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## Estimating the Fundamental Value of Stocks

### *Executive Summary*

*One of the most important factors in successful investing is to buy stocks when they are relatively inexpensive or undervalued and sell them when they are relatively expensive or overvalued. Determining the true value of stocks is a complicated process that involves numerous judgments with respect to profits, interest rates and perceptions of risk. This report discusses each of these issues and explains the assumptions used in determining the fundamental value of stocks that appear in my weekly and monthly reports.*

*The overall conclusion from this analysis is that stocks are significantly undervalued at the present time. A key assumption in reaching this conclusion is that perceptions of the risk associated with stocks will be similar to the average perception of risk that has existed since 1981. Another key assumption is that economic policies will continue to move in the direction of pro-growth classical principles. These assumptions, along with various earnings and interest rate calculations lead to the conclusion that the S&P 500 and Dow Indexes are presently undervalued by roughly 30%- 40%.*

# Estimating the Fundamental Value of Stocks

There are a number of different techniques for estimating the underlying value of the stocks. All of these techniques involve an attempt to determine the relationship between stock prices and the key factors that determine those prices—profits, interest rates and perceptions of risk. The most popular technique involves determining a normal or reasonable relationship between the price of a stock or a stock index and the earnings associated with that price. Since interest rates and perceptions of risk affect the reasonableness of the relationship between price and earnings, judgments as to each of these variables are essential to valuing stocks.

This report begins with a discussion of various measures of profits and their trends. It then discusses the role of interest rates in determining the value of stocks. Next, it deals with the relevant historical period for determining the likely perceptions of risk associated with holding stocks. Finally, it discusses the implications of these factors for assessing the current value of both the S&P 500 and the Dow Jones Industrial stock Index.

## Profits and Profit Trends

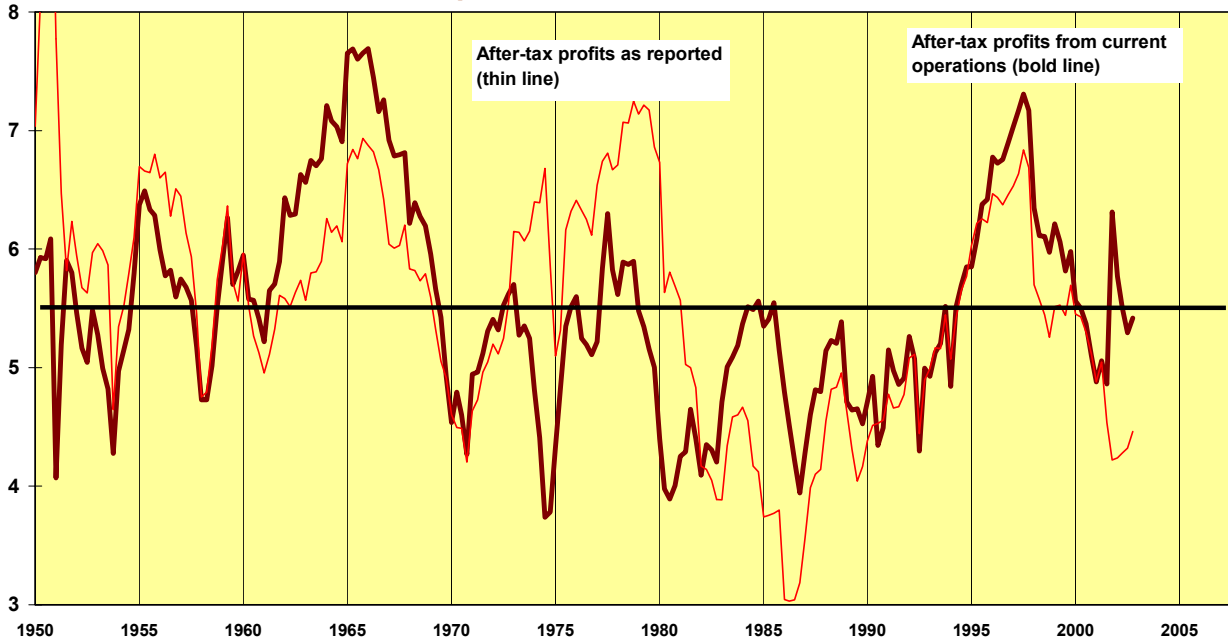
Profits are the most important element associated with determining the value of stocks. The national income accounts (NIA) contains the most comprehensive measure of corporate profits for the US economy. These corporate profit figures are available quarterly and are based on tax returns submitted by companies operating in the US. Since there are differences between company data reported to the IRS and those reported to shareholders, NIA profit numbers are not directly comparable to those found in company reports. Since there are obvious incentives for companies to be conservative in reporting profits for tax purposes, the NIA data may provide a better guide to actual profits than reports to shareholders.

There are two after-tax profit numbers reported in the national income accounts. One is reported after-tax profits based on company tax reports. The other is adjusted after-tax profits, which attempts to measure economic profits from current operations. The first adjustment applies to depreciation allowances so that they reflect estimates of actual depreciation as opposed to depreciation dictated by tax schedules. The second adjustment is for any profits or loss that stems from the impact that inflation or deflation may have on the value of inventories.

