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# How Long Is a Long-Term Investment?

*By Pu Shen*

Conventional wisdom tells us that stocks tend to outperform government bonds in the long term. That is, if stocks are held long enough, they are usually better investments because their total return is likely to be higher than the return on bonds. While this view may be correct in principle, in practice a crucial question remains: How long is long enough?

The answer is important to every investor, not just the wealthy few. With employers relying increasingly on defined-contribution retirement plans, employees must make their own saving and investment decisions. This article reviews historical patterns to show investors how the riskiness of stocks and bonds can change as an investor's holding period lengthens.

The first section of the article explains why stocks are generally considered riskier than government bonds and thus, on average, should pay higher rates of return to attract investors. It then shows why stocks, with their higher average rates of return, tend to perform better over *sufficiently long* holding periods. The second section examines the historical patterns of stock and bond returns in the

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United States. It shows that *sufficiently long* has been very long relative to most people's holding periods. The third section examines various holding periods in detail. It finds that, for many investors whose holding periods were not sufficiently long, risks for both stocks and bonds were quite high. The article concludes that, historically, longer holding periods may have reduced the riskiness of stock investments but not bond investments. Further, for most individual investors, feasible holding periods have seldom been long enough to take full advantage of long-term stock investments.

## I. STOCKS VS. BONDS

Stocks are usually considered riskier than government bonds. Thus, to be attractive to investors, they must yield higher average returns. Because of their higher average returns, stocks held for very long periods are likely to outperform bonds held for the same length of time.

### *The risks of holding stocks*

Owning a stock confers a partial ownership of a private corporation. As a result, the returns on the stock are subject to various business risks. For example, if a corporation goes bankrupt, its stock typically becomes worthless and stock investors lose their entire investment in the company. While the frequency of publicly traded corporations going bankrupt is not high in the United States, bankruptcies still happen regularly.

Government bonds, in contrast, are essentially a loan to the federal government. The interest payments on the bond and the return of the principal when the bond matures are backed by government tax receipts. Because the U.S. Treasury has always honored its debt obligations, most investors consider government bonds to be free of default risk.

It is well known that diversification can greatly reduce the risk associated with holding individual stocks. For most investors, the simplest and least costly way to diversify the risks specific to individual stocks is to invest in an index of the stock market. Because the focus of this article is to compare the risks of stocks as a whole class relative to

government bonds, “stocks” in this article will always refer to an index of the whole stock market.<sup>1</sup> Similarly, because the discussion focuses on long-term investments, and long-term government bonds are more natural to hold than short-term ones for long-term investments, “bonds” will always refer to a representative portfolio of long-term government bonds.<sup>2</sup>

Even a well-diversified index of the whole stock market is subject to business risks. Many of these risks are interrelated and therefore cannot be totally avoided by diversification. For example, when the overall economy is in recession, profits of most of the companies in the economy tend to suffer, causing aggregate earnings to decline. As a result, the short-term price fluctuations for stocks—even for an index of the entire stock market—are typically much greater than the short-term price fluctuations for bonds. From 1871 to 2001, the standard deviation of annual returns for the stock market index averaged 18.3 percent, while the standard deviation for long-term government bonds averaged only 7.5 percent (Siegel).

### *The equity risk premium*

As investors generally dislike risk, they will hold riskier assets only if they are compensated with higher expected rates of return. Thus, if both stocks and bonds are expected to provide the same average returns, investors will be willing to hold only bonds. To be attractive to investors, stocks must be cheaper and thus carry higher expected returns. The additional return is often called the equity risk premium. This premium compensates investors for bearing the additional risk of investing in stocks.<sup>3</sup>

Historical experience confirms that the equity risk premium in U.S. stock returns has been sizable. For example, from 1926 to 2002, the total compound annual rate of return of an index of all U.S. stocks (dividends included) averaged 9.7 percent. Long-term government bonds averaged only 5.5 percent.<sup>4</sup> Thus, the average equity risk premium from 1926 to 2002 was about 4.2 percent.<sup>5</sup> The high historical equity risk premium provides empirical confirmation that investors generally dislike risks.

### *The effect of holding period length*

During the past two decades, many analysts have cited the historical empirical regularity of investment returns as evidence that stocks become less risky the longer investors hold them. In fact, the risks of stocks and bonds have evolved differently as the holding period lengthened: The risks of stocks have tended to decline faster than those of bonds.

*Exposure to business cycle fluctuations.* In the short term, many factors influence the returns on stocks and bonds. One common fundamental short-term risk for both stocks and bonds is business cycle fluctuations. In an economic downturn, GDP growth slows and business earnings decline, which tend to lead to less optimistic outlooks for companies and thus lower stock prices and returns. Government bonds, on the other hand, tend to do better when the economy slows. Interest rates tend to be lower in such an environment, boosting returns on existing bonds. In an economic expansion, the reverse tends to happen.

As investor holding periods lengthen, however, short-term risks tend to become less relevant, partly because many short-term price movements tend to offset each other over a complete business cycle. In particular, if the holding period is longer than one or two decades, the risks associated with business cycle fluctuations tend to even out because the average U.S. business cycle lasts about eight years.

*Exposure to long-term risks.* Over the long term, the risks of stocks and bonds tend to have less in common. For government bonds, two of the most fundamental long-term risks are changes in long-term inflation trends and the government budget.<sup>6</sup>

Inflation is a significant long-term risk for bond investors as it reduces the return on bonds in two respects. First, when inflation increases unexpectedly, it reduces the real return for investors' bond portfolios because the nominal coupon rates on the bonds are fixed.<sup>7</sup> Second, if increased inflation is accompanied by higher expected rates of inflation in the future, it is likely to increase the required nominal interest rate on new long-term bonds. This, in turn, depresses the prices of currently held bonds and causes capital losses in investors' existing bond holdings.

The government's fiscal position is also an important long-term risk for bonds because persistent increases in government budget deficits imply persistently higher future borrowing by the government. Everything else equal, a persistent increase in the deficit leads to higher interest rates on new government bonds, reducing the prices of existing bonds and creating capital losses for investors.

