The P/E Ratio and Stock Market Performance

By Pu Shen

The U.S. stock market enters the new millennium with five consecutive years of exceptional gains. The S&P 500 index has gained more than 18 percent each of these five years and its value has tripled since 1995. Whether these hefty gains will continue is an important question for many people. Investors obviously care because stock price movements directly affect their wealth. More generally, large stock price movements may affect consumption and investment spending—and thereby influence the overall performance of the economy.

Concern has arisen recently that the stock market may be headed for a downturn because firms' share prices have become very high relative to their earnings. Analysts who hold this view point out that, in the past, high price-earnings ratios have usually been followed by slow growth in stock prices. Other analysts disagree. They argue that history is no longer a true guide because fundamental changes in the economy have made stocks more attractive to investors, justifying a higher price-earnings ratio.

This article examines the historical relationship between price-earnings ratios and subsequent stock market performance and discusses why history might not repeat itself this time. The article finds strong historical evidence that high price-earnings ratios have been followed by disappointing stock market performance in the short and long term. Specifically, high price-earnings ratios have been followed by slow *long-run* growth in stock prices. Moreover, when high price-earnings ratios have reduced the earnings yield on stocks relative to returns on other investments, *short-run* stock market performance has suffered as well. Despite this evidence, however, we cannot rule out the possibility that these historical relationships are of little relevance today due to fundamental changes in the economy.

The first section of the article focuses on the long-term outlook for stock prices, based on the past relationship of stock market performance to the price-earnings ratio. The second section discusses the short-term outlook for the stock market, based on the past relationship of stock market performance to the price-earnings ratio and the level of market interest rates. The third section discusses the possibility that the historical relationship between price-earnings ratios and subsequent stock price movements will not hold in the future.

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I.   P/E RATIOS AND LONG-TERM STOCK MARKET PERFORMANCE

Investors and stock analysts have long used price-earnings ratios, usually called P/E ratios, to help determine if individual stocks are reasonably priced.[1] More recently, some economists have argued that the average price-earnings ratio for a stock market index such as the S&P 500 can help predict long-term changes in that index. According to this view, a low P/E ratio tends to be followed by rapid growth in stock prices in the subsequent decade and a high P/E ratio by slow growth in stock prices. This section explains how the P/E ratio is measured and shows that it is currently high relative to its historical average. The section then summarizes the historical evidence that a P/E ratio above the historical average signals slow long-term growth in stock prices.[2]

What is the P/E ratio and how high is it now?

P/E ratios are ratios of share prices to earnings. The P/E ratio of a stock is equal to the price of a share of the stock divided by per share earnings of the stock. The focus of this article, however, is the P/E ratio of the overall stock market index rather than P/E ratios of individual stocks. For a stock index, the P/E ratio is calculated the same way—the average share price of the firms in the index is divided by the average earnings per share of these firms.[3]

Two types of measurement issues arise in computing P/E ratios. One of them concerns the time period over which share prices and earnings are measured. The price in a P/E ratio is usually the current market price of the stock or index, such as the weekly or monthly average of the daily closing prices. The timing of the earnings in the calculation, on the other hand, may vary quite a bit. There are two main conventions. The first is to use realized earnings in the past (trailing earnings), such as realized earnings in the past year, or averages of annual earnings

for the past few years.[4] The second convention is to use a forecast of earnings for the future, typically, predicted earnings for the current year or next year.[5]

Another measurement issue concerns which stock market index to use. This article focuses on the S&P 500 index for two reasons. First, it is the most widely known and studied index and, consequently, has the longest historical data series that is easily accessible. Second, the S&P 500 index is a good approximation of the overall stock market, as the composition of the index is regularly updated to include roughly the 500 biggest companies in the U. S. corporate world.[6] Currently, the 500 companies in the index represent more than 70 percent of the entire U.S. stock market in terms of market values.[7]

The P/E ratio for the S&P 500 index has been well above its long-term historical average in the past few years (Chart 1). In the chart, the denominator of the P/E ratio is realized earnings over the past four quarters. Defined in this way, the P/E ratio varied mostly between 5 and 27 from 1872 to 1998, averaging only 14 for the entire 127-year period. The P/E ratio moved above 27 in mid-1998 and has since stayed above that level. In June 2000, the P/E ratio was slightly above 29. While this value was lower than a year earlier, when the ratio was close to 36, it was still high by historical standards.[8]

What has a high P/E ratio meant in the past?

