CFA Institute

CFA® PROGRAM CHANGES

2018 Members' Guide to Practitioner-Relevant Updates

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Foreword: Sharpen Your Professional Edge

As any CFA charterholder well knows, education is the foundation of professional competence. Continuing education can sharpen that competence, keeping you on the "cutting edge" in a rapidly changing investment profession. It therefore gives me great pleasure to introduce the 2018 updates to the CFA Program curriculum.

As always, we continue to see tremendous change in the investment industry. Increased regulation, the role of big data, and the continued low interest rate environment are just some examples of factors impacting and changing the profession. The CFA Program curriculum updates reflect the core competencies expected of investment professionals today, and our program constantly evolves to remain current and relevant.

Through our ongoing practice analysis, we seek input from practicing investment management professionals as to the skills that are needed in modern industry practice. We use this investment practitioner input to continually enhance the program, keep it relevant, and maintain the CFA charter as the gold standard. I encourage you to volunteer and share your industry insights with us.

For the 2018 curriculum update, asset allocation, fixed income, alternative investments, and economics were the key topic areas with changes, with a total of 10 new readings added to refresh your knowledge.

I hope that you will take advantage of this free membership benefit and use this as an opportunity to stay current. I applaud you, in advance, for your commitment to new learning and the lifelong pursuit of enhancing your knowledge.

Thank you, and wishing you continued success!

Stephen Horan, CFA, CIPM
Managing Director, Credentialing

Asset Allocation

Applicable Readings

Introduction to Asset Allocation (Level III)

by William W. Jennings, CFA, and Eugene L. Podkaminer, CFA
2 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/introduction_to_asset_allocation__2018_.aspx

Principles of Asset Allocation (Level III)

by Jean L.P. Brunel, CFA, Thomas M. Idzorek, CFA, and John M. Mulvey, PhD
3 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/principles_of_asset_allocation__2018_.aspx

Asset Allocation with Real-World Constraints (Level III)

by Peter Mladina, Brian J. Murphy, CFA, and Mark Ruloff, FSA, EA, CERA
1.5 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/asset_allocation_with_real-world_constraints__2018_.aspx

What Changed in the Curriculum?

Of the 10 new 2018 curriculum readings we are providing to you, the 3 listed above represent the new asset allocation reading sequences for Level III of the CFA Program curriculum.

The new asset allocation readings expand in scope and depth of coverage. Apart from providing new and up-to-date treatment of asset-only asset allocation models (such as traditional mean–variance optimization), the new readings give greater attention to liability-relative approaches and, for the first time, cover goal-based investing. Liability-driven investing has seen major growth in institutional markets. Goal-based investing (which generally involves establishing subportfolios customized to address such goals as funding a child's education or bequeathing assets) has also moved front and center since our asset allocation curriculum was last updated, in order to accommodate those professionals catering to private clients.

In addition, we now incorporate coverage of the theory and practice of portfolio rebalancing in the asset allocation reading sequence.

The three new readings present asset allocation in a spiral of deepening coverage. The first reading provides a top-level introductory view of asset allocation. The second reading delves deeper to explain the principles and models in professionally useful detail. The third reading addresses asset allocation in the presence of real-world constraints, such as taxes and assets with limited liquidity.

Why Does It Matter to Members?

Asset allocation is a critical bridge between investment goals and constructing portfolios suitable for achieving those goals. Our members who advise private clients or work for institutional investors will find in these readings a valuable professional refresher.

Introduction to Asset Allocation

by William W. Jennings, CFA, and Eugene L. Podkaminer, CFA

William W. Jennings, CFA, is at the US Air Force Academy (USA). Eugene L. Podkaminer, CFA, is at Callan Associates (USA).

Learning Outcomes

The candidate should be able to:

a. describe elements of effective investment governance and investment governance considerations in asset allocation;

b. prepare an economic balance sheet for a client and interpret its implications for asset allocation;

c. compare the investment objectives of asset-only, liability-relative, and goals-based asset allocation approaches;

d. contrast concepts of risk relevant to asset-only, liability-relative, and goals-based asset allocation approaches;

e. explain how asset classes are used to represent exposures to systematic risk and discuss criteria for asset class specification;

f. explain the use of risk factors in asset allocation and their relation to traditional asset class–based approaches;

g. select and justify an asset allocation based on an investor's objectives and constraints;

h. describe the use of the global market portfolio as a baseline portfolio in asset allocation;

i. discuss strategic implementation choices in asset allocation, including passive/active choices and vehicles for implementing passive and active mandates;

j. discuss strategic considerations in rebalancing asset allocations.

Introduction

Asset owners are concerned with accumulating and maintaining the wealth needed to meet their needs and aspirations. In that endeavor, investment portfolios—including individuals' portfolios and institutional funds—play important roles. Asset allocation is a strategic—and often a first or early—decision in portfolio construction. Because it holds that position, it is widely accepted as important and meriting careful attention. Among the questions addressed in this reading are the following:

- What is a sound governance context for making asset allocation decisions?
- How broad a picture should an adviser have of an asset owner's assets and liabilities in recommending an asset allocation?
- How can an asset owner's objectives and sensitivities to risk be represented in asset allocation?
- What are the broad approaches available in developing an asset allocation recommendation, and when might one approach be more or less appropriate than another?
- What are the top-level decisions that need to be made in implementing a chosen asset allocation?
- How may asset allocations be rebalanced as asset prices change?

This is the first reading in several sequences of readings that address, respectively, asset allocation and portfolio management of equities, fixed income, and alternative investments. Asset allocation is also linked to other facets of portfolio management, including risk management and behavioral finance. As coverage of asset allocation progresses in the sequence of readings, various connections to these topics, covered in detail in other areas of the curriculum, will be made.

This reading serves as the introduction to asset allocation. It organizes a top-level view of asset allocation and offers definitions that will provide a coordinated treatment of many later topics in portfolio management. In the asset allocation sequence, the role of this reading is the "big picture." The second reading—Asset Allocation in Practice—provides the basic "how" of developing an asset allocation, and the third reading explores various common, real-world complexities in developing an asset allocation.

This reading is organized as follows: Section 2 reviews the place of asset allocation in portfolio management and explains the sequence of topics that follows. Section 3 concerns the investment governance context in which asset allocation decisions are made. Section 4 explains the modern interest in considering asset allocation from a comprehensive perspective of the asset owner's financial condition. Section 5 distinguishes three broad approaches to asset allocation and explains how they differ in investment objective and concepts of risk. In Section 6, these three approaches are discussed at a high level in relation to three cases. Section 7 provides a top-level orientation to how a chosen asset allocation may be implemented, providing a set of definitions that underlie subsequent readings. As a result of movements in market prices, allocations to assets typically drift away from target allocations. Section 8 discusses rebalancing, and Section 9 provides a summary of the reading.

Summary

This reading has introduced the subject of asset allocation. Among the points made are the following:

- Effective investment governance ensures that decisions are made by individuals or groups with the necessary skills and capacity and involves
  - articulating the long- and short-term objectives of the investment program;
  - effectively allocating decision rights and responsibilities among the functional units in the governance hierarchy, taking account of their knowledge, capacity, time, and position on the governance hierarchy;
  - specifying processes for developing and approving the investment policy statement, which will govern the day-to-day operation of the investment program;
  - specifying processes for developing and approving the program's strategic asset allocation;
  - establishing a reporting framework to monitor the program's progress toward the agreed-on goals and objectives; and
  - periodically undertaking a governance audit.
- The economic balance sheet includes non-financial assets and liabilities that can be relevant for choosing the best asset allocation for an investor's financial portfolio.
- The investment objectives of asset-only asset allocation approaches focus on the asset side of the economic balance sheet; approaches with a liability-relative orientation focus on

funding liabilities; and goals-based approaches focus on achieving financial goals.

- The risk concepts relevant to asset-only asset allocation approaches focus on asset risk; those of liability-relative asset allocation focus on risk in relation to paying liabilities; and a goals-based approach focuses on the probabilities of not achieving financial goals.
- Asset classes are the traditional units of analysis in asset allocation and reflect systematic risks with varying degrees of overlap.
- Assets within an asset class should be relatively homogeneous; asset classes should be mutually exclusive; asset classes should be diversifying; asset classes as a group should make up a preponderance of the world's investable wealth; asset classes selected for investment should have the capacity to absorb a meaningful proportion of an investor's portfolio.
- Risk factors are associated with non-diversifiable (i.e., systematic) risk and are associated with an expected return premium. The price of an asset and/or asset class may reflect more than one risk factor, and complicated spread positions may be necessary to identify and isolate particular risk factors. Their use as units of analysis in asset allocation is driven by considerations of controlling systematic risk exposures.
- The global market portfolio represents a highly diversified asset allocation that can serve as a baseline asset allocation in an asset-only approach.
- There are two dimensions of passive/active choices. One dimension relates to the management of the strategic asset allocation itself—for example, whether to deviate from it tactically or not. The second dimension relates to passive and active

implementation choices in investing the allocation to a given asset class. Tactical and dynamic asset allocation relate to the first dimension; active and passive choices for implementing allocations to asset classes relate to the second dimension.

- Risk budgeting addresses the question of which types of risks to take and how much of each to take. Active risk budgeting addresses the question of how much benchmark-relative risk an investor is willing to take. At the level of the overall asset allocation, active risk can be defined relative to the strategic asset allocation benchmark. At the level of individual asset classes, active risk can be defined relative to the benchmark proxy.
- Rebalancing is the discipline of adjusting portfolio weights to more closely align with the strategic asset allocation. Rebalancing approaches include calendar-based and range-based rebalancing. Calendar-based rebalancing rebalances the portfolio to target weights on a periodic basis. Range-based rebalancing sets rebalancing thresholds or trigger points around target weights. The ranges may be fixed width, percentage based, or volatility based. Range-based rebalancing permits tighter control of the asset mix compared with calendar rebalancing.
- Strategic considerations in rebalancing include transaction costs, risk aversion, correlations among asset classes, volatility, and beliefs concerning momentum, taxation, and asset class liquidity.

The full reading, worth 2 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/introduction_to_asset_allocation__2018_.aspx

Principles of Asset Allocation

by Jean L.P. Brunel, CFA, Thomas M. Idzorek, CFA, and John M. Mulvey, PhD

Jean L.P. Brunel, CFA (USA). Thomas M. Idzorek, CFA, is at Morningstar (USA). John M. Mulvey, PhD, is at the Bendheim Center for Finance at Princeton University (USA).

Learning Outcomes

The candidate should be able to:

a. describe and critique the use of mean–variance optimization in asset allocation;

b. recommend and justify an asset allocation using mean–variance optimization;

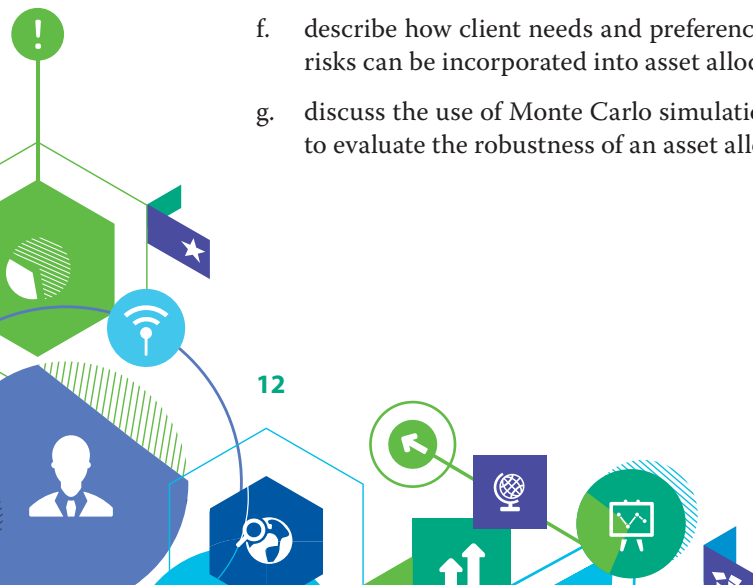
c. interpret and critique an asset allocation in relation to an investor's economic balance sheet;

d. discuss asset class liquidity considerations in asset allocation;

e. explain absolute and relative risk budgets and their use in determining and implementing an asset allocation;

f. describe how client needs and preferences regarding investment risks can be incorporated into asset allocation;

g. discuss the use of Monte Carlo simulation and scenario analysis to evaluate the robustness of an asset allocation;



h. describe the use of investment factors in constructing and analyzing an asset allocation;

i. recommend and justify an asset allocation based on the global market portfolio;

j. describe and evaluate characteristics of liabilities that are relevant to asset allocation;

k. discuss approaches to liability-relative asset allocation;

l. recommend and justify a liability-relative asset allocation;

m. recommend and justify an asset allocation using a goals-based approach;

n. describe and critique heuristic and other approaches to asset allocation;

o. discuss factors affecting rebalancing policy.

