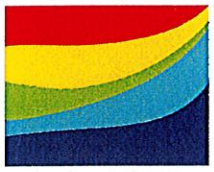

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Risk-Returns for Strategic Financial Planning

by

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Strategic financial planning is concerned with estimating the impact of portfolio choice on meeting investment objectives over time. The portfolio's stock/bond ratio is widely considered the single most important investment decision and measure of risk affecting long-term investment performance.[1]

Strategic financial planning requires estimation of long-term risk-return relationships of liquid, diversified, and economically representative stock and bond capital market indices. Historical returns of major stock and bond capital market indices are the starting point for estimating portfolio risk and return. Long-term index returns are available for a number of representative asset classes. It is noteworthy that this practical investment problem is associated with estimation of the equity return premium, one of the open questions in modern finance.

Estimates of portfolio risk and return for contemporary financial planning are given for the six AssetMark investor stock/bond risk profiles: 20/80, 40/60, 60/40, 75/25, 90/10 and 100% equity. Methods of defining an appropriate investment policy over time relative to stock/bond risk-return estimates, funding levels, investment plans, objectives and risk preferences are discussed in Michaud (1981, 1998 Ch. 10, 2003) and included references.

Long-Term U.S. Capital Market Returns

Reliable major U.S. capital market historical stock and bond index returns have been available since 1926.[2] The average annual return of large capitalization U.S. stocks relative to U.S. Treasury bills from 1926 through 2005 is 8.5%. The large cap index standard deviation for the period is 20.2%. T-bill returns averaged 3.8% with a standard deviation of 3.1% and return premium of 0.7% over inflation during the period. T-bills have a -0.02 correlation with large cap equity indices.[3]

Long-term historical return data is a useful benchmark for estimating risk and returns in capital markets. However, historical return data needs to be adjusted so that it is consistent with current and reasonably anticipatable market conditions to be useful for planning purposes. Expected long term core CPI and PCE inflation rates are estimated as 3% annually; the yield of U.S. treasury bills is roughly 5%.[4] A historical return premium of 8.5% relative to current yield implies a 13.5% estimate of large cap U.S. equity index returns. However, the current premium for U.S. T-Bills relative to inflation is large relative to historical norms. A more conservative estimate of equity returns may be based on an inflation rate of 3%, a government Treasury bill annual premium of 0.5% or 3.5% return,

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[1] Brinson et al (1986, 1991).

[2] The Center for Research in Security Prices (CRSP) stock return databases began in 1926. Original studies of CRSP stock market returns and risk include Fisher and Lorie (1968, 1970).

[3] Estimates are taken from Ibbotson 2006 Yearbook. Stocks, Bonds, Bills, and Inflation. Chicago, Il.

[4] Federal Open Market Committee Minutes of Aug 8, 2006 state that "while inflation risk remain", "core PCE inflation likely would decline gradually from its recent elevated level". At this writing, the last quarter's inflation rate was estimated to be 3.5% – 4.0%. Past commentary indicates that FOMC member's inflation targets preferences are for 1-3% over core PCE. Another indicator of inflation is the spread between inflation indexed and straight Treasury Securities, which is about 2.5%. We assume a 3% inflation rate as currently appropriate for long-term financial planning purposes.

resulting in a large cap equity return estimate of 12.0%. Table 1 displays risk and return estimates for various stock/bond mixes based on long-term return data adjusted for a 3% inflation rate.

Table 1: Long-Term Stock/T-bills Risk-Return Estimates (%) 1926 – 2005*

	20/80	40/60	60/40	75/25	90/10	100
Return	5.2	6.9	8.6	9.9	11.2	12.0
Risk	4.7	8.3	12.2	15.2	18.2	20.2

* Correlation of -0.02 between stocks and T-bills.

Relevant Historical Index Return Data

The problem with long-term historical index return data is its relevance for estimating risk and return for contemporary financial planning. In particular, how relevant is investment risk and return measured during the early and mid twentieth century for financial planning in the early twenty-first century? Capital markets and economic conditions reflect very different investing environments. Revolutionary developments have occurred in communications, derivatives, regulation, accounting, politics, investment strategies, and economics.

From a theoretical point of view the "market" is defined as the universe of all investable assets. There are many practical issues to consider when defining the market of investable assets for investment. One problem with long-term equity index returns in Table 1 is that the equity "market" today consists of much more than large capitalization U.S. stocks.

