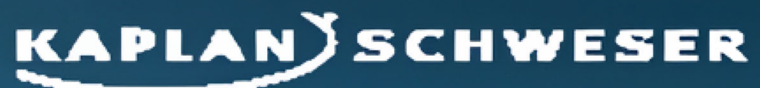
2025 CAIA®

Exam Prep

Schweser's Secret Sauce®

Level I



Schweser's Secret Sauce®

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2025

SCHWESER'S SECRET SAUCE®: 2025 CAIA® Level I

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FOREWORD

This book is a valuable addition to the study tools of any CAIA® candidate. It offers a concise summary of the CAIA Level I curriculum. However, this book does not cover every learning objective. Because it is a summary, it cannot and should not cover every concept in the Level I curriculum. It is a review tool designed to solidify the most important areas of the curriculum.

We suggest you use this book as a companion to your other, more comprehensive study materials. It is easy to carry with you and will allow you to study key concepts, definitions, and techniques over and over. Repetition is an important part of mastering the material. When you get to readings where the coverage here appears too brief or raises questions in your mind, this is your clue to go back to your SchweserNotes™ to fill in the gaps in your understanding. For the vast majority of you, there is no shortcut to learning the very broad array of subjects covered by the Level I curriculum; however, this book should be a very valuable tool for reviewing the material in the last few weeks of your studies before exam day.

Do not underestimate the task at hand. You must study intensely in order to prepare for the CAIA Level I exam. Our study materials, Mock Exams, SchweserPro™ QBank, OnDemand Classes, and Secret Sauce are all designed to help you study as efficiently as possible, grasp and retain the material, and apply your knowledge with confidence on exam day.

PROFESSIONAL STANDARDS AND ETHICS

Reading 1

Weight on Exam	15%–25%
SchweserNotes™ Reference	Book 1, Pages 1–68

Ethics is 15%–25% of the CAIA Level I exam and is highly important to your overall success. Remember, you can fail a topic area and still pass the exam—but we wouldn't recommend failing Ethics. Ethics can be tricky, and small details can be important on ethics questions. Be prepared. In addition to starting early, study the ethics material more than once. Ethics is one of the keys to passing the exam.

We recommend you read the *Standards of Practice Handbook*, which is available for free in electronic form on the CAIA Association website. Although we are very proud of our reviews of the ethics material, most of the ethics questions will likely come directly from the text and examples in the handbook. You will be much better off if you read both our summaries of the Standards *and* the handbook, and all the examples presented in it.

READING 1: CFA INSTITUTE STANDARDS OF PRACTICE

Questions about the Standards will most likely be procedural questions, but do not neglect to study the details pertaining to violations and compliance with the Standards. You will be asked to identify the course of action that an individual or firm should take to comply with the Standards. You are not required to know the Standards by number, just by name.

The following is intended to offer a useful summary of the Standards of Practice, but certainly does not take the place of carefully reading the Standards themselves, the guidance for implementing the Standards, and the examples in the handbook:

1. Know the law relevant to your position.
   - Comply with the strictest law or Standard that applies to you.
   - Do not solicit gifts.
   - Do not compromise your objectivity or independence.
   - Use reasonable care.
   - Do not lie, cheat, or steal.
   - Do not continue association with others who are breaking laws, rules, or regulations.
   - Do not use others' work or ideas without attribution.
   - Do not guarantee investment results or say that past results will be certainly repeated.

- Do not do things outside of work that reflect poorly on your integrity or professional competence.