For stocks, in contrast, the most fundamental long-term risk is likely to be uncertainty about the trend growth rate of productivity for the overall economy. In the long term, one of the most important fundamental determinants of stock prices is corporate earnings. Corporate earnings are returns to capital. Therefore, earnings should grow at the same rate as the productivity of capital, which in the long run tends to track economywide productivity.<sup>8</sup>

Increases in inflation and government budget deficits are likely to lead to a more difficult and challenging economic environment for companies in the short term. Still, the long-term trend growth rate of earnings may not be affected. In other words, while firms' profits may be lowered in the short term by higher production costs due to higher inflation and interest rates, over time businesses can often channel the higher cost of production to consumers. Therefore, in the long term, higher inflation and government budget deficits affect stock returns only indirectly, mainly through their impact on trend productivity growth. If the trend growth rate of productivity is lowered by higher inflation and government budget deficits, then long-term stock returns are also likely to fall.

Analysts can measure the impact of higher inflation or government deficits on trend productivity growth in many different ways. Generally, the size of the impact tends to be secondary, compared to bond returns. For example, an unexpected, persistent one-percentage-point increase in the annual inflation rate will immediately cut the real annual return of an existing 20-year bond by a full percentage point.<sup>9</sup> In comparison, such an increase in inflation may not measurably affect trend productivity growth.

In short, both stocks and bonds are exposed in the short term to the risks of business cycle fluctuations. But bonds may be more susceptible than stocks to the long-term risks of higher inflation or greater fiscal deficits.

*Stocks vs. bonds as the holding period lengthens.* Theoretically, as an investor's holding period lengthens, the ups and downs in short-term stock returns will likely offset each other. Thus, for investors who can lock away their stock investment for very long periods, the risks of their stock portfolios should be smaller than those for short-term investors.

There is some empirical evidence that in the long run risks to stocks tend to diminish more rapidly than risks to bonds. One measure of an asset's risk is its standard deviation. Technically, the standard deviation is the average square root of the deviations of the annualized rates of return of the asset from its historical average. In other words, the standard deviation measures, on average, the amount an actual return deviates from the average return.<sup>10</sup> From 1926 to 2002, the standard deviation of the total return of the stock market index was 21.8 percent for holding periods of one year—but just 5.3 percent for holding periods of ten years.<sup>11</sup> In contrast, for a portfolio of long-term government bonds, the standard deviation of the total return was 9.0 percent for one-year holding periods and 4.0 percent for ten-year holding periods.<sup>12</sup>

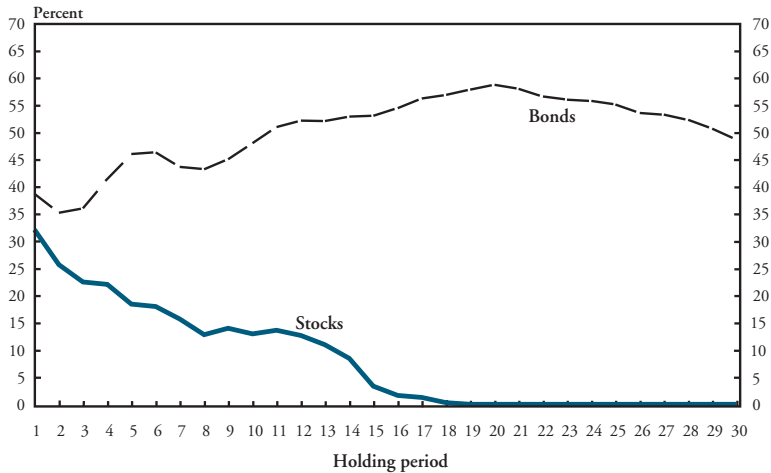
## **II. THE HISTORICAL PERFORMANCE OF STOCKS AND BONDS**

History confirms that stocks have tended to outperform bonds over sufficiently long holding periods. First, the frequency of returns beating inflation has increased faster for stocks than for bonds with increases in the holding period. Second, the frequency of stocks outperforming bonds has increased significantly for investors with long holding periods.

### *The real returns of stocks and bonds*

One common way to judge the performance of stocks and bonds is to compare each to inflation. That is, instead of focusing on the nominal returns of stocks and bonds, examine the real returns. The real return of an investment is the cumulative nominal return for the period, minus cumulative inflation. If the real return on an investment

Chart 1

FREQUENCY OF NEGATIVE REAL RETURNS  
FOR STOCKS AND BONDS*One-time investment strategy, by holding period*

Source: Author's calculations

is positive for a period, then investors gain purchasing power. If the real return is negative, the money they get at the end of the period buys less than the money originally put into the investment.

Chart 1 shows the historical frequency of stocks and bonds with cumulative real returns that were negative over holding periods from one year to 30 years. The chart assumes that a one-time investment is made at the beginning of a holding period. The cumulative real returns are the total cumulative nominal returns minus cumulative inflation based on the CPI (Consumer Price Index for All Urban Consumers). The sample period runs from the beginning of 1926 to the end of 2002.

For each holding period there are two types of hypothetical portfolios. In the stock portfolio, \$1 is invested at the beginning month of the sample period. During the holding period, the investment grows the same as the rate of the total return for the Center for Research in Security Prices Index, an index for the entire U.S. stock market. The total return includes all dividend payments, which are reinvested in the index at the market prices at the time of the payment.

The bond portfolio assumes an investment of \$1 in the beginning month of the period, and the investment grows the same as the rate of the total return recorded by the Ibbotson 2003 yearbook. Total returns are calculated using a representative portfolio of rolling 20-year government bonds. At the beginning of the period, \$1 of a representative 20-year bond is purchased at the market price. At the end of each month, the bond is sold at the current market price and the total proceeds (including coupon payments) are used to buy a new representative 20-year bond. This way, the bond portfolio always has a maturity of roughly 20 years.

For each portfolio, at the end of the holding period, the cumulative inflation rate is subtracted from the final cumulative returns on each investment. This exercise is repeated at each feasible month of the sample for each length of holding period. Then the historical frequency of negative real returns of stocks and bonds is recorded. The solid line in the chart shows this historical frequency for the stock portfolio for each length of the holding period, while the dashed line shows the frequency for the bond portfolio.

