Time-Referenced Investment Policies

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Executive Summary

- Although much of the financial literature typically assumes a unitary time horizon when discussing risk, in practice, investors often operate across several different time horizons simultaneously. Investment policies should account for these actual investor practices.
- In this article, investment policies are tailored to the changing nature of risk and return across three intended holding periods: one year, one to five years, and five years and longer. Policies should be designed to combat pricing volatility in the short run, often through the significant use of bonds.
- While standard deviation declines dramatically as the holding period increases from one year to five years, it is not a useful measure of risk for longer terms. The investment policy here should be responsive to cumulative wealth and shortfall considerations. This article discusses methods for modeling this risk. Equity allocations tend to rise here, though in some circumstances they may actually decline.
- For very long investment periods, including across multiple generations, the investment policy needs to attempt to maximize and protect net worth positions and lifetime consumption. Asset allocation becomes more flexible and capital gains become more critical.
- The salient points for crafting a model investment policy are then offered. Expanding the investment policies of a portfolio or plan beyond that of a unitary time horizon increases the flexibility of portfolio operation. The investor can adjust short-term asset allocations to maximize long-term economic benefits. By viewing the relevant economic choices to involve consumption today versus consumption tomorrow, investment policies can expand considerably beyond the traditional and more limited trade-off of pricing volatility versus pricing return.

Investment policies should be a critical part of a financial planner's regular activities. Charles Ellis (1998) advocated the development of clearly stated written policies and practices. Investment policies are relevant, and often required, in many institutional settings. For example, the development and implementation of written investment policies constitute basic responsibilities for pension trustees and administrators.

Well-written investment policies will normally include sections on objectives, constraints, policy formulation, performance evaluation, feedback and portfolio adjustment, and general oversight. Policy objectives should evaluate investment risk and list factors affecting an investor's risk tolerance. Policies should clearly identify and fully consider the intended holding periods of a plan or portfolio (IFEBP 2003).

Standard portfolio textbooks, such as Reilly and Brown (2000, at 287), acknowledge the need to change risk definitions across time: "A difference in the time horizon would require investors to derive risk measures and risk-free assets that are consistent with their investment horizons."

Yet much of the literature typically assumes a unitary time horizon. This is a simplifying assumption that is often used without a great amount of analysis being afforded to it. In practice, individual investors and institutions often operate across several different time horizons simultaneously. Investment policies should account for the actual practices of investors, instead of merely relying upon simplifying conventions that do not consider the circumstances of particular investors.

This paper explores the changing nature

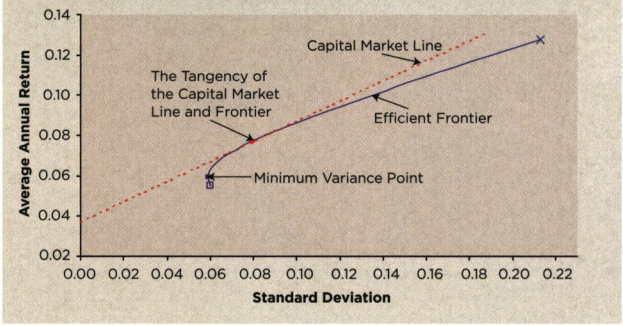
of risk and return over varying time horizons. The theoretical and practical impacts of time upon portfolio composition are considered. Three commonly used time horizons are sequentially evaluated, and investment policies are proposed for each period.

In the Short-Run

In short periods (one year) to near-term periods (one to five years), volatility risk looms large while returns are invariably pricing related. Investors with shorter holding periods should be critically concerned with the distinct possibility of a sudden and unexpected variation occurring to asset pricing. Traditionally, modern portfolio theory and the capital asset pricing model (CAPM) have been used to establish an optimal mix of assets for the given risk and return. Academic research of Fama and French (1992, 1993) has suggested that a three-factor risk model incorporating value, size, and volatility risks may be a good supplement to the CAPM. With either the single-factor risk model of the CAPM or a three-factor model, the definitions of risk and return are still largely focused on asset pricing. Such definitions are mostly suited for short- to near-term time frames, where pricing volatility is a huge problem. Figure 1 aptly demonstrates the risk/return concepts.