Some analysts argue that because the P/E ratio is well above its historical average today it will decline in the years ahead. As Chart 1 shows, the P/E ratio has followed no definite upward or downward trend over the last 127 years. When the P/E ratio has fallen well below its long-term average, it has tended to rise subsequently. And when the ratio has risen well above its long-term average, it has tended to fall back to the average.
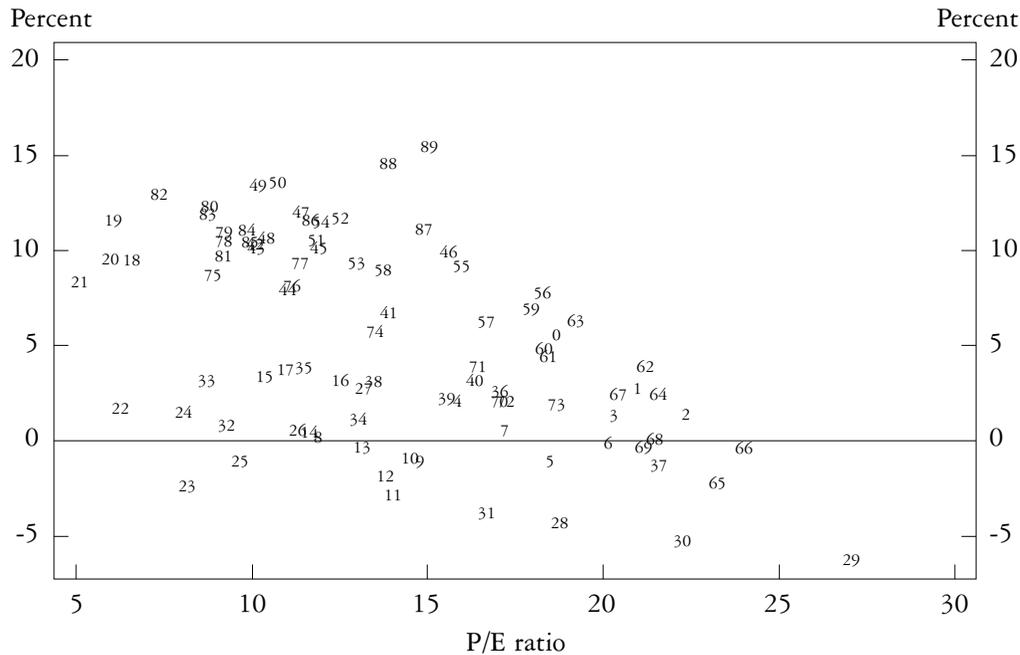
Chart 1
P/E RATIO
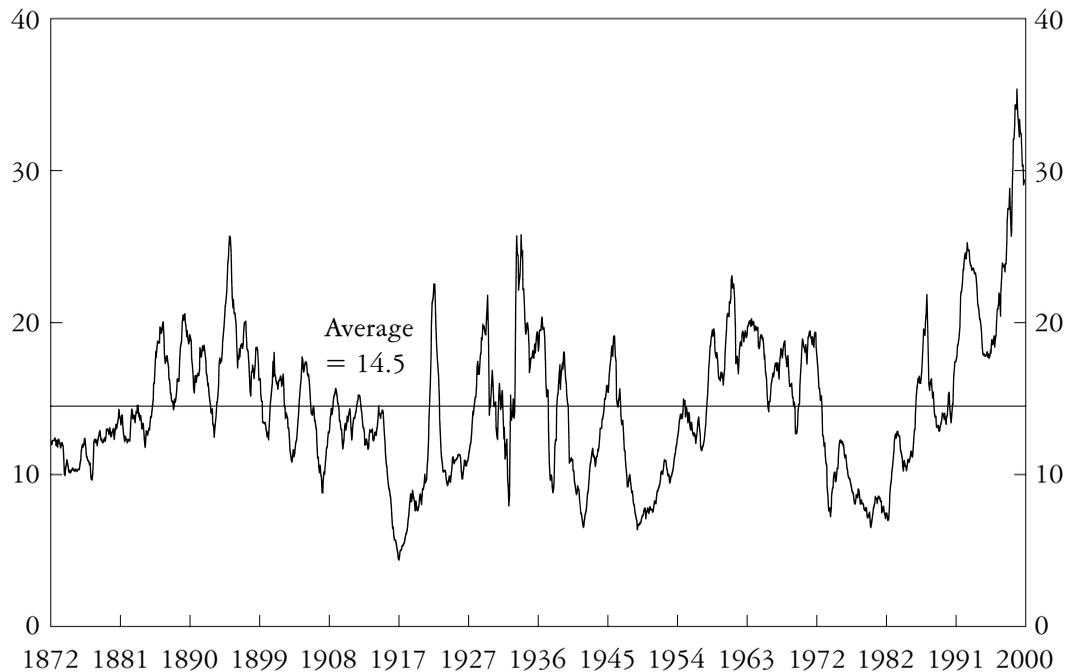
A decline in the P/E ratio back to its long-term average could occur in two ways—through slower growth in stock prices or faster growth in earnings. Of these two possibilities, only slower growth in stock prices would imply a negative outlook for the stock market.[9] One way to determine which outcome is likely to prevail is to examine the historical record and see whether movements in the P/E ratio back to its long-term average have occurred mainly through slower growth in stock prices or mainly through faster growth in earnings.[10] This is the approach taken by Campbell and Shiller in a widely cited study published in 1998.