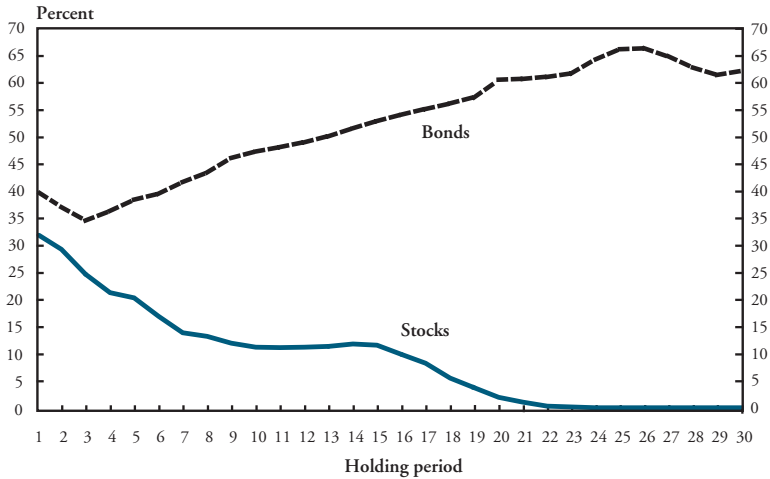
As the chart indicates, in this exercise the frequency of stocks returning less than inflation decreased as the holding period lengthened—and eventually reached zero for periods of at least 19 years. That is, from January 1926 through December 2002, when holding periods were 19 years or longer, the cumulative real return on stocks was never negative. For shorter holding periods, real returns were negative some fraction of the time.

The chart also shows that the frequency of bonds returning less than inflation initially *increased* as the holding period lengthened. Historically, when the holding period was two years, bonds returned less than inflation about 35 percent of the time. When the holding period rose to 20 years, returns on bonds failed to keep pace with inflation almost 60 percent of the time. As the holding period further lengthened from 20 years to 30 years, the frequency of bonds returning less than inflation decreased gradually to about 50 percent.

In reality, investors typically do not invest all their money at the beginning of a holding period. Rather, they are likely to gradually add to their portfolios during their working years until retirement. This strategy of repeated investment may produce different results from the



Chart 2

FREQUENCY OF NEGATIVE REAL RETURNS  
FOR STOCKS AND BONDS*Repeated-investment strategy, by holding period*

Source: Author's calculations

one-time investment strategy discussed above for two reasons. First, as investors gradually add money to their portfolios, the additional stocks or bonds may be bought at prices that are different from the initial purchase price. This difference tends to reduce the variability of the average purchase price for the portfolio—an effect called time diversification—which tends to reduce the total risk to the portfolio's returns.<sup>13</sup> Second, money added to the portfolio is held for shorter periods, which tends to make returns more volatile.<sup>14</sup>

These two factors work in opposite directions. Thus, it is not possible to infer the performance of the repeated-investment strategy from the performance of the one-time investment strategy.

Chart 2 shows the frequency of negative real returns for hypothetical stock and bond portfolios that use the repeated-investment strategy. The portfolios initially have \$1. An additional dollar is added at the beginning of each month. And the whole portfolio is liquidated at the end of the holding period.<sup>15</sup> To calculate the real returns of the portfolios, an “inflation portfolio” is constructed with \$1 as an initial investment and returns matching the rate of

inflation. An additional dollar is added at the beginning of each subsequent month, and it also grows with inflation. At the end of the holding period, the final value of this inflation portfolio is subtracted from the value of stock and bond portfolios. The frequency of the negative difference is shown in the chart.

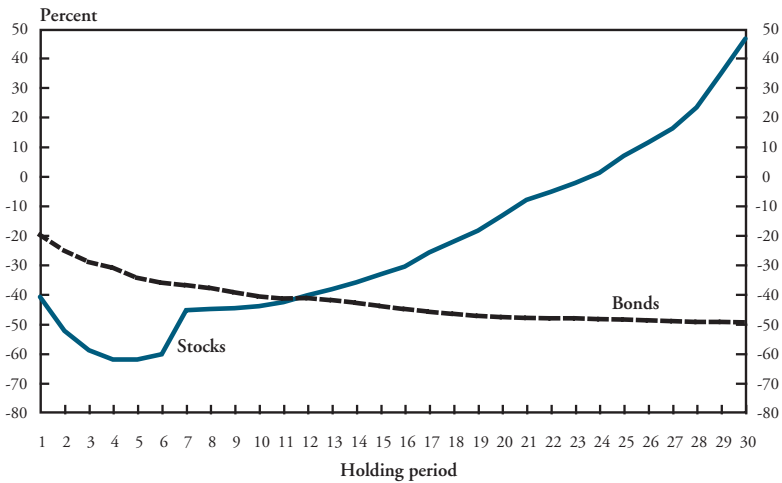
In this exercise, as the holding period lengthened, the risk of negative real returns for both stocks and bonds declined more slowly with the repeated-investment strategy than with a one-time investment strategy. With repeated investments, an investor needed a holding period at least of 24 years to guarantee a positive real return on stock investments. The frequency of negative real returns for the bond portfolio increased with the length of holding period for 26 years or less. For holding periods longer than 26 years, the frequency of negative real returns declined slightly as the holding period lengthened, but the frequency remained as high as 62 percent for 30 years. Therefore, historically speaking, in terms of preserving purchasing power, stocks were less risky than bonds for investors with holding periods of at least 24 years. For investors with holding periods of less than 24 years, it was difficult to determine whether stocks or bonds were riskier. For example, for an investor with a holding period of 15 years, the negative real return on stocks could have been larger than on bonds, even though the frequency of negative real returns for stocks was lower.

Chart 3 shows the worst performances historically for the real returns of stocks and bonds for different holding periods. Because most investors use the repeated-investment strategy, the rest of this article discusses only that strategy.

The worst case is chosen as follows. For each holding period and each portfolio, the ratio of the real return of the portfolio to the inflation portfolio is calculated. For each given length of holding period, the most negative ratio is chosen. If all the real returns are positive, which was the case for stock portfolios with holding periods of at least 24 years, the smallest ratio is chosen.<sup>16</sup> The chart shows that for holding periods of more than 12 years, the worst performances by stocks were better than the worst performances by bonds. Together, Charts 2 and 3 suggest that for holding periods of 12 years or more, the inflation risk to stock returns has historically tended to be smaller than the inflation risk to bond returns.

