Hi and welcome,

This is a brief sample to provide you with an idea of what my CSC Exam 2 study notes look like.

The style is to provide key content coverage followed by working examples.

If you have written the exam before, you can use my materials to get back up to speed very quickly.

If you are a first time writer, you can use my materials to help focus your study efforts and build your knowledge base.

If you have any questions, please do not hesitate to reach out to me by email.

All the best,

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Chapter 15
Introduction to the Portfolio Approach

Introduction

There are many types of investments available. While the main incentive behind investment is earning returns, there is no investment that does not pose any risk of losing money. Different investment securities incur different degrees of risk and have different expected returns.

In this chapter, the **portfolio approach** refers to optimizing the portfolio of assets to reduce the overall risk of the investor without necessarily decreasing the overall return. The trade-off between risk and return also plays a key role in the portfolio approach, as well as the importance of diversification which, theoretically, can completely eliminate certain types of risk.

Risk and Return

When individuals decide to invest in an asset, they consider the expected return and the risk. Rationally, anyone would choose an investment with highest returns, or pick an investment with the lowest risk.

A **higher return** comes with a **higher risk** to lose money, and **lower return** comes with **lower risk**. Depending on the investor's appetite for risk, they may prefer an asset with a lower expected return as long as the risk is also low, while others accept higher risk if it means higher returns.

There are riskier assets like equities that come with the potential of high capital appreciation, while others like bonds provide a lower fixed income and are safer. To reach their investment objectives, most investors create a portfolio of different assets, such as bonds, stocks, and mutual funds. Adding different assets to a portfolio means different income streams, such as interest income from bonds and dividends and capital appreciation from stocks and mutual funds.

Investors expect portfolios to raise in value. If an investor sells a previously bought asset for a higher price, this is known as a **capital gain.** If the investor sells the asset for a lower price, it is known as **capital loss**. Any income earned while holding the asset (dividends or interest) is known as **cash flow.**

Nominal and Real Rates of Return

The rate of return calculated earlier is known as the *nominal* **or simple rate of return**. However, investors often use the *real* **rate of return** on their investments. The real rate of return is the simple rate calculated above but adjusted for inflation. Because of rising prices (inflation), the buying power of money today is lower than it was 5 years ago because of the rising prices.

Example:

An investor earned a 25% nominal rate of return on their investment last year. Also, inflation was 1.5% last year. To find out the real rate of return, the investor must deduct the inflation from the nominal rate of return (25%-1.5% = 23.5%).

Risk-Free Rate of Return

When calculating the expected return of an asset, some investors use the risk-free rate of return plus a premium for risk. T-Bills are considered virtually risk-free because investors lose their money only if the Government of Canada defaults on the bonds.

As a result, to calculate the return of an asset, investors use the risk-free rate of return (T-Bills rate of return), plus a risk premium associated with the specific asset. Since all other assets are riskier than T-Bills, investors expect to earn higher returns to compensate for this additional risk.

For example, if you buy a $1,000 bond that matures in one year and has a fixed coupon rate of 5%, you know for sure that you will receive your $1,000 back at the end of the year, plus $50 (the bond yield). However, if you buy a stock for $25 right now, it may be worth $30 or $15 next year, so your risk increases significantly.

Types of Risks

Essentially, the risk is defined as a chance that the actual return differs from the expected return. The more uncertain the expected return is, the higher the risk. There are many types of risks that affect investments, and some of them can be mitigated while some cannot:

- **Inflation rate risk** – the risk that inflation will lower the real rate of return.
- **Business risk** – risks specific to companies; for instance, the company may be involved in a scandal that will lower its performance, or perhaps loses market share because of a new entrant on the market.
- **Political risk** – the risk that governments will negatively impact the financial markets, such as introducing unfavorable policies, risk of war, or political instability.
- **Liquidity risk** – some assets are more illiquid than others; you may want to sell an asset but you cannot find buyers, which means you won't be able to sell it at the moment and price you expect. Examples of illiquid assets include cars or houses, but also over-the-counter stocks (those that don't trade on a stock exchange)
- **Interest rate risk** – there are certain assets like bonds whose value decreases when interest rates rise.
- **Foreign investment risk** – this risk is present if you invest in foreign markets, and can be of different types (i.e., foreign exchange rate risk means your investment loses value as a result of unfavorable exchange rates)
- **Default risk** – default risk means that the company you invest in becomes unable to repay its debt; the more debt a company has, the higher the default risk.

