables and determine the statistical significance of each independent variable;

b. interpret estimated regression coefficients and their *p*-values;

c. formulate a null and an alternative hypothesis about the population value of a regression coefficient, calculate the value of the test statistic, and determine whether to reject the null hypothesis at a given level of significance;

d. interpret the results of hypothesis tests of regression coefficients;

e. calculate and interpret 1) a confidence interval for the population value of a regression coefficient and 2) a predicted value for the dependent variable, given an estimated regression model and assumed values for the independent variables;

f. explain the assumptions of a multiple regression model;

g. calculate and interpret the *F*-statistic, and describe how it is used in regression analysis;

h. distinguish between and interpret the R^2 and adjusted R^2 in multiple regression;

i. evaluate how well a regression model explains the dependent variable by analyzing the output of the regression equation and an ANOVA table;

j. formulate a multiple regression equation by using dummy variables to represent qualitative factors and interpret the coefficients and regression results;

k. explain the types of heteroskedasticity and how heteroskedasticity and serial correlation affect statistical inference;

l. describe multicollinearity and explain its causes and effects in regression analysis;

m. describe how model misspecification affects the results of a regression analysis and describe how to avoid common forms of misspecification;

n. describe models with qualitative dependent variables;

o. evaluate and interpret a multiple regression model and its results;

p. distinguish between supervised and unsupervised machine learning;

q. describe machine learning algorithms used in prediction, classification, clustering, and dimension reduction;

r. describe the steps in model training.

Introduction

As financial analysts, we often need to use more-sophisticated statistical methods than correlation analysis or regression involving a single independent variable. For example, a trading desk interested in the costs of trading NASDAQ stocks might want information on the determinants of the bid–ask spread on the NASDAQ. A mutual fund analyst might want to know whether returns to a technology mutual fund behaved more like the returns to a growth stock index or like the returns to a value stock index. An investor might be interested in the factors that determine whether analysts cover a stock. We can answer these questions using linear regression with more than one independent variable—multiple linear regression.

In Sections 2 and 3, we introduce and illustrate the basic concepts and models of multiple regression analysis. These models rest on assumptions that are sometimes violated in practice. In Section 4, we discuss three commonly occurring violations of regression assumptions. We address practical concerns such as how to diagnose an assumption violation and what remedial steps to take when a model assumption has been violated. Section 5 outlines some guidelines for building good regression models and discusses ways that analysts sometimes go wrong in this endeavor. In Section 6, we discuss a class of models whose dependent variable is qualitative in nature. These models are useful when the concern is over the

occurrence of some event, such as whether a stock has analyst coverage or not.

Summary

In this reading, we have presented the multiple linear regression model and discussed violations of regression assumptions, model specification and misspecification, and models with qualitative variables.

- The general form of a multiple linear regression model is
  $Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + \ldots + b_kX_{ki} + \varepsilon_i$
- We conduct hypothesis tests concerning the population values of regression coefficients using *t*-tests of the form

$$t = \frac{\hat{b}_j - b_j}{s_{\hat{b}_j}}$$

- The lower the *p*-value reported for a test, the more significant the result.
- The assumptions of classical normal multiple linear regression model are as follows:
  1. A linear relation exists between the dependent variable and the independent variables.
  2. The independent variables are not random. Also, no exact linear relation exists between two or more of the independent variables.

3. The expected value of the error term, conditioned on the independent variables, is 0.
4. The variance of the error term is the same for all observations.
5. The error term is uncorrelated across observations.
6. The error term is normally distributed.

- To make a prediction using a multiple linear regression model, we take the following three steps:
  1. Obtain estimates of the regression coefficients.
  2. Determine the assumed values of the independent variables.
  3. Compute the predicted value of the dependent variable.
- When predicting the dependent variable using a linear regression model, we encounter two types of uncertainty: uncertainty in the regression model itself, as reflected in the standard error of estimate, and uncertainty about the estimates of the regression coefficients.
- The *F*-test is reported in an ANOVA table. The *F*-statistic is used to test whether at least one of the slope coefficients on the independent variables is significantly different from 0.

$$F = \frac{\text{RSS}/k}{\text{SSE}/\left[n-(k+1)\right]} = \frac{\text{Mean regression sum of squares}}{\text{Mean squared error}}$$

Under the null hypothesis that all the slope coefficients are jointly equal to 0, this test statistic has a distribution of $F_{k,n-(k+1)}$, where the regression has n observations and k independent variables. The *F*-test measures the overall significance of the regression.

