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INVESTMENT PRINCIPLES

INFORMATION SHEET FOR CFA PROFESSIONALS

THE BENEFITS OF DIVERSIFICATION

THE FACTORS THAT DRIVE ASSET RETURNS AND THE EFFICIENCY OF DIVERSIFICATION

3B

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THE FACTORS THAT DRIVE ASSET RETURNS AND THE EFFICIENCY OF DIVERSIFICATION

We often hear investors say that diversification failed to protect them during difficult circumstances. But to understand what makes diversification more or less successful, we must have a basic understanding of the factors that drive the return on assets. Even though this document only discusses the performance drivers of equities and fixed income, it can also help us understand what triggers low or high levels of correlations (co-movements) of returns between two assets and how to build more efficiently diversified portfolios.

WHAT DETERMINES EXPECTED RETURNS ON FIXED-INCOME ASSETS

Let's start by explaining what drives the performance of a bond if it is held to maturity. A traditional bond usually pays a fixed coupon (normally twice a year) and a principal amount at maturity. For example, how much would a marginal investor pay to own a corporate bond that pays a 5% coupon (let's say once a year, for the sake of simplicity) and a principal amount of $1,000 in 10 years? Asking what price the investor will pay for the bond is the same as asking what return the investor requires to own the bond. Conceptually, the investor should require a return that will compensate for:

- expected inflation, assuming 10-year inflation expectations are 2% on average;
- risks, such as credit risk (the risk that the coupons and the principal at maturity may not be fully paid if the issuer faces financial difficulties). There may also be other risks, such as liquidity risk (the risk that it may be difficult or expensive to sell the bond before maturity, if necessary) and duration risk (the fact that the price of a longer maturity asset is more sensitive to changes in the bond yield). Let's assume the bond risk premium is 1%; and
- real return, or the compensation that investors require in excess of inflation on a risk-free asset such as a Treasury bond. Let's assume the real rate is 1%.

In this example, the required rate of return would be 2%+1%+1%= 4%. Therefore, 4% is the rate used to discount all future cash flows on this bond. In this way, we can calculate the price at which this bond would trade in the market.

$$Price = \$1{,}081.11 = \sum_{i=1}^{10} \frac{\$50}{(1+.04)^i} + \frac{\$1{,}000}{(1+.04)^{10}}$$

The price is greater than the principal paid at maturity because the return demanded by investors is less than the coupon rate. 4% is also called the effective annual yield to maturity because, if an investor buys the bond at this price and holds it to maturity, he will realize an effective annual rate of return of 4% if all cash flows (coupons and principal) are paid fully and on time.[1 2]

But what if the bond is not held to maturity? Let's assume the investor holds the bond for one year. In this case, the return is determined by the sale price.

$$Return = \frac{(\text{Sale Price} - \$1{,}081.11 + \$50)}{\$1{,}081.11}$$

The same factors that affected the current price will also determine the price a year from now. But a year from now:

- inflation expectations may have changed;
- the perception of the level of risk may have changed;
- the real return may have changed; and
- the maturity of the bond is now shorter by one year and this will affect pricing.

For all these reasons, the investor's return is unlikely to be the initial yield to maturity. The yield to maturity, a year from now, is likely to be driven up or down by higher/lower inflation expectations and/or risk premiums and/or real return.

Thus, returns over specific periods are largely dominated by changes in expectations, which will affect future prices. For example, let's assume inflation expectations are up or down by 1%, leaving all other factors constant. In this case, the yield to maturity of this particular bond after one year will be 3% or 5%. If the yield is 3% a year from now, the bond price will be $1,155.72. If it is 5%, it will be $1,000 because the yield is equal to the coupon rate. Assuming the investor sold his bond after one year on the basis of a 3% yield, his investment return will be:

$$11{,}53\% = \frac{(\$1{,}155.72 - \$1{,}081.11 + \$50)}{\$1{,}081.11}$$

But the return will be only -2.88% if the yield increases to 5%. Being wrong about future expectations can be costly.

