**RISK AND RETURN**

In evaluating investments, risk and return should be evaluated since they are important in decision making. You may have learnt of the trade off between risk and return i.e. the higher the risk, the higher the expected return, and vice versa.

**Return**

Return refers to the reward to an investor for taking risk. Investor s always expects a good rate of return from their investments. The rate of return is the total income the investors receives during the holding period stated as a percentage of the purchasing price at the beginning of the purchasing period. Generally

**The holding period return**

If you commit Ksh. 200,000 to an investment at the beginning of the year and you get back Ksh. 220,000 at the end of the two years, what is your return for the period? The period during which you own an investment is called its holding period, and the return for that period is the holding period return (HPR). In this example, the HPR is 1.10, calculated as follows:

HPR = Ending Value of Investment/ Beginning Value of Investment

=220,000/200,000= 1.1

To calculate the annualised holding period return, where n is the holding period. In the above example, the annual HPR will be:

HPR= = 1.048.

This value will always be zero or greater—that is, it can never be a negative value. A value greater than 1.0 reflects an increase in your wealth, which means that you received a positive rate of return during the period. A value less than 1.0 means that you suffered a decline in wealth, which indicates that you had a negative return during the period. An HPR of zero indicates that you lost all your money. Although HPR helps us express the change in value of an investment, investors generally evaluate returns in percentage terms on an annual basis. This conversion to annual percentage rates makes it easier to directly compare alternative investments that have markedly different characteristics. The first step in converting an HPR to an annual percentage rate is to derive a percentage return, referred to as the holding period yield (HPY). The HPY is equal to the HPR minus 1.

Examples: Compute the HPR and HPY on:

* 10 year, Ksh. 10, 12% redeemable preference shares.
* 10 year, Ksh. 10, 12% redeemable preference shares. Purchase price Ksh. 8.00
* Annual return on Ksh. 10, 12% irredeemable preference shares.
* A 10%, Ksh. 100 zero coupon bond. Purchased at Ksh. 87.00.

**Risk**

Whenever you make a financing or investment decision, there is some uncertainty about the outcome. Uncertainty means not knowing exactly what will happen in the future. The greater the uncertainty, the greater the risk. Risk is the degree of uncertainty. Types of risks are discussed below

* + 1. ***Cash flow risk*** is the risk that the cash flows of an investment will not materialize as expected. For any investment, the risk that cash flows may not be as expected— in timing, amount, or both—is related to the investment’s business risk.
       - **Business Risk**: ***Business risk*** is the risk associated with operating cash flows. Operating cash flows are not certain because neither are the revenues nor the expenditures comprising the cash flows.
* ***Revenues:*** depending on economic conditions and the actions of competitors, prices or quantity of sales (or both) may be different from what is expected. This is ***sales risk***.
* ***Expenditures:*** *operating costs are comprised of fixed costs and variable costs. The greater the fixed component of operating costs, the less easily a company can adjust its operating costs to changes in sales.* The risk that comes about from the mix of fixed and variable costs is known as ***operating risk***. The greater the fixed operating costs relative to variable operating costs, the greater the operating risk.
* ***Financial risk*** is the risk associated with how a company finances its operations. If a company finances with debt (Bonds), it is legally obligated to pay the amounts comprising its debts when due. By taking on fixed obligations, such as debt and long-term leases, the company increases its financial risk. If a company finances its business with equity, either generated from operations (retained earnings) or from issuing new equity, it does not incur fixed obligations and thus lowers its financial risk.

Therefore, cash flow risk of a security includes both its business risk *and* its financial risk.

* ***Default Risk***

When you invest in a bond, you expect interest to be paid (usually semiannually) and the principal to be paid at the maturity date. However, the more burdened a firm is with debt—required interest and principal payments— the more likely it is that payments promised to bondholders will not be made and that there will be nothing left for the owners. We refer to the cash flow risk of a debt security as ***default risk*** or ***credit risk***. Technically, default risk on a debt security depends on the specific obligations comprising the debt. Default may result from:

■ Failure to make an interest payment when promised (or within a specified period).

■ Failure to make the principal payment as promised.

■ Failure to make sinking fund payments (that is, amounts set aside to pay off the obligation), if these payments are required.

■ Failure to meet any other condition of the loan.

■ Bankruptcy.

Why do financial managers need to worry about default risk? Because they invest their firm’s funds in the debt securities of other firms; because they are concerned about how investors perceive the risk of their own debt securities; and because the greater the perceived default risk of a firm’s securities, the greater the firm’s cost of financing.

* + 1. ***Reinvestment Rate Risk***

Another type of risk is the uncertainty associated with reinvesting cash flows, not surprisingly called ***reinvestment rate risk***.