- R^2 is nondecreasing in the number of independent variables, so it is less reliable as a measure of goodness of fit in a regression with more than one independent variable than in a one-independent-variable regression.

  Analysts often choose to use adjusted R^2 because it does not necessarily increase when one adds an independent variable.

- Dummy variables in a regression model can help analysts determine whether a particular qualitative independent variable explains the model's dependent variable. A dummy variable takes on the value of 0 or 1. If we need to distinguish among n categories, the regression should include $n - 1$ dummy variables. The intercept of the regression measures the average value of the dependent variable of the omitted category, and the coefficient on each dummy variable measures the average incremental effect of that dummy variable on the dependent variable.

- If a regression shows significant conditional heteroskedasticity, the standard errors and test statistics computed by regression programs will be incorrect unless they are adjusted for heteroskedasticity.

- One simple test for conditional heteroskedasticity is the Breusch–Pagan test. Breusch and Pagan showed that, under the null hypothesis of no conditional heteroskedasticity, nR^2 (from the regression of the squared residuals on the independent variables from the original regression) will be a χ^2 random variable with the number of degrees of freedom equal to the number of independent variables in the regression.

- The principal effect of serial correlation in a linear regression is that the standard errors and test statistics computed by regression programs will be incorrect unless adjusted for serial

correlation. Positive serial correlation typically inflates the *t*-statistics of estimated regression coefficients as well as the *F*-statistic for the overall significance of the regression.

- The most commonly used test for serial correlation is based on the Durbin–Watson statistic. If the Durbin–Watson statistic differs sufficiently from 2, then the regression errors have significant serial correlation.
- Multicollinearity occurs when two or more independent variables (or combinations of independent variables) are highly (but not perfectly) correlated with each other. With multicollinearity, the regression coefficients may not be individually statistically significant even when the overall regression is significant as judged by the *F*-statistic.
- Model specification refers to the set of variables included in the regression and the regression equation's functional form. The following principles can guide model specification:
  - The model should be grounded in cogent economic reasoning.
  - The functional form chosen for the variables in the regression should be appropriate given the nature of the variables.
  - The model should be parsimonious.
  - The model should be examined for violations of regression assumptions before being accepted.
  - The model should be tested and be found useful out of sample before being accepted.

- If a regression is misspecified, then statistical inference using OLS is invalid and the estimated regression coefficients may be inconsistent.
- Assuming that a model has the correct functional form, when in fact it does not, is one example of misspecification. There are several ways this assumption may be violated:
  - One or more important variables could be omitted from the regression.
  - One or more of the regression variables may need to be transformed before estimating the regression.
  - The regression model pools data from different samples that should not be pooled.
- Another type of misspecification occurs when independent variables are correlated with the error term. This is a violation of Regression Assumption 3, that the error term has a mean of 0, and causes the estimated regression coefficients to be biased and inconsistent. Three common problems that create this type of time-series misspecification are:
  - including lagged dependent variables as independent variables in regressions with serially correlated errors;
  - including a function of dependent variable as an independent variable, sometimes as a result of the incorrect dating of variables; and
  - independent variables that are measured with error.
- Probit and logit models estimate the probability of a discrete outcome (the value of a qualitative dependent variable, such as whether a company enters bankruptcy) given the values of the

independent variables used to explain that outcome. The probit model, which is based on the normal distribution, estimates the probability that $Y = 1$ (a condition is fulfilled) given the values of the independent variables. The logit model is identical, except that it is based on the logistic distribution rather than the normal distribution.

- Supervised learning is machine learning that makes use of labelled training data and contrasts with unsupervised learning which does not make use of labelled data.
- Focuses of data analytics include correlation, prediction, causal inference, classification, clustering, and dimension reduction. Supervised ML is typically used for prediction and classification while unsupervised machine learning is used for clustering and dimension reduction.
- Penalized regression is a computationally efficient technique used in prediction problems. CART is a common supervised ML technique which can be applied to predict either a categorical or continuous target variable. Neural networks are applied to a variety of tasks characterized by nonlinearities and interactions among variables. Neural networks consist of three layers: an input layer, hidden layer(s), and an output layer. The K-means algorithm is a simple, bottom-up clustering algorithm based on concepts of geometric distance from points called centroids. PCA is an unsupervised learning algorithm that supplies a lower dimensional view of the structure of the volatility in data.
- The process to train ML models involves following steps:
  - Specify the ML technique/algorithm
  - Specify the associated hyperparameters

- Divide data into training and validation samples
- Evaluate learning with performance measure P, using the validation sample, and tune the hyperparameters
- Repeat the training cycle the specified number of times or until the required performance level is obtained.

