

Economic Trends

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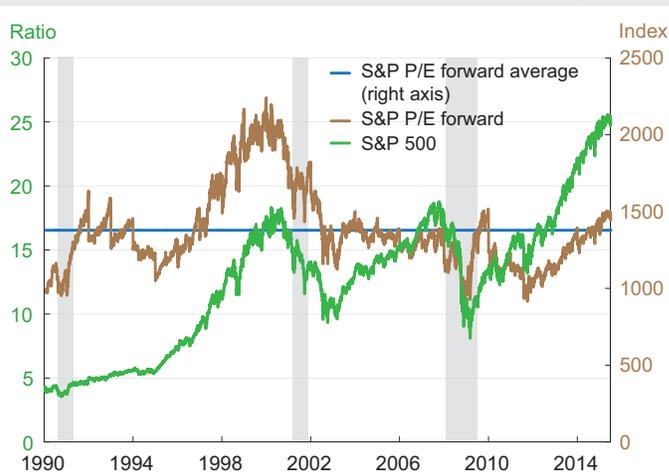
Comparing Price-to-Earnings Ratios: The S&P 500 Forward P/E and the CAPE

Joseph G. Haubrich, Sara Millington, and Brendan Costello

The price of a stock and its earnings per share allow investors to evaluate the growth potential of individual companies. These two pieces of information can be combined to produce ratios that track the relative valuation of companies over time. One popular metric is the price-to-earnings ratio (P/E ratio). When a P/E ratio is high, it is often a signal that either prices or earnings will change to bring the ratio back toward its average. Some people use the ratio to see if a stock is overvalued, if they think the price is too high to be supported by the earnings. We look at couple variants of the P/E ratio and compare the kinds of information each provides.

The P/E ratio is computed by dividing the current stock price of a company by some measure of its earnings. The ratio can be calculated in two ways: forward or trailing. The trailing P/E ratio uses a company's historical earnings data, while the forward P/E ratio uses an estimate of future earnings. (Specifically, the forward PE uses analysts' consensus earnings forecast for the next 12 months.) Since the forward P/E ratio uses projections of future earnings, it has the advantage of looking at expected earnings, rather than current earnings, which may be high or low because of one-time factors that don't reflect the prospects of the firm. On the other hand, a company's forward P/E can be artificially deflated by a rosy earnings estimate, particularly in a boom period. Addition-

S&P 500: P/E, P/E Forward, and Averages



Notes: Shaded bars indicate recessions. Last observation: July 2015.
Source: Bloomberg LP.

ally, earnings are volatile in the short-term, and profit margins tend to revert to a long-term average over a business cycle—further clouding the usefulness of the forward P/E. Still, the forward P/E is often used to analyze the valuation of a company relative to how much they actually expect to earn.

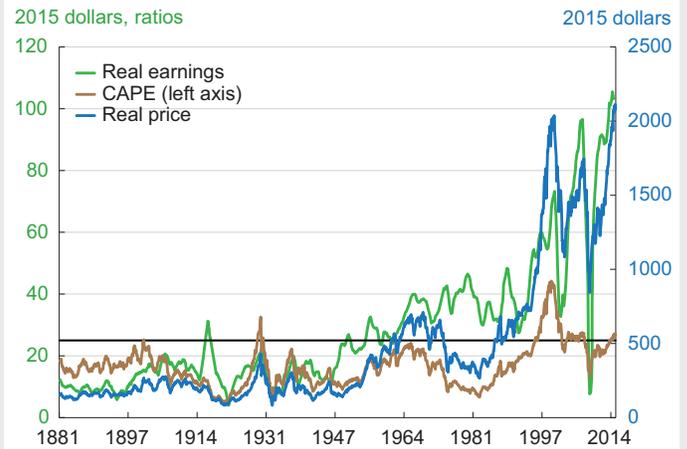
One variant of the forward P/E ratio is the S&P forward P/E ratio, which is computed with the price and earnings of the 500 stocks that comprise the S&P 500 index, allowing us to track the valuation of a large sample of companies over time. The average S&P 500 P/E forward ratio for the period 1990 to July 2015 is 16.5. The forward P/E rose dramatically in the late 1990s, in retrospect perhaps signaling the end of the stock market boom.

The forward P/E should not be taken as an infallible indicator of where prices will move. Since 2006, the S&P forward P/E ratio has generally remained below its 15-year average and well below the highs seen in the 1990s. In particular, the ratio did not increase substantially before the 2007-2008 financial crisis and did not provide a strong signal before the subsequent bear market. More recently, the ratio has grown at a markedly slower rate than the S&P 500 stock index, perhaps suggesting that stock prices have been justified by higher expected earnings.

To correct for some of the problems with using the forward P/E ratio, Yale economist Robert Shiller created a new metric: the Cyclically Adjusted Price-to-Earnings Ratio (CAPE). This ratio divides the S&P 500 index by trailing 10-year average earnings. Because this method uses historical data, it eliminates any estimate bias, and the 10-year horizon smooths out short-term volatility and variation over the business cycle. Still, the 10-year threshold is arbitrary, and may overcompensate—meaning it is less sensitive to variations in earnings that occur within a 10-year period.