For each year from 1880 to 1989, Campbell and Shiller calculated three measures: the P/E ratio of the S&P 500 index at the beginning of the year, the annualized changes in real stock prices over the following ten years, and the annualized changes in real earnings over the fol-lowing ten years. The measure of earnings used in the P/E ratio was the average of realized earn-ings over the previous ten years.[11] Stock prices were measured in real terms because what mat-ters to investors is the purchasing power of their investment.[12] If movements in the P/E ratio back toward the average occurred through changes in stock price growth, years with high P/E ratios should be years with *low* subsequent growth in stock prices. On the other hand, if movements in the P/E ratio back toward the average occurred through changes in earnings growth, years with high P/E ratios should be years with *high* subsequent growth in earnings. Campbell and Shiller use both simple graphs and statistical analysis to determine which out-come tended to prevail over the sample period.

Campbell and Shiller found that higher P/E ratios are usually followed by lower stock price growth during the following decade.[13] In Chart 2,

Chart 2

P/E RATIO AND STOCK PRICE GROWTH IN THE FOLLOWING 10 YEARS

Annual stock price growth

each observation is marked by a number, which stands for the year the P/E ratio was calculated. In the chart, the P/E ratio is measured along the horizontal axis and subsequent growth in stock prices along the vertical axis. Consider, for example, the point marked by the number 66. This data point shows that at the beginning of 1966, the P/E ratio of the S&P 500 index was about 24. The point also shows that for the next ten years, the real rate of change of the index averaged slightly negative. Overall, the observations form a northwest-to-southeast downward sloping cloud, implying that high market P/E ratios tended to be followed by low real rates of growth of the stock index in the following ten years.

Reinforcing these results, Campbell and Shiller found that higher P/E ratios are usually *not* followed by faster earnings growth. Chart 3 is similar to Chart 2 except that the real earnings growth is measured on the vertical axis

instead of real stock price growth. For example, the point marked by number 66 shows that the average growth rate of real earnings for the decade from 1966 to 1975 was negative. In contrast to Chart 2, the observations in Chart 3 form a roughly horizontal cloud, implying that there was no systematic relationship between the P/E ratio and subsequent growth in long-term earnings.

As a check on these results, Campbell and Shiller also calculated the statistical correlation over the period between the P/E ratio and subsequent growth in stock prices and earnings.[14] They found that the P/E ratio was negatively correlated with subsequent stock price growth but uncorrelated with subsequent earnings growth. They also found that the negative correlation between the P/E ratio and subsequent stock price growth was statistically significant, in the sense that the probability that this correlation was due

Chart 3
P/E RATIO AND EARNINGS GROWTH IN THE FOLLOWING 10 YEARS
Annual stock price growth

Percent   Percent
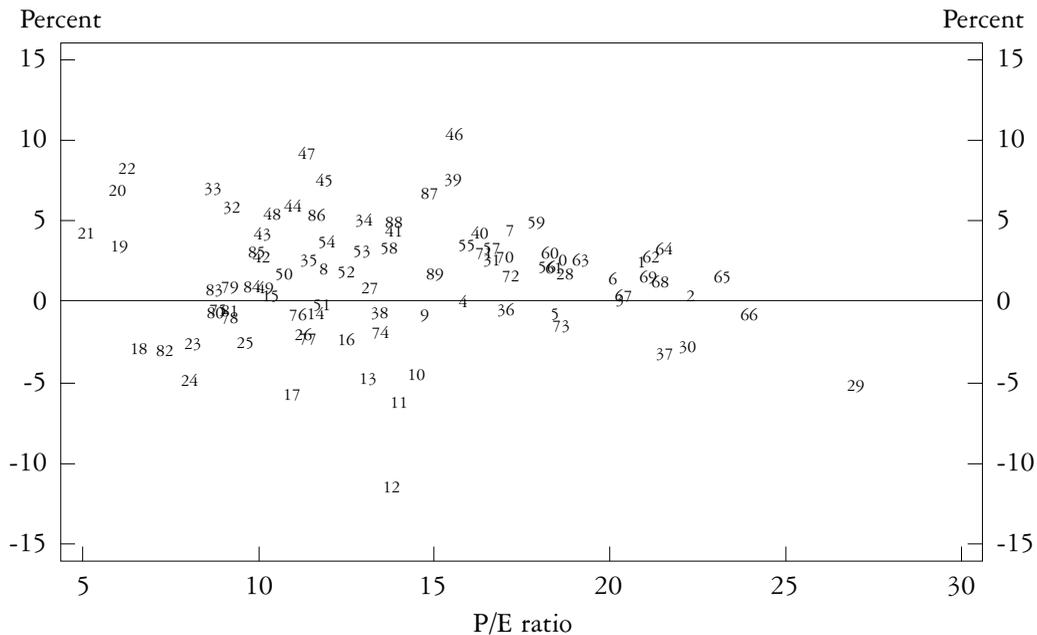
P/E ratio

to pure chance was very small.[15] Thus, the statistical results confirm the conclusion from Charts 2 and 3 that movements in the P/E ratio back toward the long-term average have occurred mainly through changes in stock price growth rather than changes in earnings growth.