Chart 3

## WORST REAL RETURN FOR STOCKS AND BONDS

*Repeated-investment strategy, by holding period*

Source: Author's calculations

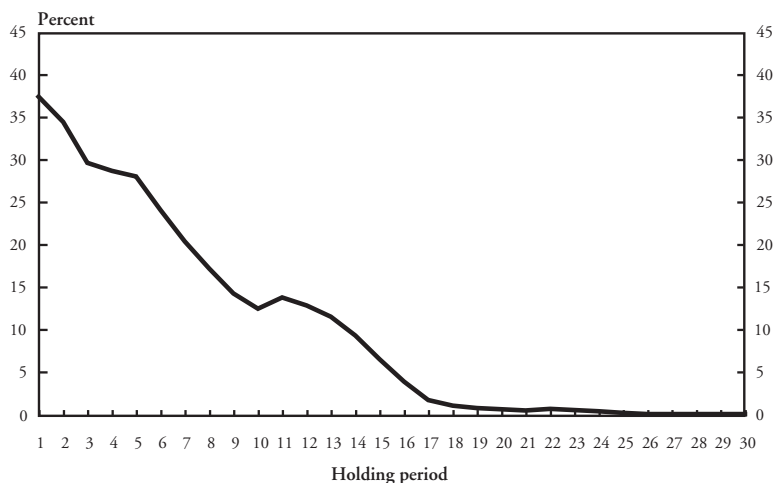
*The relative performance of stocks and bonds*

For most investors, just beating inflation is not enough—they want substantial growth. For these investors, another way to judge the relative riskiness of stocks and bonds is to compare performance more directly. Chart 4 shows the historical frequency of stocks underperforming bonds for holding periods of one to 30 years. Again, two hypothetical portfolios are created using historical data from 1926 through 2002—one for stocks and one for bonds. At the end of a given holding period, the final cumulative values of the two portfolios are compared.

For a holding period of one year, stocks historically have underperformed bonds 37 percent of the time. The frequency of stocks underperforming bonds has decreased as the holding period has grown. When a holding period was at least 26 years, stocks never underperformed bonds.<sup>17</sup> In other words, historically, stocks have been less risky than bonds for investors with holding periods of at least 26 years.<sup>18</sup>

Chart 4

## FREQUENCY OF STOCKS UNDERPERFORMING BONDS

*Repeated-investment strategy, by holding period*

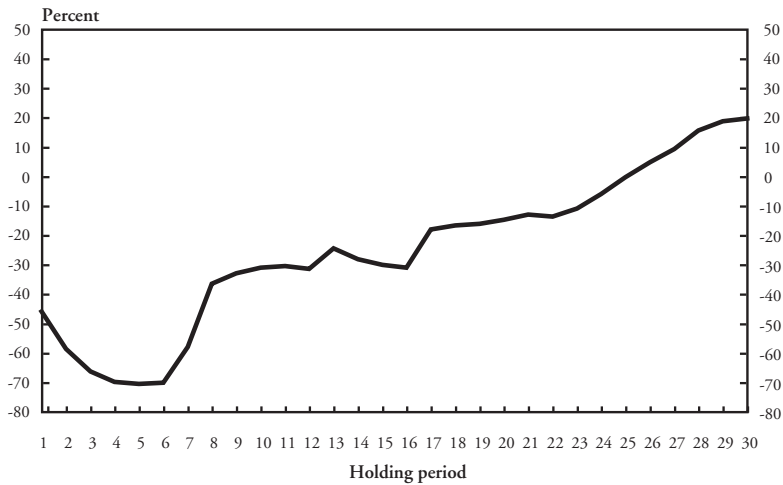
Source: Author's calculations

Focusing on the frequency of underperformance, however, tells only part of the story. If the degree of underperformance increases with the length of the holding period, stocks can still be viewed as riskier than bonds even though their frequency of underperforming bonds decreases (Bodie).

Chart 5 shows the historical worst performance of stocks relative to bonds. Performance is measured as the excess of the stock portfolio's final value relative to the bond portfolio's as a share of the bond portfolio's value. If for some starting months, the values of the stock portfolios are smaller than the values of the bond portfolios, this ratio will be negative. The most negative ratio is displayed in the chart. For holding periods of at least 26 years, the final values of all stock portfolios were larger than bond portfolios for all starting months. Thus, all the ratios were positive. In this case, the smallest ratio is displayed in the chart. It is clear from the chart that, at least historically, the magnitude of the underperformance indeed increased for holding periods of one to five years—but generally declined once holding

Chart 5

## WORST PERFORMANCE OF STOCKS RELATIVE TO BONDS

*Repeated-investment strategy, by holding period*

Source: Author's calculations

periods went beyond six years. Relative to bonds, stocks performed worst when held for five years. The value of the stock portfolio at the end of the five-year holding period was only about 30 percent of the final value of the bond portfolio. That is, in the worst case, the stock portfolio lost about 70 percent of its value relative to the bond portfolio. But for holding periods of more than 16 years, the worst relative underperformances were less than 20 percent.

It is clear that the relative riskiness of stocks depends crucially on how long investors can hold their portfolios without liquidating any portion of them. To take advantage of the diminishing risk of long-term stock investment, investors must make sure that they can continue their investment in stocks until the end of a sufficiently long holding period. For example, for a 30-year-old investor who thinks she may retire between the ages of 50 and 65, the applicable holding period for her 401(k) is only 20 years because she can only be sure that she will not need the money before the age of 50. Therefore, for this particular investor, the historical fact that stocks have always outperformed bonds if held for at least 26 years is of little help in her asset allocation decisions because her holding period is only 20 years.<sup>19</sup>

But how many investors know with certainty that they will not need to touch their stock investment for at least 26 years? The percentage may be quite small.<sup>20</sup> For example, even for investors of age 30, the holding periods for their 401(k)s may be much shorter than 26 years if they have, or expect to have, some health problems that may force them to retire early and tap their 401(k)s.<sup>21</sup>

In summary, historically, the risk of investing in stocks has declined faster than the risk of investing in bonds as the holding period increased substantially. In fact, long-term investors in U.S. stocks did very well provided they could invest in stocks continuously for at least 26 years. They not only enjoyed higher average returns than bond investors, which was expected, but they also had higher returns than bond investors 100 percent of the time—regardless of the month or year when they started the investment.

### **III. HISTORICAL EXPERIENCE FOR INVESTORS WITH SHORTER HORIZONS**

While the conventional wisdom is correct—that stocks historically have been a safer investment for long-term investors—the required holding periods are probably much longer than is practical for many investors. Moreover, in the future, the historical experience might not be repeated exactly. This section discusses why holding periods needed to ensure that stocks will outperform bonds might need to be even longer in the future. It also examines the experience of investors with shorter holding periods since 1926 and shows that, for some of these investors, both stocks and bonds have proved to be quite risky.