International stocks are now widely considered a component of the equity market for asset management. However, very little international investing occurred and little reliable international index returns were available prior to 1970. Also, prior to the 1970s, the dollar was fixed relative to gold for much of the twentieth century. If international stock indices are included in defining the financial planning equity market, it is reasonable to exclude historical returns up until the mid 70s when the dollar was then allowed to float freely and international investing became practical. While foreign equities may not necessarily provide superior returns and may exhibit more risk than domestic stock indices for a U.S. investor, long-term evidence suggests that the combination of U.S. and foreign equities may be a superior investment over either (Michaud 1996 et al).

An associated issue is the importance of small capitalization stocks in defining the financial planning equity market. Small cap U.S. stocks and non-U.S. emerging market stocks are a standard of contemporary investment management. A practical definition of the equity market for investors in the twenty-first century includes large and small cap U.S. stocks and developed and emerging international stocks.

Other asset classes are often considered as part of a well defined investment program. Popular alternatives to traditional stock and bond indices include real estate, hedge funds and private equity. But alternative asset classes often represent hard-to-measure risk assets and are beyond the scope of this study. For simplicity and transparency among

other reasons, focus is directed to stock/bond risk-return estimates confined to the four major equity market classes and a representative comprehensive bond index.

Index Choice

The Russell 1000 and 2000 stock market indices are used for defining risk-return estimates for large and small cap U.S. stocks.[5] The Russell indices are available since 1979. They are representative of much of the investable stocks in U.S. capital markets. One important benefit they provide over other long-lived U.S. stock indices is that they represent a consistent and transparent construction process for small and for large cap stocks.[6] The Morgan Stanley Capital International (MSCI) Europe Asia and Far East (EAFE) and Emerging markets indices used for defining risk-return estimates for non-U.S. stocks.[7] These are standards for international investment, as extensively available as any other set of indices, and managed relative to float, investability and other issues of concern in foreign markets. The Lehman Bros aggregate bond index is a long lived broadly representative comprehensive standard for U.S. fixed income markets.[8] Except for MSCI Emerging markets index, available since January 1988, all the other indices are available since 1979. The 79-05 historical period provides ample historical return data for financial planning risk-return estimation.

Estimating Risk-Return

The historical period 1979-2005 was chosen in part to accommodate the continuous availability of desirable index returns. However, emerging market index returns were unavailable until January 1988. Estimating risk and return when one or more of the indices has missing data is a common problem. In many studies, return data from one period is used for some indices and other time periods for others. Such practices are neither rigorous nor justifiable. Particularly troublesome issues include estimating correlations reliably.

The EM algorithm is a maximum likelihood statistical procedure designed to optimally estimate risk-return parameters with missing data. The EM algorithm is a well understood procedure designed for this purpose.[9] The EM algorithm avoids arbitrary decisions for parameter estimation. The data reported in Table 2 uses the EM algorithm to estimate risk and return for the major capital market equity indices used in this study.

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[5] Russell Investment Group. "U.S. Equity Index Values." *Russell.* www.russell.com/us/indexes/us/index_values.asp (March 17, 2006).

[6] Obvious alternatives are the large and small cap Ibbotson indices. The Ibbotson large cap and Russell 1000 risk-return estimates are virtually identical over the period of the study: 1979-2005. However, the Ibbotson small cap and Russell 2000 risk-return estimates are substantially different over the same period.

[7] Morgan Stanley Capital International. "Equity Indices." *MSCI.* www.msci.com/equity/index2.html (March 16, 2006).

[8] Lehman Brothers. "Global Family of Indices." *Lehman Live.* www.lehmanlive.com (March 16, 2006).

[9] One standard reference is Carlin and Louis (1996). The financial problem raised with any missing data technique is that the existence of an index would have modified the investment environment and affected existing indices.

Geometric versus Arithmetic Returns

One of the more enduring misunderstandings of estimating risks and returns for financial planning is the confusion between geometric and arithmetic returns. Mathematically, the geometric mean is always less than the arithmetic mean. A familiar example demonstrates the importance of understanding the difference between the arithmetic and geometric mean of returns. Assume a 100% return followed by a -50% return. The arithmetic mean return over the two periods is 25% but a dollar grows to 2 dollars and ends up at 1 dollar at the end of the second period. The geometric mean gives the correct measure of return over the two periods, 0%.