The Campbell-Shiller study was published in 1998, at which time they predicted "substantial declines in real stock prices, and real stock returns close to zero, over the next ten years." As the current P/E ratio of the S&P 500 index is actually higher than that at the time of their study, their bearish conclusion would presumably still apply today.[16]

## II. A LOOK AT SHORT-TERM STOCK MARKET PERFORMANCE

The last section focused on what high P/E ratios mean for stock price growth over the long term. Investors, however, also have good reasons

to care what high P/E ratios mean for share prices in the short term. Some investors may have investment horizons shorter than ten years.[17] Moreover, even if investors have a long-term horizon, they still have to make short-term investment decisions, such as where to allocate their 401(k) contributions every month.[18]

Some economists argue that today's high P/E ratio signals slower growth in stock prices not only in the long term but also in the short term. These economists believe short-term stock market performance can be predicted by comparing the inverse of the P/E ratio, commonly known as the earnings yield, to some measure of market interest rates. They argue that when the spread between the earnings yield and market rates is very low, as has been the case recently, stock prices tend to fall over subsequent weeks or months.

Chart 4
SPREAD BETWEEN EARNINGS YIELD AND TREASURY BILL RATE
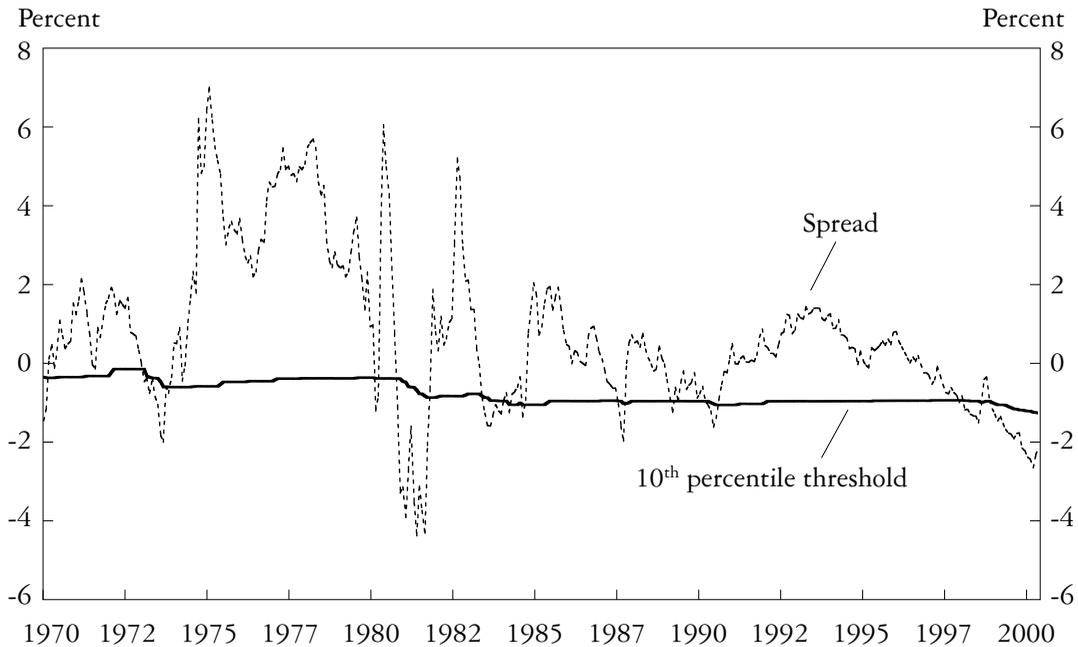
This section explains the justification for focusing on the spread between the earnings yield and market interest rates. The section then shows that the spread is currently very low and summarizes the historical evidence that low spreads signal slow short-term growth in stock prices.

Why look at the spread between the earnings yield and market interest rates?

The key variable used to predict stock market performance in this section is the spread between the earnings yield and the level of interest rates. The earnings yield is simply the inverse of the P/E ratio, and represents average earnings per dollar invested in stocks. Expressing the relationship between stock prices and earnings in this way makes the measure comparable to an interest rate, which represents interest income per dollar invested in bonds.

When assessing the short-term outlook for stock prices, there are two reasons for focusing on the spread between the earnings yield and market interest rates. First, a low spread may indicate that stocks are expensive relative to alternative investments such as Treasury securities or money market funds. In such situations, investors may switch from stocks to other assets, causing growth in stock prices to slow. Second, researchers have found that in predicting monthly stock market returns, a combination of the earnings yield and market interest rates usually performs better than either the earnings yield or interest rates alone.[19]

The strongest evidence that both the earnings yield and interest rates matter for short-run stock market performance comes from a paper by Lander and others published in 1997. The purpose of this study was to see if changes in the earnings yield relative to interest rates could

