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The Shiller CAPE Ratio: A New Look

Jeremy J. Siegel

Robert Shiller's cyclically adjusted price–earnings ratio, or CAPE ratio, has served as one of the best forecasting models for long-term future stock returns. But recent forecasts of future equity returns using the CAPE ratio may be overpessimistic because of changes in the computation of GAAP earnings (e.g., "mark-to-market" accounting) that are used in the Shiller CAPE model. When consistent earnings data, such as NIPA (national income and product account) after-tax corporate profits, are substituted for GAAP earnings, the forecasting ability of the CAPE model improves and forecasts of US equity returns increase significantly.

In 1998, Robert Shiller and John Campbell published the pathbreaking article "Valuation Ratios and the Long-Run Stock Market Outlook." A follow-up to some of their earlier work on stock market predictability, it established that long-term stock market returns were not random walks but, rather, could be forecast by a valuation measure called the "cyclically adjusted price–earnings ratio," or CAPE ratio.[1] Shiller and Campbell calculated the CAPE ratio by dividing a long-term broad-based index of stock market prices and earnings from 1871 by the average of the last 10 years of earnings per share, with earnings and stock prices measured in real terms.[2] They regressed 10-year real stock returns against the CAPE ratio and found that the CAPE ratio is a significant variable that can predict long-run stock returns.

The predictability of real stock returns implies that long-term equity returns are mean reverting. In other words, if the CAPE ratio is above (below) its long-run average, the model predicts below-average (above-average) real stock returns for the next 10 years. **Figure 1** plots the CAPE ratio from 1881 through 2014, together with both the forecast 10-year annualized real stock returns from the model and the actual 10-year forward returns.[3] The CAPE model explains more than a third of the variation in future 10-year real stock returns.

The CAPE model first gained national attention on 3 December 1996, when Robert Shiller and John Campbell presented a preliminary version of their research to the Board of Governors of the Federal Reserve, warning that stock prices in the late 1990s were running well ahead of earnings. Fed Chairman Alan Greenspan's (1996) "irrational exuberance" speech, delivered one week later, was said to have been partly based on their research.[4] At the top of the bull market in 2000, the CAPE ratio hit an all-time high of 43, more than twice its historical average, and correctly forecast the poor equity returns over the next decade. In January 2015, the CAPE ratio reached 25.04—54.59% higher than its long-term mean—forecasting a 10-year future real stock return of only 2.20%. This estimate is 4.5 percentage points (pps) below the long-run compound annual real return on equities, which averaged 6.70% a year between 1871 and 2015.

The CAPE model's January 2015 forecast of meager stock returns is the result of two factors: the higher valuation of equities and the forecast decline of the CAPE ratio. If the CAPE ratio remains constant at its January 2015 value and if the growth rates of real earnings and dividends remain at their average levels since 1871, the 10-year future annualized real return on stocks will be 5.2%—150 bps below its long-run average.[5] This estimate implies that the forecast reversion of the CAPE ratio to its mean subtracts an additional 300 bps from the annual return on equity.

Reasons for Elevated CAPE Ratios

One of the suggested reasons for the elevated CAPE ratios (including the number cited by many bearish stock market forecasters) is that investors are overoptimistic about future earnings growth and when that growth does not materialize, investors will sell, sending stock prices downward.

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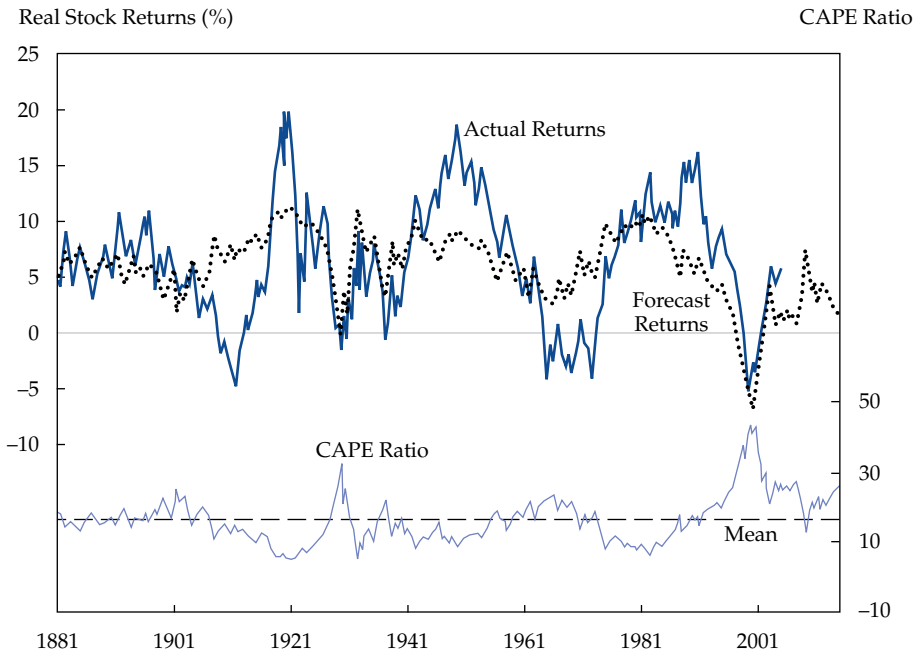
Editor's note: This article was reviewed and accepted by Robert Litterman, executive editor at the time the article was submitted.

