THE MYTHS AND REALITY OF LOW-GRADE BONDS

by

Marshall E. Blume
Donald B. Keim

27-91

RODNEY L. WHITE CENTER FOR FINANCIAL RESEARCH
The Wharton School
University of Pennsylvania
Philadelphia, PA 19104-6367

The Myths and Reality of Low-Grade Bonds

Marshall E. Blume
Donald B. Keim

October 28, 1991

*We thank Darren Klein for his excellent research assistance and the Geewax-Terker Research Program in Financial Instruments for financial support.

Abstract

This paper updates through June 1991 the authors' prior research on low-grade bonds. The paper finds further support for the hypothesis that low-grade bonds behave sometimes like high-grade bonds and sometimes like small stocks. Much of the drop in the prices of low-grade bonds in the last half of 1990 and the subsequent increase in the first half of 1991 parallel the price movements of small stocks. Also consistent with our earlier work, the volatility of low-grade bonds is less than that of high-grade corporates or long-term governments. The shorter "duration" of low-grade bonds accounts for this counter-intuitive result.

1 Introduction

The market for low-grade bonds as we know it today began in 1977 with the issuance of 1.1 billion dollars of new issues. Previously in the post-World War II period, virtually all new issues of publicly traded bonds carried an investment grade rating of BBB or higher (in terms of the Standard and Poor's rating system). The important change in 1977 was the issuance of bonds whose initial ratings were below investment grade. No longer were low-grade bonds solely "fallen angels," bonds originally issued with an investment-grade rating but subsequently downgraded to below investment grade.

From 1977 through 1989, the market for low-grade bonds grew dramatically. In 1989 alone, new issues amounted to 24.2 billion dollars, and the outstanding market value of low-grade bonds had grown to 205 billion dollars, representing roughly a quarter of all marketable corporate debt.[1] In 1990 new issues collapsed to 1.4 billion dollars. There has been a modest recovery in 1991 with 3.8 billion dollars of new issues through October 7.[2]

Despite the drop in new underwritings in 1989 and 1990, Merrill Lynch as well as Salomon Brothers estimate that the outstanding supply of low-grade bonds is still over 200 billion dollars, making these bonds a significant asset class.[3] As such, low-grade bonds warrant continued study.

Numerous studies have documented the higher default rates of low-grade bonds in comparison to high-grade bonds,[4] but these results are not surprising. After all, low-grade bonds should have a greater probability of default. These studies of default rates are clearly of interest, but what is ultimately of overriding interest to investors is the effect of higher levels of default on the realized returns of low-grade bonds. In a number of previous studies, we have examined some of the characteristics of the returns realized by low-grade bonds.[5] This paper updates these earlier studies through June 1991. The turbulent markets in the last

[1] Drexel Burnham supplied these estimates.

[2] Merrill Lynch supplied these estimates of new issues for 1990 and 1991.

[3] Recently, redemptions have exceeded new issues, which by itself would reduce the supply. However, the rapid increase in the market value of existing bonds in 1991, a fact documented below, has offset this effect.

[4] Examples include Altman (1987, 1989) and Asquith, Mullins and Wolff (1989).

[5] See Blume and Keim (1987), Blume and Keim (1991) and Blume, Keim and Patel (1991).

half of 1990 and the first half of 1991 make such an update most relevant at this time.

After a short description of the data, the second section of the paper presents some statistics summarizing the return and volatility characteristics of long-term low-grade bonds, and corresponding statistics for other asset classes. The third section contains an analysis of the covariability of the returns of low-grade bonds and the other assets classes. The fourth section summarizes our findings.

2 Return Statistics for Low-Grade Bonds

A major difficulty in analyzing the returns realized by the low-grade bond universe, particularly for the early years, is obtaining reliable prices. To help overcome this difficulty, both Drexel Burnham Lambert and Salomon Brothers provided us with month-end bid prices for original-issue low-grade bonds covering the years 1982-1988. The bonds included in our index calculations have a face value of $25,000,000 at time of issue, are non-convertible, and have ten or more years to maturity.[6] Thus, the return indexes for the low-grade bonds covered in this study should be viewed as long-term indexes and not necessarily representative of the short-term low-grade universe.

To analyze the realized returns of these bonds before 1982, we collected month-end bond prices for the 1977-1981 period for all bonds satisfying the same criteria as above and listed in the S&P Bond Guide. These monthly prices may be less reliable than those provided to us for the 1982-1988 period, but using these prices allows us to analyze the low-grade bond market from its beginnings in 1977. We did compare indexes constructed from the Drexel-Salomon data and the S&P data over the 1982-1986 period and found a high correlation between these two indexes, suggesting that indexes based upon S&P prices prior to 1982 are credible.[7] For 1989, we used the long-term low-grade bond index published by Drexel to measure monthly returns, and for the eighteen months ending June 1991, we used the long-term low-grade bond index published by Salomon. Both of these indexes use criteria similar to our index from 1977 through 1988.

[6] When a bond had less than ten years to maturity, it was dropped from our calculations.

[7] See Blume and Keim (1987).

For comparison purposes, we employ monthly returns for two stock indexes and two bond indexes published by Ibbotson Associates. The stock indexes are the S&P 500 and a small-stock index. The small-stock index measures the returns of a value-weighted portfolio of NYSE and AMEX stocks in the smallest size quintile as determined by NYSE stocks. The bond indexes are a long-term high-grade corporate bond index, which is identical to the Salomon Brothers index of the same name, and a long-term government bond index with a maturity of approximately 20 years.

2.1 Realized Returns

From January 1977 through June 1991, low-grade bonds had an annual compounded rate of return of 10.3 percent (Table 1 and Figure 1). This return is greater than the 8.9 percent realized by long-term government bonds and the 9.5 percent realized by long-term high-grade corporates. The return is less than the 13.8 percent realized by the S&P 500 and the 18.0 percent realized by small stocks. Thus, over these fourteen and a half years, the return on low-grade bonds was between those of the two higher grade bond indexes and those of the two stock indexes.