The full reading, worth 3.5 CE credits, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/multiple-regression-machine-learning

Financial Reporting and Analysis

Applicable Reading

Analysis of Financial Institutions (Level II)

by Jack T. Ciesielski, CPA, CFA, and Elaine Henry, PhD, CFA
2.5 CE credits
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/analysis-financial-institutions

What Changed in the 2019 Curriculum?

New to the curriculum at Level II is an in-depth discussion of two types of financial institutions: (1) banks and quasi-digital banking companies and (2) insurance companies. Banks and insurers have unique operating and investment characteristics by virtue of being highly regulated financial intermediaries. In many markets, both developed and emerging, they are a key sector, affecting economic growth and the systemic risk of markets.

"Analysis of Financial Institutions" covers the use and interpretation of key financial metrics for banks and explains the evaluation of off-balance-sheet assets and liabilities, a bank's business segmentation and competitors, and currency exposure. Practitioners are shown how to competently assess individual insurers' various revenue streams—including the offering of investment products, such as annuities, alongside risk management insurance contracts—and analyze the insurers' business profiles, earnings characteristics, investment returns, liquidity, underwriting profitability, reserves, and capitalization. The reading explains the distinctive accounting content of insurance.

Why Does It Matter to Members?

In previous years, the presentation of fundamental analysis focused only on nonfinancial companies. This reading fills a gap by providing a toolkit for fundamental analysis of financial institutions and should be relevant to investment analysts and portfolio managers whose investment universe includes financial institutions.

Analysis of Financial Institutions

by Jack T. Ciesielski, CPA, CFA, and Elaine Henry, PhD, CFA

Jack T. Ciesielski, CPA, CFA, is at R.G. Associates, Inc., publisher of The Analyst's Accounting Observer (USA). Elaine Henry, PhD, CFA, is at Stevens Institute of Technology (USA).

Learning Outcomes

The candidate should be able to:

a. describe how financial institutions differ from other companies;

b. describe key aspects of financial regulations of financial institutions;

c. explain the CAMELS (capital adequacy, asset quality, management, earnings, liquidity, and sensitivity) approach to analyzing a bank, including key ratios and its limitations;

d. describe other factors to consider in analyzing a bank;

e. analyze a bank based on financial statements and other factors;

f. describe key ratios and other factors to consider in analyzing an insurance company.

Introduction

Financial institutions provide a wide range of financial products and services. They serve as intermediaries between providers and recipients of capital, facilitate asset and risk management, and execute transactions involving cash, securities, and other financial assets.

Given the diversity of financial services, it is unsurprising that numerous types of financial institutions exist. Types of financial institutions include deposit-taking, loan-making institutions (referred to as *banks* in this reading), investment banks, credit card companies, brokers, dealers, exchanges, clearinghouses, depositories, investment managers, financial advisers, and insurance companies. In many situations, overlap of services exists across types of institutions. For example, banks not only take deposits and make loans but also may undertake investment management and other securities-related activities and may offer such products as derivatives, which are effectively insurance against adverse effects of movements in the interest rate, equity, and foreign currency markets. As another example of overlap, life insurance companies not only provide mortality-related insurance products but also offer savings vehicles. This reading focuses primarily on two types of financial institutions: banks (broadly defined as deposit-taking, loan-making institutions) and insurance companies.

Section 2 explains what makes financial institutions different from other types of companies, such as manufacturers or merchandisers. Section 3 discusses how to analyze a bank. Section 4 focuses on analyzing insurance companies. A summary of key points concludes the reading.

Summary

- Financial institutions' systemic importance results in heavy regulation of their activities.
- Systemic risk refers to the risk of impairment in some part of the financial system that then has the potential to spread throughout other parts of the financial system and thereby to negatively affect the entire economy.
- The Basel Committee, a standing committee of the Bank for International Settlements, includes representatives from central banks and bank supervisors from around the world.
- The Basel Committee's international regulatory framework for banks includes minimum capital requirements, minimum liquidity requirements, and stable funding requirements.
- Among the international organizations that focus on financial stability are the Financial Stability Board, the International Association of Insurance Supervisors, the International Association of Deposit Insurers, and the International Organization of Securities Commissions.
- Another distinctive feature of financial institutions (compared to manufacturing or merchandising companies) is that their productive assets are predominantly financial assets, such as loans and securities, creating greater direct exposures to a variety of risks, such as credit risk, liquidity risk, market risk, and interest rate risk. In general, the values of their assets are relatively close to fair market values.
- A widely used approach to analyzing a bank, CAMELS, considers a bank's **C**apital adequacy, **A**sset quality, **M**anagement

capabilities, **E**arnings sufficiency, **L**iquidity position, and **S**ensitivity to market risk.