Chart 5
S&P 500 INDEX

Logarithmic scale   Logarithmic scale
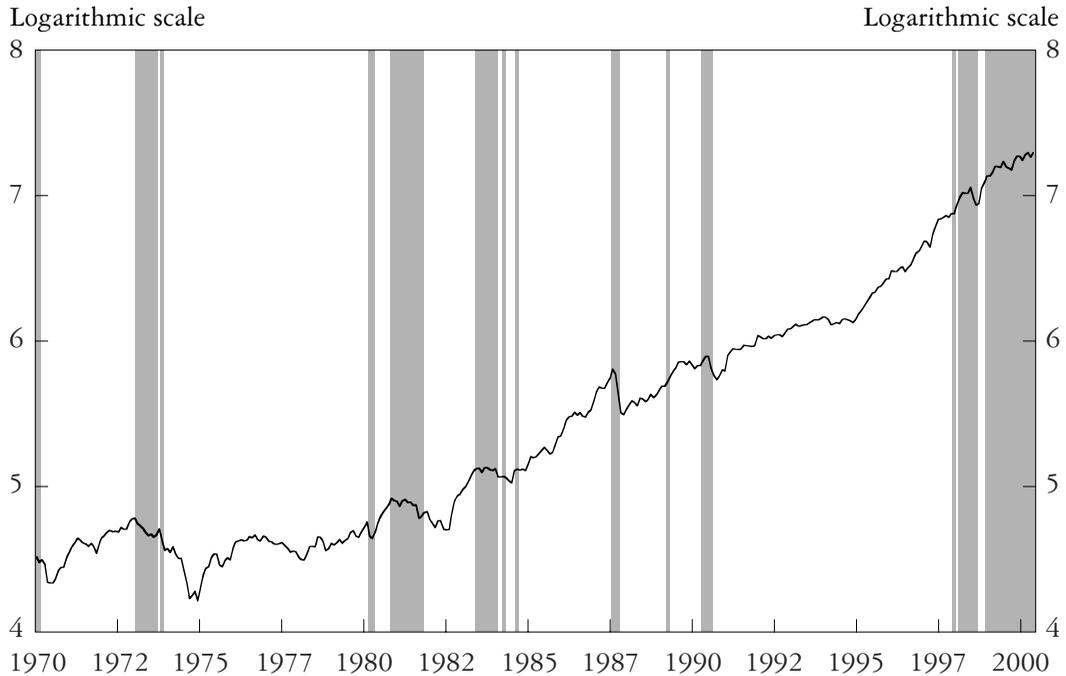
help predict stock market returns in the follow-
ing month. The monthly stock market return
was defined to include both the capital gain
from holding stocks in the S&P 500 and the
dividends paid on those stocks.[20] For the earn-
ings yield, the authors used the average of real-
ized earnings over the past year and forecast
earnings over the coming year. For the interest
rate, the authors used a variety of medium-term
and long-term Treasury yields with maturities
ranging from three to 30 years. The sample
period for the study was from 1979 to 1996.

Using regression analysis, the study yielded two
main results. First, approximately equal changes
in the earnings yield and interest rate had no sys-
tematic effect on stock returns during the follow-
ing month.[21] Second, decreases in the earnings
yield relative to the interest rate tended to reduce
stock returns in the following month. Taken
together, these results suggest that a simple way

of predicting short-term market performance
may be to focus on the *spread* between the earn-
ings yield and the level of interest rate. This
approach has the advantage of combining infor-
mation on P/E ratios and market interest rates
into a single indicator, allowing the short-term
market outlook to be discussed using simple
graphs rather than complex regression analysis.

*How low is the spread now and what has
a low spread meant in the past?*

To explore the implications of the spread for
the short-term market outlook, the rest of this
section draws on a recent paper by Rolph and
Shen. While close in spirit to Lander and others,
this study used somewhat different measures of
the earnings yield and the level of interest rate.
For the earnings yield, Rolph and Shen used
realized earnings over the past year rather than
an average of realized earnings and forecast

Table 1

PERFORMANCE OF THE S&P 500 INDEX IN DIFFERENT PERIODS

	Entire sample period	When spread between E/P ratio and 3-month T-bill rate is above the 10th percentile (Non low-spread)	When spread between E/P ratio and 3-month T-bill rate is under the 10th percentile (Low-spread)
Mean monthly returns (%)	.82	1.10	-.35
Monthly standard deviations (%)	3.54	3.44	3.73
Total number of months	366	297	69

earnings. For the interest rate, Rolph and Shen used the 3-month Treasury bill rate.[22]

The current spread, as measured by Rolph and Shen, is well below the average for the past 30 years. The dotted line in Chart 4 plots the spread by month from 1970 to 2000.[23] In June 2000, the spread was about minus two percentage points, compared to an average of 0.7 percentage point for the entire period. In contrast to some other periods, such as the early 1980s, the low spread in June 2000 was due entirely to the low earnings yield rather than to unusually high interest rates.

Another way of showing that the spread is currently very low is to compare it to the tenth percentile of past spreads, indicated by the solid line in the chart. For each month, this line shows the tenth percentile of all spreads between that month and 1962, the first year for which the data used in the study were available.[24] In June 2000, the spread was about one percentage point below the tenth percentile threshold, indicating that the spread had been

at least a percentage point higher in 90 percent of all months since 1962.

To see if such a low spread has signaled poor stock market performance in the past, Rolph and Shen compared stock price growth in months when the spread was below the tenth percentile threshold in the previous month to stock price growth in other months. The contrasting behavior of stock prices in these two types of months can be seen from Chart 5, which plots the S&P 500 index for the same period as in Chart 4. The chart is drawn on a logarithmic scale, which means that the slope of the line corresponds to the proportional growth in stock prices. The shaded areas in the chart represent the low-spread months, those when the spread was below the tenth percentile threshold in the previous month.

