Foundations of Accounting & Finance

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Week - 12

Lecture – 55

Cost of Capital and Valuation - Part I

Introduction

In the previous session, we discussed about the distinction between systematic and unsystematic risk. Let us revisit that discussion.

Systematic Risk: This type of risk affects the entire market or a broad segment of it. Factors such as macroeconomic policies, inflation rates, or fluctuations in interest rates impact all stocks in a similar direction, even though with varying degrees. Events such as natural disasters or significant economic shifts, like the onset of COVID-19 in March 2020, exemplify systematic risk. Diversification, the strategy of spreading investments across various assets, does not entirely shield against systematic risk since the entire market is affected.

Unsystematic Risk: Unlike systematic risk, unsystematic risk is specific to individual companies. For instance, news of internal conflicts within a company, such as the recent chaos at Raymond's, may impact only that particular company's stock. However, by diversifying investments across multiple companies and sectors, the adverse effects of unsystematic risk can be mitigated. While diversification cannot completely eliminate unsystematic risk, it can significantly reduce its impact on overall returns.

Understanding the distinction between systematic and unsystematic risk is crucial for investors as it informs their risk management strategies. Systematic risk poses challenges to diversification, while unsystematic risk can be managed through proper investment allocation.

How to measure risk?

The Beta – Measure of Systematic Risk

When it comes to assessing risk, one of the key tool is beta. Beta serves as a measure of risk, particularly in relation to the broader market. But what does it mean to measure risk relative to the market? Beta operates by comparing the volatility of an asset to that of the overall market. But how does this comparison actually work? Essentially, beta measures risk by looking at how an asset's performance is against the market's performance. But what exactly does it mean to be "relative to the market"? Let me clarify with example:

Beta: An example

Let us consider an index, such as the NSE 50 or BSE 30, to illustrate the concept. An index represents the weighted average price of the stocks included in it. Here is a simplified explanation of how an index is composed:

Imagine we have about 5 sectors: IT, auto, FMCG, healthcare, and pharma. Each sector contributes to the total trades based on its trading volume. We assign weights to each sector based on its contribution to trading volume over a specified period.

For instance, let us say IT contributes 25% to total trades, auto 20%, FMCG 15%, healthcare 15%, and pharma 10%. These percentages serve as the weights for each sector.

Within each sector, we identify the stocks contributing the most to trading volume. For example, in the IT sector, let's say Stock 1 contributes 60% to IT 25%, Stock 2 contributes 30%, and Stock 3 contributes 10%.

We calculate the weighted contribution of each stock by multiplying its weight by its contribution to the sector's trading volume. Then, we sum up these weighted contributions for all stocks to get the sector's weighted average price.

Repeating this process for all sectors, we arrive at the weighted average price for each sector. The index is the sum of these weighted average prices for all sectors.

It is important to note that this is a simplified explanation for illustrative purposes. In reality, index composition and calculation are more complex, involving numerous stocks and continuous adjustments. Stocks can enter or exit the index, and sector weights may change over time based on market dynamics.

Why beta of index is always 1?

The beta of an index is always 1 because it is compared relative to the index itself. If I invest my money in all the stocks included in the index, following the same weights as specified, then my return will exactly match the return of the index. Therefore, we say that the beta of the index is always 1.

What is the risk of investing in a SBI fixed deposit?

The risk of investing in an SBI FD is certainly less than 1. This is because the level of risk associated with an FD is lower compared to investing in stocks or equity in an index. Therefore, the beta of an SBI FD will be less than 1.In essence, beta is always relative to the market.

Calculation of beta

$$\beta_i = \frac{\mathrm{Cov}(R_i, R_M)}{\sigma^2(R_M)}$$

where $\mathrm{Cov}(R_i, R_M)$ is the covariance between the return on Asset i and the return on the market portfolio, and $\sigma^2(R_M)$ is the variance of the market.

The calculation of beta involves determining the covariance, or co-movement, of a particular stock with the market, and then dividing it by the variance of the market. This ratio gives us a measure of risk known as beta.

In essence, beta is computed by taking the covariance of the stock with the market portfolio's return and dividing it by the variance of the market. This calculation provides insight into how a stock's performance correlates with movements in the overall market.

The applications of Beta

The fundamental principle in finance: risk and return are intertwined. Generally, higher the risk, higher is the expected return. Now, consider investing in SBI FD. The expected return on an SBI FD is typically lower than that of investing in stocks, even in a stock market index. This difference is primarily because the relative risk associated with an FD is considerably lower compared to investing in the broader market index. The beta of the index, representing the market, is 1. Therefore, it follows that the beta of an SBI FD should be less than 1, given its lower relative risk.

To illustrate, let us consider an investment scenario:

You have the option to invest in a particular stock, let us call it Stock A. This stock recently entered the market through an initial public offering (IPO). As you contemplate investing in Stock A, you anticipate a certain level of return. But what exactly is this expected return? Let us explore further.

Risk free rate (R_f)

To understand the expected return on an investment, one crucial piece of information you need is the risk-free rate, denoted by R_f. But what exactly is the risk-free rate?

