PERFORMANCE OF LONG-TERM MARKETABLE SECURITIES: RISK-RETURN, RANKING AND TIMING 1961 — 1984

By

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PREFACE

This study updates and extends prior studies that have utilized total annual returns and return-structure curves for long-term marketable securities. Two new, value-weighted markets indices are formed using different combinations of U.S. government and agency securities, corporate bonds and non-farm home mortgages as well as common stocks. Beta coefficients are calculated for the 22 risk classes of securities that are tracked. The levels and differences in the beta coefficients formed with each of these three indices indicate the importance of utilizing broader measures of security market performance. Second, a case is made for the cyclical movement of the regression lines representing the entire market for long-term, marketable securities even though some of the evidence for their existence is open to challenge on a statistical basis. Third, the experienced limits of changes of the regression lines' slopes, which represent the risk-return trade offs for long-term marketable securities over the last 20 years, are explored. Fourth, statistical explanations of stock prices and earnings-price ratios are developed as a step in the direction of understanding the timing and amplitude of their fluctuations. Fifth, the timing and volatility patterns for individual risk classes are catalogued and some efforts toward understanding them are advanced. Finally, the importance of timing and broad portfolio diversification across all long-term securities markets are discussed and illustrated. These latter discussions stand in sharp contrast with much of the current applications of modern portfolio theory which concentrates on the performance of common stocks only and implicitly considers Treasury bills to be the only alternative to investment in common stocks.

An enormous volume of original data collection and calculations underlies these continuing studies. Some of the calculations followed false trails and are not reported. I wish to thank both the Financial Analysts Research Foundation and the College of Business Administration, University of Iowa, for making funds available that helped to finance the research assistance and the computer time that were needed.

The essential data gathering and computations were performed by Lynn Russell, Liza Shenk, and Vernon Klein – all MBA students at the University of Iowa. Others who provided secretarial, lay out and editorial assistance were Phyllis Irwin and her staff, Linda Knowling and Robert Gaddis. Professor Carl Schweser worked with me in selecting the securities utilized in the various risk classes required to update the total annual returns from 1982 through 1984. Professors Warren Boe and Gary Tethke advised and guided me on numerous technical statistical problems.

I wish to thank also Professor Jack Treynor and Mr. Edmund Mennis who reviewed the manuscript for the Financial Analysts Research Foundation and made numerous very valuable suggestions. The final product is much more useful because of their criticisms and suggestions. Finally, I wish to thank Professor Richard F. DeMong for his patience over the long period that this manuscript was in progress and for the very careful editing that he and his editorial consultant, Jonathan A. Kates provided. Of course, I alone am responsible for any errors of fact or interpretation in this study as published.

I. INTRODUCTION

The major objective of this study is to report the returns and return-structure curves on 22 separate classes of long-term marketable securities for the period 1961 through 1982. Correlation matrices are formed on the basis of the holding period returns on each of these classes. Beta coefficients for ranking the relative riskiness of each class are prepared on three different levels of inclusiveness for the market index. Betas are formed using only stock market performance data; using stock market data plus bond market data; and using both of these data sources plus mortgage market performance.

The second major objective is to report the timing patterns of the total annual returns and to relate them to business cycles, interest rate cycles and stock market cycles. The causes of the differences in timing patterns of the total annual returns (TARs) and the amplitude of their movements are discussed. The TARs on stocks are shown to fluctuate around those for bonds. Movements in the earnings-price ratio are analyzed in terms of real, that is, nonfinancial, changes projected for the economy. The results of this part of the study are displayed in a way that may make them helpful for individual and professional investors who want to use them to rebalance their portfolios of bonds, stocks and money market instruments. The objective of the rebalancing is to seek to avoid likely losses due to allocation by type of security, as distinct from the selection of individual securities.

In most of this study 22 different risk classes of long-term marketable security are used. These risk classes in increasing order of relative riskiness are as follows:

Long-Term U.S Government Bonds*
Government National Mortgage Association
  Pass-Through Bonds (GNMAs)
Corporate Bonds
  Aaa*
  Aa*
  A*
  Baa*
  Ba*

Preferred Stocks
- High Quality*
- Medium Quality*
- Speculative Quality*

Convertible Corporate Bonds
- BBB
- BB
- B

Convertible Preferred Stocks
- A
- BBB
- BB
- B

100 Largest Capitalization Common Stocks
- I*
- II*
- III*
- IV*
- V*

*The basic holding period returns and return structure curves and related materials beginning with 1910 for these risk classes are published in Soldofsky and Max [55].

The method of dividing the 100 largest capitalization common stocks into five separate classes is discussed in the Data and Methodology section. A sixth common stock class, the smallest capitalization stocks listed on the New York Stock Exchange (NYSE) as prepared by Ibbotson and Sinquefield (I-S) [24], is used for some purposes. This additional risk class, when used, brings the total to 23.

A distinct advantage of using these 22 (23) risk classes is that it provides a view of how each class performs in terms of risk and return. Of particular concern is the way that each class performs at different stages of the business cycle and relative to interest rates. The data demonstrate that bonds, preferred stocks, convertible bonds, convertible preferred stocks, and common stocks are not homogenous risk classes. Much information can be gained for the purposes of portfolio management and security analysis by observing the extent and timing of the performance differences of risk classes within these well-recognized, broader groups of securities. The quality classes are the traditional ones of the market place with the exception of the five groups prepared from the largest capitalization common stocks.

A separate section on the sources of Data and Methodology follows. The third section develops the total annual returns by risk class and the averages of these total annual returns. The return-structure curves presented in Section IV build upon the data in the prior section. Section V utilizes the total annual return data to calculate beta coefficients and correlation matrices for all 22 risk classes of securities. Two new, broad market indices are used in addition to a stock market index in calculating the betas.

The next section, Section VI, reviews the dating of business, stock market, and interest rate cycles. This background information is used first as a framework within which to discuss the performance of the most volative securities and then to rank their performance. As a part of the development of the argument for the explanations of the patterns of return-structure curves that were observed, regression analysis was used to establish the causes of the movements of earning-price ratio in Sections VII and VIII. Finally, all of these threads are used in Section IX to help address relevant questions about the allocation of portfolios among various classes of securities and the timing of reallocations among the risk classes. Major conclusions and results are summarized in the last section.

II. DATA AND METHODOLOGY

The prices of the individual stocks and bonds and their respective dividend and interest payments have all been collected from published sources such as the *Wall Street Journal* [62] and *Moody's Bond Record* [32]. The total annual returns (TARs) or holding period returns (HPRs) for the 14 risk classes of securities for the period 1910-1976 were published in 1978 by Soldofsky and Max [53] and parts of the data have appeared in other places as well [54], [55]. Soldofsky and Max [53] contains the most complete description of the procedures for preparing these returns. Essential business cycle data are included for convenience.

The series for the four risk classes of convertible preferred stocks and three classes of convertible bonds were first published by Soldofsky [48] in 1971 and were updated through 1979 [50]. The TARs for the convertible securities start with 1961 and effectively constrain the starting date for the present study. The number of convertible securities available prior to 1961, as reported by Pilcher [36], would reduce the validity of such TARs even if they had been prepared.

The TARs are prepared on an annual basis by the method brought to public attention in 1959 by Markowitz [29]. That well-known formulation is:

$$\text{TAR} = \frac{(P_c - P_o) + D}{P_o} - 1 \qquad (1)$$

where TAR = total annual return;
P_c = closing price of the security;
P_o = opening price of the security;
D = annual dividend in the case of a stock and the annual interest payment in the case of a bond.

The geometric means of the TARs for each security in each risk class were calculated for each year. These annual TARs are basic building blocks for this study. The use of the geometric mean rather than the arithmetic mean is still a matter of controversy, as discussed by Rogalski and Tinic [40] and by Soldofsky and Miller [54], but the geometric mean has been used by Ibbotson and Sinquefield (I-S) [24] in previous studies published by the Financial Analysts Research Foundation.

The geometric mean is always less that the arithmetic mean except in the practically impossible case in which the annual returns are identical every year. The arithmetic and geometric means are related through the variance of their TARs. The larger the variance, the larger the difference between the arithmetic and geometric means.[1] The arithmetic average return is merely the annual TARs summed and then divided by the number of items in the array or:

$$\overline{TAR}_A = \frac{TAR_1 + TAR_2 + TAR_3 + \ldots + TAR_n}{n}$$

where $\overline{TAR}_A$ is the arithmetic average return.

The geometric average return is calculated by first preparing the product of the TARs in the array and then taking the root of the number observations or:

$$\overline{TAR}_G = \sqrt[n]{TAR_1 \times TAR_2 \times TAR_3 \times \ldots \times TAR_n}$$

where $\overline{TAR}_G$ is the geometric average return.

Unless otherwise indicated when TAR and $\overline{TAR}$ are shown, the geometric mean is being used. The TAR is an ex post concept of the return on a security and applies equally well to stocks and to bonds. The ex post return concept, which uses historical data, is distinctly and vitally different from the ex ante concept of return used in the earnings-price ratio and the D/MP + g model for stocks, and from the yield to maturity model used for bonds. These ex ante models implicity or explicitly utilize assumptions about the stream of future cash flows.

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1. This problem has been studied by Schweser, Soldofsky and Schneeweis [43] as it applies to the least squares regression line, that is, to return-structure curves, formed from the mean and standard deviation of the various risk classes of long-term marketable securities. As the variance is larger for the most volatile classes of securities, the slope of the curve will be reduced by their presence. Some portfolio managers are aware of this problem and have labeled it the "variance slippage."

A. Risk Classes

Only brief descriptions of the risk classes being used and some of the problems encountered using them are presented. For further detail the reader should see Soldofsky and Max [53] and Soldofsky [49]. The latter includes detailed information about the U.S. government bonds, convertible securities and the GNMAs. Four different U.S. government bonds were used; all had final maturities of twenty years or more and no "Flower" bonds were included.

The consistency and homogeneity of each risk class over time is of considerable importance to the risk-return performance measurements presented later. Table X, for example, will show that the relative return performance of the 22 different risk classes frequently changes dramatically from year to year. U.S. government bonds had the highest TAR in 1974 and fell to lowest in 1975. However, the quality of these top-rated, default-free securities did not change that year or any other year; the economic and financial climate changed. The ex post holding period returns, as distinguished from the ex ante yield to maturity, are very sensitive to market factors.

Moody's bond quality ratings have been accepted as being highly reliable since the beginning of the century. They have been tested by many academics including Soldofsky. The literature on this subject is substantial. Although the consistency through time of the quality ratings of the preferred stock classes, convertible bond classes, convertible preferred stock classes and common stock classes have not been tested as extensively, they are also very highly likely to be consistent and constant through time. Some of this evidence is mustered in Soldofsky and Max [53].

Government National Mortgage Association Pass Through Securities (GNMAs). These securities were issued starting with 1970. The Salomon Brothers series of TARs prepared by Waldman and Baum [60] started with 1972 and is updated annually. A technical description of this series was prepared by Waldman [61]. The TARs on mortgages for 1961 through 1969 were prepared by Soldofsky for conventional mortgages by using the contract and effective interest rates on conventional loans made by all lenders for the purchase of existing homes. The data for the years 1961, 1962 and 1963 are summarized in Guttentag and Beck [21]. The data for the years 1964 through 1971 are published in the *Federal Home Loan Bank Board Journal* [17].[2]

Corporate Bonds. The Moody's top five risk classes for industrial bonds—Aaa, Aa, A, Baa, and Ba—were used for this study. These risk classes were originally established for industrials in 1914 by John Moody. Fifteen different bonds were used each year for each risk class.[3] No company is represented by two bond issues in any one year. The remaining term to maturity was not allowed to drop below twelve years. Each bond for which data were collected was used for at least three years. These constraints and precautions were used to avoid distorting the study of long-term rates with the problems associated with the term structure of interest rates and thin markets.[4]

Preferred Stocks. The Moody's classification of preferred stocks into high grade, medium grade, and speculative grades was used. A minimum of 15 and a maximum of 18 different stocks were used each year in each of these three risk classes. On occasion, the number of different stocks was bolstered to 15 by using comparably rated preferred stocks as rated by Standard & Poor's. Not all large preferred stocks are rated by both financial service organizations, but sufficient overlap exists among the stocks rated so that stocks with comparable risk could be selected with considerable confidence. When more than 18 stocks were available, the stocks with the largest market value were utilized. Each stock used was included for at least three successive years. Only one preferred stock for one company was used in any one year. All of these securities were straight preferreds.

Convertible Bonds. Standard & Poor's risk classification of BBB, BB and B ratings was used to select individual bonds included in

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2. For a more detailed discussion of these computations and the problems involved in preparing these mortgage TARs see Robert M. Soldofsky [49].

3. The adequacy of a "portfolio" of 15 different bonds issued by separate companies to provide adequate diversification to remove and avoid unsystematic risk has been explored by Boardman and McEnally [7]. They concluded that the number of issues needed varied by risk class. Eight issues are adequate for Aaa bonds, but for lower rated bonds up to 16 different issues are needed. Also see Cheney [11] on bond classes and bond yield volatility.

4. The position taken here that 12 years remaining term to maturity is enough for corporate bonds is supported by the evidence mustered by Livingston and Jain [28].

these several studies of convertible bonds. At least 15 issues were sought for each risk class in each year, but in some of the earlier years not that many issues could be located with complete price data. In no instance were less than ten convertible bonds used for any class in any year. When more than 15 bonds of a risk class existed for a given year, the largest issues were selected. Only one bond was used for any one company in any one year. However, every bond included at any point was used for at least three consecutive years. Within these constraints the bonds with the longest maturities were selected. Too few convertible bonds classified as A or above existed to permit the construction of TARs for this risk class.

Convertible Preferred Stocks. Standards & Poor's quality ratings were used for the selection of individual convertible preferred stocks used in the several studies that included these securities. At least 15 issues were sought for each risk class each year, but in some years not that many could be located with complete price data. In no case were less than ten securities used in any one year. Only one such security was used for any corporation in any single year. However, a convertible included at any point was used for at least three years. When more than 15 securities were available, the largest ones were utilized.

Common Stocks. The 100 largest capitalization stocks have been used in this and prior Soldofsky studies [53]. In 1960, the market value of these stocks was 43 percent of the market value of all common stocks. In 1980, the market value of the 100 largest stocks traded on the NYSE was 46.8 percent of all the stocks traded on that exchange, and 40.9 percent of all traded common stocks on the organized exchanges, and by NASDAQ.[5] These stocks were grouped into five risk classes of 20 stocks each on the basis of the standard deviations of their TARs in the preceding decade. The 100 largest stocks were selected in terms of their market value at the beginning of each decade. Thus the stocks included among the 100 largest were adjusted in 1971 and 1981. In 1981 so many adjustments to the five risk classes were required that the annual return measurements were smoothed for the years 1978, 1979 and 1980.[6]

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5. The value of all traded common stocks is given in the *Annual Reports of the Securities and Exchange Commission* [44].

6. Forty replacements were required in 1981.

B. Business Cycles

The period covered by this study spans four complete business cycles plus the expansion that started in November 1982. These cycles are so important to the interpretation of the data presented that their dates, as determined by the National Bureau of Economic Research (NBER), are given in Table I. The periods from the peaks of business cycles to their troughs, which are called recessions or contractions, are shown as shaded areas in Figures IV and V which are introduced later.[7]

TABLE I
BUSINESS CYCLES
(Dates, and Length in Months)

		Contraction	Expansion	Cycles	
Trough	Peak	Trough from previous peak	Peak from previous trough	Trough from previous trough	Peak from previous peak
2/61	12/69	10	106	34	116
11/70	11/73	11	36	117	47
3/75	1/80	16	58	52	74
7/80	7/81	6	12	64	18
11/82	–	16	–	28	–

Source: *Business Conditions* [9]

Five interest rate cycles and five earnings-price cycles also were identified by Soldofsky for these 22 years. These two additional cycle concepts are developed later. The dating of the peaks and troughs of each of these three cycles plays a role in understanding the movements in the return-structure curves and the timing of sharp changes in the performance ranking of the TARs of individual risk classes of securities.

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7. A recession is defined in the NBER volume *Business Cycles* [33] as a period of decline in total output, income, employment, and trade that lasts a minimum of six months. Consequently the "official" designation of a peak or a trough cannot occur for at least six months after the turning point and may not be announced for considerably longer than that.

III. TOTAL ANNUAL RETURNS AND AVERAGES OF THE TOTAL ANNUAL RETURNS

The annual TARs for each of the 22 risk classes included in this study are given in Table II. The symbols given for each risk class at the left-hand margin of the table are used throughout; their use will help to simplify and shorten both the exposition and some of the tables.

Four background considerations are relevant to the use and understanding of these annual TARs. First, the initial year, 1961, was at the beginning of the longest period of prosperity that the United States has experienced since World War II. The trough of the 1958-61 business cycle occurred in February 1961, and the recovery continued until November 1969. Second, different analysts may prefer to use different periods of years for various analytical purposes. For reasons to be discussed in the next section, successive overlapping six-year periods were found to provide the most useful statistical results for the return-premium regression lines for 1961 through 1984. Table III shows these six-year $\overline{\text{TAR}}$s for 17 overlapping periods and their respective standard deviations, σ_{TAR}, for each risk class. These two items, the mean and standard deviation, form the basis for subsequent analysis. Third, the geometric mean was used to prepare the $\overline{\text{TAR}}$s. However, anyone who prefers the arithmetic means can readily construct them for any period of years from the data in Table II. Fourth, the data are based upon annual rather than more frequent observations.[8] In later analysis the I-S [24] monthly data for common stocks, long-term government bonds and corporate bonds, together with other information will be used to help indicate the intra-year period during which the TARs of various series reversed direction.