2. Do not act or cause others to act on material nonpublic information.
   - Do not manipulate market prices or trading volume with the intent to mislead others.
3. Act solely for the benefit of your client and know to whom a fiduciary duty is owed with regard to trust accounts and retirement accounts.
   - Treat clients fairly by attempting simultaneous dissemination of investment recommendations and changes.
   - Do not personally take shares in oversubscribed IPOs.
   - When in an advisory relationship, do the following:
     - Know your client.
     - Make suitable recommendations and take suitable investment action (in a total portfolio context).
     - Preserve confidential client information unless it concerns illegal activity.
     - Do not try to mislead with performance presentation.
     - Vote nontrivial proxies in clients' best interests.
4. Act for the benefit of your employer.
   - Do not harm your employer.
   - Obtain written permission to compete with your employer or to accept additional compensation from clients which is contingent on future performance.
   - Disclose (to your employer) any gifts from clients.
   - Do not take material with you when you leave employment (you can take what is in your brain).
   - Supervisors must take action to ensure compliance with rules, laws, the Standards, and so on.
   - Do not take supervisory responsibility if you believe procedures are inadequate.
5. Thoroughly analyze investments.
   - Have a reasonable basis.
   - Keep records.
   - Tell clients about investment processes.
   - Distinguish between facts and opinions.
   - Review the quality of third-party research and the services of external advisers.
   - In quantitative models, consider what happens when their inputs are outside of the normal range.
6. Disclose potential conflicts of interest (let others judge the effects of any conflict for themselves).
   - Disclose referral arrangements.
   - Client transactions come before employer transactions, which come before personal transactions.

    - Treat clients who are family members just like any other clients.

7. Do not cheat on *any* exams (or help others to).
    - Do not reveal CAIA exam questions, or disclose what topics or concepts were tested or not tested.

My goodness! What *can* you do?

- You can use information from recognized statistical sources without attribution.
- You can use several pieces of nonmaterial, nonpublic information to construct your investment recommendations (mosaic theory).
- You can execute large trades that may affect market prices as long as the intent of the trade is not simply to mislead market participants.
- You can say that Treasury securities are without default risk.
- You can always seek the guidance of your supervisor, compliance officer, or outside counsel.
- You can get rid of records after seven years.
- You can accept gifts from clients and referral fees as long as they are properly disclosed.
- You can call your biggest clients first (after fair distribution of investment recommendation or change in recommendation).
- You can accept compensation from a company to write a research report if you disclose the relationship and nature of compensation.
- You can accurately describe the nature of the examination process and the requirements to earn the right to use the CAIA designation.

INTRODUCTION TO ALTERNATIVE INVESTMENTS

Readings 2.1–2.9

Weight on Exam	20%–28%
SchweserNotes™ Reference	Book 1, Pages 69–259
	Book 2, Pages 1–87

Topic 2 introduces alternative investments and sets a framework for analyzing these investments using statistical methods. Many of the analysis techniques in this topic are similar to those found in traditional investment analysis, but they are applied in a different manner to suit the requirements of alternative investments. There are many definitions and formulas in this topic. Be ready to do some number crunching on the exam.

READING 2.1: WHAT IS AN ALTERNATIVE INVESTMENT?

Categories of Alternative Investments

Traditional investments are long positions in cash, bonds, and publicly traded stocks. Alternative investments are considered nontraditional.

There are four categories of alternative assets you must know for the CAIA exam, including real assets, hedge funds, private equity, and private debt:

1. **Real assets** are associated with investments that directly control nonfinancial assets and represent actual rights to consumption. Real asset investments include real estate, infrastructure, natural resources, commodities, and intangible assets.
2. **Hedge funds** are private investment vehicles that are subject to minimal regulation and therefore able to pursue unique investment opportunities using derivatives, leverage, short positions, and other strategies.
3. **Private equity** includes equity securities that are not publicly traded. Private equity investments include venture capital, growth equity, and leveraged buyouts (LBOs).
4. **Private debt** was commonly considered part of private equity. This was because debt investments in highly leveraged firms generally behave like equity investments due to high cash flow risk. Private debt investments include direct lending strategies, distressed debt, and structured products.

Return Characteristics

Alternative investments are often viewed as diversifiers because they frequently have low or no correlation with traditional assets, allowing investors to reduce risk without

hurting return expectations. Alternative investments also tend to be illiquid (infrequent or low-volume trading) and lumpy (difficult to divide), meaning that immediate transactions occur at lower prices than for an equivalent liquid asset. Many alternative investments trade at inefficient prices due to fewer participants, lower competition, higher transaction costs, and an inability to establish both long and short positions. Finally, the return distributions for many alternative investments are not normal due to infrequent trading, nonlinear payoffs, and leverage.

