HISTORICAL RETURNS: THE CASE FOR EQUITY

by

Jeremy J. Siegel

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

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Professor of Finance

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ABSTRACT

The availability of long term data confirm the superiority of the returns of equity over fixed income instruments. This premium, particularly in the twentieth century, has been far greater than traditional finance models would have predicted on the basis of the available economic and financial data. New data from the nineteenth century suggest that the real rate of interest was far higher and the equity premium correspondingly lower. Several explanations for this premium are explored. It is concluded that the higher real rates of interest that the economy has experienced over the past decade may not be atypical of a longer-term financial perspective, although stocks still appear the asset of choice for long-term accumulation.

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What is Past, is Prologue.

----Shakespeare, *The Tempest*

I. Introduction

In the decades immediately following the stock market collapse of 1929-1932, stocks were often considered unacceptable as investment vehicles, particularly for conservative trust and retirement accounts which were primarily invested in fixed income assets. After the stock market boom of the post-War period, a careful examination of the historical data demonstrated that equity offered returns superior to bonds and money market instruments when viewed from a long-term perspective. Since stock returns are generally more risky than those on fixed income instruments, this result is not surprising. However, in 1985, Rajnish Mehra and Edward Prescott published research demonstrating that stocks appeared to offer *excessive* returns in relation to their risk and, at the same time, bonds offered puzzlingly low returns. Since their work was published, finance economists have been struggling, with only partial success, to explain why historical stock returns have been so high relative to those on fixed-income securities and whether this phenomenon may persist into the future.

Most of the research on the stock market has been conducted either in the post-War period, or from the mid 1920s, when the S&P 500 Index was formulated. Since 1926 the long-run dominance of stocks over fixed income securities is well documented. From 1926-

1990, the real compound annual return on stock is 6.4% while that on short-term government bonds, which is often used as the proxy for the "risk free" asset, is 0.5%.[1]

Recent research has extended the time period analyzed by Mehra and Prescott. These data demonstrate that the excess return of stocks over bonds is not nearly as large during most of the nineteenth century. Well-documented historical series on stock prices have now been constructed which go all the way back to 1802,[2] although there is some fragmentary data back to 1789.[3] By examining historical interest rate data in the United States and United Kingdom, Siegel (1991) has constructed a relatively risk-free rate of interest on long- and short-term bonds over the same time period. The analysis of this data reveals that the real returns on bonds were far higher during most of the nineteenth century than the twentieth century, although the return on stocks still dominated fixed income securities.

II. Long-Term Asset Returns

A. Stocks, Bonds, and Gold

In order to analyze asset return from the beginning of the nineteenth century, the data are divided into three sub-periods. The first, running from 1802 through 1870, contains the least comprehensive data, particularly before 1834. The second, running from 1871 through 1925, comprises the period studied by the Cowles Foundation, an economics research group begun by Alfred Cowles (1938) at the University of Chicago in the 1930s. The last sub-period, from 1926 to the present, coincides with the development of the S&P 500 Stock Index and contains the most comprehensive data on stock prices as well as other economic variables.

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[1] The period analyzed in the Mehra-Prescott study, 1889-1978, showed a compound real return for short-bonds at 0.80%, and the real returns for stocks at 5.87%.

[2] In the 1970s and 1980s economists such as Roger Ibbotson and Rex Sinquefield (1991) have analyzed data on inflation, stock, and bond returns since 1926, when the S&P 500 Index came into existence. Subsequently several authors (Particularly Jones and Wilson (1987a,b)) have pushed much of the data back to 1872, the date from which the Cowles Foundation began collecting comprehensive data on stocks. Most recently, William Schwert (1990) has reconstructed monthly stock indices back to 1802. His stock data are used in this study. There is some data going back to 1789, but its quality cannot be verified, so it is omitted from this study.

[3] Ibbotson and Brinson (1987, p. 73) report that the Foundation for the Study of Cycles, located in Pittsburgh, has published data from an internal stock index entitled, "Historical Record: Stock Prices 1789-Present," Data Bulletin 1975-1. However, attempts to obtain documentation for this series have not been successful.

Figure 1 displays what one dollar invested in 1802 in various assets would have accumulated by the end of 1990. These series are referred to as *Total Returns Indices*, since they assume that all cash flows, such as interest and dividends, as well as any capital gains, are continually reinvested in the asset under consideration. Total returns indices differ from standard stock market indices, such as the S&P 500 Index, which do not include the reinvestment of cash flows. These standard indices are called *Capital Appreciation Indices*.[4]

Of course, the early stock indices were not as comprehensive as those constructed today. From 1802 to 1820, the stock index consisted of an equally weighted portfolio of several bank stocks from Boston, New York, and Philadelphia. Afterwards an insurance company was added and in 1834 the portfolio became heavily weighted towards railroad stocks. In 1939 Alfred Cowles constructed an index, beginning in 1871, which consisted of all stocks listed on the New York Stock Exchange and for the first time dividend payments were carefully recorded.

As Figure 1 indicates, the total return index for stocks dominates all other assets over the entire period. One dollar invested in 1802, with all dividends reinvested, accumulated to over $1 million by the end of 1990. Over the entire period, equities have achieved a compound annual nominal rate of return of 7.6% per year, a rate which doubles approximately every nine and one-half years. The average arithmetic return is 9.0% per year. This was the average annual return for investing in equities over one year, but this return cannot, through a buy-and-hold strategy, be converted into a compound annual rate of return over more than one year.[5]

The power of compound returns clearly is evident in the stock market. Since one dollar would have accumulated to over one million dollars over these past 188 years, $3 million dollars, invested and reinvested since 1802, would grow to the incredible sum of over $3 trillion. This nearly equals the entire capitalization of the U.S. stock market in 1990! Three million dollars in 1802 is equivalent to $33 million in today's purchasing power. This was certainly a large, but not overwhelming sum of money to the early indus-

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[4] Stock indices do, however, reflect the increase in the value of shares resulting from the reinvestment of retained earnings (earnings not paid as dividends) and changes in the capitalization of future expected earnings of the firm.

[5] The geometric, or compound return, which is the n^{th} root of the one year returns, is always less than the average, or mean arithmetic return. The geometric return can be approximated by the arithmetic mean minus one-half the variance of the individual one-year returns.

trialists and landholders of the early nineteenth century.[6] Although some investors continually reinvest dividends and interest, eventually these large accumulations are almost always spent either in retirement or by the heirs of the original investor. Capital which has accumulated untouched for nearly two centuries is unprecedented.

Figure 1 also demonstrates that nominal stock returns have also been increasing over time. In Table 1 stock returns are displayed in each sub-period. The compound rate of return on stocks is 5.8% from 1802 through 1870, 7.4% from 1871 through 1925, and 9.8% from 1926 through 1989.[7]

Figure 1 also displays returns on both long and short-term government bonds, gold, and commodities. Long-term federal government bonds did not always exist throughout the entire period, so in the early years, high-grade municipals (which some even viewed as having lower risk than governments) were substituted for federal bonds in the series. Municipal bonds were also substituted for government bonds in the later periods when the prices of government bonds were distorted by the "circulation privileges" or the right of banks to issues currency against these bonds. Most of these data were takn from the classic *A History of Interest Rates* by Sidney Homer (1963).