Introduction

Determining a strategic asset allocation is arguably the most important aspect of the investment process. This reading builds on the "Introduction to Asset Allocation" reading and focuses on several of the primary frameworks for developing an asset allocation, including asset-only mean–variance optimization, various liability-relative asset allocation techniques, and goals-based investing. Additionally, it touches on various other asset allocation techniques used by practitioners, as well as important related topics, such as rebalancing.

The process of creating a diversified, multi-asset class portfolio typically involves two separate steps. The first step is the asset

allocation decision, which can refer to both the process and the result of determining long-term (strategic) exposures to the available asset classes (or risk factors) that make up the investor's opportunity set. Asset allocation is the first and primary step in translating the client's circumstances, objectives, and constraints into an appropriate portfolio (or, for some approaches, multiple portfolios) for achieving the client's goals within the client's tolerance for risk. The second step in creating a diversified, multi-asset-class portfolio involves implementation decisions that determine the specific investments (individual securities, pooled investment vehicles, and separate accounts) that will be used to implement the targeted allocations.

Although it is possible to carry out the asset allocation process and the implementation process simultaneously, in practice, these two steps are often separated for two reasons. First, the frameworks for simultaneously determining an asset allocation and its implementation are often complex. Second, in practice, many investors prefer to revisit their strategic asset allocation policy somewhat infrequently (e.g., annually or less frequently) in a dedicated asset allocation study, while most of these same investors prefer to revisit/monitor implementation vehicles (actual investments) far more frequently (e.g., monthly or quarterly).

Section 2 covers the traditional mean–variance optimization (MVO) approach to asset allocation. We apply this approach in what is referred to as an "asset-only" setting, in which the goal is to create the most efficient mixes of asset classes in the absence of any liabilities. We highlight key criticisms of mean–variance optimization and methods used to address them. This section also covers risk budgeting in relation to asset allocation, factor-based asset allocation, and asset allocation with illiquid assets. The observation that almost all portfolios exist to help pay for what can be characterized as a "liability" leads to the next subject.

Section 3 introduces liability-relative asset allocation—including a straightforward extension of mean–variance optimization known as surplus optimization. Surplus optimization is an economic balance sheet approach extended to the liability side of the balance sheet that finds the most efficient asset class mixes in the presence of liabilities. Liability-relative optimization is simultaneously concerned with the return of the assets, the change in value of the liabilities, and how assets and liabilities interact to determine the overall value or health of the total portfolio.

Section 4 covers an increasingly popular approach to asset allocation called goals-based asset allocation. Conceptually, goals-based approaches are similar to liability-relative asset allocation in viewing risk in relation to specific needs or objectives associated with different time horizons and degrees of urgency.

Section 5 introduces some informal (heuristic) ways that asset allocations have been determined and other approaches to asset allocation that emphasize specific objectives.

Section 6 addresses the factors affecting choices that are made in developing specific policies relating to rebalancing to the strategic asset allocation. Factors discussed include transaction costs, correlations, volatility, and risk aversion.

Section 7 summarizes important points and concludes the reading.

Conclusions

This reading has surveyed how appropriate asset allocations can be determined to meet the needs of a variety of investors. Among the major points made have been the following:

- The objective function of asset-only mean–variance optimization is to maximize the expected return of the asset mix minus a penalty that depends on risk aversion and the expected variance of the asset mix.
- Criticisms of MVO include the following:
  - The outputs (asset allocations) are highly sensitive to small changes in the inputs.
  - The asset allocations are highly concentrated in a subset of the available asset classes.
  - Investors are often concerned with characteristics of asset class returns such as skewness and kurtosis that are not accounted for in MVO.
  - While the asset allocations may appear diversified across assets, the sources of risk may not be diversified.
  - MVO allocations may have no direct connection to the factors affecting any liability or consumption streams.
  - MVO is a single-period framework that tends to ignore trading/rebalancing costs and taxes.
- Deriving expected returns by reverse optimization or by reverse optimization tilted toward an investor's views on asset returns (the Black–Litterman model) is one means of addressing the tendency of MVO to produce efficient portfolios that are not well diversified.
- Placing constraints on asset class weights to prevent extremely concentrated portfolios and resampling inputs are other ways of addressing the same concern.

- For some relatively illiquid asset classes, a satisfactory proxy may not be available; including such asset classes in the optimization may therefore be problematic.
- Risk budgeting is a means of making optimal use of risk in the pursuit of return. A risk budget is optimal when the ratio of excess return to marginal contribution to total risk is the same for all assets in the portfolio.
- Characteristics of liabilities that affect asset allocation in liability-relative asset allocation include the following:
  - Fixed versus contingent cash flows
  - Legal versus quasi-liabilities
  - Duration and convexity of liability cash flows
  - Value of liabilities as compared with the size of the sponsoring organization
  - Factors driving future liability cash flows (inflation, economic conditions, interest rates, risk premium)
  - Timing considerations, such longevity risk
  - Regulations affecting liability cash flow calculations
- Approaches to liability-relative asset allocation include surplus optimization, a hedging/return-seeking portfolios approach, and an integrated asset–liability approach.
  - Surplus optimization involves MVO applied to surplus returns.
  - A hedging/return-seeking portfolios approach assigns assets to one of two portfolios. The objective of the hedging portfolio

is to hedge the investor's liability stream. Any remaining funds are invested in the return-seeking portfolio.

- An integrated asset–liability approach integrates and jointly optimizes asset and liability decisions.

- A goals-based asset allocation process combines into an overall portfolio a number of sub-portfolios, each of which is designed to fund an individual goal with its own time horizon and required probability of success.
- In the implementation, there are two fundamental parts to the asset allocation process. The first centers on the creation of portfolio modules, while the second relates to the identification of client goals and the matching of these goals to the appropriate sub-portfolios to which suitable levels of capital are allocated.
- Other approaches to asset allocation include "120 minus your age," 60/40 stocks/bonds, the endowment model, risk parity, and the 1/*N* rule.
- Disciplined rebalancing has tended to reduce risk while incrementally adding to returns. Interpretations of this empirical finding include that rebalancing earns a diversification return, that rebalancing earns a return from being short volatility, and that rebalancing earns a return to supplying liquidity to the market.
- Factors positively related to optimal corridor width include transaction costs, risk tolerance, and an asset class's correlation with the rest of the portfolio. The higher the correlation, the wider the optimal corridor, because when asset classes move in sync, further divergence from target weights is less likely.

- The volatility of the rest of the portfolio (outside of the asset class under consideration) is inversely related to optimal corridor width.
- An asset class's own volatility involves a trade-off between transaction costs and risk control. The width of the optimal tolerance band increases with transaction costs for volatility-based rebalancing.

The full reading, worth 3 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/principles_of_asset_allocation__2018_.aspx

Asset Allocation with Real-World Constraints

by Peter Mladina, Brian J. Murphy, CFA, and Mark Ruloff, FSA, EA, CERA

Peter Mladina is at Northern Trust (USA). Brian J. Murphy, CFA, is at Willis Towers Watson (USA). Mark Ruloff, FSA, EA, CERA (USA).

Learning Outcomes

The candidate should be able to:

a. discuss asset size, liquidity needs, time horizon, and regulatory or other considerations as constraints on asset allocation;

b. discuss tax considerations in asset allocation and rebalancing;

c. recommend and justify revisions to an asset allocation given change(s) in investment objectives and/or constraints;

d. discuss the use of short-term shifts in asset allocation;

e. identify behavioral biases that arise in asset allocation and recommend methods to overcome them.

Introduction

This reading illustrates ways in which the asset allocation process must be adapted to accommodate specific asset owner circumstances

and constraints. It addresses adaptations to the asset allocation inputs given an asset owner's asset size, liquidity, and time horizon as well as external constraints that may affect the asset allocation choice (Section 2). We also discuss the ways in which taxes influence the asset allocation process for the taxable investor (Section 3). In addition, we discuss the circumstances that should trigger a re-evaluation of the long-term strategic asset allocation (Section 4), when and how an asset owner might want to make short-term shifts in asset allocation (Section 5), and how innate investor behaviors can interfere with successful long-term planning for the investment portfolio (Section 6). Throughout the reading, we illustrate the application of these concepts using a series of hypothetical investors.

Summary

- The primary constraints on an asset allocation decision are asset size, liquidity, time horizon, and other external considerations, such as taxes and regulation.
- The size of an asset owner's portfolio may limit the asset classes accessible to the asset owner. An asset owner's portfolio may be too small—or too large—to capture the returns of certain asset classes or strategies efficiently.
- Complex asset classes and investment vehicles require sufficient governance capacity.
- Large-scale asset owners may achieve operating efficiencies, but they may find it difficult to deploy capital effectively in certain active investment strategies given liquidity conditions and trading costs.

- Smaller portfolios may also be constrained by size. They may be too small to adequately diversify across the range of asset classes and investment managers, or they may have staffing constraints that prevent them from monitoring a complex investment program.
- Investors with smaller portfolios may be constrained in their ability to access private equity, private real estate, hedge funds, and infrastructure investments because of the high required minimum investments and regulatory restrictions associated with those asset classes. Wealthy families may pool assets to meet the required minimums.
- The liquidity needs of the asset owner and the liquidity characteristics of the asset classes each influence the available opportunity set.
- Liquidity needs must also take into consideration the financial strength of the investor and resources beyond those held in the investment portfolio.
- When assessing the appropriateness of any given asset class for a given investor, it is important to evaluate potential liquidity needs in the context of an extreme market stress event.
- An investor's time horizon must be considered in any asset allocation exercise. Changes in human capital and the changing character of liabilities are two important time-related constraints of asset allocation.
- External considerations—such as regulations, tax rules, funding, and financing needs—are also likely to influence the asset allocation decision.

- Taxes alter the distribution of returns by both reducing the expected mean return and muting the dispersion of returns. Asset values and asset risk and return inputs to asset allocation should be modified to reflect the tax status of the investor. Correlation assumptions do not need to be adjusted, but taxes do affect the return and the standard deviation assumptions for each asset class.
- Periodic portfolio rebalancing to return the portfolio to its target strategic asset allocation is an integral part of sound portfolio management. Taxable investors must consider the tax implications of rebalancing.
- Rebalancing thresholds may be wider for taxable portfolios because it takes larger asset class movements to materially alter the risk profile of the taxable portfolio.
- Strategic asset location is the placement of less tax-efficient assets in accounts with more-favorable tax treatment.
- An asset owner's strategic asset allocation should be re-examined periodically, even in the absence of a change in the asset owner's circumstances.
- A special review of the asset allocation policy may be triggered by a change in goals, constraints, or beliefs.
- In some situations, a change to an asset allocation strategy may be implemented without a formal asset allocation study. Anticipating key milestones that would alter the asset owner's risk appetite, and implementing pre-established changes to the asset allocation in response, is often referred to as a "glide path."
- Tactical asset allocation (TAA) allows short-term deviations from the strategic asset allocation (SAA) targets and are

expected to increase risk-adjusted return. Using either short-term views or signals, the investor actively re-weights broad asset classes, sectors, or risk-factor premiums. The sizes of these deviations from the SAA are often constrained by the Investment Policy Statement.