This relative ranking that we observe for the entire period is sensitive to the time period over which the returns are measured. An examination of the seven successive two-year periods from July 1977 through June 1991 discloses substantial variability in the rankings of realized returns (Table 2). For example, in the first and second two-year periods ending June 1979 and June 1981, the returns of low-grade bonds exceed those of the two other bond indexes and are less than either stock index. Note that the annual returns on small stocks are extremely high during these two periods (31.6 percent and 51.8 percent, respectively).

Similarly, in the third two-year period ending in June 1983, low-grade bonds earned 24.2 percent—slightly less than the 24.4 percent for corporates and the 29.5 percent for small stocks, but greater than the 21.7 percent for governments and the 19.4 percent for the S&P 500. In the fourth and sixth two-year period ending in June 1985 and in June 1989, however, the returns on low-grade bonds exceeded the returns for both stock indexes, and the high-

grade bond returns exceeded the low-grade bond returns. In contrast, in the fifth two-year period ending June 1987, low-grade bonds realized 13.1 percent—the lowest rate of returns of the five asset classes. In the last period ending June 1991, small stocks earned the lowest returns (-1.6 percent), followed by low-grade bonds (4.4 percent).

In sum, over the entire fourteen and a half years from January 1977 through June 1991, the realized annual returns on long-term low- grade bonds exceeded the corresponding returns on both long-term governments and long-term high-grade corporates, but were less than the returns on the two stock indexes. However, there was wide variability in the rankings of the returns of these various asset classes by subperiod.

2.2 Relative Volatility

For the January 1977 through June 1991 period, the volatility of monthly returns of low-grade bonds as measured by their standard deviation is less than the volatility of any of the four comparison asset categories (Table 1). Specifically, the standard deviation of monthly returns is 2.88 percent for low-grade bonds, 3.31 for long-term high-grade corporates, 3.62 for long-term governments, 4.59 percent for the S&P 500, and 5.67 percent for small stocks.

Unlike the relative rankings of realized returns, there is comparative stability in the relative rankings of the standard deviations of monthly returns across the asset classes (Table 2). In each of the seven successive two-year periods ending in June 1991, the standard deviation of the returns for low-grade bonds was less than that of either equity index. In all but two of the seven two-year periods, the standard deviation of monthly returns for low-grade bonds is less than that for either of the two higher grade bond indexes. The two exceptions are the periods from July 1977 through June 1979 and from July 1989 through June 1991.

The finding that the monthly volatility of low-grade bonds is less than that of high-grade corporates or governments over the extended period from 1977 through June 1991 and for five of the seven successive two-year periods may seem counterintuitive. As it turns out, sound economic reasons can account for this result. Before delving into these reasons, we

shall first dispose of a statistical explanation—namely, that "stale" prices cause a downward bias in the estimated volatility of low-grade bonds and that this bias is greater for low-grade bonds than for other asset classes.

The effect of including an occasional "stale" price in the calculation of an index is to smooth the returns of that index and thus to reduce the estimated standard deviation. To illustrate, suppose that the general level of interest rates moves up, so that all bonds experience losses. If it takes a transaction to change the recorded price and if not all of the bonds in an index trade, some of the bonds will have recorded prices that do not reflect their "true" current prices. Thus, an index of bonds calculated with both current true prices and old "stale" prices will not drop as much as it should since the recorded "stale" prices are greater than their unrecorded "true" prices. The effect is to spread a change in market value artificially over two or more periods, reducing the apparent volatility of the index.

If "stale" prices are more common with low-grade bonds, a statistical bias might explain the apparent lower standard deviations of low-grade bonds. An adjustment to the estimated standard deviations allows us to explore this possibility. If the changes in prices from one month to the next are uncorrelated, the autocorrelations of the calculated index are a measure of the effect of "stale" prices and can be used to make the required adjustment. In this framework, a positive autocorrelation indicates the presence of stale prices.

The first order autocorrelation coefficients are positive for all asset classes, but greatest for low-grade bonds. Adjusting for "stale" prices using these positive autocorrelations leads to increased estimates of the volatility of the returns of all asset groups but with the greatest increase for the low-grade bond index. Yet, the adjusted volatility of low-grade bonds for the 1977-1991 period is still less than that of either governments or corporates, although the gap is considerably narrowed (Table 1).

We now entertain several economic reasons for the apparent lower volatility of low-grade bonds in comparison to the other two types of bonds. First, we explore potential differences in the durations of the different bond indexes. Duration measures the sensitivity of bond prices to interest rate movements. Although all of the bond indexes are long-term indexes,

the durations of the indexes differ. Importantly, the duration of the low-grade bond index is less than that of either the long-term high-grade corporate index or the long-term government index. There are several reasons. First, the time to maturity of low-grade bonds in our index is less than the time to maturity for either of these two indexes. At the end of 1988, the time to maturity of the low-grade bonds in our index was slightly less than 15 years, in contrast to the maturity of 20 years for these two indexes. Second, the coupons of the low-grade bonds in our universe are greater than those of the governments or corporates. This shorter maturity and the larger coupons result in a shorter duration that will make the returns of low-grade bonds less sensitive to general interest rate movements than the returns of the comparison bonds.

There are still other reasons for the relatively low duration of the index of low-grade bonds. First, low-grade bonds are more likely to be called than long-term governments or even long-term high-grade corporate bonds since low-grade bonds typically have less call protection than these other two type of bonds. Some low-grade bonds have no call protection at all, and some are callable after as short a period of three years. In contrast, long-term governments are callable only within the five years preceding maturity or not callable at all. High-grade corporates usually have a five- or a ten-year call protection period. Thus, if interest rates increase, low-grade bonds are more likely to be called, which reduces their relative duration.

Additionally, a corporation may decide to call its low-grade bonds even if there were no changes in the general level of interest rate. The credit quality of an issuer of a low-grade bond may improve, allowing a refinancing of the bond at lower interest rate. Also, a corporate issuer of low-grade bonds may decide at some point, quite apart from changes in interest rates, to improve the financial quality of its balance sheet by replacing the debt with equity.

Finally, although not formally the same as a call, an issuer of a low-grade bond may default, which reduces the effective life of the bond and thus its "duration." As long as the occurrences of defaults are uncorrelated across bonds, defaults themselves will not have a

significant impact upon the volatility of an index although the presences of such defaults will reduce the expected return of an index.