#### *Historical patterns vs. future performance*

As every investment prospectus states, past performance is no guarantee of future results. Historical frequencies may or may not be a good indication of future probabilities. The sample size of 77 years (1926-2002) is quite small given the length of the holding period required for stocks to outperform inflation or bonds 100 percent of the time.<sup>22</sup> It is quite possible that future return patterns may be somewhat

different from historical patterns. Therefore, the prudent practice may be to assume that future returns will be in a range that is similar to the past, but not necessarily exactly the same.

In other words, it may not be wise to believe that the required holding periods for stocks to outperform inflation 100 percent of the time in coming decades will be exactly as in the past—namely, 24 years. Instead, it may be better to assume that the required holding periods will be in a range around 24 years. For example, if the range is plus or minus five years, then in the future stocks may beat inflation 100 percent of the time for holding periods of as short as 19 years, or as long as 29 years. Similarly, for stocks to outperform bonds 100 percent of the time in the next half century, it may be more likely that a holding period of a minimum of 21 to 31 years is needed.<sup>23</sup>

Given that the historical pattern may not be repeated in the future and that the ideal holding periods are too long for many investors, it may be fruitful to examine the historical performance of stocks and bonds over selected holding periods. This section does so for holding horizons of ten years, 20 years, and 25 years. It also discusses how changes in inflation and the fiscal outlook, as well as a few special factors, might have affected past performance.

### *Holding periods of ten years*

For investors with holding periods of ten years, historically the real returns on stocks were positive about 89 percent of the time, compared to only 68 percent for holding periods of one year (Chart 2). While on average investors had an annualized real rate of return of 6.6 percent, the average masked some very poor performing periods. Stocks did not keep up with inflation after ten years 11 percent of the time. In the worst-case scenario, an investor could diligently add \$1 every month to the broad stock market index, reinvest all the dividends in the index for ten years, and end up with only 56 cents on the dollar, adjusted for inflation. In other words, in the worst case the cumulative real return was -44 percent.

While bonds are generally considered less risky over short horizons, they were no less risky compared to stocks at the ten-year horizon. Historically, bond investors with holding periods of ten years beat

inflation only 53 percent of the time, compared with 60 percent of the time for investors with holding periods of one year. Even though the average annualized real rate of return was 2.4 percent, nearly half of the time bond investors did not break even. In the worst-case scenario, bond investors lost a cumulative 41 percent for the ten-year period—nearly as much as the unluckiest stock investors.

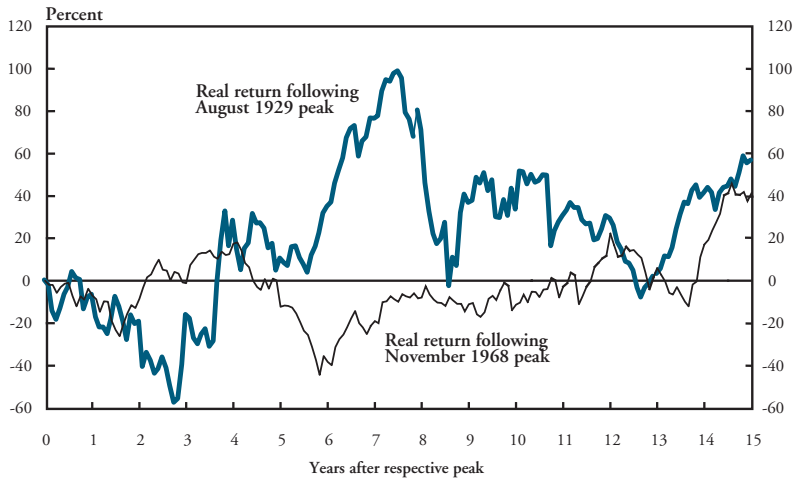
A direct comparison of stocks and bonds does not yield a clear winner, however. While stocks had a higher average rate of return than bonds, they could still underperform bonds over ten-year periods. In fact, historically, stocks offered lower returns than bonds roughly 12 percent of the time (Chart 4). In the worst case, the value of a stock portfolio was 31 percent less than a bond portfolio (Chart 5).

### *Holding periods of 20 years*

For investors with holding periods as long as 20 years, stocks were a bit less risky. After 20 years of repeated investment, stocks beat inflation about 98 percent of the time. Over the 2 percent of the time when the real return on stock investments was negative, the worst loss was a cumulative 13 percent. Bond investors, in contrast, were able to beat inflation only 40 percent of the time. Over the other 60 percent of the time, their real returns were negative, and the worst loss was 48 percent (Charts 2 and 3). For holding periods of 20 years, stocks historically outperformed bonds 99 percent of the time (Chart 4). Over the other 1 percent of the time, stock portfolios underperformed bonds, sometimes by as much as 15 percent (Chart 5).

To better gauge downside risk, it is useful to examine some actual episodes in which stocks and bonds performed poorly. For stock investors with holding periods of 20 years, the unluckiest period ended in late 1974. While the two-day drop of the stock market in 1929 may be the most famous crash of the U.S. market, the prolonged bear market in the early 1970s was likely more detrimental to stock investors. Chart 6 shows how much time it took stock portfolios to yield positive real returns after the market peak. The thick line represents the real returns from repeated investments starting in August 1929, the market peak before the crash. The thin line represents the real returns from repeated investments starting in November 1968, the



*Chart 6***CUMULATIVE REAL STOCK RETURNS FOLLOWING SEVERE DOWNTURNS***Repeated-investment strategy*

Source: Author's calculations

market peak before the prolonged bear market in the early 1970s. Somewhat surprisingly, the stock portfolio's return became positive after only four years following the 1929 crash, although it took almost 13 years to turn decisively positive. In contrast, after a short visit to the positive territory two years after the 1968 peak, the stock portfolio spent the next decade in negative returns. It took 14 years for the portfolio to yield decisively positive returns.