The risk/return trade-off can be clearly seen in Figure 1, with the annualized expected return shown on the y-axis and the standard deviation of the expected return displayed on the x-axis. The curve is the efficient frontier, and represents the best available risk/return combinations possible for a two-asset class portfolio. The analysis can be expanded to n assets. A portfolio composed of 100 percent bonds is noted as a box at the bottom of the frontier, while 100 percent equities is marked with an X. The small blue dot on the frontier is the minimum variance point. The dashed red line is the capital market line, which postulates a linear relationship between risk and return of assets. The red dot is the tangency of the capital market line and the frontier. This comprises the optimal allocation of equities to bonds, for the assumed risk/return characteristics of the two asset classes.

Figure 1: Optimal Allocations for Short-Run Periods



Optimality was calculated by the author to be around 30 percent equities, using historical data between 1926 and 2005 for spliced indices composed of broad-based domestic equities and bonds. Optimal allocations will vary substantially, however, depending upon the assumed risk-free rate of return, types of assets contained in the portfolio, the rates of return, variance of return, and correlations among assets. The important point is that asset allocation balances or optimizes the risks and returns of the asset stream. In short-term time frames, bonds will typically make up a significant percentage of an investor's portfolio at optimality.

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The exact point of optimality is referred to as the market portfolio, since a mix of only two index funds (equities and bonds) will generate optimal allocations. Theoreticians will often recommend the broad diversification of assets so as to emulate the market portfolio at optimality. With proper diversification, firm-specific risk can be eliminated, leaving only market-level, systematic risk to face.

While many portfolio texts normally use the 90-day Treasury bill as the risk-free rate of return, many long-term investors who shorten their time horizons for near-term funding needs will view the risk-free asset from a different perspective. Campbell and Viceira (2002) argue that cash instruments, such as T-bills, will not be riskless, as there will be reinvestment risk to contend with from interest rate shocks and inflationary pressures in the economy. Inflation-indexed bonds will provide a much lower risk, in real terms, than will cash or near-cash instruments. These types of bonds generate stable, real returns that can match short-term liability needs. This

Figure 2: Cumulative Wealth Index

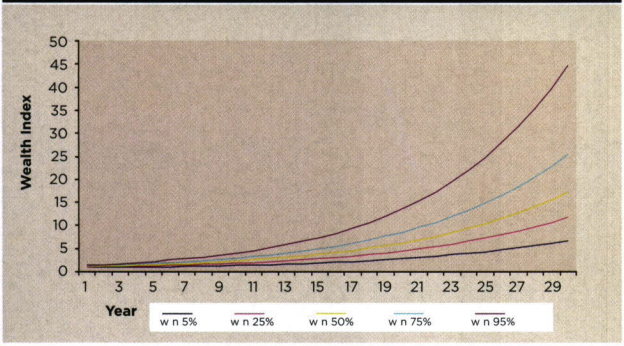
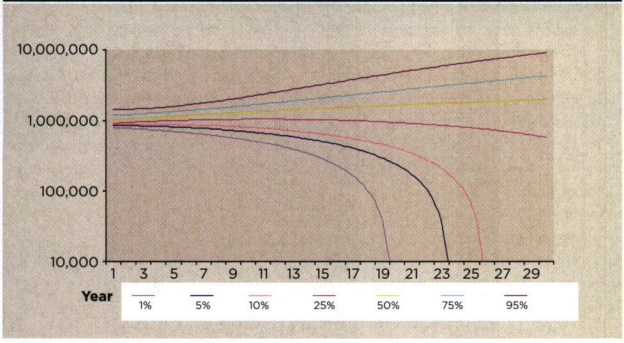


Figure 3: Monte Carlo Simulation of Net Wealth



generally supports the above findings of higher bond allocations in the shorter periods, only with inflation-indexed bonds constituting the cash portions of the portfolio. The use of bonds and inflation-indexed instruments is consistent with long-standing financial practice recommendations to increase bond allocations as time horizons shorten.

