CFA® Level I (2025) Portfolio Management notes

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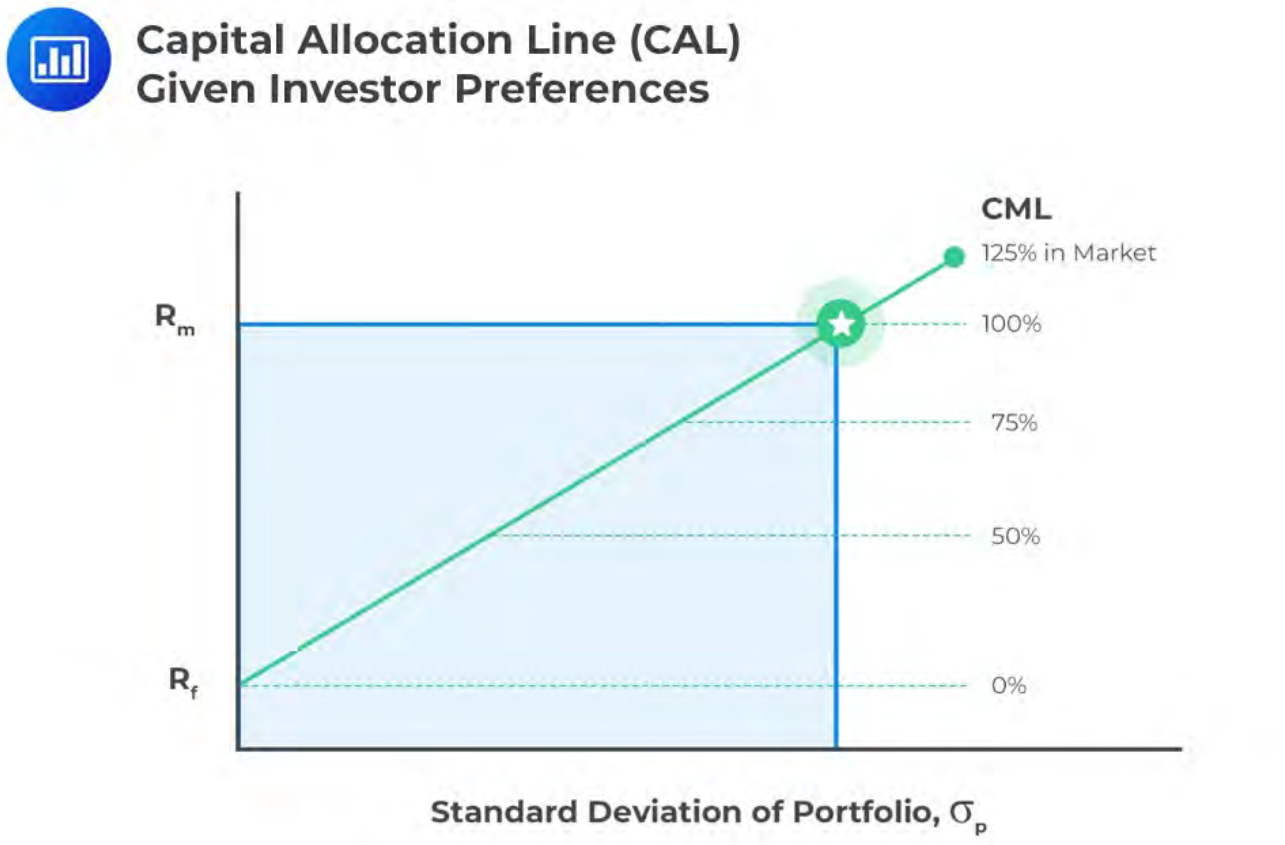
Investor Preferences

A highly risk-averse investor may choose to invest only in a risk-free asset. On the contrary, a less risk-averse investor may have a small portion of their wealth invested in the risk-free asset and a large portion invested in the risky portfolio. An investor with a high-risk tolerance may, in fact, choose to borrow from the risk-free asset and invest in a risky portfolio. This enables the investor to invest more than 100% of their assets and create a leveraged portfolio.



Utility and Indifference Curves

Utility is a measure of relative satisfaction that an investor derives from different portfolios. We can generate a mathematical function to represent this utility that is a function of the portfolio's expected return, the portfolio variance, and a measure of risk aversion.