Worse than investing in stocks right before a market crash is liquidating stocks shortly after the crash. This situation faced investors whose holding periods ended in late 1974—the parents and grandparents of many of today's baby boomers. Take, for example, an investor who planned to retire in 1974 after investing \$100 in the stock market every month since the beginning of 1955. Even with all dividends reinvested, that 20-year portfolio had a total cumulative real return of -13 percent. In other words, by the end of 1974, the investor would have contributed a total of \$24,000 to the retirement account, but the entire portfolio could only purchase roughly an equivalent of \$20,900 of 1955's goods and services—not much of a nest egg.

For stock investors with holding periods a bit longer than 20 years, the worst time to withdraw was the summer of 1982. High inflation in the late 1970s and early 1980s eroded the real returns on stock investments. For example, for an investor who started steady investments in stocks in the summer of 1961 and withdrew in the summer of 1982, the real return for the 21-year period was -8 percent.

For bond investors, there were many episodes in which the nominal returns of portfolios were less than inflation even after a long holding period. But the unluckiest ones were those whose holding periods ended in early 1980s. In fact, for all holding periods longer than five years, the worst case was to withdraw during the fall of 1981. Following the persistent increase in inflation in the 1970s, investors started to require extraordinarily high interest rates on government bonds as compensation for inflation, inducing large capital losses on all existing bonds. So an investor who started investing in the fall of 1961 and added \$100 in long-term bonds every month had a cumulative real return by the fall of 1981 of -48 percent.

### *Holding periods of 25 years*

Stock investors with holding periods of 25 years typically were rewarded handsomely. Stocks always beat inflation over 25-year periods from 1926 to 2002, and they outperformed bonds 99.8 percent of the time (Charts 2 and 4). Bond investors, however, beat inflation only 34 percent of the time, and if their holding periods ended in the fall of 1981, they lost a cumulative 49 cents on every dollar they invested (Charts 2 and 3).

It is interesting that relative to bonds, the worst performances for stocks were observed most recently. For example, one of the rare cases in which stocks underperformed bonds, even for holding periods as long as 25 years, was the period that ended September 2002. At the end of this period, the value of the stock portfolio was about 0.3 percent less than that of the bond portfolio.<sup>24</sup> Stocks underperformed bonds because long-term bonds performed exceptionally well due to the persistent decline in trend inflation that started in the early 1980s. In fact, the spectacular performance of long-term bonds in recent decades has made

the difference between average returns for stocks and bonds much smaller than its long-term average. This has led some analysts to believe that the equity risk premium may have declined substantially.<sup>25</sup>

### *Factors affecting performance*

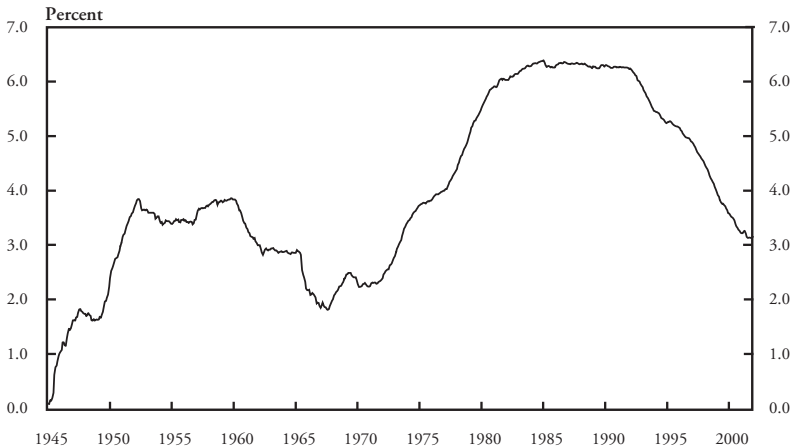
As discussed in Section I, changes in inflation and the fiscal outlook tend to influence the long-term performance of bonds more than that of stocks. Historical experience generally supports this view. In addition, some special factors might also have played a role in this market performance.

*Inflation.* The inflation process in the United States changed profoundly in the past century. Before the establishment of the Federal Reserve System, there was little national control of inflation. As a result, periods of inflation or deflation were frequent although the average inflation rate was close to zero.<sup>26</sup> Since the establishment of the Federal Reserve, fluctuations in the inflation rate have been more moderate, although the average inflation rate has been higher, and positive, since World War II. Further, fluctuations in inflation rates have since become highly persistent.

Chart 7 shows the 20-year average annual rate of inflation from 1945 to 2003. The average rate was about zero from 1926 to 1945, as the deflation accompanying the Great Depression roughly offset mild inflation in the remainder of the period. The 20-year average inflation rate rose to about 4 percent in the mid-1950s, declined in the first half of the 1960s, and then steadily increased to a peak of about 6.5 percent in the mid-1980s. The chart shows that even when averaged over 20-year periods, the inflation rate was not constant, suggesting that the inflation process had very long cycles.

Both stocks and bonds, but especially bonds, performed poorly in the 1970s as inflation increased steadily.<sup>27</sup> The stock market started to recover in the mid-1970s, although high inflation continued to erode the real returns on stocks. Bond returns, however, only started to recover after market participants were convinced of the Federal Reserve's resolve to control inflation. As trend inflation began to decline in the 1980s, bond returns gave their best performance in decades.

Chart 7  
CPI INFLATION, 20-YEAR MOVING AVERAGE



Source: Bureau of Labor Statistics

*Fiscal outlook.* The U.S. federal budget landscape has also changed considerably in recent decades. Before the 1970s, the federal government tended to run a surplus when the economy was expanding and a deficit when the economy was contracting. It would go deep into debt only under unusual circumstances, such as to finance a large-scale war. But since then, the government has regularly reported a sizable annual deficit, regardless of whether the economy was expanding or contracting. The only exception was from 1998 to 2001. In other words, the structural deficit of the federal government has experienced persistent increases. From 1952 to 1973, the annual fiscal deficit averaged about 0.8 percent as a share of GDP. From 1974 to 2003, it averaged 2.5 percent of GDP.

There is little disagreement among experts that persistent increases in structural government deficits tend to increase long-term interest rates. But the magnitude of the increase is the subject of a large literature that has generated a wide range of estimates. One of the relatively conservative estimates is that, everything else equal, a persistent one-percentage-point increase in the U.S. federal budget deficit as a share of GDP leads to a 0.25-percentage-point increase in interest rates (Laubach).<sup>28</sup> Using this estimate, the persistent increases in

the observed fiscal deficit from 1974 to 2003 have likely pushed up the required interest rates on government bonds by nearly a half percentage point. This would have depressed bond returns during the transitional periods but increased bond returns after the structural deficit stabilized. Since the transitional period started in the 1970s and coincided with a period of rising inflation, the actual impact of the worsening fiscal outlook is difficult to disentangle from the effect of higher inflation.