Treasury bills, or short-term governments, did not exist at all before 1920. Series on the rates on commercial paper are available from Macaulay (1938) back to the 1830s, but in earlier years commercial paper rates were subject to a high and variable risk premium. Siegel (1991) has constructed a synthetic short-term government series which removes the risk-premium on this commercial paper by utilizing the relation between short and long-term interest rates that existed in Britain during the nineteenth century, where financial markets were far more highly developed. Continual reinvestment of coupons on an initial investment of $1 in long-term government bonds in 1802 would have yielded $6,070 in 1990 and continual reinvestment of interest on treasury bills would have yielded $3,570.

The series on gold is the value of gold measured at the market price. Until the mid 1960s this price was controlled by the governments and U.S. citizens were not allowed to hold gold in monetary form between 1933 and 1970. Nonetheless gold has been a key asset

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[6] Blodget (1806) estimated that wealth in the United States was $2.45 billion in 1802. Total wealth today is estimated at $10 to $15 trillion, of which $3 to $4 trillion is in the stock market.

[7] The data from the Foundation for the Study of Cycles, cited in fn. 3 above, shows a compound return of 7.95 from 1802 through 1870 and 7.92% from 1789 through 1870.

in the world's monetary history and is still considered by many investors to be an important hedge asset. One dollar of gold purchased in 1802 would be worth $19.30 by the end of 1990.

The consumer price index is provided for comparison, and would be representative of the value of a basket of widely diversified goods which could be costlessly stored with no depreciation. Consumer goods have appreciated a relatively modest ten fold, or to $11.20 over the entire period, almost all of it in the last sub-period. Table 3 summarizes the returns for gold and commodities over the various time periods.

Note that by the end of the first sub-period, 1802-1870, the accumulations in government bonds, bills, and stock returns were virtually identical. It is in the second, and especially the third sub-period, when stocks clearly dominate fixed income assets. The return on gold is clearly dominated by bonds and stocks over the entire period, but its appreciation did surpass bonds (but not stocks) over the past 74 years.

B. The Price Level

Of importance in interpreting asset prices movements over time is understanding the behavior of the price level, shown in Figure 2. Although this figure displays various price indices (which are analyzed in Siegel (1991)), they all tell the same story. Before World War II, the price level in the United States showed no overall trend either upward or downward. After the War, the price level has been increasing persistently. This increasing trend accelerated until the 1980s, when the rate of inflation slowed. The consumer price index in 1990 was nearly seven times its 1945 value. Over the entire period from 1802, prices (based on the CPI index) have increased at an average annual rate of 1.3%. This is broken down into an increase of 0.1% per year in the first sub-period, and 0.6% and 3.1% in the second and third sub-period, respectively. These statistics are displayed in Table 3.

Economic theory suggests that the abandonment of the gold standard, a process which started in 1933, but gained momentum in the post World War II period, changed the behavior of the overall price level. Throughout the nineteenth and early part of the twentieth century, a major restraint on the supply of money was the amount of gold held by the government. Since 1933 the requirement that gold back government money was progressively eliminated by legislation. Chronic inflation, which cannot occur under a gold

standard, became the norm in the post-War period. Further analysis of the price level is undertaken in Section III.B. below.

C. Real Returns on Assets

Analyzing the behavior of the price level allows us to calculate the *real* return on financial assets, which are illustrated in Figure 3. Because of inflation, real returns are much more modest than money returns, especially in the final sub-period. One dollar invested in equities in 1802 would have grown to 92,400 dollars of constant purchasing power, or real dollars, in 1990. Over the same period one dollar in long-term governments would have accumulated to 545 real dollars, in short-term governments to 320 real dollars, and in gold to only $1.73. A dollar of hoarded currency, which pays no return and whose value is eroded by inflation, would have left an investor with only 9 cents of purchasing power in 1990.[8]

D. Taxes and Returns

Figure 4 displays the total returns index corrected both for federal taxes and inflation. Average federal income tax rates have been taken from studies of Robert Barro and Chaipat Sahasakul (1983, 1986) and are reported in Table 1. Since no state or local taxes have been considered, tax rates are set at zero before 1913, when the federal income tax was instituted. It is assumed that dividends and interest income are taxed at the average marginal tax rate prevailing in the year they were earned. It is assumed that capital gains are taxed (and losses remitted) at one-fifth of the prevailing average marginal tax rates, consistent with the research done by Protopapadakis (1983). The reduced tax rate results primarily from the deferment of taxes on accrued, but not realized capital gains.

Since a significant part of the returns on equity have been earned through capital gains, while virtually all the returns on bonds are in the form of taxable interest, the returns on equity are taxed at a lower effective rate compared with those on fixed income assets. In the third sub-period when taxes became important, the compound after tax return on

[8] It is of interest that an investor would actually have done far better hoarding paper money than gold bullion. The first U.S. currency, a one dollar United States note issued in 1862, now catalogs for $1000 in uncirculated condition, while earlier colonial paper goes for even more. Of course, gold coins have also increased in value far more than bullion.

stocks was lowered by 1.1 percentage points to 5.3%. Real after-tax returns on short-term bonds were lowered by 0.8 percentage points to minus 0.3%, while the return on long-term government bonds fell 1.2 percentage points to 0.2%.

These results indicate that on an after tax basis, investors rolling over in long-term bonds have barely kept up with inflation, while those rolling over in short-term bonds have fallen behind inflation. In fact, investors in short-term bonds have earned no after tax real return from 1896 through 1982, while over the same period, the after-tax real return index for equities increased about eighty-seven fold!

E. Stability of Returns Across Periods

One of the striking aspects of these data is the relative constancy of the real returns on equity across all the subperiods. In the first sub-period, the geometric return on equity is 5.7%; it is 6.8% in the second sub-period, and 6.4% in the third sub-period.[9] These figures imply that although inflation increased substantially in the third sub-period, the nominal return on equity increased by an almost identical amount, so that the return after inflation was essentially unchanged. This might be expected if one considers stocks as claims on *real* assets, so that in the long-run stocks are good hedges against inflation.[10]

Figure 5 displays 30-year centered moving compound real rate of returns on stocks, short and long-term government bonds.[11] The lack of any major trend to the return on stocks is easily perceived. Over the entire period, the average real compound rate of return on stocks has been 6.2%. Over *every* thirty year period from 1802 through 1990, there has been only two when the compound annual rate of return on stocks fell below 3%, and that occurred at the depths of the Depression, in 1931 and 1932. Furthermore, there have been only two additional thirty-year periods where the real compound rate of return on equity has fallen below 4%: the periods ending in 1920 and 1921. The greatest returns to stocks over a thirty year period ended in the early 1960s, when the real compound annual return exceeded 10%.

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[9] If the stock data from the Foundation for the Study of Cycles (cf. footnotes 3 and 7 above) are considered, the real compound annual return on equity from 1802-1970 is 6.8%, identical to the second period.

[10] In the short-run stocks have proved poor hedges against inflation. This will particularly so if the inflation is induced by supply shocks which affects the productivity of capital. See Fama (1981)

[11] The averaging period is progressively shortened to fifteen years at the end points of these series.

In contrast, from any thirty year period beginning with 1888, the year the Mehra-Prescott period begins, the real rate of return on short-term government securities has been above two percent for only a single thirty year period, from 1903-1933. From 1888, the real return on long-term bonds has never reached 4% over any thirty year period, and exceeded 3% during only twelve years. One has to go back to the period from 1835 through 1865 to find any period where the return on either long *or* short-term bonds exceeded that on equities. The dominance of stocks over fixed income securities, so evident from Figures 1, 3 and 4, is borne out by the data.