$U = E(r) - ½A?^2$

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Question

Consider two assets in a portfolio. Asset A has an allocation of 80% and a standard deviation of 16%. Asset B has an allocation of 20% and a standard deviation of 25%. The correlation coefficient between asset A and asset B is 0.6. In this case, the portfolio standard deviation is *closest to*:

A. 16.3%.

B. 2.7%.

C. 22%.

Solution

The correct answer is **A**.

We determine the portfolio variance as follows:

Portfolio variance = $(0.8)^2 \times (0.16)^2 + (0.2)^2 \times (0.25)^2 + 2(0.8)(0.2)(0.16)(0.25)(0.6)$

Then, we use the square root of the variance to get the standard deviation:

Portfolio standard deviation = $\sqrt{2.66\%} = 16.3\%$

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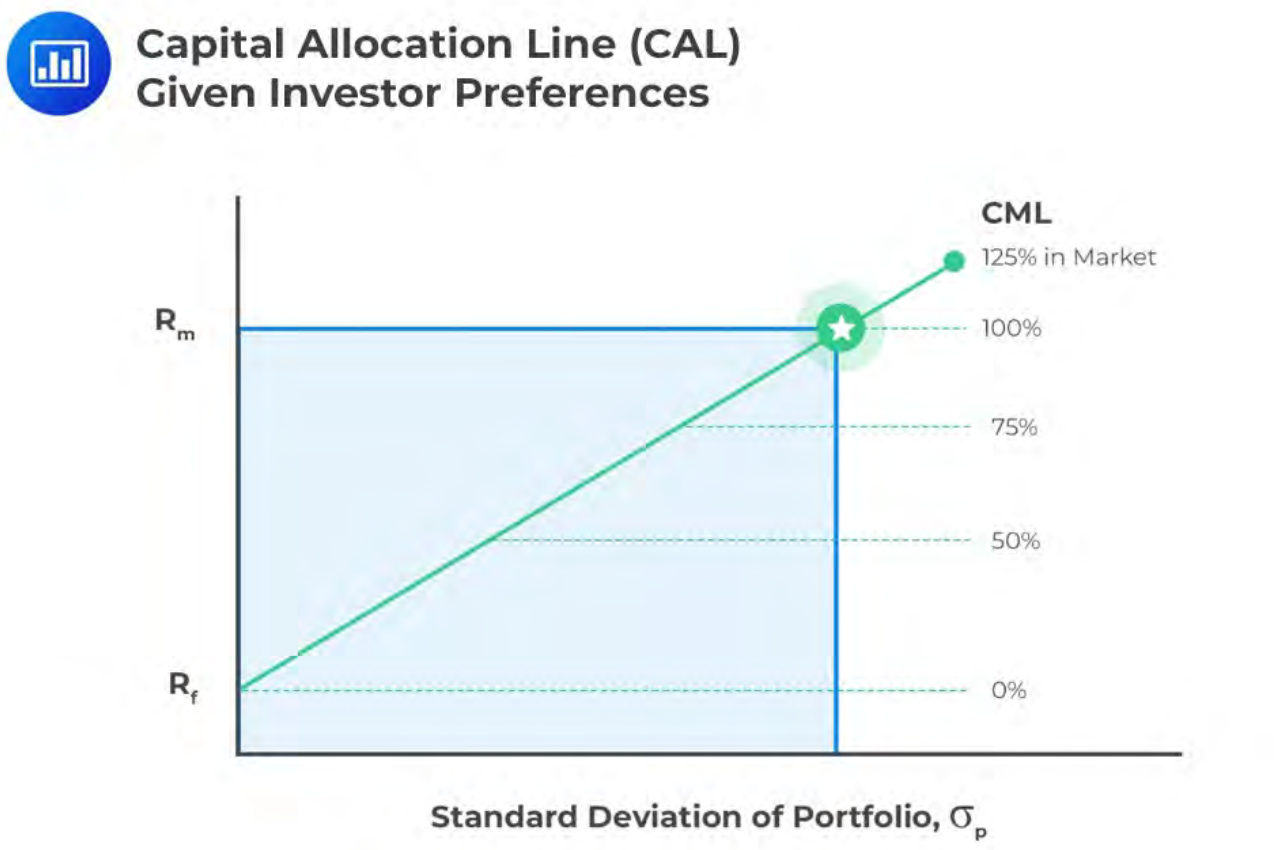
LOS 2a: describe the implications of combining a risk-free asset with a portfolio of risky assets

By combining a portfolio of risky assets with a risk-free asset, we can improve the return-risk characteristics of the portfolio and realize a better trade-off. This combination is called the capital allocation line (CAL). The proportion of allocation to risky assets versus allocation to risk-free assets will be dependent on the risk preferences of the investor.



