

Modern Portfolio Theory

Modern Portfolio Theory (MPT) is a mathematical concept to construct an efficient investment portfolio: Given a certain level of risk, its expected return will be optimized. - In essence, MPT formalizes the concept of diversification: It concludes that owning different kinds of financial assets is less risky than owning merely one (type) of them. MPT also emphasizes that risk is an inherent part of reward, illustrated by the Efficient Frontier (EF) of optimal portfolios.

At its core, MPT is a mathematical model with the purpose to optimize an investor's expected return given a certain risk. Harry Markowitz, a Nobel Prize laureate and co-developer of the MPT, provided unique insights in regards to the impact of diversification:

That the return of a portfolio is composed of the relative return contributions of its individual assets is obvious. And, that diversifying returns across several assets is preferable for many investors instead of putting all eggs in one basket, appears reasonable as well.

What seems less obvious at first sight, though, is the following: The total risk of a portfolio – or its volatility (standard deviation) - is actually not determined by simply accumulating the relative proportions of the risks of each individual security in the portfolio. Instead, the risk of a portfolio is a function of the numerous correlations among the assets of the portfolio: It is the correlations of each asset pair of the portfolio, which counts.

MPT's relevance is in describing to which extent diversification impacts risk: Accordingly, investing in a broad variety of assets almost always reduces risk (volatility). - As long as asset prices do not change and behave in perfect synchrony (i.e. are not perfectly, fully correlated), a diversified portfolio will have less risk than the sum of the weighted average risks of its assets. In consequence, a portfolio may even be less volatile than its least volatile asset.

Therefore, in the context of a portfolio, an individual asset's risk and return should not be analyzed on a stand-alone basis: Instead, it should be assessed to which extent it contributes to the overall risk and return of a portfolio. Whereby, the EF represents the sets of optimal portfolios offering the highest

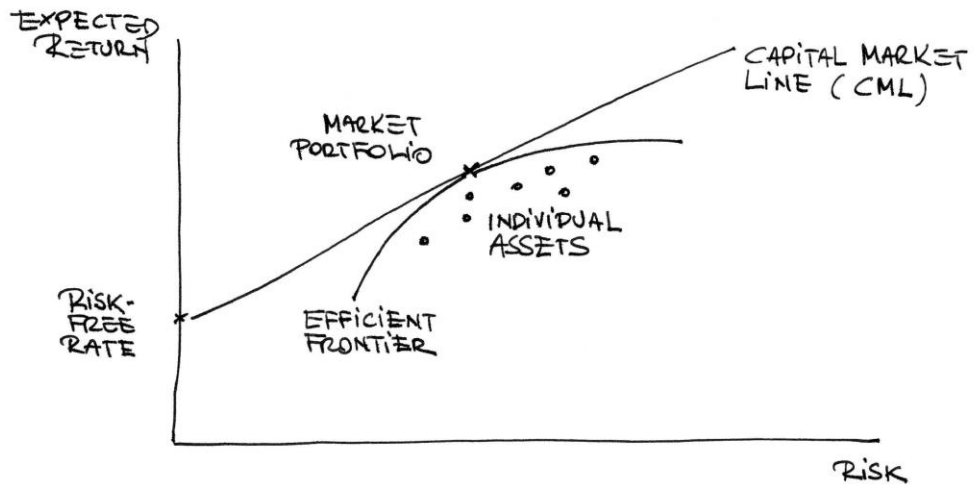
expected return for a defined level of risk (or the lowest risk for a given level of expected return). Hence, portfolios that lie below the EF are not considered optimal, as they do not provide the adequate return for a given level of risk.

Applied in practice, it seems evident that one can reduce risk (volatility) by adding the stock of an airline to a stock of an oil exploration and production company. With an increase in oil prices, the oil company's share price is likely to go up, while the stock of the airline (kerosene being a substantial component of its cost base) expected to decline. Assumedly, the two stocks' dynamics and performance will be negatively correlated: If one goes up, the other will go down.

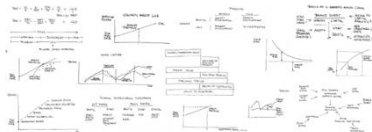
MPT pushes this idea a significant step further, though: It postulates that even if two stocks are positively – as long as not fully and perfectly - correlated, then a combination of these two stocks (now forming a portfolio) would have a lower risk (lower volatility or standard deviation) than the relative weighting of the risks of the two stocks. In practice: If one added to the stock of an oil company that of an oil equipment manufacturer (latter usually also performs well if oil prices rise, however with some delay), then this addition (despite both stocks being positively correlated) would still reduce the overall portfolio risk.

Having said this, not all risks can be eliminated by building a portfolio: The so-called market risk (also referred to as: systematic risk) can actually not be diversified away.

Empirical and statistical research supports the strength of the MPT concept: Already a portfolio of merely between 15-20 different stocks (across several industries and / or geographies) is powerful enough to eliminate / diversify away all unsystematic (company-specific) risks, leaving it only exposed to the market or systematic risk.

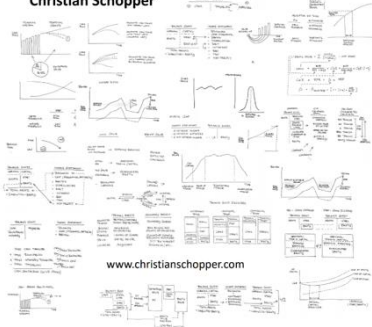


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