Characteristics of Alternative Investments

Alternative investments can be described by several interconnected characteristics:

- **Structuring** involves setting up investments either as pass-throughs or into broad sets of tradable securities with unique risk, tax, and other attributes.
- **Regulatory factors** include government regulation and taxation.
- **Institutional factors** (how financial institutions and markets affect owning and trading investments) include structures such as public and private listings, trading market activity, and investor composition.
- **Compensation structures** include arrangements that impact a manager's fees, exposure to the investment's performance, and conflicts of interest with investors.
- **Trading strategies** include the development and execution of trading strategies used by investment managers and the resulting performance impact of the strategies.
- **Information asymmetries** in markets occur when different market participants have differing knowledge levels regarding particular investments and market conditions.
- **Innovation** relates to the creativity and speed associated with alternative investments. This creativity often drives higher returns, but can make it difficult for alternative investments to be analyzed and managed.
- **Incomplete markets** are markets where limited investment opportunities are not able to fully satisfy the exact investment options sought by market participants.

Alternative Investing Goals

The primary goals associated with investing in alternative assets include active management, absolute and relative return generation, arbitrage, return enhancement, and return diversification.

Alternative investment managers are evaluated in terms of active management systems, which incur active risk (deviation from the benchmark) to obtain active return (average portfolio return above the benchmark). Managers may generate absolute returns (evaluated against a standard of zero or the risk-free rate) or relative returns (evaluated against a risky benchmark return) by engaging in arbitrage, return enhancement, or return diversification strategies.

Pillars of Alternative Investment Management

Empirical analysis involves performing analyses and making decisions based on historical results. Economic reasoning is a theoretical approach that takes the results

from empirical analysis and asks whether returns from the past could continue into the future.

Figure 1: 2 × 2 Framework

Alternative Investments		Trading	
		Public	Private
Primary Objective	Diversification (Risk Management)	Real Assets/Private Debt	Real Assets/Private Debt
	Enhanced Return (Alpha)	Hedge Funds	Private Equity

READING 2.2: THE ENVIRONMENT OF ALTERNATIVE INVESTMENTS

Market Participants

Buy-side institutions are asset managers that focus on acquiring appropriate securities for their investment portfolios.

- **Plan sponsors** are organizations that fund a health care or retirement plan for qualified members. The plan sponsor manages the plan assets to meet its obligations and determines the membership requirements and plan structure.
- With **foundations and endowments**, *foundations* are nonprofit funds established to support specific charitable activities on a continuing basis while maintaining the real value of the portfolio assets. *Endowments* are funds dedicated to providing financial support on an ongoing basis for a specific purpose. Foundations and endowments typically have long investment horizons, high risk tolerance, and low liquidity needs.
- **Family office** and **private wealth institutions** are investment firms whose client base consists of high net worth families.
- **Sovereign wealth funds** are pools of assets owned by a government and typically managed by its central bank. Their purpose is to stabilize the economy, to provide a potential resource for future crises, and to provide future goods and services to citizens.
- **Private investment pools** include hedge funds, funds of funds, private equity funds, and commodity trading advisers. These funds are typically structured as limited partnerships and use sophisticated trading strategies. Performance-based fees are used to reward top-performing general partners.
- A **separately managed account (SMA)** is a portfolio owned by a single investor and managed according to that investor's preferences. No shares are issued because a single investor owns the entire account.
- **Mutual funds** and **'40 Act funds**. These funds fall under the scope of the Investment Company Act of 1940 ('40 Act). A recent innovation in this category is *alternative '40 Act funds*, which use alternative investments and alternative investment strategies within the confines of the '40 Act.
- The **Undertakings for Collective Investment in Transferable Securities (UCITS)** are regulated public funds in the European Union, similar to *'40 Act funds*.

- **Private limited partnerships** operate similar to other limited partnership structures. Limited partners experience favorable tax treatment.
- **Master limited partnerships (MLPs)** are essentially the same as a private limited partnership, but offer the advantage of being publicly traded.

Sell-side institutions focus on selling investment research and transaction execution services rather than managing accounts.