Figure 1. Shiller CAPE Ratio and Actual and Forecast 10-Year Real Stock Returns, 1881–2014



But there are other explanations for an elevated CAPE ratio that do not rely on unduly bullish expectations of future earnings. The rise in the CAPE ratio and the forecast reduction in the real stock return may be owing to the dramatic fall in the real yield on bonds. The average real return on US Treasury bonds over 1871–2014 was 2.95%, but the January 2015 real return on 10-year Treasury inflation-protected securities (TIPS) was only 0.5%. The 2.45 pp reduction will exceed the reduction in the real return on stocks if the CAPE ratio remains at its current level over the next 10 years.

Even if real returns on bonds revert to their historical mean, the CAPE ratio could remain at its 2015 elevated level owing to a lower equity risk premium required by investors. The vast literature in this area dates back to the pathbreaking research of Mehra and Prescott (1985), who found that the realized returns on equities are far too high to be explained by standard risk and return models. The higher CAPE ratio may reflect investors' adjustment to a lower risk premium over bonds and thus their willingness to accept a lower real return on stocks relative to bonds.

In this article, I offer an alternative explanation of the elevated CAPE ratio. The nature of the earnings series that is substituted into the CAPE model has not been consistently calculated for the long period over which Shiller has estimated his CAPE equations. Changes in accounting practices since 1990 have depressed reported earnings during economic downturns to a much greater degree than in the earlier years of Shiller's sample. Because the CAPE ratio takes into account the last 10 years of earnings, any stock return forecast issued before 2018 will include the extraordinarily low earnings of 2008–2009 and may be biased downward.

Shiller's CAPE Methodology

Shiller's CAPE methodology regresses the forward 10-year annualized real stock return (RET_t) on the current value of the $CAPE_t$ ratio, which is the simple arithmetic average of the last 10 years of real reported per share earnings of the S&P 500 Index, $EARN_t$, over 1881–2004:

$$RET_t = \underset{t = 10.53}{0.270} - \underset{t = 8.13}{0.177}\log\left(CAPE_t\right) + \varepsilon_t, R^2 = 0.350,$$

where

$$CAPE_t = \frac{P_t}{\left[\left(EARN_t + EARN_{t-1} + \ldots + EARN_{t-10}\right)/10\right]}.$$

The coefficient on the CAPE ratio is highly significant and the R^2 is 35%, indicating that the CAPE ratio explains more than a third of the variation of 10-year real equity returns.

The Total Return Portfolio

The CAPE methodology is not robust to a secular change in the growth rate of per share earnings. The higher the growth rate of real earnings, the lower the average of the past 10 years of earnings relative to current earnings—which raises the

Table 1. Earnings and Dividend Growth, 1871–2014

Period	Earnings per Share Growth	Dividends per Share Growth	Average Dividend Yield	Dividend Payout Ratio	Real Stock Return
1871–2014	1.83%	1.47%	4.27%	56.9%	6.70%
1871–1945	0.68	0.76	5.04	65.6	6.68
1946–2014	3.07	2.24	3.25	49.5	6.72

CAPE ratio. The higher ratio biases the forecast of future returns downward because it is based on estimates drawn from data when the growth rate of earnings was lower. As **Table 1** shows, growth in real earnings per share has accelerated since 1945. One reason for the higher growth is the substitution of share buybacks for cash dividends, as evidenced by the sharply lower dividend payout ratio.[6]

Acknowledging that a change in dividend policy affects the CAPE ratio, Bunn and Shiller (2014) neutralized its impact by constructing the CAPE ratio of a *total return portfolio* (TRP). The TRP assumes that all dividends are reinvested in the index and that the TRP's earnings per share are the index's earnings per share times the number of shares in the TRP—what Bunn and Shiller termed the "scale-adjusted earnings per share." The P/E (price-to-earnings ratio) of the TRP is the total return divided by the scale-adjusted earnings, and the CAPE ratio of the TRP is the total return index divided by the average of the last 10 years of scale-adjusted earnings per share—with all variables calculated in real terms. The TRP is agnostic as to whether a change in dividend policy has taken place because it treats price and dividend returns symmetrically.

The scale-adjusted earnings per share grow at a faster rate than the per share earnings of an index of stock prices because of the reinvestment of dividends—suggesting that the 10-year past average of scale-adjusted earnings will be a smaller fraction of current scale-adjusted earnings than the CAPE ratio calculated at the index level and will have a higher average CAPE ratio. **Figure 2** plots the standard Shiller CAPE ratio as the price index CAPE ratio and the total return CAPE ratio.

