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Asset Allocation

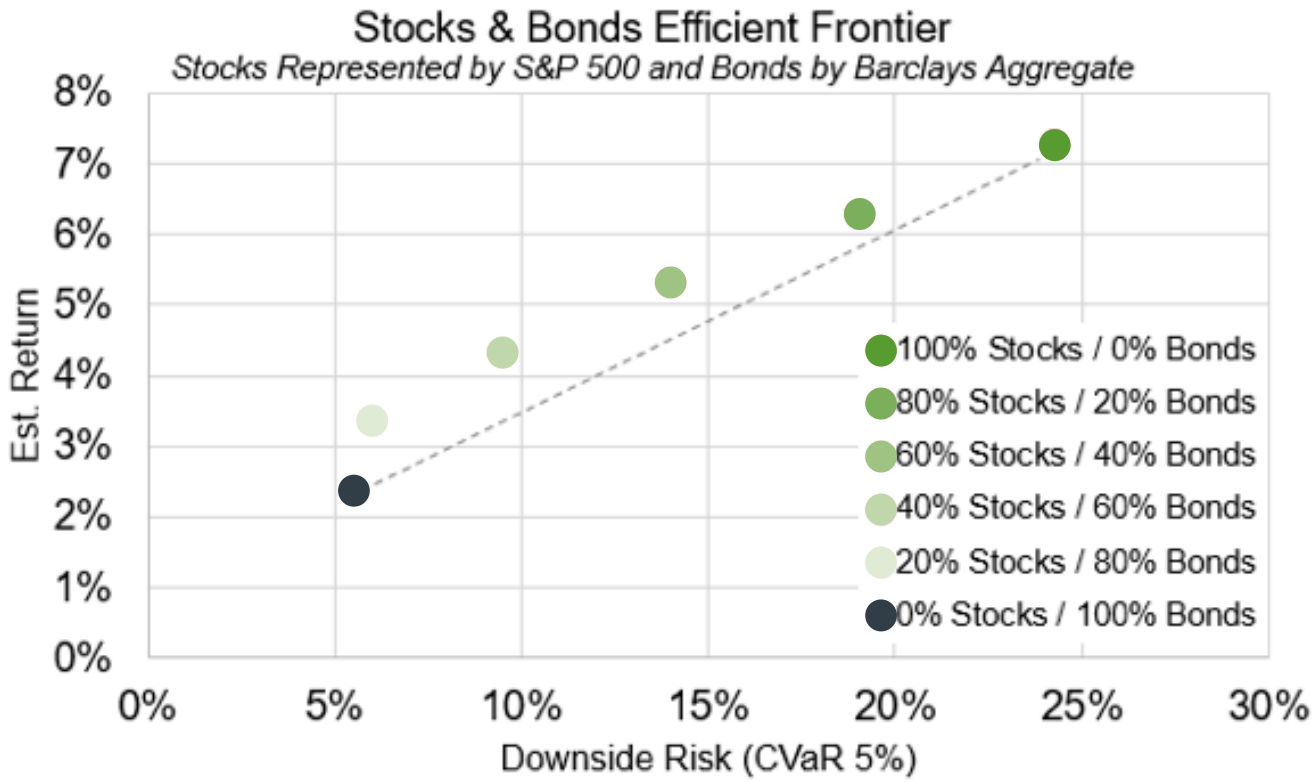
"The most important key to successful investing can be summed up in just two words-asset allocation." –Michael LeBoeuf

Asset allocation is the process of dividing one's resources among many different choices. In terms of investments, "assets" refers to investible cash, and "choices" refers to investments that are available to purchase. Asset allocation refers to the percentage of an investment portfolio that is contained in each individual investment. For example, a portfolio's asset allocation may be 80% stocks, 15% bonds, and 5% gold. No matter the actual allocation, the primary goal of asset allocation is diversification. Diversification means spreading investment risks over many different asset classes, so that "not all your eggs are in one basket."