- **Large dealer banks** underwrite and trade securities and derivatives; often operate their own hedge funds and private equity funds; and engage in proprietary trading, off-balance sheet financing, and over-the-counter derivatives trading. Dealer banks also may offer account management services to buy-side institutions and may serve as prime brokers. Large dealer banks have the potential to influence the overall health of the financial markets because of actions that can increase systemic risk.
- **Retail brokers** generate investment research and execute securities trades for their customers. Retail brokers also engage in proprietary trading. Front office responsibilities include client meetings to decide investment strategy. Middle office responsibilities include managing risk and linking front and back office communication. Back office responsibilities include account maintenance, information technology, and clearing and settling trades.

Outside service providers provide professional services vital to the formation and continued operation of alternative investment funds.

- **Prime brokers** execute trades on behalf of investment managers; lend securities to sell short; and provide research, account statements, other documentation, and financing. Prime brokers allow managers to transact with multiple broker-dealers and transact in multiple investment types within a single account.
- **Auditors/accountants** review all documentation for accounting issues and provide tax advice to managers creating funds. The accountant audits fund records, provides tax and compensation advice, and prepares financial statements once the fund is operational.
- **Attorneys** provide legal advice regarding optimal fund structure; maintain regulatory registrations; and prepare documents including private placement memoranda, offering documents, partnership agreements, subscription agreements, and management company operating agreements.
- **Fund administrators** verify operational controls, assets under management, and performance figures, and may also be a key figure regarding tax issues and audit preparation.
- **Hedge fund infrastructure** service providers reduce the complexity of operating a hedge fund by providing platforms, software, and data.
- **Consultants** provide portfolio allocation and investment manager selection advice. They may also help identify client investment objectives and provide ongoing monitoring of portfolios and managers. The challenge with consultants is the potential for consulting conflicts of interest, where the objectivity of consultants may be compromised when they are paid by money managers.

- **Depositories/custodians** hold client assets and provide information services, trade clearance, and trade settlement.
- **Banks** include *investment banks* that focus on investment activities, while *commercial banks* focus on capital management and provide loans, lines of credit, and external credit enhancement. Non-U.S. banks may be structured differently and provide a different set of services.

Alternative Investment Structures

Common structures of alternative investments include the following:

- **Limited liability** represents an upper limit on an investor's potential losses. Limited liability comes from holding passive investments, where the owner has the benefit of reduced liability due to having a small stake in and relatively limited control or influence on the business. The asymmetry between limited losses and large potential profits raises the issue of probity (exercising strong moral principles).
- **Limited liability companies (LLCs)** are legal entities that offer protection to their investors in a manner similar to corporations, with two differences relative to corporation investors: (1) protection is not absolute, and (2) distributions are not necessarily pro rata and aligned with ownership percentages.
- **Special purpose vehicles (SPVs)** and **special purpose entities (SPEs)** are legal entities designed to be bankruptcy remote (offer protection from any bankruptcy proceedings involving the entity which set up the SPV/SPE).
- **Master trust and feeder funds** (together, a **master-feeder structure**) provide tax neutrality by accommodating the various taxation profiles associated with investors from different countries.

Fund Structures

Key features commonly found in fund structures include the following:

- **Partnership documents** standard to the limited partnership structure include the offering memorandum/private placement memoranda; the partnership/limited partnership agreement (LPA), which sets the terms and conditions associated with the legal framework of the partnership; the subscription agreement; and the management company operating agreement.
- **Adverse selection** (decisions made by one party leading less desirable parties to be drawn into the transaction) and **moral hazards** (actions may change after a transaction is completed) are two concerns in limited partnerships.
- A **limited partner advisory committee (LPAC)** allows limited partners to have some (nonsignificant) influence. A simple majority (over 50%) is needed for smaller decisions, and a **qualified majority** (over 75%) is needed for larger-impact decisions.