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8. Jacob [25] calculated monthly, quarterly and annual TARs in her empirical study of systematic risk for portfolios an securities for the period 1946-65. She used 5- and 10-year horizons. At one point she stated that when annual five-year holding periods were used, the results should have more consistency than with the use of quarterly or monthly data. As a rule of thumb, she suggested that the time horizon should be 5 to 20 times as long as the observational period.

TABLE II

ANNUAL HOLDING PERIOD RETURNS BY RISK CLASS: 1971-1984

RISK CLASS			YEAR													
SYMBOL	NAME	#	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
GB	U.S. Government Bonds	1	16.2%	5.3%	-0.4%	4.9%	9.6%	14.2%	-0.9%	0.4%	-1.1%	-3.3%	-0.8%	42.7%	0.0%	15.4%
GNMA	GNMA Mortgages	2	N.A.	6.1	2.5	3.9	10.4	16.3	1.5	2.2	0.2	0.4	1.5	40.1	10.0	15.1
BA	Corporate Bonds Aaa	3	13.9	7.9	2.0	-3.3	12.1	18.7	1.5	-1.6	-3.5	-5.1	-0.8	42.3	4.2	15.3
B2	Corporate Bonds Aa	4	11.9	10.0	-0.4	-4.5	15.1	17.3	3.5	-1.9	-2.9	-5.4	0.2	39.4	7.9	15.8
B3	Corporate Bonds A	5	11.3	5.8	3.0	-4.0	16.8	18.7	3.7	-1.4	-3.8	-4.4	-1.0	35.9	13.3	15.6
B4	Corporate Bonds Baa	6	17.0	14.4	-2.4	-9.3	15.8	19.6	8.5	1.9	-4.4	-5.4	5.7	35.0	16.1	15.8
B5	Corporate Bonds Ba	7	22.1	10.1	0.5	-11.3	24.2	25.5	10.6	2.2	1.5	2.7	4.4	24.3	16.6	16.2
P1	Preferred Stock High Qual.	8	9.5	6.7	0.3	-7.2	14.3	16.3	4.8	-2.1	-6.5	-2.0	5.2	31.1	11.3	12.2
P2	Preferred Stock Med. Qual.	9	9.8	8.6	-1.5	-10.2	22.8	25.2	8.0	-1.7	-0.4	-1.0	4.9	26.4	18.7	8.4
P3	Preferred Stock Spec. Qual.	10	9.3	20.8	1.2	-5.0	35.3	23.0	7.2	-0.9	-6.2	0.7	6.6	31.1	16.4	3.4
BC1	Convertible Bonds, BBB	11	7.1	6.9	-13.1	-9.2	-9.3	14.6	1.8	3.7	16.0	8.7	-1.5	21.8	37.3	-1.2
BC2	Convertible Bonds, BB	12	25.2	-0.9	-12.6	-8.9	23.9	23.4	12.0	4.9	11.5	17.5	6.9	28.5	35.8	-3.7
BC3	Convertible Bonds, B	13	23.4	8.3	-12.5	-22.3	38.3	36.8	13.6	9.8	6.2	5.1	4.2	12.4	36.3	-5.3
PC1	Preferred Stock, Convert. A	14	22.8	2.2	-17.3	-21.3	40.2	24.9	-9.1	-1.7	19.5	18.2	2.6	13.8	26.7	11.0
PC2	Preferred Stock, Convert. BBB	15	12.2	8.2	-23.5	-22.8	43.7	33.7	-1.1	-1.9	21.9	18.9	-7.8	19.7	37.3	11.8
PC3	Preferred Stock, Convert. BB	16	14.1	11.5	-22.5	-13.2	49.4	33.2	3.2	2.5	29.3	15.0	5.2	18.0	35.8	13.0
PC4	Preferred Stock, Convert. B	17	6.3	10.2	-12.3	-3.6	22.6	44.8	7.9	8.7	12.1	24.4	1.9	14.8	36.3	22.5
C1	Common Stock, Class I	18	13.1	30.1	10.4	-14.1	19.2	16.7	-11.4	10.3	18.2	15.9	5.8	31.5	14.5	8.1
C2	Common Stock, Class II	19	11.0	23.7	-6.2	-22.1	28.8	10.7	-6.3	6.9	17.6	21.8	-7.8	21.9	21.0	-4.3
C3	Common Stock, Class III	20	7.0	11.6	-5.7	-29.1	31.8	22.5	-14.4	2.7	24.0	26.5	-3.4	7.6	25.3	-5.1
C4	Common Stock, Class IV	21	9.9	8.9	-28.8	-22.4	48.3	17.0	-14.2	4.1	34.4	41.9	-22.4	-5.7	23.4	-2.2
C5	Common Stock, Class V	22	-7.1	4.3	-35.7	-40.6	60.4	49.7	-8.6	16.0	40.1	72.6	-20.0	-3.6	18.3	-0.1
S&P	Standard & Poor's 500 Stocks Index		13.2	21.3	-16.2	-26.7	36.9	22.4	-6.5	6.8	18.1	32.3	-5.8	20.4	22.3	6.4

TABLE III

MEAN AND STANDARD DEVIATION OF 6-YEAR ANNUAL HOLDING PERIOD RETURNS BY RISK CLASS

Period (Inclusive)	U.S. GB	GNMA	CORPORATE BONDS					PREFERREDS			CONV. BONDS			CONV. PREFS				COMMON STOCKS				
			Aaa	Aa	A	Baa	Ba	High	Med	Spec	BBB	BB	B	A	BBB	BB	B	I	II	III	IV	V
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
1961-66	1.025	1.053	1.063	1.078	1.045	1.066	1.091	1.029	1.054	1.053	1.078	1.060	1.026	N.A.	1.049	1.073	1.061	1.027	1.119	1.029	1.029	1.054
	σ 0.034	0.039	0.096	0.138	0.137	0.209	0.216	0.072	0.074	0.088	0.130	0.140	0.160	N.A.	0.059	0.099	0.182	0.039	0.294	0.042	0.055	0.051
1962-67	1.014	1.051	1.039	1.072	1.050	1.055	1.117	1.005	1.036	1.030	1.081	1.051	1.069	N.A.	1.081	1.100	1.086	1.011	1.104	1.014	1.011	1.036
	σ 0.051	0.037	0.080	0.134	0.141	0.193	0.239	0.075	0.079	0.079	0.131	0.129	0.215	N.A.	0.111	0.134	0.228	0.048	0.302	0.048	0.062	0.061
1963-68	1.000	1.075	1.058	1.114	1.103	1.109	1.180	0.996	1.033	1.027	1.108	1.084	1.126	N.A.	1.119	1.132	1.113	1.003	1.002	1.007	1.008	1.029
	σ 0.040	0.075	0.072	0.102	0.119	0.153	0.171	0.068	0.078	0.073	0.120	0.103	0.161	N.A.	0.120	0.120	0.213	0.040	0.038	0.041	0.060	0.057
1964-69	0.988	1.061	1.015	1.062	1.045	1.065	1.089	0.974	0.999	0.995	1.076	1.021	1.052	N.A.	1.061	1.086	1.036	0.984	0.998	0.985	0.981	1.000
	σ 0.047	0.083	0.088	0.125	0.152	0.153	0.202	0.064	0.083	0.101	0.154	0.183	0.244	N.A.	0.190	0.182	0.294	0.043	0.041	0.048	0.064	0.061
1965-70	1.002	1.066	0.984	1.022	1.027	1.046	1.039	0.983	0.984	0.974	1.065	1.007	1.021	N.A.	1.054	1.063	1.034	0.996	1.008	1.005	0.990	0.994
	σ 0.071	0.084	0.080	0.117	0.145	0.149	0.222	0.081	0.061	0.077	0.151	0.180	0.250	N.A.	0.190	0.184	0.295	0.066	0.083	0.090	0.078	0.052
1966-71	1.029	1.075	0.995	1.021	1.024	1.042	0.990	0.997	0.996	0.985	1.034	1.013	1.023	1.046[a]	1.059	1.052	0.996	1.019	1.027	1.022	1.014	1.022
	σ 0.096	0.086	0.097	0.116	0.144	0.146	0.205	0.093	0.076	0.089	0.116	0.190	0.252	0.091	0.191	0.175	0.268	0.088	0.094	0.100	0.108	0.107
1967-72	1.031	1.090	1.053	1.074	1.065	1.089	1.014	1.026	1.023	1.035	1.061	1.028	1.056	1.050[b]	1.082	1.080	1.034	1.038	1.051	1.040	1.051	1.045
	σ 0.096	0.072	0.151	0.130	0.124	0.095	0.200	0.080	0.073	0.114	0.098	0.182	0.242	0.090	0.182	0.168	0.261	0.086	0.091	0.095	0.108	0.105
1968-73	1.043	1.082	1.066	1.041	1.029	0.998	0.897	1.038	1.025	1.038	1.012	0.982	0.976	1.019[c]	0.996	0.993	0.946	1.050	1.058	1.051	1.056	1.050
	σ 0.085	0.076	0.151	0.138	0.124	0.155	0.172	0.069	0.072	0.113	0.112	0.182	0.195	0.129	0.196	0.173	0.179	0.075	0.083	0.087	0.102	0.101
1969-74	1.052	1.054	1.028	0.978	0.947	0.938	0.807	1.022	0.999	1.019	0.975	0.952	0.921	0.982[d]	0.919	0.945	0.928	1.041	1.046	1.040	1.032	1.024
	σ 0.082	0.045	0.174	0.164	0.153	0.164	0.170	0.083	0.087	0.119	0.103	0.177	0.200	0.162	0.176	0.158	0.168	0.083	0.093	0.095	0.120	1.122
1970-75	1.079	1.073	1.080	1.041	1.022	1.016	0.918	1.058	1.052	1.099	1.012	1.040	1.034	1.043	1.025	1.053	1.030	1.072	1.080	1.082	1.075	1.077
	σ 0.059	0.037	0.166	0.197	0.202	0.276	0.366	0.080	0.112	0.152	0.098	0.163	0.232	0.235	0.251	0.253	0.124	0.067	0.086	0.083	0.109	0.136
1971-76	1.082	0.839	1.084	1.081	1.085	1.089	1.112	1.065	1.087	1.137	1.023	1.077	1.107	1.073	1.070	1.106	1.107	1.121	1.069	1.054	1.039	1.016
	σ 0.063	0.448	0.081	0.088	0.087	0.120	0.151	0.089	0.137	0.150	0.111	0.178	0.255	0.248	0.280	0.272	0.202	0.147	0.190	0.217	0.282	0.425
1972-77	1.054	1.067	1.064	1.067	1.072	1.075	1.094	1.057	1.084	1.133	1.015	1.056	1.091	1.021	1.048	1.088	1.110	1.079	1.040	1.017	0.998	1.013
	σ 0.058	0.056	0.080	0.087	0.087	0.114	0.142	0.088	0.137	0.152	0.109	0.160	0.249	0.246	0.281	0.274	0.201	0.177	0.197	0.232	0.291	0.426
1973-78	1.044	1.061	1.048	1.047	1.060	1.054	1.080	1.042	1.067	1.097	1.010	1.066	1.094	1.014	1.031	1.073	1.107	1.048	1.013	1.002	0.990	1.032
	σ 1.083	0.056	0.086	0.092	0.095	0.110	0.145	0.093	0.143	0.157	0.106	0.156	0.249	0.247	0.283	0.275	0.201	0.144	0.175	0.228	0.289	0.428
1974-79	1.043	1.057	1.038	1.043	1.048	1.051	1.084	1.031	1.069	1.084	1.059	1.108	1.127	1.077	1.110	1.163	1.151	1.060	1.053	1.050	1.097	1.165
	σ 0.064	0.063	0.093	0.095	0.103	0.114	0.143	0.103	0.142	0.168	0.094	0.123	0.224	0.233	0.251	0.236	0.165	0.153	0.180	0.242	0.275	0.387
1975-80	1.027	1.058	1.035	1.041	1.047	1.058	1.109	1.040	1.085	1.094	1.090	1.154	1.179	1.147	1.186	1.215	1.197	1.112	1.129	1.149	1.208	1.367
	σ 0.073	0.067	0.096	0.097	0.104	0.104	0.112	0.094	0.123	0.160	0.057	0.075	0.152	0.180	0.183	0.185	0.140	0.116	0.124	0.177	0.241	0.300
1976-81	1.101	1.036	1.014	1.020	1.018	1.041	1.077	1.025	1.056	1.049	1.071	1.126	1.123	1.087	1.101	1.145	1.162	1.190	1.068	1.091	1.088	1.226
	σ 0.066	0.062	0.087	0.081	0.087	0.093	0.093	0.081	0.102	0.101	0.071	0.068	0.124	0.137	0.165	0.136	0.157	0.111	0.122	0.171	0.259	0.357
1977-82	1.052	1.134	1.049	1.053	1.044	1.065	1.075	1.047	1.058	1.068	1.083	1.134	1.085	1.069	1.079	1.121	1.115	1.113	1.086	1.067	1.050	1.139
	σ 0.181	0.159	0.184	0.168	0.155	0.148	0.089	0.135	0.107	0.131	0.090	0.085	0.040	0.117	0.133	0.105	0.076	0.143	0.136	0.158	0.263	0.349
1978-83	1.199	1.156	1.181	1.169	1.158	1.530	1.095	1.137	1.119	1.137	1.140	1.124	1.121	1.108	1.167	1.131	1.123	1.088	1.119	1.131	1.248	1.327
	σ 0.051	0.082	0.048	0.523	0.554	0.731	0.828	0.055	1.073	0.073	0.136	0.170	0.118	0.127	0.136	1.170	0.158	0.158	0.130	0.131	0.102	0.170
1979-84	1.179	1.154	1.180	1.168	1.157	1.152	1.094	1.133	1.110	1.133	1.149	1.144	1.125	1.082	1.148	1.112	1.118	1.091	1.139	1.147	1.254	1.338
	σ 0.770	0.104	0.761	0.083	0.084	0.096	0.106	0.079	0.091	0.080	0.153	0.153	0.111	0.151	0.161	0.189	0.182	0.154	0.109	0.117	0.091	0.141

N.A. = Not Available.
[a] Based on 1970 and 1971 only.
[b] Based upon observations from 1970 through 1972.
[c] Based on observations from 1970 through 1973.
[d] Based on observations from 1970 through 1974.

IV. RETURN-STRUCTURE CURVES

In this section the return-structure curves are developed and interpreted. The primary purpose of these curves is to show how added return and added risk are related. The returns are measured as TARs and the risk is measured as the σ_{TAR}. The intercepts, slopes, regression coefficients and measurements of statistical significance change widely from year to year; they depend upon the number of years included in the average and upon the specific years involved.[9] In later sections the patterns in these changes will be pointed out, their causes analyzed and their theoretical and practical importance assessed. A review of return-structure curves going back to 1910 will be introduced to add perspective.

Means and standard deviations were prepared for 120 different combinations of holding periods for all risk classes of securities. These periods included all four-year through all ten-year periods included in the 1961-84 data base. Table IV presents all possible six-year combinations of data starting with 1961-1966 and going through 1979-1984. The reasons for the decision to utilize the six-year period in this presentation are suggested by a discussion of the data in Table IV, Adjusted R^2s for Four-Through-Ten-Year Total Annual Returns.

The goodness of fit of the linear regression lines to the observations that comprise the return-structure curves was highest for the six-year periods. The adjusted R^2s for 10 of these 17 were significant at the .01 level or beyond as measured by the F statistic; that is, the probabilities are beyond one in 100 that the results are not a matter of chance in almost 60 percent of these cases.[10] Twelve of 17 regres-

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9. An earlier version of this study included a section on Statistical Methods. This section reviewed the simple methods used as a part of this work. These techniques include arithmetic and geometric means, standard deviations, coefficient of variation, regression analysis, correlation coefficients, and coefficients of determination. The meaning and uses of t- were included. This earlier version, *Performance of Long-Term Marketable Securities: Risk-Return, Ranking Timing, 1961-1982* [48], is available from the College of Business Administration, University of Iowa, Iowa City, Iowa 52242.

10. The entire series, 1961-1982 (84), provides for only three independent or non-overlapping runs of six years. These overlapping observations reduce the importance of adjusted R^2 values. For a similar opinion on overlapping time periods but one limited to common stock, see McEnally [30].

sion lines were significant beyond the .05 level. The proportions of the seven-year and eight-year regression lines significant at the .01 and .05 levels were very slightly higher than they were for the six-year periods. However, the six-year lines were chosen for further analysis and illustration because of a preference for shorter periods. The increasing volatility observed in the financial markets argues for shorter rather than longer periods, even though statisticians might prefer the seven-year periods because of the slightly higher "reliability."

The six-year return-structure line for the period 1975-80 is shown in Figure 1. The interpretation of the slope of the line, which is 1.099, is that each additional 1.0 percent increase in the $\overline{\text{TAR}}$ coincides with a 1.099 percent increase in standard deviation of the $\overline{\text{TAR}}$. All along the regression line, the risk rises almost 10 percent faster than the return. The intercept of 5.658 percent for the regression line at the risk or y-axis shown on the figure at 1.00, a zero rate of return, means that substantial risk exists even at the zero rate return in the holding-period framework. For the 1975-1980 period, the $\overline{\text{TAR}}$ on U.S. Governments was 2.7 percent and the $\overline{\text{TAR}}$ on the highest quality common stocks was 11.2 percent. The difference indicates a return premium of 8.5 percent for the period. On the average for the six, six-year periods ending with 1977-82, the $\overline{\text{TAR}}$s on the U.S. Governments and the highest grade common stocks were 3.85 percent and 8.37 percent respectively; the return premium for this quality of common stock averaged 4.52 percent.[11] The reader may use the data in Table II to calculate the TARs for any period and for any of the 22 risk classes from the annual data.