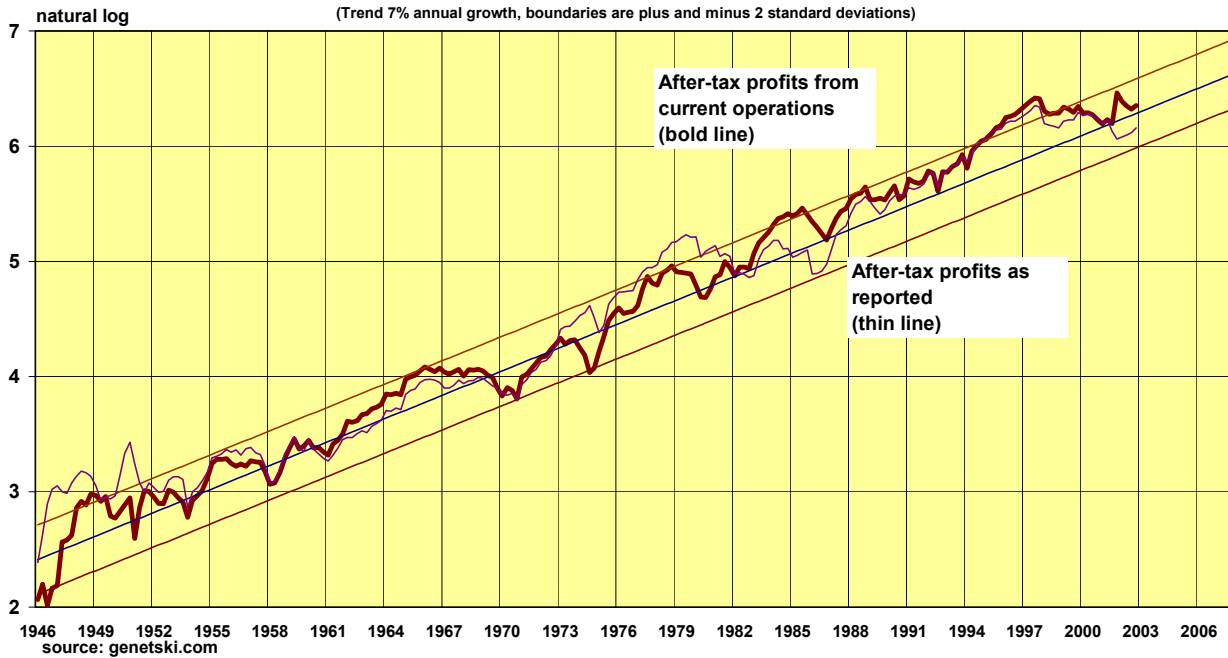
The first chart on the following page shows the long-term profit share of gross domestic product (GDP) for both the reported and adjusted NIA profit data. The chart shows that there can be significant differences between the two measures. The differences appear during periods when there are either major tax changes affecting depreciation schedules or when there are sharp changes in prices affecting inventory values. In spite of these differences, over time, there is a tendency for both figures to average about 5½% of GDP. In times of high employment, the average share tends to be closer to 6% of GDP.

The next chart shows the underlying long-term trend in US corporate profits. For the past half century, after-tax corporate profits have tended to grow at roughly 7% a year, the same rate as spending and income in the rest of the economy.

### Corporate Profits Share of GDP



### GDP Profits: Actual & Trend



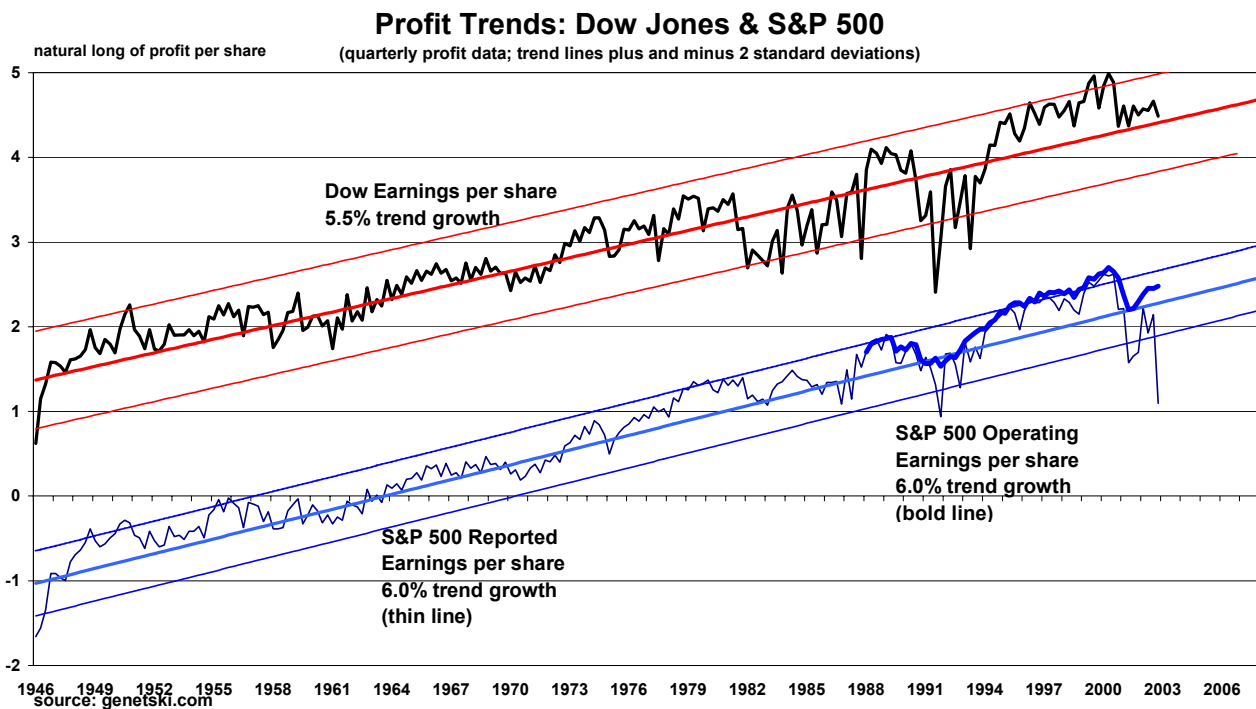
One of the problems with using national income profits for valuing stock prices is that these profits refer to the whole economy. For purposes of relating profits to stocks, it's useful to view profits associated with a particular stock index. The next chart shows the longer-term performance of profits for companies in the Dow Jones Industrial Stock Index and the S&P 500. For the Dow companies, only reported profits are available. For the S&P 500, the thin line extending back to the mid-1940s shows reported profits. The bold line that begins in 1988