- "**C**apital adequacy," described in terms of the proportion of the bank's assets that is funded with capital, indicates that a bank has enough capital to absorb potential losses without severely damaging its financial position.
- "**A**sset quality" includes the concept of quality of the bank's assets—credit quality and diversification—and the concept of overall sound risk management.
- "**M**anagement capabilities" refers to the bank management's ability to identify and exploit appropriate business opportunities and to simultaneously manage associated risks.
- "**E**arnings" refers to the bank's return on capital relative to cost of capital and also includes the concept of earnings quality.
- "**L**iquidity" refers to the amount of liquid assets held by the bank relative to its near-term expected cash flows. Under Basel III, liquidity also refers to the stability of the bank's funding sources.
- "**S**ensitivity to market risk" pertains to how adverse changes in markets (including interest rate, exchange rate, equity, and commodity markets) could affect the bank's earnings and capital position.
- In addition to the CAMELS components, important attributes deserving analysts' attention include government support, the banking entity's mission, corporate culture and competitive environment, off-balance-sheet items, segment information, currency exposure, and risk disclosures.
- Insurance companies are typically categorized as property and casualty (P&C) or life and health (L&H).

- Insurance companies earn revenues from premiums (amounts paid by the purchaser of insurance products) and from investment income earned on the float (amounts collected as premiums and not yet paid out as benefits).
- P&C insurers' policies are usually short term, and the final cost will usually be known within a year of a covered event, whereas L&H insurers' policies are usually longer term. P&C insurers' claims are more variable, whereas L&H insurers' claims are more predictable.
- For both types of insurance companies, important areas for analysis include business profile, earnings characteristics, investment returns, liquidity, and capitalization. In addition, analysis of P&C companies' profitability includes analysis of loss reserves and the combined ratio.

The full reading, worth 2.5 CE credits, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/analysis-financial-institutions

Fixed Income

Applicable Reading

Credit Analysis Models (Level II)

by James F. Adams, PhD, CFA, and Donald J. Smith, PhD
2 CE credits
Access to full reading: https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/credit-analysis-models

What Changed in the 2019 Curriculum?

The 2019 "Credit Analysis Models" refresher reading at Level II replaces, with many improvements, the previous curriculum reading of the same title. This replacement takes a broader approach to the topic, including real-world applications for how precise credit analysis can drive investment decision making.

This reading gives an overview of the important tools and applications of various approaches to credit risk modeling, including benefits and limitations. Also explored are the input factors used to determine the expected exposure to default loss, recovery rates, the calculated assumed loss given default, and the probability of default.

The reading explores calculations for credit scoring, including the components of FICO credit scores. Also included are details of credit ratings (used within the wholesale bond market for corporate and government issues and asset-backed securities) and the forward outlook (positive, stable, or negative) as assigned by the major US-based corporate rating agencies. More extensive details are provided for valuing risky fixed-rate and floating-rate ("floater") bonds on the basis of various interest rate volatility assumptions and using the credit risk model for the purpose of interpreting changes in credit spreads.

Why Does It Matter to Members?

Credit analysis is an important competency in fixed-income portfolio management and risk management. This modern treatment of a core topic in investments should be professionally relevant to members who come into contact with the fixed-income sector.

Credit Analysis Models

by James F. Adams, PhD, CFA, and Donald J. Smith, PhD

James F. Adams, PhD, CFA, is at J.P. Morgan (USA). Donald J. Smith, PhD, is at Boston University Questrom School of Business (USA).