Table 4 reports a comparison of the historical compound returns on stocks, long- and short-term bonds. One can see that over the entire period stocks outperform short-term bonds 59.3% of the time on a year-to-year basis, but this rises to 87.5% over a thirty year horizon. It can also be seen that, since 1872, over every twenty-year horizon or longer, stocks have *never* underperformed short-term assets and have outperformed long-term bonds 95.8% of the time! Even with holding periods as short as five years, stock outperform long and short term bonds by a four-to-one margin since 1926 and three-to-one since 1872. In contrast, from 1802-1872, stocks outperformed short-term bonds by slightly more than 50% over either a one-year or 30-year holding period.

III. Interpretation of Trends in the Return Series

Although the data demonstrate that returns on equities have, on the whole, compensated investors for the increased inflation over the post-War period, fixed income securities did not. For fixed income returns to compensate investors fully for increased inflation, two factors must hold. First, future inflation must be anticipated by both the borrowers and the lenders, and secondly, the real returns on fixed income securities must be invariant to the rate of inflation.

A. Unexpected Inflation

One could argue that much of the increase in the price level since World War II, and especially since 1970, was *unanticipated* and hence bondholders did not have a chance to adjust their required returns to the changed circumstances. However, it is unlikely that unanticipated inflation was a significant factor in the pricing of short-term securities, such as ninety day treasury bills. The inflationary process, although subject to long-term uncertainty since the abandonment of the gold standard, has been quite persistent and inertial in

the short-run. This inertia has given investors ample opportunity to capture the inflation premium in the rate of interest. Yet, as we have seen, the realized real rate of interest for short-term bonds fell almost as much as it did for long-term bonds. Hence, it is unlikely that inflation alone can explain the lower real rates.

B. Slower Growth

A second reason real returns may have been depressed is that the inflation, particularly that in the 1970s, was caused by external shocks, such as OPEC, which slowed growth and lowered the expected real return on investment. Economic theory suggests that real rates of interest should be positively related to economic growth so that weak growth lowers real returns.

Although this explanation is tempting for the 1970s, it is hard to point to depressed real growth throughout the entire period from 1926-1990. The early post-War years were marked with robust real growth, yet the real yield on short-term bonds, although not as depressed as the 1970s, were nonetheless significantly below the earlier periods that we have studied. Furthermore, we have noted that stocks increased their real return during the 1960s, which is inconsistent with fixed income securities experiencing lower returns due to slower growth.

C. Risk and Other Factors

There are other factors that may contribute to a decline in real interest rates. A drop in the real returns on fixed income investments could be caused by an increase in the riskiness of other assets in the economy. If stocks are perceived as being riskier, investors might wish to purchase fixed income assets as a hedge against this uncertainty, driving up their price and down their yield.

But the data do not suggest that the economy is becoming riskier. The volatility of the stock market returns, which rose to a high during the Great Depression, has fallen significantly in recent years, as indicated in Table 1. In contrast, the volatility of bond returns has surged in recent years and approaches the variability of stocks. The volatility of

nominal short-term returns has also increased in recent years, but not nearly as much as that of government bonds.[12]

Furthermore, there is evidence that the real economy is more stable in the post-War period, which by itself would suggest a higher real return on fixed income assets. This is illustrated by noting the statistics in Table 3. The recent post-war period shows a marked reduction in the variability of most of the real variables in the economy.[13] Intuition would suggest that the less risky the real economy, the smaller would be the realized yield differential between risky assets, such as stocks, and less risky assets, such as bonds. If the real return on stocks remains constant, and this is what the data suggest, then the real return on fixed income instruments should have risen. The decline in the real yields on bonds suggests that the changing variability of the real economy is not an adequate explanation.

Perhaps the low real interest rates during much of this century can be explained by a combination of historical and institutional factors. The 1929-32 stock market crash and the Great Depression left a legacy of fear in most investors, causing many to cling to government securities and insured deposits, driving down their yield. Redistribution policies undertaken by the government subsequent to the Great Depression may also have lowered real rates by shifting wealth to more risk averse segments of the population. Furthermore, during World War II and early post-War years, interest rates were kept low by a stated support policy of the Federal Reserve. This policy, because of its inflationary consequences was abandoned in 1952, but interest rate controls, particularly on deposits, lasted much longer. During the 1970, real growth slowed and the returns on both bonds and stocks declined. It was not until the 1980s that the real return on fixed income securities reached the level it achieved in the nineteenth century.

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[12] Over the three major subperiods, the *real* variability of the returns on bonds has not displayed the upward trend over time that the *nominal* variability has. This is due to the fact that, at least in the short-run, the price level, measured on a year-to-year basis, has become less variable in the post-War period (see Table 3). Hence, although interest rates have been more volatile, this has, been more than offset by the decreased variability of the short-run price level. This may seem paradoxical, since we have maintained that inflationary instability marked the post-War period. However, it should be noted that it is the long-run inflation rate that has become unstable, despite the fact that in the short-run inflation may have become more predictable.

[13] The reasons often cited for the greater stability of the real economy is more stable monetary policy, a larger government sector, a change in the mix of economic production to more stable sectors, such as services, and even better information and inventory controls.

IV. The Equity Premium

A. Definition of the Equity Premium

Whatever the reasons, the drop in the real return on fixed income investments has meant that the advantage of holding equities, which we have shown experienced a remarkably steady real return, has increased. The excess return for holding equities over short-term bonds is referred to as the equity risk premium, or simply, *equity premium*. This premium, which is plotted in Figure 6, has shown a rising trend over the last two hundred years, and was particularly high in the middle of this century. The equity premium, which is usually stated in terms of the *arithmetic* computation of returns, can be directly computed from Tables 1 and 2. The premium averaged 1.3% in the first sub-period, 4.4% in the second sub-period, and 8.0% since 1926.

Not only has the trend, but the mere magnitude of the equity premium has puzzled financial economists. In 1985, Professors Mehra and Prescott published research which maintained that the observed relation between stock and bond returns is inconsistent with most of the basic models employed by economists to explain macroeconomic behavior. Specifically, the equity premium has been far too high given the low real rates that investors apparently require on their fixed income instruments.

B. Intuitive Explanation of Premium Puzzle

The magnitude of the equity risk premium suggests that investors are very *risk averse*, which means they demand a high premium to hold risky assets, such as equities. The fact that the equity premium has been so high indicates that individual must be highly compensated for any downward movement in their consumption pattern.

But there is other evidence which is inconsistent with the high equity risk premium. Real per capita income has increased at a rate of one to two percent per year since the last half of the nineteenth century. Given the low historical level of the real rate of interest (especially when taxes are taken into account), individuals should be extremely anxious to borrow as much from their "richer future" to raise the standard of living of their "poor present". This will be so since individuals' behavior towards risk indicates their dislike for the possibility of a reduced standard of living.

Individuals can obtain a higher current standard of living by either saving less or borrowing more. By doing this they can smooth the level of consumption over their lifetime. Economic theory would predict that such behavior would raise the real interest rate, and hence lower excess returns earned by shareholders. But the real rate that brings the equity premium in line with the growth rate of income would require a real rate of interest far above the level experienced during most of this century.[14]

C. Possible Explanations

Economists have grappled for an explanation for the high level of equity premium and the low levels of real rates of interest. Some have suggested that reducing one's standard of living at any *given time* is qualitatively different than experiencing income inequality *over* time.[15] Others have suggested that there may also be problems with borrowing against future consumption, so that the observed real rate is far below the level that would allow individuals to smooth their consumption.[16]

Mehra and Prescott did their study from 1889 through 1978, which comprises part of both the second and third sub-periods that we have studied. During that time period the real rate of return on short-term assets averaged .91%. However, the real rate of interest is far higher both before and after this sub-period. Outside the Mehra-Prescott period, the short-term real rate averaged 5.71%, and since 1982, the real rate has averaged 3.5%.