Asset classes are sectors of investment that have differing risk characteristics. Anything that can be invested in can be categorized into some asset class. Examples of asset classes include:

- Stocks – shares of ownership in a publicly-traded company
- Bonds – a legal claim on the assets of a company, municipality, or other government entity
- Precious Metals – physical metals such as gold, silver, platinum, and palladium
- Commodities – physical goods produced and traded such as corn, wheat, coal, and oil
- Hedge Funds – investment funds that undertake a unique trading strategy in other asset classes
- Real Estate – ownership of physical property such as land, apartment building, or rental house.

Instead of deciding whether it is better to invest in stocks or bonds, over long time horizons it is nearly always optimal to invest in stocks and bonds. Why? Because of risk diversification. When the stock market is experiencing turbulence, bonds tend to hold steady and oftentimes experience positive price appreciation. Between investing in 100% stocks or 100% bonds, there are more "efficient" opportunities for an investor to pick up more return for very little additional risk or to substantially reduce risk without greatly compromising return.



This example is only taking into account combining two funds, the S&P 500 index fund and the Barclay's Aggregate bond market index fund. By opening the investment opportunities to include additional bond sub-sectors (municipals, corporates, etc.) and equity sub-sectors (financials, utilities, energy, etc.) the frontier of opportunities improves further. The Efficient Frontier of opportunities makes another substantial improvement when Alternative Investments (such as options funds, managed futures, real estate funds, etc.) are added to the mix.

How do investment professionals get from a list of asset classes to actually choosing investments? For years the investment industry has resorted to educated guessing.[1] You might think that is a sarcastic statement, but sadly it is more common than one would like to think. Using the six asset classes listed above, an investment advisor may simply take a $100,000 portfolio and invest it evenly across the six asset classes. Or, they may form a positive opinion on one or two asset classes and tilt a slightly larger allocation to those and shift an allocation away from other asset classes.

There is a more educated approach then "guessing." A more scientific and data-driven way to determine asset allocation is accomplished through what is referred to as asset allocation optimization. Asset allocation optimization means using mathematics, aided by technology, to quantify the risk and return of specific asset allocations to find the best combinations of asset classes. "The best combinations" can be defined as those asset allocations that provide the highest level of return for a desired level of risk, or the lowest level of risk for a desired level of return. There are three inputs needed for each asset class in order to conduct a proper asset allocation optimization: Return, Risk, and Correlation.

Return

Return is simply the level of total price growth (or decline) and income expected to be earned over a period of time. The formula for calculating total return is:

$$Total\ Stock\ Return = \frac{(P_1 - P_0) + D}{P_0}$$

$$P_0 = Initial\ Stock\ Price$$
$$P_1 = Ending\ Stock\ Price (Period\ 1)$$
$$D = Dividends$$

For instance, if a stock is trading at $50 at the beginning of the month, and is trading at $49 at the end of the month, and collected $2 of dividends during the month, the total monthly return was 2%.

The return is included in the asset allocation optimization as a return assumption. The investment professional will use one of any number of means to arrive at a return assumption, which represents the expected return on the asset class over some predefined time period, typically one year. There are several methods one can use to arrive at an expected return:

- Historical – averages the returns for the asset class over some historical period. Typically this historical period includes times of both good investment returns and poor investment returns so the expected return is not extremely high or low.
- Market-Based – uses a mathematical formula that includes current market data such as treasury yields and statistical data on the relationship between the asset class and a comparative benchmark "market portfolio."[2]
- Custom – an investment professional may have expertise in forecasting returns on certain asset classes, so he or she may feel comfortable using market data such as price multiples, yield data, and other information to determine a reasonable expected return.

The expected return on each asset class is the number that optimizer models use when they calculate expected return on a portfolio.

[1]Sometimes the "guesswork" isn't really educated at all!

[2]Typically the S&P 500 Index, [3]TSPG uses a 5% CVaR level, meaning "worst-case scenario" is defined as the worst performing 5% of return history.

Risks

Broadly defined, risk is the probability of realizing a return that is different than the expected return.

Traditionally, risk is has been defined as the volatility of returns around the expected return, known as standard deviation. When this metric of risk is used, the optimization is called **mean-variance optimization** because it uses the average return for each asset class (the mean) and the variability of investment returns around that mean (the variance). This is an appropriate measure for investors with short time horizons since they generally care more about what the value of the portfolio will be at a near point in the future. However, day-to-day volatility typically does not matter to a long-term investor when compared to the possibility of catastrophic losses.