Private Equity Fund Fees and Terms

PE-style fund fees and terms include the following:

- **Management fees** are the baseline compensation the fund manager requires to support ongoing fund activities. Fees are assessed on **committed capital**, which is the amount of funding promised by investors. **Carry** (carried interest) is the fund manager's share of the fund's profits and is the main incentive tied to performance. Standard terms of limited partnership agreements are that the LP must receive all distributions up to its capital invested plus a set **preferred return** (hurdle rate), before the GP receiving any carried interest. VC funds are utilizing **subscription lines**, which are lines of credit used to make investments.
- Other standard terms include GP contributions, known as **hurt money**, which are typically 1% of the fund's committed capital. Also, the **key personnel clause** protects LPs in case a key person leaves, cannot commit adequate time to fund management, or sells their interests. LPs can suspect investment or disinvestment activities until replacements are found. A **bad-leaver clause** allows for the removal of a GP for cause. A **good-leave clause** allows investors with a qualified majority to stop any additional funding of the partnership.
- An LP receiving less than the sum of contributed capital and a specific amount of fund profits at the end of a fund's life may trigger a **clawback escrow agreement**, which ensures managers do not receive a greater percentage of fund distributions than they are entitled to receive.

Types of Financial Markets

Primary markets relate to the sale of new security issues. New equity issues involve initial public offerings (IPOs) and seasoned issues or secondary issues. *Securitization* is the process of pooling assets and then issuing new securities that derive their cash flows from the pool. The pool assets may be publicly listed or unlisted and vary in terms of liquidity. Primary markets are often used as an exit strategy for alternative investments.

Secondary markets are where securities trade after their initial issuance. Secondary markets provide liquidity and price/value information. Well-developed secondary markets lower the cost of capital for firms raising external capital in the primary market. In secondary markets, dealer banks serve as intermediaries, and trade for their own accounts with other dealer banks and with broker-dealers. Dealers generally do not charge commissions on transactions. Instead, they make their profit from the *bid-ask spread*. Both **market orders** (customer orders to buy and sell immediately at the best possible price) and **limit orders** (customer orders to buy and sell at a specific price or better) are managed here.

Third markets refer to regional exchanges where nonmember firms can both make markets in and trade exchange-listed securities without the exchange, thereby reducing transaction costs.

Fourth markets allow the private electronic exchange of securities between investors *without* using a broker as an intermediary. Members avoid the bid-ask spread by submitting orders that are matched to other outstanding orders through *crossing*. This market is used by institutions that trade very large volumes of securities. *High-frequency trading (HFT)*, which involves trades that are executed in milliseconds and

positions that are held for only seconds, typically occurs in fourth markets. Third and fourth markets are both **private markets**.

Short Selling

Short selling involves selling borrowed financial assets at market prices. The short seller hopes to buy back the assets when the price is lower than the higher sale price. Shares are often sold in **street name** (the brokerage firm is the owner of the shares), as short sellers borrow these securities and sell them. **Substitute dividends** must be paid by the short seller to the original lender (stock owner) if dividends are paid before the shares are bought back. **Dividend irrelevancy** reflects the fact that the short seller owes dividends paid to the stock owner, but the share price will decline due to the dividend payment (which benefits the short seller). When demand is high for short sales, inventory declines, and short sellers may be required to cover their positions (**bought-in**). Short squeezes are a risk that results from short sellers having to cover their positions with purchases, which drives prices higher.

READING 2.3: ACCESSING ALTERNATIVE INVESTMENTS

Alternative Investment Fund Structures

Alternative investments can be purchased using different fund structures. The universe of fund structures is often segmented by strategies that involve either public (liquid) or private (illiquid) securities.

Hedge funds that invest in strategies involving public/liquid securities typically use an **open-end fund structure**. Investors can subscribe to or redeem from open-end (evergreen) funds at any time. In the event that the fund's value declines after an incentive fee is calculated, existing investors will not be charged another incentive fee until the fund's value rises above the last incentive fee level. This is known as the **high-water mark**.

Fund structures that invest in private/illiquid securities are known as **closed-end funds**, **drawdown funds**, or **private equity (PE)-style funds**. Most of the alternative investment industry (outside of hedge funds) use this fund structure. This structure is best suited for illiquid markets where large funds cannot be invested immediately. With PE-style funds, limited partners (LPs) pool resources to invest in privately owned companies that are managed by general partners (GPs).

The risks of a PE fund must be evaluated differently than listed investments. The key risks include market risk, liquidity risk, commitment risk, and realization risk.