shows company estimates of profits from ongoing operations. A large number of write-offs associated with the recent economic slowdown combined with larger taxable allowances for depreciation have led to a sharp drop in reported profits relative to those estimated to be from ongoing operations.

To the extent that operating profits accurately depict the ongoing profits from current operations, this figure is a more accurate one than the reported profits data. However, some observers suggest that there may be a growing tendency for one-time restructuring costs to become an ongoing means of disguising poor performance. To the extent that this is true, reported profits would tend to be a more accurate gauge of profitability. Since S&P operating profits behave more like the NIA numbers previously mentioned, there is some reason to believe that the S&P operating profits data are reasonably accurate. However, for purposes of this analysis, the reported profits data will be used. To the extent that operating profits provide a more accurate picture of the underlying profitability of the S&P 500, the use of reported profits data for the most recent period may provide a negative bias to calculating the value of S&P 500 stocks.

It is interesting to note that the longer-term growth trend for both Dow and S&P 500 profits is below that of the overall economy. This is likely due to the selection of more mature, less risky companies. In a dynamic economy, new innovative businesses will tend to have the greatest potential for profit growth (as well as risk). Hence, investing in more mature, established companies tends to mean less profit growth (as well as less risk) than investing in the broader market.

The recent drop in reported earnings for the S&P 500 represents the most dramatic departure from the trend line in over half a century. However, the more positive trend in S&P 500 operating profits suggests that the recent collapse may not be related to ongoing operations. Also, a similar collapse in Dow profits in 1991 provides some further evidence that such developments represent a temporary phenomenon.



## Interest Rates—Their Role and Trends

Interest rates play an important role in valuing stocks. When interest rates rise, it reduces the inherent value of all assets, including stocks. When interest rates fall, it raises the value of all assets, including stocks. The next chart shows the historical behavior of longer-term interest rates.

### Long-term Interest Rates

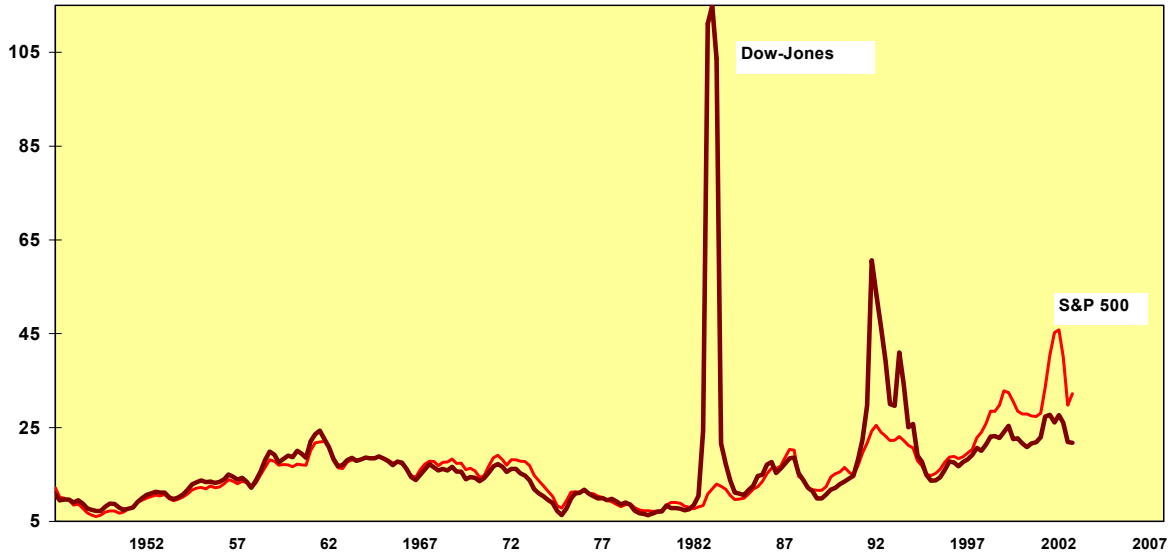


## Valuing Stocks With Price-Earnings (P/E) Ratios

One of the most popular techniques for valuing stocks is the P/E ratio. Analysts often determine an average or “reasonable” P/E ratio as a benchmark. If the current P/E ratio is above this average, they conclude that stocks are overvalued. The following chart shows the P/E ratios for both the S&P 500 and the Dow Jones Industrial Index from 1948 through 2002. During this period, the average P/E for the S&P 500 has been 15.7%, while the average for the Dow has been 17%. Interestingly, if we eliminate the those periods when the P/Es on the Dow spiked due to a collapse in profits, the average for both indexes is roughly 15½%.

