



Introduction to Portfolio Theory

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In 1952, an economist named Harry Markowitz wrote his dissertation on “Portfolio Selection”, a paper that contained theories which transformed the landscape of portfolio management—a paper which would earn him the Nobel Prize in Economics nearly four decades later.

As the philosophical antithesis of traditional stock selection, his Modern Portfolio Theory (MPT) continues to be a popular investment strategy, and this portfolio management tool—if used correctly—can result in a diverse, profitable investment portfolio.

Harry Markowitz (born 1927) is a Nobel Prize-winning American economist best known for developing Modern Portfolio Theory (MPT), a groundbreaking investment strategy based on his realization that the performance of an individual stock is not as important as the performance and composition of an investor's entire portfolio.

Since Markowitz introduced MPT to academic circles in his article, "Portfolio Selection" in The Journal of Finance in 1952, his original theory has fundamentally changed the way that people and institutions invest.



Don't Put All Your Eggs in One Basket!

Portfolio (diversification) theory is about relative risk. The variability of actual returns is being examined not between individual securities but relative to the market as a whole in which the investments are being traded. Portfolios are a bundle of investments held or diversified to spread risk. Most rational people will spread their risk by holding a mixture of investments, usually with different income and capital performance qualities. A careful selection of a mix of investments can reduce the risk of incurring a loss in the portfolio's capital value and achieve the best possible returns from the bundle.

I. Financial Portfolio Definition

A portfolio is a collection of financial investments like stocks, bonds, commodities, cash, and cash equivalents, including closed-end funds and exchange-traded funds (ETFs).

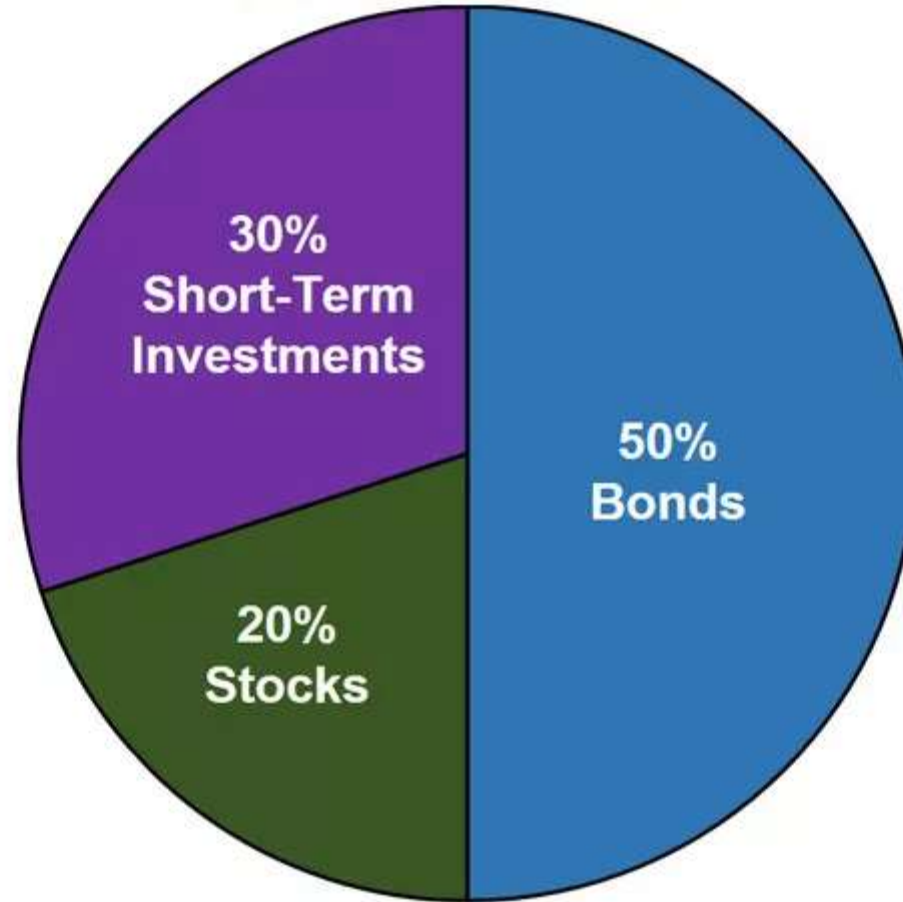
People generally believe that stocks, bonds, and cash comprise the core of a portfolio. Though this is often the case, it does not need to be the rule. A portfolio may contain a wide range of assets, including real estate, art, and private investments.