* + 1. ***Interest Rate Risk***

***Interest rate risk*** is the sensitivity of the change in an asset’s value to changes in market interest rates. You should remember that market interest rates determine the rate we must use to discount a future value to a present value. The value of any investment depends on the rate used to discount its cash flows to the present. If the discount rate changes, the investment’s value changes. Suppose you buy a Kenya Government Treasury Bond that matures in five years. There is no default risk, since the government could simply print more money to pay the interest and principal. Does this mean there is no risk when you own a Treasury bond? No. You need to do something with the interest payments as you receive them and the principal amount when it matures. You could stuff them under your mattress, reinvest in another Treasury bond, or invest them otherwise. If yields have been falling, however, you cannot reinvest the interest payments from the bond and get the same return you are getting on the bond. When your Treasury bond matures, you face reinvestment risk.

* + 1. ***Purchasing Power Risk***

***Purchasing power risk*** is the risk that the price level may increase unexpectedly. If a firm locks in a price on your supply of raw materials through a long-term contract and the price level increases, it benefits from the change in the price level and your supplier loses—the firm pays the supplier in cheaper currency. If a firm borrows funds by issuing a long-term bond with a fixed coupon rate and the price level increases, the firm benefits from an increase in the price level and its creditor is harmed since interest and the principal are repaid in a cheaper currency.

* + 1. ***Currency Risk***

Currency risk is the risk that the *relative values* of the domestic and foreign currencies will change in the future, changing the value of the future cash flows. As financial managers, we need to consider currency risk in our investment decisions that involve other currencies and make sure that the returns on these investments are sufficient compensation for the risk of changing values of currencies.

Suppose you are evaluating the investment in a new product. You do not know and cannot know precisely what the future cash flows will be. But from past experience, you can at least get an idea of possible cash flows and the likelihood—the probability—they will occur.

|  |  |  |
| --- | --- | --- |
| SCENARIO | CASH FLOW Ksh. | PROBABILITY OF CASH FLOW |
| Product success | 4,000,000.00 | 40% |
|  |  |  |
| Product flop | –2,000,000.00 | 60% |

But what is the expected cash flow in the first year? The expected cash flow is the average of the possible cash flows, weighted by their probabilities of occurring:

Expected cash flow = 0.40(Ksh. 4,000,000) + 0.60(–Ksh. 2,000,000) = Ksh. 400,000.00 A general formula for expected value is:

Expected value=*E*(*x*) =*p*1*x*1+*p*2*x*2+*p*3*x*3+........... + *pnxn* +........................ + *pNxN*, where

*E*(*x*) = the expected value

*n* = possible outcome

*N* = number of possible outcomes

*pn* = probability of the *n*th outcome

*xn* = value of the *n*th outcome

Measure of risk that does tell us something about how much to expect and the probability that it will happen is the standard deviation. The ***standard deviation*** is a measure of dispersion that considers the values and probabilities for each possible outcome. The larger the standard deviation, the greater the dispersion of possible outcomes from the expected value. The standard deviation considers the distance (deviation) of each possible outcome from the expected value and the probability associated with that distance:

Standard deviation of possible outcomes is given by:

Compute and fill the table below. As an investor, which of the 2 products would you choose? Why.

Distinguish between the following investors- Risk neutral, risk averse, and risk preference.

|  |  |  |
| --- | --- | --- |
| SCENARIO | PROBABILITY (%) | POSSIBLE RETURN ON INVESTMENT (%) |
| **Product A** |  |  |
| Success | 25 | 24 |
| Moderate Success | 50 | 10 |
| Failure | 25 | -4 |
| **Product B** |  |  |
| Success | 10 | 40 |
| Moderate Success | 30 | 30 |
| Failure | 60 | -5 |
|  |  |  |

|  |  |  |
| --- | --- | --- |
|  | Expected return | Standard Deviation |
| Product A | 10% | 9.9% |
| Product B | 10% | 18.57% |

**RETURN AND THE TOLERANCE FOR BEARING RISK**

Investors may fall into one of the following three categories:

* Risk averse investors: These are investors who do not like risk- i.e. given two investments, they would choose the one with less risk for a given level of returns- like in the example above, most investors would choose product A to B. This is not to mean, however that risk averse investors cannot take risk. It means they will take more risk only when they feel that they are adequately compensated for it.
* Risk neutral investors are indifferent towards risk- they do not need additional compensation to bear more risk. In the above example, a risk neutral investor would choose either of asset A or B.
* A risk preference person likes risk—someone even willing to pay to take on risk. Are there such people? Yes. Consider people who play the lotteries (SMS), where the expected value is always negative: The expected value of the winnings is less than the cost of the lottery ticket/SMS.

In evaluating investments, we assume that investors are risk averse, and that risk is something bad that ought to be avoided. Additional risk is to be taken only if there is adequate compensation in terms of higher returns.