Table 2: Equity and Fixed Income Index Risk and Returns (1979 – 2005 data)

	Large Cap	Small Cap	EAFE	Emerging	Govt/Corp
Return	13.8%	14.4%	11.8%	19.2%	8.8%
Risk	15.2%	19.4%	16.8%	23.3%	6.2%

Which return measure, arithmetic or geometric, is appropriate as a basis for defining risk and return for financial planning? As Michaud (1981, 2003) shows, the geometric mean is a function of the length of the investment horizon as well as the return distribution. In contrast, the arithmetic mean is a direct measure of the return distribution that does not depend on the investment horizon. From a practical point of view, the geometric mean typically underestimates investment return and often leads to unrealistically risk-averse investment decisions.

Equity Risk and Return

Defining the risk and return for equity market investment requires a weighting scheme of the four major equity asset classes. The natural weights are the capitalizations of each market. The problem with using the capitalizations of the indices is that they have varied widely over the historical period and even significantly over relatively recent periods. The appropriate answer is to use current capitalization weights with some judgment. This framework provides an appropriate risk-return estimate for an individual planning for the future. Table 3 provides the capitalization weights for estimating equity portfolio risk and return in this study.

Table 3: Equity Market Cap Weights (%)

	Large Cap	Small cap	EAFE	Emerging
Percents	46%	4%	43%	7%

Table 4 provides our estimates of equity and fixed income risk and returns based on the results of Tables 2 and 3. The estimate of the geometric mean assumes a twenty-five year investment horizon. Table 5 provides arithmetic mean estimates of risk and return for the six AssetMark investor risk profiles adjusted assuming a 3% inflation rate.

Table 4: Stocks and Bonds Strategic Risk and Returns 1979 - 2005

	Return*	Geo Mean**	Risk***	Corrs		
Stocks	12.3%	11.4%	14.4%	1	.12	-0.17
Bonds	7.8%	7.6%	6.2%	.12	1	-.03
Inflation	3.0%	3.0%	1.2%	-.17	-03	1

* Adjusted for current 3% inflation rate (4% historical). ** Twenty-five year horizon. *** Correlations based on 1988 – 2005 returns.

Table 5: Strategic Stock/Bond Risk-Return Estimates (%) 1979 – 2005

	20/80	40/60	60/40	75/25	90/10	100
Return	8.7	9.6	10.5	11.2	11.8	12.3
Risk	6.0	7.2	9.3	11.1	13.1	14.4

Discussion

It is of interest to compare the results in Table 5 to those in Table 1. A more relevant "bond" index for investment results in increases in return in Table 5 for high bond allocations; however, high equity allocation returns are relatively similar. The use of a more "diversified" global equity market portfolio in Table 5 results in significantly less risk relative to Table 1 for all but high allocations to bonds.

There are important assumptions implicit in Table 5 results. The risk-return estimates in Table 5 are designed for strategic financial planning not tactical investment management. Short-term or tactical estimates are typically forecasts of risk and return for short periods of time. In contrast, Table 5 risk-return estimates are not forecasts but computations of risk and return based on historical capital market returns adjusted for contemporary economic, financial and other considerations. Strategic estimates assume a reasonably long-term investment planning horizon and that portfolio mean and variance of return relative to the stock/bond mix is the appropriate portfolio risk measure.[10]

Summary

A portfolio's stock/bond ratio is widely considered to be the single most important investment decision affecting investment performance over time. Financial planning requires appropriate current estimates of risk and return for various stock/bond mixes.

Relevant historical return includes small and large cap domestic and international equity indices and a comprehensive long-lived bond index. The Russell 1000 and 2000 U.S. stock indices and MSCI EAFE and Emerging Markets equity indices with the Lehman Bros. aggregate bond index was used to estimate risk and return for investment for the six AssetMark stock/bond risk profiles. The period 1979-2005 was used to estimate risks and returns. Table 5 summarizes the results adjusted for the current 3% inflation rate. Methods for estimating the investment implications of risk profile decisions on meeting investment objectives over time relative to investment plans, levels of funding, and

[10] The assumption that portfolio mean and variance is an appropriate measure of investor portfolio risk follows Levy and Markowitz (1979). The notion that portfolio stock/bond mix defines risk strategically is from Brinson et al (1986, 1991).

investor risk-averseness are discussed further in Michaud (2003) and references contained therein.

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