RISK/RETURN OUTLINE

Delvin D. Hawley, PhD

"Risk" means the amount of uncertainty associated with an event that will occur in the future. If the event is the future price of a risky asset, (or its actual return), we can only GUESS or ESTIMATE the future price. Some estimates will be better than others, so we should be able to say something about HOW GOOD our estimate is expected to be.

Suppose we buy a share of DDH stock for $100 today, and we expect to sell it one year from now. We don't expect DDH to pay any dividends during the year, so our actual rate of return will depend only on the price of the stock in one year. At the time we bought the stock, we could only guess what that final price would be. That best SINGLE guess that we can make is called the EXPECTED VALUE of the final price. Suppose our best guess is that DDH will sell for $110 one year from now, so the expected rate of return is 10%.

The EXPECTED VALUE doesn't say anything about how reliable or dependable our guess is. That is, it doesn't say anything about the possible DISPERSION of the final price. Maybe we think that the price would have a range of possible values from $108 to $112. In this case, our guess would be quite reliable since the dispersion of final prices around the expected value is quite small. But what if we think the range of possible final prices is $90 to $130. Now the dispersion is very large and there is a much larger chance that our guess could turn out to be very inaccurate. This DISPERSION of the possible future outcomes is measured by the STANDARD DEVIATION (abbrev. SD). All you need to know about SD is that it tells us how wide the possible dispersion of outcomes is, and allows a comparison with other stocks or risky assets. In the example above, the SD of the first range is less than the SD of the second range, since the possible dispersion of outcomes is smaller in the first range.

When we hold one company's stock alone, we are exposed to all of its potential dispersion. The TOTAL RISK of a stock is the possible dispersion of the future price of the stock when held in isolation. TOTAL RISK is measured by the STANDARD DEVIATION. Look at the example in Figure 1. If we could buy both of these stocks and hold them together in a PORTFOLIO, the variability of one would exactly offset the variability of the other, and the PORTFOLIO return would not vary at all, no matter when we look at the return. That is, the portfolio would have NO RISK. Note that we did not change the risk of the two stocks if we held them in isolation, but when they are combined equally in the same portfolio, they cancel each other's risk.

These two stocks have a CORRELATION with each other of -1.0, i.e. they behave exactly opposite to each other under the same circumstances. CORRELATION describes how the price or return of two stocks (or one stock and a portfolio) move in relation to each other. The two stocks tend to move in exactly opposite directions and by the same amount under identical circumstances. If the stocks behaved identically under the same conditions, they would have a CORRELATION with each other of +1.0, the highest correlation possible. If one of the stocks did not move at all with changes in the other stock, (or with no discernable pattern), the correlation would be 0.0.

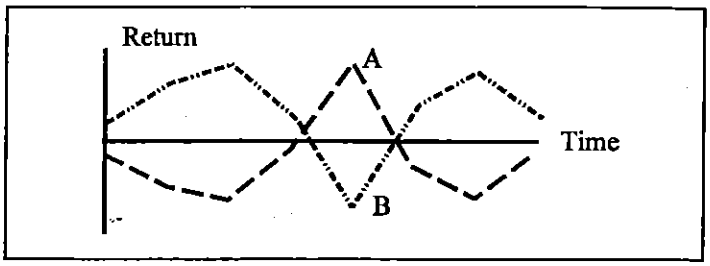

Figure 1

DIVERSIFICATION refers to the process of reducing our exposure to risk by adding stocks to our portfolio that have a correlation with the portfolio that is LESS THAN 1.0. If we do this, the variability of each stock helps to offset some of the variability of the others, so the TOTAL RISK of the portfolio is reduced. In the example, the two stocks had a -1.0 correlation, so ALL of the risk was eliminated from the portfolio. In reality, it is very hard to find two stocks that have a perfectly negative correlation with each other. Most stocks have a correlation with other stocks that is high and positive, say between .7 and .9. That is, when one stock moves up, others tend to move up also but not quite by the same amount, and vice versa. Consequently, when we combine such stocks in a portfolio, the total risk of the portfolio is reduced a LITTLE, but we can't get rid of it entirely. If we keep adding more stocks to the portfolio, we continue to reduce the risk until it reaches a level that we cannot get below, no matter how many stocks we add together.

As we DIVERSIFY our portfolio by adding more and more stocks, we will never get SD=0 because the potential dispersion of the PORTFOLIO return is the result of TWO influences. COMPANY-SPECIFIC influences are such things as management's decisions and policies, equipment breakdowns, labor problems, lawsuits, etc. These things affect a particular company without affecting every stock in the market. The effects of these influences can be DIVERSIFIED AWAY by adding stocks to our portfolio from different industries and regions. The dispersion of the stock's return that is the result of these influences is called DIVERSIFIABLE RISK (also UNSYSTEMATIC RISK or BUSINESS RISK). MARKET influences are such things as inflation, taxes, interest rates, money supply, and investor risk-aversion. These factors influence ALL stocks at the same time,although not to the same degree. The effects are not isolated to a particular stock or even a particular industry, but rather have an impact on EVERY stock. The dispersion of a stock's return that is the result of these factors CANNOT be diversified away, no matter how many stocks we add to our portfolio.This component of risk is called UNDIVERSIFIABLE RISK (or SYSTEMATIC or MARKET risk).

So, we can diversify away the COMPANY-SPECIFIC risk by holding a well-diversified portfolio, but the portfolio will not be risk-free because the MARKET risk will still be there. Suppose we select stocks at random to compose a portfolio. With each stock we add to the portfolio, we reduce the total risk of the portfolio until we reach a minimum risk level which we cannot get below. When we have about 20 or 30 stocks in our portfolio, we have eliminated almost all of the COMPANY-SPECIFIC risk and are left with only the MARKET risk. Such a portfolio is said to be WELL-DIVERSIFIED, and it will behave like the broad-based market indices (such as the S&P 500 index).