### P/E Ratios: S&P 500 & Dow Jones Industrials

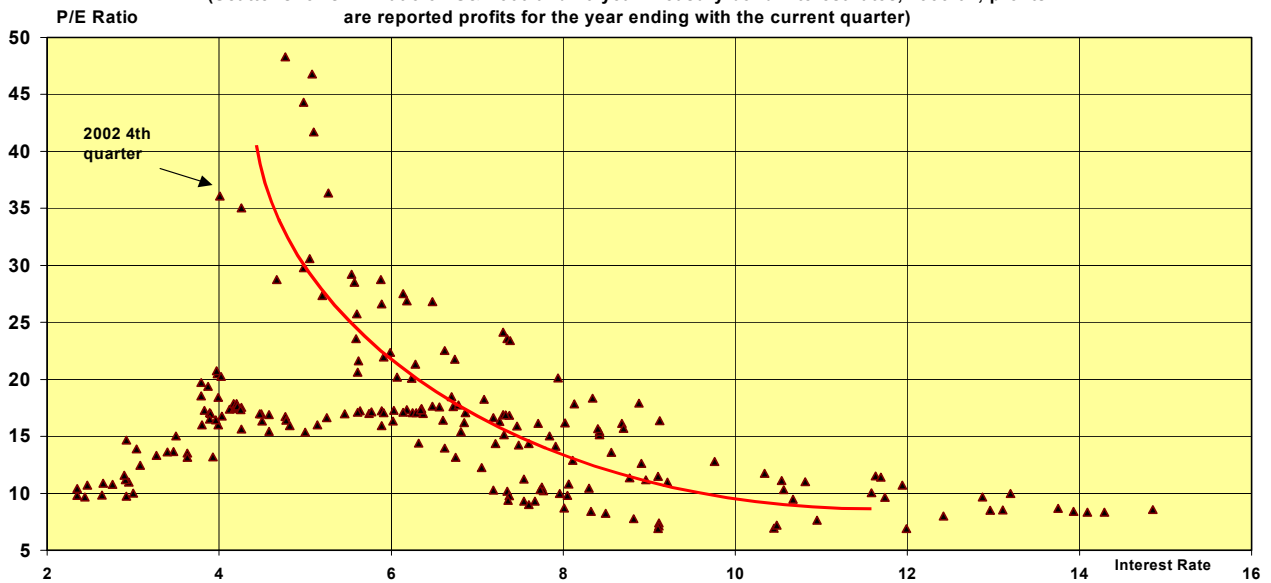
(Price is the quarterly average; earnings are reported earnings over the past 4 quarters)



As noted above, stock values are affected by interest rates. When interest rates are relatively high, stocks are worth less and P/E ratios should be relatively low. When interest rates are low, stocks tend to be worth more so P/E ratios should be relatively high. The chart below shows this tendency.

### P/E Ratios and Interest Rates

(Scatter shows P/E ratio on S&P 500 and 10-year Treasury bond interest rates, 1953-02; profits are reported profits for the year ending with the current quarter)

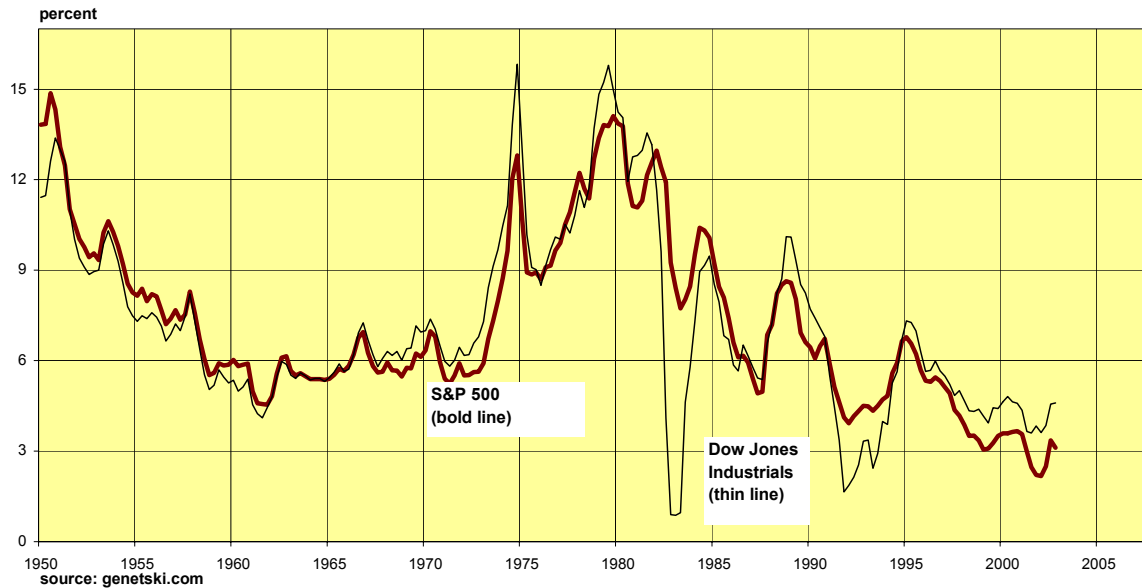


The only period when the expected relationship did not exist was during the 1950s, when P/Es were relatively low. At this time recent memories of the Depression led to high perceived risks associated with owning stocks. Since the mid-1950s, the average P/E on the S&P 500 has been roughly 16. However, when interest rates were relatively high (above 8% on 10-year Treasury Notes), the average P/E has been 11. In contrast when interest rates were relatively low (below 6% on 10-year Treasury Notes) the average P/E has been 20. When interest rates on the 10-year Treasury Notes have been between 6% and 8%, the average P/E has been roughly 16.