For all of these reasons, a comparison of the volatility of low-grade bonds to the volatility of the other two bond asset classes does not hold everything constant. A prior study[8] derived an index of government bonds adjusted to have the same "duration" as the low-grade bond index in terms of coupons and call features. With this adjustment, the volatility of the government bond index was less than the volatility of the low-grade bond index. Once one controls for these differences in duration, the standard deviation of the low-grade bond index is greater than the standard deviation volatility of the high-grade bonds indexes.[9]

2.3 Estimation Errors in Expected Returns and Volatility

The relative rankings of the compounded rates of return of low-grade bonds relative to governments, corporates, the S&P 500, and small stocks varied substantially from one subperiod to another. In contrast, the rankings of the standard deviations of monthly returns were much more stable across subperiods. This result is exactly what one would expect. Merton (1980) showed that the accuracy of an estimate of volatility of a stationary return process[10] depends upon the number of subintervals within any specific period of time, whereas the accuracy of an estimate of the expected compounded rate of return depends on the overall length of the estimation period, not the number of subintervals.

As an example, if a researcher has an estimation period of ten years, the estimate of volatility will be more accurate the greater the number of subintervals in these ten years. Monthly returns will provide more accurate estimates of volatility than yearly returns, and weekly returns will provide more accurate estimates of volatility than monthly returns. In

[8]See Blume, Keim and Patel (1991).

[9]In making this adjustment, the call features of the low-grade bonds turned out to have more of an impact than the adjustment for the coupon levels, despite the fact that the adjustment for call features was not complete. In fact, we were able to account only for the volatility of interest rates in valuing the call provisions of each low-grade bond and only up to the end of the call protection period. We ignored the value of the call after the call protection period, the increased possibility of early call because of credit improvement or balance sheet restructuring, and the possibility of default. With these further adjustments, the gap would have been even greater.

[10]His proof assumed a stationary diffusion process, a commonly used process to describe security returns.

contrast, there is no increase in the accuracy of an estimate of the expected compound rate of return by increasing the number of subperiods. The only way to increase the accuracy of this estimate is to increase the length of the estimation period.

Figure 2 contains a heuristic demonstration of this argument using returns from two hypothetical investments. The solid line represents an investment that grows at a steady pace—in this case, 10 percent per year. The dashed line represents a much more volatile investment. On the assumption that the returns for each of these investments are drawn from stationary processes, an investor could reliably determine that the investment portrayed by the dashed line is the more volatile investment. Yet, an investor would be at a loss to determine from the data in Figure 2 which investment has the greatest expected compound rate of growth.

3 The Covariability of Asset Categories

The purpose of this section is analyze the covariability of the returns of low-grade bonds with the returns of other asset categories. The main conclusion is that low-grade bonds display characteristics of both stocks and bonds. Moreover, the relative importance of the returns of stocks and bonds in explaining the returns of low-grade bonds changes over time.

For the entire fourteen and a half years from 1977 through June 1991, the correlation of low-grade bonds with government bonds is 0.62 and with small stocks is 0.54 (Table 3). In contrast, the correlation of high-grade corporate bonds with governments is 0.95 and with small stocks is 0.20. Thus, in terms of correlation coefficients, low-grade bonds have more equity characteristics and less pure bond characteristics than high-grade corporate bonds.

Although low-grade bonds have both the characteristics of bonds and equities, the importance of these two markets in explaining the returns on the low-grade bond index varies over time. An examination of the seven successive two-year periods from July 1977 through June 1991 shows that there is substantial variability in the correlation coefficients of low-grade bonds with government bonds and small stocks (Figure 3). Over these seven two-year periods, the correlation of low-grade bonds with governments varies from 0.22 to 0.81, and

with small stocks from 0.42 to 0.83. In three of the two-year periods, the returns of low-grade bonds are more highly correlated with the returns of small stocks than with the returns of governments, and in the other four periods, the reverse occurs. The most recent two-year period ending June 1991 saw the greatest correlation between low-grade bonds and small stocks (0.83) and the smallest correlation between low-grade bonds and government bonds (0.22).

To explore the simultaneous relation between low-grade bonds and other asset categories, we ran regressions of monthly returns of low-grade bonds on the returns of long-term governments and small stocks. Previous research has found that the returns on small stocks and low-grade bonds in January exceed on average the returns of higher quality bonds and larger stocks. To incorporate such a January effect, we added a dummy variable assuming a value of 1 for January to some of the regressions. In the regression for the overall period with the January dummy variable excluded, the coefficient on governments is 0.43 and on small stocks is 0.22 with an adjusted R-squared of 0.57. The inclusion of the January dummy has little effect on these coefficients and leads to a modest increase in the R-squared to 0.58. Nonetheless, the coefficient of the January dummy is positive and significant. Since the returns of small firms already contain a January effect, one might have expected the coefficient of the January dummy to be zero. The fact that it is not zero indicates that the January effect for low-grade bonds may be of a slightly different magnitude from the January effect in the returns of small firms.

To examine the stationarity of these regressions, we reran the regressions for each of the seven two-year periods ending in June 1991. For the first six periods from July 1977 through June 1989, the estimated coefficients on governments and small stocks are quite stationary with the coefficients ranging from 0.22 to 0.46 for governments and from 0.07 to 0.22 for small stocks (Table 4). The table only includes the regressions with the January dummy. Like the overall period, dropping the January dummy had little effect on the estimated coefficients or the R-squared's.

Consistent with the previous analyses of correlations, the estimated coefficients in the

last subperiod from July 1989 through June 1991 are quite different from the earlier years. The coefficient on long-term governments is -0.24 and not significant, while the coefficient on small stocks is 0.60. Thus, in the last two years, low-grade returns are more sensitive to small stocks than previously. A plot of the major market indexes for these two years shows the close relation between small stocks and low-grade bonds (Figure 4). During the six months from June 1989 through December 1989, there were substantial declines in the values of both of these indexes, while S&P stocks and the higher grade index experienced gains. For the next six months, the five asset groups moved very much in parallel. This parallel movement is clearer if the plot of the indexes begins in December 1989 (Figure 5).