If the markets for long-term securities were perfectly efficient, all of the means and standard deviations would fall exactly on the regression line – but they do not. Perfect markets would include perfect foresight of both anticipated risk and return. The coefficients of determination, the R^2s, would all be 1.00, but they ranged from .000 to .7308 for the six-year, return-premium curves. Nevertheless, the fit of the linear regression lines to the data for the six-year curves and for the other curves which cover holding periods from

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11. For a discussion of return premiums on utility common stocks see Soldofsky [47]. In this article, two ex ante approaches as well as the present ex post approach was discussed and empirical evidence provided. The Brigham-Shome ex ante approach is data-based and the Benore ex ante approach uses survey-based data.

TABLE IV

ADJUSTED R^2/s FOR HOLDING PERIODS OF FOUR THROUGH TEN YEARS

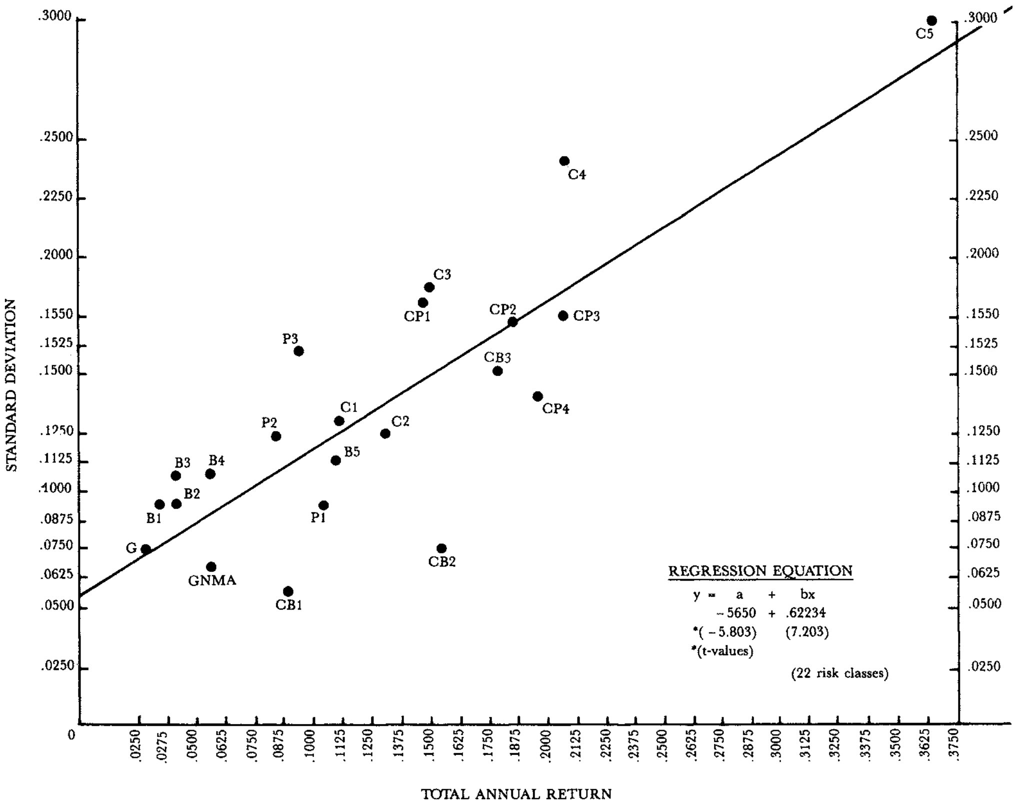
LENGTH OF PERIOD[#]

4 YEARS		5 YEARS		6 YEARS		7 YEARS		8 YEARS		9 YEARS		10 YEARS	
YEARS	ADJ. R^2	YEARS	ADJ. R^2	YEARS	ADJ. R^2	YEARS	ADJ. R^2	YEARS	ADJ. R^2	YEARS	ADJ. R^2	YEARS	ADJ. R^2
(81-84)	.0262	(80-84)	.2452	(79-84)	.0030	(78-84)	.0000	(77-84)	.0000	(76-84)	.0000	(75-84)	.0714
(80-83)	.1852	(79-83)	.0000	(78-83)	.0000	(77-83)	.0450	(76-83)	.0000	(75-83)	.1195	(74-83)	.0380
(79-82)	.0000	(78-82)	.0000	(77-82)	.0000	(76-82)	.0000	(75-82)	.1681[b]	(74-82)	.0702[a]	(73-82)	.0000
(78-81)	.5998[c]	(77-81)	.4422[c]	(76-81)	.4344[c]	(75-81)	.6413[c]	(74-81)	.5306[c]	(73-81)	.3394[c]	(72-81)	.3016[c]
(77-80)	.5147[b]	(76-80)	.6549[c]	(75-80)	.7078[c]	(74-80)	.3860[c]	(73-80)	.6150[c]	(72-80)	.5893[c]	(71-80)	.0000
(76-79)	.4628[b]	(75-79)	.6368[c]	(74-79)	.4501[c]	(73-79)	.1822[b]	(72-79)	.0885[a]	(71-79)	.0804[c]	(70-79)	.0299
(75-78)	.4083[b]	(74-78)	.0627	(73-78)	.0000	(72-78)	.0000	(71-78)	.0365	(70-78)	.1379[b]	(69-78)	.2949[c]
(74-77)	.0000	(73-77)	.0573	(72-77)	.0761	(71-77)	.3783[c]	(70-77)	.2378[c]	(69-77)	.3734[c]	(68-77)	.3170[c]
(73-76)	.0091	(72-76)	.0089	(71-76)	.3404[c]	(70-76)	.1880[b]	(69-76)	.3631[c]	(68-76)	.0000	(67-76)	.0000
(72-75)	.2538[a]	(71-75)	.5167[c]	(70-75)	.3124[c]	(69-75)	.3991[c]	(68-75)	.3285[c]	(67-75)	.0026	(66-75)	.0551
(71-74)	.6572[c]	(70-74)	.2065[b]	(69-74)	.2571[b]	(68-74)	.3703[c]	(67-74)	.2270[c]	(66-74)	.2732[c]	(65-74)	.0758[a]
(70-73)	.0572	(69-73)	.1401[a]	(68-73)	.2257[b]	(67-73)	.0068	(66-73)	.0574	(65-73)	.0000	(64-73)	.0000
(69-72)	.0151	(68-72)	.0571	(67-72)	.0000	(66-72)	.0000	(65-72)	.1011[a]	(64-72)	.0729[a]	(63-72)	.1272[b]
(68-71)	.0000	(67-71)	.0000	(66-71)	.0000	(65-71)	.1857[b]	(64-71)	.1287[b]	(63-71)	.1738[c]	(62-71)	.0606[a]
(67-70)	.0263	(66-70)	.0277	(65-70)	.2967[c]	(64-70)	.2173[b]	(63-70)	.2644[c]	(62-70)	.1301[b]	(61-70)	.2175[c]
(66-69)	.2484[a]	(65-69)	.5708[c]	(64-69)	.4362[c]	(63-69)	.4290[c]	(62-69)	.2846[c]	(61-69)	.3747[c]		
(65-68)	.8489[c]	(64-68)	.7329[c]	(63-68)	.7308[c]	(62-68)	.5323[c]	(61-68)	.5473[c]				
(64-67)	.7521[c]	(63-67)	.7308[c]	(62-67)	.6069[c]	(61-67)	.6139[c]						
(63-66)	.5744[c]	(62-66)	.2961[b]	(61-66)	.5310[c]								
(62-65)	.5187[b]	(61-65)	.5855[c]										
(61-64)	.3921[b]												

# = 22 risk classes of securities
a. = F distribution value significant at the .10 level.
b. = F distribution value significant at the .05 level.
c. = F distribution value significant at the .01 level.

FIGURE I

RETURN-STRUCTURE CURVE
(1975-1980)



four-to-ten years, is very highly significant in a statistical sense.[12] The F-values for the entire set of 112 linear regression lines through 1982 were significant beyond the .01 level 51 times and between the .05 and .01 levels another 18 times. The evidence shows that the goodness of fit of the data to the linear regression lines is highly unlikely to be a matter of chance. One vital question that will be addressed below is the reason(s) that the R^2s and t- and F-values fall so low in about one-third of the observations.

The use of the term "perfect markets" and the explanation of the typical, positive, return-structure curve requires some further discussion. The term "perfect markets" is used in a sense that some writers have described as the idealized, neoclassical, perfect markets. In this sense, all buyers and sellers have perfect foresight and are rational, rate-of-return maximizers. All buyers and sellers are price takers, information is costless, outcomes are not affected by income taxes, and transactions costs are so small that they can be disregarded. The next period's prices (returns) always turn out to be exactly as anticipated. Prices and rates of return would always be exactly on their anticipated time path. When the financial markets are in such a theoretically beautiful position, ex ante yields would be identical with ex post yields. For funds, the rate of change in the yield to maturity would be a myopic mirror image of the holding period return. In this perfect world of no surprises the correlation coefficients on the return-structure curves would be 1.00.

The slopes of the return-structure curves are generally positive, as detailed below, because of the societal experience built into them. Bonds were differentiated from stocks in late sixteenth century Western Europe for the purpose of allocating different degrees of risk and return in accordance with nascent business units.[13] Bonds

12. Numerous transformations of the data and nonlinear regressions were tried in the search for an equation form that fit the data better. The conclusion was that a linear, nontransformed equation gave the best fit.

13. During this period the center of financial activity gradually shifted from Antwerp to Amsterdam. Even some forms of trading futures contracts developed. The first "stocks" traded on the New York Stock Exchange in 1792 were U.S. government bonds. Shares in the Bank of the United States and the Bank of North America also were traded this first year.

The government stock was newly issued to consolidate parts of the unfunded debt of the state governments and of the national government under the Articles of Confederation. Part of the genius of Alexander Hamilton, the first Secretary of the Treasury, was to propound a scheme that would give value to worthless paper and win votes for the adoption of our Constitution. One of the first acts of the 1789 Congress was to pass a tariff bill that provided income to fund the unfunded debt and, thereby, to breathe some value into it.

Corporate charters originally required an individual act of a State legislature. Until at least the 1830s, securities now called bonds were then generally called stocks. The New York Boston, Philadelphia and Baltimore exchanges traded "[U.S.] government stocks" and "state [improvements] stocks."

generally have fixed, contractual rates of interest and fixed maturity dates. Common stocks have no fixed obligation to pay a given or increasing dividend and have no maturity. Preferred stocks, an equity instrument with a fixed dividend, were viewed as being somewhat less risky that common stocks. These evolving securities instruments were a way of further differentiating risk and return in response to the needs of governments, and business corporations and their investors. As added risk is assumed for the purpose of seeking added return, no one should be surprised that the outcomes are generally as anticipated and as built into the legal characteristics of these instruments.

One might start from the theoretical proposition that in a world of specialized, crafted contractual provisions for a multiplicity of long-term marketable securities the average anticipated-expected returns would be the unbiased average of all of the risk classes of securities being considered. Such a proposition would be analogous to the unbiased expectations theory for the term structure of interest rates, but in that theory the risk level is held to be constant. Reasons for biases such as liquidity preference and market segmentation and tax differentials have been developed and empirical testing carried out.

Similar propositions could be worked out for long-term marketable securities. The major source of bias would be societal differentiation of the contractual provisions of the major classes and subclasses of securities. Another source of bias is market segmentation and a third may be institutional investors' preference for quality for reasons that would then require a further explanation themselves. Another possible source of bias would be differential information about the characteristics and performance of the many risk classes of securities. Even transactions costs may be different as between government bonds at the one extreme and common stocks at the other. The higher transactions costs for common stocks probably could explain a very small part of the positive slope of the return-structure curve.

Over periods of time such as the quarter of a century covered by the data in this study the securities in each risk class reflect stable, market-wide factors. These risk classes of securities — or quasiportfolios — reflect the continuing dominance of the same general economic, financial, political and legal background. The individual securities and the groups of securities remain about equally and consistently sensitive to such background conditions as changing interest rates and business conditions.

The slope coefficients and the intercepts for the regression lines for the 17 six-year periods ending with 1972-1982 are given in Table V. In the ten instances for which the F-value was at the .01 level or beyond, the coefficient of the $\overline{\text{TAR}}$ variable averaged 0.7403. For the three most recent periods, 1974-79, 1975-80, and 1976-81, the slope coefficient averaged 0.961. These results indicated that on average a 1.00 percentage point increase in the return was associated with a slightly lower increase in risk as measured by the standard deviation.

Figure II shows the regression line for 12 of the 17 six-year periods that had F-values beyond the five-percent level of significance. This chart depicts the limits of what has been experienced during the past twenty years and suggests the most likely range of future experience for portfolios composed of bonds, stocks and closely related securities. These lines are numbered chronologically so that readers may follow their movements. To observe lines with nonoverlapping observations, start with line II, 1963-68, move to line VII, 1969-1974, and on to line IX, 1975-80.

In eight of these 12 six-year periods, the slope of the regression line was strongly positive, and in the remaining four it was clearly negative. In each of the four successive negative periods, 1968-73, 1969-74, 1970-75, and 1971-76, substantial changes were observed in the spread between AAA bond yields and the earnings-price (e-p) ratio on the Standard & Poor's (S&P) stock average.[14] The e-p ratio plunged in 1969, 1970 and 1971 while the AAA bond yields remained rather stable. The e-p ratios recovered in 1972 and 1973. A consequence, as elaborated later, was a sharp decline in the structure of returns. Figure III profiles the negatively sloping regression line for 1968-74. Observe that seven risk classes of securities had both negative TARs and very high standard deviations for this period. These seven were the lowest three grades of convertible preferred stocks, the lower two grades of convertible bonds and the lowest two grades of (straight) corporate bonds. The low returns and high risk on these classes of securities are contrasted with the modest positive returns and modest risk for the period on common stocks and U.S. governments.

14. The importance of these spreads between bond yields and the e-p ratio on stocks are discussed on pages 37, 39 and 45.

TABLE V

REGRESSION LINES FOR SIX-YEAR, RETURN-STRUCTURE CURVES

Period	Intercept a	Slope Coefficient bx	Adj R^2	F-Value
1979-84	0.1872	−0.3239	.0000	0.93
	(4.542)	(−0.963)		
1978-83	0.1524	−0.1759	.0004	0.95
	(4.943)	(0.066)		
1977-82	.1555	−.01138	.0000	0.00
	(0.306)	(−0.024)		
1976-81	−.8488	.89867	.4344[c]	17.13
	(−3.607)	(4.139)		
1975-80	−.5650	.62234	.7078[c]	51.88
	(−5.803)	(7.203)		
1974-79	−.01305	1.3610	.4501[c]	18.19
	(−3.781)	(4.265)		
1973-78	.0783	−.5806	.0000	0.80
	(1.152)	(0.896)		
1972-77	1.187	−.9544	.0761	2.73
	(1.936)	(−1.652)		
1971-76	1.3469	−1.081	.3440[c]	11.84
	(4.005)	(−3.440)		
1970-75	1.5041	−1.279	.3124	0.11
	(3.631)	(−3.246)		
1969-74	0.5688	−.4391	.2571[b]	0.83
	(3.77)	(−2.875)		
1968-73	0.66021	−.5186	.2257[b]	7.12
	(3.316)	(−2.668)		
1967-72	0.06079	.0679	.0000	0.03
	(.156)	(.184)		
1966-71	−.1229	.2543	.0000	0.36
	(−.284)	(.602)		
1965-70	−1.028	1.135	.2967[c]	9.86
	(−2.782)	(3.14)		
1964-69	−1.157	1.245	.4362[c]	17.25
	(3.747)	(4.153)		
1963-68	−.6949	0.7405	.7308[c]	58.00
	(6.668)	(7.616)		
1962-67	−1.681	1.711	.6069[c]	33.42
	(5.381)	(5.781)		
1961-66	−2.057	2.054	.5310[c]	24.77
	(−4.714)	(4.977)		