These examples have shown that it is easy to forecast the return on a bond if it is held to maturity (assuming no default) but difficult to forecast its return if it is sold before maturity. But can we forecast the return of a bond fund or a bond index? To a certain degree we can. Let's assume a bond fund invests in Treasury securities with an average maturity of about 10 years. Each year, as the average maturity of the securities gets shorter, the manager sells some of the shorter-term securities to purchase longer maturity securities, thus keeping the average maturity of the bond fund fairly constant over time.

For example, between December 2004 and December 2014, the yield to maturity on 10-year Treasury bonds fell from 4.25% to 2.17%. If a manager had followed the strategy we just described, the yearly compounded return would have been 4.92%, somewhat higher than the initial yield to maturity. If, hypothetically, the yield to maturity had followed the opposite pattern over the same period (starting at 2.17% and ending at 4.25%), the yearly compounded return would have been 1.45%, somewhat lower than the initial yield to maturity. The reason is simple: if interest rates decline, bond coupons are invested at a lower rate of return but the price of the bonds we currently hold increases. The reverse occurs if interest rates increase.

[1] In reality, the industry standard is usually to express the yield to maturity as an effective semi-annual return (not annual) multiplied by two (to annualize). For example, the yield in this example is presented as a 4% annual effective yield. A 4% annual effective yield is equivalent to a 1.9804% semi-annual effective yield (taking into account the effect of interest compounding). Thus, according to the industry standard, the 4% effective annual yield presented in the example would in fact be expressed as a 3.9609% yield to maturity (1.9804% x 2).

[2] When the yield to maturity is used to express the return that will be realized, there is an implicit assumption that the coupons are reinvested at the yield to maturity itself.

In other words, the current yield to maturity of a bond fund or a bond index with an average maturity of about "X" years is a good indicator of the return (before fees) that will be realized over those "X" years. In a low-rate environment, this is an indication of low future returns.

WHAT DETERMINES EXPECTED RETURNS ON EQUITY ASSETS

Equities differ from bonds in the following ways:

- Common stocks have no maturity. For example, an equity index has implicitly an infinite maturity;
- Common stocks may or may not pay dividends, depending on a firm's profitability and dividend policy;
- Equity holders are paid dividends only after bondholders are compensated. Thus, equities are is riskier than bonds issued by the same firm.

But a rational investor looking at investing in equities would also require a return to compensate for expected inflation, real return, and various risk premiums related to investing in equities, such as market, value, momentum and liquidity (to be discussed later). Thus, with equities there are many more risk factors to consider, and the likelihood of being wrong about expectations is greater. It is also impossible to calculate a yield to maturity for a stock because there is no maturity and future dividends are not known. Therefore, investors often express the attractiveness of a stock by its price-to-earnings (PE) ratio, which is the ratio of price over corporate earnings. Several methods are used to calculate the PE ratio. For example, we may say that the S&P 500 Index trades at "X" times the earnings of the previous 12 months or the earnings projected over the next 12 months. When the PE multiple is high, it is likely that inflation expectations are low and/or that market risk is less of a concern for investors and/or that profit growth expectations are high. A low multiple would likely reflect opposite expectations for at least some of these factors. Thus, when market conditions appear good (bad), investors are willing to pay a higher (lower) multiple, which is the equivalent of requiring a lower (higher) yield.

To illustrate the role of changing expectations of equity returns, let's consider the following example, which explains the sources of the performance of the S&P 500 over two different but illustrative periods: 1979-1999 and 2000-2006.

RETURN ATTRIBUTED TO	1979-1999	2000-2006
Dividend	3.94%	1.63%
Growth in Earnings	5.71%	8.50%
Change in PE Multiple	8.23%	-9.00%
Total	**17.88%**	**1.13%**
PE Beginning and End	7.4-33.3	33.3-18.2
Dividend Growth rate	5.78%	5.53%

Equities had a tremendous performance from 1979 to 1999 and a dismal performance from 2000 to 2006. Surprisingly, the growth in earnings was greater after 2000 while the dividend growth rate was similar. Dividends did not explain much of the performance in either case. Much of the total performance was driven by a change in PE multiple.