- The success of TAA decisions is measured against the performance of the SAA policy portfolio by comparing Sharpe ratios, evaluating the information ratio or the *t*-statistic of the average excess return of the TAA portfolio relative to the SAA portfolio, or plotting outcomes versus the efficient frontier.
- TAA incurs trading and tax costs. Tactical trades can also increase the concentration of risk.
- Discretionary TAA relies on a qualitative interpretation of political, economic, and financial market conditions and is predicated on a belief of persistent manager skill in predicting and timing short-term market moves.
- Systematic TAA relies on quantitative signals to capture documented return anomalies that may be inconsistent with market efficiency.
- The behavioral biases most relevant in asset allocation include loss aversion, the illusion of control, mental accounting, recency bias, framing, and availability bias.
- An effective investment program will address behavioral biases through a formal asset allocation process with its own objective framework, governance, and controls.
- In goals-based investing, loss-aversion bias can be mitigated by framing risk in terms of shortfall probability or by funding high-priority goals with low-risk assets.

- The cognitive bias, illusion of control, and hindsight bias can all be mitigated by using a formal asset allocation process that uses long-term return and risk forecasts, optimization constraints anchored around asset class weights in the global market portfolio, and strict policy ranges.
- Goals-based investing incorporates the mental accounting bias directly into the asset allocation solution by aligning each goal with a discrete sub-portfolio.
- A formal asset allocation policy with pre-specified allowable ranges may constrain recency bias.
- The framing bias effect can be mitigated by presenting the possible asset allocation choices with multiple perspectives on the risk/reward trade-off.
- Familiarity bias, a form of availability bias, most commonly results in an overweight in home country securities and may also cause investors to inappropriately compare their investment decisions (and performance) to other organizations. Familiarity bias can be mitigated by using the global market portfolio as the starting point in developing the asset allocation and by carefully evaluating any potential deviations from this baseline portfolio.
- A strong governance framework with the appropriate level of expertise and well-documented investment beliefs increases the likelihood that shifts in asset allocation are made objectively and in accordance with those beliefs. This will help to mitigate the effect that behavioral biases may have on the long-term success of the investment program.

The full reading, worth 1.5 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/asset_allocation_with_real-world_constraints__2018_.aspx

Fixed Income

Applicable Readings

Introduction to Fixed-Income Portfolio Management (Level III)

by Bernd Hanke, PhD, CFA, and Brian J. Henderson, PhD, CFA
1.5 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/introduction_to_fixed-income_portfolio_management__2018_.aspx

Liability-Driven and Index-Based Strategies (Level III)

by James F. Adams, PhD, CFA, and Donald J. Smith, PhD
2 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/liability-driven_and_index-based_strategies__2018_.aspx

Yield Curve Strategies (Level III)

by Robert W. Kopprasch, PhD, CFA, and Steven V. Mann, PhD
2 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/yield_curve_strategies__2018_.aspx

Fixed-Income Active Management: Credit Strategies (Level III)

by Campe Goodman, CFA, and Oleg Melentyev, CFA
2 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/fixed-income_active_management__credit_strategies__2018_.aspx

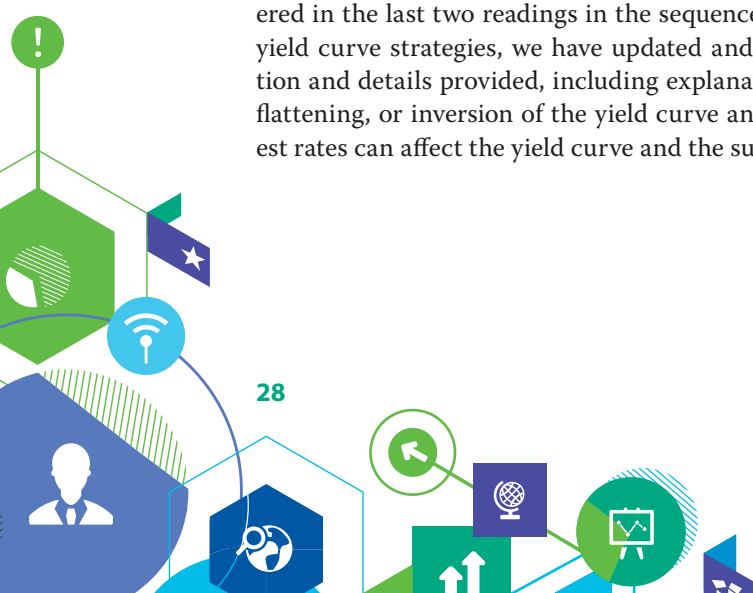
What Changed in the Curriculum?

These four new 2018 fixed-income curriculum readings constitute the new Level III reading sequence in fixed-income portfolio management. Each written by diverse teams of senior practitioner experts, they constitute a complete modern explanation of how fixed-income portfolios are managed in today's marketplace.

The reading sequence parallels asset allocation by beginning with an overview offering a bird's eye view of global fixed-income portfolio management, which sets up the subsequent, more detailed readings.

The second reading covers two kinds of mandates that are not focused on beating a benchmark through active management. Liability-driven investment (LDI) strategies have become very important for pension funds, defined benefit plans, and insurers worldwide. Such institutional investors have used LDI strategies to address directly the promise and responsibility of making pledged payments to retired employees or policyholders, for example. The coverage of LDI retains techniques previously covered that are still relevant, while updating and adding content relevant to private wealth managers. One estimate is that index-based mandates represented upwards of 25% of the US fixed-income market in 2016. Although this growth is less rapid than that for equities, it is still substantial. The reading addresses the special issues in bond indexing more thoroughly than before.

The two major groups of active total return strategies are covered in the last two readings in the sequence. In the new reading on yield curve strategies, we have updated and expanded the information and details provided, including explanations on the steepening, flattening, or inversion of the yield curve and how fluctuating interest rates can affect the yield curve and the success of strategies.



The credit strategies reading covers credit spreads and both top-down and bottom-up credit analysis and offers a similar top-down and bottom-up perspective for crafting a fixed-income portfolio. Also noteworthy are brand-new sections that delve into environmental, social, and governance (ESG) issues of credit securities and also tackle the management of tail and liquidity risk in credit portfolios. Other valuable content includes emerging market credit and credit strategies that can be implemented by using structured financial products/instruments, such as mortgage-backed securities, collateralized debt obligations, and covered bonds.

Why Does It Matter to Members?

Credit analysis and fixed-income risk management techniques are crucial professional knowledge. A savvy fixed-income portfolio manager will definitely want to stay current, while those engaged primarily in equity analysis will want to, at the very least, stay informed.

Introduction to Fixed-Income Portfolio Management

by Bernd Hanke, PhD, CFA, and Brian J. Henderson, PhD, CFA

Bernd Hanke, PhD, CFA, is at Global Systematic Investors LLP (United Kingdom). Brian J. Henderson, PhD, CFA, is at The George Washington University (USA).

Learning Outcomes

The candidate should be able to:

a. discuss roles of fixed-income securities in portfolios;

b. describe how fixed-income mandates may be classified and compare features of the mandates;

c. describe bond market liquidity, including the differences among market sub-sectors, and discuss the effect of liquidity on fixed-income portfolio management;

d. describe and interpret a model for fixed-income returns;

e. discuss the use of leverage, alternative methods for leveraging, and risks that leverage creates in fixed-income portfolios;

f. discuss differences in managing fixed-income portfolios for taxable and tax exempt investors.

Introduction

Globally, fixed-income markets represent the largest asset class in financial markets, and most investors' portfolios include fixed-income investments. Fixed-income markets include publicly traded securities (such as commercial paper, notes, and bonds) and non-publicly traded instruments (such as loans and privately placed securities). Loans may be securitized and become part of the pool of assets supporting an asset-backed security.

This reading discusses why investor portfolios include fixed-income securities and provides an overview of fixed-income portfolio management. Section 2 discusses different roles of fixed-income securities in portfolios, including diversification, regular cash flows, and inflation hedging potential. Section 3 describes the two main types of fixed-income portfolio mandates: liability-based (or structured) mandates and total return mandates. It also describes approaches to implementing these mandates. Section 4 discusses bond market liquidity and its effects on pricing and portfolio construction. Section 5 introduces a model of how a bond position's total expected return can be decomposed. The model provides a better understanding of the driving forces behind expected returns to fixed-income securities. Section 6 discusses the use of leverage in fixed-income portfolios. Section 7 describes considerations in managing fixed-income portfolios for both taxable and tax-exempt investors. A summary of key points completes the reading.

Summary

This reading describes the roles of fixed-income securities in an investment portfolio and introduces fixed-income portfolio management. Key points of the reading include the following:

- Fixed-income investments provide diversification benefits in a portfolio context. These benefits arise from the generally low correlations of fixed-income investments with other major asset classes such as equities.
- Fixed-income investments have regular cash flows, which is beneficial for the purposes of funding future liabilities.
- Floating-rate and inflation-linked bonds can be used to hedge inflation risk.
- Liability-based fixed-income mandates are managed to match or cover expected liability payments with future projected cash inflows.
- For liability-based fixed-income mandates, portfolio construction follows two main approaches—cash flow matching and duration matching—to match fixed-income assets with future liabilities.
- Cash flow matching is an immunization approach based on matching bond cash flows with liability payments.
- Duration matching is an immunization approach based on matching the duration of assets and liabilities.
- Hybrid forms of duration and cash flow matching include contingent immunization and horizon matching.
- Total return mandates are generally structured to either track or outperform a benchmark.

- Total return mandates can be classified into different approaches based on their target active return and active risk levels. Approaches range from pure indexing to enhanced indexing to active management.
- Liquidity is an important consideration in fixed-income portfolio management. Bonds are generally less liquid than equities, and liquidity varies greatly across sectors.
- Liquidity affects pricing in fixed-income markets because many bonds either do not trade or trade infrequently.
- Liquidity affects portfolio construction because there is a trade-off between liquidity and yield. Less liquid bonds have higher yields, all else being equal, and may be more desirable for buy-and-hold investors. Investors anticipating liquidity needs may forgo higher yields for more-liquid bonds.
- Fixed-income derivatives, as well as fixed-income exchange-traded funds and pooled investment vehicles, are often more liquid than their underlying bonds and provide investment managers with an alternative to trading in illiquid underlying bonds.
- When evaluating fixed-income investment strategies, it is important to consider expected returns and to understand the different components of expected returns.
- Decomposing expected fixed-income returns allows investors to understand the different sources of returns given expected changes in bond market conditions.
- A model for expected fixed-income returns can decompose them into the following components: yield income, rolldown return, expected change in price based on investor's views of

yields and yield spreads, expected credit losses, and expected currency gains or losses.

- Leverage is the use of borrowed capital to increase the magnitude of portfolio positions. By using leverage, fixed-income portfolio managers may be able to increase portfolio returns relative to what they can achieve in unleveraged portfolios. The potential for increased returns, however, comes with increased risk.
- Methods for leveraging fixed-income portfolios include the use of futures contracts, swap agreements, structured financial instruments, repurchase agreements, and securities lending.
- Taxes can complicate investment decisions in fixed-income portfolio management. Complications result from the difference in taxation across investor types, countries, and income sources (interest income or capital gains).

The full reading, worth 1.5 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/introduction_to_fixed-income_portfolio_management__2018_.aspx

Liability-Driven and Index-Based Strategies

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

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James F. Adams is a contributing author and his contributions solely represent his views and can in no way be taken to reflect the views of JPMorgan Chase & Co.

Learning Outcomes

The candidate should be able to:

a. describe liability-driven investing;

b. evaluate strategies for managing a single liability;

c. compare strategies for a single liability and for multiple liabilities, including alternative means of implementation;

d. evaluate liability-based strategies under various interest rate scenarios and select a strategy to achieve a portfolio's objectives;

e. explain risks associated with managing a portfolio against a liability structure;

f. discuss bond indexes and the challenges of managing a fixed-income portfolio to mimic the characteristics of a bond index;

g. compare alternative methods for establishing bond market exposure passively;

h. discuss criteria for selecting a benchmark and justify the selection of a benchmark;

i. describe construction, benefits, limitations, and risk–return characteristics of a laddered bond portfolio.