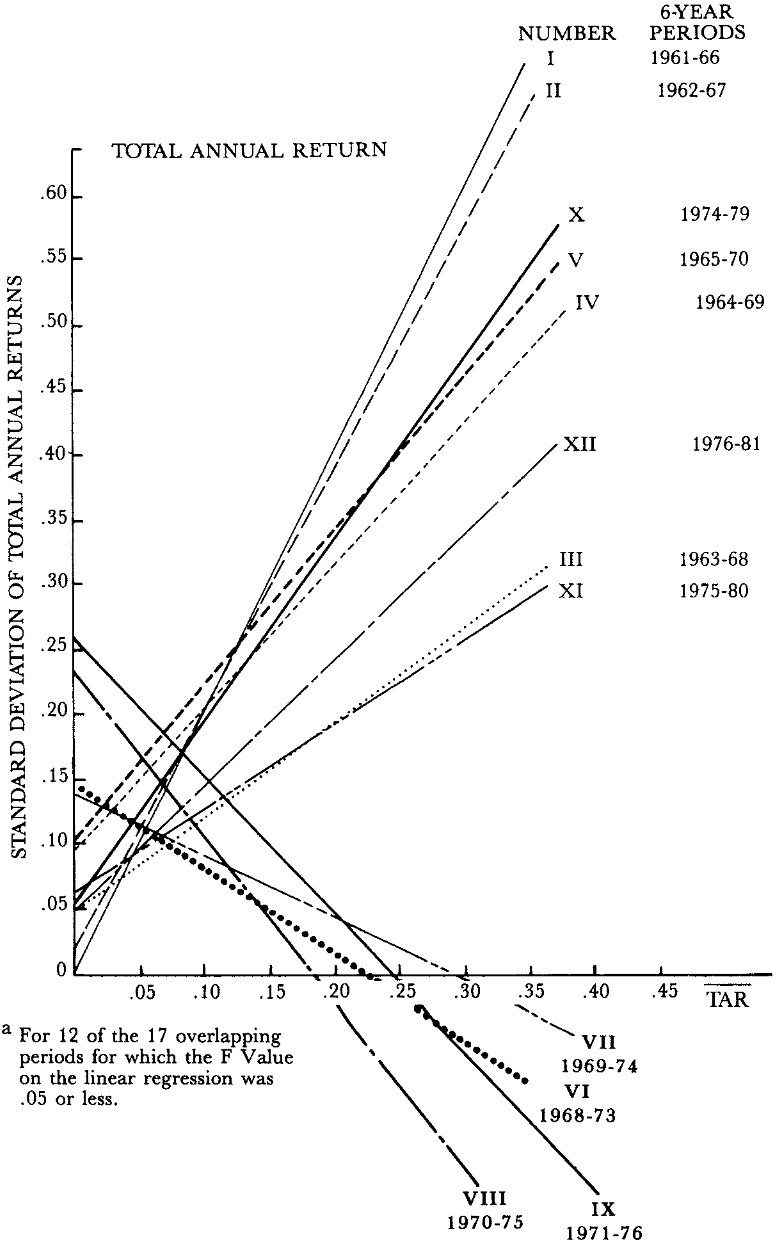
t-values given in parenthesis below each intercept and slope coefficient

b = significant between the .05 and .01 level

c = significant beyond the .01 level

FIGURE II

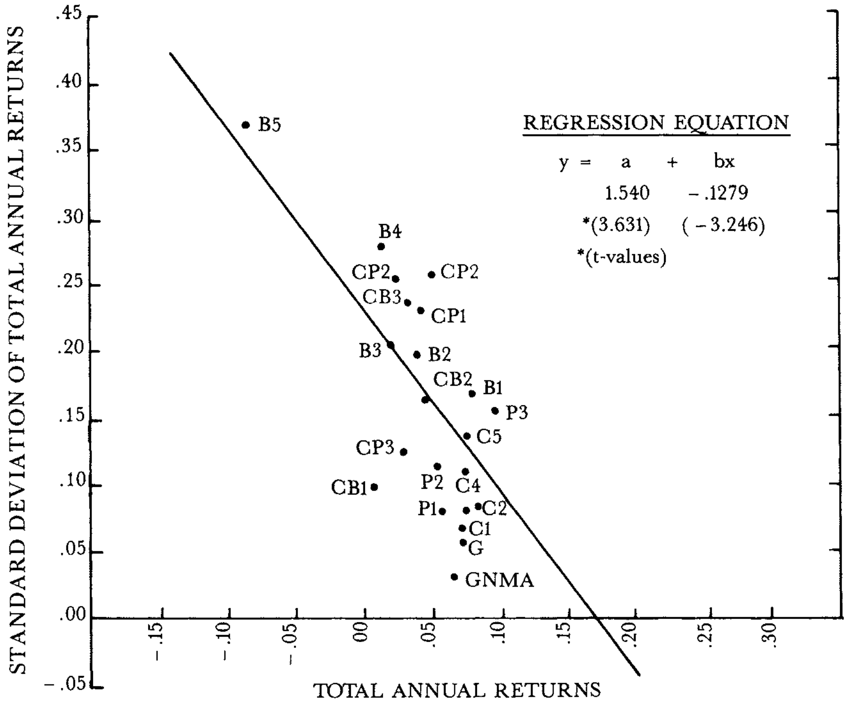
RETURN-STRUCTURES CURVES
(1961-66) to (1976-81)[a]



[a] For 12 of the 17 overlapping periods for which the F Value on the linear regression was .05 or less.

FIGURE III

RETURN-STRUCTURE CURVE
(1970-75)



That the regression lines in Figure II indicate the recently experienced limits of the risk-return relationships needs to be emphasized. Table V reports that the four highest positive slopes were as follows:

Period	Slope Coefficient	Adj R^2
1961-66	2.05	.531
1962-67	1.71	.607
1974-79	1.36	.450
1965-70	1.135	.297

The four steepest negative slopes that had highly significant or very highly significant adjusted R^2 values were as follows:

Period	Slope Coefficient	Adj. R^2
1970-75	−1.279	.312
1971-76	−1.081	.340
1968-73	−0.5186	.226
1969-74	−0.4391	.257

An interpretation of these data is that one might reasonably anticipate that in future six-year periods the positive returns on some classes of securities could be as much as twice or more their average. On the negative side, the return for added risk could be quite high as shown by the negative slope coefficients. As observed in the preceeding paragraph, twice as many six-year periods had positive slope coefficients as negative slope coefficients when only those regression lines that were significant in a statistical sense were counted.

What does the longer historical record show about the experienced limitations of the return-structure curves? Data are not parallel for the periods before 1961-66 back to 1910 because they cover only 14 risk classes of securities. Too few convertible securities existed prior to 1961 to prepare their TARs by risk class. Furthermore, an earlier study [53] showed that a ten-year, nontransformed regression line provides the best fit to the data from 1961-70 to 1910-70.

The regression lines in this study for these 14 risk classes of securities had negative slopes for all ten-year periods from 1910-19 through to 1932-41 with the exception of 1919-1928. For most of the moving ten-year periods from 1910-1928, the t-values for the regression coefficients, adjusted R^2 and F-value were significant.[15] Many of the negative slope coefficients were well above −2.0.[16] The highest negative coefficient associated with significant statistical values was −3.59 for the period 1927-36.[17]

Starting with 1938-47 all slope coefficients were positive until 1964-73. The highest positive slopes were about 1.5, prior to the 1960s. The ten-year slope coefficient for the 14 risk classes of securities reached a high of 2.5 for the 1961-70 period. That slope value is higher than it is for the 1961-1966 period when all 22 risk classes of securities are considered.

This review of return-structure curves presents empirical evidence of the positive and negative limits that have been experienced in the United States during most of this century. They could be exceeded in either direction before the end of the century. The number of risk classes that might be included in some future study could be expanded as the varieties of long-term marketable securities continues to proliferate.

Before moving on to discuss the correlation matrices among the 22 risk classes of securities and the analysis of the causes of the cyclical disintegration and regeneration of the R^2s, three bits of collateral information about the level and changes of the return premiums should be mentioned. The first, the well-known I-S [24] monograph,

15. In 1954 the TARs on common stock were similar to those of 1975. The TAR for Class V common was 64.0 percent in 1954. In 1945 the Class V TAR was 49.1 percent; all of the common stock classes had TARs above 25 percent that year. Other noteworthy years for common stock were 1915, 1928, 1933 and 1935. See Soldofsky and Max [53] for further details. The bond TARs in 1982 were by far the highest recorded in modern times in the United States. Bond TARs have been prepared back to 1909. The only other years bond TARs generally were about 20 percent or more were 1921—the year of the sharp, short, post-World War I depression—and 1934 and 1935—the years immediately after the end of the Great Depression of 1929-1933.

16. An article of faith of modern financial theorists and other experts dealing with investments in securities is that risk and return should be positively related. However, for extended historical periods the evidence is contrary to this belief. Let others speculate why these negative relations occurred and why they may occur again.

17. Common stock is given relative little attention in justly famous editions of Graham and Dodd, *Security Analysis* [20] which were published in 1934, 1940 and 1951. Common stock generally was considered to be too speculative to be of investment quality. Graham and Dodd quote approvingly the opinion of Lawrence Chamberlain on this point. Chamberlain [10], an earlier bond authority, wrote in 1911 that, "Since stocks are the typical speculative paper and bonds the typical investment security, it is manifestly unfair to use the same investment standard to the disparagement of stocks." Par. 63.

is based on only four classes of securities: namely, NYSE equities, small NYSE stock, corporate bonds and government bonds.[18] Second, Brigham [8], has prepared ex ante return premiums for the Dow Jones Industrials over 20-year Treasury Bonds for the period 1966-1981. These premiums ranged from about 5 percent to 7 percent and stood at about 5.6 at the end of 1981. Finally, Soldofsky [47] has published an ex ante, survey-based, return-premium series using Charles Benore's data for the returns on utility common stocks over Aa utility bonds for the same quality of company. The Benore series, which runs from 1974 through 1983, reports ex ante return premiums that range from 1.75 percent to 4.89 percent. The return premium stood at 3.58 percent in April 1983. The return premiums on industrial and utility common stocks are intuitively consistent, considering the lower returns that are generally expected from utility shares because of their lower variability.

The I-S [24] ex post studies, these new ex post data studies being reported, the Brigham ex ante studies and Benore ex ante studies of return premiums all show higher returns on common stocks than on bonds. During some short periods of turmoil in the markets, bond $\overline{\text{TAR}}$s may exceed stock $\overline{\text{TAR}}$s, but the normal tendency is the other way about. The reason for the normative proposition that the return on stocks exceeds that of bonds is that stocks are riskier both in ex ante and ex post terms.

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18. See I-S [24], Exhibit 10 for a summary profile of their risk and return results.

V. BETA COEFFICIENTS AND THE CORRELATION MATRIX

This section is concerned with the popular beta coefficient as it is used in portfolio theory. Underlying the beta calculation are the correlations of each individual security, or class of securities, to a market index. Betas will be given for the entire set of 22 risk classes of securities and correlation matrices provided also.

A. Beta Coefficients

The beta coefficient, which measures a security's riskiness relative to the market index being used, is based upon the building blocks of TARs. This measure of ex post returns usually is prepared for the individual securities included in the market index used. More formally, the return on a security, or a risk class of securities, is:

$$k_j = \alpha + \beta \bar{k}_m + e$$

where k_j = the return on the security or the class of securities;
α = the intercept term in the regression;
β = slope coefficient in the regression;
k_m = the market index return;
e = random errors.

The β coefficient term may be expressed as correlation between the market index and the individual security or class of securities. In formal terms:

$$\beta = \frac{\text{covariance } (k_j, k_m)}{\text{variance of } k_m} .$$

The covariance of k_j, k_m, in turn, is equal to the correlation between the two return[19] or:

$$\text{covariance } (k_j k_m) = r_{jm}, \sigma_j \sigma_m .$$

19. See any of the well known text books in investments such as Jacobs [26] or the Ambachtsheer and Ambrose [2] chapter in the volume *Managing Investment Portfolios* for more detailed and rigorous discussions of the underlying theory and statistics.

The beta on an individual security or class of securities is a measure of its sensitivity to the market index used. Portfolio managers trying to reduce the fluctuation in the returns on their portfolios seek stocks or other securities with low betas relative to the index and the other securities in the portfolio.

Betas. Perhaps the most serious criticism of the widely-used betas is that the market index, the measuring rod around which the beta is formed, is almost always for common stocks only. Theoretically, the index should include all real assets and marketable securities as Roll [41] has argued forcefully. Market indices that include both bonds and stocks have been prepared and tested by Alexander [1] in 1980 and for common and preferred stock by Bildersee [6] in 1973. Real estate's role in portfolio theory has been discussed by Harris Friedman [19] and others, but no market index has been built incorporating either real estate or mortgages.

Two new, broad market indices were prepared for this study utilizing the major groups of *long-term* marketable securities according to their approximate market-value weights of 60 percent for common stocks, 3.8 percent for U.S. government and agency securities, 7.8 percent for corporate bonds and 28.4 percent for 1–4 family non-farm home mortgages.[20]. Broad market index A includes all of these components, while composite B excludes home mortgages.

The weight for common stocks, U.S. governments and agency securities, corporate bonds, and 1–4 family non-farm home mortgages are supported by data from various sources. First, in keeping with the use of debt instruments having maturities of twelve years or more, data were sought for that portion of the debt instruments which had such long maturities. The maturity structure of U.S. T-bonds is published in the *Treasury Bulletin*.[21] The maturity structure of corporate bonds has been prepared by McKeon and Blitz [31]. No data were located on the remaining term to maturity of home mortgages.[22] My estimates of the amount and proportion of mort-

20. The TARs for these mortgages starting with 1972 were prepared at Salomon Brothers by Waldman [61] and Waldman and Baum [60]. See the discussion above on pages 6 and 7.

21. The *Treasury Bulletin* actually shows maturity class limits for five different classes including the 10-20 years class. The volume of Treasury bonds maturing in 10-or-more years as of December 1982 was $72,995 million. [59].

22. Ibbotson and Fall [23] include the value of residential real estate but not that of mortgages.

gages outstanding with maturities of twelve years or more were made after conversations with officers of private companies and government agencies that insure home mortgages.

Betas for 22 risk classes of securities utilizing the S&P 500 stock index, which is published in S&P's *Security Price Index Record* [45], and the two new, broad market indices for the period 1973-1982 are shown in Table VI.[23] Three sets of observations about the betas in these tables are pertinent. Observe that the first column uses the S&P 500 stock index; the second column uses a broad market composite index as described above that includes U.S. governments, home mortgages and corporate bonds; and the third column is the same as the second, but excludes the mortgage component. In modern portfolio theory, the average of all individual betas for securities of the type included in the index should obviously be 1.00. In the case of the five risk classes of common as compared with the S&P 500 stocks as shown in Table VI, the average beta is very close to 1.00; the result is a rough check on the representativeness of the common stocks used in this study. Note that the first three risk classes of convertible preferred stocks had betas more like that of the typical stock. Also, convertible bonds had even lower risk relative to the stock market. Straight preferred stock and the corporate and government bonds were the least risky classes in relative terms. These relative risk class rankings provide no surprises, but they do confirm what prudent investors have known all along; namely, that a mixture on quality bonds tends to stabilize the return and risk levels of a securities portfolio.

The second set of observations relates the levels of the betas in the first and second columns. The broad market index used in the second column reduces the betas for the riskiest classes of common stocks, and raises the betas substantially for the bond and mortgage groups as compared with the values in the first column. This new broad market index is far from perfect because it does not exactly represent the bonds used, and it has no separate components for convertible securities. However, it does provide a partial response to one of Roll's criticism that the market indices used in empirical studies are inappropriate because they are almost always stock market

23. For the beta coefficients for 26 risk classes of securities for 1976-81, see Soldofsky [48]. This study includes information about income and deep discount bonds that are not available for longer periods.

TABLE VI

BETA COEFFICIENTS FOR LONG-TERM MARKETABLE SECURITIES (1973-82)

Risk Class	Based on Market Index for		
	S&P 500 Stocks	Broad Market Composite A[1]	Broad Market Composite B[1]
U.S. Government Bonds	.19	.56*	.40*
GNMA Mortgages	.20	.52*	.38*
Straight Corporate Bonds - Aaa	.26	.63*	.46*
Straight Corporate Bonds - Aa	.24	.57*	.42*
Straight Corporate Bonds - A	.27	.56*	.42*
Straight Corporate Bonds - Baa	.19	.22	.13
Straight Corporate Bonds - Ba	.29	.42	.33
Preferred Stocks - High Quality	.25	.50*	.37*
- Medium Quality	.37*	.56*	.44*
- Speculative Quality	.40*	.61*	.48*
Convertible Bonds - BBB	.43*	.53*	.45*
- BB	.55*	.67*	.56*
- B	.68*	.67*	.58*
Convertible Preferred Stocks - A	.87*	.84*	.75*
Convertible Preferred Stocks - BBB	1.01*	1.02*	.90*
Convertible Preferred Stocks - BB	.89*	.86*	.77*
Convertible Preferred Stocks - B	.59*	.57*	.50*
Common Stocks - Class I	.50*	.64*	.54*
Common Stocks - Class II	.75*	.79*	.70*
Common Stocks - Class III	.88*	.77*	.72*
Common Stocks - Class IV	1.19*	.90*	.88*
Common Stocks - Class V	1.76*	1.34*	1.30*

[1]The broad market composite index A was formed by using 1981 year-end weights for the market value of common stocks (60.0%) and the value of the following securities with ten-or-more years remaining to maturity: U.S. Government bonds and agency securities (3.8%), 1-4 Family Non-Farm Mortgages (28.4%), and corporate bonds (7.8%). The broad market composite index B excludes the mortgage component.

* t < 2.000

indices.[24] The betas given in the second column suggest the direction and the strength of the changes in the betas if perfect broader market indices were used. Finally, the betas in the third column, which excludes home mortgages but includes government and corporate bonds, are in between those in the first two columns. That is, the betas are generally higher than those for the S&P 500 stock index and lower than those for the Board Market Composite A. Again, the results are not surprising, but the differences do confirm the approximate size of the impact from excluding home mortgages, which comprise about 25-30 percent of the negotiable long-term securities available in the markets.[25]

B. Correlation Matrices

The correlation matrices for 1973-82 and for 1963-72 are given in Tables VII and VIII respectively. Correlation matrices were prepared also for the 1971-76 and 1977-82 periods. These matrices are used to demonstrate the extent of the relative stability of the TARs to one another through successive, nonoverlapping time periods of ten- and six-years. One of the primary things that portfolio managers should seek is low and negative correlations among TARs and some assurance that these relationships will not change enough to destroy their portfolio strategies.