First National Bank follows a more narrow definition of risk: realizing a significant loss of investment principal. At the First National Bank, "significant" means the average worst-case loss scenario for a given asset class or portfolio. This is called **Conditional Value at Risk (CVaR)**[3]. To show a calculation of CVaR, for example, since September of 1989, at the time of this original illustration, there have been 335 months of S&P 500 performance. 5% of 335 months is 17 months, meaning the CVaR is calculated based on the average performance in the worst 17 months of the historical period. For the S&P 500, this is -9.2%. Using CVaR as the optimization risk metric results in portfolios that reduce the likelihood of catastrophic portfolio events that can have long-lasting impacts on the investor's financial condition. The CVaR number for each asset class is the number that the optimizer models use when they calculate total expected risk of a portfolio.

Correlation

Correlation links the individual asset classes together by describing how their return streams interact. Correlations are mathematical calculations based on two historical return streams that result in a number within a range of -1 (perfectly negative correlation) to +1 (perfectly positive correlation). Correlations are typically displayed in a "correlation matrix" such as:

Correlations

	Stocks	Bonds	Gold
Stocks	1.00	0.05	0.23
Bonds	0.05	1.00	0.31
Gold	0.23	0.31	1.00

Generally, the lower the correlation number, the more the diversification benefits. To illustrate this, imagine a person owns a hot dog stand on the beach. The risk to this investment is if the weather is bad, consumers won't be at the beach. So this person buys a concession stand at the mall across the street from the beach. On good weather days, the hot dog stand does well and the mall concession stand does poorly. On bad weather days, the hot dog stand does poorly and the mall concession stand does well as would-be-beachgoers go to the mall instead. The owner is clearly better off than if he or she owned only one of the food stands!

This illustration shows the power of a negative correlation-the two food stands react opposite to the same risk factor: the weather. In terms of investments, correlation can be a powerful force that reduces the risk in a portfolio. The correlation matrix above shows there is a near-zero correlation between stocks and bonds, meaning that the two asset classes behave independent of one another.

