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A financial planning rule of thumb that you often hear is that the percentage allocation to safe assets (cash or bonds) should increase with age, and accordingly the percentage allocation to the risky asset (equities) should decline with age. One popular version is that your allocation to equities should be no higher than 100 minus your age. The idea here is that the older you are, the less time or opportunity you have to recover from a market downturn.

Another widely held tenet is that the longer your investment horizon, the greater should be your allocation to risky assets. The idea here is that the standard deviation of return declines with time.

These two ideas seem to be consistent; the older you are, in general the shorter your investment horizon.

However, economic theory is generally not supportive of the notion that your risky allocation should decline with age. Economist Paul Samuelson famously wrote[1] a demonstration of the error of this notion using words of only 1 syllable, so that everyone could understand him. The essence of the argument is that "When you lose – and you sure can lose – with N large, (note: N is the holding period) you can lose real big." While it is true that the probability of loss declines with a longer holding period, the size of the potential loss rises. These two effects offset each other so that if you do not like an investment at a short-term horizon, you should not like it at a long-term horizon.

It is possible to reconcile these views by taking into account the effect of human capital. Human capital (HC) is defined to the present value today of future income. For a given individual, HC increases with education and experience, but eventually declines with age. A person's total wealth is the sum of net holdings of tangible and financial assets (let's call these net holdings "financial capital" or FC) and human capital. A young person's wealth is typically dominated by human capital while a retired person's wealth is entirely comprised of financial capital. Samuelson's argument is that the ratio of risky assets to total wealth should be invariant to age.

In order to accomplish this, the stock weight in the financial portfolio must decline with age. This is because most occupations tend to be more bond-like than stock-like. Since the HC portfolio is bond-like and its relative weight declines with age, the weight on stocks in the financial portfolio must decline with age in order to maintain a constant weight on stocks in the combined HC and financial portfolios.

If it is not age, what then does determine the optimal risky asset weight? The answer is expected return on the risky asset, the volatility of the risky asset, and your degree of risk aversion. In some formulations the optimal weight is proportional to the ratio of the expected excess return to the volatility, where the proportionality factor depends on the degree of risk aversion. This means every investor needs to come up with an estimate of expected return and volatility. Today many economists argue that likely future returns are materially lower than historical returns. This is most obvious in the case of Treasury bonds. Today the yield on long-term Treasuries is less than 3%. This means that the nominal return over the life of the bonds will be less than 3%, well below historical returns. Equities in turn have historically offered a return premium over default free bonds of approximately 6% per year. Even if that premium were to hold in the future, the total return would be lower due to the lower return on bonds.

Bill Gross, the Chief Investment Officer at bond giant PIMCO, claims[2] that the equity premium will be lower in the future due to slow growth in GDP. He asserts that if nominal GDP growth is 3% then stock returns cannot be greater than 3% in the long run, otherwise the value of stocks would explode relative to GDP. Mr. Gross seems to ignore the fact that one component of equity return is the amount of cash returned to the shareholder through dividends or stock buybacks. Indeed, this is historically the greatest component of long-term returns. Thus, the ratio of equity market capitalization to GDP can remain stable even as the equity return exceeds the rate of GDP growth.

Still, Mr. Gross' larger point is a good one – future returns on both stocks and bonds are likely to be lower than historical returns. According to standard asset allocation models, this means that the typical investor's optimal allocation to the risky asset is lower than it would be if expected returns were higher.

This has important ramifications for all investors. For example, in recent weeks the California Public Employees Retirement System (CALPERS) announced a 2011 portfolio return of 1%, well below its long-term target of 8%. While a one year deviation of actual return from target is not by itself all that big a deal, the fact that CALPERS continues to plan for 8% return in an environment that is very unlikely to produce such a return suggests that pressures on California's budget will increase substantially in the future as scheduled pension benefits outstrip investment returns.

And on a more modest level, the likelihood of lower future returns has important implications for individual investors as well. First, you have to save more than you thought. Second, it may be too late, in which case you have to work longer than you thought. The good news is that you can extend the value of your HC by working longer or developing greater skills. This can be an important safety hatch if the value of your FC turns out to be less than anticipated.

[1]Paul Samuelson, "Why we should not make mean log of wealth big though years to act are long," Journal of Banking and Finance, 1979.

[2]Bill Gross, "Cult Figures," PIMCO, 2012.