Some Selected Evidence Suggesting that the US Stock Market is Overvalued

Campbell and Shiller (1997) have constructed data since 1872 on January stock market prices ($P_t$) and total annual corporate earnings ($E_t$). Figure 1 shows the relationship between the ratio $P_t/E_{10_t}$ ($E_{10_t}$ denotes mean real earnings for years $t-10$ to $t-1$) and $\log (P_{t+10}/P_t)$, for every year from 1882 to 1987. The hollow square at the current $P_t/E_{10_t}$ ratio shows that a regression line through the historical data predicts a geometric rate of decline of more than 10 percent a year over the next ten years (note, however, that the total return would be better than this because shareholders would receive dividends), for a net decline of about 60 percent. While such an extreme outcome seems rather unlikely (note, for example, that the point for 1929 is well above the regression line, suggesting some degree of nonlinearity in the relationship), the figure certainly bodes ill for the stock market over the medium run.\footnote{The ‘current’ point represents July 1997. The last data point in the Campbell-Shiller data is for January 1997. To construct the current point, simply multiplied the January 1997 market price by the ratio of the July to the January level of the S&P 500, deflating by the change in the PPI from January to July. In principle, we should have done an adjustment to the 10-year moving average of earnings. Making a crude adjustment to earnings to reflect the most recent data only changes the $P_t/E_{10_t}$ ratio from 34 to 33.}

One reason the current $P_t/E_{10_t}$ ratio is so high is that earnings growth has been very strong over the last five years or so; even if the contemporaneous $P/E$ ratio were constant, $P$ over a lagged moving average of $E$ would be high in periods when $E$ had been growing fast. Defining $E_{1_t}$ as the once-lagged level of earnings, Figure 2 shows the ratio of $E_{1_t}$ to $E_{10_t}$. While $E_{1_t}/E_{10_t}$ is certainly higher than average right now, it is nowhere near a sample record. This suggests that it is stock prices, and not an unprecedented spurt of earnings growth, that is mainly responsible for the current high $P_t/E_{10_t}$ ratio. Figure 3 confirms this by showing that the ratio of price to one-year lagged earnings, $P_t/E_{1_t}$ is extremely high. In all of the years whose $P_t/E_{1_t}$ ratios rival or exceed the current ratio (1993, 1992, 1934, 1922, 1895), $E_{1_t}$ was, for cyclical reasons, very low relative to preceding years. By contrast, $E_{1_{1997}}$ is quite high compared to preceding years.

Another way to evaluate whether current market levels are plausible is to work out their implications for the evolution of capital’s share of GDP. To do this requires a forecast for earnings growth. If the value of a share of stock is equal to the PDV of the dividends to which that share entitles the holder, then the price of a share should be given by the Gordon formula:

$$P_t = \frac{D_t}{(r - g)},$$

where $r$ is the required rate of return for risky investment and $g$ is the expected growth of dividends per share. Given an assumption for $r$, this formula can be used to back out the value of $g$ that is consistent with an observed $P_t/D_t$ ratio, $g = r - D_t/P_t$. 

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The $g$ that emerges from this exercise is a measure of growth in dividends per share. Dividends per share can grow in (at least) three ways: through growth in earnings, holding capital constant; through growth in earnings because of growth in capital; or, holding capital and earnings constant, through a reduction in the number of shares (share buybacks). This last possibility has become relevant in the last fifteen years as firms have begun systematic share repurchases as a way of distributing earnings to shareholders in the form of (tax-preferred) capital gains. However, Campbell and Shiller (1997) note that if $D$ is defined as the sum of dividends and repurchases, the $g$ that emerges from the formula should represent total $D$ growth; if $D$ is a constant share of earnings, this translates directly into an earnings growth forecast. Repurchases amounted to about 0.8 percent in 1996 (Campbell and Shiller); given the rise in prices since, this is probably an upper bound for the appropriate 1997 adjustment. The current dividend yield is 1.6 percent, so the sum of dividend yield and repurchases is .016 + .008 = .024.