Systematic and Non-Systematic Risk

Some types of risks can be mitigated, others will always be present in any investment. Systematic or market risk cannot be reduced (i.e., inflation risk or interest rate risk).

Non-systematic or specific risk can be reduced and even theoretically eliminated through diversification. The non-systematic risk refers to the likelihood that a specific asset's price moves in a different direction compared to the market as a whole. To avoid exposing themselves to this risk, investors can invest in a diversified portfolio.

Measuring Risk

Measuring the risk of an investment means getting a better understanding of the likelihood of the expected return turning into the actual return. There are many ways to measure return, but two of the most common ones are **standard deviation** and **beta.**

Standard deviation is a measure of risk applied to a security or portfolio of securities. It uses **past performance** to calculate a range of possible outcomes and is expressed as a percentage. The more fluctuation in past prices (volatility), the higher the risk because the future outcomes have a wider range.

A **high standard deviation means higher risk**. For instance, when purchasing bonds, you know exactly what your return will be if you hold the bond until maturity. But, in the case of a stock, the price could increase, decrease, or remain the same. The higher the number of possible outcomes, the greater the risk that the outcome will be unfavorable for the investor, thus the greater the standard deviation.

Beta is another way to measure risk and **compares the price movement of an asset (or portfolio) with the market as a whole**.

Relationship Between Risk and Return in a Portfolio

The example above calculated the rate of a return for a single security. To find out the return of a portfolio, investors must first calculate the rate of return of each security, then add them up to find out the entire return of a portfolio:

Equation 3 - Expected Rate of Return of a Portfolio

$$Expected\ Return = R_1(W_1) + R_2(W_2) + \cdots + R_n(W_n)$$

Where:
R = the expected rate of return calculated for a security
W = the proportion (weight) of the security based on the dollar value of the security
N = The number of securities on the portfolio

Example:
You have a total of $100 and invest $20 in a stock A and $80 in a bond B. This means that:

Weight of Stock A: $20/$100 = 0.2 (0.2 * 100 = 20%)
Weight of Bond B: $80/$100= 0.8 (0.8 * 100= 80%)

Stock A has an expected return of 20% and bond B has an expected return of 5%. The total expected return for the portfolio is:

Expected Return = (20% * 20%) + (5% * 80%) = 4% + 4% = 8%

When there are too many assets, it can be difficult to achieve higher returns. Also, all other functions related to portfolio management, such as research, valuation, risk analysis, and others may become too complex when there are too many assets in a portfolio. In this case, portfolio managers use additional risk management tools to decrease the overall risk, such as hedging the portfolio using derivatives.

Combining Securities in a Portfolio

Securities in a portfolio interact with each other, so portfolio managers can adjust portfolios so that the **entire portfolio as a whole performs better than the sum of its assets**.

To decrease risk through diversification, assets must be selected carefully. If you only invest in several debt securities, you are still exposed to interest rate risk and default risk. Investing in similar securities does not mean you have a diversified portfolio because their risk characteristics are very similar.

In general, the total risk of a portfolio decreases as you add more assets (like stocks to your portfolio), but the more assets you add, the lower the reduction rate. Ideally, the portfolio manager should balance out the portfolio so that the risk cannot be reduced anymore through diversification.

Correlation

Correlation is important for diversification. It is a statistical measure of how two securities relate to each other. A **correlation of +1** (perfect positive) means that **two securities move in the same direction** and in the same proportion. For instance, when stock A price increases by 10%, stock B's price also increases by 10%. Adding perfectly correlated assets to a portfolio does not lower its risk.

For example, you invest in an oil company, which means that you benefit if the price of oil increases and lose if the price of oil decreases. To reduce this risk, you should not invest in another oil company or related stock because if the oil decreases, both stocks' prices will go down (they are positively correlated).