Combined Portfolios

We calculate the expected return of a mixed portfolio by adding up the expected returns of its components. To assess the portfolio's risk, we need the allocation to each component, the standard deviation of each, and the correlation between them. When the assets aren't perfectly correlated, the portfolio's variance will be lower than that of its individual assets.

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LOS 2d: explain return generating models (including the market model) and their uses

A return-generating model can provide investors with an estimate of the return of a particular security given certain input parameters. The most general form of a return-generating model is a multi-factor model. In its simplest form, the multi-factor model is the single index model, a common implementation that gives the market model.

Multi-factor Models

A multi-factor model is a financial model that employs multiple factors in its calculations to explain asset prices. These models introduce uncertainty stemming from multiple sources. CAPM, on the other hand, limits risk to one source – covariance with the market portfolio. Multi-factor models can be used to calculate the required rate of return for portfolios as well as individual stocks.

CAPM uses one factor, the market factor, to determine the required return. However, the market factor can further be split into different macroeconomic factors. These may include inflation, interest rates, business cycle uncertainty, etc.

A factor can be defined as a variable that explains the expected return of an asset.

A factor beta is a measure of the sensitivity of a given asset to a specific factor. The bigger the factor, the more sensitive the asset is to that factor.

A multi-factor appears as follows:

$$R_i = E(R_i) + \beta_{i1}F_1 + \beta_{i2}F_2 + \cdots + \beta_{ik}F_k + e_i$$

Where:

R_i= Rate of return on stock i.

$E(R_i)$= Expected return on stock i.

β_{ik}= Sensitivity of the stock's return to a one unit change in factor k.

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Investors are Risk-averse, Utility-maximizing, Rational Individuals

This assumption does not require all investors to have the same degree of risk aversion. Instead, it requires investors to be risk-averse as opposed to risk-neutral or risk-seeking. Investors are assumed to be rational if they correctly evaluate all available information to arrive at well-informed decisions. The rationality of investors has been criticized because personal bias can result in irrational decision-making. However, this behavior does not affect the model outcome.

Markets are Frictionless, Devoid of Transaction Costs and Taxes

In addition to indifference to transaction costs, the model also assumes that investors can borrow and lend at a risk-free rate. The transaction costs of many large institutions are negligible, and many investors do not pay taxes. The practical inability to borrow or lend at risk does not materially affect the CAPM results. In spite of this, costs and restrictions on short-selling can introduce an upward bias on asset prices. It is noteworthy that the prices do not affect the CAPM conclusions.

Investors Plan for the Same, Single Holding Period

The assumption of a single holding period is convenient since multi-period models have become very difficult. A single-period assumption has shortcomings. It, however, does not severely limit the applicability of the CAPM.

Investors have Homogenous Expectations or Beliefs

This is the assumption that all investors analyze securities the same way, and using the same probability distributions and inputs for future cash flows. This then means that all asset valuations are identical, and the same optimal portfolio of risky assets is generated – the market portfolio. This assumption can be relaxed as long as the generated optimal risky portfolios are not significantly different.

All Investments are Infinitely Divisible

This is the assumption that investors can hold fractions of assets. It is deemed convenient from a

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Question

An overvalued security would *most likely* plot:

A. Below the Security Market Line (SML).

B. On the Security Market Line (SML).

C. Above the Security Market Line (SML).

Solution

The correct answer is **A**.

Securities overvalued, relative to market consensus, will appear below the SML. On the other hand, securities undervalued, relative to market consensus, will appear above the SML. Securities correctly priced will appear directly on the SML.

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for portfolio inclusion.