The last ten years represents only about 5% of the total period we have examined, but it does contain the highest real rate during any consecutive ten year period since the nineteenth century, excepting the sharp deflationary periods of 1920-21 and the Great Depression. It remains to be seen whether the real rates on fixed income investment we

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[14] If consumption were sufficiently variable, a high equity premium might still be justified. But consumption is relatively smooth, and has been getting smoother over time. Investors would have to be far more risk-averse than previously thought to justify the risk premium and real rates we have seen. Analysis of this position can be found in Kandel and Stambaugh (1991).

[15] George Constantinides (1990) has explored the dependence of current level of utility on past consumption. Andrew Abel (1990) explores the phenomenon of "keeping up with the Jonses." Greg Mankiw (1986) has explored the role of shocks to individual asset holdings.

[16] Perhaps the paradox results from high stock returns, and not low real interest rates. Certainly it was not universally agreed in 1802 (or even 1872) that the United States would be the greatest economic power in the next century. What if one had owned stock in Japan or Germany before World War II?. Or even Argentina at the turn of the century, when it was considered one of the great economic powers? From a global perspective, the long-term returns on stocks may not be as high as we have found.

have experienced over the past decade will be characteristic of the future, as they characterized the nineteenth and early twentieth century. If they do, then the advantage of holding equities over bonds will shrink, but long-term capital accumulation still appears best served by holding equities.

V. Conclusions

This study demonstrates the superiority of holding stocks over either fixed income investments, gold, or commodities over the period from 1802-1990. The compound annual real return on stocks has averaged about 6% over the entire period. In contrast, the real rate of return on fixed income assets has declined over most of the period, and has averaged only 0.5% since 1926.

The magnitude of the excess return for equity appears excessive, especially during this century, relative to the behavior of other macroeconomic variables. However, earlier data suggest that the real return on fixed income assets has not always been as low as during most of this century, nor has the equity premium been as high. In fact, the higher real rates of the 1980s and early 1990s may mark a return to a longer-term historical norm, rather than being a temporary phenomenon associated with higher budget deficits, tight monetary policy, or the transition from the high inflation of the 1970s. The coming decades may witness a far better performance of fixed income assets relative to that of equity, although the historical analysis in this paper suggests that stocks are still the asset of choice for long-term accumulation.

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FIGURE 1.

TOTAL RETURN INDICES

CURFIG2 FIG1

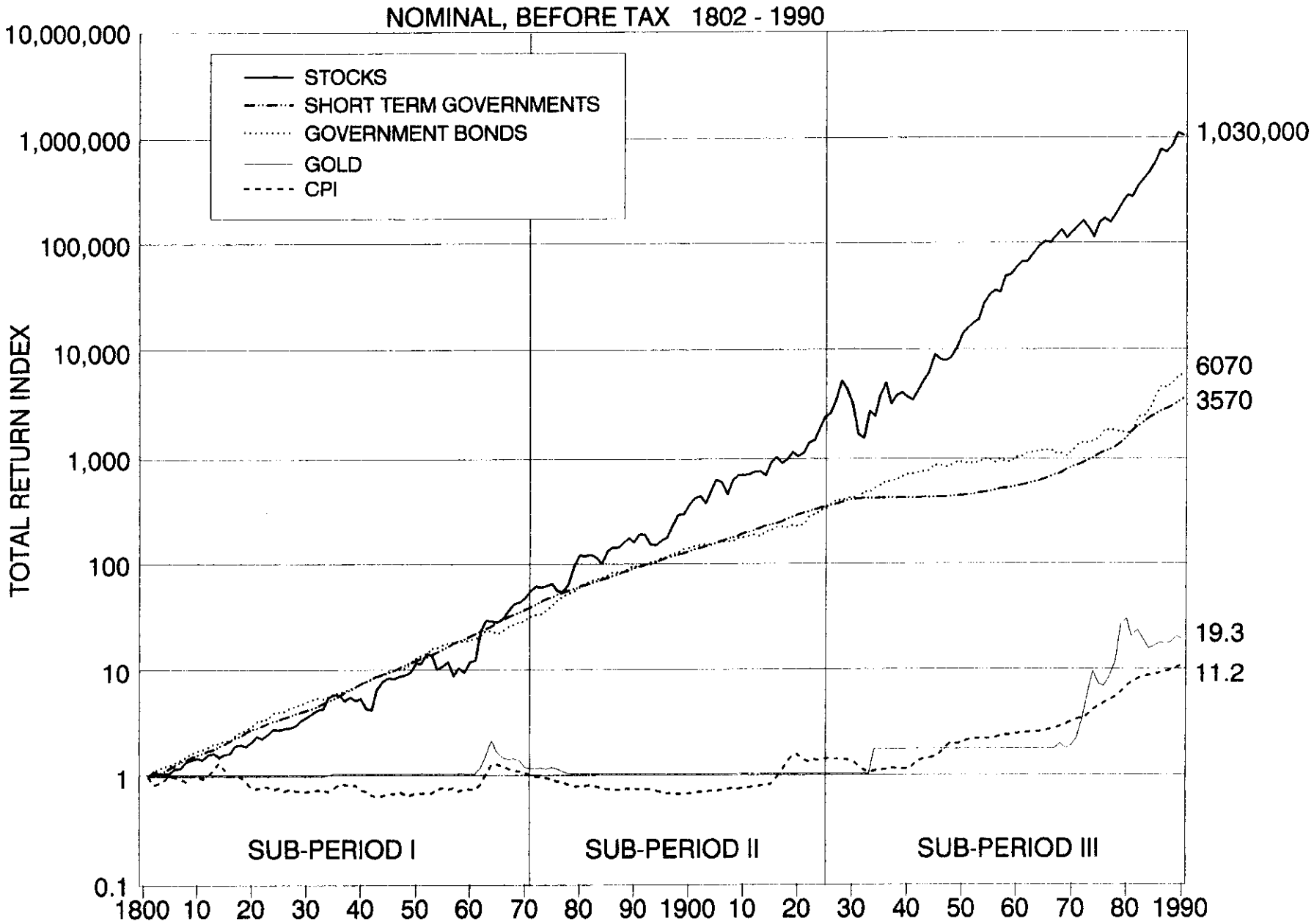

FIGURE 2.