First, the correlations among the risk classes are examined for the 1973-82 period and the shifts between time periods are reviewed. As shown in the second column of Table VII, the returns on the GNMA mortgages and the top three qualities of corporate bonds are very highly correlated — above 0.946. These correlations are so

24. Roll [41] also makes the point that no single-index model will be adequate because it does not consider the real sector of the economy. Statistical studies reported below on pages 48-51 confirm the importance of Roll's criticism. An effort was made to explain in a statistical sense the e-p ratio for the Standard & Poor's 500 stock series. A coefficient of determination, (R^2), of .87 was obtained by using the reciprocal of the ratio of GNP divided by the forecast GNP advanced two-quarters, 10-year T-bond yields and the reciprocal of the leading indicators.

25. The correlation coefficients have not been constant since the 1910s as suggested by the following tabulations, which are based on Soldofsky and Max [53]:

	RISK CLASS	
U.S. Govts.	**Class I Common Stocks**	**Class IV Common Stocks**
1910-1938	.412	.261
1939-1953	.093	.316
1954-1976	.086	.223

TABLE VII

CORRELATION MATRIX FOR 22 RISK CLASSES OF SECURITIES: 1973-1982

	RISK CLASS	GB	GNMA	C1	C2	C3	C4	C5	P1	P2	P3	B1	B2	B3	B4	B5	BC1	BC2	BC3	PC1	PC2	PC3	PC4
GB	US Govt. Bonds	1.000																					
GNMA	GNMA Mortgages	0.995	1.000																				
C1	Common Stocks - Class I	0.546	0.592	1.000																			
C2	Common Stocks - Class II	0.355	0.401	0.850	1.000																		
C3	Common Stocks - Class III	0.114	0.169	0.786	0.921	1.000																	
C4	Common Stocks - Class IV	-0.044	-0.014	0.521	0.844	0.895	1.000																
C5	Common Stocks - Class V	-0.043	0.010	0.540	0.836	0.917	0.961	1.000															
P1	Preferred Stocks - High Quality	0.871	0.899	0.583	0.461	0.295	0.055	1.131	1.000														
P2	Preferred Stocks - Med. Quality	0.725	0.759	0.596	0.587	0.503	0.294	0.372	0.936	1.000													
P3	Preferred Stocks - Spec. Quality	0.723	0.746	0.539	0.555	0.436	0.277	0.309	0.920	0.949	1.000												
B1	Corporate Bonds - Aaa	0.972	0.985	0.609	0.429	0.217	0.002	0.040	0.950	0.842	0.817	1.000											
B2	Corporate Bonds - Aa	0.967	0.973	0.557	0.413	0.202	0.013	0.039	0.960	0.865	0.858	0.990	1.000										
B3	Corporate Bonds - A	0.980	0.946	0.601	0.474	0.281	0.072	0.110	0.970	0.905	0.896	0.985	0.985	1.000									
B4	Corporate Bonds - Baa	0.315	0.353	0.269	0.343	0.395	0.229	0.351	0.674	0.841	0.783	0.483	0.527	0.595	1.000								
B5	Corporate Bonds - Ba	0.426	0.461	0.437	0.347	0.370	0.097	0.207	0.747	0.786	0.737	0.548	0.595	0.593	0.779	1.000							
BC1	Convertible Bonds - BBB	-0.572	0.599	0.722	0.813	0.708	0.637	0.667	0.582	0.674	0.528	0.600	0.597	0.588	0.389	0.446	1.000						
BC2	Convertible Bonds - BB	0.555	0.596	0.633	0.801	0.704	0.630	0.697	0.723	0.825	0.741	0.631	0.656	0.667	0.621	0.653	0.909	1.000					
BC3	Convertible Bonds - B	0.291	0.337	0.490	0.686	0.712	0.615	0.703	0.608	0.828	0.754	0.442	0.477	0.551	0.895	0.683	0.670	0.829	1.000				
PC1	Convertible Pref. Stocks - A	0.280	0.317	0.716	0.892	0.932	0.865	0.870	0.470	0.677	0.638	0.366	0.393	0.440	0.564	0.544	0.872	0.843	0.832	1.000			
PC2	Convertible Pref. Stocks - BBB	0.354	0.390	0.665	0.885	0.887	0.855	0.870	0.522	0.734	0.669	0.441	0.466	0.516	0.607	0.499	0.845	0.898	0.874	0.971	1.000		
PC3	Convertible Pref. Stocks - BB	-0.288	0.308	0.581	0.810	0.838	0.830	0.817	0.460	0.692	0.638	0.361	0.410	0.440	0.619	0.546	0.799	0.853	0.865	0.967	0.973	1.000	
PC4	Convertible Pref. Stocks - B	-0.284	0.336	0.460	0.646	0.722	0.698	0.818	0.453	0.655	0.535	0.370	0.377	0.424	0.630	0.441	0.744	0.815	0.816	0.793	0.861	0.300	1.000

high that an investor would be tempted just to choose among them on the basis of the highest yielding risk class. Prudence would suggest some diversification. All three classes of preferred stock were strongly correlated to U.S. government bond returns; they were more highly correlated than were Baa and Ba bonds. High quality, convertible bonds fell between Baa and B bonds also. Convertible preferred stocks and lower quality bonds and convertible bonds were similar. The correlations of U.S. governments with the five qualities of common stock ranged from −.04 to +0.55. The greatest variability was found in this broad group of industrial common stocks; utility common stocks have very high correlations with bonds. Alternatively, one could also start his inquiry with a column for common stocks, such as Class II, read down the column for this risk class's TAR relationship with other risk classes and read across the column to the left from the first entry.

Table IX compares the correlation coefficients for three risk classes of great interest — U.S. government bonds, common stock I, and corporate bonds, AAA — for two successive six-year periods and two successive ten-year periods.

A comparison of the two columns of six-year correlations for the U.S. governments to the other risk classes shows that the higher risk classes tend to be more stable relative to one another. Even between the two columns of ten-year correlations, the comparative figures for the Ba bonds to U.S. governments are 0.73 and 0.93 for the 1963-72 and 1973-82 periods, respectively. The lower the risk class, the greater the variability tends to be between periods. For some risk classes, such as high quality preferred stock, the correlation with U.S. governments was lower during the 1963-72 period than the 1973-82 period. For the Baa and Ba bonds the correlation was higher in the earlier decade than the later. The very low correlation for GNMAs to U.S. governments from 1963-1972 is probably explained by the newness of the secondary market in GNMAs which was just starting during that decade. Only slowly was the secondary market in GNMAs integrated with the other securities markets.

Common stocks exhibited the greatest variability relative to U.S. governments for the six- and ten-year periods. For the six-year periods Class IV common varied from 0.592 to −0.263. For the ten-year periods the low-to-negative correlations for the three lower classes of common show more stability.

Common stock I shows considerable stability relative to the other risk classes as can be observed by studying the four center columns in Table IX. Again, the least stable relationships were shown with the riskier classes of securities. The highest turn up rela-

TABLE VIII

CORRELATION MATRIX FOR 22 RISK CLASSES: 1963-1972

	RISK CLASS	GB	GNMA	C1	C2	C3	C4	C5	P1	P2	P3	B1	B2	B3	B4	B5	BC1	BC2	BC3	PC1	PC2	PC3	PC4
GB	US Govt. Bonds	1.000																					
GNMA	GNMA Mortgages	0.113	1.000																				
C1	Common Stocks - Class I	0.230	0.313	1.000																			
C2	Common Stocks - Class II	0.027	0.285	0.871	1.000																		
C3	Common Stocks - Class III	0.002	0.742	0.678	0.739	1.000																	
C4	Common Stocks - Class IV	-0.187	0.555	0.534	0.548	0.898	1.000																
C5	Common Stocks - Class V	-0.458	0.340	0.432	0.681	0.781	0.825	1.000															
P1	Preferred Stocks - High Quality	0.706	0.532	0.513	0.245	0.522	0.416	0.003	1.000														
P2	Preferred Stocks - Med. Quality	0.485	0.542	0.781	0.674	0.767	0.625	0.380	0.849	1.000													
P3	Preferred Stocks - Spec. Quality	0.396	0.470	0.923	0.765	0.741	0.562	0.340	0.725	0.888	1.000												
B1	Corporate Bonds - Aaa	0.895	0.458	0.489	0.217	0.361	0.201	-0.187	0.934	0.755	0.670	1.000											
B2	Corporate Bonds - Aa	0.850	0.425	0.377	0.723	0.291	0.138	-0.277	0.925	0.649	0.606	0.964	1.000										
B3	Corporate Bonds - A	0.834	0.483	0.317	0.094	0.380	0.229	-0.141	0.933	0.683	0.564	0.950	0.971	1.000									
B4	Corporate Bonds - Baa	0.780	0.522	0.683	0.395	0.505	0.343	-0.313	0.932	0.838	0.814	0.965	0.913	0.881	1.000								
B5	Corporate Bonds - Ba	0.733	0.456	0.704	0.502	0.502	0.393	0.914	0.804	0.856	0.759	0.868	0.715	0.717	0.910	1.000							
BC1	Convertible Bonds - BBB	-0.015	0.544	0.418	0.485	0.774	0.720	0.666	0.376	0.520	0.546	0.230	0.198	0.307	0.342	0.352	1.000						
BC2	Convertible Bonds - BB	0.317	0.529	0.478	0.553	0.732	0.656	0.560	0.450	0.619	0.556	0.457	0.319	0.443	0.517	0.659	0.812	1.000					
BC3	Convertible Bonds - B	0.030	0.415	0.539	0.662	0.779	0.755	0.730	0.224	0.485	0.543	0.211	0.089	0.189	0.326	0.461	0.803	0.991	1.000				
PC1	Convertible Pref. Stocks - A	0.877	a	-0.119	-0.096	-0.213	0.465	-0.286	0.241	0.493	0.586	0.903	-0.071	0.149	0.698	0.866	0.356	0.992	0.751	1.000			
PC2	Convertible Pref. Stocks - BBB	0.053	0.721	0.480	0.625	0.873	0.723	0.665	0.310	0.513	0.560	0.274	0.213	0.313	0.369	0.376	0.760	0.812	0.885	0.806	1.000		
PC3	Convertible Pref. Stocks - BB	-0.021	0.513	0.535	0.668	0.818	0.734	0.721	0.227	0.482	0.586	0.181	0.099	0.188	0.308	0.380	0.876	0.877	0.968	0.499	0.927	1.000	
PC4	Convertible Pref. Stocks - B	-0.214	0.348	0.379	0.507	0.680	0.697	0.753	0.032	0.221	0.358	-0.020	-0.064	0.029	0.111	0.156	0.817	0.754	0.911	0.086	0.812	0.915	1.000

a = Not available

TABLE IX

COMPARISON OF CORRELATIONS AMONG TARS OF SELECTED SECURITIES FOR THE PERIODS

	U.S. Govt. Bonds				Common Stock I				Corporate Bonds - Aaa			
	6-Year Periods		10-Year Periods		6-Year Periods		10-Year Periods		6-Year Periods		10-Year Periods	
	1971-76	1977-82	1963-72	1973-82	1971-76	1977-82	1963-72	1973-82	1971-76	1977-81	1963-72	1973-82
U. S. Government Bonds	1.000	1.000	1.000	1.000	0.204	0.663	0.230	0.546	0.814	0.996	0.895	0.972
GNMA Mortgages	0.964	0.999	0.113	0.995	0.375	0.661	0.313	0.592	0.927	0.995	0.458	0.985
Common Stocks, I	0.205	0.663	0.230	0.546	1.000	1.000	1.000	1.000	0.649	0.590	0.489	0.609
Common Stocks, II	0.414	0.430	0.027	0.355	0.901	0.842	0.871	0.850	0.724	0.359	0.217	0.429
Common Stocks, III	0.508	-0.024	0.002	0.114	0.816	0.674	0.678	0.786	0.860	-0.108	0.361	0.202
Common Stocks, IV	0.592	-0.263	-0.187	-0.044	0.605	0.391	0.534	0.521	0.745	-0.332	0.201	0.013
Common Stocks, V	0.569	-0.320	-0.458	-0.043	0.590	0.312	0.432	0.540	0.813	-0.383	-0.187	0.039
Preferred Stocks - High Quality	0.693	0.946	0.706	0.871	0.730	0.443	0.513	0.583	0.965	0.967	0.934	0.960
Preferred Stocks - Med. Quality	0.651	0.939	0.485	0.725	0.683	0.400	0.781	0.596	0.930	0.963	0.755	0.865
Preferred Stocks - Spec. Quality	0.425	0.925	0.396	0.723	0.750	0.401	0.923	0.539	0.734	0.950	0.670	0.817
Corp. Bonds - Aaa	0.814	0.996	0.895	0.972	0.649	0.590	0.489	0.609	1.000	1.000	1.000	1.000
Corp. Bonds - Aa	0.748	0.989	0.850	0.967	0.736	0.548	0.377	0.557	0.966	0.998	0.964	0.990
Corp. Bonds - A	0.709	0.987	0.834	0.980	0.622	0.535	0.317	0.601	0.953	0.997	0.950	0.985
Corp. Bonds - Baa	0.748	0.942	0.780	0.315	0.794	0.388	0.683	0.269	0.954	0.967	0.965	0.483
Corp. Bonds - Ba	0.773	0.930	0.733	0.426	0.688	0.363	0.704	0.437	0.972	0.958	0.868	0.548
Convert. Bonds - BBB	0.806	0.717	-0.015	0.572	0.638	0.834	0.418	0.722	0.913	0.668	0.230	0.600
Convert. Bonds - BB	0.922	0.830	0.317	0.555	0.396	0.632	0.478	0.633	0.899	0.819	0.457	0.631
Convert. Bonds - B	0.770	0.497	0.030	0.291	0.634	-0.161	0.539	0.490	0.948	0.550	0.211	0.442
Convert. Pref. Stocks - A	0.769	0.241	0.877	0.280	0.562	0.804	-0.119	0.716	0.878	0.168	0.903	0.366
Convert. Pref. Stocks - BBB	0.699	0.388	0.053	0.354	0.603	0.721	0.480	0.665	0.869	0.329	0.274	0.441
Convert. Pref. Stocks - BB	0.681	0.250	-0.021	0.288	0.538	0.663	0.535	0.581	0.805	0.186	0.181	0.361
Convert. Pref. Stocks - B	0.682	0.153	-0.214	0.284	0.429	0.486	0.379	0.460	0.835	0.107	-0.020	0.370

tive to the convertibles, where the correlations varied from −0.16 to 0.83. The investor may be seeking a low or negative correlation with quality common stock, but cannot have great assurance of what the outcome will be six to ten years hence.

VI. CYCLES AND PERFORMANCE PATTERNS

In this section, the 1961-1982 patterns of the TARs and the various economic and financial indicators are explored. One objective of this discussion is to provide the background needed to explain the fluctuating correlations for the return-structure curves. The second objective is to seek out those patterns that may help security analysts and portfolio managers reallocate their investments advantageously among the many risk classes of securities. The literature on this topic is surprisingly limited. Some recent articles and sections of books that consider this subject include: Bauman and McClaren [3], Bernstein [4], [5], Cohen, Zinbarg, and Zeikel [12], Curley and Bear [15], Fong [18], Jacob and Pettit [26], Oldfield [35], Regan [37], Renshaw [39], and Schwert [42].

Two distinct approaches are used in this review. First, the relative rank of the return on each of the 22 risk classes is shown. These relative rankings are compared with the absolute level of the TARs, AAA industrial bond yields, 91-day T-bill returns and the earnings-price (e-p) ratio for the Standard & Poor's (S&P's) 500 stocks. In the second approach, these items are seen against the business-cycle background as they are measured by the NBER. Starting with 1973 a consistent series of quarterly forecasts for the Gross National Product (GNP) and Corporate Profits after Taxes (CPAT) becomes available from Data Resources Incorporated (DRI). These projections are published quarterly for each of the coming four quarters. The base date of 1973 for these series largely explains why this point was used as the opening of the multiple correlation studies that are reported. Other series of useful economic variables are available much earlier.

The first approach requires a narrative historical and a largely chronological review.[26] The second, briefer approach utilizes regression analysis and correlation studies.

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26. This review, which runs over 2,000 words, is available in the original version of this paper [48]. It has been removed from this version because it adds nothing to the analysis and its removal saves space.

Performance Ranking By Risk Class

Table X shows the annual TAR performance rank for each of the 22 risk classes starting with 1961. Observation of this Performance Sheet shows that many of the risk classes fluctuated much more widely and regularly than others.[27]. The number of years that the six most widely fluctuating classes were in the highest three or lowest three places is as follows:

	Highest Three Places	Lowest Three Places	Total
Common Stocks, Class V	9	8	17
Common Stocks, Class IV	4	6	10
U.S. Government Bonds	5	5	10
Speculative Quality Convertible Bonds, B	3	7	10
Convertible Preferred Stock, BBB	5	3	8
Corporate Bonds, Aa	2	4	6

Most of the attention in this discussion is focused on common stock classes IV and V, U.S. government bonds, and Class A industrial corporate bonds for the sake of brevity. The relative and absolute TARs of these reference classes are emphasized also.