*Other factors.* Some other special factors might have also affected stock and bond returns in the past. Chief among them are changes in trend productivity growth, swings in market price-to-earnings ratios, greater stock market accessibility, and the globalization of the U.S. government bond market.

In the 1970s, labor *productivity growth* slowed considerably from its earlier trend growth rate. The Congressional Budget Office estimates that the trend growth rate of labor productivity averaged 2.3 percent per year from 1950 to 1973, but only 0.8 percent from 1974 to 1981. The rate then recovered somewhat to 1.4 percent from 1982 to 1995, and further increased to 2.2 percent from 1996 to 2003.

Productivity growth is an important determinant for earnings growth in the long run. Thus, the slower productivity growth in the 1970s provides a partial explanation of the prolonged bear market in stocks at the time. Likewise, the jump in productivity growth in the late 1990s may have contributed to the high stock returns of that period.

While changes in trend productivity growth have been generally consistent with stock market performance, they are unlikely to be the main factor behind large swings in stock returns. Both the bear market in the 1970s and the bull market in the 1990s actually started before trend productivity growth changed. Over the past five years, average stock returns were well below their long-term average, although trend productivity growth remained high.

Swings in the *price-to-earnings ratio* of the stock market index might have played as important a role as productivity in past stock performance. Total stock returns are the sum of three components: the dividend yield, the growth rate of earnings, and the rate of change in the P/E ratio. A high P/E ratio relative to the historical average tended to lead to negative changes in the P/E ratio for subsequent periods, putting downward pressure on total stock returns (Campbell and

Shiller).<sup>29</sup> For example, P/E ratios were particularly high in the summer of 1929 and early 2000. Both periods preceded abrupt market downturns, resulting in the poor average stock performances for many holding periods that included the downturns.

Over the past 30 years, the *accessibility* of the U.S. stock market to individual investors has improved greatly due to many structural changes in the market (Diamond; Rea and Reid). In particular, the introduction and rapid growth of indexed stock funds made it possible for small investors to hold portfolios that resemble the whole stock market. This greater accessibility, combined with the general shift from traditional company pension plans to 401(k) plans, has led many more individual investors to directly participate in the stock market. And the increased participation and greater diversification have likely reduced the risks of stocks and increased their demand, therefore boosting stock returns during the transition.

These changes could explain some of the stellar stock returns in the last two decades of the 20th century. Some analysts suggest that the logical consequence of these changes is that the equity risk premium may have declined permanently, reducing the difference in average stock and bond returns in the future (Heaton and Lucas).

Finally, *globalization* of the U.S. bond market could have affected bond returns in much the same way as greater stock market accessibility could have affected stock returns. The U.S. government bond market has become a truly global market over the past two decades. In the early 1980s, foreign holdings of Treasury securities were negligible. Now, foreigners hold about half of marketable Treasury securities, which has increased the demand for Treasuries. This greater demand might have offset some of the impact of the increased supply of Treasuries caused by higher fiscal deficits, keeping interest rates lower than they otherwise would have been and boosting the returns on existing bonds during the period.

To summarize, even for investors with holding periods of 20 years or more, investing is still a risky business. While the risk associated with stocks has declined somewhat for investors with very long holding periods, the risk associated with bonds, somewhat surprisingly, has not.

#### **IV. CONCLUSION**

This article confirms the conventional wisdom that in the United States stocks historically have been safer than long-term government bonds for investors with long holding periods. But the article also shows that the conventional wisdom has only been true for investors who held their portfolios for more than 25 years. For practical purposes, that may be too long a holding period for most investors. Over the years, for investors who have held their portfolios for shorter periods, both stocks and bonds were exposed to substantial risks, and stocks did not necessarily outperform government bonds. This implies that in making asset allocation decisions, investors should think carefully about how long they will be able to hold their portfolios undisturbed and how much risk they are willing to bear.

## ENDNOTES

<sup>1</sup>The performance of an index of the entire stock market is also more representative because while an individual investor may achieve better or worse results than the market average, for investors as a whole, their investment result is the performance of the whole market index.

<sup>2</sup>Long-term government bonds also have higher average returns than short-term government bonds (often called Treasury bills). Therefore, focusing on long-term bonds provides a more stringent comparison of the relative performance of stocks. Most of the discussion in the remainder of this article, however, would also apply if short-term government bonds were the focus instead. As the conventional wisdom is mostly about stock performance relative to government bonds, this article will not discuss corporate bonds or municipal bonds. These bonds are exposed to default risk, as well as business cycle or tax-treatment risk, and thus are very different from Treasury securities.

<sup>3</sup>In the economics and finance literature, “equity risk premium” usually refers to the difference in the rates of return on stocks and short-term government bonds. As the focus of this article is the comparison of stocks and long-term bonds, the term is instead used to refer to the rate of return difference between stocks and long-term bonds. Qualitatively, most of the discussion is the same whether short-term or long-term bonds are considered.

<sup>4</sup>The stock returns are based on the Center for Research in Security Prices Index, and bond returns are from the Ibbotson 2003 yearbook. In particular, the calculated average bond return includes the period of 1942 to 1951, when the Federal Reserve, at the request of the Treasury, capped interest rates on long-term government bonds to help the federal government reduce its cost of borrowing to finance war spending, which depressed the average returns of the bonds.

<sup>5</sup>Annual consumer price inflation averaged 3.1 percent for the period, making the average real annual return for stocks about 6.6 percent, compared to only 2.4 percent for bonds. These returns are comparable to ones obtained by Siegel, who concluded that from 1871 to 2001, the average total compound annual real rate of return of an index of all stocks (dividends included) was 7 percent, but the average total real rate of return for long-term government bonds was only 2.9 percent.

<sup>6</sup>While persistent shifts in the long-term equilibrium real interest rate do affect both stocks and bonds, such shifts are typically tied to shifts in investors’ time preference or the trend growth rate of multifactor productivity, which are difficult to observe, and therefore are not discussed in this article.