PRICE INDICES

1800 - 1990

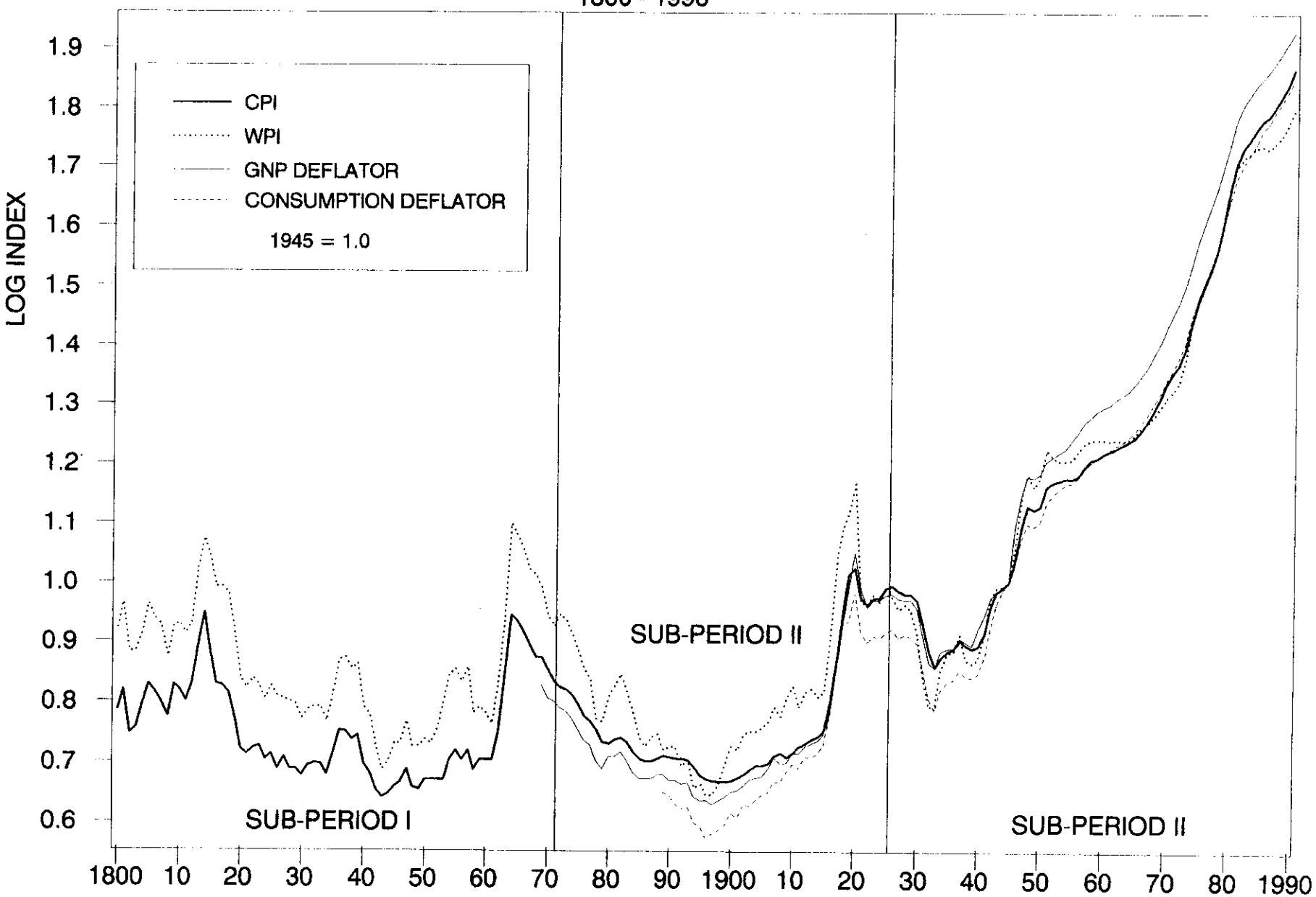

FIGURE 3.

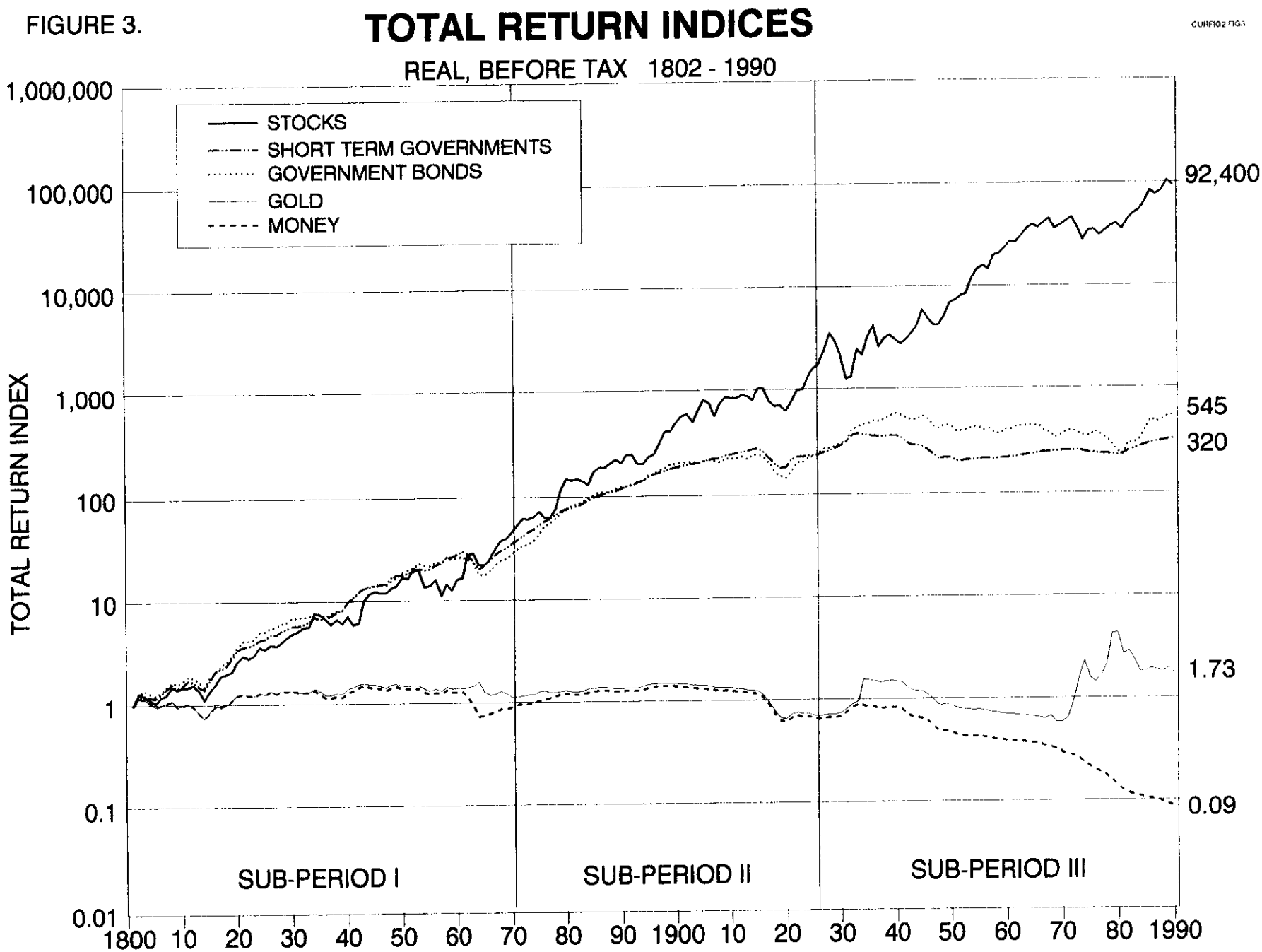
TOTAL RETURN INDICES
REAL, BEFORE TAX 1802 - 1990
CURFIG2 FIG1
STOCKS
SHORT TERM GOVERNMENTS
GOVERNMENT BONDS
GOLD
MONEY
TOTAL RETURN INDEX
1,000,000
100,000
10,000
1,000
100
10
1
0.1
0.01
92,400
545
320
1.73
0.09
SUB-PERIOD I
SUB-PERIOD II
SUB-PERIOD III
1800 10 20 30 40 50 60 70 80 90 1900 10 20 30 40 50 60 70 80 1990

FIGURE 4.