To diversify the risk, you need to choose securities that are **negatively correlated** – or **two securities that move in the opposite direction**. If an asset A increases by 10%, and an asset B decreases by -10%, they have a perfect negative correlation (-1).

For example, you invest in a tea company and in a coffee company. Because of a drought, coffee production decreased significantly, so people stopped buying coffee because it became too expensive and switched to tea instead. The coffee company's stock price decreased by 10%, while the tea company's stock price increased by 10%. Thus, the losses in the coffee stock are offset by the gains in the tea stock, which means they have a perfect negative correlation.

Finding stocks that have a perfect correlation is extremely difficult in reality, which is why you cannot completely eliminate systematic risk. For a well-diversified portfolio, systematic risk is the main source of uncertainty.

Figure 2 - Risk in an Equity Portfolio
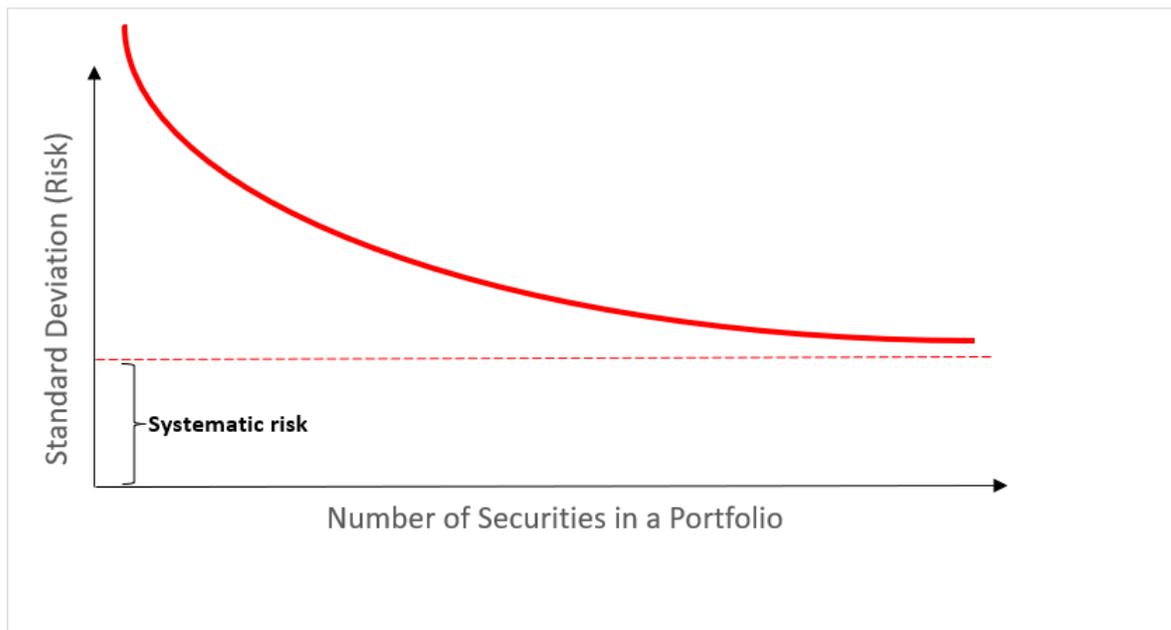
Portfolio Beta

As mentioned earlier, beta measures the **volatility of a security compared to the volatility of the market as a whole**. Volatility refers to the changes in returns over a long period of time, so the greater change in market returns, the higher the volatility and the risk.

- A beta of 1 means that the security goes up and down with the market. For example, if the S&P/TSX Composite Index increases by 8%, a stock fund with a beta of 1 will also increase by 8%. If the market decreases by 3%, the stock fund will also decrease by 3%.
- A beta less than 1 means that the security moves less than the market. If a stock fund has a beta of 0.5, it increases only by 5% if the S&P/TSX Composite Index increases by 10%. Similarly, if the S&P/TSX Composite Index decreases by 10%, the stock fund only decreases by 5%.
- A beta higher than 1 means that the security rises more than the market. For instance, if the stock fund has a beta of 1.5, it is expected to rise 15% (1.5 x 10%) if the S&P/TSX Composite Index rises by 10%.