As earnings decline, P/E ratios become progressively larger. Similarly, as interest rates move lower, it becomes progressively more difficult to determine a stable P/E ratio. At the extreme, as earnings or interest rates approach zero, the expected P/E ratio approaches infinity. For this reason, it is useful to reverse the P/E ratio and look at earnings relative to the price of the stock, the E/P ratio. The E/P ratio also has the advantage of being readily comparable to the interest rate. The chart below shows the E/P ratio on both the S&P 500 and the Dow Jones Industrial Index.

### Earnings/Price Ratios: S&P 500 and Dow Jones Industrials

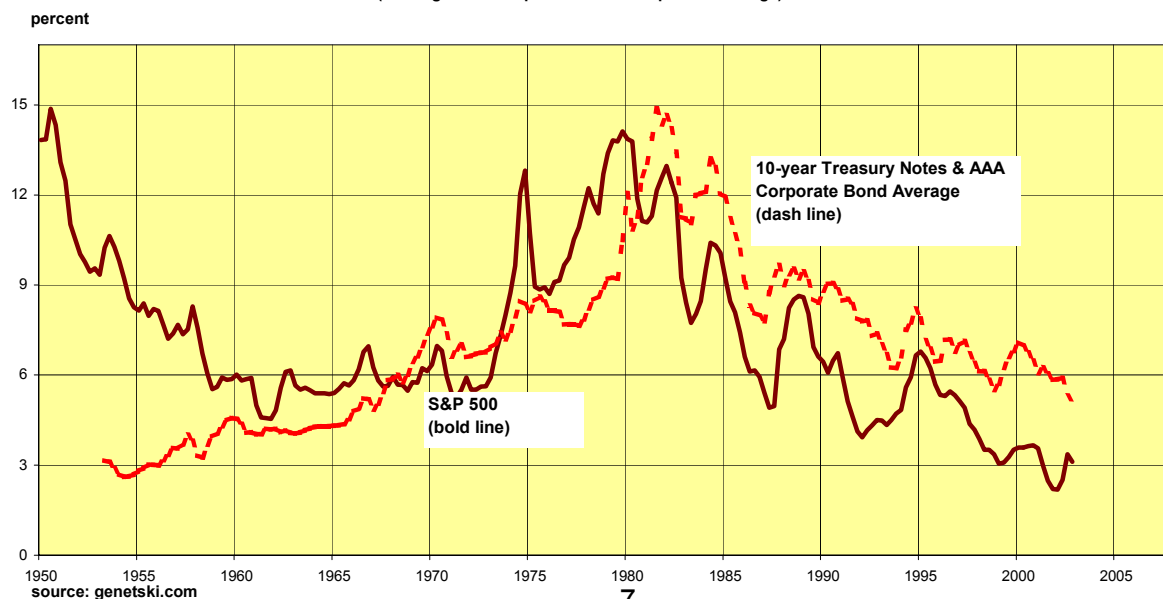
(Earnings are four-quarter totals of reported earnings)



The sharp swings in the E/P ratio reflect a combination of the interest rate environment and the perception regarding risk that happens to exist during that period. In the chart below, the average of interest rates on the 10-year Treasury Note and Moody's AAA corporate bond are plotted along with the E/P ratio for the S&P 500. During the 1950s, early-to-mid 1960s and the mid-to-late 1970s, investors perceived great risk in stocks. As a result, the earnings yield on

### Earnings/Price Ratio: S&P 500 and Long-term Interest Rates

(Earnings are four-quarter totals of reported earnings)



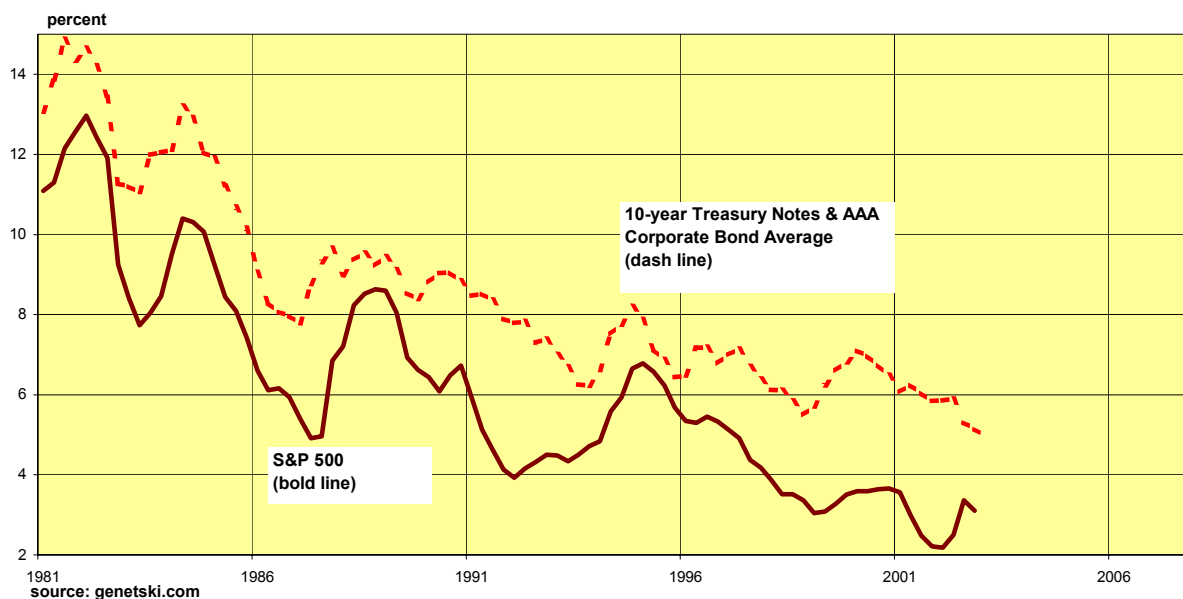
stock prices tended to exceed the yield on longer-term fixed income securities. Since the beginning of the 1980s, when the US embarked on a series of pro-growth policies, the perceived risks associated with stocks has been far less. As a result, the average earnings yield on the S&P 500 stock price has been roughly 2½ percentage points less than the yield on fixed income securities. In 2002, the earnings yield on the S&P 500 index was about 3%, which is roughly 2 percentage points below the yield on fixed-income securities. The earnings yield on the Dow companies was 4.6%, only about ½ percentage point below the yield from fixed-income securities.