From July 1990 through October 1990, there was a wide divergence in the movement of stocks, low-grade bonds, and the higher grade bonds. Small stocks declined the most. The decline in both S&P stocks and low-grade bonds was about the same. The higher grade bonds experienced some decline and then a recovery. Following October 1990, stocks and low-grade bonds experience substantial recoveries through the June 1991. As already mentioned, one would expect low-grade bonds to realize losses when small stocks do poorly and vice versa, but the swings should not be as great. An analysis not reported here shows that the losses on low-grade bonds, and their subsequent recovery, were greater than their historical relation to small stocks would predict.

A question that this study cannot answer is whether the behavior of the low-grade market in the last two years represents a permanent change in the behavior of long-term low-grade bonds or a temporary aberration. In this regard, it is interesting to note that the correlation between low-grade bonds and small stocks is almost as great in the two years ending June 1979 as it is in the most recent two years.

4 Conclusion

This paper updates the authors' earlier analyses of long-term low-grade bonds. The volatility of low-grade bonds has increased in the last two years, and during these last two years, low-grade bonds tracked small stocks more closely than they have historically. Even with this

increase in volatility, the volatility of low-grade bonds is still not that much different from higher grade long-term bonds. The evidence indicates that, even in this most recent period, the volatility of returns of low-grade bonds is considerably less than that of common stocks.

BIBLIOGRAPHY

Altman, E. I., 1987, "The anatomy of the high-yield bond market", *Financial Analysts Journal*, July-August, 12-25.

Altman, E. I., 1989, "Measuring corporate bond mortality and performance", *Journal of Finance*, 44, 909-922.

Asquith, P., D. W. Mullins, Jr., and E. D. Wolff, 1989, "Original issue high-yield bonds: Aging analysis of defaults, exchanges and calls," *Journal of Finance*, 44, 923-952.

Blume, M. E. and D. B. Keim, 1987, "Lower-grade bonds: Their risks and returns," *Financial Analysts Journal*, July-August, 26-33.

Blume, M. E. and D. B. Keim, 1991, "Risks and returns of low-grade bonds: An update," forthcoming in *Financial Analysts Journal.*

Blume, M. E., D. B. Keim and S. Patel, 1991, "Returns and volatility of low-grade bonds: 1977-1989," *Journal of Finance*, 46, 49-74.

Merton, R. C., 1980, "On estimating the expected return on the market: An exploratory investigation," *Journal of Financial Economics*, 8, 323-362.

Table 1

Summary Statistics of Returns for Various Asset Categories
January 1977 - June 1991

	Annual Compounded Return	Monthly			
		Mean Return	Standard Deviation	Adjusted Standard Deviation[1]	Auto-correlation ρ_1
Long-Term Government Bonds	8.9	0.78	3.62	3.85	0.07
Long-Term High-Grade Corporate Bonds	9.8	0.81	3.31	3.74	0.15
Long-Term Low-Grade Bonds	10.3	0.86	2.88	3.52	0.27
S&P 500	13.8	1.19	4.59	4.76	0.04
Small Stocks	18.0	1.56	5.67	6.54	0.18

[1]Stale prices can induce positive but spurious autocorrelation in the indices of returns, biasing downward the estimated standard deviation of monthly returns. To examine the magnitude of this bias, the monthly standard deviations were adjusted in a two-step procedure: First, annualize the estimated monthly standard deviation, taking into account the autocorrelation. If σ^2 is the monthly variance and the first order autocorrelation is ρ_1 with all other autocorrelations zero, the variance of the sum of 12 monthly returns is $\sigma^2(12 + 22\rho_1)$. Thus, multiplying the monthly standard deviation by $(12 + 22\rho_1)^{1/2}$ yields an annual standard deviation that takes into account the first order serial correlation. Second, divide by the $\sqrt{12}$ to reexpress this annual standard deviation in monthly units. If the second order autocorrelation is ρ_2 and all high order autocorrelations are zero, the multiplying constant is $(12 + 22\rho_1 + 20\rho_2)^{1/2}$.

Table 2

Annual Returns and Standard Deviations for Successive Two-Year Periods

Date	Long-Term Government Bonds	Long-Term High-Grade Corporate Bonds	Long-Term Low-Grade Bonds	S&P 500	Small Stocks
A. Annual Compounded Returns					
7/1977 - 6/1979	2.3	3.1	4.7	6.7	31.6
7/1979 - 6/1981	-7.0	-7.8	0.6	18.8	51.8
7/1981 - 6/1983	21.7	24.4	24.2	19.4	29.5
7/1983 - 6/1985	15.2	15.4	13.5	11.9	0.9
7/1985 - 6/1987	17.0	15.6	13.1	30.3	18.7
7/1987 - 6/1989	11.8	12.3	10.5	5.9	2.7
7/1989 - 6/1991	6.8	8.3	4.4	11.8	-1.6
B. Standard Deviations of Monthly Returns					
7/1977 - 6/1979	1.5	1.3	2.0	4.0	7.2
7/1979 - 6/1981	5.1	5.1	4.3	4.6	5.3
7/1981 - 6/1983	4.8	4.7	3.4	4.8	5.3
7/1983 - 6/1985	3.6	3.6	2.1	3.5	4.3
7/1985 - 6/1987	4.1	2.5	1.8	4.8	4.3
7/1987 - 6/1989	2.9	2.5	1.8	6.0	7.1
7/1989 - 6/1991	2.2	1.6	3.9	4.6	5.7

Source: These statistics are based upon several indexes of monthly returns. From 1977 through 1988, the bonds underlying the low-grade bond index are all non-convertible with face value at time of issue of greater than $25 million and with time to maturity of at least ten years from the date on which any return is calculated. The returns for the individual bonds from 1982 through 1988 are based upon bid prices from Drexel Burnham Lambert and Salomon Brothers and prior to 1982 upon prices from the *S&P Bond Guide*. The return indexes from 1977 through 1988 are averages of these returns by month. For 1989, Drexel calculated a monthly return index using bid prices in virtually the same way as the 1977-1988 indexes were calculated, and this index was used to extend the sample through 1989. The returns from January 1990 through June 1991 are derived from the Salomon Brothers long-term bond index for low-grade bonds. The returns for (1) the S&P 500, (2) a value-weighted portfolio of common stocks in the smallest size quintile on the NYSE, (3) the Salomon Brothers index of long-term high-grade (rated A and above) corporate bonds, and (4) long-term (approximately twenty years to maturity) government bonds are from Ibbotson Associates.