In the Longer Time Horizons

By as little as a five-year holding period, standard deviation is reduced by 50 percent from that of a one-year hold. This does not mean, however, that all forms of risk dissipate in longer time frames. It would be a huge mistake, in fact, to suggest that risk is reduced merely because standard deviation goes down in the longer time frames. Standard deviation should only be used to compare risks among assets in the same holding period.

With traditional measures of risk not being overly useful for longer horizon investing, other measures come to the forefront. Multiple-horizon investors will not be so concerned with single-period returns as they are with returns to cumulative wealth. The rate of return in any one year gives way to the return on wealth over all periods of time.

Moving toward risk and return parameters that are compounded across time is consistent with these thoughts. Ibbotson (2005) believes that risk and return across time should be analyzed through notions of cumulative wealth. This is done by calculating the optimal portfolio rates of return in any one time frame, and then compounding lognormal return data over successive periods of time. Pricing volatility risk is still important, but only as one variable of a cumulative wealth calculation. Cumulative wealth is visually described in Figure 2.

Figure 2 sketches out a cumulative wealth index across time, for five different levels of confidence. Note the ever-expanding range of wealth over time. Liability-related items are thereby introduced into an analysis that, up until now, has focused solely on the asset streams. As the range of terminal, end-period wealth increases, the risk of not being able to fully fund investment objectives also increases. Short-term pricing volatility may be stamped out across time, but another menacing risk emerges to takes its place: that of the probability of shortfall from attaining investment objectives.

Shortfall risk can be modeled in a variety of ways. Roy (1952) was the first person to propose a liability type of measure with his safety-first criterion. Rather than optimizing assets in isolation of liability streams, a point along the frontier was selected that corresponded to a threshold rate of return necessary to fund the liabilities. Another method is asset-liability modeling (ALM). Actuaries and accountants have been very active since the 1970s using ALM to match assets with liabilities for each time frame. Currently, ALM is required in many defined-benefit situations to ascertain the economic well-being of pension funds.

Econometric methods such as Monte Carlo simulations have also been devised to estimate the abilities of the asset stream to sufficiently fund the liability stream. Figure 3 shows a hypothetical $1 million portfolio

having an annual withdrawal of $50,000 plus a 3 percent cost-of-living adjustment. The author conducted 500 trial runs on the assumed facts, using a constant 40/60 allocation of stocks/bonds. The hypothetical generally follows a Monte Carlo example given in Ibbotson (2005), with some modifications in the assumptions and procedures.

For the given hypothetical, Figure 3 displays the probability of shortfall from stated investment objectives, to various degrees of confidence. Note that complete portfolio failure occurs by year 19 at the 1 percent level, by year 23 at the 5 percent confidence level, and by year 36 for the tenth percentile. Failure will occur even at the 25th percentile if given enough time. This type of economic projection provides an excellent way in which to evaluate funding risks at the extremes.

With the previous hypothetical, if portfolio sponsors want to lower the probability of shortfall, investment policies could be changed. Specifically,

- Stock-to-bond allocations could be adjusted to increase expected returns.
- Certain assets could be added to the portfolio (international, alternative) to increase portfolio expected return and possibly reduce portfolio volatility.
- Downside risk could be battled with the addition of defensive assets to the portfolio, or through the use of hedged positions and financial derivatives.
- If all else fails, additional assets (contributions) may be needed or liabilities (benefits) may have to be reduced.

As time horizons are lengthened, investment policies should reflect the changing nature of the risks involved. No longer is the investor exclusively concerned with an asset's mean average rate of return and variance of return. The probability of shortfall, within stated confidence levels, becomes the relevant risk facing investors. Allocations are dependent on both the assets and the liabilities. While equity allocations may be increased to lower the likelihood of shortfall, this is not an inevitable result: equity percentages may decrease in order to reduce the range of cumulative wealth. This would occur in situations where sufficient assets already exist to cover the anticipated liability stream, with the investor being more concerned about capital preservation issues rather than capital accumulation goals.

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Intergenerational Views of Investing

As time horizons extend into decades, the investing landscape again shifts to reflect the changing economic choices. Institutions, pension plans, and corporations routinely plan for these time frames. Individuals accustomed to regular investing over the course of their economic livelihood also can have very long horizons.

