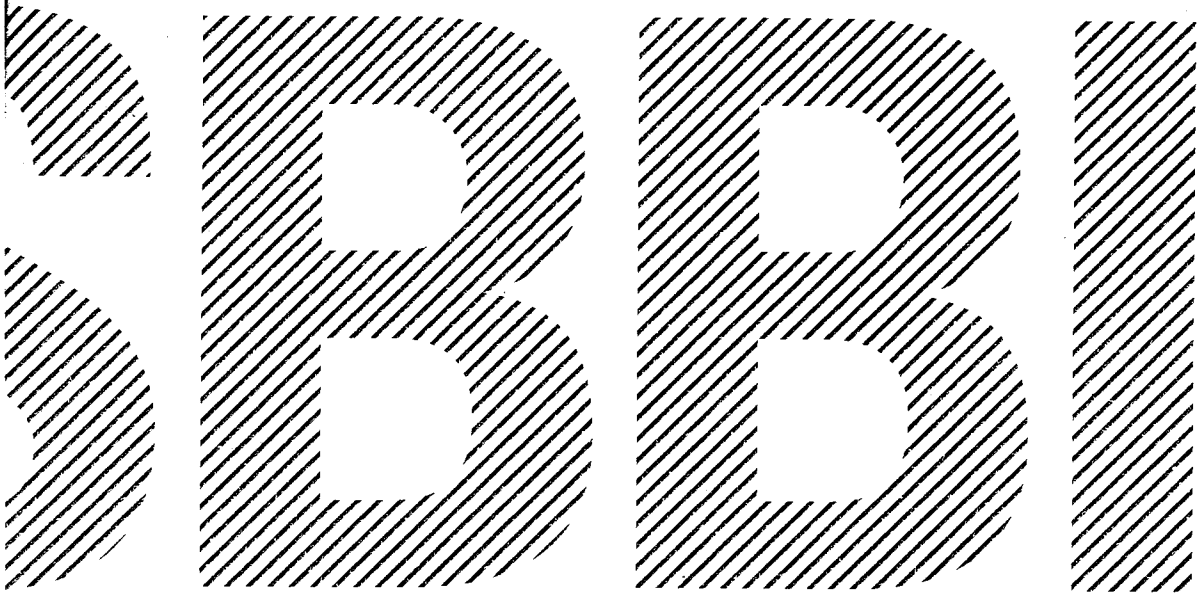
Ibbotson® SBBI®
2012 Classic Yearbook

Market Results for
Stocks, Bonds, Bills, and Inflation
1926–2011



MORNINGSTAR®

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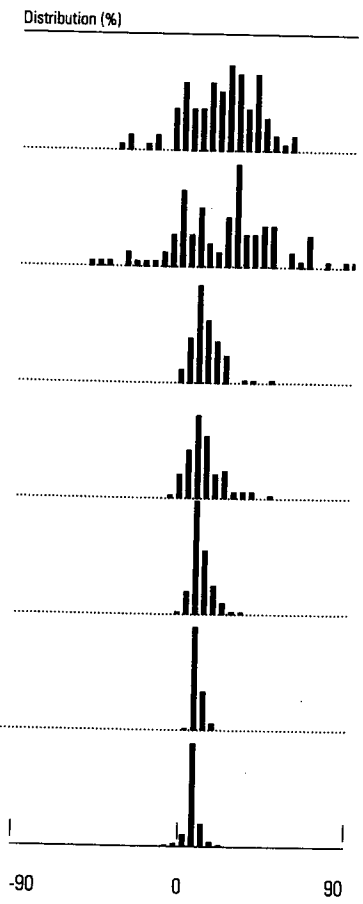
Table 2-1: Basic Series: Summary Statistics of Annual Total Returns

Series	Geometric Mean (%)	Arithmetic Mean (%)	Standard Deviation (%)
Large Company Stocks	9.8	11.8	20.3
Small Company Stocks*	11.9	16.5	32.5
Long-Term Corporate Bonds	6.1	6.4	8.4
Long-Term Government Bonds	5.7	6.1	9.8
Intermediate-Term Government Bonds	5.4	5.5	5.7
U.S. Treasury Bills	3.6	3.6	3.1
Inflation	3.0	3.1	4.2



Data from 1926–2011. * The 1933 Small Company Stocks Total Return was 142.9 percent.

Note that in Table 2-1, the arithmetic mean returns are always higher than the geometric mean returns. The difference between these two means is related to the standard deviation, or variability, of the series. [See Chapter 6.]

The "skylines" or histograms in Table 2-1 show the frequency distribution of returns on each asset class. The height of the common stock skyline in the range between +10 and +20 percent, for example, shows the number of years in 1926–2011 that large company stocks had a return in that range. The histograms are shown in 5 percent increments to fully display the spectrum of returns as seen over the last 86 years, especially in stocks.

Riskier assets, such as large company stocks and small company stocks, have low, spread-out skylines, reflecting the broad distribution of returns from very poor to very good. Less risky assets, such as bonds, have narrow skylines that resemble a single tall building, indicating the tightness of the distribution around the mean of the series. The histogram for Treasury bills is one-sided, lying almost entirely to the right of the vertical line representing a zero return; that is, Treasury bills rarely experienced negative returns on a yearly basis over the 1926–2011 period. The inflation skyline shows both positive and negative annual rates. Although a few deflationary months and quarters have occurred recently, the last negative annual inflation rate occurred in 1954.

