The Economic Markets and Risk-Adjusted Economic Value

Economic Markets

The Economic Markets are defined as all global economic wealth, including stocks, bonds, and derivatives traded on financial markets, real estate, government assets, and even futures on individuals' salaries. Economic Markets contain global systemic risk. This is Economic Market Risk (EMR), which could be referred to as Market Risk, although the term Market Risk is more ambiguous since the shortened term may just refer to the systemic risk in the financial markets. The dynamics and risk/reward profile of the Economic Markets are determined by the actions and inactions of actual or potential shareholders, governments, and individuals around the globe.

Risk-Adjusted Economic Value

The goal for enterprises is to maximize RAEV.

Even a governmental agency or a non-profit is influenced by the Economic Markets – purchase prices, employee salaries, land values, etc. When the stated goal of an enterprise seems to be "intangible" (e.g., EPA wishing to protect the environment through lower pollutant levels), these intangibles need to be mapped to RAEV so that decisions can be made in a consistent manner. For a publicly-traded corporation, the goal is clear and always the same. Any other goal would violate the fiduciary duty of the company, in spirit and perhaps even legally.

A sufficiently accurate Enterprise Options Management model will contain many possible states of the future world. Each choice has an RAEV that is calculated as the sum of all future value possibilities, probabilistically-weighted and discounted. The values are derived from explicit cash flows and non-specific opportunities and effects. The non-specific opportunities and effects could result in cash flows (positive or negative) at some point in the future but cannot be made more specific, so they are translated to RAEV directly. Probabilities give the proper weighting to the likelihood of each possibility (including possible risks), quantifying the degree of belief that, given current information, the possibility will occur. Discounting provides proper weighting of long-term versus short-term values, accounting for the EMR of each possible cash flow scenario through any information about the relationships between the relevant uncertainties and the Economic Markets. As our intuition would suggest, the more the Economic Markets tend to rise upon a given change in state, the higher the discount rate (one way to think of this is that a dollar buys less when prices are higher). The exact discount rate will reflect the world's attitude toward risk and reward. Accordingly, when there is no perceived relationship between a state change and the Economic Markets, that state change must be discounted at the "risk-free" rate. The risk-free rate is the lending rate when there is complete certainty of being paid back fully and on time.

Arbitrage

Wall Street values derivatives (e.g., options) of market-traded assets like stocks by removing any arbitrage opportunities.

One of the major benefits to modeling with the goal of maximizing RAEV is that all arbitrage opportunities are automatically removed. With a different goal, we'd either have to ignore or explicitly model market trading opportunities. For example, if we used a constant discount rate throughout a model, we could always borrow money and invest in a risky market opportunity that would give us an expected return that exceeds the constant discount rate. Explicitly modeling every trading opportunity would be extremely burdensome and make even the simplest models too complex and impractical, while RAEV allows us to focus on modeling the essential business problem.

Arbitrage opportunities occur when a trader can make money with no risk, for example, by buying corn in Chicago at one price while simultaneously selling that corn in New York for a higher price. Obviously, these opportunities are rare and don't last long. At any instant, owning an option on a stock is equivalent to owning both some fraction of that stock and some fraction of a risk-free bond. In essence, the arbitrage trader could *replicate* the option by buying the stock and bond. The purchase fractions are nearly continuously changing yet the value of that option will always stay extremely close to its equivalent value in terms of stock and bond because otherwise there would be an arbitrage opportunity for a trader. The exact value of a simple call option on a stock (option to purchase the stock at a pre-set price) was solved analytically by Fischer Black and Myron Scholes resulting in the famous Black-Scholes formula. Robert Merton made the observation that the removal of arbitrage was necessary for the proper interpretation of the solution. Scholes and Merton won the 1997 Nobel Prize in Economics for their work (Black passed away in 1995).

Market participants have the option to invest in risk-free bonds and have shown a preference for larger and more certain payoffs. Therefore, we expect that the whole of the Economic Markets will have an average future growth rate that is higher than the risk-free rate. For decisions and valuations that can be made using replication techniques, maximizing RAEV leads to the same decisions and valuations.

Proxies for the Economic Markets and Risk-Free Rate

For modeling purposes, we need to find proxies for the Economic Markets and the risk-free rate that are as close as possible to the real thing. Unfortunately, many large economic summaries like GNP and GDP are simply snapshots and don't contain sufficient information about the future. We'd like a proxy that is easy to relate to because it is simple and well-known, that covers or is highly correlated with all major industries, and that has a long historical data record. Most often, an historical data summary will represent our best expectations about the Economic Markets going forward. The S&P500 Composite Index is perhaps the only choice that meets these requirements. For example, Ibbotson's "Stocks, Bonds, Bills, and Inflation 2009 Classic Yearbook" was the premier data source for US Capital market returns in 2008. This yearbook

contains market data over the relatively long time period of 1926-2008 and found that the S&P500 has a geometric mean of 11.2% and a standard deviation of 19.2% over that period.

Historically, there has been a sizable positive correlation between the return of stocks and bonds. Therefore, our estimate of the S&P500's future growth rate should consider the current risk-free rate. To define the risk-free rate in practice, we should look for a definition that has zero or very low correlation with the S&P500, is easy to track, is forward-looking, and has a long historical data record. The 30-day US Treasury Bill is perhaps the best choice toward meeting these requirements, although it has historically had a low positive correlation with the S&P500.

Asset owners demand to be rewarded for holding risk. An important indicator of how asset owners perceive reward and risk is the expected Price of Risk[1]. Historically, the S&P's Price of Risk against the 30-day US T-Bill has been relatively stable compared to the S&P500's growth rate. Therefore, it is generally preferable to calculate the expected growth rate of the Economic Markets moving forward from the prevailing risk-free rate and a constant Price of Risk and volatility from historical data. Where appropriate, the risk-free rate may be matched to the prevailing U.S. Treasury yield curve (and perhaps its derivatives) and modeled as a known or unknown variable.

As an example, from Ibbotson's 2009 yearbook, we calculated the historical expected growth rate of the S&P500 from 1926-2008 as 9.15% with a volatility of 17.14%, the constant growth rate of the 30-day US T-Bill as 3.54%, and the S&P500's Price of Risk with the US T-Bill as .4130. The numbers we've calculated here are historical and arguments can be made to suggest that our expectations should not merely be averages from the past[2]. Although the S&P500 will usually be the best proxy for the Economic Markets and the 30-day US T-Bill growth rate will usually be the best proxy for the risk-free rate, there may be special cases when other definitions will be better. For most Enterprise Options Management models, small changes in expectations or in the proxies would likely result in second-order effects.

[1] A reward-to-risk ratio called "Price of Risk" is defined as a asset's growth rate plus one-half of the asset's volatility squared minus the risk-free rate with the total divided by the asset's volatility.

[2] See Pablo Fernández's "Equity Premium: Historical, Expected, Required and Implied" at http://www.fma.org/Barcelona/Papers/EquityPremiumHERI.pdf.