<sup>7</sup>This was at least true before the introduction of Treasury Inflation Indexed Securities (TIIS) in 1997, which are also called TIPS. These are government bonds the payments of which are indexed to actual inflation during the lives of the bonds (Shen 1998). As TIPS were not available for most of the historical periods discussed in the article, they are excluded from the set of government bonds studied in the article.

<sup>8</sup>Returns to capital are also related to how labor and capital owners split the gains in productivity. In the U.S., capital’s share of national income has been relatively stable, estimated at around 20 percent (Golob and Bishop).



<sup>9</sup>If the market interest rate also increases as a result of higher inflation, current bond holders will suffer additional losses. For example, if the market interest rate rises from 4 percent to 5 percent, the value of a 20-year bond with a 4 percent coupon rate will be reduced by more than 12 percent.

<sup>10</sup>The reported standard deviations to follow use compound annualized rates of return, and thus the historical average rate of return is the geometric average of returns.

<sup>11</sup>The total return of the stock market index includes all dividend payments and assumes that they are all reinvested in the stock index at the market price at the time of the payment.

<sup>12</sup>The bond portfolio considered in this article is a rolling 20-year bond portfolio: buying a representative 20-year bond each month and selling it at the market price the next month and using the proceeds to buy a new representative 20-year bond. Campbell and Viceira use a more complicated methodology and show some qualitatively similar results. They calculated that as the holding period lengthened from one year to 25 years, the annualized conditional standard deviation of returns for stocks declined from 18 percent to 14 percent, but the annualized conditional standard deviation for the rolling bond portfolios increased from 8 percent to 12 percent.

<sup>13</sup>This is related to, yet slightly different from, dollar averaging, which refers to the fact that when investors gradually add a fixed dollar amount to their portfolios, they naturally buy more stocks or bonds when the prices are relatively low, and buy less when the prices are high. Thus, their average purchase price is lower than the average price if they buy fixed units of stocks or bonds. Even with dollar averaging, the average purchase price for a portfolio is usually higher than the initial purchase price for long-term stock investors simply due to the fact that the nominal prices of stocks tend to increase over very long periods.

<sup>14</sup>This feature is realistic: as investors age, the period for which they can afford to lock their money away necessarily becomes shorter.

<sup>15</sup>For a holding period of 30 years, this strategy mimics that of an investor who puts a constant amount of money each month in her 401(k) starting at age 35, withdraws the entire portfolio at retirement at age 65, and uses the proceeds to buy a perpetuity pension. Some readers may think that because a retiree tends to draw down her savings gradually, it is more realistic to assume a liquidating schedule that spans many years. But for the purpose of evaluating risk, the ending date of the holding period should be the earliest date for which there is a slight possibility that the invested money might be needed. The knowledge that the portfolio is likely to yield positive real returns in another four years (a 24-year holding period) is of little use to an investor who needs the money at the end of a 20-year holding period. Therefore, in the example, it is implicitly assumed that the probability is zero that the investor will need to touch her 401(k) money before retirement, but the probability rises and becomes positive at her retirement.

<sup>16</sup>With the repeated-investment strategy, the longer the holding period, the more money is invested in the portfolio. Therefore, a direct comparison of real returns across different holding periods is not meaningful, but the ratios are comparable.

<sup>17</sup>Due to data restrictions, the frequencies were calculated using different numbers of realizations. For example, for a holding period of one year, there were 912 possible starting months, thus 912 realizations. For a holding period of 30 years, however, there were only 564 possible starting months, thus only 564 realizations.

<sup>18</sup>For readers who are familiar with Siegel (2002), this result may not seem particularly surprising: Siegel calculated that in the U.S., from 1871 to 2001, stocks never underperformed bonds for holding periods of 30 years. The finding here is consistent with Siegel's.

<sup>19</sup>For many investors, the majority of their retirement savings, with the exception of a house purchase, start much later in life, because they may first need to repay student loans, start a family, and put enough money aside for their children's college funds.

<sup>20</sup>This suggests one of the possible explanations for the puzzling historical fact that stocks carried a risk premium over bonds even though they did not appear to be riskier than bonds for very long-term investors: the market return might have been decided mostly by shorter-term investors.

<sup>21</sup>This discussion points out a shortcoming of individual retirement savings plans such as 401(k) or IRA accounts: These accounts do not allow individuals to share the risk of forced early retirement. From society's point of view, it would be more efficient to spread this risk among many individuals so that all retirement savings can be viewed as having a holding period ending at the average retirement age. While theoretically a specially designed insurance contract can spread the risk associated with the length of the holding period, and thus is better suited to take advantage of the reduced relative risk of stocks for very long holding periods, practically the only available substitutes that currently exist are company pension plans and social security programs, both of which also play many other roles and therefore are not perfect substitutes.

<sup>22</sup>Another way to look at this is that the sample size of 77 years only includes at most three nonoverlapping subperiods for any holding periods of more than 20 years. Therefore, the finding based on historical data that stocks always outperformed inflation or bonds for holding periods at least 24 or 26 years is likely not statistically significant.

<sup>23</sup>Siegel reports that for the 200-year period from 1802 to 2001, stocks underperformed bonds once for a holding period as long as 30 years.

<sup>24</sup>Nevertheless, in terms of real returns, both stocks and bonds performed well for the period.

<sup>25</sup>For example, Jagannathan and others have estimated that the equity risk premium averaged only about 0.7 percentage point from 1970 to 1999.

<sup>26</sup>Bordo and others provide the GDP deflator for the U.S. from 1880 to 1913, and Siegel gives the consumer price series for the U.S. from 1800 to 2001.

<sup>27</sup>Investors might have been slow to recognize the inflation risk. For example, in 1955, the Treasury was able to issue a 40-year bond at a nominal interest rate of 3 percent. This bond would have given investors who bought it at issuance and held it to maturity a respectable (by historical standards) real return of 2 to 3 percent if the average annual inflation rate for the next 40 years were zero or 1 percent. But in reality, the annual inflation rate from 1955 to 1995 averaged 4.4 percent. In other words, investors who bought the bond at issuance and held it to maturity lost almost 40 percent in terms of purchasing power.

<sup>28</sup>Many other experts have come up with different estimates, mostly ranging from zero to 2 percentage points.

<sup>29</sup>While P/E ratios may be useful for long-term stock performance, other authors have argued that for the short-term market outlook, spreads between the E/P ratio and some interest rates may be more informative (Shen 2003).

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