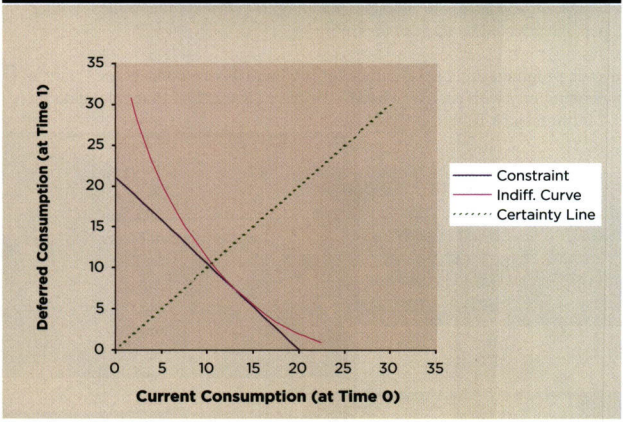
With very long holding periods, investors may see the various investment institutions, customs, and practices in sociological as well as economic terms. Investing is no longer just an economic undertaking—it is a way of life for these investors. Complex adaptive behavior may better describe the way in which long-term investors relate to the world (Hagstrom 1999). The capital markets and investment arenas are seen as a complex mix of economic and social entities that change and adapt in response to the shifting attitudes of the general population of investors.

Deferral of capital gain taxes becomes a critical component of a long-term investor's policies and views. An investor may be loath to ever sell, for he or she will be taxed on the gain, thereby lowering the ability of assets to compound and grow over time. A sale also may come at an inopportune time before the full reversionary tendency of assets becoming evident. Buys may become infrequent as well, as the investor is only interested in the best firms within each industry, and then only if the investor can buy companies for reasonable valuation levels.

This may explain why many investment managers will have either concentrated holdings of private businesses or focused value-oriented portfolios of publicly traded assets. The emphasis will be on quality, growth, and value of business activity, rather than sheer quantity. Academic research as far back as the 1960s found that a limited number of equities—as few as 10 to 15—provided virtually all the benefits of diversification (Evans and Archer 1968). A relatively small number of equities in a mix of international and domestic equities could lower systematic risk levels while also being fully diversified (Solnik 1976). Currently, a somewhat greater number of assets may be needed to combat firm-level risk. This is due to higher volatility and correlation levels among many assets, but 50 to 75 equities may still be sufficient for diversification purposes in today's market environment.

The chief danger for investors with very long horizons becomes the fluctuation in their net worth positions. They see the investing experience in terms of consumption choices, with the investor maximizing his or her lifetime consumption. Instead of the principal choice being between pricing risk versus return, the primary economic decision is one of consumption today versus consumption tomorrow. Investors will want to smooth their current consumption to stable and predictable amounts while maximizing consumption over their entire economic lives. The relevant risk is the variability of lifetime consumption.

Figure 4: Lifetime Consumption



Dynamic programming, initially developed by Richard Bellman (1953), can model these types of economic choices and preferences. Many scholars, such as Eeckhoudt, Gollier, and Schlesinger (2005), as well as Gollier (2001), feel that the method presents a significant advantage for long-term investors. [Editor's note: For more on consumption smoothing and dynamic programming, see "Economics' Approach to Financial Planning" by Laurence J. Kotlikoff in the March 2008 issue of this journal.] The objective is no longer to secure a high return in every single time period. The focus is now on lifetime investment goals. The investor can be more flexible in asset allocations, shifting risk aversion preferences according to changing economic conditions at the aggregate and individual levels. Figure 4 depicts the economic choices involved.

Figure 4 displays a two-period consumption choice. The curve (in pink) sketches out the consumption choices that the investor is indifferent to, while the blue line depicts the budget constraint. The dashed green line is referred to as the certainty line, which would result if consumption choices are equally preferred between the different time periods. The point of optimality or equilibrium occurs at the tangency of the indifference curve and the budget constraint. Note the similarity of analysis with the point of tangency of the efficient frontier and the capital market line. The preference for current consumption was set at 57.5 percent and deferred consumption at 42.5 percent. This resulted in a shift in the indifference curve toward current consumption. If consumption were the same for both periods, the tangency of the budget constraint and the indifference curves would occur at the certainty line.