Consider the concept of the time value of money. It essentially tells us that a dollar today holds more value than a dollar tomorrow. This discrepancy arises due to inflation, which diminishes the purchasing power of money over time. For instance, if you buy something today for 100 rupees, you might need to spend 105 rupees next year for the same item, assuming a 5 percent inflation rate.

Now, let us say you decide to invest in a government bond or a treasury bill. These are essentially investments in government securities. What is unique about investing in these instruments is that the risk associated with them is virtually non-existent. Why? Because the government, being the issuer, is obligated to repay the invested amount. The risk of default is incredibly low, as a government's failure to repay would essentially mean the collapse of the country itself.

So, the return you receive from investing in government bonds or treasury bills serves a specific purpose: to compensate for inflation. When you invest in these instruments, you are essentially preserving the purchasing power of your money. The guarantee of receiving this return is virtually certain, given the negligible risk involved. This return is what we refer to as the risk-free rate, denoted by R_f. It represents the baseline return against which other investments are compared.

Beta

Now, let us move forward with this information. Suppose you have invested in stock A. Your investment remains in stock A for now, and you are keen to determine what return it will yield.

First things first, you should aim to at least match the risk-free rate (R_f) – that is the bare minimum expectation. However, since investing in stock A entails more risk compared to investing in a government bond, you will want to aim for a return above the risk-free rate to justify taking on that additional risk. The expectation is higher, although it is not guaranteed.

So, what is the extra return you need to aim for? That hinges on the risk associated with investing in stock A. To measure this risk, we turn to a metric called beta. Beta, denoted as β, measures the covariance of stock A's returns with the market, divided by the variance of the market. Here, "market" typically refers to an index, like a stock market index such as the S&P 500. Essentially, beta tells us how sensitive a stock's returns are to changes in the overall market.

Market risk premium

What exactly is this "market premium"? It is the return that the market offers above the risk-free rate (R_f). Let us break it down with an example:

Imagine you invest your money in an index, like the S&P 500, or alternatively, you invest in all the stocks within that index, allocating your funds in the same proportions as they're weighted in the index. Now, let us say this investment in the index yields a return of 12 percent.

On the other hand, if you were to invest in a risk-free asset like a Treasury bill (T-bill), you would typically earn a lower return, say 4 percent.

So, what is the extra return you are receiving by investing in the index compared to the risk-free asset? It's simply the difference between the two returns, which is 12 percent minus 4 percent, totalling 8 percent. This 8 percent represents the market premium – essentially, it is the additional return you gain by opting to invest in the market rather than in a risk-free asset.

Capital asset pricing model (CAPM)

Let us discuss Capital Asset Pricing Model (CAPM) to understand how it helps determine expected returns on investments.

Investment in the index

Firstly, suppose you have invested in the index, meaning your portfolio mirrors the performance of the market. In this case, the beta of the index is exactly 1. So, what return can you expect? Well, it's a simple calculation: you'll receive the risk-free rate (R_f) plus the market premium multiplied by the beta of the index. Since the beta of the index is 1, the equation simplifies to the risk-free rate plus the market premium. With a risk-free rate of 4 percent and a market premium of 8 percent, your expected return would be exactly 12 percent, mirroring the return of the index.

Investment in an individual stock

Now, let us shift focus to a specific stock, say stock A. When investing in stock A, you still need to secure at least the risk-free rate as a baseline return. But since stock A carries more risk than a risk-free asset like a government bond, you will aim for a return above the risk-free rate to compensate for that additional risk. This added return is where the beta of stock A comes into play. Beta measures the risk of stock A relative to the market. If stock A's beta is less than 1, it implies lower risk compared to the market, resulting in a lower expected return. Conversely, if the beta is greater than 1, it indicates higher risk, leading to a higher expected return.

For instance, let us say stock A has a beta of 1.2, indicating higher risk than the market. With a market premium of 8 percent, the expected return on stock A would be the risk-free rate plus the market premium multiplied by the beta, resulting in roughly 13.6 percent.

Conversely, if we consider an investment in a low-risk asset like an SBI FD with a beta of, say, 0.3, the expected return would be lower. With the market premium of 8 percent factored in, the expected return on the FD would be around 6.4 percent.

In essence, the CAPM helps investors measure expected returns by factoring in the risk-free rate, the market premium, and the beta of the investment relative to the market. This model ensures that investors are adequately compensated for the risk they undertake, guiding their investment decisions accordingly.

Relationship between Risk and Expected Return (CAPM)

Indeed, the relationship between risk and expected return, as elucidated by the Capital Asset Pricing Model (CAPM), is crucial in guiding investment decisions. Essentially, investors demand a positive relationship between the expected return on assets and the level of risk associated with those assets.

Individuals are inclined to hold risk-free assets only if the expected return compensates adequately for the risk. For instance, the expected return on the market consists of two components: the risk-free rate and compensation for the risk inherent in the market portfolio. This compensation, often referred to as the risk premium, reflects the additional return investors require to bear the risk associated with market investments.