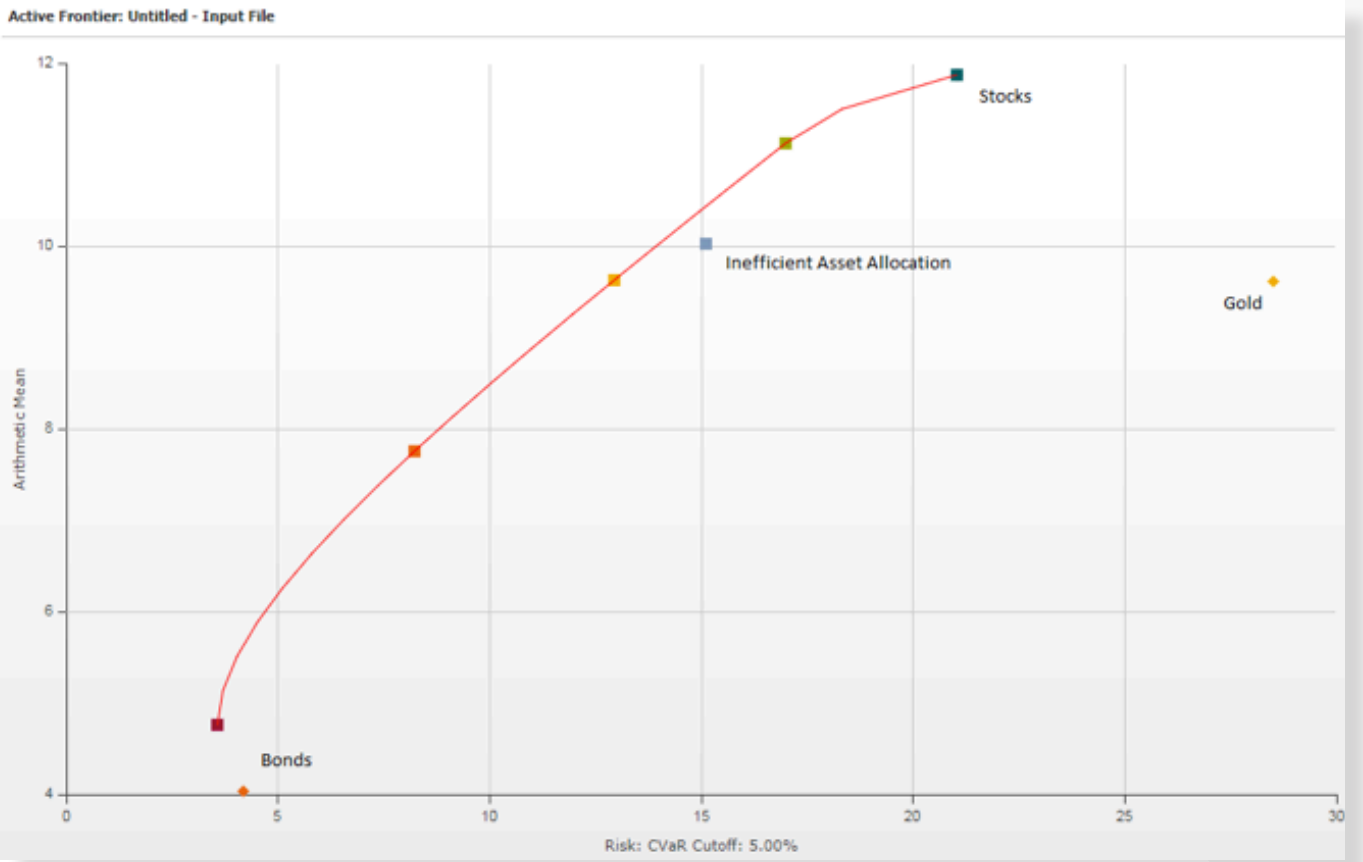
Correlations also show why an asset, which may be undesirable on its own, but as part of a portfolio, may play an integral role in reducing the risk of the portfolio. For example, historically a mutual fund that only short-sells stocks has done very poorly, earning large negative returns with high risk levels. However, because it has a negative correlation with stocks, it is able to provide high returns when stocks are doing poorly.

The Optimization Process

Just as each individual asset class has its own risk and return numbers, each asset allocation has its own risk and return numbers. The optimization process begins with inputting all of the asset classes and their risk, return, and correlation characteristics into an optimization software. Then the software runs through every possible combination of the asset classes to calculate the expected return and risk of each allocation.

This results in what is called the **efficient frontier**. The efficient frontier is the portfolio that has the greatest expected return for a given level of risk and the least amount of risk for a given level of return, at each point of risk and return. The efficient frontier is represented by the red line in the below graph.