The magnitude of the risk reduction that we get when we add a new stock to our portfolio depends on the CORRELATION of the new stock's returns with the returns of the portfolio. The lower the correlation, the greater the diversification effect. Consequently, the relevant measure of any stock's risk is not its STANDARD DEVIATION (this measures total risk), but rather the risk it adds to a diversified portfolio, i.e. its MARKET RISK. This risk is measured by the stock's BETA. Beta is a proportional multiplier that says how sensitive a particular stock is to movements in the over-all stock market. If a stock has above-average sensitivity, (i.e. when the S&P 500 moves up 1%, this stock moves up MORE than 1%), then stock has a Beta GREATER THAN 1.0. If the stock is of average sensitivity, its Beta is 1.0.

If we could hold ALL the stocks in the market in the same portfolio, we would have the MARKET PORTFOLIO. Since this portfolio would be made up of every stock that exists, its market risk and expected return would be the AVERAGE of all stocks. This portfolio would provide a BENCHMARK for risk and return against which all other stocks could be compared. The Beta of such a portfolio is defined as 1.0, so Beta provides just such a benchmark for comparing stocks of different risks. Beta is a measure of the MARKET RISK of any stock as compared to this AVERAGE RISK/AVERAGE RETURN benchmark.

RISK-AVERSE investors must expect to earn an adequate rate of return for holding risky assets. If the rate of return they expect to earn is not sufficient to compensate them for the risk they must bear, then they won't buy the stock. The REQUIRED RETURN is the minimum EXPECTED RETURN that an investor will accept on a stock. If the expected return is lower than the required return, no one will want to buy the stock (those who own it will want to sell) and its price will fall (expected return will increase) until expected return equals required return and investors begin to purchase the stock again.

The required rate of return for a stock depends on the MARKET risk of the stock, the degree of investor RISK-AVERSION on average, and the current RISK-FREE rate of interest. This relationship is described by the CAPITAL ASSET PRICING MODEL (CAPM). The CAPM describes the TRADE-OFF between REQUIRED RETURN and MARKET RISK for any security THAT IS HELD AS PART OF A WELL-DIVERSIFIED PORTFOLIO. It tells us the expected return that investors should demand as compensation for the undiversifiable risk they are bearing. The reason that investors cannot REQUIRE compensation for bearing DIVERSIFIABLE risk, (they would bear such risk if they only had a few stocks in their portfolio), is that they bear that risk by their own CHOICE. They could have chosen to own the same stock but held it in a diversified portfolio, in which case they would not have to bear the stock's diversifiable risk at all. Therefore, the REQUIRED RETURN is compensation only for the MARKET RISK associated with a stock, as measured by its Beta.

The HEIGHT of the Security Market Line depends on the level of the RISK-FREE RATE, which is composed of the REAL RATE OF INTEREST (investors' time value of money) plus an INFLATION PREMIUM (necessary to keep pace with inflation). If the average investor's time value of money increases because money becomes tighter, or if the expected rate of inflation increases, then the risk-free rate will increase. (The reverse is also true). The risk-free rate is the basic component of ALL the required rates. If it increases, then ALL the required rates will increase by the same amount, so the Market Line will SHIFT UP parallel to itself.

The SLOPE of the Market Line depends on the degree of risk aversion of the average investor. If investors' uncertainty about future economic conditions increases, then their risk aversion will increase. They will require MORE compensation for bearing the SAME risk that they did before their outlook changed. The slope of the Market Line will INCREASE, pivoting on the risk-free rate (which will NOT change as a result of a change in risk-aversion). Of course, a decrease in risk aversion has the opposite effect on the Market Line (decreased slope).

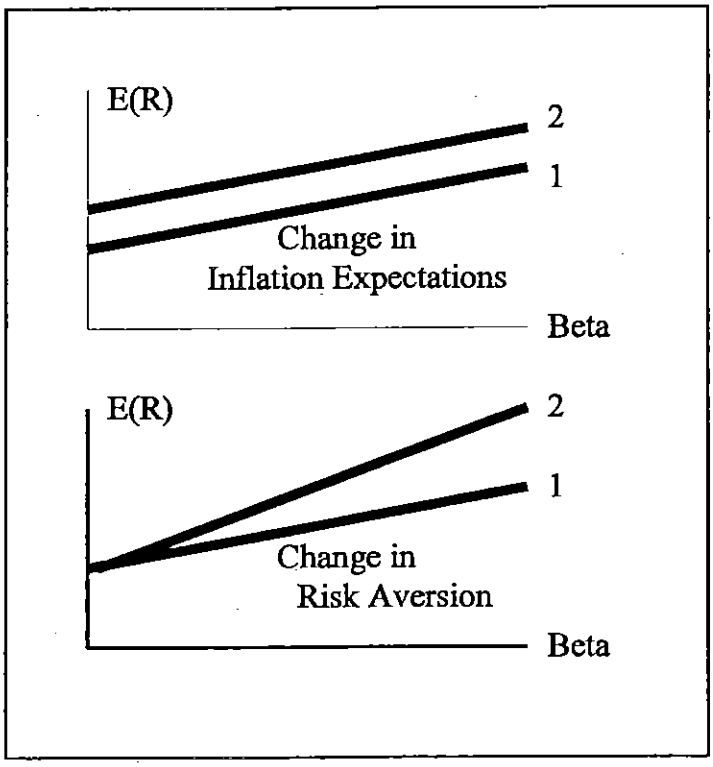

Figure 2