Capital Appreciation, Income, and Reinvestment Returns

Table 2-2 provides further detail on the returns of large company stocks, long-term government bonds, and intermediate-term government bonds. Total annual returns are shown as the sum of three components: capital appreciation returns, income returns, and reinvestment returns. The capital appreciation and income components are explained in Chapter 3. The third component, reinvestment return, reflects monthly income reinvested in the total return index in subsequent months in the year. Thus, for a single month the reinvestment return is zero, but over a longer period of time it is non-zero. Since the returns in Table 2-2 are annual, reinvestment return is relevant.

The annual total return formed by compounding the monthly total returns does not equal the sum of the annual capital appreciation and income components; the difference is reinvestment return. A simple example illustrates this point. In 1995, an "up" year on a total return basis, the total annual return on large company stocks was 37.58 percent. The annual capital appreciation was 34.11 percent and the annual income return was 3.04 percent, totaling 37.15 percent. The remaining 0.43 percent (37.58 percent minus 37.15 percent) of the 1995 total return came from the reinvestment of dividends in the market. For more information on calculating annual total and income returns, see Chapter 5.

Monthly income and capital appreciation returns for large company stocks are presented in Appendix A: Tables A-2 and A-3, respectively. Monthly income and capital appreciation returns are presented for long-term government

Another approach in calculating the premium would be to add up the components that comprise the supply of equity return, excluding the P/E component. Thus, the supply of equity return only includes inflation, the growth in real earnings per share, and income return. The forward-looking earnings model calculates the long-term supply of U.S. equity returns to be 9.43 percent:

$$SR = \left[\left(1+CPI\right)\times\left(1+g_{REPS}\right)-1\right]+Inc+Rinv$$

$$9.43\%^{*} = \left[\left(1+2.99\%\right)\times\left(1+2.08\%\right)-1\right]+4.08\%+0.21\%$$

*difference due to rounding

where:

SR = the supply of the equity return;
CPI = Consumer Price Index (inflation);
g_{REPS} = the growth in real earning per share;
Inc = the income return;
Rinv = the reinvestment return.

The equity risk premium, based on the supply-side earnings model, is calculated to be 4.10 percent on a geometric basis:

$$SERP = \frac{\left(1+SR\right)}{\left(1+CPI\right)\times\left(1+RRf\right)}-1$$

$$4.10\%^{*} = \frac{\left(1+9.43\%\right)}{\left(1+2.99\%\right)\times\left(1+2.07\%\right)}-1$$

*difference due to rounding

where:

SERP = the supply-side equity risk premium;
SR = the supply of the equity return;
CPI = Consumer Price Index (inflation);
RRf = the real risk-free rate.

Converting the geometric average into an arithmetic average results in an equity risk premium of 6.16%:

$$R_A = R_G + \frac{\sigma^2}{2}$$

$$6.16\% = 4.10\% + \frac{20.30\%^2}{2}$$

where:

R_A = the arithmetic average;
R_G = the geometric average;
σ = the standard deviation of equity returns.

Long-Term Market Predictions

The supply side model estimates that stocks will continue to provide significant returns over the long run, averaging around 9.43 percent per year, assuming historical inflation rates. The equity risk premium, based on the top-down supply-side earnings model, is calculated to be 4.08 percent on a geometric basis and 6.18 percent on an arithmetic basis.

In the future, Ibbotson and Chen predict increased earnings growth that will offset lower dividend yields. The fact that earnings will grow as dividend payouts shrink is in line with the Miller and Modigliani Theory.

The forecasts for the market are in line with both the historical supply measures of public corporations (i.e. earnings) and overall economic productivity (GDP per capita). **IM**

Endnotes

1 The standard deviation is the square root of the variance; hence the term "mean-variance" in describing this form of the optimization problem.

2 Markowitz, Harry M., Portfolio Selection: Efficient Diversification of Investments, New York: John Wiley & Sons, 1959.

3 For more information about Morningstar *EnCorr®* software, refer to the Investment Tools and Resources page at the back of this book, or within the United States, call +1 866 910-0840. Outside the United States, call +44 020 3107-0020.

4 It is also possible to conduct a simulation using entire data sets, that is, without estimating the statistical parameters of the data sets. Typically, in such a nonparametric simulation, the frequency of an event occurring in the simulated history is equal to the frequency of the event occurring in the actual history used to construct the data set.

5 The expected capital gain on a par bond is self-evidently zero. For a zero-coupon (or other discount) bond, investors expect the price to rise as the bond ages, but the expected portion of this price increase should not be considered a capital gain. It is a form of income return.

6 See Chapter 12, "Wealth Forecasting with Monte Carlo Simulation" for more information.

7 See Markowitz and Usmen [2003].

8 Ranking investment strategies by forecasted GM is sometimes described as applying the Kelly Criterion; an idea promoted by William Poundstone [2005].

9 Other researchers have also proposed using GM and CVaR as the measures or reward and risk in an efficient frontier. See for example Sheikh and Qiao, [2009].

10 "Long-Run Stock Returns: Participating in the Real Economy," Roger G. Ibbotson and Peng Chen, Financial Analysts Journal, January/February 2003.