Investment Returns and Risk Premiums

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Arithmetic Return and Geometric Return

Perhaps one of the greatest considerations in investing is found in optimizing the return on investment (ROI). If an investment is not beating the rate of inflation, then the investment is not a good one. Likewise, if an investment is not earning a return on investment which is worth the risk taken on the investment, then it is not a good choice either. There exists two principal ways to calculate the return on investment, to wit; the arithmetic and geometric methods (Edspira, 2016). Each has its purpose in auditing the return. An arithmetic return is the most common. We typically see this return listed as the annual percentage yield (APY) when lending, and as the annual percentage rate (APR) when borrowing. The formula is quite simply, the sum of the annual rates of return for each year, divided by the number of years (Minney, 2013). Given a 3-year investment with annual rates of return of 3%, 6%, and 5%, after applying the formula (3+6+5)/3, the resultant is 4.7% when rounded to the nearest tenth of a percent. The trouble with this basic formula is that it does not take into account the effect of compounding and volatility of the investment (Edspira, 2016). Practically speaking, this method for calculating an arithmetic return is most effective for evaluating the potential for *future* gains on investments (Edspira, 2016).

To effectively evaluate a particular stock, bond, or investment's *historical* performance, the geometric return is preferred. The formula for calculating a geometric return is a little different. First, for each year, begin by adding (or subtracting in the case of a negative) each year's percentage of return expressed as a decimal from 1 (to account for the initial investment), then multiply each, then compute the N'th root (where N represents the number of years), finally subtract one (to factor out consideration for the initial investment) (Edspira, 2016). To exemplify the differences between the two methods, suppose a cryptocurrency's return were analyzed over a three year period and yielded rates of return of 30%, -40%, and 35%. Applying the arithmetic formula (30-40+35)/3 causes the cryptocurrency to appear to be a fairly good investment with an 8.3% rate of return. Yet, when we apply the geometric method's formula $(1.30*0.60*1.35)^{1/3}-1$ now accounting for compounding and volatility, we compute a 1.7% return which we see is insufficient to rival the rate of annual inflation. If we were analyzing this cryptocurrency's past three year performance to determine if it might be a worthwhile investment moving forward, we would decide that it is too volatile and choose another.

Volatile Returns

The average return will be higher than the geometric return for a stock that has volatile returns over a 2-year period. This holds true when returns are volatile over any period of years. Simply stated, volatility lowers geometric returns and this has become known as volatility drag (Kitces, 2021). Two really great examples illustrate this. First, suppose a $1,000 portfolio took a 20% hit in year one, and rebounded 20% in year two. Computing arithmetic mean is really simple, the average of a -20% and a +20% appears to be a 0% return on investment (Pittman, 2010). However, when computing a geometric return, the math results in a negative 2% geometric return over the two year period (Ballast, 2020). A quick look at how much money would be left in the portfolio at the end of the two years shows there would be $960 in the account, proving the geometric rate of return to be far more reliable in accounting for volatility.

A second example which actively illustrates this is to suppose you had a cryptocurrency portfolio with $10,000 in it, doubled your money in year one, and then lost half in year two. Expressing this in terms of percentages would reflect a 100% gain in year one and a 50% loss in year two. Applying the formula to find the arithmetic rate of return makes your portfolio look

highly profitable, showing a positive 25% rate of return (Pittman, 2010). However, when applying the geometric formula, the result is a 0% rate of return (Pittman, 2010). Looking at the actual balance of the portfolio reveals $20,000 at the end of year one and $10,000 at the end of year two, proving the geometric return to be far more reliable since it accounts for volatility (Ballast, 2020).

Displaying Investment Returns

Investment returns can be expressed in terms of the amount in dollars or as the percentage of return. Suppose an investor places $1,000 in a 3-year certificate of deposit (CD) with a simple interest annual yield of 3%, that doesn't offer compounding. The bank could advertise this as a way to earn 9% on your investment, or as 3% APY, or as a way to earn $90 per $1,000 invested. While there is analysis to be made from a marketing standpoint, as to which method of presentation will be more attractive to customers, certainly expressing investment returns as a percentage is most convenient and comprehensible to all investors (Wells, 2014). It is definitely a more simple way to convey the investment's returns as it does not require knowing the amount the investor intends to invest (Fernando, 2021). Lastly, relating the investment return as a percentage enables prospective investors to compare the investment to other investments to determine which will be more profitable. Of course, it goes without saying that the investor would be wise to only compare opportunities with similar risk to ensure the comparison is more accurate.

Risk Premiums

When comparing investments, it is always wise to account for risk. Today, when I compare investments, I consider 2.24% to be the risk-free rate of return. This is because it is the present yield of risk-free treasury bonds (Goldberg, 2021). Any investment return over and above this percentage is termed the risk premium (Hayes, 2021). Said another way, it is the premium, expressed as a percentage, paid to investors for assuming the additional risk above and beyond that of a risk-free investment (Hayes, 2021). Since corporate bonds are actually loans from the investor to the corporation, they are significantly lower risk than common stock, which represents a share in the equity of a company where its value is tied to the performance of the company (Davis, 2021). For this reason, common stock demands a higher risk premium.

Bond Risk Premium and Equity Risk Premium

In a general sense interest rates rise over time, and thus to visualize interest rates over time, we would see a curve which slopes upward (Pandl, 2013). When investing over the long-term in bonds, a premium is added to rates, known as the bond risk premium, which accounts for not only this upward curve, but also for the risk one takes by tying up their money in a longer term bond (Pandl, 2013). In tying up money in a long-term bond, the investor forfeits any opportunity to place their money in investments which in the coming months or years may offer a greater short-term return (Pandl, 2013). In a related, but different sense, equity risk premium refers to the rise in a stock's yield above the yield offered on risk-free treasury bonds (Hayes, 2021). Since holding stocks represent an equity interest, they pose more risk to the principal as the value of the company may go up or down and investing in that risk pays a premium.

Risk Premiums and Returns

In the ongoing study of risk and risk premiums, the term beta becomes relevant. Beta is a decimal number which corresponds to the volatility of a security against the benchmark (Ciura, 2021). The benchmark for considering volatility is the S&P 500, an index tracking the performance of 500 large companies (Kappes, 2019). Any beta score greater than 1.0 means that the security is more volatile than the average of those 500 companies, and any beta score lower than 1.0 means the security is less volatile (Ciura, 2021). In theory, the greater the risk that an investor takes on, the greater the potential return on investment. However, a Harvard Business School paper titled The Low Beta Anomaly: A Decomposition into Micro and Macro Effects suggests that using some criteria, low beta stocks can be identified which offer higher returns than the average low-beta stocks (Baker et al., 2013). Along the same lines of this research, five stocks have been identified that match the criteria set forth in the 2013 Harvard article, to wit; Quest Diagnostics (DGX), Viacom CBS (VIAC), J.M. Smucker (SJM), FirstEnergy (FE), and General Mills, (GIS) (Ciura, 2021). Every investor's concern is maximizing returns (and thus risk premiums) while lowering risk and exposure. In keeping with this, common sense would signal that one must take on risk in order to attain respectable returns, however, it appears that it could be possible to find respectable returns among certain low beta stocks. It stands to reason that high, or respectable, dividends certainly contribute to this concept as well.

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