- **Market risk** reflects the risk that unrealized (paper) losses in a fund become actual realized losses if the fund does not have sufficient time or capital to wait for the asset prices to recover.
- **Liquidity risk** relates to the inability to sell assets quickly and without significant losses. It can be mitigated by maintaining sufficient quantities of *liquid assets*.
- **Funding (commitment) risk** is the risk that an LP is unable to meet capital commitments, and is mitigated by the capital in *capital calls*.

- **Realization risk** is the risk of long-term losses in invested capital, and can be mitigated through sufficient *portfolio diversification*.

Liquid Alternatives

Liquid alternatives use private placement investment strategies within a retail fund. Regulatory constraints include leverage limits, diversification requirements, and liquidity requirements. Liquid alternatives can be divided into five categories:

1. **Skill-based replication products.** These attempt to earn comparable returns to alternative funds that rely on a manager's skills by using a more basic strategy that may use a mathematical or system approach.
2. **Liquidity-based replication products.** These use liquid investments that have similar characteristics to illiquid securities used in illiquid alternative funds.
3. **Constrained clones.** These attempt to follow similar strategy as an existing alternative investment product but modified due to investment limitations (e.g., liquidity, leverage, diversification).
4. **Unconstrained clones.** These attempt to follow a near-identical strategy as an existing alternative investment product that is relatively liquid.
5. **Diversified/absolute return products.** These focus on creating returns that have low correlation with traditional investments but do not pattern strategy after existing alternative investments.

The factors responsible for the difference in risk-adjusted returns for liquid alternatives and private placements are that liquid alternatives have (1) no incentive fees, (2) less skilled managers, (3) an inability to capture illiquidity premiums, and (4) a narrower set of permissible investment strategies.

Direct Investing and Co-investing

Direct investing is a way for investors to access private companies without the additional layers of fees involved with a PE FoF or with a direct PE fund. Examples of direct investing include **solo investing**, **partnership investing**, and **co-investing**. Demand for direct investing is being driven by the ability to target specific goals, the extra control inherent in the process, and the potential for cost efficiency. The most popular type of direct investing is co-investing.

The potential challenges for LPs include operating an in-house program, access to co-investments, the potential for reduced diversification, and organizational constraints. The potential challenges for a GP include lack of follow-through, delay in deal processing, additional costs, and the potential for a negative impact on the relationship with LPs not engaged in co-investing.

Figure 2: Traditional PE Fund Investment vs. Direct Investment

Methods	Research	Deal Sourcing, Selection, and Due Diligence	Investment Decision	Monitoring and Ongoing Management	Asset Sale
Traditional PE fund	GP	GP	GP	GP	GP
Co-investment	GP or LP	GP	LP or shared	GP or LP	GP or LP
Partnership	GP or LP	GP or LP	LP	LP or shared	LP
Solo investment	LP	LP	LP	LP	LP

The nine potential advantages of co-investing are reduced fees, superior returns, targeted investing, diversification management, dilution mitigation, a dual layer of deal review, improved monitoring, access to invitation-only funds, and a reduced J-curve.

The five potential disadvantages of co-investing include potentially unbalanced portfolios, increased fiduciary risk, conflicts of interest, disagreement between LPs, and challenges with the allocation of fees.

Historical Performance, Key Competencies, and J-Curve Effects

Academic perspectives on co-investing performance are mixed.

Before LPs pursue co-investing, they need to evaluate if they possess a few key competencies. They will need internal expertise, a deal sourcing network, the ability to approve (or deny) deals quickly and efficiently, and an eye for risk management.

Co-investing has the following four potential influences on the shape of the J-curve: (1) lower (or zero) fees can help shorten the J-curve by reducing fee drag; (2) nearly immediate capital deployment can shorten the J-curve; (3) return dispersion is wider for co-investing, which could amplify the J-curve; and (4) co-investing sometimes requires follow-on investments which could lengthen the J-curve.