Portfolio Construction

A diversified portfolio can be constructed using the investment policy statement (IPS), the desired asset allocation, and security analysis. Besides achieving investment performance, risk management is critical in the portfolio construction process. The IPS will outline a client's risk tolerance, and the portfolio manager must ensure the portfolio is aligned with this risk profile. Once the portfolio manager has chosen securities to buy and the quantities in which to buy them, the transactions will be executed. Often, a specialized trade execution team or external stockbroker executes these transactions.

3. The Feedback Step

After a portfolio manager has constructed a portfolio has been constructed, they need to review and monitor it at an appropriate interval.

Portfolio Monitoring and Rebalancing

Portfolio rebalancing occurs when a portfolio has shifted from the targeted asset allocation due to market movements. If the top-down or bottom-up views change, an individual security or asset class may need to be changed. A change in a client's circumstances may prompt a revision of the IPS and the portfolio.

Portfolio Measurement and Reporting

Portfolio performance must be evaluated to establish whether the client's objectives have been met. Portfolio performance may be assessed in relation to the benchmark set out in the IPS. Following analysis of the performance, it may be determined that the client's objectives have changed. This realization will be factored into the planning and execution steps.

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Learning Module 4: Basics of Portfolio Planning & Construction

LOS 4a: describe the reasons for a written investment policy statement (IPS)

Before constructing a client's portfolio, an advisor should understand the client's goals, resources, circumstances, and constraints. Portfolio planning is the process of constructing a portfolio to meet a client's investment objectives. The written document governing this process is the Investment Policy Statement (IPS).

The IPS

The IPS is the communication between a client and their advisor that outlines the plan for achieving investment success. Prior to formulating the IPS, the advisor will work with the client to articulate the client's risk tolerance and specific circumstances. Typical constraints center on liquidity requirements, time horizons, regulatory requirements, tax status, and other unique needs.

In the case of institutional clients, IPS formulation may involve asset-liability management studies, identification of liquidity requirements and a range of tax and legal matters, or governance arrangements in the case of an endowment or pension plan. It may also set out the institution's approach to corporate governance and how shareholder voting will be approached and conducted.

A well-structured IPS is a document that the advisor refers to when exploring the feasibility of a particular investment. In some countries, an IPS is, in fact, a legal or regulatory requirement. The document should also be reviewed regularly to keep it in tune with client-based dynamics. This way, it will maintain its relevance and continue to be appropriate for the client's objectives.

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Question

Given the following client scenario, which option best describes the ability to take on risk and willingness to take on risk?

The client has a high-paying executive position in a large multi-national company. The client's lifestyle is relatively conservative, and as a result, the client has accumulated $5 million in savings and has paid off the mortgage over a property. The client will reach retirement age in 15 years. The client believes that "cash is king" and the financial markets are "just a gamble."

A. Ability: low; Willingness: high.

B. Ability: high; Willingness: low.

C. Ability: low; Willingness: low.

Solution

The correct answer is **B**.

The client's wealth is relatively substantial and exceeds their lifestyle requirement and financial obligations. The earnings are expected to continue for 15 years, a fairly long time horizon and as such, the ability to bear risk is high.

However, the client demonstrates a low willingness to take on investment risk perceiving the financial markets to be "a gamble." Therefore the willingness to take on risk is low.

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Question

Which statement best describes tactical asset allocation (TAA)?

A. TAA formulates the portfolio policy weights which provide exposure to systematic risk factors.

B. TAA allocates greater portions of the portfolio to those securities within the benchmark with higher expected returns.

C. TAA deliberately deviates from the SAA to generate additional returns on the basis of short-term asset class forecasts.

Solution

The correct answer is **C**.

Tactical asset allocation will tilt the portfolio to those asset classes expected to outperform in the short term.

On the other hand, strategic asset allocation is the policy portfolio designed to provide exposure to systematic risk factors generating portfolio returns that meet investment objectives.

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How to detect and Overcome Anchoring and Adjustment Bias

- Investors should ask questions that may show an anchoring and adjustment-related bias. For instance, such questions should seek to understand the factors that inform an investor's decisions, i.e., are the decisions based on rational analysis, or are they anchored to a particular price?
- Any recommendation for investment should be questioned to determine if it is based on past estimates or a 'default' number.

b) Mental Accounting Bias

Mental accounting bias refers to the mental allocation of money into 'accounts' that manipulate decisions, despite money being fungible (interchangeable).