Dr. Peter Bernstein [5] reports a correlation coefficient of .94 for AAA corporate bonds, and the spread between these bonds yields and the dividend yield on the S&P 500 common stocks. He improves upon this relationship by considering the impact of short-term rates on long-term bond yields. His successful econometric calculations, direct observations of the markets, and introspection suggest that short rates should play a very important role in balanced portfolio management. The prices and e-p ratios on stocks ride or float on the changing level of interest rates, on the interest rate and

27. The I-S small stocks, the smallest 20 percent of the NYSE-listed common stocks each year in terms of capitalization, are more volatile than the Class I common stocks as used in this study. The I-S small stocks would have ranked second among the most volatile securities if their TARs had been integrated in the Form Sheet, Table IX. Their TARs would have been among the three highest 13 times and among the lowest three times. The I-S small stocks would have ranked highest eight times, second highest twice, and third highest three times. On the low side, they would have been lowest once and next to the lowest twice. During the years 1961-1981, they had negative TARs six times. These six negative TARs were 7.0 percent in 1966, 11.9 percent in 1962, 17.4 percent in 1970, 20.0 percent in 1974, 25.1 percent in 1969, and 30.1 percent in 1973. In these same years, as shown on Table II, the returns on all of the other classes of common stock were negative except for three modest exceptions.

TABLE X

TOTAL ANNUAL PERFORMANCE RANKING BY RISK CLASS: 1961-84

RISK CLASS	YEAR																							
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
GB	2	3	21	20	21	1	21	21	4	3	6	19	8	1	21	21	15	14	16	18	14	2	22	6
GNMA	12	10	10	15	12	2	11	2	1	7	13	17	3	2	20	18	14	11	14	15	13	3	19	8
B1	19	7	19	19	20	3	18	19	5	5	8	14	4	4	19	13	13	17	18	20	14	1	21	7
B2	20	1	20	17	19	4	17	17	3	2	11	9	8	6	17	15	10	20	17	21	11	4	20	2
B3	18	8	17	17	17	6	16	18	8	1	12	18	2	5	15	13	9	16	19	19	16	5	17	5
B4	17	9	12	16	16	10	19	15	9	6	5	4	11	11	16	12	4	13	20	21	4	6	15	4
B5	16	2	7	13	13	5	15	16	7	11	4	8	7	13	10	6	3	11	13	13	8	12	13	3
P1	13	4	13	14	18	17	20	20	6	4	17	16	6	8	18	18	8	22	22	17	6	9	18	10
P2	14	6	6	8	15	11	14	14	10	12	16	11	10	12	12	7	5	18	15	16	7	11	11	13
P3	8	5	15	7	14	15	13	13	14	15	18	3	5	7	7	10	7	15	21	14	2	8	14	16
BC1	7	13	14	6	2	13	8	6	13	8	19	15	17	10	22	20	12	8	9	11	17	14	2	18
BC2	3	16	11	12	5	14	9	10	19	16	1	22	16	9	11	9	2	6	11	8	1	10	6	20
BC3	11	20	8	10	4	18	2	9	20	21	2	12	15	18	6	3	1	3	12	12	9	19	4	15
PC1	a	a	a	a	a	a	a	a	a	9	3	21	18	16	5	8	19	18	6	7	10	18	7	12
PC2	15	11	9	11	10	8	5	1	18	10	10	13	20	20	4	4	16	20	5	6	19	15	1	11
PC3	10	12	16	4	6	7	4	4	17	17	7	6	19	14	2	5	11	10	3	10	4	16	5	9
PC4	2	15	18	21	1	19	1	11	21	18	21	7	14	3	13	2	6	4	10	4	12	17	3	1
C1	5	14	5	9	11	9	12	12	12	20	9	1	1	15	14	17	20	2	7	9	3	7	16	14
C2	6	16	3	1	8	12	10	5	11	19	14	2	13	17	9	22	17	5	8	5	20	13	9	21
C3	9	18	4	4	9	20	7	3	15	12	20	5	12	21	8	11	22	9	4	3	18	20	8	22
C4	1	19	2	3	7	21	6	8	2	12	15	10	21	19	3	16	21	7	2	2	22	22	9	19
C5	4	21	1	2	3	15	3	6	16	22	22	20	22	22	1	1	18	1	1	1	21	21	12	17

a = Not available until 1970.

bond-stock spreads, and on the direction of change in these items much like the relationships of independent and dependent variables. These relationships are pictured in Figure IV.

Bernstein's [4], [5] studies focus on the yield spreads between (1) dividend yields and bonds and (2) bonds and bills as the best predictors of stock market prices. The major energy for changes in stock prices, he demonstrates, comes from the levels of interest rates, and from the spreads between dividend yields and bond yields. Once the differences among the general classes of securities are broken down into even as many as 22 separate classes, as they are in this study, timing of the movements of funds becomes more complex, but may be manageable.

Four points emerged from the year-by-year review. First, the TARs on the common stocks are far more volatile than those of the bonds. Common stock Classes IV and V are the most volatile of the stock groups being tracked. The relative and absolute volatility of these and all of the other classes of securities may be expressed by their standard deviations and coefficients of variation. Second, absolute differences among total returns by risk class may be as narrow as 18 percentage points in some calendar years, such as in 1978, or as much as 51 percentage points, as in 1975. In 1969 all TARs were negative, and in 1963, 1975 and 1976 all TARs were positive. Third, the years 1961-1982 covered four periods of expansion or prosperity as designated by the NBER, but five distinct interest rate and e-p ratio cycles were completed during this time as shown in Table XI. The differences in the timing of the beginning and ending of these three cyclical views of the markets need to be stressed. Fourth, some differences of opinion are easily possible about the exact dating of the beginning and ending of these cycles, but the important point is that the interest rate and e-p cycles and the two spreads stressed by Bernstein may provide timely information for the advantageous shift of funds from one general class of securities to another.

FIGURE IV

EX ANTE RETURNS: STOCKS, BONDS AND BILLS
1961-83

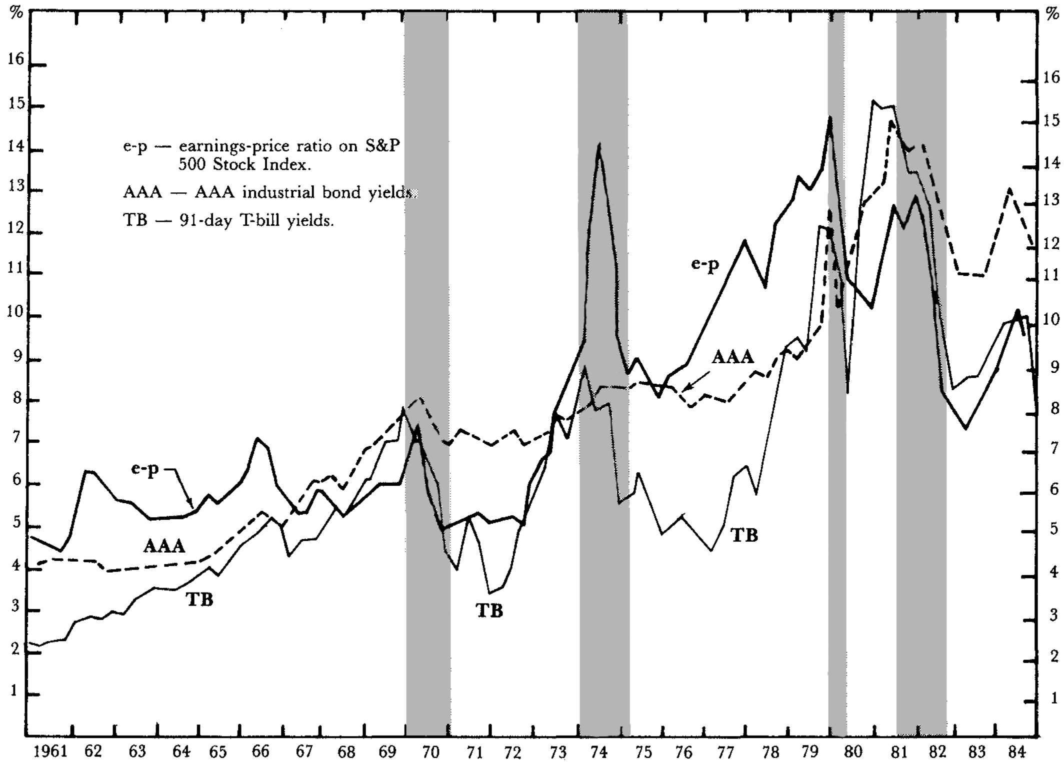

TABLE XI
COMPARISON OF BUSINESS CYCLES
WITH BOND AND STOCK MARKET CYCLES

Business Cycle[a]		Interest Rate Spread[b]		E-P Interest Rate Spread[c]	
Trough	Peak	Trough	Peak	Trough	Peak
Feb. 1961	Dec. 1969	June 1961	Sept. 1966	Sept. 1963	Dec. 1965
		Feb. 1967	Apr. 1969	Sept. 1966	Jan. 1971
Nov. 1970	Nov. 1973	Jan. 1971	Jan. 1974	June 1971	June 1973
Mar. 1975	Jan. 1980	Apr. 1976	Jan. 1980	Sept. 1974	Sept. 1975
July 1980	July 1981	June 1980	June 1981	June 1979	March 1981

[a]Geoffrey H. Moore, *Business Cycles, Inflation and Forecasting* [34].
[b]AAA industrial bond yield minus 91-day, T-bill yield.
[c]Earnings-price ratio on S&P 500 stock average minus AAA industrial bond yields.

VII. ANALYSIS OF PERFORMANCE PATTERNS AND RETURN-STRUCTURE CURVES

A review of the return-structure curves, the NBER business cycles and the interest rate spread cycle, and the stock-bond spread cycles form the background essential for understanding of these cycles. Regression studies for four to ten-year year holding periods disclose adjusted R^2 cycles.

The generally accepted normative proposition is that the R^2 for a return-structure curve should be 1.00 in information efficient perfect markets.[28] The conditions for such markets include costless information and perfect foresight as discussed above. If the public investing in securities were strongly risk averse, one would expect a return-structure curve with a slope of more than 1.00. If the extent of the risk aversion increases as a function of the extent of the risk itself, one would expect the return-structure curve to be concave upward.[29] As a matter of fact the curves were linear and the slopes varied from a negative 1.08 for 1971-76 to a positive 2.05 for 1961-66 for the six-year curves as shown in Table V. The slopes were positive in seven of the 11 cases where the F-values for the six-year regression lines were significant beyond the .05 level.

Several possible explanations for these modest linear slopes, which averaged .630 for this 22-year period, are plausible. First, the extent of risk aversion may be masked in some way by the personal income-tax structure. Second, a large and increasing proportion of the securities are held by financial intermediaries that have no marked risk aversion functions. Third, the range of risk on the security classes studied may be too narrow for a high degree of risk aversion to be visible. However, the sample time period may be too short to be representative in a statistical sense. Moreover, the common stock groups are composed of the 100 largest-capitalization companies in the country. Nevertheless, when the I-S "small NYSE-stock" class is added, the best fit is still linear. Thousands of

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28. For a discussion of four types of efficiency in a financial system see James Tobin [57]. Tobin, a Nobel laureate in economics, designates these as (1) information efficiency, (2) fundamental value efficiency, (3) full insurance efficiency (Arrow-Debreu), and (4) functional efficiency.

29. Always assuming that the risk-measurement technique used captures the investor's implicit or explicit use of the term and that the bulk of the investors are rational.

smaller—and presumably more volatile—stocks that are traded in other U.S. stock markets are not included in the study. One should also keep in mind that real assets are alternatives to securities and that foreign real assets and securities are additional alternatives.

The adjusted R^2s for all 112 holding periods from 1961-82 are summarized in Table IV, both by column for the number of years in the holding period and by row for periods ending with the same terminal year. Several observations about the R^2s are noteworthy. First, as emphasized earlier, 51 or almost half of the adjusted R^2s are significant beyond the .01 level, and another 18 are significant between the .05 and .01 levels. Second, in the four-year period, 1965-68, the R^2 reached .85, and in the prior four-year period it was .75. Third, among the five-year periods the R^2s were above .70 twice, and between .60 and .70 another two times. As longer periods are observed, the R^2s become progressively lower. Fourth, looking down the columns and across the rows, note that the R^2s move upward and downward in discernible wave patterns.

Two "explanations" of these wave patterns are plausible. The first is that these waves are not random; they reflect the financial markets, complex responses to actual and projected business conditions, as well as the dynamics of the interrelations among the returns on securities, and between securities and tangible assets.

Second is that these waves are a mere mirage arising from autocorrelation and the use of overlapping, moving averages. Autocorrelation refers to the lack of independence among successive observations in time series data. The use of the coefficients of determinations, the R^2s, from these data may give waves, but the results may not be statistically significant.[30] The fact that the data used in these series are percentages rather that absolute amounts increases the chances that the observed results are meaningful. Regardless of the outcome, the limited number of observations reduces the power of the statistical results.

The materials are at hand to help understand the causes of these patterns. The discussion will be least complicated by starting with the earliest overlapping four-year periods. The NBER marked the

30. The Durbin-Watson and other tests of autocorrelation were carried out for both the ordinary least squares regressions and for maximum likelihood estimates for all 5-, 6-, and 7-year sequences. No autocorrelation problem was found in 70 percent of the cases. Even more encouraging, nonoverlapping sequences such as 1964-69, 1970-75, and 1976-81 do not exhibit autocorrelation. A complete set of these statistical results are available in Working Paper 86-13, April 1986, College of Business Administration, University of Iowa for $5.00.

period from February 1961 through December 1969 as one of continuous expansion; but it contained two full securities market cycles, as shown in Table XI. For the years 1964, 1965 and 1967, the TARs by risk class line up just about as one would anticipate that they should based upon the return and risk characteristics of these securities.[31] The rank order of performance for these and other years is shown in Table XI.[32] The stock-bond spread peaked in December 1965 and bottomed in September 1968, and interest rates rose from 4.65 percent to 5.34 percent during 1965. Consequently, the TARs on most fixed-income securities were low or negative that year. Stock prices fell far enough in 1966 to cause negative returns, when all risk classes of securities except U.S. government bonds had negative TARs. The R^2 for the TARs across these 22 risk classes of securities was .7521 for these three typical years of expansion and one of mild decline.

The year 1968 was another year of modest expansion. When the TARs for 1964 were removed from, and the TARs for 1968 added to the four-year regression, the R^2 rose to a high of .849; the unexplained variance was only about 15 percent. Looking across the row for holding periods ending in 1968 as shown in Table V, the R^2s were all above .50 for periods through eight years in length.

In 1969 rates on AAA bonds rose from 6.46 percent to 7.54 percent and later peaked at 8.12 percent in June 1970. The stock-bond spread fell modestly. Consequently, the typical recovery pattern was reversed that year. The peak of the NBER's expansion cycle was later set as December 1969. The four-year period, 1966-69, included 1967 and 1968, two typical expansion years; 1966, an almost flat year for the TARs; and 1969, a year of all negative TARs, but one in which the returns on common equities and other riskier classes were much below those of corporate and government bonds. The R^2 fell to .2484.

The bottom of the recession was reached in November 1970. Interest rates fell and the stock-bond spread rose moderately from the previous year end. The TARs for quality, fixed-income securities were at 10 percent and above while the TARs were negative on six other risk classes of securities including three of the common stock classes. The R^2 for the 1967-70 period was .0265; virtually no

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31. The best intra-year points to shift between bonds, stocks and even 91-day T-bills may be confirmed by referring to I-S's [24] AAA tables of monthly holding period returns.

32. See Figure IV, p. 40, for a representation of these relationships and others mentioned in this section.

correlation existed for the TARs for the 22 risk classes over this period. The statistical explanation is that the TARs were randomly related, but a more probing explanation is that the movements of the returns and prices in the efficient-market environment in response to the background forces caught them in a particular configuration for these four years. In 1971 both the bond-to-T-bill spreads and the stock-bond spreads passed through their troughs, and interest rates climbed modestly. All but one of the TARs were positive. The largest gains were scored by some of the convertible securities. When the ups and downs of 1968-1971 in terms of the TARs were correlated, the R^2 was an absolute .0000. The same randomness is observed looking across the holding periods ending with 1971 for the five- and six-year periods as well.

The R^2s on the four-year, holding-period-return cycle moved upward for the next three four-year periods and reached .6572 for the 1971-74 period. Six years passed from the peak period ending in 1968 to the peak period ending 1974, and another seven years passed before the peak period ending with 1981 when the R^2 reached .5998. The year-by-year recounting of the details leading to the 1981 peak is omitted, but the background information is included in the tables and figures. The spacing of the peaks and troughs for the R^2s is different by one year in terms of some of the longer time periods. The financial markets will — in all likelihood — continue to exhibit these return-structure cycles, but their timing may be different. The longer the expansion periods relative to the contractions, the higher the R^2s are likely to be. The long NBER cycle (1961-70) that included two stock market cycles had the highest R^2s. On the other hand, the shorter and more volatile that interest rates, e-p ratios and the spreads become, the lower and less significant the calculated R^2s will become.

A question in the reader's mind is likely to be "How can I use this information to my advantage in my personal portfolio or in my job as a professional portfolio manager?" This question will be answered, but before proceeding to the final section which considers this question, an analysis of the relationship between stock prices and earnings-price ratios will contribute to the answer. One observation based upon this review of market cycles is that to reduce risk based upon low or negative correlations, the appropriate risk class mixtures must be maintained for years—not merely weeks or months.