TOTAL RETURN INDICES

CURFIG2.FIG4

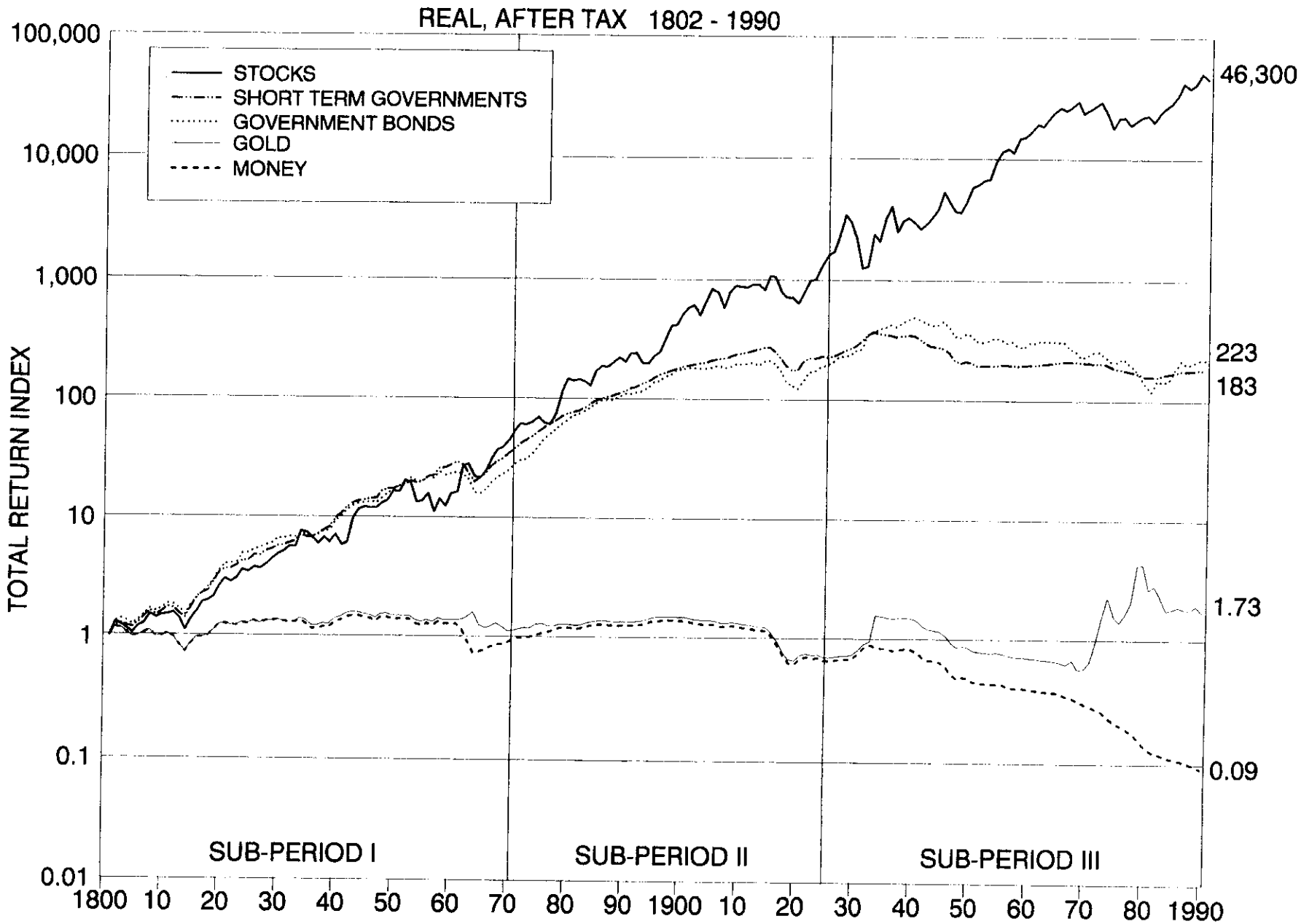

FIGURE 5.

REAL RETURNS - STOCKS AND BONDS

PRESCOT2 L12G

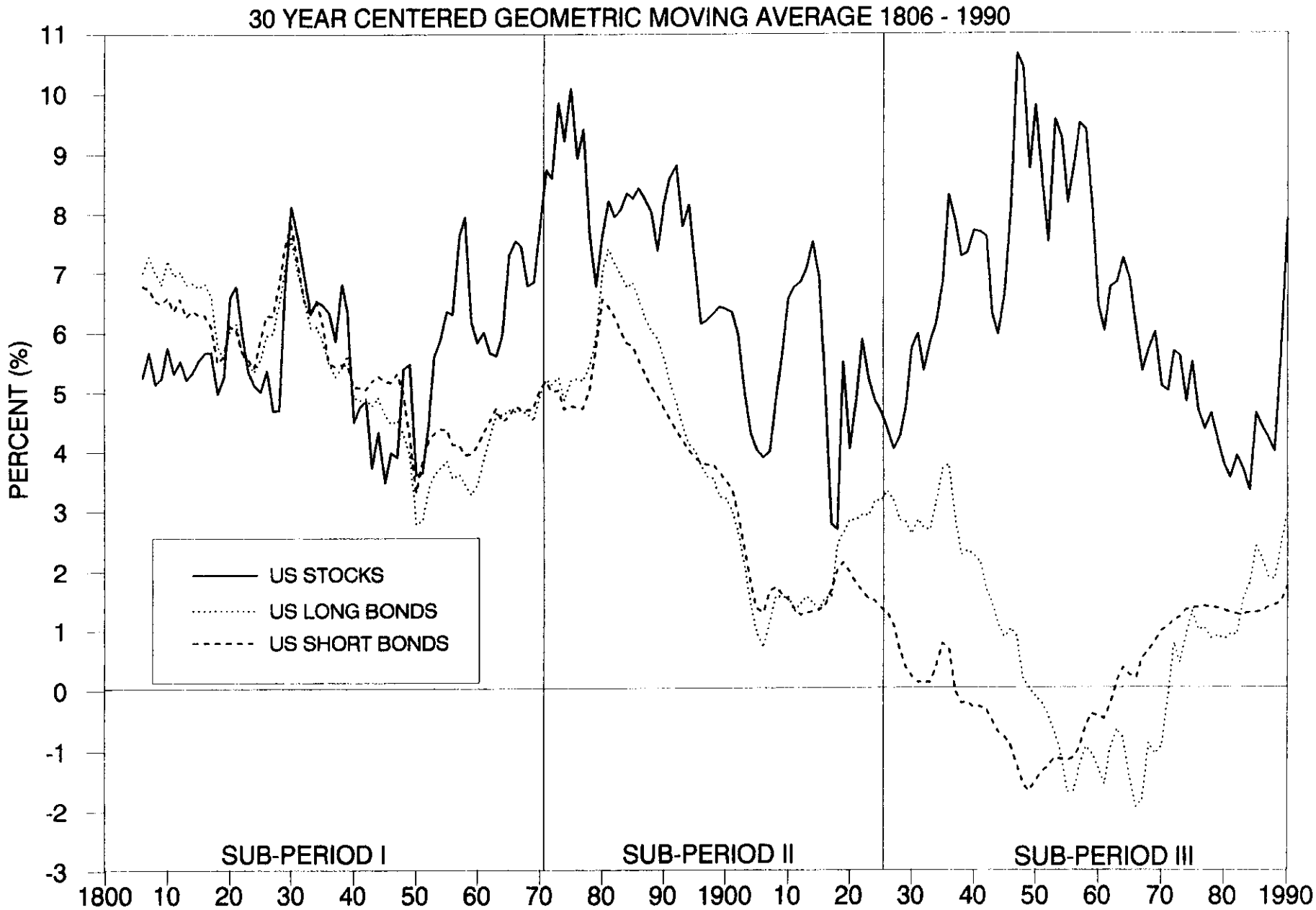

FIGURE 6.