In 1979, investors were willing to pay only $7.40 for each dollar of S&P 500 earnings whereas, in 1999, they were willing to pay $33.30, more than four times as much. This situation came to an abrupt end in 2006, when investors were willing to pay only $18.20. What happened? A change in PE multiples is the equivalent of a change in yield. It reflects changes in investor expectations. In 1979, investors were requiring a significant return to own equities because they were expecting high inflation and were concerned about market risk. In 1999, inflation expectations were very low and investors, rationally or irrationally, were less concerned about risk. Thus, the required return on equities was low, and equity prices (PEs) were very high. Prices came crashing down when investors became significantly concerned about risk as they reviewed the growth expectations for the information technology sector. Again, we see that future equity returns are largely affected by how right or wrong our current expectations are. When current market expectations are over optimistic (as in the late 1990s), they can lead to low future returns and vice-versa.

FACTORS THAT DRIVE HIGH AND LOW CORRELATIONS BETWEEN ASSETS

Now that we understand the main performance drivers of financial assets, it should become clear that two assets will have higher correlations if price fluctuations in both assets are caused by similar drivers. But correlations will be low if price fluctuations in either asset are explained by different drivers. For example, it is well known that returns on equities and fixed income were highly correlated in the 1970s, 1980s, and 1990s but that the correlation was low in the 2000s. The correlation of equities to Treasury bonds actually became significantly negative during the 2008 financial crisis. Why?

- In the 1970s, 1980s, and 1990s, changes in inflation expectations were significant and were a dominant performance driver. Equities and fixed income both benefitted from a decline in inflation expectations, which led to a strong correlation of returns between the two asset classes.
- In the early 2000s, PE multiples collapsed because investors required a significantly higher risk premium to invest in equities when they realized that the earnings expectations for the technology sector were unrealistic. Interest rates declined in response to monetary policy and growth concerns, so correlations were low.
- In 2008, almost all risky asset classes performed poorly, and diversification did not seem to work. A crisis of liquidity was triggered by significant global credit concerns. The contagion was widespread and led to a significant re-evaluation of economic growth around the world. As investors required higher compensation for risks in all regions of the world, all risky assets were hit at the same time. Only assets that were perceived as truly safe, such as Treasury bonds, emerged unscathed and provided diversification benefits. Treasury bonds rallied not only because inflation expectations declined but also because investors were so concerned about risky assets that they turned to Treasury bonds as a haven. This caused the real return to go down significantly, triggering a further rise in the price of Treasury bonds. Therefore, the correlation between risky assets and Treasury bonds was significantly negative during this period.

Diversification is about combining assets whose prices and required returns are driven by different sets of factors. Two bank stocks are more likely to be driven by a similar set of factors than are a bank stock and a technology stock. So are equities versus fixed income, commodities versus equities or bonds, and gold versus wheat.

Even so, in specific circumstances there are factors that will similarly affect many securities, asset classes, and even regions at the same time and reduce the effectiveness of diversification. Significant changes in inflation expectations and a large decline in global liquidity are two examples. It does not mean that we should not diversify but that we must do so wisely; but even then the effectiveness of diversification will vary over time.

Finally, some investors have unrealistic expectations of diversification. For example, we have just shown that equity returns are significantly more volatile than bond returns. They can easily be more than twice as volatile on average. But in a crisis, such as 2008, equity returns can temporarily be four or more times as volatile as bond returns. Therefore, if an investor owns a 60/40 equity-bond portfolio during a crisis, the volatility of the equity component will almost completely drive the portfolio's overall volatility. In such circumstances, more than 90% of total portfolio risk and return can be determined by what happens to the equity component. Therefore, investors must diversify wisely, consider their aversion to risk not only in normal times but also in bad times, and perhaps consider some of the risk mitigating strategies that will be discussed later.