Introduction

Fixed-income instruments make up nearly three-quarters of all global financial assets available to investors, so it is not surprising that bonds are a critical component of most investment portfolios. This reading focuses on structured and passive total return fixed-income investment strategies. "Passive" does not necessarily mean "buy and hold" because the primary strategies discussed—immunization and indexation—can entail frequent rebalancing of the bond portfolio. "Passive" stands in contrast to "active" fixed-income strategies that are based on the asset manager's particular view on interest rate and credit market conditions.

Sections 2 through 6 address how to best structure a fixed-income portfolio when considering both the asset and liability sides of the investor's balance sheet. It is first important to have a thorough understanding of both the timing and relative certainty of future financial obligations. Because it is rare to find a bond investment whose characteristics perfectly match one's obligations, we introduce the idea of structuring a bond portfolio to match the future cash flows of one or more liabilities that have bond-like characteristics. Asset–liability management (ALM) strategies are based on the concept that investors incorporate both rate-sensitive assets and liabilities into the portfolio decision-making process. When the liabilities are given and assets are managed, liability-driven investing

(LDI) may be used to ensure adequate funding for an insurance portfolio, a pension plan, or an individual's budget after retirement. The techniques and risks associated with LDI are introduced using a single liability, and then expanded to cover both cash flow and duration matching techniques and multiple liabilities. This strategy, known as immunization, may be viewed simply as a special case of interest rate hedging. It is important to note that when funds exceed a predetermined threshold, investors can also use interest rate derivatives as a tool to manage their liabilities in addition to choosing a specific asset portfolio to achieve the management of their liabilities. This contingent form of immunization involves active management above a pre-specified funding threshold while retaining a more passive approach at lower funding levels. Section 5 reviews these concepts in detail using the example of a defined benefit pension plan. Section 6 reviews risks associated with these strategies, such as model risk and measurement risk.

Investors often use an index-based investment strategy to gain a broader exposure to fixed-income markets rather than tailoring investments to match a specific liability profile. Sections 7 through 9 cover this approach. Advantages of index-based investing include greater diversification and lower cost when compared with active management. That said, the depth and breadth of bond markets make both creating and tracking an index more challenging than in the equity markets. Fixed-income managers face a variety of alternatives in matching a bond index, from full replication to enhanced indexing using primary risk factors. We describe how portfolio managers and investors in general can gain fixed-income exposure through mutual funds or exchange-traded funds, as well as via synthetic means. Given the wide variety of fixed-income instruments available, it is critical to select a benchmark that is most relevant to a specific investor based on factors such as the targeted duration profile and risk appetite. In the area of private wealth management,

establishing a laddered portfolio of bonds is often an effective strategy to match an individual investor's duration and risk preferences. The final section discusses this approach.

Summary

This reading covers structured and passive total return fixed-income strategies: immunization of single and multiple liabilities, indexation, and laddering. The reading makes the following main points:

- Passive fixed-income investing requires a frame of reference, such as a balance sheet, to structure the bond portfolio. This frame of reference can be as simple as the time to retirement for an individual or as complex as a balance sheet of rate-sensitive assets and liabilities for a company.
- Asset–liability management strategies consider both assets and liabilities.
- Liability-driven investing takes the liabilities as given and builds the asset portfolio in accordance with the interest rate risk characteristics of the liabilities.
- Asset-driven liabilities take the assets as given and structures debt liabilities in accordance with the interest rate characteristics of the assets.
- Assets and liabilities can be categorized by the degree of certainty surrounding the amount and timing of cash flows. Type I assets and liabilities, such as traditional fixed-rate bonds with no embedded options, have known amounts and payment dates. For Type I assets and liabilities, yield duration statistics such

as Macaulay, modified, and money duration apply. Type II, III, and IV assets and liabilities have uncertain amounts and/or uncertain timing of payment. For Type II, III, and IV assets and liabilities, curve duration statistics such as effective duration are needed. A model is used to obtain the estimated values when the yield curve shifts up and down by the same amount.

- Immunization is the process of structuring and managing a fixed-income portfolio to minimize the variance in the realized rate of return over a known investment horizon.
- In the case of a single liability, immunization is achieved by matching the Macaulay duration of the bond portfolio to the horizon date. As time passes and bond yields change, the duration of the bonds changes and the portfolio needs to be rebalanced. This rebalancing can be accomplished by buying and selling bonds or using interest rate derivatives such as futures contracts and interest rate swaps.
- An immunization strategy aims to lock in the cash flow yield on the portfolio, which is the internal rate of return on the cash flows. It is not the weighted average of the yields to maturity on the bonds that constitute the portfolio.
- Immunization can be interpreted as "zero replication" in that the performance of the bond portfolio over the investment horizon replicates the zero-coupon bond that provides for perfect immunization. This zero-coupon bond has a maturity that matches the date of the single liability—there is no coupon reinvestment risk nor price risk as the bond is held to maturity (assuming no default).
- The risk to immunization is that as the yield curve shifts and twists, the cash flow yield on the bond portfolio does not match

the change in the yield on the zero-coupon bond that would provide for perfect immunization.

- A sufficient, but not necessary, condition for immunization is a parallel (or shape-preserving) shift whereby all yields change by the same amount in the same direction. If the change in the cash flow yield is the same as that on the zero-coupon bond being replicated, immunization can be achieved even with a non-parallel shift to the yield curve.
- Structural risk to immunization arises from some non-parallel shifts and twists to the yield curve. This risk is reduced by minimizing the dispersion of cash flows in the portfolio, which can be accomplished by minimizing the convexity statistic for the portfolio. Concentrating the cash flows around the horizon date makes the immunizing portfolio closely track the zero-coupon bond that provides for perfect immunization.
- For multiple liabilities, one method of immunization is cash flow matching. A portfolio of high-quality zero-coupon or fixed-income bonds is purchased to match as closely as possible the amount and timing of the liabilities.
- A motive for cash flow matching can be accounting defeasance, whereby both the assets and liabilities are removed from the balance sheet.
- Immunization of multiple liabilities can be achieved by structuring and managing a portfolio of fixed income bonds. Because the market values of the assets and liabilities differ, the strategy is to match the money durations. The money duration is the modified duration multiplied by the market value. The basis point value is a measure of money duration calculated by multiplying the money duration by 0.0001.

- The conditions to immunize multiple liabilities are that (1) the market value of assets is greater than or equal to the market value of the liabilities, (2) the asset basis point value (BPV) equals the liability BPV, and (3) the dispersion of cash flows and the convexity of assets are greater than those of the liabilities.
- A derivatives overlay—for example, interest rate futures contracts—can be used to immunize single or multiple liabilities.
- The number of futures contracts needed to immunize is the liability BPV minus the asset BPV, divided by the futures BPV. If the result is a positive number, the entity buys, or goes long, futures contracts. If the result is a negative number, the entity sells, or goes short, futures contracts. The futures BPV can be approximated by the BPV for the cheapest-to-deliver security divided by the conversion factor for the cheapest-to-deliver security.
- Contingent immunization adds active management of the surplus, which is the difference between the asset and liability market values, with the intent to reduce the overall cost of retiring the liabilities. In principle, any asset classes can be used for the active investment. The entity can choose to over-hedge or under-hedge the number of futures contracts needed for passive immunization.
- Liability-driven investing (LDI) often is used for complex rate-sensitive liabilities, such as those for a defined benefit pension plan. The retirement benefits for covered employees depend on many variables, such as years of employment, age at retirement, wage level at retirement, and expected lifetime. There are different measures for the liabilities: for instance, the accumulated benefit obligation (ABO) that is based on current wages and the projected benefit obligation (PBO) that is based on expected

future wages. For each liability measure (ABO or PBO), a model is used to extract the effective duration and BPV.

- Interest rate swap overlays can be used to reduce the duration gap as measured by the asset and liability BPVs. There often is a large gap because pension funds hold sizable asset positions in equities that have low or zero effective durations and their liability durations are high.
- The hedging ratio is the percentage of the duration gap that is closed with the derivatives. A hedging ratio of zero implies no hedging. A hedging ratio of 100% implies immunization—that is, complete removal of interest rate risk.
- Strategic hedging is the active management of the hedging ratio. Because asset BPVs are less than liability BPVs in typical pension funds, the derivatives overlay requires the use of receive-fixed interest rate swaps. Because receive-fixed swaps gain value as current swap market rates fall, the fund manager could choose to raise the hedging ratio when lower rates are anticipated. If rates are expected to go up, the manager could strategically reduce the hedging ratio.
- An alternative to the receive-fixed interest rate swap is a purchased receiver swaption. This swaption confers to the buyer the right to enter the swap as the fixed-rate receiver. Because of its negative duration gap (asset BPV is less than liability BPV), the typical pension plan suffers when interest rates fall and could become underfunded. The gain on the receiver swaption as rates decline offsets the losses on the balance sheet.
- Another alternative is a swaption collar, the combination of buying the receiver swaption and writing a payer swaption. The

premium received on the payer swaption that is written offsets the premium needed to buy the receiver swaption.

- The choice among hedging with the receive-fixed swap, the purchased receiver swaption, and the swaption collar depends in part on the pension fund manager's view on future interest rates. If rates are expected to be low, the receive-fixed swap typically is the preferred derivative. If rates are expected to go up, the swaption collar can become attractive. And if rates are projected to reach a certain threshold that depends on the option costs and the strike rates, the purchased receiver swaption can become the favored choice.
- Model risks arise in LDI strategies because of the many assumptions in the models and approximations used to measure key parameters. For example, the liability BPV for the defined benefit pension plan depends on the choice of measure (ABO or PBO) and the assumptions that go into the model regarding future events (e.g., wage levels, time of retirement, and time of death).
- Spread risk in LDI strategies arises because it is common to assume equal changes in asset, liability, and hedging instrument yields when calculating the number of futures contracts, or the notional principal on an interest rate swap, to attain a particular hedging ratio. The assets and liabilities are often on corporate securities, however, and their spreads to benchmark yields can vary over time.
- The Credit Support Annex to the standard ISDA swap agreement often calls for collateralization by one or both counterparties to the contract. This requirement introduces the risk of exhausting available securities or cash assets to serve as collateral.

- Investing in a fund that tracks a bond market index offers the benefits of both diversification and low administrative costs. The deviation of the returns between the index and the fund is called tracking risk, or tracking error. Tracking risk arises when the fund manager chooses to buy only a subset of the index, a strategy called enhanced indexing, because fully replicating the index can be impractical as a result of the large number of bonds in the fixed-income universe.
- Corporate bonds are often illiquid. Capital requirements have reduced the incentive for broker/dealers to maintain inventory in thinly traded securities. The lack of active trading is a challenge for valuation. Matrix pricing uses available data on comparable securities to estimate the fair value of the illiquid bonds.
- The primary risk factors encountered by an investor tracking a bond index include decisions regarding duration (option-adjusted duration for callable bonds, convexity for possible large yield shifts, and key rate durations for non-parallel shifts) and portfolio weights (assigned by sector, credit quality, maturity, coupon rate, and issuer).
- Index replication is one method to establish a passive exposure to the bond market. The manager buys or sells bonds only when there are changes to the index. Full replication can be expensive, however, as well as infeasible for broad-based fixed-income indexes that include many illiquid bonds.
- Several enhancement strategies can reduce the costs to track a bond index: lowering trading costs, using models to identify undervalued bonds and to gauge relative value at varying points along the yield curve, over/under weighting specific credit sectors over the business cycle, and evaluating specific call features to identify value given large yield changes.