Over the period as a whole, the S&P 500 index tended to perform worse in the low-spread months than other months. In general, the S&P 500 line slopes upward, indicating that stock prices were increasing. In shaded areas corre-

sponding to clusters of low-spread months, by contrast, the S&P 500 index is usually flat or falling. The main exception is the last shaded area, which consists of the last year and a half, a period in which the stock market has grown substantially even though the spread has remained below the tenth percentile threshold.[25]

Table 1 provides further evidence that very low spreads have usually signaled weak stock market performance. The first column of the table shows that for the whole sample period of 366 months, the monthly changes in the stock index averaged 0.82 percent.[26] The next two columns compare the stock index performance during low-spread months and non low-spread months. For the 297 months when the spread was not particularly low, the stock market index increased by an average of 1.10 percent. For the 69 low-spread months, in contrast, the index *decreased* by an average of 0.35 percent per month.

In addition to growing slower in low-spread months, the stock market index also tended to be more volatile in such months. One measure of volatility is the standard deviation of the growth rate of the index. As shown in the second row of Table 1, the standard deviation was 3.73 percent in low-spread months but only 3.44 percent in non low-spread months. Thus, it appears that on average the stock market performed poorly during the months when the spread was very low, both in terms of average returns and volatility.[27]

To summarize, the Rolph-Shen study shows that, over the past 30 years, a very low spread between earnings yields and short-term interest rates has generally signaled poor stock market performance during the subsequent month. Currently, this spread is very low by historical standards, which implies a bearish outlook for the U.S. stock market in the short term.[28]

III. IS THIS TIME DIFFERENT?

For the past three years, the historical relationships reported in the Campbell-Shiller study have been pointing to slower long-term growth in stock prices. And for the past year and a half, the results of the Rolph-Shen study have been signaling slower short-term growth in stock prices. The stock market index today, however, is much higher than both three years ago and a year and a half ago. Has the long-standing tendency for high P/E ratios and low spreads to be followed by declining stock price growth merely been delayed, or have fundamental changes in favor of higher P/E ratios rendered the historical patterns out of date? Some analysts argue that the U.S. economy and the stock market have entered a "New Era," so that history will not repeat itself this time around.

This section discusses three frequently mentioned reasons why this time may be different—faster earnings growth, reduced risk of stocks, and lower transaction costs for investing in stocks.[29] All of these changes suggest possibly permanently higher P/E ratios and lower spreads. Therefore, these changes make it possible that the stock market will deviate from its historical pattern, continuing to grow in both the short term and long term.[30]

Earnings are expected to grow faster

What matters to investors is firms' ability to generate earnings in the future. If earnings are expected to grow persistently faster than previously, it is only natural that investors be willing to pay more for stocks and thus raise the P/E ratio.[31] Many analysts believe that the U.S. economy has entered a "New Era," in which globalization and accelerated technological progress will allow the economy to grow faster than in the past. Further, they believe that in this New Era faster economic growth will translate into faster corporate earnings growth for a long time to come.[32]

There is some evidence that economic growth in the United States has accelerated recently. For example, growth in per capita gross domestic product (GDP) averaged about 2.3 percent from 1995 to 1998, compared to about 2.0 percent from 1947 to 1998 (Lucas and Heaton). Corporate earnings have also grown faster recently. For example, real earnings growth for companies in the S&P 500 index has averaged about 8 percent in the past five years, versus only 2.6 percent for the period from 1957 to 1999.

Some believers in the New Era argue that the recent increase in GDP and earnings growth is permanent because it reflects the spread of new information and communications technology. In support of this view, they cite recent empirical studies showing that trend productivity growth increased sharply in the second half of the 1990s, with much of the increase attributable to new information and communications technology (Oliner and Sichel; Jorgenson and Stiroh 1999, 2000). However, whether the recent robust growth in GDP and earnings will persist is still open to debate. Specifically, skeptics question how revolutionary the new information and communication technology is and point out that there have been periods in the past when robust growth has faltered as the business cycle turned (Gordon).[33]

Stocks may appear less risky to investors

Stocks have always been perceived as risky investment, relative to bank CDs, money market funds, or government securities. Consequently, the expected returns on stocks have had to exceed the returns on these safer assets to attract investors.[34] If stocks are now perceived by investors to be less risky today than in the past, demand for stocks will be higher, resulting in higher stock prices and higher P/E ratios.

There are several reasons that stocks may be perceived as less risky today. First, better macroeconomic policies should allow the economy to grow with less fluctuation, causing earnings to be more stable. One prominent financial expert points out that because the average P/E ratio of 14 includes the Great Depression, "saying we'll go back to a 14 P/E means saying we have learned nothing about how to better manage the economy" (Siegel 2000). Second, as a group, investors today may have longer investment horizons than investors in the past.[35] Longer investment horizons make stocks less risky to investors because historically stock returns have been less variable over the long term than the short term. Third, with innovations in information technology and increased access to financial service industry, investors may now have a better understanding of stocks and thus may have changed their perception of the risks of investing in stocks.[36]

Transaction costs of investing in stocks have fallen

In the calculation of historical stock returns, the effect of transaction costs is usually ignored. Consequently, there has been a wedge between the calculated rate of return (gross return) and the rate of return net of transaction costs (net return), which is what the investors have actually received. This wedge has decreased recently, however, as financial innovations such as the proliferation of no-load mutual funds have made investing in stock market less costly.