You may choose to hold and manage your portfolio yourself, or you may allow a money manager, financial advisor, or another finance professional to manage your portfolio.

The process of selecting a portfolio may be divided into two stages:

- The first stage starts with observation and experience and ends with beliefs about the future performances of available securities.
- The second stage starts with the relevant beliefs about future performances and ends with the choice of portfolio.

Asset Allocation for a Conservative Portfolio (hypothetical example)



II. Assumptions of modern portfolio theory:

1. Investors are rational and risk-averse

- Investors prefer more return to less, but for a given return, they will choose the investment with lower risk.
- They're rational in that they make decisions based on logic and available information.

2. Markets are efficient

- All available information is already reflected in asset prices.
- No investor can consistently outperform the market through stock selection or market timing.

3. Returns are normally distributed

- The returns of assets are assumed to follow a normal distribution (bell curve), which makes calculations of risk and expected return more straightforward.
- This simplifies the math but doesn't always hold true in real markets, especially during crashes or extreme events.

4. Investors make decisions based solely on expected return and risk

- Risk is measured by the **standard deviation** (volatility) of returns.
- Correlations between asset returns are used to understand diversification effects.

5. There are no taxes or transaction costs

- MPT assumes that buying or selling assets is free of friction.
- This makes rebalancing costless, which is unrealistic but simplifies modeling.

6. All investors can borrow and lend at the risk-free rate

- Investors have access to a risk-free asset (like a government bond) and can borrow or lend unlimited amounts at this rate.
- This helps in constructing the **Capital Market Line (CML)** and combining risky portfolios with the risk-free asset.

7. All investors have the same investment horizon

- Everyone is assumed to plan over the same time period, making portfolio comparisons easier.

8. Asset returns are unaffected by an investor's actions

- Individual investors are "price takers" — they can't influence the price of assets with their trades.

III. Diversification

Diversification is a portfolio allocation strategy that aims to minimize idiosyncratic risk by holding assets that are not perfectly positively correlated. Correlation is simply the relationship that two variables share, and it is measured using the correlation coefficient, which lies between $-1 \leq \rho \leq 1$.

- A correlation coefficient of -1 demonstrates a perfect negative correlation between two assets. It means that a positive movement in one is associated with a negative movement in the other.
- A correlation coefficient of 1 demonstrates a perfect positive correlation. Both assets move in the same direction in response to market movements.

A perfect positive correlation between assets within a portfolio increases the standard deviation/risk of the portfolio. Diversification reduces idiosyncratic risk by holding a portfolio of assets that are not perfectly positively correlated.

For example, suppose a portfolio consists of assets A and B. The correlation coefficient for A and B is -0.9. The figure shows a strong negative correlation – a loss in A is likely to be offset by a gain in B. It is the advantage of owning a diversified portfolio.

VI. Does Diversification Eliminate Risk?

The idiosyncratic risk associated with the portfolio is lower or negligible if it's diversified. It is because any loss in one asset is likely to be offset by a gain in another asset (which is negatively correlated).

Systematic risk refers to the risk that is common to the entire market, unlike idiosyncratic risk, which is specific to each asset. Diversification cannot lower systematic risk because all assets carry this risk.

Portfolios can be diversified in a multitude of ways. Assets can be from different industries, different asset classes, different markets (i.e., countries), and of different risk levels. The key to a diversified portfolio is holding assets that are not perfectly positively correlated.



Thanks