### Putting It All Together

In order to determine the value of stocks it's necessary to begin by making a judgment about the relevant historical period. My judgment is that in terms of economic milieu, the current period is similar to the period since 1981, where investors do not fear either a major Depression or a shift away from pro-growth, free market policies. As the chart below shows, the E/P ratio during this period has been relatively stable compared to long-term interest rates.

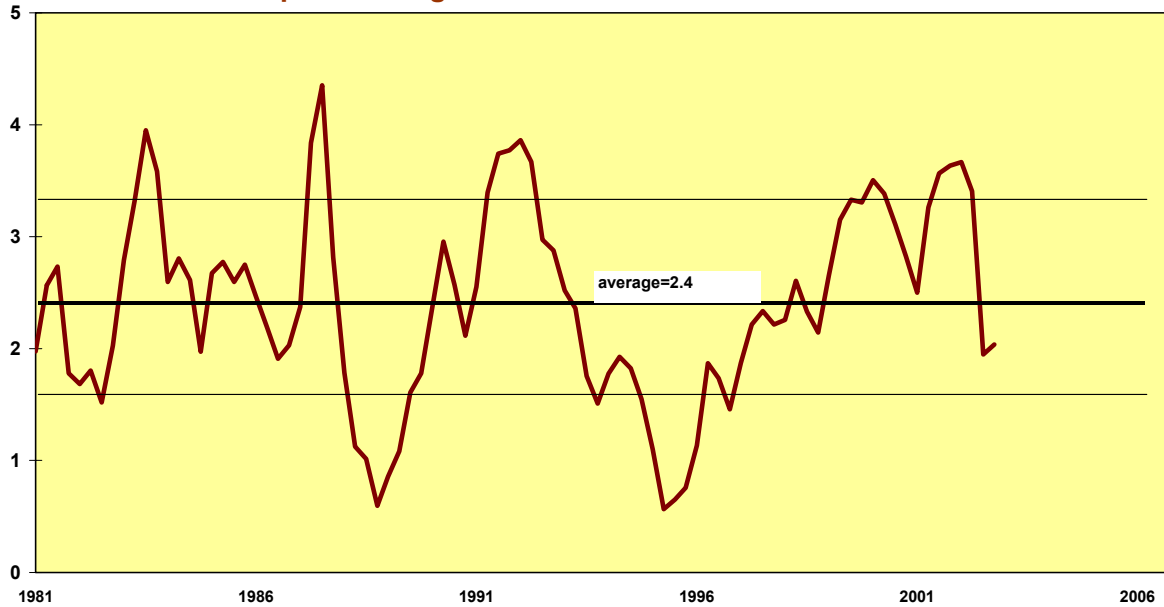
### Earnings/Price Ratio: S&P 500 and Long-term Interest Rates

(Earnings are four-quarter totals of reported earnings)



The next chart shows the spread between the E/P ratio and the long-term interest rate average along with lines indicating one standard deviation above and one below the average. The average provides a guide to a “normal” E/P ratio, given long-term interest rates. Standard deviation lines provide a guide to the extent to which the market has moved above or below a “normal” interest-adjusted E/P ratio during this period. The relationship between long-term interest rates and the E/P ratio provides a measure of the perceived risk that investors associated with holding stocks. When the E/P ratio moves closer to the interest rate, the perceived risk associated with holding stocks increases. When investors are willing to accept much lower earnings relative to stock prices, it indicates that the perceived risk associated with holding stocks has declined.

Spread: Long-term Rates Over E/P Ratio S&P 500



This analysis suggests that for the fourth quarter of 2002, a normal interest-adjusted E/P ratio for the S&P 500 would have been 2.4 percentage points below the average of the 10-year Treasury Note and the AAA corporate bond rate. During the fourth quarter the average of these interest rates was 5.1%. As a result, a normal E/P would be 3.0. With earnings at \$27.59 for the four quarters ending in this quarter, an E/P ratio of 2.4 would mean a normal or fundamental value of the S&P 500 of roughly 1000.