READING 2.4: QUANTITATIVE FOUNDATIONS

Compounded Returns

Compounding refers to the growth in value realized on a reinvested asset. Compounding recognizes interest earned on reinvested interest. Compounding increases overall return, but when calculating a return for a set beginning and ending dollar amount, the realized compounded return will be lower than the simple interest return, all else equal. Over discrete time periods, the simple holding period return (after one year of semiannual compounding) equals this:

$$R = \left(1 + \frac{R^{m=2}}{2}\right)^2 - 1$$

In finance, we often are interested in continuously compounded returns. **Continuous compounding** refers to the continuous reinvestment of interest, in which case the simple return will equal this:

$$R = e^{R^{m\to\infty}} - 1$$

Logarithms can be used to calculate the continuously compounded rate. Taking the natural logarithm of both sides of the continuous compounding equation and using the property of natural logarithms, we see this:

$$\ln(1 + R) = \ln(e^{R^{m\to\infty}}) = R^{m\to\infty}$$

In the previous equation, ln(1 + R) is the log return or continuously compounded return. Log returns greatly facilitate the calculation of the geometric mean return. We can calculate the **geometric mean return** using the arithmetic mean log return, *M*, as follows:

$$\text{geometric mean} = e^{M} - 1$$

Internal Rate of Return

The **internal rate of return (IRR)** is the discount rate that equates the present value of an investment's cash inflows with the present value of the investment's cash outflows. In other words, the IRR is the return associated with a zero net present value. The IRR is calculated using an iterative process with the following formula. Note that using the IRR function on your financial calculator will save you time on exam day.

$$CF_0 + \frac{CF_1}{(1 + IRR)} + \frac{CF_2}{(1 + IRR)^2} + \cdots + \frac{CF_T}{(1 + IRR)^T} = 0$$

The IRR is the standard measure of performance in the private equity and private real estate markets in which regular valuations of assets are not available. The IRR accounts for both the timing and magnitude of cash flows into and out of the investment.

The IRR is a highly useful method to calculate returns. However, the IRR is subject to several problems stemming from its assumptions and cash flow patterns:

- *Borrowing type cash flow patterns* (i.e., positive initial cash flow) changes the interpretation of the IRR. In this case, a high IRR reflects the effective cost of borrowing, not the return on investment.
- *Multiple sign change cash flow patterns* may create multiple IRR solutions, and the number of solutions may equal the number of sign changes.
- There are *scale differences*, which are differences in the timing of cash flows or differences in investment size.
- *Differences in timing* arise when one investment lasts longer than another.
- IRRs also are problematic when *aggregating the results of several investments*. The combined IRR of two investments might not equal the average of the two individual investment IRRs.

- *IRR calculations assume that all cash flows are reinvested at a rate equal to IRR*. In cases where the reinvestment assumption is invalid, the modified IRR can be used, in which the investment's cash inflows are compounded at an assumed reinvestment rate and the investment's cash outflows are discounted at an assumed financing rate.

The IRR is a **dollar-weighted return** (or money-weighted return), meaning it is an average return that depends on the timing of cash distributions and withdrawals. In contrast, a **time-weighted return** (or *geometric mean return*) is an average return that ignores the effects of the timing of cash distributions or withdrawals. The use of the time-weighted return removes the distortions caused by the timing of cash flows and thus provides a better measure of a manager's ability to select investments over the period. Conversely, if the manager has complete control over money flows into and out of an account, the money-weighted return is the more appropriate performance measure.

Performance Measures for Illiquid Investments

Three ratios have been developed to measure performance for illiquid assets such as private equity. These measures include the following:

- **Distribution to paid-in (DPI) ratio.** The realized return, which compares cumulative distributions to total capital drawn.
- **Residual value to paid-in (RVPI) ratio.** The unrealized return, which compares the total value of unrealized investments to total capital drawn.
- **Total value to paid-in (TVPI) ratio.** The total value of distributions and unrealized investments to total capital drawn. The TVPI is equal to the sum of the DPI and RVPI.

Another measure is the **public market equivalent (PME) method**, which is used to determine the incremental expected cash-weighted return associated with investing in private equity rather than a publicly traded (but similar risk) market index.

Accounting Conservatism and the J-Curve

Accounting conservatism results in liability and expense recognition before potential gain and revenue recognition. Private equity funds tend to have negative IRRs in the early years of the fund due to the recognition of expenses not meeting the qualification to be considered "assets."

The **J-curve** reflects low interim IRRs in the early years followed by positive IRRs in the later years due to accelerated losses or expenses early on and deferred profits recognized later. Private equity funds tend to follow this distribution.