The magnitude of this risk premium depends on the level of risk relative to the market. If an asset's risk exceeds that of the market, investors expect a higher compensation. This is reflected in a beta greater than 1, indicating higher volatility compared to the market. Conversely, if an asset's risk is lower than that of the market, the beta is less than 1, and the compensation is correspondingly lower.

In summary, the expected return on assets should reflect the level of risk involved, ensuring investors are adequately compensated for the risks they undertake. This principle forms the basis of rational investment decision-making and underpins the application of CAPM in financial analysis. The following equation summarizes the calculation of CAPM.

Capital Asset Pricing Model

$$\overline{R} = R_F + \beta \times (\overline{R}_M - R_F)$$

$$\text{Expected return on a security} = \text{Risk-free rate} + \text{Beta of the security} \times \text{Difference between expected return on market and risk-free rate}$$

Example

7.2 percent as the historical U.S. equity risk premium. The average historical worldwide equity premium was 6.9 percent. Taking into account a number of factors, 7 percent to be a reasonable estimate of the future U.S. equity risk premium. For example, suppose the risk-free rate, estimated by the current yield on a one-year Treasury bill, is 1 percent, the expected return on the market is:

$$\overline{R}_M = R_F + \text{Risk premium}$$

$$8\% = 1\% + 7\%$$

Example

The stock of Aardvark Enterprises has a beta of 1.5, and that of Zebra Enterprises has a beta of 0.7. The risk-free rate is assumed to be 3 percent, and the difference between the expected return on the market and the risk-free rate is assumed to be 8.0 percent. The expected returns on the two securities are

Expected Return for Aardvark = 3%+ 1.5 * 8.0 =15.0 %

Expected Return for Zebra = 3%+ 0.7 * 8.0 = 8.6 %

The Cost of Capital

The cost of capital is a fundamental concept in finance, representing the expense a company incurs to raise funds for its operations and investments. It encompasses various sources of capital, including equity, debt, and preference shares.

Let us break down each component:

1. **Cost of Debt**: When a company borrows money, it typically pays interest on that borrowing. The interest rate serves as the cost of debt capital. It is straightforward to calculate because the interest rate is predetermined and known.

2. **Cost of Preference Share**: Preference shares also entail a fixed rate of return, similar to debt. The amount of dividend or interest paid on preference shares constitutes the cost of preference share capital.

3. **Cost of Equity**: Equity represents ownership in the company, and investors expect a return on their investment. The cost of equity is determined by the expected return required by investors who hold the company's equity. One method to estimate this is by using the Capital Asset Pricing Model (CAPM), which calculates the expected return based on the risk associated with the investment.

In summary, the cost of capital considers the various forms of funding a company employs and reflects the returns expected by providers of each type of capital. By understanding these costs, companies can make informed decisions about their financing strategies and investment opportunities.

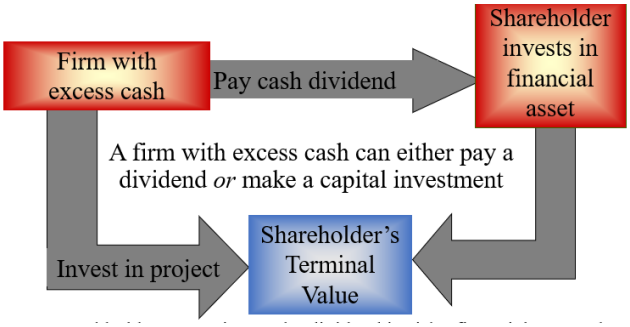
The Cost of Equity Capital – I

The cost of equity capital is a crucial metric for companies, representing the return expected by shareholders on their investment. This return is reflective of the risk associated with investing in the company's stock and encompasses various factors such as dividends, capital gains, and overall growth prospects.

When shareholders invest in a company's equity, they anticipate a certain level of return commensurate with the risks involved. This expected return, often referred to as the cost of equity, reflects the compensation shareholders require for investing their capital in the company rather than in alternative investment opportunities.

In essence, the cost of equity capital captures the expectations and demands of shareholders regarding the financial performance and growth prospects of the company. It serves as a critical

determinant in evaluating the company's investment projects, capital budgeting decisions, and overall financial strategy.



Example

Suppose the stock of the Quatram Company, a publisher of college textbooks, has a beta of 1.3. The firm is 100 percent equity-financed; that is, it has no debt. Quatram is considering a number of capital budgeting projects that will double its size. Because these new projects are similar to the firm's existing ones, the average beta on the new projects is assumed to be equal to Quatram's existing beta. The risk-free rate is 5 percent. What is the appropriate discount rate for these new projects, assuming a market risk premium of 8.4 percent?

$$\begin{aligned} R_S &= 5\% + (8.4\% \times 1.3) \\ &= 5\% + 10.92\% \\ &= 15.92\% \end{aligned}$$

This means that the cost of equity for this particular investment is 15.92 percent. All future cash flows associated with this investment would be discounted at this rate to assess their present value.

While CAPM is a widely used method for estimating the cost of equity, there are other approaches available for valuing equity and determining the cost of equity.