- Investors can obtain passive exposure to the bond market using mutual funds and exchange-traded funds that track a bond index. Shares in mutual funds are redeemable at the net asset value with a one-day time lag. Exchange-traded fund (ETF) shares have the advantage of trading on an exchange.
- A total return swap, an over-the-counter derivative, allows an institutional investor to transform an asset or liability from one asset category to another—for instance, from variable-rate cash flows referencing LIBOR to the total return on a particular bond index.
- A total return swap (TRS) can have some advantages over a direct investment in a bond mutual fund or ETF. As a derivative, it requires less initial cash outlay than direct investment in the bond portfolio for similar performance. A TRS also carries counterparty credit risk, however. As a customized over-the-counter product, a TRS can offer exposure to assets that are difficult to access directly, such as some high-yield and commercial loan investments.
- Selecting a particular bond index is a major decision for a fixed-income investment manager. Selection is guided by the specified goals and objectives for the investment. The decision should recognize several features of bond indexes: (1) Given that bonds have finite maturities, the duration of the index drifts down over time; (2) the composition of the index changes over time with the business cycle and maturity preferences of issuers; and (3) value-weighted indexes assign larger shares to borrowers having more debt, leading to the "bums problem" that bond index investors can become overly exposed to leveraged firms.
- A laddered bond portfolio is a common investment strategy in the wealth management industry. The laddered portfolio offers

"diversification" over the yield curve compared with "bullet" or "barbell" portfolios. This structure is especially attractive in stable, upwardly sloped yield curve environments as maturing short-term debt is replaced with higher-yielding long-term debt at the back of the ladder.

- A laddered portfolio offers an increase in convexity because the cash flows have greater dispersions than a more concentrated (bullet) portfolio.
- A laddered portfolio provides liquidity in that it always contains a soon-to-mature bond that could provide high-quality, low-duration collateral on a repo contract if needed.
- A laddered portfolio can be constructed with fixed-maturity corporate bond ETFs that have a designated maturity and credit risk profile.

The full reading, worth 2 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/liability-driven_and_index-based_strategies__2018_.aspx

Yield Curve Strategies

by Robert W. Kopprasch, PhD, CFA, and Steven V. Mann, PhD

Robert W. Kopprasch, PhD, CFA (USA). Steven V. Mann, PhD, is at the University of South Carolina (USA).

Learning Outcomes

The candidate should be able to:

a. describe major types of yield curve strategies;

b. explain why and how a fixed-income portfolio manager might choose to alter portfolio convexity;

c. formulate a portfolio positioning strategy given forward interest rates and an interest rate view;

d. explain how derivatives may be used to implement yield curve strategies;

e. evaluate a portfolio's sensitivity to a change in curve slope using key rate durations of the portfolio and its benchmark;

f. construct a duration-neutral government bond portfolio to profit from a change in yield curve curvature;

g. evaluate the expected return of a yield curve strategy.

Introduction

Active portfolio management seeks to outperform a benchmark. Portfolio returns are often evaluated relative to a benchmark that has characteristics aligned with the investment manager's mandate or style. Managers seek to outperform the benchmark by constructing a portfolio that is not fully representative of the index. Any differences from the benchmark are typically deliberate and not the result of illiquidity or inconvenience.

Active yield curve strategies are designed to capitalize on expectations regarding the level, slope, or shape (curvature) of yield curves. This reading focuses on the challenges of developing and implementing active fixed-income portfolio strategies for which the primary tools are based in the dynamics of yield curves. In most instances, we have chosen to illustrate the strategies and dynamics using the US Treasury curve because of data availability. These same strategies, however, can be implemented in any jurisdiction with a well-developed sovereign debt market—a market where there are regular bond issuances along the yield curve and the market is liquid.

Section 2 discusses some foundational concepts essential for understanding yield curve strategies and expands on three basic changes to yield curves: level, slope, and curvature. It also addresses convexity, an important tool for fixed-income portfolio managers. Section 3 discusses how a portfolio manager can use strategies to express a directional view on interest rates. Section 4 addresses how and why a portfolio manager might choose to position his or her portfolio in anticipation of various yield curve environments. Section 5 compares the performance of various duration-neutral portfolios in multiple yield curve environments. Section 6 presents a framework for analyzing the expected return of a yield curve strategy. Section 7 provides a summary.

Summary

This reading focused on the strategies a fixed-income portfolio manager may use to position his portfolio in anticipation of the future state of yield curves.

- Macaulay duration is a weighted average of time to receive the bond's cash flows.
- Modified duration is the Macaulay duration statistic divided by one plus the yield to maturity per period. It provides an estimate of the percentage price change for a bond given a 100 bps change in its yield to maturity.
- Effective duration is the sensitivity of the bond's price to a change in a benchmark yield curve, as opposed to the price response to a change in the bond's own yield. It is similar to modified duration, but its calculation is flexible to allow for its use in cases when the bond has an embedded option.
- Key rate duration is a measure of a bond's sensitivity to a change in the benchmark yield curve at a specific maturity point or segment. Key rate durations help identify a portfolio's sensitivity to changes in the shape of the benchmark yield curve.
- The money duration of a bond is a measure of the bond's price change in units of the currency in which the bond is denominated.
- The price value of a basis point scales money duration so that it can be interpreted as money gained or lost for each basis point change in the reference interest rate.

- The three primary yield curve movements of importance to the fixed-income manager are changes in level, slope, or curvature of the yield curve.
- Curvature of the yield curve can be measured using the butterfly spread, which describes the relationship between yields at short, intermediate, and long maturities.
- Duration management is the primary tool used by fixed-income portfolio managers.
- Convexity supplements duration as a measure of a bond's price sensitivity for larger movements in interest rates. Convexity can be an important portfolio management tool.
- Adding convexity to a portfolio using physical bonds typically requires a give-up in yield.
- For two portfolios with the same duration, the portfolio with higher convexity has higher sensitivity to large declines in yields and lower sensitivity to large increases in yields.
- Interest rate derivatives can be used effectively to add convexity to a portfolio.
- The four major strategies used when the yield curve is expected to remain stable are buy and hold; ride the yield curve; sell convexity; and the carry trade.
- The major strategies used when changes are expected in the level, slope, or curvature of the yield curve are duration management; buying convexity; and bullet and barbell structures.
- Selling convexity can be accomplished by selling calls on bonds owned, selling puts on bonds one would be willing to own, or

buying securities with negative convexity, such as callable bonds or mortgage-backed securities.

- The carry trade buys a higher-yielding security, financing it with a lower-yielding security.
- Duration should not be extended or shortened without considering the manner in which the changed duration will be distributed throughout the portfolio. The same duration change can be effected with any number of trades, each of which has its own sensitivity to changes in the curve.
- Portfolio duration can be modified using futures, options, or leverage.
- A bullet portfolio holds securities targeting a single segment of the curve, with the bonds clustered around the portfolio's duration target. A bullet is typically used to take advantage of a steepening yield curve.
- A barbell portfolio combines securities with short and long maturities (and fewer intermediate maturities) compared with the duration target. A barbell is typically used to take advantage of a flattening yield curve.
- A barbell portfolio structure has higher convexity than a bullet portfolio structure.
- Key rate durations can be used to estimate a bond or portfolio's sensitivity to changes in the shape of the yield curve as well as to identify bullets and barbells.
- A butterfly trade combines a bullet and a barbell in a duration-neutral long–short structure. (This trade is distinct from the butterfly spread measure used to determine curvature.)

- A butterfly long in the wings and short in the body is long (has positive) convexity and benefits from volatile interest rates. This butterfly also benefits from a yield curve flattening (unrelated to its convexity).
- A butterfly short in the wings and long in the body is short convexity and benefits from stable interest rates. This butterfly also benefits from a yield curve steepening (unrelated to its convexity).
- Comparing forward yields (implied yield change) with a manager's yield forecast (forecast yield change) can help determine which bonds are likely to perform the best over the forecast horizon.
- Options can be used to add or reduce convexity in a portfolio.
- The expected return of a fixed income portfolio can be estimated using the following formula:

$$\begin{aligned} E(R) \approx\ & \text{Yield income} + \text{Rolldown return} \\ & + E(\text{Change in price}) - E(\text{Credit losses}) \\ & + E(\text{Currency gains or losses}) \end{aligned}$$

The full reading, worth 2 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/yield_curve_strategies__2018_.aspx

Fixed-Income Active Management: Credit Strategies

by Campe Goodman, CFA, and Oleg Melentyev, CFA

Campe Goodman, CFA, is at Wellington Management (USA). Oleg Melentyev, CFA (USA).

Learning Outcomes

The candidate should be able to:

a. describe risk considerations in investment-grade and high-yield corporate bond portfolios;

b. compare the use of credit spread measures in portfolio construction;

c. discuss bottom-up approaches to credit strategies;

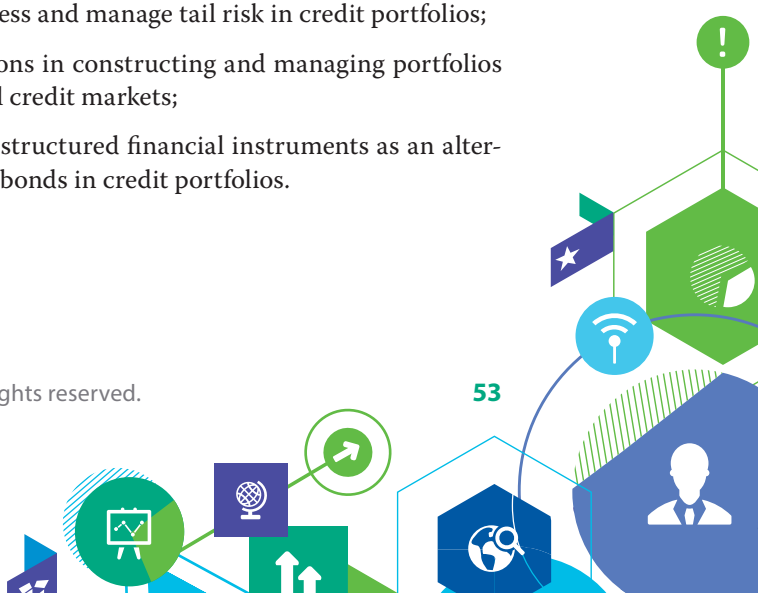
d. discuss top-down approaches to credit strategies;

e. discuss liquidity risk in credit markets and how liquidity risk can be managed in a credit portfolio;

f. describe how to assess and manage tail risk in credit portfolios;

g. discuss considerations in constructing and managing portfolios across international credit markets;

h. describe the use of structured financial instruments as an alternative to corporate bonds in credit portfolios.



Introduction

This reading covers strategies used in the construction and management of credit portfolios. A credit portfolio consists primarily of securities for which credit risk is an important consideration. The credit market is the component of the fixed-income market that includes both publicly traded debt securities (such as corporate bonds, sovereign and non-sovereign government bonds, supranational bonds, and commercial paper) and non-publicly traded instruments (such as loans and privately placed securities). The credit market also includes structured financial instruments—such as mortgage-backed securities, asset-backed securities, and collateralized debt obligations—that may be traded publicly or non-publicly.

Corporate bonds are the largest portion of the credit market. Section 2 compares investment-grade and high-yield corporate bonds and highlights implications of differences in these bonds for portfolio construction and management. Section 3 describes basic measures used to evaluate credit securities, including credit spread measures and excess returns from credit securities. Section 4 discusses two main approaches to credit strategy—bottom-up and top-down—used in constructing and managing credit portfolios. Section 5 discusses examines how to manage two important non-credit risks—liquidity risk and tail risk—in credit portfolios.

When managing international credit portfolios, portfolio managers need to consider various global implications. Section 6 discusses issues and risks that are particularly relevant for international credit portfolios. In addition to corporate bonds, credit investors may consider structured financial instruments such as mortgage-backed securities, asset-backed securities, collateralized debt obligations, and covered bonds. Section 7 covers the use of structured financial instruments in credit portfolios. The final section summarizes the reading.