This is the basis of the risk-return tradeoff- ***the higher the risk, the higher the expected return.***

**EXPECTED RETURN, RISK AND DIVERSIFICATION**

Businesses will rarely consider investing in one project at a time. Consider a roadside kiosk- the proprietor will rarely stock one product (say cigarettes), but rather in a collection of products (Cigarettes, soap, soft drinks e.t.c.). A bigger business will also have a collection of assets- buildings, inventory, stocks and bonds, e.t.c. A collection of investments is referred to as a portfolio. In any portfolio, one investment may do well while another does poorly. The projects’ cash flows may be “out of sync” with one another. Diversification helps an investor to avoid ***putting all eggs in one basket,*** just in case that particular basket gets torn! The investment in assets whose returns are out of step with one another is the whole idea behind diversification. Diversification is the combination of assets whose returns do not vary with one another in the same direction at the same time. Diversification is a way of reducing risk. Which is the other way of reducing risk?

**Expected return of a portfolio**

In the example above, suppose you had Ksh. 20,000.00 and you decide to invest the cash in asset A and asset B as follows:

* All the Ksh. 20,000 in asset B
* Ksh. 5000 in asset A, and Ksh. 15,000 in asset B
* Ksh. 10,000 in asset A and Ksh. 10,000 in asset B.
* Ksh. 15,000 in asset A and Ksh. 5000 in asset B
* All the Ksh. 20,000 in asset A

What is the expected return from the portfolio in each case? The expected return from a portfolio is simply the weighted average of the returns of each asset in the portfolio. The weights used are the proportions of cash placed in each asset.

E(Rp)= W. E(Ra) + Wb. E(Rb) + ……………………. + Wn. E(Rn)

In the case above;

* E(Rp)= (0%\*10) + (100%\*10) =
* E(Rp)= (25%\*10) + (75%\*10) =
* E(Rp)= (50%\*10) + (50%\*10) =
* E(Rp)= (75%\*10) + (25%\*10) =
* E(Rp)= (0%\*10) + (100%\*10) =

Example 1

You have Ksh. 10,000 that you wish to invest. After surveying the market, you choose to put your money in Savings Development Bonds (SDBs) of the Government of Kenya that have a coupon of 12%, and in shares that have an expected return of 15%. What would be your expected return if:

* You invest 90% of your cash in SDBs and 10% in shares?
* You invest 60% of your cash in SDBs and 40% in shares?
* You invest Ksh. 7,000 of your cash in SDBs and the remainder in shares?

**Risk of a portfolio (2 asset portfolio)**

Unlike the expected return, the risk of a portfolio is NOT merely the weighted average of the risks of the securities in the portfolio! The formula below summarizes how to calculate risk (Variance) of a portfolio

Where: is the weight of asset A in the portfolio

Is the standard deviation of returns of asset A

Is the standard deviation of returns of asset B

Is the correlation coefficient between the returns of asset A and asset B

**NB:** To get the standard deviation, you take the square root of the variance

**Computing the correlation coefficient**

The correlation coefficient is a standardized measure of the degree of relationship between the returns of two assets. It is the tendency for two or more sets of data—in our case returns—to vary together. It will always fall between +1 and -1.

* A correlation coefficient of +1 indicates a perfect, positive correlation between the two assets’ returns.
* A correlation coefficient of –1 indicates a perfect, negative correlation between the two assets’ returns.
* A correlation coefficient of 0 indicates no correlation between the two assets’ returns.
* A correlation coefficients falling between 0 and +1 indicates positive, but not perfect positive correlation between the two assets’ returns.
* A correlation coefficient falling between –1 and 0 indicates negative, but not perfect negative correlation between the two assets’ returns.

The correlation coefficient is computed as follows:

Where Cov (a,b) is the covariance of returns between asset A and B.

And so, how do you compute covariance?

Take the following example of probability distributions of returns for asset A and asset B.

|  |  |  |
| --- | --- | --- |
| Probability | Return on asset A (%) | Return on asset B (%) |
| 0.2 | 8 | 17 |
| 0.1 | 10 | 13 |
| 0.3 | 12 | 9 |
| 0.05 | 13 | 12 |
| 0.02 | 10 | 12 |
| 0.3 | 11 | 8 |
| 0.03 | 15 | 6 |

REQUIRED:

* 1. The expected return of asset A and of asset B.
  2. The variance and standard deviations of returns for assets A and B.
  3. The covariance of returns between asset A and B.
  4. The expected return and standard deviation of returns if you invested in a portfolio comprised of:
     + All in asset B
     + 20% of asset A and 80% of asset B.
     + 40% of asset A and 60% of asset B.
     + 60% of asset A and 40% of asset B
     + 80% of asset A and 20% of asset B
     + All in asset A.