VIII. EXPLANATIONS OF STOCK PRICE AND EARNINGS-PRICE RATIOS

The preceding section stressed the annual ranking variations measured in terms of annual holding period returns for the risk classes that fluctuated most widely. This review demonstrated that the relative performance ranking of the most volatile classes reflected greater absolute changes in their TARs. Even though U.S. governments and AA corporate bonds have large changes in their performance ranking about as often as Class IV and Class V common stocks, as shown in Table XI, the TARs of these fixed-income securities moved in much narrower ranges. In other words, the ranking of most volatile classes of common stock gyrated around the rankings of these two classes of bonds. One should seek to explain why the common stocks fluctuated so much more widely, and whether or not any useful insights for the detection of predictive patterns may be uncovered. The objectives of this section are primarily to review prior relevant research and to present the results of the research undertaken for this study. The specific objective of this part of the research was to explain the determinants of the e-p ratio.

Two prior studies were found that used various measurements of economic performance in their quest for explanations of stock-price movements.[33] One of these, a 1982 study by Cragg and Malkiel [14], was concerned with the variances of analyst-predicted growth rates from the actual growth rates for 178 securities. Their data covered the period 1961 through 1968. As a part of their study, they sought risk measures that would help to explain these variances. First, they prepared a regression coefficient for the excess rate of return on each security using the University of Chicago Center for Research in Security Prices (CRSP), value-weighted market index. In their linear regression studies, the t-values for the beta coefficients were significant, but they were able to improve them by adding the rate of change in national income, T-bills rates and the inflation rate to their explanatory variables. They prepared separate

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33. A third, recent study by Reilly, Griggs and Wong [38] deals with earnings multiples for the period 1962-81. However, only two of its nine variables reflect nonfinancial data. These two are the CPI and the Department of Commerce failure rate. The extensive bibliography for the article is quite useful.

studies for each year, 1961 through 1968. Their R^2s ranged from .10 for 1963 to .59 for 1968.

The second study, which was published by Hendershott and Huang [22] in 1981, undertook to increase our understanding of the wide fluctuations of the real or price-level adjusted TARs on stocks and bonds over the period 1926-80.[34] Their econometric study had no immediate or apparent decision-making orientation. However, in their "summary" they wondered whether or not the stability of the estimated relationships they found among real and nominal interest rates, real and nominal returns on equity, unanticipated inflation, expected economic activity, and so forth had been affected by the October 1979 change in Federal Reserve operating procedures and the resulting increase in the volatility in financial markets.

Their study utilized one-month changes in T-bill rates, corporate bonds and equities, as well as the Livingston, survey-based, inflationary expectations data, and NBER's business-cycle dates. Their regression studies were able to explain about 60 percent of the monthly realized returns on corporate bonds using T-bills rates, the unexpected change in the new-issue rates and unanticipated inflation. However, they were able to explain only about 16 percent of the monthly realized returns on equities using the T-bills rates, unanticipated inflation and changes in bond coupon rates.[35] One limitation of their work was that they used the I-S data which are for corporate bonds in general, rather than for specific risk classes of corporate bonds. Similarly, I-S uses all stocks on the New York Stock Exchange, which submerges many well-known risk differences, such as those between industrial stocks and utility stocks.

The prior discussions and displays have shown that the absolute TARs and the relative ranking of the common stocks obviously were sensitive to interest rates, e-p ratios, stock-bond spreads, and business cycles. The e-p ratio of the S&P 400 industrial stock index was used in this study because it is the most conveniently available, satisfactory, broad index for the purpose.

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34. Almost no overlap was noted between the economic, monetary and economic literature cited by Cragg and Malkiel [14] and Hendershott and Huang [22], and the more practical, decision-oriented literature cited by Bauman and McLaren [3].

35. Schwert [42] has also studied the stock market's reaction to unexpected inflation. He concluded that the relationship was not strong. Others have argued that the markets already incorporate reactions to unexpected inflation through other variables and are not dependent upon the Bureau of Labor Statistics announcements of the C.P.I.

In this study the economic indicators used included the Gross National Product (GNP) and Profits after Taxes (PAT) projections published of Data Resources Incorporated (DRI) [15].[36] Other series used were the Leading Economic Indicators prepared by the Department of Commerce, 91-day Treasury bill rates, the consumer price index, the leading consumer price index series recently constructed by the NBER's Geoffrey Moore [34] and 10-year Treasury bond rates. Various combinations of the earnings series part of the e-p ratios were tried against the stock-prices part of the series. Twelve-month earnings were advanced by one, two and three quarters relative to the price index. The percentage changes in the GNP and PAT projections for one-through-four quarters were matched against the various trailing and leading e-p ratios. The economic indicators used are ones that are readily available to most analysts. Several different series of GNP projections are now available on a regular basis.

The best results for "explaining" the quarterly e-p ratios for the seven years 1976-1982 for the S&P 400 industrials were obtained using the contemporaneous e-p ratio. When the earnings series was advanced one quarter so that the e-p ratio was based upon three quarters of trailing earnings and one quarter of leading earnings, the results as measured by the adjusted R^2 dropped from .750 using four independent variables to .574. As the earnings series was advanced two and three quarters, the adjusted R^2 continued to drop. Table XII shows the multiple regression results for e-p ratios for the 1976-1982 and 1973-1982 periods. A step-wise regression program, which brings in the variables in their order of contribution to statistical explanation, was used for the calculations. Of course, the stepwise regression methodology may allow the introduction of variables that may be significant only in this sample or this time period. Thus, the results can not be generalized without some caution.

The result of these regressions may be written as follows:

$$\text{e-p ratio} = aX_1 + bX_2 + cX_3 + dX_4$$

where X_1 = 1/(% change in GNP projected two quarters divided by the estimated GNP for the latest completed quarter.)

X_2 = 1/lending indicators.

X_3 = 91-day Treasury bills.

X_4 = 1/consumer price index.

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36. DRI was incorporated in 1968. No consistent data for these two series were available before 1971.

TABLE XII

STATISTICAL EXPLANATIONS FOR THE E-P RATIO FOR THE S&P 400 INDUSTRIALS STOCK INDEX (ADJUSTED R^2)*

Variables	Number of Variables Used 1	2	3	4
		1976-1982		
$1/(GNP_{t+2p}/GNP_t)$	.5846[c]	.4293[c]	.3420[c]	.3800[c]
1/Leading Indicators		.2038[b]	.1632[b]	.2557[c]
91-day T-bill			.1475[b]	.1298[b]
1/CPI				.1136[b]
Adjusted R^2	.5846	.6693	.7181	.7501
F Statistic	36.60	25.30	20.37	17.26
		1973-1982		
$1/(GNP_{t+2Q}/GNP_t)$	.6119[c]	.5864[c]	.4885[c]	.4859[c]
1/Leading Indicators		.1669[c]	.2046[c]	.2643[c]
10-year T-bond			.1671[c]	.1161[b]
$1/(PAT_{t+2Q}/PAT_t)$				.0786[b]
Adjusted R^2	.6119	.6767	.7307	.7519
F-Statistic	59.92	38.72	32.56	26.51

b = t-value significant at the .05 level
c = t-value significant at the .01 level

*Step-wise regression program was used for these computations.

The percentage change in the projected GNP is a measure of the anticipated change in the performance of the economy. Alternative leads were tried by using projections of 1,2,3 and 4 quarters. The two-quarters' lead was best for both the 1976-1982 and 1973-1982 regression studies. The reciprocal was used in order to produce a positive correlation coefficient. When a rise in the GNP is projected, that rise is typically reflected in higher stock prices and lower e-p ratios. Even though prospective earnings per share rise, prices appear to be rising even faster. Furthermore, as interest rates usually rise with a rising GNP, e-p ratios rise also with the rise in interest rates, despite the narrowing stock-bond spread. The reciprocal of the Leading Indicators is used also to provide a positive correlation coefficient. As the Leading Indicators rise, the familiar price-earnings ratio tends to rise, but its reciprocal, the e-p ratio, tends to fall.

By far the most important explanatory variable for the e-p ratio is the broadest measure of the anticipated change in the GNP. The second most important variable is the reciprocal of the Leading Indicators. Together these two variables explain about two-thirds of the e-p ratio. Although one might speculate that these variables are looking at the same phenomena, the results indicate that together they have greater explanatory power then either one does individually.

Among the other independent variables that were tried in the multiple regression analysis were 91-day T-bills rates, 10-year T-bond rates, the ratio of the yields on 91-day T-bills to 10-year bonds, and PAT.[37] Various lead times were tried with the PAT series; lead times were advanced by quarters up to three-quarters of a year, so that the values used were comprised of one-quarter of a year trailing PAT and three-quarters of projected PAT. Many combinations of the e-p ratio and PAT, both adjusted for various lead times, were tried in the search for the best combination.

The same step-wise, multiple regression technique was used to try to "explain" the e-p ratios for the S&P utilities and 500 composite

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37. Bernell K. Stone [56] has suggested the use of a two-index model because bonds and equities are not independent gambles, and because many common stocks, preferred stocks, and convertible securities are interest-rate sensitive. He develops the structure for a two-index model, but is never specific about which interest rate index he would use. He suggests that one of the reasons for the instability of the betas is the absence of a second index such as an interest rate index. Within the step-wise regression format the interest rate on T-bills was the third most important explanatory variable for the e-p ratio, and the rate on Treasury bonds provided no additional explanatory power. Perhaps, the reason is that such additional information as is embodied in the long-term bond rate is already included in other variables.

stock series.[38] The highest explanatory power was obtained for the S&P utilities series. For (e + 1Q)/p for 1976-82, the adjusted R^2 was 0.9626 using the 10-year T-bonds yields only. With (e + 2Q)/p for the same period, the value fell to 0.9601, which is still remarkable high. Utility stocks are rightly dubbed "money stocks."

For the S&P composite e-p for 1976-82, the adjusted multiple R^2 was .8677 for the first three variables as contrasted with .7504 for (e + 1Q)/p. These independent variables were in descending order of importance: 1/(GNP ÷ 2Q/GNP), 10-year T-bond yields, and 1/leading indicators. For the e-p series for the longer period, 1973-82, the adjusted multiple R^2 for the first three variables was .7362. The order of importance of the variables remained unchanged. Very likely, the explanatory power will decrease as the periods of time are lengthened beyond seven years.

These regression studies show that movements of the e-p ratios and, by extension, the stock prices themselves are related to both the current and prospective changes in both the real and financial realms of the economy. The GNP reflects primarily the real economy. The Leading Indicators series is composed of 62 individual series; 45 of these report the real realm while the other 17 such as stock prices, cash flows, money flows and interest rates, report the financial realm.[39]

The real and financial realms are so inextricably interrelated that many different analytical schemes may be workable. The changing and growing complexities of the economy and the changing timing patterns among the financial markets are such that no correlations will be perfect. The .960 adjusted R^2 for the utilities e-p ratio was remarkably high. But seeking high and stable returns from investments in securities requires the movements of funds among the money, bond and stock markets. No perfect schemes are available to achieve these goals. However, the timing pattern discussed below for shifting funds from market to market that emerges from the annual TAR ranking scheme is likely to be helpful.

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38. The S&P index for rails was divided into separate series for rails and transportation starting in 1980 in such a way that a consistent e-p series on these groups was not available.

39. See *Business Conditions Digest* [9] for a complete listing of these 62 series.

IX. PORTFOLIO PERFORMANCE: FUNDS ALLOCATION AND TIMING

An objective of portfolio management is to maximize the long-run rate of return consistent with a designated target risk level. One might seek to achieve that goal in various ways, much as by maintaining a portfolio fully invested in common stocks and a stock-trading strategy. The average rate of return on a total return basis from 1961 through 1981 was 7.6 percent, according to the I-S [24] study. In seven of those 21 years the TAR on the common stocks was negative. The average TAR for the 14 positive-return years was 18.9 percent. An obvious way to improve the average TAR is to be out of the stock market in the negative-return years. The typical discussions of Sharpe-Markowitz portfolio theory does not introduce alternative strategies for mixing common stock investments with those in other securities or in real assets.

Funds Allocation Studies

Studies by Bauman and McLaren [3] and Peter Bernstein [4] are relevant to the search for the golden grail of portfolio allocation. The stated objective of the Bauman-McLaren [3] study was to explain stock market returns and to improve the allocation of funds between the stock and bond markets. However, the study was limited to explaining the "expected" return defined as the ex post TAR, not the timing of switches among the stock, bond and money markets.

They tested eleven different variables with annual data for the period 1948-75. Their best model, which had an adjusted R^2 of .3334, used three independent variables: the normalized earnings-price (e-p) ratio, the geometric return of the prior three years, and the prior years' December-to-December change in the Consumer Price Index (CPI). The only variables introduced that resemble those used in the present study are the CPI and the change in the Composite AAA Corporate Bond yield. As observed above, the timing movements in the markets are sufficiently different and unique to each market cycle to foil any rigid, maximizing decision rule.

Dr. Peter Bernstein's research [5], which was referred to earlier, is extremely useful for the analysis of timing because he incorporates short-term rates, long-term rates, the spread between these rates, and the spread between the dividend yield on the S&P 500 and AAA corporate bond yields in his econometric studies. He reports a correlation coefficient of 0.94 between the AAA bonds and dividend yield spread. He improves his correlation somewhat by adding short-term rates. He concludes, in effect, that the yields on stocks float on the structure of bond returns and not the other way around. A similar conclusion was reached earlier in this monograph using a different approach.

X. STOCK MARKET TIMING

Stock-market timing studies have had a long and honorable history. In their 1940 edition of *Security Analysis* Graham and Dodd [20] wrote, "The validity of stock-market forecasting methods is a subject for extensive inquiry and perhaps vigorous controversy." However, they did not pursue market timing; their concern was with analytical methods and objective standards for both stock and bond investments. They did not discuss such questions as when to shift funds between stocks and bonds, the basis for such allocation decisions, or the use of money-market instruments as alternatives to both stocks and bonds. Most such studies are flawed in that they omit both transaction costs and the costs of developing and executing timing strategies.

Forty years after Graham and Dodd, textbook discussions of the art of timing have advanced very little. In 1984 Jacob and Pettit [25] state only that an investor who pursues a market-timing strategy can do so while having access to risk-free assets such as money-market funds, or a market portfolio of securities such as index funds. A market-timing strategy may not be called an active strategy. The proportions of wealth invested in each segment depends upon the forecasted relative returns. The Curley and Bear [15] textbook discusses timing and portfolio revision but their discussion is limited to common stocks and is set within a Sharpe-Markowitz portfolio context.

A recent article by Fong [18] was concerned with asset allocation among stocks, bonds and T-bills. Ex ante return series were used for broad classes of securities. Fong prepared simulations showing the outcomes of various mixes of these broad classes using returns related to their historical ranges. His results would have been much different if he had used ex post holding period returns, which show frequent negative TARs on both bonds and stocks. More recently, (1983) Renshaw [39] reviewed stock market performance for the period 1929-1981. He developed sales for a buy-and-sell strategy which he shows provided an 18 percent return for this period, as compared with 8.1 percent for common stock for the same period according to the I-S study.

Cohen, Zinbarg and Zeikel [12] provide a whole chapter on investment timing and the business cycle. After reviewing the meager literature on the subject, their own conclusions set forth a strategy of shifting from common stocks to liquid assets to high-quality, long-term bonds to lower quality bonds and back to common stocks as the business cycles progresses. Their conclusions, which are bolder and broader than the individual items they review, are generally consistent with the timing patterns that flow from the discussion of the TAR patterns of the 22 risk classes of securities from 1961 through 1982 presented in this study.

Timing of investment switches to increase or maximize return, as most know from personal experience, is much easier to talk about than to do successfully. A *Wall Street Journal* item by Slater [46] on March 12, 1984, reviewed the performance of two newsletters that offered advice, on timing the market's turns. Over the most recent 7 1/4-year period an investor holding aggressive mutual funds would have been able to improve his return over the return of that of the Lipper Growth Fund Index by 50 or 68 percentage points by following strictly the advisories issued by these two newsletters. He would have switched from stock funds to money-market funds and back to stock funds on the signal from the advisors. The decision to rebalance large, professionally-managed portfolios, can be implemented quickly. For example, the model portfolio at Merrill Lynch was moved from 70 percent stocks and 30 percent bonds in the second quarter of 1983 to 35 percent stocks, 50 percent bonds and 15 percent cash by January 1984 according to Leefeldt [27]. What Merrill Lynch did with its actual portfolios as distinguished from its model portfolio is not reported.

Portfolio strategists undoubtedly have their own preferred signals for the timing of moves among the broad classes of securities such as high-quality common stocks and investment-quality corporate bonds, as well as among individual securities. They may also shift funds from aggressive stocks to defensive stocks, for example, when they believe the market is about to fall.

The "Form Sheet," Table X, displays the annual ranking of the 22 risk classes of securities being followed. The most volatile risk class, Class V common stocks, ranked in the highest three places nine times and in the lowest three places eight times in the 22 years, based on the information in Table X. Class IV common stocks ranked in the top three four times and in the bottom three six times. If one could somehow avoid these lowest rankings, which are usually associated with negative returns, the average returns would obviously be greatly improved.[40]

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40. In 1963, 1975 and 1976 the returns on all 22 risk classes were positive. The lowest returns in these years were 0.9 percent, 9.6 percent and 10.7 percent respectively.

If one were wise enough or lucky enough to have invested in only the three highest-performing risk classes each year, the total annual returns would have averaged 18.2 percent for the 1963-1972 period and 24.2 percent for the 1973-1982 period.[41] During the 22-year period covered by this study only Baa bonds and high-quality and medium-quality preferred stocks did not appear among the three top-performing classes at least once. In most years, at least two or three of the risk classes with the highest returns were either straight bonds or common stocks. Only in 1965 and 1968 did any of the three best-performing risk classes have any negative returns. Of course, the mythical, all-knowing investor could have avoided any negative TARs these years by moving his funds into money-market instruments.