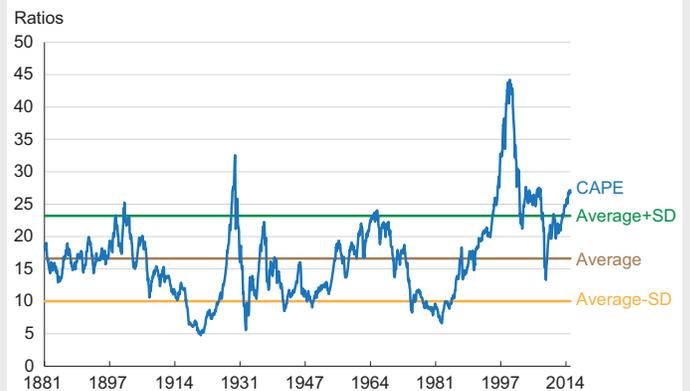
We see defined peaks in the CAPE in the late 1920s, before the Great Depression, and in the late 1990s before the crashing of the dot-com bubble. Corrections occurred immediately after both of these peaks and again during the Great Recession. The mean value of the CAPE over the period is 16.62. One standard deviation up and down are indicated on the chart below, which captures 67 percent of the values of the CAPE. We see that in the most recent post-recession datapoints, the CAPE is climbing above the one-standard-deviation bar, and companies are becoming relatively higher valued.

Decomposition of CAPE



Last observation: June 2015.
Source: Shiller, "Irrational Exuberance."

Cyclically Adjusted P/E



Last observation: June 2015.
Source: Shiller, "Irrational Exuberance."

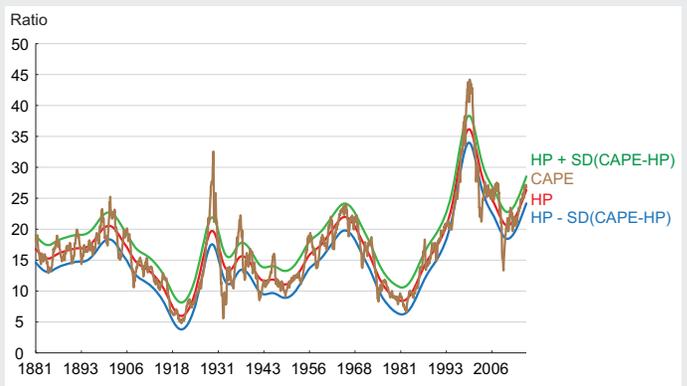
We can decompose the CAPE into its two constituent parts: aggregate company market prices and aggregate earnings. Note that the aggregate components are adjusted to their real values by discounting for inflation. Historically, we see that earnings and prices moved largely together, meaning that neither measure was disproportionately affecting the CAPE. Starting in the late 1990s, however, we see that prices have grown substantially faster than earnings.

If the CAPE moves too far above the trend, it sparks fear that a crash or bear market is forthcoming. To analyze the CAPE's position, though, you must define a trend. The simplest definition is the long-term average, which we show in the decomposition chart. Another possible trend is one that moves. To analyze a moving trend, we use a Hodrick-Prescott (HP) filter, which provides a smooth trend that fluctuates over time.

The chart below shows the original CAPE data with the HP-filtered data superimposed over it. Compared to the original series, the smoothed data is much tighter around the average value. In particular, the peaks of the late 1920s and late 1990s, though still present, are significantly reduced in magnitude, due to their short duration. Though recent CAPE levels look high relative to the long-run average level, relative to the HP trend they don't look particularly high. Considering the current value of the CAPE from a historical perspective, we would expect a market correction to bring it closer to the average. However, it is only slightly above the HP filter moving average value, and it falls within the standard deviation bands of the HP filter.

The P/E ratio has proven useful in the past for detecting when the stock markets are overvalued and headed for a correction. However, since the early 2000s the economy may have changed structurally; for example, the type of jobs that are available or the industries that are driving growth may now be different than in the past. These factors may need to be taken into account when assessing what is "normal" or "overvalued" in today's markets. A moving average representation of the P/E ratio, such as the CAPE with the HP filter, allows us to better analyze whether the P/E ratio is truly above its trend.

CAPE with Hodrick-Prescott Filter



Last observation: June 2015.
Source: Shiller, "Irrational Exuberance."



Joseph Haubrich is a vice president and economist at the Federal Reserve Bank of Cleveland, where he is responsible for leading the Research Department's Banking and Financial Institutions Group. He specializes in research related to financial institutions and regulations.

Sara Millington is a research analyst in the Research Department of the Federal Reserve Bank of Cleveland. Her primary interests include macroeconomics, monetary policy, and public finance.

Brendan Costello is an intern in the Research Department of the Federal Reserve Bank of Cleveland. His primary interests include financial policy and regulation, innovation and patent policy, and law and economics.

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