Taking the 30-year Treasury (current yield about 6.6 percent) as the riskless long-term nominal rate, the final assumption required is for the prospective equity premium (prospective here means the premium consumers would demand given their beliefs about mean dividend growth; it is not a forecast of the actual equity premium that will be realized). Of course, the lower is the equity premium, the lower is the justifiable payout ratio $D_t/P_t$. The average realized equity premium over the postwar period has been about 5 percent; however, this figure partly reflects the terrible returns received on nominal assets during the unanticipated inflations of the 1960s and 1970s. It may also reflect a temporary but powerful aversion to stocks in the wake of their appalling fall during the Great Depression. Thus, there is considerable reason to believe that the prospective required equity premium is much lower than 5 percent. Siegel (1994) shows that the historical average value of the equity premium for stocks before the Great Depression was roughly 2-1/2 percent, so I will assume an equity premium has fallen to .025, yielding a nominal discount rate on risky assets of .066+.025=.091. This implies $g = .091-.024 = .067$.

Seven percent nominal earnings growth does not seem extravagant (though recall that at every opportunity I made conservative assumptions). However, what is required is seven percent nominal growth forever, clearly unsustainable in an economy with a natural rate of growth of 5 percent. I therefore divide the future into the “near term” of the next five years, and the “long term,” the period from five years out onward, and I assume that in the long term, earnings growth will equal GDP growth at 5 percent (nominal) annually. In this case, the minimum near-term growth rate in nominal earnings required to justify current $D_t/P_t$ ratios is about 15 percent annually.

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2 Campbell and Shiller note that stock options issued to employees should be netted against repurchases; Nelly Lang at the Board says that in 1996 option exercises were about half of repurchases, making the 0.8 percent figure look even more like an upper bound. Shulman, Brown, and Narayanan (1997) calculate that so far in 1997 employee options are actually larger than repurchases, which would argue for a downward adjustment to $D/P$. 

Is 15 percent annual growth in earnings over the next 5 years reasonable? Market analysts’ “top down” estimates of next-five-year growth in nominal earnings for the S&P 500 as a whole are currently around 8 percent, although “bottom up” estimates, which sum the appropriately weighted earnings growth for each of the stocks in the S&P 500 individually, imply nominal earnings growth per share of about 12.6 percent (memo from Steven Sharpe to Alan Greenspan, August 1997).

Another way to gauge whether 15 percent nominal growth is plausible is to examine its implications for capital’s share of GDP. Figure 4 shows that if aggregate earnings grow at an 15 percent nominal rate for the next five years while the rest of the GDP forecast comes out as anticipated in the Midsession Review, capital’s share of GDP will reach an all-time postwar high in 2000 and rise to preposterous levels by 2002.

One concern about the foregoing calculation is whether it is appropriate to apply the projections for earnings growth for the S&P 500 to the NIPA earnings numbers. For example, the S&P 500 contains many large multinational firms; if most of the 15 percent nominal growth of total earnings were to come from overseas branches of such firms, it might be inappropriate to apply that 15 percent to the NIPA earnings figures. Figure 5 shows earnings growth rates for S&P earnings and NIPA earnings; in the past, the two have been highly correlated, although the correlation does appear to have fallen somewhat in recent years. Still, this figure does suggest that 15 percent S&P growth would probably go along with a very similar figure for NIPA earnings growth.

**Explanations?**

“I know of no way of judging the future but by the past.” - Patrick Henry

Backward-looking expectations are probably the simplest explanation. This is an appealing story because it has also been used to explain other anomalies in stock market pricing, e.g. the consistent poor return on “growth” stocks whose price/earnings ratio is high and whose price or earnings have grown sharply, and the consistent good returns on “value” stocks with low P/E ratios.

Another observation supporting this view is that a regression of the $P_t/E_{10t}$ ratio on $E_{1t}/E_{10t}$ and $P_{t-1}/P_{t-10}$ finds that the $P_t/E_{10t}$ ratio is very strongly positively related to lagged price growth, even after accounting for earnings growth relative to its lag. Of course, there are other possible explanations for such a finding, but none that convincingly explains the overall pattern of results.
Figure 1

Once-Lagged E Over MA(10) of E

Figure 2

P/E Ratio Versus Subsequent Returns

Campbell-Shiller Data  Current Point  Regression Line

1929

Now
FIGURE 3

Price Over Last Year's Earnings

FIGURE 4

Capital's Share in GDP
FIGURE 5

Rates of Return, S&P vs NIPA