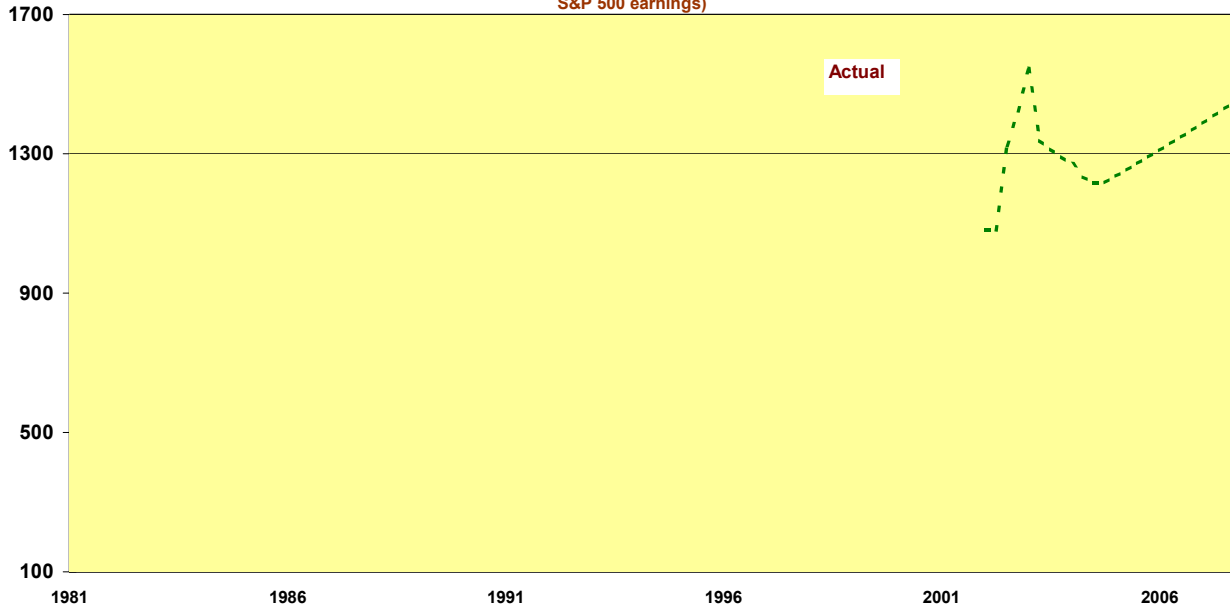
The chart on the following page shows the implications of calculating a fundamental value for the S&P 500 based on actual earnings and on trend earnings. Since actual earnings were well below trend at the end of 2002, the estimated value of the fundamental is relatively low. However, since interest rates may also have been well below their normal levels, this provides an offset that raises the fundamental value.

The chart shows that the S&P was overvalued for most of the latter half of the 1990s based on trend earnings. However, it was reasonably valued based on reported earnings until interest rates rose sharply at the end of the decade. Within the past year, the actual value of the S&P 500 has dropped below both estimates of fundamental value.

The behavior of interest rates plays a large role in future valuation. Under the assumption that the average of the long-term rates rises to 6% over the next two years, the fundamental value of the S&P 500 using trend earnings drops to a low of just over 1200 by the end of 2004. With the S&P 500 currently close to 900, the analysis suggests that this index should rise by roughly 30% over the next two years.

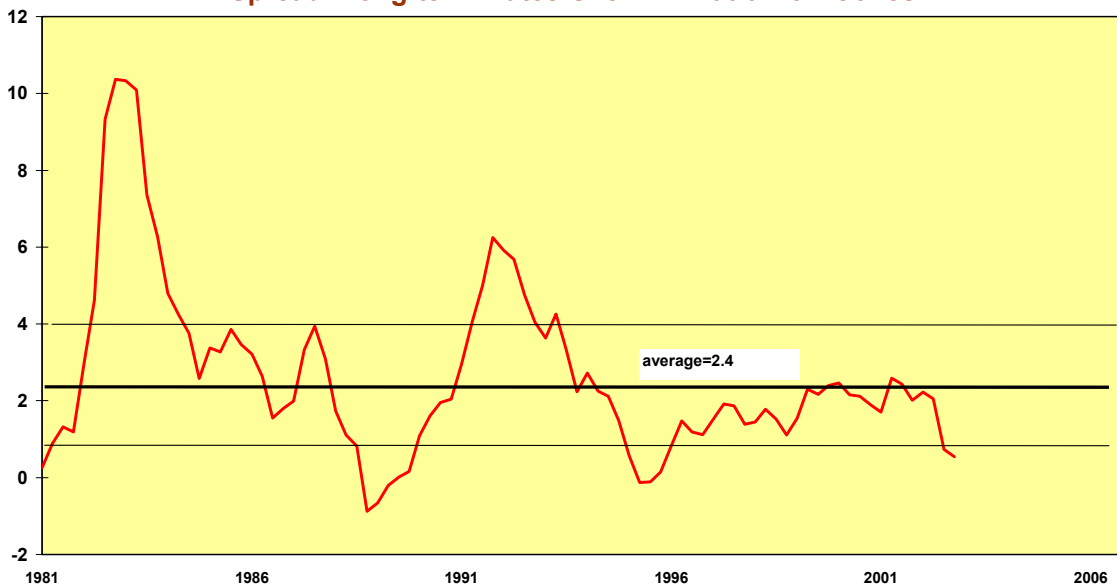
### S&P: Actual & Fundamental

(Fundamental based on average spread between long-term interest rates and E/P ratio using actual four-quarter reported S&P 500 earnings)