Modern portfolio theory, the procedures that follow the original insights of Markowitz, Sharpe and Lintner, prepare a capital market line that is anchored in the "riskless rate" of return. The 91-day T-bill rate is generally used as the proxy for that riskless rate, but—as is common knowledge—that rate itself fluctuates widely over the years as shown in Table XIII and Figure IV. In the procedure used to calculate the relative risk of the stock to the "markets," the TARs are calculated using the riskless rate as one of the major inputs. This procedure, and the way the capital market line is drawn, give the impression that the alternative to common stocks is the T-bill.

In any given year the TARs on any of the 22 risk classes of securities utilized in this study may be higher or lower than the T-bill rate, as summarized in Table XIII. By investing in the three risk classes of securities earning the highest returns in the 1963-72 decade the TARs would have averaged 18.2 percent; in the 1973-82 decade they would have averaged 24.4 percent. Avoiding the years in which the TARs were negative would have increased those returns. Utilizing T-bills in the years that returns were below the "riskless rate" would have increased the average rate to 10.1 percent for the 1963-72 period and to 26.2 percent for the 1973-82 period.

The TARs on all of the long-term securities were higher than the returns on T-bills in all years except 1966 and 1969 for the 1963-72 decade as shown in Table XIII. In 1966 only U.S government bonds had a positive rate; that rate was 4.1 percent. The choice between governments and T-bills was close. The point is that one's

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41. Table 6 of Ibbotson and Fall [23] shows the following correlations for the period 1947-1978 of NYSE common stocks with U.S. Treasury securities: Bills −0.459; Notes −0.174; and Bonds −0.041.

TABLE XIII

RETURNS ON 3-MONTH TREASURY BILLS AND 22 CLASSES OF LONG-TERM MARKETABLE SECURITIES[a]
(1961-1984)

Year	T-Bill	Return Relative To T-Bills No. of Classes Higher	Lower	Highest Tar	Lowest Tar
1961	2.4%	20	1	+31.3%	+ 0.5
1962	2.8	10	11	+ 8.0	−21.6
1963	3.2	19	3	+35.5	+ 0.9
1964	3.5	20	1	+18.6	− 3.3
1965	3.9	13	8	+30.8	− 0.8
1966	4.9	0	21	+ 4.1	−18.1
1967	4.3	11	10	+44.2	− 6.9
1968	5.3	13	8	+21.0	− 0.6
1969	6.7	0	21	− 0.7	−31.1
1970	6.4	8	14	+17.3	−14.7
1971	4.3	21	1	+25.2	− 7.1
1972	4.1	20	2	+30.1	− 0.9
1973	7.0	1	21	+10.4	−35.7
1974	7.8	0	22	+ 4.9	−40.1
1975	5.8	22	0	+60.4	+ 9.3
1976	5.0	22	0	+44.8	+10.7
1977	5.3	7	15	+13.6	−14.4
1978	7.2	4	18	+16.0	− 2.1
1979	10.1	11	11	+40.1	− 4.4
1980	11.4	10	12	+72.6	− 5.4
1981	14.0	0	22	+ 6.9	−22.4
1982	10.6	19	3	+42.7	− 5.7
1983	8.6	4	18	+37.3	0.0
1984	10.0	12	10	+22.5	− 8.1

[a]Only 21 risk classes until 1970.

return does not have to go down with common stocks, whose TARs ranged from -6.4 percent to -18.1 percent that year.

Table XIII shows for the 1973-1982 decade that in 1974 and 1981 T-bill rates were higher than those of all 22 risk classes and in 1973 only one class — U.S. government bonds — performed better than T-bills. In 1973 Class I common stock had a TAR of 10.4 percent while T-bills earned 7.03 percent. Six other risk classes had rates between 7.03 percent and 0.00 percent. In 1974 T-bills earned 7.83 percent which beat everything by a wide margin even though U.S. governments and GNMAs had positive returns. The inference is that when the storm flags of rising inflation and an impending recession are hoisted, run for a safe haven such as T-bills.

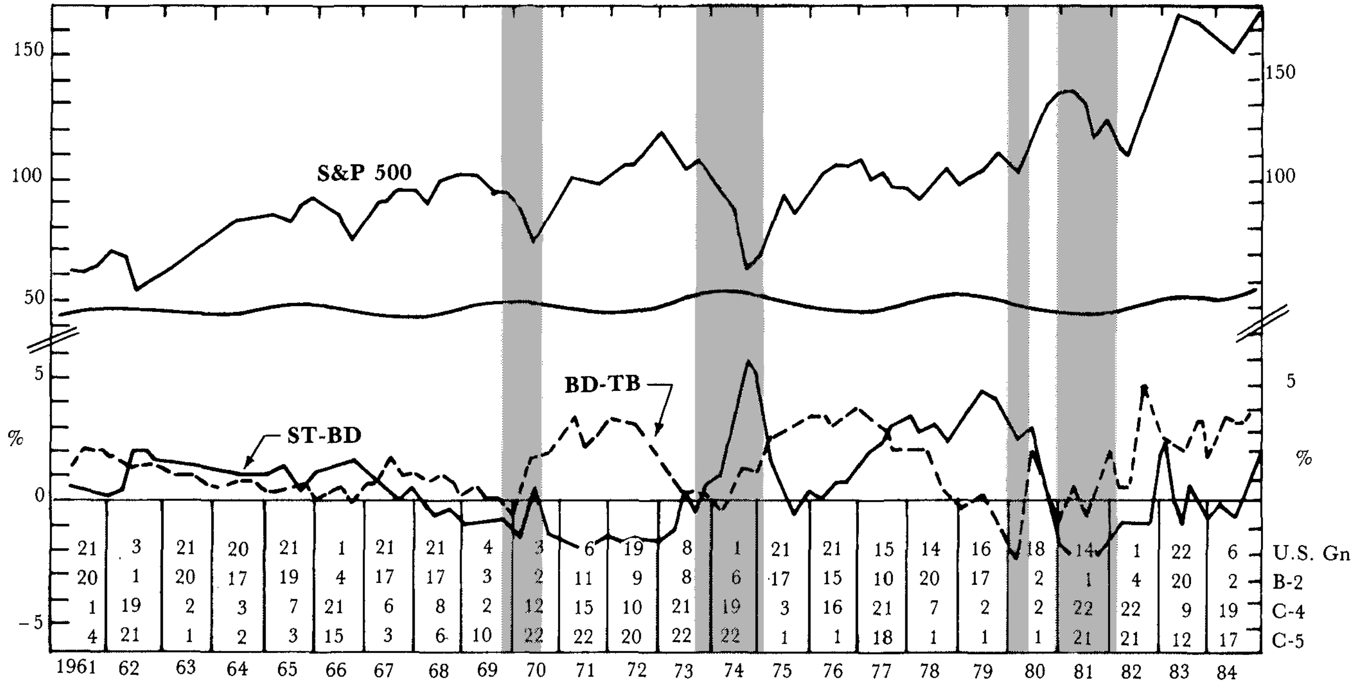
This discussion is limited to financial assets. To the extent that the anticipated returns on real assets are negatively correlated with those of financial assets, some investors always have and always will seek to maximize their wealth by strategies that span both of these asset classes.[42]

The many elements that are of high importance to the timing of switches have been discussed, and most of these are summarized in Figures IV and V. These figures show the following for the years 1961 through 1983: AAA corporate bond yields, T-bill yields, e-p ratios for the S&P 500, the S&P 500 Index itself, the AAA bond to T-bill spread and the e-p to AAA-bond spread. Superimposed on Figures IV and V are shaded areas representing the NBER-reported business cycle troughs. At the bottom of Figure V are the annual TAR rankings of the four most volatile risk classes of securities. The dates of the peaks and troughs on the NBER business cycle, the AA bond series, and the e-p for the S&P 500 stocks series are given in Table X. One can move a transparent ruler slowly across this figure and note how these series rise and fall in patterns, and at the same time note their impact on the ranking of Classes IV and V common stock, AA corporate bonds and U.S. government bonds.

If a portfolio manager uses the information in Figure V, updates it regularly, and adds one or more of his own best portfolio reallocation rules, he is likely to be able to avoid the very substantial losses that appear regularly — and will continue to appear regularly into the foreseeable future. Avoiding the larger losses and being willing to give up some gains on common stock that may come after a

42. Some work has been done on the correlation of TARs on real and financial assets. Table 6 of Ibbotson and Fall [23] includes the 1947-1978 annual returns (TARs) for farms and residential housing in a correlation matrix with those of many long and short-term securities. Soldofsky is preparing a new study on this topic.

FIGURE V
S&P 500 STOCK INDEX, YIELD SPREADS AND RISK-CLASS RANKINGS



S&P 500 — S&P 500 Stock Index. (Top of figure.)
ST-BD — spread between the e-p ratio for the S&P 500 Stock Index and AAA industrial bond yields. (Bottom of figure.)
BD-TB — BD-TB is the spread between AAA industrial bonds and 91-Treasury bills. (Bottom of figure.)

period of recovery is more than 1-2 years old, may substantially improve total portfolio performance. The key to most of this successful switching is the projection of interest rates, and the two spreads. Projections of short-term and long-term interest rates and earnings are made by numerous organizations. Projections of e-p ratios may be available. The regression studies reported earlier achieved quite high adjusted R^2s for the e-p ratios associated with the S&P 500 Index. The explanatory variables used in these studies — the projected GNP, the leading indicators and the Consumer Price Index — are all readily available.

XI. SUMMARY, COMMENT AND CONCLUSION

Risk and return, performance ranking, and timing represent three of the many ways of observing the past performance of long-term marketable securities and for organizing information that are useful for evaluating past portfolio decisions and for making current and future portfolio decisions.

This study utilized the ex post performance data of seven distinct risk classes of bonds, three classes of preferred stocks, seven classes of convertible securities, and five classes of common stock. These performance data were used (1) to prepare risk-return or return-structure curves; (2) to prepare beta coefficients using both a conventional stock-market index and two newly constructed, broader market indices; (3) to construct correlation matrices for all 22 risk classes of securities; (4) to develop some generalized observations about the cyclical patterns of return-structure curves; and (5) to provide a basis for observing the relative performance timing of each risk class of securities over the last four business cycles.

Before summarizing the major conclusions of the study, some comments about return-structure curves and their close relative, the term-structure-of-interest rates curves, are in order. Each of these constructs is concerned with (1) the time dimension or term to maturity; (2) risk; and (3) return. The more familiar term-structure-of-interest rates curve holds the level of risk constant and observes the functional relationship between return and the term to maturity. Chronological movements of the term-structure curve have been studied and theories have been constructed about the shapes and movements of these curves.

Return-structure curves (1) hold the term to maturity constant—in a range of 12 years to infinity—so that results are not affected by term-structure noise[43]; (2) use numerous risk classes as

43. Term-structure noise refers to the rapid, short-term changes in interest rates up to about 10-12-year-maturities. The shorter the term or maturity, the more rapid and wider the range of the fluctuations. The long-term government bond rates used in term-structure studies shift quite slowly and move in a much narrower range. Furthermore, these long-term rates are virtually level for maturities of 12 years and beyond. The short-term interest rate movements are a distraction; they interfere with the focus of attention in this study on long-term rates. In this sense, the interference with the focus of attention on long-term interest rate signals is "noise".

of long-term marketable securities; and (3) emphasize the functional relationship between return and risk.[44]

Term-structure curves employ the ex ante, yield-to-maturity concept which does not provide an explicit measure of risk. Return-structure curves use the ex post total annual return (TARs) technique which provides information for the standard deviation as a measure of total portfolio risk. The basic TARs can be used to prepare other measures of risk, as is done in the Capital Asset Pricing model.

Twenty-three major conclusions of the study are set forth for the following six topics: (1) regression lines fitted to return-structure curves; (2) beta coefficients and correlation matrices; (3) cycles and performance patterns; (4) determinants of earnings-price ratios; (5) stock-and-bond yield relationships; and (6) market timing and portfolio allocation. Market timing was the second of the two major objectives of the study and is necessarily related to funds allocation.

1. Conclusions for linear lines fitted to return-structure curves:

   1.1 Regression lines covering 6-7 years generally have the highest R^2s and other statistical measurements. Several of the R^2s are above .70 and many more are significant at the .01 level in terms of the F-values of the regressions.

   1.2 Nonlinear regression lines generally have lower R^2s.

   1.3 Their slopes are generally positive. The positive slopes averaged about 0.74; that is, every 1 percent increase in return was associated with about a 0.74 percent increase in risk. Recently, positive slopes have been just below 1.00.

44. The functional relationship between return and risk refers to the change in one variable as a function of a change in the other. These functional relationships have been explored by regression studies such as those shown in Table V and pictured in Figures I, II and III.

1.4 Experience shows that since the 1961-66 period these slopes have ranged between a positive 2.1 and a negative 1.3.

1.5 Most of the slopes prior to World War II are negative; many have values above −2.5.

2. Conclusions on beta coefficients and the correlation matrix for the 22 risk classes of securities:

2.1 For the 1973-1982 period, common stock betas showed mixed results for the broadest market index as compared with the S&P 500 Index. The betas rose somewhat for the least risky classes and fell more sharply for the riskier classes.

2.2 For this same period, based on a single-index CAPM model using the S&P 500 Index, the betas for other than common stocks ranged from 1.01 for BBB convertible preferred stock, to 0.19 for U.S. government bonds.

2.3 When broader market indicies were used that incorporated the TARs on U.S. Treasury bonds, corporate bonds and mortgages – all having a term to maturity beyond 10 years, the betas were generally higher. For example, using an S&P 500 Index, the beta for U.S. governments was 0.19 for 1973-82. Using the new broad market index, the beta for these securities rose to 0.59.

2.4 The correlation matrices for both the 1963-1972 period and the 1973-1982 show that low — and even negative — correlations exist between common stocks and various classes of fixed-income securities. Portfolio diversification should include both stocks and bonds in order to achieve large reductions in portfolio risk. For example, the correlation between U.S. government bonds and Class I common stocks ranged from 0.230 for 1963-72 to 0.546 for 1973-82.

2.5 Correlation coefficients may move substantially between risk classes for a period of years.

3. Conclusions on cycles and performance patterns:

3.1 The R^2s of the regression lines for the return-structure curves move through clear-cut patterns over conventional NBER-determined business cycles. Three six-year cycles were identified. The adjusted R^2 values ran from .00 to .71. However, these patterns could reflect autocorrelation problems in the procedures. More studies will be prepared on this topic.

3.2 During periods of crisis and turbulence in the financial markets, the adjusted R^2s fall to 0, but as stability returns and the economy grows steadily, R^2s move upward and become significant at the .01 level and beyond in terms of the F-value. The impact of the Vietnam War, the oil crises of 1973 and 1979 and the periods of rising inflation ending in 1975 and 1980 are clear.

3.3 The TARs on the two highest quality classes of common stocks and U.S. government bonds are more frequently among the best and worst performing securities in individual years than any of the other risk classes of securities studied. These stock classes and the U.S. government bonds tend to have their best and worst performances in different years. The strong possibility of timing their purchase and sale to increase portfolio return exists. For example in 1970 the TAR on U.S. governments was 12.0 percent while that on the class I common was −7.5 percent.

4. Conclusions on the determinants of the earnings-price (e-p) ratios for the S&P stock index:

4.1 The most important determinants of e-p ratios for the period 1976-82 are, in descending order of importance:

(1) the reciprocal of percentage of change in the GNP projected two periods ahead to the latest GNP, (2) the reciprocal of the Leading Indicators, (3) 91-day Treasury bills, and (4) the reciprocal of the CPI. These four variables explain 75 percent of the variations in the e-p ratio.

4.2 The explanatory power of these and other variables may change from period to period.

4.3 Ninety-six percent of the e-p variations for public utilities for the 1976-82 period are explained by correlating S&P utilities data with the 10-year T-bond rates. The S&P utilities earnings series was advanced one quarter and divided by the companion price series.

4.4 Other researchers have used other variables to help explain stock price and/or earnings-price ratios with less success.

4.5 Data for all of the explanatory variables such as projected GNP and the Leading Indicators used in these step-wise, multiple-regression studies are readily and publicly available.

5. A well known financial consultant concludes concerning the general ex ante relationship between stock and bond yields that the returns on stock "float" on bond returns and not the other way about. His econometric results are summarized in two places.

6. The conclusions on market timing and portfolio allocation:

6.1 Noting the total annual returns can be raised substantially by avoiding the losses that occur in largely predictable patterns across risk classes of securities is merely common sense. The results show that the TAR is 24.2% from investing in the three best performing risk classes each year from 1973 through 1982. If the investor had substituted T-bills as appropriate for these best performing securities, his returns could have been increased another two full percentage points.

6.2 Portfolio returns probably can be further increased by shifting funds among the risk classes of securities in patterns that are related to the stages of the business cycle. The Form Sheet, Table X and Figure 5 demonstrate these patterns.

6.3 Other keys to successful switching among risk classes are: projected interest rates, the spread between the e-p ratio on the S&P 500 and AAA bond rates, and the spread between the AAA bond rates and 90-day Treasury-bill rates, as illustrated in Figure V and by correlation studies.

6.4 Cycles of four to six years are typical and should be kept in mind when considering the use of securities portfolios diversified broadly among risk classes. Periods of such length are needed for the magic of low or negative correlations to work out their risk reduction potential.

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