Table 3

Correlations of Monthly Returns for Various Asset Classes
January 1977 - June 1991

	Long-Term High-Grade Corporate Bonds	Long-Term Low-Grade Bonds	S&P 500	Small Stocks
Long-Term Government Bonds	0.95	0.62	0.37	0.20
Long-Term High-Grade Corporate Bonds		0.69	0.34	0.20
Long-Term Low-Grade bonds			0.52	0.54
S&P 500				0.81

Source: These statistics are based upon several indexes of monthly returns. From 1977 through 1988, the bonds underlying the low-grade bond index are all non-convertible with face value at time of issue of greater than $25 million and with time to maturity of at least ten years from the date on which any return is calculated. The returns for the individual bonds from 1982 through 1988 are based upon bid prices from Drexel Burnham Lambert and Salomon Brothers and prior to 1982 upon prices from the *S&P Bond Guide*. The return indexes from 1977 through 1988 are averages of these returns by month. For 1989, Drexel calculated a monthly return index using bid prices in virtually the same way as the 1977-1988 indexes were calculated, and this index was used to extend the sample through 1989. The returns from January 1990 through June 1991 are derived from the Salomon Brothers long-term bond index for low-grade bonds. The returns for (1) the S&P 500, (2) a value-weighted portfolio of common stocks in the smallest size quintile on the NYSE, (3) the Salomon Brothers index of long-term high-grade (rated A and above) corporate bonds, and (4) long-term (approximately twenty years to maturity) government bonds are from Ibbotson Associates.

Table 4

Regressions of Low-Grade Bond Returns on Bond and Stock Market Returns for Various Dates

Dates	Intercept	January Dummy	Long-Term Governments	Small Stocks	$\bar{R}^2$
1/1977 - 6/1991	0.18		0.43	0.22	0.57
	(1.22)		(10.63)	(8.46)	
	0.10	1.05	0.44	0.21	0.58
	(0.65)	(2.03)	(10.87)	(8.07)	
7/1977 - 6/1979	-0.21	0.87	0.38	0.18	0.72
	(-0.91)	(1.11)	(2.19)	(5.00)	
7/1979 - 6/1981	-0.51	2.74	0.66	0.20	0.71
	(-0.86)	(1.53)	(6.52)	(2.08)	
7/1981 - 6/1983	0.43	1.51	0.46	0.22	0.67
	(0.92)	(1.02)	(4.87)	(2.53)	
7/1983 - 6/1985	0.37	1.75	0.44	0.07	0.72
	(1.51)	(1.97)	(6.46)	(1.24)	
7/1985 - 6/1987	0.43	0.98	0.22	0.15	0.56
	(1.62)	(1.06)	(3.04)	(2.05)	
7/1987 - 6/1989	0.41	0.45	0.33	0.16	0.51
	(1.47)	(0.43)	(3.25)	(3.95)	
7/1989 - 6/1991	0.59	-0.44	-0.24	0.60	0.66
	(1.13)	(-0.25)	(-0.95)	(6.59)	

Table 5

Regression of Excess Returns of Low-Grade Bonds on the Excess Returns of a Reference Portfolio Consisting of 75 Percent Stocks, 20 Percent High-Grade Bonds, and 5 Percent Low-Grade Bonds

Various Dates

Date	α	β	$\bar{R}^2$
1/1977 - 6/1991	-0.02 (-0.09)	0.47 (10.57)	0.39
7/1977 - 6/1979	-0.17 (-0.59)	0.43 (4.53)	0.46
7/1979 - 6/1981	-0.88 (-1.27)	0.65 (3.63)	0.35
7/1981 - 6/1983	0.49 (1.13)	0.63 (6.50)	0.64
7/1983 - 6/1985	0.19 (0.61)	0.48 (4.49)	0.45
7/1985 - 6/1987	0.11 (0.35)	0.27 (3.65)	0.35
7/1987 - 6/1989	0.26 (0.87)	0.24 (3.51)	0.33
7/1989 - 6/1991	-0.40 (-0.67)	0.69 (4.31)	0.43