Summary

This reading covers strategies and risk considerations in the construction and management of credit portfolios. Key points include the following:

- Credit risk is usually the most important consideration for high-yield portfolio managers. For investment-grade portfolio managers, interest rate risk, spread risk, and credit migration (or credit downgrade) risk are typically the most relevant considerations.
- The risk in a portfolio of investment-grade bonds is typically measured in terms of spread duration.
- Credit spreads tend to be negatively correlated with risk-free interest rates.
- When default losses are low and credit spreads are relatively tight, high-yield bonds tend to behave more like investment-grade bonds; that is, with greater interest rate sensitivity.
- High-yield bonds tend to be less liquid than investment-grade bonds because of higher return volatility in the high-yield bond market; smaller inventories of high-yield bonds than of investment-grade bonds held by broker/dealers; and smaller size of the high-yield market compared with the investment-grade market.
- Reflecting differences in liquidity between high-yield and investment-grade bonds, bid–offer spreads are larger for high-yield bonds.
- Credit spread measures include spread over the benchmark, the G-spread, the I-spread, the Z-spread, and option-adjusted spread. Each measure has advantages and disadvantages in use.

- Excess return is the compensation that a bond investor receives for assuming credit risk. When considering excess return, credit portfolio managers typically manage interest rate risk separately.
- A bottom-up approach to credit strategy involves selecting the individual bonds or issuers that the investor views as having the best relative value from among a set of bonds or issuers with similar characteristics (usually the same industry and often the same country of domicile).
- A spread curve is the fitted curve of credit spreads for each bond of an issuer plotted against either the maturity or duration of each of those bonds. A spread curve may be useful in conducting bottom-up relative value analysis.
- A top-down approach to credit strategy involves the investor formulating a view on major macroeconomic trends, such as economic growth and corporate default rates, and then selecting the bonds that she expects to perform best in the expected environment.
- Top-down portfolio managers commonly use several measures to gauge the credit quality of their portfolios: (1) average credit quality; (2) average OAS; (3) average spread duration; (4) duration multiplied by spread.
- In practice, investors often employ a combination of a top-down and bottom-up approach to credit strategy.
- Some fixed-income mandates include a requirement that the portfolio consider environmental, social, and governance factors in the investment process. ESG factors are particularly relevant to the credit component of fixed-income portfolio mandates.

- Liquidity risk is prominent in the credit markets, particularly following the global financial crisis. Measures of secondary market liquidity include trading volume, spread sensitivity to fund outflows, and bid–ask spreads.
- Liquidity management tools used by credit portfolio managers include cash, position sizing, credit default swap index derivatives, exchange-traded funds, and liquid bonds outside the benchmark.
- Scenario analysis is a common tool for assessing tail risk in credit portfolios. Two principal tools that investors use to manage tail risk include portfolio diversification and tail risk hedges.
- Many investors manage bonds that are issued in multiple countries and currencies and therefore need to consider international (global) implications.
- Credit portfolio managers can improve returns through geographic diversification (investing across various countries and regions). Risks of geographic diversification include geopolitical risk, elevated liquidity risk, currency risk, and legal risk.
- Credit investors sometimes use structured financial instruments as alternatives to corporate bonds. Common types of structured financial instruments include mortgage-backed securities, asset-backed securities, collateralized debt obligations, and covered bonds.

The full reading, worth 2 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/fixed-income_active_management__credit_strategies__2018_.aspx

Alternative Investments

Applicable Readings

Introduction to Alternative Investments (Level I)

by Terri Duhon, George Spentzos, CFA, FSIP, and Scott D. Stewart, CFA
2 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/introduction_to_alternative_investments__2018_.aspx

Alternative Investments Portfolio Management (Level III)

by Jot K. Yau, PhD, CFA, Thomas Schneeweis, PhD, Edward A. Szado, PhD, CFA, Thomas R. Robinson, PhD, CFA, and Lisa R. Weiss, CFA
4 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/alternative_investments_portfolio_management__2018_.aspx

What Changed in the Curriculum?

The two 2018 curriculum readings relevant to alternative investments are substantial revisions and thus are considered new readings for Level I and Level III of the CFA Program curriculum.

This new material reflects our expanded focus and commitment to teaching CFA Program candidates about this growing and important sector of the global investment marketplace. As of December 2014, the category of alternative investments represented a significant 25% of all global assets under management, according to data from Boston Consulting Group and DTZ Research. There is no apparent slowdown in sight.

The inclusion of so-called alternative investments within the current CFA Program curriculum is a reflection of the increasing importance of alternative investments within many institutional and high-net-worth investors' portfolios. Consequently, we have purposefully added educational materials that define and fully explain the characteristics of, and strategies for, multiple types of alternative investments, such as infrastructure investment, public and private real estate, hedge funds, private equity, commodities, and commodity derivatives.

We also educate analysts on the methods for valuations, potential illiquidity, and risk management issues specific to these alternative investments, as well as the best practices surrounding the due diligence process.

Why Does It Matter to Members?

It is critical for professionals to stay relevant and competitive in the changing investment management industry. That often means understanding the benefits, limitations, risks, and precise usage of newer and less traditional investment products. Such is the case with the growing universe of alternative investments. Today's investors are often seeking other investment options that can be used in parallel to, or in conjunction with, traditional investments in their quest to achieve specific goals and objectives. Further, portfolio and asset class diversification has become a key portfolio tenet that investors of all types have largely embraced.

It no doubt makes sense for you as an investment professional to be able to offer investors the information, guidance, and assessments appropriate for alternative financial instruments.

Introduction to Alternative Investments

by Terri Duhon, George Spentzos, CFA, FSIP, and Scott D. Stewart, CFA

Terri Duhon, is at B&B Financial Markets, Said Business School, Oxford University, CHAPS Co, and Morgan Stanley International (United Kingdom). George Spentzos, CFA, FSIP (United Kingdom). Scott D. Stewart, CFA, is at Cornell University (USA).

CFA Institute acknowledges the research assistance of John W. Stewart, CFA, on the data analysis in this reading.

Learning Outcomes

The candidate should be able to:

a. compare alternative investments with traditional investments;

b. describe categories of alternative investments;

c. describe potential benefits of alternative investments in the context of portfolio management;

d. describe hedge funds, private equity, real estate, commodities, infrastructure, and other alternative investments, including, as applicable, strategies, sub-categories, potential benefits and risks, fee structures, and due diligence;

e. describe, calculate, and interpret management and incentive fees and net-of-fees returns to hedge funds;

f. describe issues in valuing and calculating returns on hedge funds, private equity, real estate, commodities, and infrastructure;

g. describe risk management of alternative investments.

Introduction

Assets under management in vehicles classified as alternative investments have grown rapidly since the mid-1990s. This growth has largely occurred because of interest in these investments by institutions, such as endowment and pension funds, as well as high-net-worth individuals seeking diversification and return opportunities. Alternative investments are perceived to behave differently from traditional investments. Investors may seek either absolute return or relative return.

Some investors hope alternative investments will provide positive returns throughout the economic cycle; this goal is an absolute return objective. Alternative investments are not free of risk, however, and their returns may be negative and/or correlated with other investments, including traditional investments, especially in periods of financial crisis. Some investors in alternative investments have a relative return objective. A relative return objective, which is often the objective of portfolios of traditional investment, seeks to achieve a return relative to an equity or fixed-income benchmark.

This reading is organized as follows. Section 2 describes alternative investments' basic characteristics and categories; general strategies of alternative investment portfolio managers; the role of alternative investments in a diversified portfolio; and investment structures used to provide access to alternative investments. Sections 3 through 7 describe features of hedge funds, private equity, real estate, commodities, and infrastructure, respectively, along with issues in calculating returns to and valuation of each. Section 8 briefly describes other alternative investments. Section 9 provides an overview of risk management, including due diligence, of alternative investments. A summary and practice problems conclude the reading.

Summary

This reading has provided an overview of the characteristics, potential benefits, and risks of alternative investments. It also described features of some categories of alternative investments. Including alternative investments in an investor's portfolio may result in benefits, such as diversification benefits. These benefits do not come without associated risks, however. It is important that investors understand these risks before including alternative investments in their portfolios. Some key points of the reading are summarized as follows:

- Alternative investments are alternatives to long-only positions in stocks, bonds, and cash. Alternative investments include investments in assets such as real estate and commodities as well as investments in special vehicles such as private equity and hedge funds.
- Alternative investment strategies are typically active, return-seeking strategies.
- Characteristics common to many alternative investments, compared with traditional investments, include lower liquidity, less regulation, lower transparency, higher fees, and limited and potentially problematic historical risk and return data.
- Alternative investments often have unusual legal and tax considerations and may be highly leveraged.
- Alternative investments are attractive to investors because of the potential for diversification (reduced risk) and/or higher returns when added to a portfolio of traditional investments.
- The risks associated with alternative investments must be factored into the investment decision-making process.

- Many alternative investments are valued for performance-reporting purposes, including reporting to index providers, using estimated values rather than actual market prices. As a result, the volatility of returns and correlation of returns with the returns to traditional investments will tend to be underestimated. It is important to identify and understand how alternative investments are valued.
- Indexes for alternative investments may be subject to a variety of biases, including survivorship and backfill biases.
- Many alternative investments, such as hedge and private equity funds, use a partnership structure with a general partner that manages the business and limited partners (investors) who own fractional interests in the partnership.
- The general partner typically receives a management fee based on assets under management or committed capital (the former is common to hedge funds and the latter is common to private equity funds) and an incentive fee based on realized profits.
- Hurdle rates, high-water marks, lockup and notice periods, and clawback provisions may also be specified in a partnership agreement.
- The fee structure affects the returns to investors (limited partners) in alternative investments such as hedge and private equity funds.
- Hedge funds are typically classified by strategy. One such classification includes four broad categories of strategies: event-driven, relative value, macro, and equity hedge.
- Primary private equity fund strategies include leveraged buyouts, venture capital, development capital, and distressed

investing. Leveraged buyouts and venture capital are the dominant strategies.

- Real estate investing includes direct and indirect ownership of real estate property and lending against real estate properties.
- Real estate property has some unique features, including basic indivisibility, heterogeneity (no two properties are identical), and fixed location.
- The required amount to directly invest in real estate may be large, and the investment may be relatively illiquid. Different investment forms, such as REITs and mortgage securitizations, partially address these issues.
- Commodity investments may involve investing in actual physical commodities or in producers of commodities, but more typically, these investments are made using commodity derivatives.
- Returns to commodity investing are based on changes in price and do not include an income stream such as dividends, interest, or rent.
- Infrastructure assets are capital intensive, long-lived, real assets that are intended for public use and provide essential services. Investors expect these assets to generate stable cash flows, which adjust for economic growth and inflation, and they may also expect capital appreciation.
- Category, stage of development, and geographic location of underlying assets and the form of infrastructure investment affect risks and expected returns of infrastructure investments.
- Managing risks associated with alternative investments can be challenging because these investments are often characterized

by asymmetric risk and return profiles, limited portfolio transparency, and illiquidity.

- Traditional risk and return measures (such as mean return, standard deviation of returns, and beta) may provide an inadequate picture of alternative investments' risk and return characteristics. Moreover, these measures may be unreliable or not representative of specific investments.
- Operational, financial, counterparty, and liquidity risks may be key considerations for those investing in alternative investments.
- It is critical to perform due diligence to assess whether (a) the manager can effectively pursue the proposed investment strategy; (b) the appropriate organizational structure and policies for managing investments, operations, risk, and compliance are in place; and (c) the fund terms appear reasonable.
- The inclusion of alternative investments in a portfolio, including the amounts to allocate, should be considered in the context of an investor's risk–return objectives, constraints, and preferences.