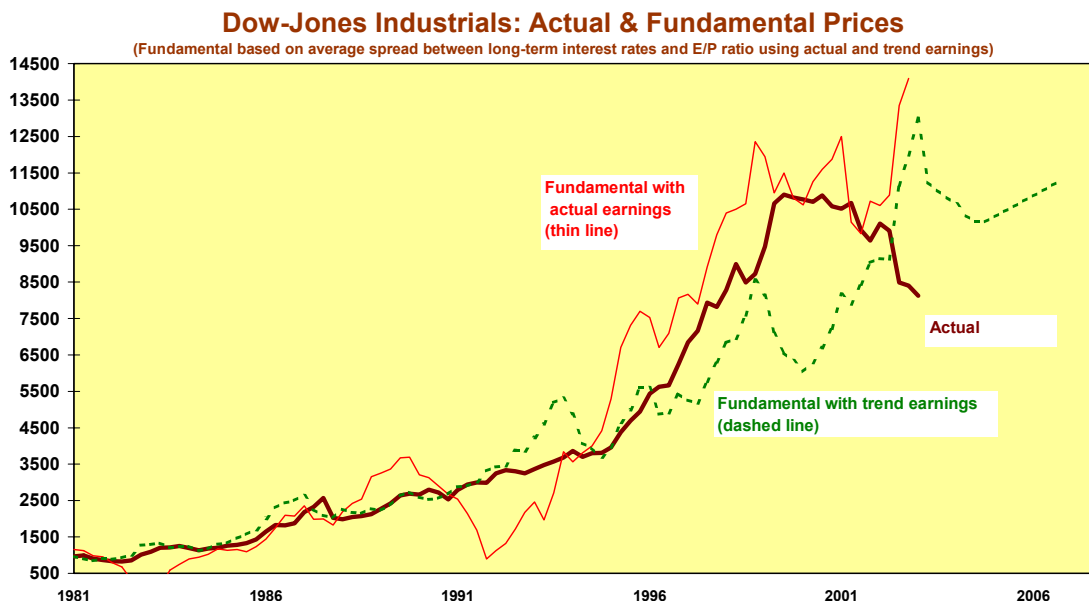


A similar analysis on the Dow-Jones data shows that the average E/P ratio on the Dow companies has been 2.7 percentage points below the yield on long-term rates. However, as the chart below shows, the Dow data are biased upward by the sharp drop in Dow company earnings in 1982 and again in 1991. Adjusting for these unusual periods produces an average spread 2.4 percentage points, which is the same spread that applied to the S&P 500. Although the spread is similar, greater volatility with respect to the Dow leads to an even larger standard deviation than with the S&P 500.

### Spread: Long-term Rates Over E/P Ratio Dow-Jones



Since Dow company earnings were above their trend line in the fourth quarter of 2002, the analysis using actual earnings shows that the fundamental value of the Dow was just over 14,000 or 68% above the actual reading of 8,400. With trend profits the value of the Dow in the fourth quarter is just under 1200. Either way, the analysis suggests that the Dow is now significantly undervalued. As with the S&P 500, an increase in interest rates will reduce the fundamental value. In the case of trend earnings, the fundamental value of the Dow would drop to just over 10,000 with the average of long-term interest rates rising to 6%.



It is important to note that the concept of a longer-term trend in earnings becomes less valid as the number of stocks becomes more limited. The concept has the greatest validity for the overall economy. It has somewhat less validity for the S&P 500 and much less for the 30 stocks in the Dow. Hence, if the current mix of Dow stocks happens to have earnings above the longer-term trend at a time of economic sluggishness, it strongly suggests that the current mix of companies will be able to generate earnings well above their historical trend line during a strong economic recovery.

Although the analysis in this report focuses on measuring value, the extent to which stocks are over or under-valued in the future depends on the extent to which the economic climate produces relatively strong profits with relatively low interest rates. The key to this is the extent to which economic policies move toward or away from pro-growth classical principles. My assumption has and continues to be that we are in the midst of an extended period where policies are moving in the direction of those principles. As a result, the coming years are likely to produce a combination of relatively strong increases in profits and relatively low interest rates. Given the current under-valuation of stocks, this climate bodes well for substantial positive gains from holding equities.

## Conclusions

There are several conclusions that can be drawn from this analysis. The first broad conclusion is that the profit trend for the entire economy tends to grow faster than the profit trend for either the S&P 500 companies or the Dow-Jones companies. This means that over time investments in a broad basket of smaller company stocks should outperform an investment in the types of larger companies included in the major stock indexes.

Second, profits for the total economy and for the Dow companies have held up much better during the recent period than reported profits for the S&P 500 companies. Since there has been a strong tendency for profits to return to their long-term trend lines, it's reasonable to assume that reported profits for the S&P 500 companies are likely to rise more rapidly than either those for the Dow companies or those for the overall economy during the coming years. Also, if S&P operating profit numbers are accurate, they suggest that even during a sluggish economy in 2002, profits were at their long-term trend.

As for stock market valuations, both the Dow and the S&P 500 stock price indexes appear significantly undervalued at the present time. The extent of the under-valuation depends on the future trends in both profits and interest rates. Assuming that profits for both the S&P 500 and Dow companies were consistent with their long-term trend growth and with long-term interest rates at present levels, my analysis suggests that the S&P 500 and the Dow were undervalued by 44% and 38%, respectively during the first quarter of 2003.

To the extent that interest rates are currently below normal, these figures overstate the extent of to which stocks are undervalued. Looking ahead, amid a strong economic recovery, both profits and interest rates would head higher. Assuming that S&P 500 earnings are consistent with their long-term trend; that Dow company earnings rise at a 5½% yearly rate from 2002 levels; and that long-term interest rates rise from roughly 5% to roughly 6% by the end of 2004 would produce lead to fundamental values for the S&P 500 and Dow indexes of roughly 1220 and 11000, respectively. Under these assumptions, both the S&P 500 and Dow could be expected to increase by roughly 30% between now and the end of 2004.

In summary, stocks appear to be significantly undervalued at the present time. At current long-term interest rates, the S&P 500 and Dow are undervalued by roughly 40%. If we assume that interest rates are unusually low and should be roughly a full percentage point higher, the expected increase in stock prices would be closer to 30% by the end of next year.