The reduction in transaction costs can lead to an increase in P/E ratios in two ways. First, as transaction costs fall, the net return to investors will increase even if the gross return remains the same. This increases the demand for stocks and boosts stock prices and P/E ratios. Second, lower transaction costs make it easier for individual investors to diversify among many different stocks, which reduces the risk of stock investment. As discussed earlier, if stocks are perceived as less risky, investors will require a lower premium to invest in the stocks, leading to higher P/E ratios.

Empirical studies confirm that the cost of investing in the stock market for individual investors has declined substantially in recent years. For example, one study calculates that the average annual charge for stock funds declined by about 0.76 percentage point from 1980 to 1997 (Rea and Reid).[37] This decline was mainly due to two factors: the decreased importance of front-loaded funds and the increased popularity of low-cost index funds.

To summarize, there are several plausible arguments why history may not repeat itself this time around and the P/E ratio may stay well above its historical average for the foreseeable future. If these arguments prove to be correct, the stock market may continue to grow both in the near term and in the coming decade.

IV. CONCLUSION

Some analysts view the current high price-earnings ratio of the stock market as a sign that the stock market may be headed for a downturn. This view receives some support from historical evidence that very high price-earnings ratios have usually been followed by poor stock market performance. When price-earnings ratios have been high, stock prices have usually grown slowly in the following decade. Moreover, at times such as the present when high price-earnings ratios have reduced the earnings yield on stocks relative to interest rates, stock prices have also tended to grow slowly in the short run. Forecasts based on such evidence are subject to much uncertainty, however, because history may not repeat itself. Specifically, the possibility cannot be ruled out that this time will be different due to fundamental changes in the economy that will allow high price-earnings ratios to persist and thus stock prices to continue growing both in the near term and in the coming decade.

ENDNOTES

[1] P/E ratios are one of several "valuation ratios" that scale a firm's stock price by some measure of the firm's assets or potential to generate income for shareholders. Other commonly used valuation ratios include price-sales ratios, price-to-book ratios, and price-dividend ratios.

[2] In this article, the phrase "long term" is typically used for period around ten years of time, to be consistent with the usage in the original research. For investment purposes, however, it is more appropriate to think a ten-year period as a "medium term."

[3] The average here is a weighted average, with the weight proportional to the relative market capitalization of the stock.

[4] The main reason for using a multiyear average of earnings rather than the past year's earnings is to smooth out fluctuations in earnings due to temporary events and business cycles (Graham and Dodd).

[5] These differences in timing conventions can give rise to very different P/E ratios. In statistical studies of the relationship between P/E ratios and stock returns, however, differences in P/E ratios due to differences in the timing of the earnings are usually of secondary importance, as long as a consistent definition is used throughout the analysis. As it is much easier to find historical data of realized earnings than historical data of predicted earnings, many studies use realized earnings. This article follows the same practice.

[6] For example, the current list includes both long-established companies, such as Allstate and AT&T, and new fast-growing companies, such as Agilent Technologies and America Online.

[7] In contrast, while the Dow-Jones industrial average index is equally well known and easily accessible, the choice of the firms in the index is somewhat arbitrary and the index represents a much smaller portion of the market.

[8] The data used in Charts 1 to 3 are downloaded from the web site of economist Robert Shiller. They are real prices and earnings converted to constant January 2000 dollars. The earnings used in the calculation of Chart 1 are realized earnings in the most recent 12-month period.

[9] Analysts who believe the movement would occur through faster earnings growth include those who strongly believe the "efficient market hypothesis," which says that it is impossible to forecast the future movements of the stock market except for its long-term trend. For people in this school, it is futile to look at the P/E ratio, or any other publicly available information, to predict the short-term or long-term behavior of the market (Malkiel). Some analysts take an intermediate view, arguing that the stock market is efficient most but not all of the time (Black).

[10] Needless to say, this approach assumes that historical patterns are still going to hold in the future. Many statistical studies use historical data to find certain patterns and extrapolate them to the future, and thus rely on the assumption that history will repeat itself. While sensible, there are times this assumption may be questionable. Section III will present some arguments against this assumption.

[11] As earnings tend to grow over time, the ten-year average of earnings tends to be smaller than earnings in the most recent year. As a result, Campbell and Shiller's P/E ratios are usually higher than other commonly cited P/E ratios, such as the P/E ratios shown in Chart 1. As it is applied uniformly, this definition should raise all historical P/E ratios and thus should not pose a problem for their analysis.

[12] Further, as the inflation rate over ten-year periods has varied sizably, the nominal rate of return is not a good approximation to the real rate of return.