The full reading, worth 2 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/introduction_to_alternative_investments__2018_.aspx

Alternative Investments Portfolio Management

by Jot K. Yau, PhD, CFA, Thomas Schneeweis, PhD, Edward A. Szado, PhD, CFA, Thomas R. Robinson, PhD, CFA, and Lisa R. Weiss, CFA

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Learning Outcomes

The candidate should be able to:

a. describe common features of alternative investments and their markets and how alternative investments may be grouped by the role they typically play in a portfolio;

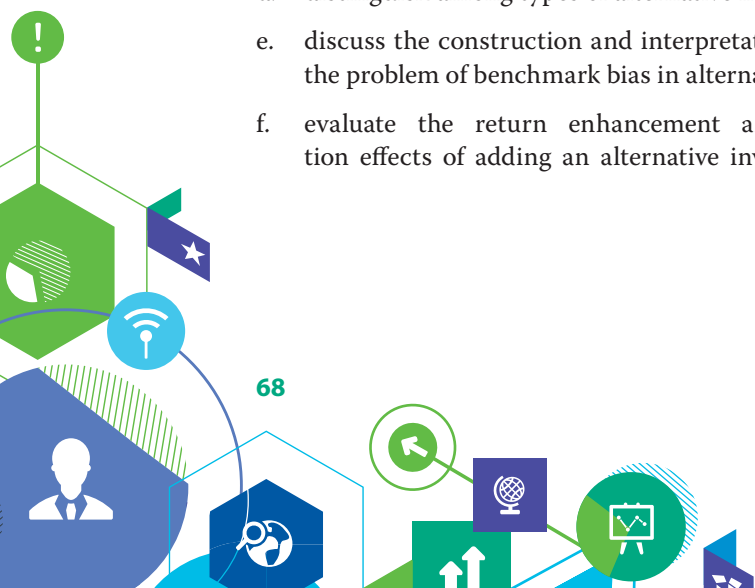
b. explain and justify the major due diligence checkpoints involved in selecting active managers of alternative investments;

c. explain distinctive issues that alternative investments raise for investment advisers of private wealth clients;

d. distinguish among types of alternative investments;

e. discuss the construction and interpretation of benchmarks and the problem of benchmark bias in alternative investment groups;

f. evaluate the return enhancement and/or risk diversification effects of adding an alternative investment to a reference



portfolio (for example, a portfolio invested solely in common equity and bonds);

g. describe advantages and disadvantages of direct equity investments in real estate;

h. discuss the major issuers and suppliers of venture capital, the stages through which private companies pass (seed stage through exit), the characteristic sources of financing at each stage, and the purpose of such financing;

i. compare venture capital funds and buyout funds;

j. discuss the use of convertible preferred stock in direct venture capital investment;

k. explain the typical structure of a private equity fund, including the compensation to the fund's sponsor (general partner) and typical timelines;

l. discuss issues that must be addressed in formulating a private equity investment strategy;

m. compare indirect and direct commodity investment;

n. describe the principal roles suggested for commodities in a portfolio and explain why some commodity classes may provide a better hedge against inflation than others;

o. identify and explain the style classification of a hedge fund, given a description of its investment strategy;

p. discuss the typical structure of a hedge fund, including the fee structure, and explain the rationale for high-water mark provisions;

q. describe the purpose and characteristics of fund-of-funds hedge funds;

r. discuss concerns involved in hedge fund performance evaluation;

s. describe trading strategies of managed futures programs and the role of managed futures in a portfolio;

t. describe strategies and risks associated with investing in distressed securities;

u. explain event risk, market liquidity risk, market risk, and "J factor risk" in relation to investing in distressed securities.

Introduction

Today, many defined-benefit pension funds, endowments, foundations, and high-net-worth individuals allocate money to alternative investments in proportions comparable to those given to traditional assets, such as bonds and common equities. In doing so, such investors may be seeking risk diversification, greater opportunities to apply active management skills, or both. Portfolio managers who understand alternative investments have a substantial advantage over those who do not.

This reading presents six groups of alternative investments: real estate, private equity, commodities, hedge funds, managed futures, and distressed securities. These six diverse asset groups cover a wide spectrum of risk and return characteristics and are the major alternative asset classes in the portfolios of most institutional and individual investors.

This reading focuses on the distinguishing characteristics of alternative investments and their potential contributions in a portfolio context. Among the questions we will address in this reading are the following:

- What types of investments are available in each market, and what are their most important differences for an investor?
- What benchmarks are available to evaluate the performance of alternative investment managers, and what are their limitations?
- What investment strategies and portfolio roles are characteristic of each alternative investment?
- What should due diligence cover? (Due diligence is the investigation into the details of a potential investment, including the scrutiny of operations and management and the verification of material facts.)

The reading is organized as follows: Section 2 introduces and presents an overview of the field of alternative investments. In Sections 3 through 8, we present the six alternative asset groups. For each group, we discuss the market for the investments; benchmarks and historical performance, with a focus on the group's record as a standalone investment; the portfolio role of the investments and specific strategies; and issues in performance evaluation and reporting. The final section summarizes the reading.

Summary

Alternative investments have become a significant portion of the portfolios of both individual and institutional investors. This

reading presents six groups of alternative investments: real estate, private equity, commodities, hedge funds, managed futures, and distressed securities.

- Common features of alternative investments include relative illiquidity, which tends to be associated with a return premium as compensation; diversifying potential relative to a portfolio of stocks and bonds; high due diligence costs; and the difficulty of performance evaluation.
- Due diligence for alternative investment selection should cover market opportunity, investment process, organization, people, terms and structure, service providers, documents, and write-up.
- Special concerns for advisers to private wealth clients include tax issues, suitability, communication with the client, decision risk (the risk of changing strategies at the point of maximum loss), and potentially concentrated equity positions of the client in a closely held company.
- The physical real estate market is characterized by a relative lack of liquidity, large lot size, and high transaction costs.
- Real estate investments can be viewed in terms of direct ownership and indirect ownership. Direct ownership includes investment in residences, business real estate, and agricultural land. Indirect ownership includes investment in vehicles such as REITs.
- Advantages to real estate investment include tax benefits, the use of leverage, control over property, diversification, potential as an inflation hedge, and low volatility of returns.
- Disadvantages to real estate investment include the inability to subdivide real estate investments, high information costs, high

commissions, maintenance and operating costs, location risk, and political risk related to tax deductions.

- Private equity investments are highly illiquid, and investors must be willing to hold these securities for long periods.
- Private equity investments include start-up companies, middle-market private companies, and private investment in public entities.
- Private equity investors include angel investors, venture capitalists, and larger companies in the same industry.
- There are two broad approaches to investing in commodities: direct and indirect. Direct commodity investment entails purchasing the physical commodities or using derivatives with direct exposure to changes in spot prices. In contrast, indirect investment in commodities involves the acquisition of indirect claims on commodities.
- The inflation-hedging ability of commodity investing appears to vary according to the commodity.
- Hedge funds are skill-based investment strategies in various forms, including limited partnerships. The funds use various investment strategies and thus are often classified according to investment style. Within each style category, hedge funds are classified according to the underlying markets traded or the unique trading style—for example, relative value, event driven, hedged equity, and global macro.
- Within each style classification, there are a number of subgroups. For instance, within the hedge fund relative value style classification, subgroups include market-neutral long–short

equity, convertible hedging, and fixed-income arbitrage (or bond hedging).

- Hedge funds can provide both return and diversification benefits, but the risks are not usually well represented by standard deviation.
- Managed futures are actively managed investment vehicles that share many features of hedge funds (e.g., compensation arrangements). However, managed futures programs primarily trade futures and option contracts, whereas hedge funds typically are more active in cash markets.
- Managed futures programs include systematic trading strategies (based on trading rules applied to price data and often managed and traded by computers) and discretionary trading strategies (which incorporate manager judgment and fundamental data considerations).
- Distressed securities are securities of companies that are in financial distress or near bankruptcy. The securities could be equity, debt, trade claims, or other claims.
- Distressed securities investment exploits the fact that many investors are unable to hold below-investment-grade securities. Furthermore, few analysts cover the distressed securities market.
- Risks of distressed securities investing include event risk, J (for "judge") factor risk, liquidity risk, market risk, and other risks.

The full reading, worth 4 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/alternative_investments_portfolio_management__2018_.aspx

Economics

Applicable Readings

Currency Exchange Rates: Understanding Equilibrium Value (Level II)

by Michael R. Rosenberg and William A. Barker, PhD, CFA
2.5 CE credits (including 0 SER)
Access to full reading:
https://www.cfainstitute.org/learning/products/publications/readings/Pages/currency_exchange_rates__understanding_equilibrium_value__2018_.aspx

What Changed in the Curriculum?

Our 2018 curriculum readings include one all-new economics reading in Level II of the CFA Program curriculum.

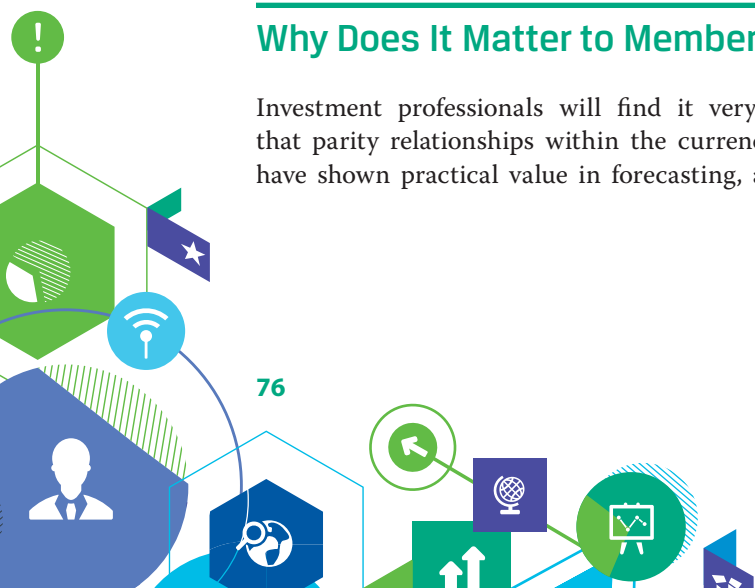
We believe this reading will have particular appeal and value for those interested in understanding what economic theory says about the evolutionary process of currency exchange rates over the longer term. These relationships toward which markets should gravitate are referred to as "equilibrium relationships."

This reading explores "parity relationships." This includes interest rate parity, wherein interest rates differ between two markets and the current rate available for exchanging between those currencies at some future point in time (forward rates). This reading explains the principles, strategies, and implications of both uncovered interest rate parity and covered interest rate parity.

The reading also delves into purchasing power parity relationships—the relationship between currency exchange rates and inflation differentials between markets. It further explores how, in putting together these two parity relationships, one can assess how interest rate differences should relate to inflation differences, as well as the implications for real interest rates. Moreover, this reading further enhances the discussion of monetary and fiscal policy for exchange rates.

Why Does It Matter to Members?

Investment professionals will find it very useful to understand that parity relationships within the currency exchange rate realm have shown practical value in forecasting, at least at definite time



horizons. The information accessed here can best benefit long-term investors. Understanding how such differences in currency exchange rates occur and how monetary and fiscal policies exert their influence offers a better understanding of the underlying economic theory, which may then lead to the development of better strategies and solutions for clients.

Currency Exchange Rates: Understanding Equilibrium Value

by Michael R. Rosenberg and William A. Barker, PhD, CFA

Michael R. Rosenberg (USA). William A. Barker, PhD, CFA (Canada).