> "When time periods are made part of the process, the basic choice of immediate consumption versus deferred consumption becomes more evident than with modern portfolio theory."

When time periods are made part of the process, the basic choice of immediate consumption versus deferred consumption becomes more evident than with modern portfolio theory. The advantage of a long-term investment perspective comes from the investor being able to break up the risks on lifetime consumption into smaller, discrete components of shorter holding periods. The investor can then adjust exposure to risky assets in these shorter time frames in order to maximize lifetime consumption.

Model Investment Policies

The following is a brief outline of the salient points to consider in crafting in-depth investment policies incorporating all relevant holding periods. The final language should be considerably expanded upon, but it at least provides a framework for investment policies across varying time frames.

- In the short run, the relevant risk and return should be defined in pricing-related terms.
- Diversification of assets is a critical and necessary component of appropriate policies. In the short run, diversification is needed to reduce pricing volatility. In the long term, diversification can mitigate the variability of more fundamental risks, such as the variability of free cash flows.
- The allocation of assets is also a vital part of any investment policy, as the allocation decision will establish the primary risk/return structure of the portfolio.
- The exact percentage of assets allocated to each of these positions depends on the time frame of investment, the risk/return objectives of the portfolio,

and the investor's risk tolerances. A 60/40 equity-to-bond allocation may be a good starting point in the analysis. In longer periods, the investor should be able to tolerate more short-term pricing volatility, and therefore concentrate more in equities. With greater risk tolerance, the investor also can prefer equities over bonds. Further, basic risk/return parameters will affect the desired or needed allocation. Conversely, as the time frame decreases or risk aversion increases, equity percentages should decrease.

- Once the core of a portfolio is established, portfolio managers can consider style, size, country, and industry allocations of the Fama and French multi-factor modeling process. This can potentially generate higher returns while still maintaining a fully diversified portfolio.
- At all times, however, it is imperative to keep expense ratios and tax impacts extremely low. Otherwise, the portfolio is doomed to under-perform. The overall goal should be to generate risk-adjusted alpha on a post-tax, post-cost basis, and to do so on a long-term, compound annualized basis. It also may be difficult to find skilled managers who will outperform in the future. Indeed, reversion-to-the-mean tendencies exist on the performance statistics of out-performing fund managers as much as they do on individual assets (Carhart 1997).
- As time frames lengthen, the goal of short-term outperformance should give way to the probability of shortfall and underfunding of investment objectives as the primary forms of risk that face investors. Assets should be matched with expected liabilities across all intended time frames of investment.
- As time frames become inter-generational in nature, the investment focus again shifts, now toward the maximization of lifetime consumption. The basic allocation decision can be even more important here, as investors can deliberately change short-term asset-class allocations in order to maximize long-term utility (Eeckhoudt, Gollier, and Schlesinger 2005). The ability to adjust short-term allocations is a distinct economic advantage for anyone emphasizing long-term consumption choices.
- As a final thought, the deep desire of the financial community to dissect asset pricing into component parts in a quest to outperform may be a peculiar endeavor of short-term thinking patterns. With long-term risks shifting away from pricing volatility and toward the probability of shortfall and the variation in lifetime consumption, more attention should be given to overall portfolio management and less to the daily gyrations of asset and market-level pricing. Individuals and managers alike would be better served by adopting long-term investment beliefs and philosophies that optimize consumption over a lifetime of decisions involving economic choices under conditions of uncertainty.

Conclusion

The meaning and measure of risk and return changes over the course of the intended holding period, and investment policies should be tailored to reflect those changes. Investment managers should be concerned with pricing risk in the shorter time frames and take measures, largely through diversification and allocation decisions, to combat and shift such risk. In the longer periods, investment policies should focus on shortfall scenarios, with liabilities being made part of the analysis. In very long time frames, investment policies should attempt to stabilize annual consumption and ensure that consumption across an investor's entire life (and even across an entire family's life) is protected and maximized.

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