[13] Chart 2 and Chart 3 (discussed in the next paragraph) are similar to Exhibit 6 in the Campbell-Shiller study, with updated data. To make the charts easier to understand, observations in the last century are dropped. As in Chart 1, prices and earnings are all converted to constant January 2000 dollars. In their study, Campbell and Shiller also investigate the relation between the price-dividend ratio and stock price growth, which exhibits similar patterns.

[14] The study uses regression analysis. The statistical correlation has the same sign as the slope coefficient in the respective regression.

[15] As each data point contains ten years of observations, and the regression is based on annual data, the usual t-statistics of the regression do not give a proper measure of the significance of the slope coefficient. Campbell and Shiller use simulations in their study to show that the slope coefficient is likely to be significant.

[16] While the P/E ratio based on the past year's earnings has declined somewhat recently, the P/E ratio based on the past ten-year's earnings is higher than the 1997 level.

[17] One such group is parents who are investing to cover the costs of college education for their teenage children.

[18] "Keeping the status quo" is still a decision. In fact, every instance in which investors have an opportunity to change their investment portfolios but take no action should be viewed as an investment decision.

[19] In contrast, long-term studies such as Campbell and Shiller have found that the P/E ratio alone does a good job of predicting market performance. One reason may be that real interest rates are less variable over the long run than the short run.

[20] Because dividend yields are relatively stable, most of the variation in the monthly stock market return is due to capital gains—that is, to changes in stock market index.

[21] For example, when the 10-year Treasury yield is used for the interest rate, the estimated regression equation for the monthly stock return is *1.715 + 8.339 (earnings yield – 1.015*interest rate)*, with all variables measured in percent per month.

[22] Each variable in the spread was calculated using only information publicly available at the time. For example, for March 1970, the daily average of the S&P 500 index was used as the measure of stock prices, the average 3-month Treasury bill rate for March was used as the measure of the interest rate, and realized earnings in the four quarters of 1969 were used as the measure of earnings.

[23] The Rolph-Shen paper was written in 1999. The author has updated the original study with more recent data.

[24] Each month, one more observation becomes available to calculate the tenth percentile, explaining why the threshold varies slightly over time.

[25] There were also a few times when the market turned down considerably even though the spread was not particularly low—for example, in the mid-1970s and early 1980s.

[26] The use of a nominal index exaggerates the real return to investors because inflation averaged about 0.4 percent per month during the period. At the same time, the calculation slightly understates the real return to investors during the period by omitting dividend yields.

[27] The difference in the average monthly returns between the low-spread months and non low-spread months is sta-

tistically significant, but the difference in the standard deviations is not.

[28] From Chart 4, it is clear that at the end of the sample period, in June 2000, the spread was signaling slow growth in stock prices. Strictly speaking, this bearish outlook only applied to the month of June. But as the threshold only changes slowly and the gap between the spread and the threshold was more than one percentage point in June, the short-term outlook should remain bearish barring large movements in stock prices, reported earnings growth, or the short-term interest rate.

[29] Campbell and Shiller, Diamond, and Golob and Bishop provide good reviews of these arguments.

[30] Most of these arguments, however, only justify the *current* P/E ratios as sustainable, therefore implicitly suggesting that, going forward, investors should expect stock returns more in line with the historical average, rather than the stellar pace of the past five years.

[31] Faster earnings growth can support the current high P/E ratios through another channel, which is to allow the P/E ratio to gradually decline toward its historical average without excessive reduction in the stock price growth. As shown in the Campbell-Shiller study, historically, the downward movement in the P/E ratio has primarily been the result of reductions in price growth. Nevertheless, it is possible that "this time is truly different."

[32] A related argument is that out-of-date accounting treatment of R&D spending may understate corporate earnings, causing P/E ratios to appear higher than they really are (Nakamura).

[33] Another caveat is that even persistently faster earnings growth may not support higher P/E ratios, if the faster growth causes an economywide increase in interest rates.

[34] This additional return is called the "equity risk premium," a premium to compensate investors for investing in risky equity assets.

[35] There is dispute as to whether or not investors as a whole have longer investment horizons now than in the past. On the one hand, as companies switch their pension plans from defined benefits to defined contributions, more individual investors are now investing for their retirement, which should lengthen the average investment horizon. On the other hand, this switch implies the decline of company managed pension investments. Because company pension plans have even longer horizons than individuals, the decrease in their importance could shorten the average investment horizon.

[36] While the reduction in perceived risk has permanently boosted the P/E ratio, it also implies that future stock returns will be somewhat lower than the historical average. With the reduction in risk, future returns on stocks do not need to be as high as in the past to attract investors. A few calculations suggest that a reduction in perceived risk sufficient to support the current P/E ratio would imply future long-term stock returns to be about 2 to 2.5 percentage points below the historical average (Golob and Bishop; Lucas and Heaton). These calculations suggest that if the argument of less risky stocks is true, investors looking for the stock market to repeat its performance in the past five years are likely to be somewhat disappointed.

[37] The total reduction in transaction cost, however, may not be as large as suggested by these numbers, as the cost reduction for large institutional investors, who account for a major share of stock ownership, is likely to be smaller (Diamond).

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