FIGURE 1

MAJOR MARKET INDEXES

DECEMBER 1976 TO JUNE 1991

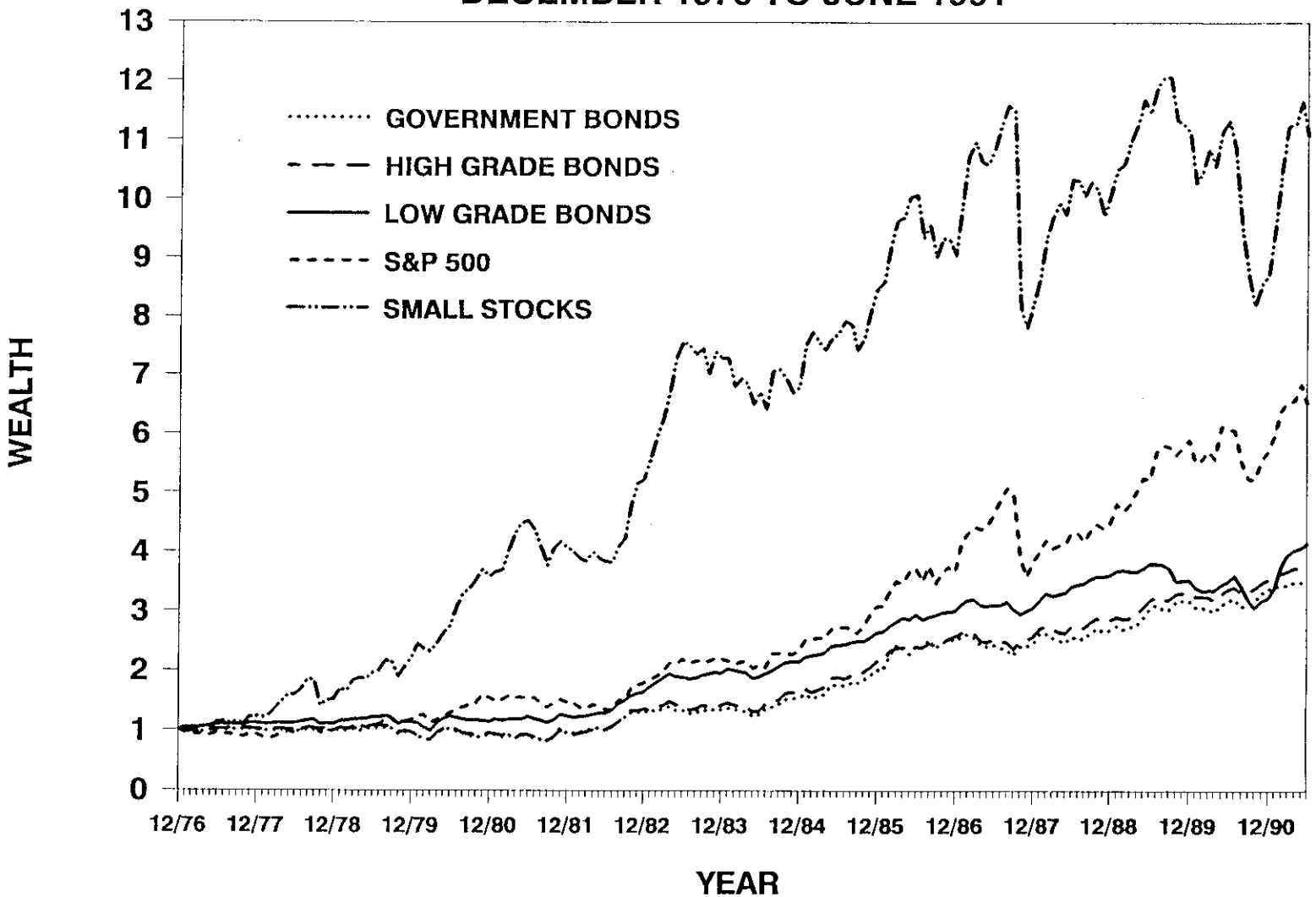


FIGURE 2

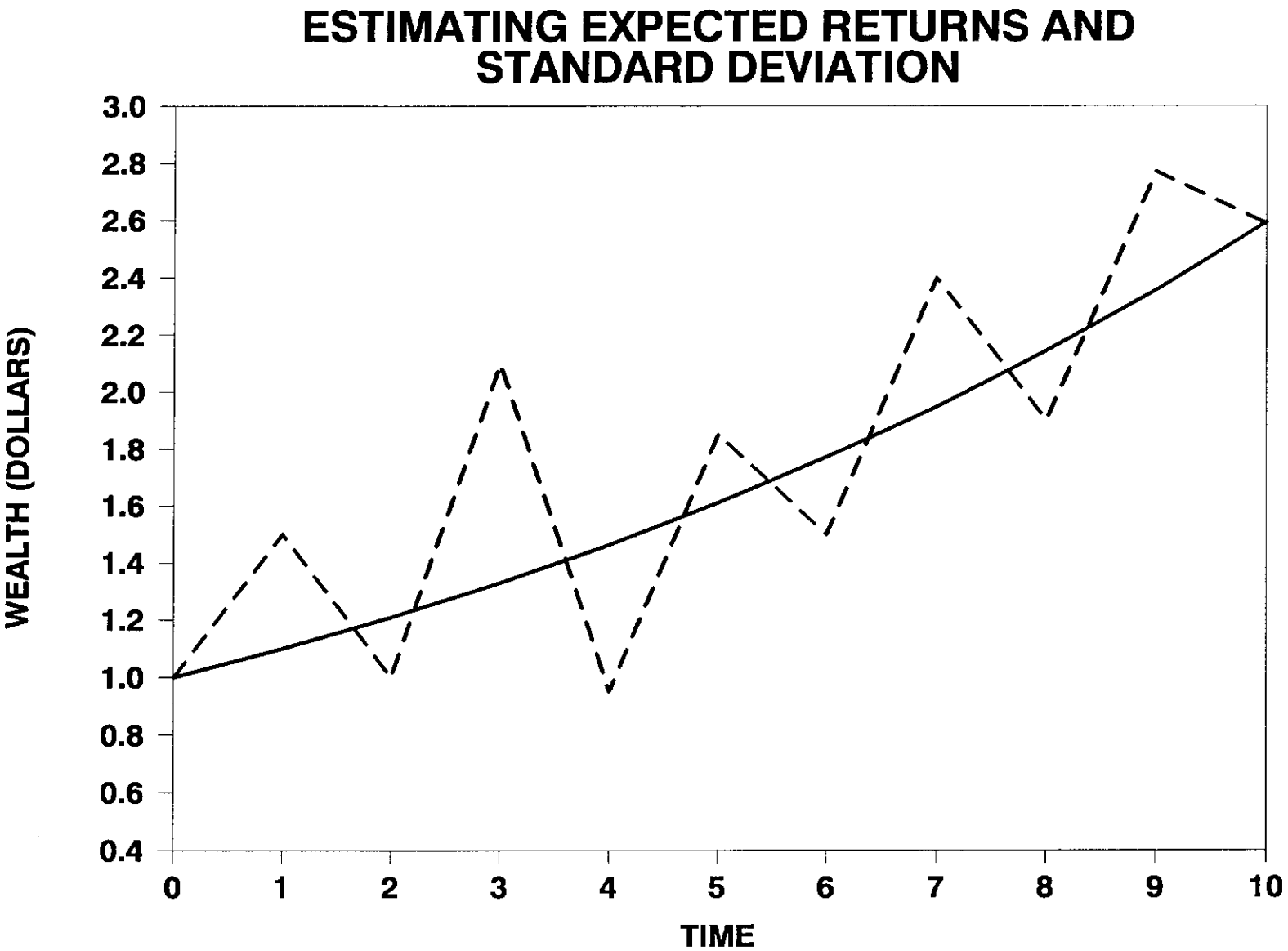

ESTIMATING EXPECTED RETURNS AND STANDARD DEVIATION
WEALTH (DOLLARS)
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0
1
2
3
4
5
6
7
8
9
10
TIME

