MARKOWITZ MODEL

Central Concepts of Markowitz's Modern Portfolio Theory

Markowitz

In 1952, Harry Markowitz presented an essay on "Modern Portfolio Theory" for which he also received a Noble Price in Economics. His findings greatly changed the asset management industry, and his theory is still considered as cutting edge in portfolio management. There are two main concepts in Modern Portfolio Theory, which are

- Any investor's goal is to maximize Return for any level of Risk
- Risk can be reduced by creating a diversified portfolio of unrelated assets

Markowitz theory

Before the development of Markowitz theory, combination of securities was made through **"simple diversification".** The layman could make superior returns on his investments by making a random diversification in his investments.

A portfolio consisting of securities of a large number will always bring a superior return than a portfolio consisting of ten securities because the portfolio is ten times more diversified. The simple diversification would be able to reduce unsystematic or diversifiable risk. In securities, both diversifiable and un-diversifiable risks are present.

Markowitz theory

Unsystematic risk was supposed to be independent in each security. Many research studies were made on diversification of securities. It was found that 10 to 15 securities in a portfolio would bring adequate.

returns. Too much diversification would also not yield the expected return.

- Some experts have suggested that diversification at random does not bring the expected return results. Diversification should, therefore, be related to industries which are not related to each other.

- A person having on his portfolio about 8 to 10 securities will reduce his risk but if he has too many securities as described above it would notlead to any gain.

Markowitz theory

If systematic risk is reduced by simple diversification, research studies have shown that an investor should spread his investments but he should not spread himself in so many investments that it leads to **"Superfluous diversification"**. When an investor has too many assets on his portfolio he will have many problems. These problems relate to inadequate return.

- The investor will also find it impossible to manage the assets on his portfolio because the management of a larger number of assets requires knowledge of the liquidity of each investment, return; the tax liability and this will become impossible without specialized knowledge..

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Assumption of the Markowitz Theory

The market is efficient and all investors have in their knowledge all the facts about the stock market and so an investor can continuously make superior returns either by predicting past behavior of stocks through technical analysis or by fundamental analysis of internal company management or by finding out the intrinsic value of shares. Thus, all investors are in equal category.

2. All investors before making any investments have a common goal. This is the avoidance of risk because they are risk averse.

3. All investors would like to earn the maximum rate of return that they can achieve from their investments.

Assumption of the Markowitz Theory

4.Markowitz brought out the theory to find out how the security returns are correlated to each other. By combining the assets in such a way that they give the lowest risk maximum returns could be brought out by the investor.

5.The investors base their decisions on the expected rate of return of an investment. The expected rate of return can be found out by finding out the purchase price of a security dividend by the income per year and by adding annual capital gains.

6. From the above, it is clear that every investor assumes that while making an investment he will combine his investments in such a way that he gets a maximum return and is surrounded by minimum risk

Assumption of the Markowitz Theory

7. The investor can reduce his risk if he adds investment to his portfolio.

8. The investor assumes that greater or larger the return that he achieves on his investments, the higher the risk factor surrounds him. On the contrary, when risks are low the return can also be expected to be low.

9. An investor should be able to get higher return for each level of risk "by determining the efficient set of securities".

Markowitz Theory

Markowitz approach determines for the investor the efficient set of portfolio through three important variables, i.e., return, standard deviation and coefficient of correlation.

- Through this method the investor can, with the use of computer, find out the efficient set of portfolio by finding out the trade-off between risk and return. According to this theory, the effects of one security purchase over the effects of the other security purchase are taken into consideration and then the results are evaluated.

Markowitz Theory

Security	Expected Return R_1%	Proportion X_1%
1	10	25
2	20	75

The return on the portfolio on combining the two securities will be

$Rp = R1X1 + R2X2$

$Rp = 0.10(0.25) + 0.20(0.75)$

$= 17.5\%$

The Effect of Combining Two Securities

It is believed that holding two securities is less risky than having only one investment in a person's portfolio. When two stocks are taken on a portfolio and if they have negative correlation, then risk can be completely reduced because the gain on one can offset the loss on the other.

- The effect of two securities can also be studied when one security is more risky when compared to the other security

		Stock-A	*Stock-B*
Return %		7 or 11	13 or 5
Probability average		.4 each return	.4 each return
Expected Return %		7.2 +	7.20
Variance		4	16
Standard Deviation		2	4
+ Expected Return	=	.4 × 7 + .4 × 11 = 7.2	
Expected	=	.4 × 13 + .4 × 5 = 7.2	
Rate of Return on Portfolio	=	9	

Formula:

$$Rp = \sum_{i=1}^{N} X_i R_i$$

Where, Rp = the expected return to portfolio
X_1 = proportion of total portfolio invested in security i
R_1 = expected return to security i
N = total number of securities in portfolio

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In the following situation:

I. When Stock 'A' in a given investment is taken at 2/3 proportion during prosperity

Rp = (2/3) x (7) + (1/3) x (5) = 6.33

II. When Stock 'A' in a given investment is taken at 2/3 proportion during depression

Rp = (2/3) x (7) + (1/3) x (13) = 9.0 (Higher return than expected).

Thus, by putting some part of the amount in stock which is riskier stock, i.e., 'B', the risk can be reduced rather than if the investor was to purchase only Stock 'A'. If an investor was to purchase only Stock 'A', his return would be according to his expectation an average of 7.2% which becomes as low as 7% in depression periods and rises to 11% in boom periods.

The standard deviation of this stock is as low as 2%. The investor will make a return of higher than 7.2% by combining two-thirds of Stock 'A' and one-third of Stock 'B'. Thus, the investor is able to achieve a return of 9% and bring the risk to the minimum level.

- Thus, the effect of holding two securities in a portfolio does reduce risk but research studies have shown that it is important to know what proportion of the stock should be brought by the investor in order to get a minimum risk, the portfolio returns can be achieved at the higher point by setting of one variation against another..

The investor should be able to find out two investments in such a way that one investment is giving a higher return, whereas the other investment is not performing well even though one of the securities is more risky, it will lead to a good combination.

- This is a difficult task because the investor will have to continue to find out two securities which are related to each other inversely, like the example given for Stocks 'A' and 'B'. But securities should also be correlated to each other in such a way that maximum returns can be achieved.

References

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