Learning Outcomes

The candidate should be able to:

a. calculate and interpret the bid–offer spread on a spot or forward currency quotation and describe the factors that affect the bid–offer spread;

b. identify a triangular arbitrage opportunity and calculate its profit, given the bid–offer quotations for three currencies;

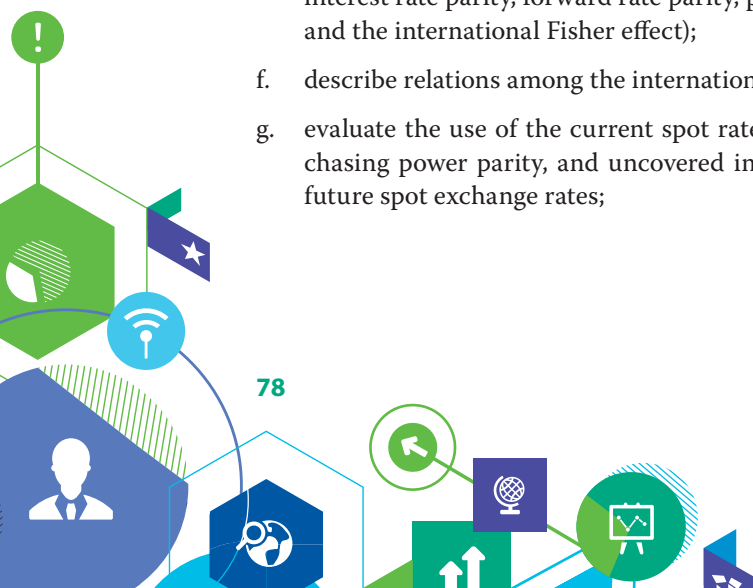
c. distinguish between spot and forward rates and calculate the forward premium/discount for a given currency;

d. calculate the mark-to-market value of a forward contract;

e. explain international parity conditions (covered and uncovered interest rate parity, forward rate parity, purchasing power parity, and the international Fisher effect);

f. describe relations among the international parity conditions;

g. evaluate the use of the current spot rate, the forward rate, purchasing power parity, and uncovered interest parity to forecast future spot exchange rates;



h. explain approaches to assessing the long-run fair value of an exchange rate;

i. describe the carry trade and its relation to uncovered interest rate parity and calculate the profit from a carry trade;

j. explain how flows in the balance of payment accounts affect currency exchange rates;

k. explain the potential effects of monetary and fiscal policy on exchange rates;

l. describe objectives of central bank or government intervention and capital controls and describe the effectiveness of intervention and capital controls;

m. describe warning signs of a currency crisis.

Introduction

Exchange rates are well known to follow a random walk, whereby fluctuations from one day to the next are unpredictable. The business of currency forecasting can be a humbling experience. Alan Greenspan, former chairman of the US Federal Reserve Board, famously noted that "having endeavored to forecast exchange rates for more than half a century, I have understandably developed significant humility about my ability in this area."

Hence, this reading is not about predicting exchange rates, but about the tools the reader can use to better understand long-run equilibrium value. This outlook helps guide the market participant's decisions with respect to risk exposures, as well as whether currency hedges should be implemented and, if so, how they should be

managed. After discussing the basics of exchange rate transactions, this reading presents the main theories for currency determination—starting with the international parity conditions—and then describes other important influences, such as current account balances, capital flows, and monetary and fiscal policy.

Although these fundamentals-based models usually perform poorly in predicting future exchange rates in the short run, they are crucial for understanding long-term currency value. Thus, the reading proceeds as follows:

- Section 2 reviews the basic concepts of the foreign exchange market covered in the CFA Level I curriculum reading and expands this previous coverage to incorporate more material on bid–offer spreads.
- In Section 3, we begin to examine determinants of exchange rates, starting with longer-term interrelationships among exchange rates, interest rates, and inflation rates embodied in the international parity conditions. These parity conditions form the key building blocks for many long-run exchange rate models.
- Section 4 examines the FX carry trade, a trading strategy that exploits deviations from uncovered interest rate parity.
- Section 5 examines the relationship between a country's exchange rate and its balance of payments.
- In Section 6, we examine how monetary and fiscal policies can *indirectly* affect exchange rates by influencing the various factors described in our exchange rate model from Section 3.
- Section 7 examines *direct* public sector actions in foreign exchange markets, both through capital controls and by foreign exchange market intervention (buying and selling currencies for policy purposes).

- Section 8 examines historical episodes of currency crisis and some leading indicators that may signal the increased likelihood of a crisis.

A final section summarizes the key points of the reading.

Summary

Exchange rates are among the most difficult financial market prices to understand and therefore to value. There is no simple, robust framework that investors can rely on in assessing the appropriate level and likely movements of exchange rates.

Most economists believe that there is an equilibrium level or a path to that equilibrium value that a currency will gravitate toward in the long run. Although short- and medium-term cyclical deviations from the long-run equilibrium path can be sizable and persistent, fundamental forces should eventually drive the currency back toward its long-run equilibrium path. Evidence suggests that misalignments tend to build up gradually over time. As these misalignments build, they are likely to generate serious economic imbalances that will eventually lead to correction of the underlying exchange rate misalignment.

In this reading, we have described how changes in monetary policy, fiscal policy, current account trends, and capital flows affect exchange rate trends, as well as what role government intervention and capital controls can play in counteracting potentially undesirable exchange rate movements. The reading makes the following key points:

- Spot exchange rates apply to trades for the next settlement date (usually $T + 2$) for a given currency pair. Forward exchange rates apply to trades to be settled at any longer maturity.

- Market makers quote bid and offer prices (in terms of the *price currency*) at which they will buy or sell the *base currency.*
  - The offer price is always higher than the bid price.
  - The counterparty that asks for a two-sided price quote has the option (but not the obligation) to deal at either the bid or offer price quoted.
  - The bid–offer spread depends on (1) the currency pair involved, (2) the time of day, (3) market volatility, (4) the transaction size, and (5) the relationship between the dealer and client. Spreads are tightest in highly liquid currency pairs, when the key market centers are open, and when market volatility is relatively low.
- Absence of arbitrage requires the following:
  - The bid (offer) shown by a dealer in the interbank market cannot be higher (lower) than the current interbank offer (bid) price.
  - The cross-rate bids (offers) posted by a dealer must be lower (higher) than the implied cross-rate offers (bids) available in the interbank market. If they are not, then a triangular arbitrage opportunity arises.
- Forward exchange rates are quoted in terms of points to be added to the spot exchange rate. If the points are positive (negative), the base currency is trading at a forward premium (discount). The points are proportional to the interest rate differential and approximately proportional to the time to maturity.
- International parity conditions show us how expected inflation, interest rate differentials, forward exchange rates, and expected future spot exchange rates are linked. In an ideal world:

  - relative expected inflation rates should determine relative nominal interest rates;
  - relative interest rates should determine forward exchange rates; and
  - forward exchange rates should correctly anticipate the path of the future spot exchange rate.

- International parity conditions tell us that countries with high (low) expected inflation rates should see their currencies depreciate (appreciate) over time, that high-yield currencies should depreciate relative to low-yield currencies over time, and that forward exchange rates should function as unbiased predictors of future spot exchange rates.
- With the exception of covered interest rate parity, which is enforced by arbitrage, the key international parity conditions rarely hold in either the short or medium term. However, the parity conditions tend to hold over relatively long horizons.
- According to the theory of covered interest rate parity, a foreign-currency-denominated money market investment that is completely hedged against exchange rate risk in the forward market should yield exactly the same return as an otherwise identical domestic money market investment.
- According to the theory of uncovered interest rate parity, the expected change in a domestic currency's value should be fully reflected in domestic–foreign interest rate spreads. Hence, an unhedged foreign-currency-denominated money market investment is expected to yield the same return as an otherwise identical domestic money market investment.

- According to the *ex ante* purchasing power parity condition, expected changes in exchange rates should equal the difference in expected national inflation rates.
- If both *ex ante* purchasing power parity and uncovered interest rate parity held, real interest rates across all markets would be the same. This result is real interest rate parity.
- The international Fisher effect says that the nominal interest rate differential between two currencies equals the difference between the expected inflation rates. The international Fisher effect assumes that risk premia are the same throughout the world.
- If both covered and uncovered interest rate parity held, then forward rate parity would hold and the market would set the forward exchange rate equal to the expected spot exchange rate: The forward exchange rate would serve as an unbiased predictor of the future spot exchange rate.
- Most studies find that high-yield currencies do not depreciate and low-yield currencies do not appreciate as much as yield spreads would suggest over short to medium periods, thus violating the theory of uncovered interest rate parity.
- Carry trades overweight high-yield currencies at the expense of low-yield currencies. Historically, carry trades have generated attractive returns in benign market conditions but tend to perform poorly (i.e., are subject to crash risk) when market conditions are highly volatile.
- According to a balance of payments approach, countries that run persistent current account deficits will generally see their currencies weaken over time. Similarly, countries that run persistent current account surpluses will tend to see their currencies appreciate over time.

- Large current account imbalances can persist for long periods of time before they trigger an adjustment in exchange rates.
- Greater financial integration of the world's capital markets and greater freedom of capital to flow across national borders have increased the importance of global capital flows in determining exchange rates.
- Countries that institute relatively tight monetary policies, introduce structural economic reforms, and lower budget deficits will often see their currencies strengthen over time as capital flows respond positively to relatively high nominal interest rates, lower inflation expectations, a lower risk premium, and an upward revision in the market's assessment of what exchange rate level constitutes long-run fair value.
- Monetary policy affects the exchange rate through a variety of channels. In the Mundell–Fleming model, it does so primarily through the interest rate sensitivity of capital flows, strengthening the currency when monetary policy is tightened and weakening it when monetary policy is eased. The more sensitive capital flows are to the change in interest rates, the greater the exchange rate's responsiveness to the change in monetary policy.
- In the monetary model of exchange rate determination, monetary policy is deemed to have a direct impact on the actual and expected path of inflation, which, via purchasing power parity, translates into a corresponding impact on the exchange rate.
- Countries that pursue overly easy monetary policies will see their currencies depreciate over time.
- In the Mundell–Fleming model, an expansionary fiscal policy typically results in a rise in domestic interest rates and an increase in economic activity. The rise in domestic interest rates

should induce a capital inflow, which is positive for the domestic currency, but the rise in economic activity should contribute to a deterioration of the trade balance, which is negative for the domestic currency. The more mobile capital flows are, the greater the likelihood that the induced inflow of capital will dominate the deterioration in trade.

- Under conditions of high capital mobility, countries that simultaneously pursue expansionary fiscal policies and relatively tight monetary policies should see their currencies strengthen over time.
- The portfolio balance model of exchange rate determination asserts that increases in government debt resulting from a rising budget deficit will be willingly held by investors only if they are compensated in the form of a higher expected return. The higher expected return could come from (1) higher interest rates and/or a higher risk premium, (2) depreciation of the currency to a level sufficient to generate anticipation of gains from subsequent currency appreciation, or (3) some combination of the two.
- Surges in capital inflows can fuel boom-like conditions, asset price bubbles, and currency overvaluation.
- Many consider capital controls to be a legitimate part of a policymaker's toolkit. The IMF believes that capital controls may be needed to prevent exchange rates from overshooting, asset price bubbles from forming, and future financial conditions from deteriorating.
- The evidence indicates that government policies have had a significant impact on the course of exchange rates. Relative to developed countries, emerging markets may have greater success in managing their exchange rates because of their large foreign

exchange reserve holdings, which appear sizable relative to the limited turnover of FX transactions in many emerging markets.

- Although each currency crisis is distinct in some respects, the following factors were identified in one or more studies:

  1. Prior to a currency crisis, the capital markets have been liberalized to allow the free flow of capital.
  2. There are large inflows of foreign capital (relative to GDP) in the period leading up to a crisis, with short-term funding denominated in a foreign currency being particularly problematic.
  3. Currency crises are often preceded by (and often coincide with) banking crises.
  4. Countries with fixed or partially fixed exchange rates are more susceptible to currency crises than countries with floating exchange rates.
  5. Foreign exchange reserves tend to decline precipitously as a crisis approaches.
  6. In the period leading up to a crisis, the currency has risen substantially relative to its historical mean.
  7. The terms of trade (exports relative to imports) often deteriorate before a crisis.
  8. Broad money growth and the ratio of M2 (a measure of money supply) to bank reserves tend to rise prior to a crisis.
  9. Inflation tends to be significantly higher in pre-crisis periods compared with tranquil periods.

The full reading, worth 2.5 CE credits, can be found at https://www.cfainstitute.org/learning/products/publications/readings/Pages/currency_exchange_rates__understanding_equilibrium_value__2018_.aspx