FIGURE 3

CORRELATIONS OF LOW-GRADE BONDS

WITH TREASURY BONDS AND SMALL STOCKS

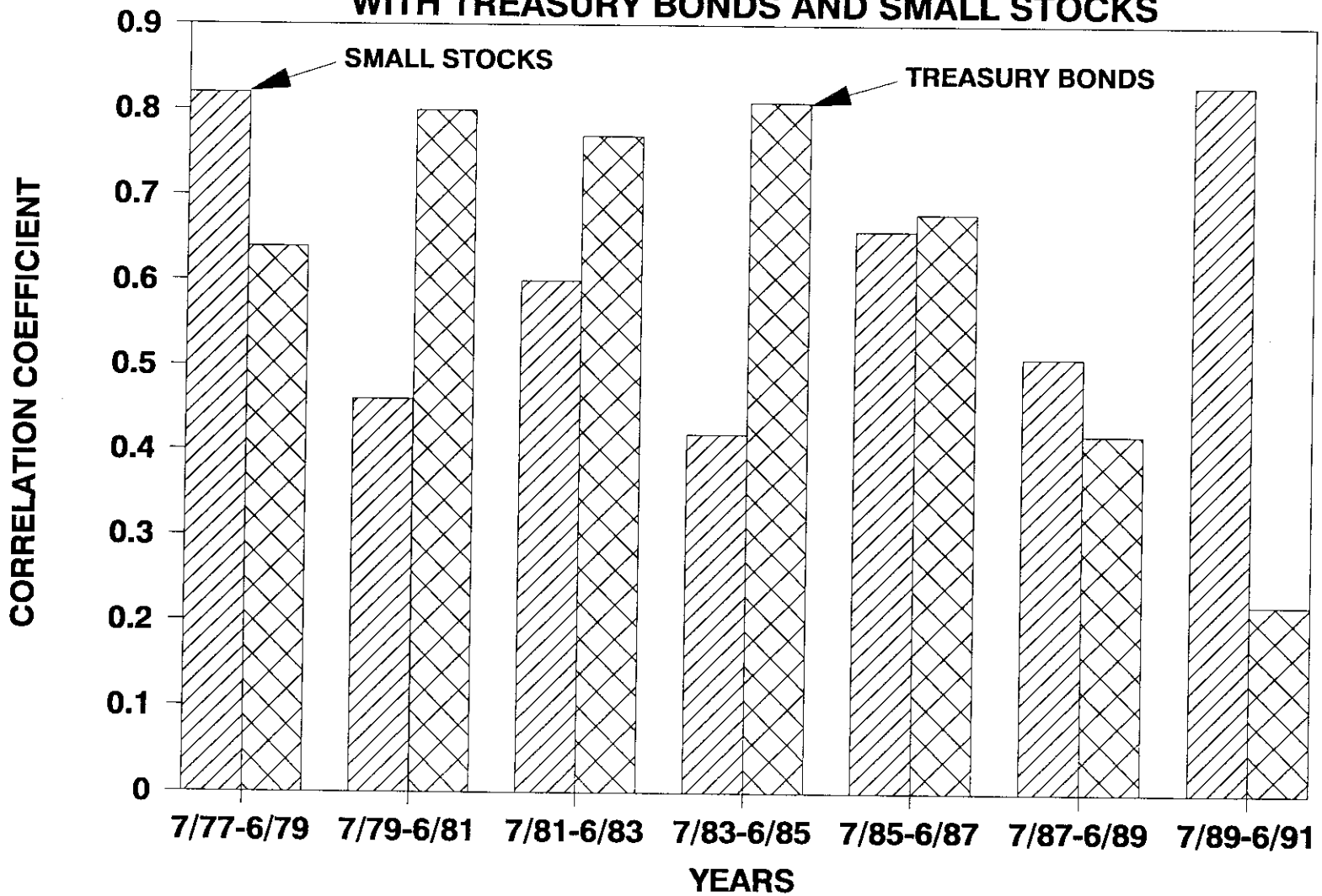


FIGURE 4

MAJOR MARKET INDEXES

JUNE 1989 TO JUNE 1991

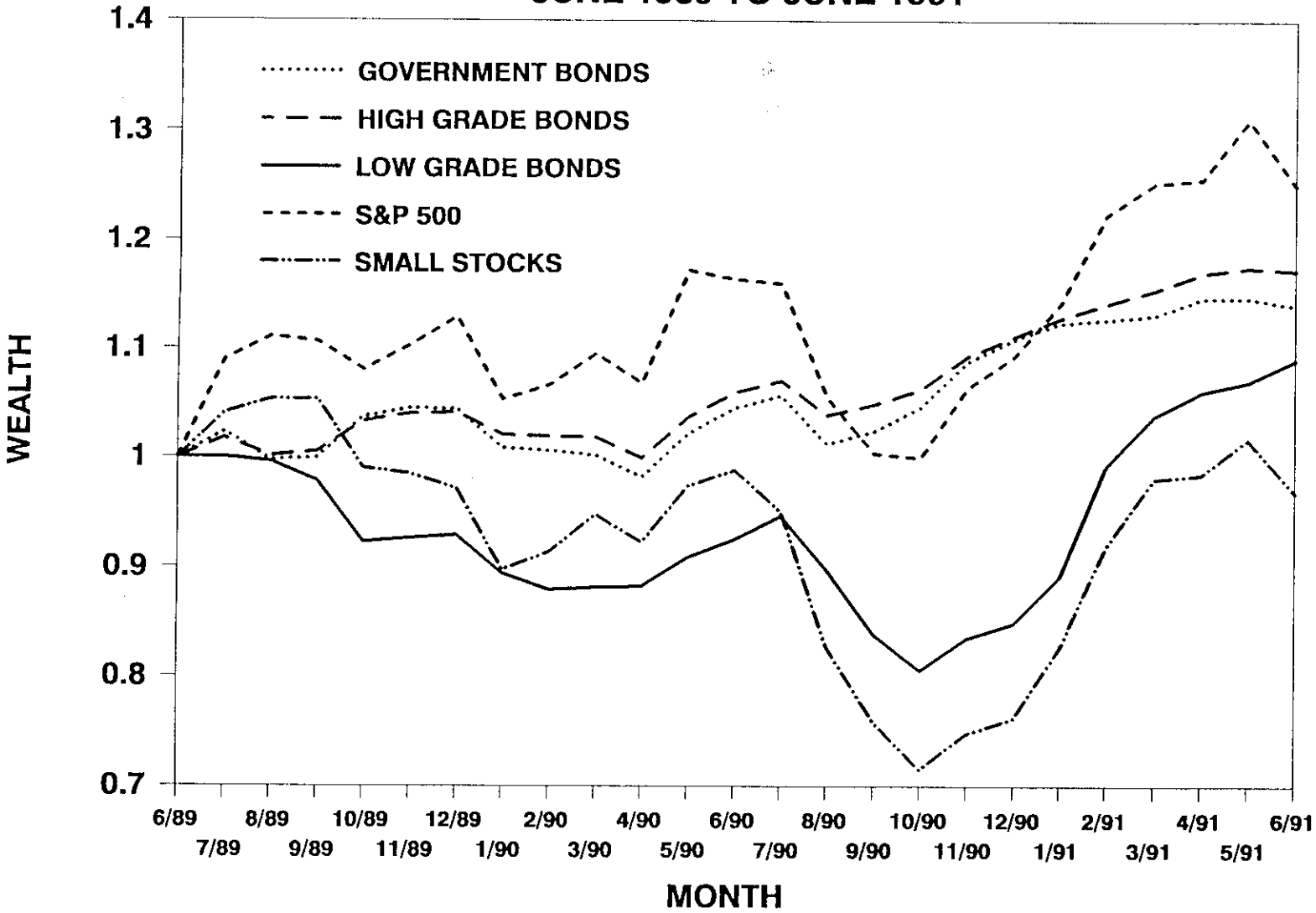
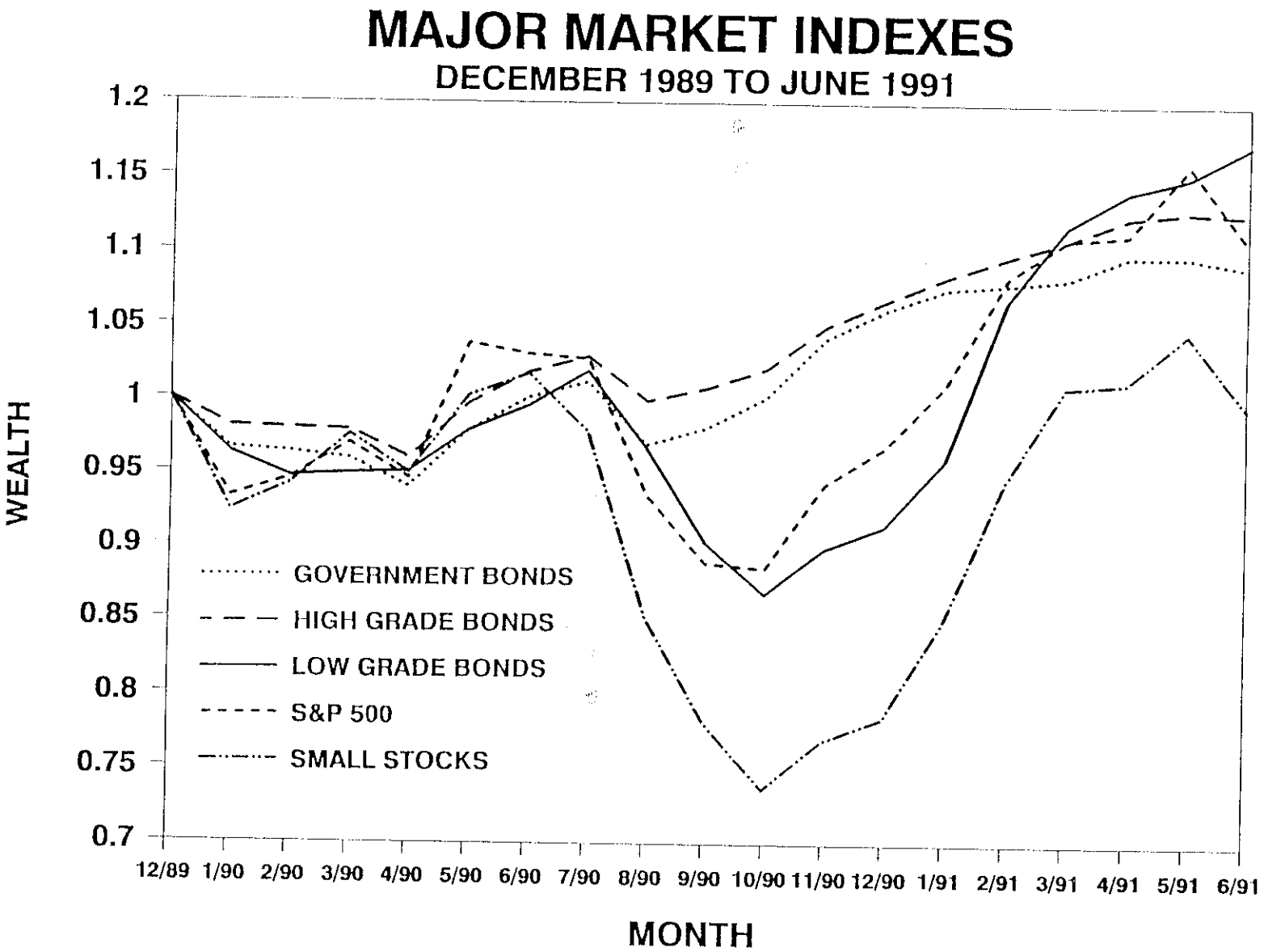


FIGURE 5


MAJOR MARKET INDEXES
DECEMBER 1989 TO JUNE 1991
WEALTH
1.2
1.15
1.1
1.05
1
0.95
0.9
0.85
0.8
0.75
0.7
GOVERNMENT BONDS
HIGH GRADE BONDS
LOW GRADE BONDS
S&P 500
SMALL STOCKS
12/89 1/90 2/90 3/90 4/90 5/90 6/90 7/90 8/90 9/90 10/90 11/90 12/90 1/91 2/91 3/91 4/91 5/91 6/91
MONTH