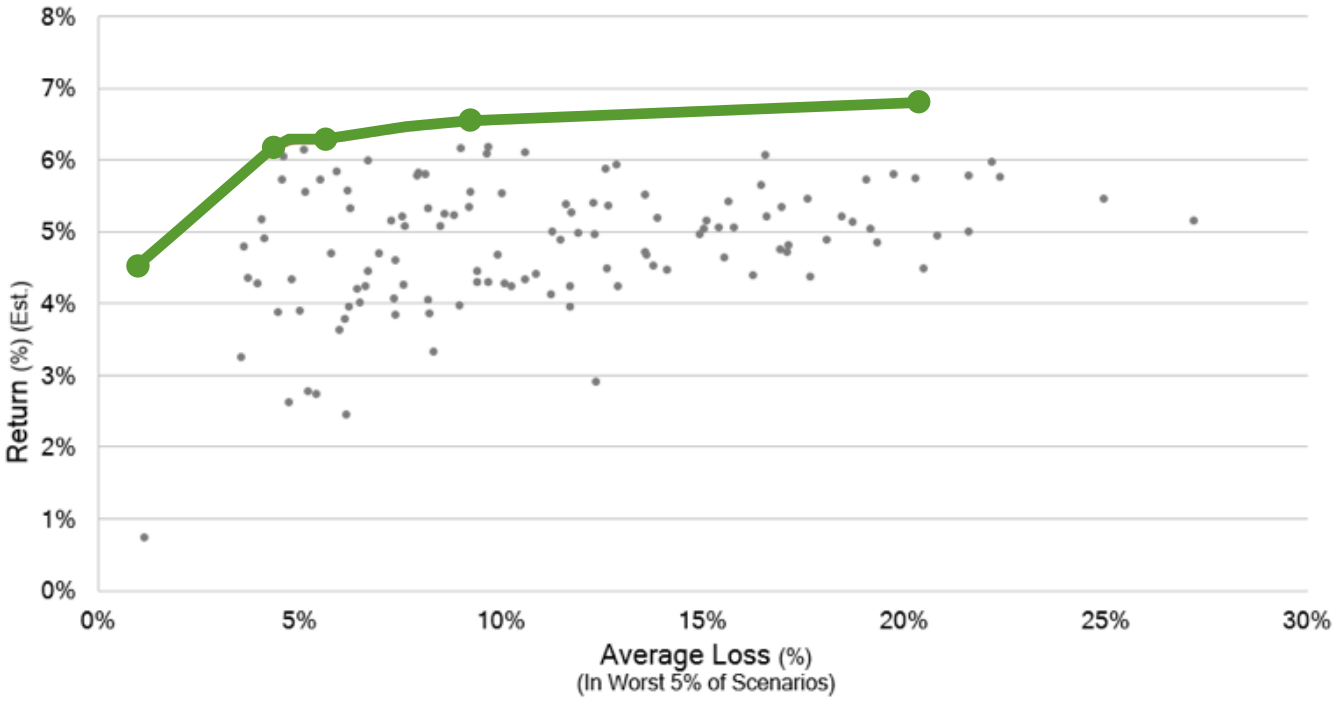
Asset allocations are marked along the efficient frontier. The optimization software returns asset allocations, which are also presented below.



Name	Stocks	Bonds	Gold
Portfolio 1	9.27	90.73	0.00
Portfolio 2	39.42	49.27	11.31
Portfolio 3	57.52	23.05	19.44
Portfolio 4	72.08	2.11	25.81
Portfolio 5	100.00	0.00	0.00
Inefficient Asset Allocation	75.00	23.00	2.00

The "Inefficient Asset Allocation" is called inefficient because it does not lie on the efficient frontier. Note that the frontier contains asset allocations that have both 1) the same return for a less amount of risk (the frontier is to the left of the inefficient asset allocation), and 2) the same amount of risk but with a greater expected return (the frontier is above the inefficient asset allocation). When one understands the process required to achieve optimal asset allocation, one also understands why "educated guessing" rarely results in an optimal asset allocation, as it is difficult to arrive at the same asset allocations as the mathematical approach with luck alone!