Learning Outcomes

The candidate should be able to:

a. explain expected exposure, the loss given default, the probability of default, and the credit valuation adjustment;

b. explain credit scores and credit ratings;

c. calculate the expected return on a bond given transition in its credit rating;

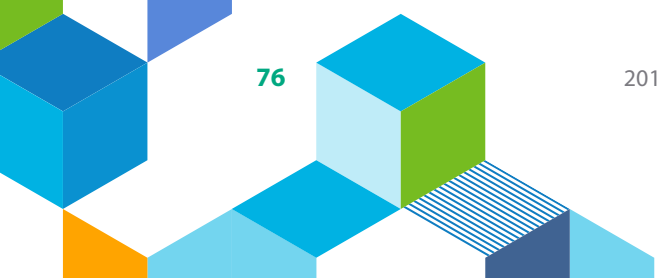
d. explain structural and reduced-form models of corporate credit risk, including assumptions, strengths, and weaknesses;

e. calculate the value of a bond and its credit spread, given assumptions about the credit risk parameters;

f. interpret changes in a credit spread;

g. explain the determinants of the term structure of credit spreads and interpret a term structure of credit spreads;

h. compare the credit analysis required for securitized debt to the credit analysis of corporate debt.



Introduction

This reading covers important concepts, tools, and applications of credit analysis. The topic of Section 2 is modeling credit risk. The inputs to credit risk modeling are the expected exposure to default loss, the loss given default, and the probability of default. We explain these terms and use a numerical example to illustrate the calculation of the credit valuation adjustment for a corporate bond and its credit spread over a government bond yield taken as a proxy for a default risk-free rate (or default-free rate).

Section 3 discusses credit scoring and credit ratings. Credit scoring is a measure of credit risk used in retail loan markets, and ratings are used in the wholesale bond market. Section 4 explains two types of credit analysis models used in practice—structural models and reduced-form models. Both models are highly mathematical and beyond the scope of this reading. Therefore, we provide only an overview to highlight the key ideas and similarities and differences between them.

Section 5 uses the arbitrage-free framework and a binomial interest rate tree to value risky fixed-rate and floating-rate bonds for different assumptions about interest rate volatility. Section 6 builds on the credit risk model to interpret changes in credit spreads that arise from changes in the assumed probability of default, the recovery rate, or the exposure to default loss. The term structure of credit spreads is explained in Section 7. Section 8 compares the credit analysis required for securitized debt to the credit analysis of corporate bonds.

Summary

This reading has covered several important topics in credit analysis. Among the points made are the following:

- Three factors important to modeling credit risk are the expected exposure to default, the recovery rate, and the loss given default.
- These factors permit the calculation of a credit valuation adjustment that is subtracted from the (hypothetical) value of the bond, if it were default risk free, to get the bond's fair value given its credit risk. The credit valuation adjustment is calculated as the sum of the present values of the expected loss for each period in the remaining life of the bond. Expected values are computed using risk-neutral probabilities, and discounting is done at the risk-free rates for the relevant maturities.
- The CVA captures investors' compensation for bearing default risk. The compensation can also be expressed in terms of a credit spread.
- Credit scores and credit ratings are third-party evaluations of creditworthiness used in distinct markets.
- Analysts may use credit ratings and a transition matrix of probabilities to adjust a bond's yield-to-maturity to reflect the probabilities of credit migration. Credit spread migration typically reduces expected return.
- Credit analysis models fall into two broad categories: structural models and reduced-form models.
- Structural models are based on an option perspective of the positions of the stakeholders of the company. Bondholders are

viewed as owning the assets of the company; shareholders have call options on those assets.

- Reduced-form models seek to predict *when* a default may occur, but they do not explain the *why* as do structural models. Reduced-form models, unlike structural models, are based only on observable variables.
- When interest rates are assumed to be volatile, the credit risk of a bond can be estimated in an arbitrage-free valuation framework.
- The discount margin for floating-rate notes is similar to the credit spread for fixed-coupon bonds. The discount margin can also be calculated using an arbitrage-free valuation framework.
- Arbitrage-free valuation can be applied to judge the sensitivity of the credit spread to changes in credit risk parameters.
- The term structure of credit spreads depends on macro and micro factors.
- As it concerns macro factors, the credit spread curve tends to become steeper and widen in conditions of weak economic activity. Market supply and demand dynamics are important. The most frequently traded securities tend to determine the shape of this curve.
- Issuer- or industry-specific factors, such as the chance of a future leverage-decreasing event, can cause the credit spread curve to flatten or invert.
- When a bond is very likely to default, it often trades close to its recovery value at various maturities; moreover, the credit spread curve is less informative about the relationship between credit risk and maturity.

- For securitized debt, the characteristics of the asset portfolio themselves suggest the best approach for a credit analyst to take when deciding among investments. Important considerations include the relative concentration of assets and their similarity or heterogeneity as it concerns credit risk.

The full reading, worth 2 CE credits, can be found at https://www.cfainstitute.org/en/membership/professional-development/refresher-readings/2019/credit-analysis-models