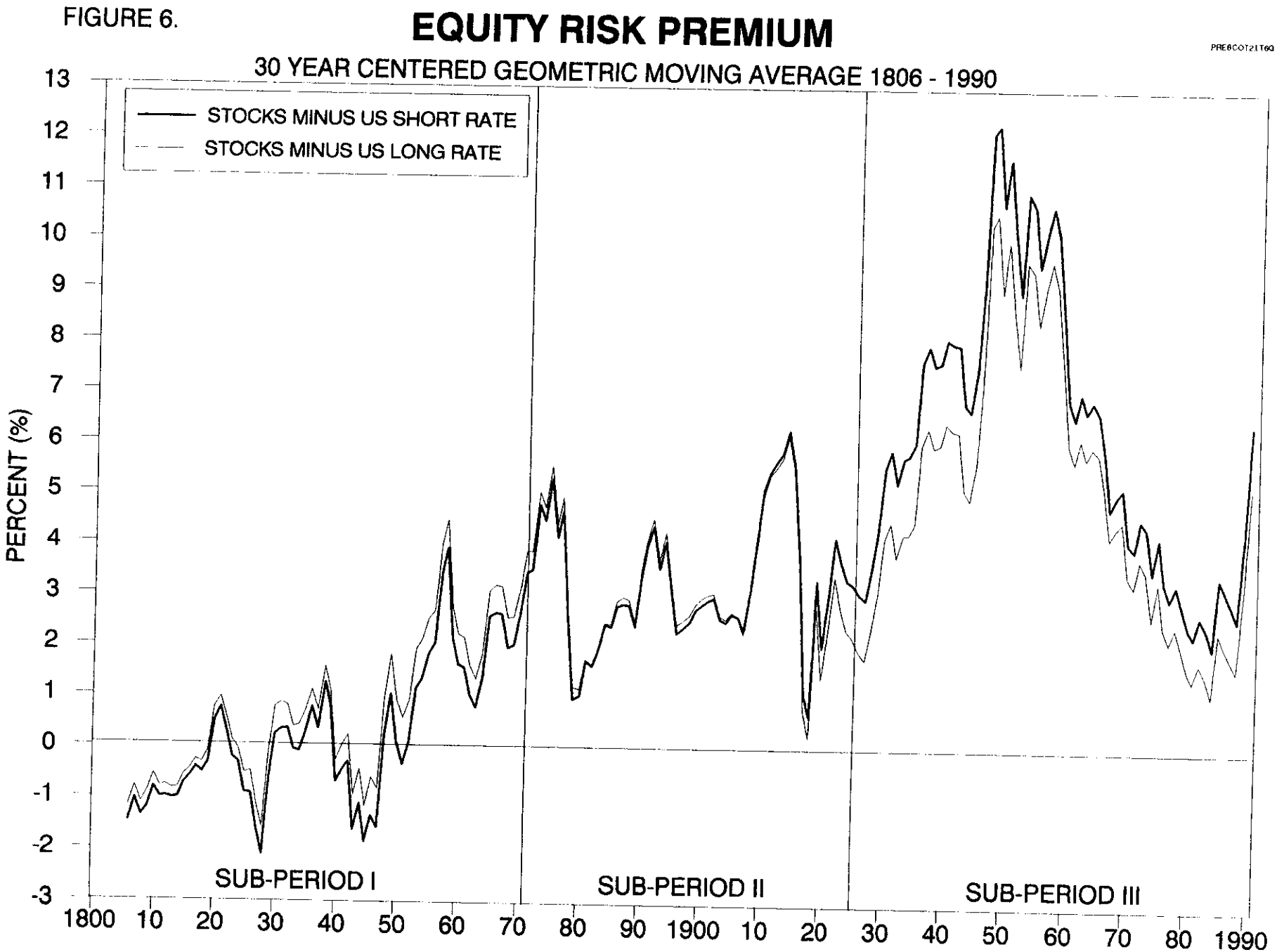
EQUITY RISK PREMIUM
PRE6COT21T6Q
30 YEAR CENTERED GEOMETRIC MOVING AVERAGE 1806 - 1990
STOCKS MINUS US SHORT RATE
STOCKS MINUS US LONG RATE
PERCENT (%)
13
12
11
10
9
8
7
6
5
4
3
2
1
0
-1
-2
-3
SUB-PERIOD I
SUB-PERIOD II
SUB-PERIOD III
1800
10
20
30
40
50
60
70
80
90
1900
10
20
30
40
50
60
70
80
1990

TABLE 1

STOCK MARKET RETURNS (%)

(STANDARD DEVIATIONS IN PARENTHESES)

	TOTAL NOMINAL RETURN %		TOTAL REAL RETURN %		NOMINAL CAPITAL APPRECIATION %		REAL CAPITAL APPRECIATION %		DIVIDEND INCOME %	AVERAGE TAX RATE %	TOTAL REAL AFTER TAX RETURN %	
	A	G	A	G	A	G	A	G	A	A	A	G
PERIOD												
1802-1990	9.0	7.6	7.8	6.2	4.1	2.6	2.9	1.3	5.0	6.8	7.4	5.8
	(17.7)		(18.5)		(17.4)		(18.1)		(1.0)		(18.3)	
1871-1990	10.3	8.7	8.3	6.6	5.4	3.7	3.5	1.7	4.9	10.8	7.7	6.0
	(18.8)		(19.4)		(18.3)		(19.0)		(1.3)		(19.1)	
MAJOR SUB-PERIODS												
I 1802-1870	6.8	5.8	6.9	5.7	1.8	0.7	1.9	0.6	5.0	0.0	6.9	5.7
	(15.4)		(16.6)		(15.4)		(16.5)		(0.0)		(16.6)	
II 1871-1925	8.5	7.4	8.0	6.8	3.4	2.3	3.0	1.7	5.0	0.7	8.0	6.7
	(15.3)		(16.5)		(15.2)		(16.4)		(1.0)		(16.4)	
III 1926-1990	11.9	9.8	8.6	6.4	7.1	5.0	3.9	1.8	4.8	19.3	7.4	5.3
	(21.1)		(21.7)		(20.4)		(20.9)		(1.4)		(21.2)	
POST-WAR PERIODS												
1946-1990	12.0	11.1	7.4	6.3	7.4	6.5	2.9	1.9	4.6	24.4	5.9	4.9
	(14.6)		(15.2)		(13.8)		(14.5)		(1.4)		(14.5)	
1966-1981	7.3	6.2	0.4	-0.6	3.1	2.1	-3.5	-4.4	4.2	26.4	-0.8	-1.7
	(15.1)		(13.9)		(14.3)		(13.3)		(1.3)		(13.0)	
1966-1990	10.7	9.6	4.6	3.5	6.3	5.3	0.5	-0.5	4.3	25.9	3.2	2.2
	(15.1)		(14.7)		(14.4)		(14.1)		(1.2)		(13.8)	
1982-1990	16.7	15.9	12.0	11.2	12.1	11.3	7.6	6.9	4.6	25.1	10.3	9.6
	(13.1)		(13.0)		(12.7)		(12.6)		(1.0)		(12.3)	

A = Arithmetic mean
G = Geometric mean

TABLE 2
FIXED INCOME RETURNS (%)

(STANDARD DEVIATIONS IN PARENTHESES)