Effects of Mental Accounting Bias

- Investors tend to disregard opportunities to scale down risk by diversification.
- Mental accounting bias may make an investor irrationally differentiate between returns earned from the income and those flowing from capital appreciation. Even though investors may urge to retain principal investment, mental account bias may inspire them to stick to the idea of spending the income generated by the principal.
- Investors may irrationally divide wealth or a portfolio into investment principal and investment returns. In fact, some investors may conclude that huge risk can be assumed using the returns compared with the initial investment principal. This is euphemistically referred to as "playing with house money."

How to Detect and Overcome Mental Accounting Bias

- Mental accounting bias can be recognized by identifying its effects. The main impact of mental accounting bias is that it disregards the relationships between investments, leading to accidental risk-taking.

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LOS 5c: describe how behavioral biases of investors can lead to market characteristics that may not be explained by traditional finance

Some persistent market patterns such as momentum, value, bubbles, and crashes impact market efficiency and are regarded as functions of behavioral finance.

Market Anomalies

Anomalies are noticeable departures from the efficient market hypothesis, as evidenced by persistently aberrant returns. For instance, an anomaly such as misclassifications may stem from statistical problems, choice of asset pricing model, or temporary disequilibria.

There are ways of explaining some anomalies. Such ways include the analysis of the small sample sizes used, statistical bias in sample selection, survivorship bias, or data mining. It is also important to note that that the benchmark choice is paramount in determining the magnitude of any over or underperformance.

Momentum

When future price behavior aligns with that of the recent past, this is known as momentum or trending effects. Before reverting to the mean, the favorable association typically lasts about two years.

Availability, hindsight, and loss aversion biases can all contribute to momentum.

Regret is the feeling one experiences after missing out on an opportunity. It is often a manifestation of hindsight bias, reflecting the human predisposition to see past events as foreseeable. Thanks to regret, investors may feel an overwhelming urge to act emotionally not to miss out on the next big momentum play.

Bubbles and Crashes

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Question

Which of the following *least accurately* describes effective risk governance practices?

A. Defining risk tolerance and unacceptable risks after a period of crisis

B. Appointing a CRO to work with the CEO and other executives to build and implement a risk framework

C. Integrating the risk management framework and process into the management level of the organization

Solution

The correct answer is A.

Effective risk governance requires the governing body to openly discuss risk, undertake scenario planning and evaluate the potential negative outcomes of the risk on the organization during periods of normalcy.

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meet regulatory solvency requirements, which creates compliance risk. It may also need to rapidly sell assets to raise cash hence creating a liquidity risk.

Often, risk models do not adequately account for risk interactions and understate the overall risk. The governance board, company management, and financial analysts should be aware of how consequential a combination of risks can be. This awareness should motivate them to adopt holistic approach to risk management instead of treating each risk in isolation.

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This simply means that under normal conditions, in 95% of the months, we expect the fund to make a profit or loss of no more than $100 million. Put differently, the probability of losing $100 million or more in any given month is 5%.

Limitations of VaR

- It does not describe the **worst possible** loss. Indeed, as seen from the example above, we would expect the $100 million loss mark to be breached 5 times out of a hundred for a 95% confidence level.
- VaR does not describe the losses in the left tail. It indicates the probability of a value occurring but stops short of describing the distribution of losses in the left tail.
- Two arbitrary parameters are used in its calculation – the confidence level and the holding period. The confidence level indicates the probability of obtaining a value greater than or equal to VaR. The holding period is the time span within which we expect the loss to be incurred, say, a week, month, day, or year. VaR increases at an increasing rate as the confidence level increases. VaR also increases with increases in the holding period.
- VaR estimates are subject to both model risk and implementation risk. Model risk arises from incorrect assumptions while implementation risk is the risk of errors from the implementation process.

Conditional Value at Risk (CVaR)

The expected shortfall (ES), also known as the conditional VaR (CVAR), is the average of losses defined by the probability. In other words, it is the expected loss given that the portfolio return already lies below the pre-specified worst-case quantile return (e.g. 5th percentile).

Consider this: the 5% VaR for a fund is -25%. Therefore, 5% of the time, the fund earns a return that's less than -25%. The expected shortfall gives as the expected value of all returns falling at or below the 5 percentile return. As such, ES is a larger loss than VaR. However, unlike the VaR, ES satisfies the subadditivity property.

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