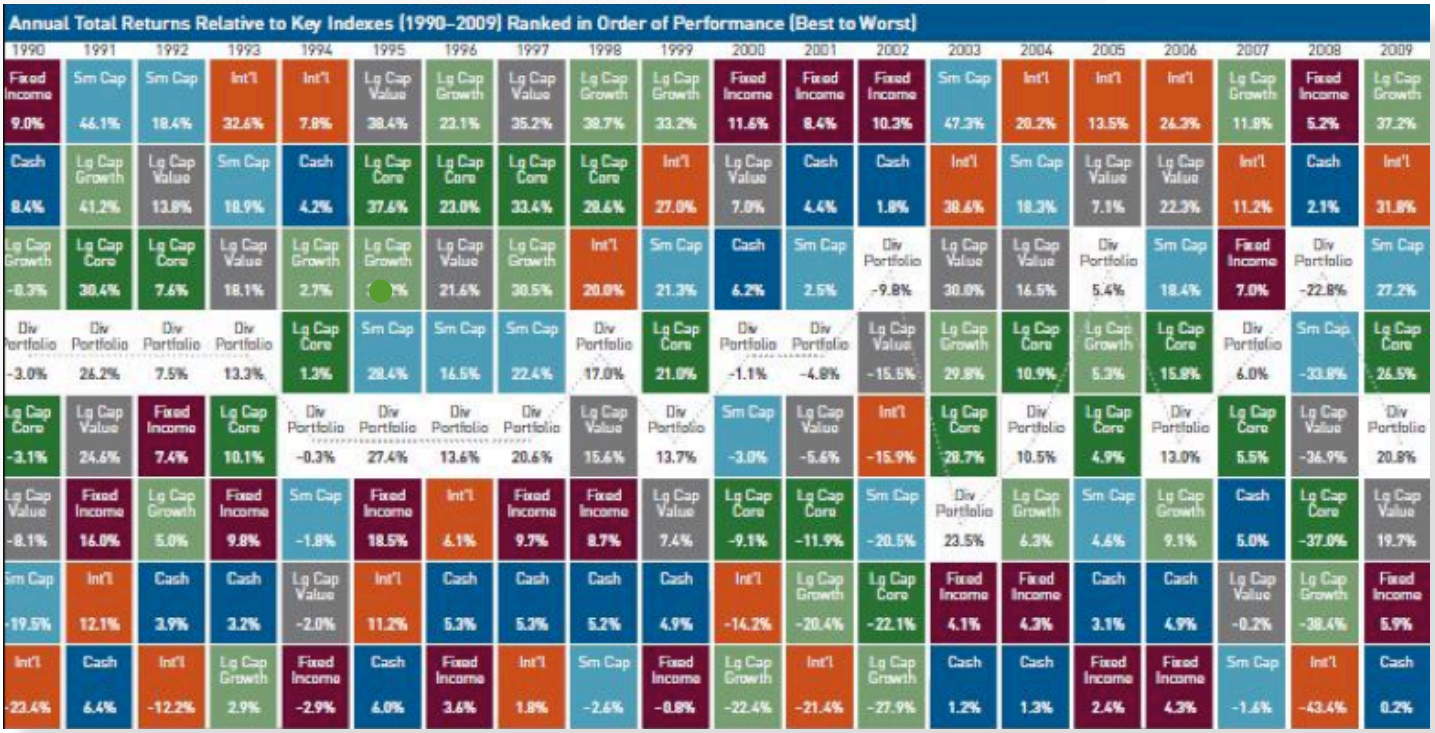
To demonstrate this, First National Bank conducted an experiment by which employees filled out their desired asset allocations on paper without the ability to run calculations. They were, however, given detailed information about each possible investment. Then investment officers ran the employee asset allocation suggestions through the optimizer software to see how close the employees came to optimal allocations. The results point to the fact that "educated guessing" typically results in inefficient portfolios, sometimes to a large degree.



Diversification

A proper asset allocation is critical to the long-term performance of an investment portfolio by ensuring effective investment diversification. Diversification serves to reduce portfolio risk while maintaining return. This chart[4] is a popular demonstration of why diversification is important; it shows how individual asset class returns may be volatile from year to year, but over time a diversified portfolio provides stable returns[5]. Note that the asset class names are not as important as the stability of the white-colored boxes, which signify a diversified portfolio.

Proper diversification should not be confused with "label diversification." Label diversification is when investments that appear to be different are actually driven by the same risk factors. For instance, an investor might split up their assets between an S&P 500 Index Fund and a Russell 1000 index fund. This would be an example of label diversification, since all of the companies within the S&P 500 index are also contained within the Russell 1000 index. These indices would both be classified as "large-cap stock funds."[6]



Choosing an Asset Allocation

The next step in the investment management process is to choose the asset allocation that best fits the needs of the investor. This is done through meetings with First National Bank Fiduciary Officers and Investment Officers and through clients completing a risk tolerance questionnaire. While all of the asset allocations on the efficient frontier may be the best combination of asset classes for that level of risk and return, a client seeking a low-risk portfolio would not be happy having a high CVaR portfolio, no matter how efficient it may be for that level of return.

About First National Bank *We want to be your partner in creating a plan that secures and empowers your financial prosperity, while giving you the ability to care for your family today and for generations to come. Contact First National Bank today by calling (217) 935-2148 to schedule your prosperity planning meeting.*

[4]Blackrock

[5]This chart is often referred to as a Callan Periodic Table of Investment Returns, after Callan & Associates, the firm that first created this chart.

[6]This sort of investment also creates an advanced statistical problem with calculating correlations known as multicollinearity. Correlations cannot be calculated when one investment is a subset of another investment.