	LONG TERM GOVERNMENTS							SHORT TERM GOVERNMENTS				
	COUPON	NOMINAL RETURN		REAL RETURN		REAL, AFTER TAX RETURN		RATE	REAL RETURN		REAL, AFTER TAX RETURN	
	A	A	G	A	G	A	G	A	A	G	A	G
PERIOD												
1802-1990	4.7	4.9	4.7	3.7	3.4	3.2	2.9	4.4	3.3	3.1	2.9	2.8
	(1.8)	(5.7)		(8.6)		(8.4)		(2.3)	(6.2)		(6.2)	
1871-1990	4.5	4.7	4.5	2.9	2.5	2.2	1.8	3.9	2.0	1.9	1.5	1.4
	(2.3)	(6.7)		(8.5)		(8.2)		(2.5)	(4.7)		(4.8)	
MAJOR SUB-PERIODS												
I 1802-1870	4.9	5.1	5.0	5.3	4.9	5.1	4.8	5.4	5.6	4.7	5.3	4.7
	(0.4)	(3.5)		(8.6)		(8.5)		(1.2)	(7.8)		(7.5)	
II 1871-1925	4.0	4.6	4.5	4.1	3.9	4.0	3.8	4.1	3.6	3.5	3.6	3.5
	(0.6)	(3.7)		(6.9)		(6.8)		(0.7)	(4.9)		(4.9)	
III 1926-1990	5.0	4.9	4.6	1.8	1.4	0.6	0.2	3.7	0.6	0.5	-0.3	-0.3
	(2.9)	(8.4)		(9.5)		(8.9)		(3.3)	(4.0)		(4.0)	
POST-WAR PERIODS												
1946-1990	5.9	4.9	4.5	0.4	0.0	-1.2	-1.6	4.9	0.4	0.3	-0.8	-0.9
	(3.1)	(9.6)		(9.9)		(8.9)		(3.3)	(3.3)		(3.0)	
1966-1981	7.2	2.8	2.5	-3.8	-4.0	-5.5	-5.7	6.9	0.0	0.0	-1.7	-1.7
	(1.8)	(6.9)		(7.4)		(7.1)		(2.9)	(1.7)		(1.8)	
1966-1990	8.2	7.4	6.8	1.5	0.9	-0.8	-1.4	7.2	1.3	1.2	-0.5	-0.6
	(2.3)	(11.5)		(11.9)		(10.6)		(2.5)	(2.3)		(2.2)	
1982-1990	10.0	15.7	14.9	11.0	10.3	7.5	7.0	7.9	3.5	3.5	1.6	1.6
	(1.8)	(13.2)		(12.5)		(10.8)		(1.6)	(1.4)		(1.1)	

A = Arithmetic mean
G = Geometric mean

TABLE 3
ECONOMIC VARIABLES (%)

(STANDARD DEVIATIONS IN PARENTHESES)

	PRICES							*OUTPUT*				*S&P500 (PER SHARE)*			
	CPI		WPI		GNP DEFLATOR		GOLD	REAL GNP		INDUSTRIAL PRODUCTION		REAL EARNINGS		REAL DIVIDENDS	
	A	G	A	G	A	G	A	A	G	A	G	A	G	A	G
PERIOD															
1802-1990	1.5	1.3	1.4	1.0	--	--	2.3	--	--	--	--	--	--	--	--
	(6.0)		(9.0)				(14.8)								
1871-1990	2.1	2.0	2.0	1.6	2.3	2.2	3.3	3.5	3.3	5.5	4.0	6.0	3.0	3.9	3.1
	(4.9)		(8.1)		(5.3)		(17.7)	(5.6)		(17.7)		(25.7)		(12.8)	
MAJOR SUB-PERIODS															
I 1802-1870	0.4	0.1	0.4	-0.1	--	--	0.5	--	--	--	--	--	--	--	--
	(7.5)		(10.3)				(7.0)								
II 1871-1925	0.7	0.6	0.7	0.2	0.9	0.7	-0.2	3.8	3.7	5.6	4.1	6.5	2.1	2.5	1.6
	(5.1)		(9.6)		(5.5)		(1.2)	(4.9)		(18.2)		(31.9)		(13.4)	
III 1926-1990	3.2	3.1	3.1	2.9	3.5	3.4	6.2	3.2	3.0	5.4	4.0	5.6	3.7	5.2	4.4
	(4.5)		(6.4)		(4.7)		(23.6)	(6.1)		(17.4)		(19.2)		(12.1)	
POST-WAR PERIODS															
1946-1990	4.6	4.5	4.3	4.1	4.9	4.9	7.4	2.6	2.5	3.7	3.5	7.1	6.1	6.4	6.2
	(3.6)		(5.3)		(4.0)		(26.5)	(4.3)		(6.1)		(14.9)		(5.9)	
1966-1981	6.9	6.8	6.8	6.7	6.6	6.6	22.0	2.8	2.8	3.4	3.3	7.6	7.0	5.8	5.7
	(3.2)		(4.2)		(2.1)		(39.2)	(2.3)		(5.1)		(10.8)		(4.5)	
1966-1990	5.9	5.9	5.2	5.2	5.6	5.6	13.4	2.8	2.8	3.2	3.1	4.7	3.9	5.4	5.3
	(3.0)		(4.1)		(2.2)		(34.4)	(2.3)		(4.9)		(12.7)		(3.7)	
1982-1990	4.2	4.2	2.5	2.5	3.9	3.9	-2.0	2.8	2.8	2.8	2.7	(0.3)	(1.4)	4.6	4.6
	(1.3)		(2.1)		(1.0)		(13.4)	(2.4)		(4.6)		(14.3)		(1.5)	

A = Arithmetic mean
G = Geometric mean

TABLE 4

HOLDING PERIOD RETURN COMPARISONS FOR STOCKS, LONG BONDS AND SHORT BONDS

HOLDING PERIOD	TIME PERIOD	STOCK RETURN > LONG BOND	STOCK RETURN > SHORT BOND	LONG BOND RETURN > SHORT BOND
1 YEAR	1802–1871	57.1%	51.4%	44.3%
	1872–1925	61.4%	60.2%	57.8%
	1926–1990	58.3%	72.2%	41.7%
	1802–1990	59.3%	59.3%	49.7%
	1872–1990	60.5%	63.9%	52.9%
2 YEARS	1802–1871	53.6%	49.3%	42.0%
	1872–1925	67.5%	65.1%	61.4%
	1926–1990	77.8%	66.7%	44.4%
	1802–1990	64.4%	59.6%	51.1%
	1872–1990	70.6%	65.5%	56.3%
5 YEARS	1802–1871	48.5%	50.0%	42.4%
	1872–1925	72.3%	72.3%	67.5%
	1926–1990	80.6%	80.6%	38.9%
	1802–1990	65.4%	65.9%	53.0%
	1872–1990	74.8%	74.8%	58.8%
10 YEARS	1802–1871	47.5%	44.3%	42.6%
	1872–1925	79.5%	86.7%	69.9%
	1926–1990	91.7%	80.6%	22.2%
	1802–1990	71.1%	71.1%	51.1%
	1872–1990	83.2%	84.9%	55.5%
20 YEARS	1802–1871	54.9%	52.9%	33.3%
	1872–1925	94.0%	100.0%	67.5%
	1926–1990	100.0%	100.0%	36.1%
	1802–1990	83.5%	85.9%	50.6%
	1872–1990	95.8%	100.0%	58.0%
30 YEARS	1802–1871	56.1%	51.2%	17.1%
	1872–1925	100.0%	100.0%	68.7%
	1926–1990	100.0%	100.0%	38.9%
	1802–1990	88.8%	87.5%	48.8%
	1872–1990	100.0%	100.0%	59.7%