The mean CAPE ratio of the TRP is 19.84, or 22.5% higher than the price index CAPE ratio; the January 2015 total return CAPE ratio exceeds its long-run mean by 40.0%, compared with 54.6% for the price index CAPE ratio. Shifting from a price index to a total return CAPE ratio explains some, but certainly not all, of the rise in the CAPE ratio. The forecast 10-year real return on stocks in the TRP rises to 2.81%—61 bps higher than the 2.20% projected by the price index CAPE ratio but still well below the 6.7% historical average real return on stocks.

Earnings Concepts

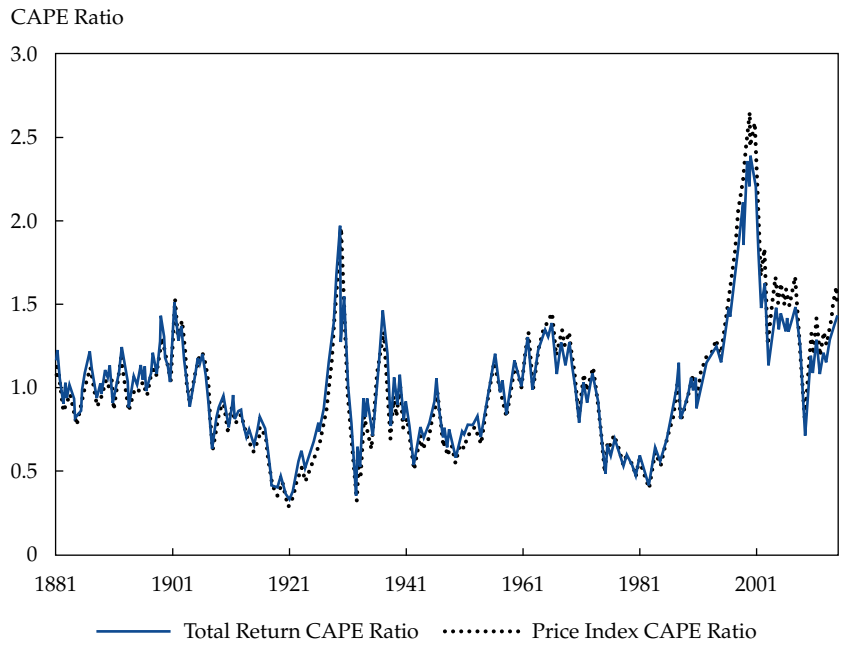
Although the lower real return on bonds and/or a lower equity risk premium may explain the rise in the CAPE ratio, an alternative reason for the higher CAPE values in recent years is changes in accounting standards, particularly for reported earnings. Companies report their earnings in two principal ways: reported earnings (or net income) and operating earnings. Reported earnings are earnings sanctioned by the Financial Accounting Standards Board (FASB), an organization founded in 1973 to establish accounting standards. Those standards—the generally accepted accounting principles, or GAAP—are used to compute the earnings that appear in annual reports and that are filed with government agencies (earnings filed with the IRS may differ from those filed elsewhere). GAAP earnings, which are the basis of the Standard & Poor's reported earnings series that Shiller used in computing the CAPE ratio, have undergone significant conceptual changes in recent years.

A more generous earnings concept is operating earnings, which often exclude such "one-time" events as restructuring charges (expenses associated with a company's closing a plant or selling a division), investment gains and losses, inventory write-offs, expenses associated with mergers and spinoffs, and depreciation or impairment of "goodwill." But the term *operating earnings* is not defined by the FASB, and companies thus have some latitude in interpreting what is and what is not excluded. In certain circumstances, the same charge may be included in the operating earnings of one company and omitted from those of another.

Because of these ambiguities, several versions of operating earnings are calculated. Standard & Poor's calculates a very strict version of operating earnings that differs from GAAP reported earnings only in excluding asset impairments (including inventory write-downs) and severance pay associated with such impairments.[7] We can call the earnings reported by companies "company operating earnings" and those calculated by Standard & Poor's "S&P operating earnings."[8]

Over 1988–2014, when all three earnings series are available, S&P operating earnings averaged 15.5% above reported (GAAP) earnings, and company-reported operating earnings averaged 3.2% above S&P

Figure 2. Price Index CAPE and Total Return CAPE Ratios relative to Their Means, 1881–2014



operating earnings. During recessions—particularly the Great Recession of 2008–2009—the gaps between these earnings concepts widened significantly. In 2008, company operating earnings declined 26.9% to $50.84, S&P operating earnings fell 40% to $39.61, and GAAP reported earnings collapsed 77.3% to $12.54.

Changes in Reported Earnings

The definition of reported earnings has undergone substantial changes in the last two decades. In 1993, the FASB issued Statement of Financial Accounting Standards (FAS) No. 115, which stated that securities of financial institutions held for trading or "available for sale" were required to be carried at fair market value. FAS Nos. 142 and 144, issued in 2001, required that any impairments to the value of property, plant, equipment, and other intangibles (e.g., goodwill acquired by purchasing stock above book value) be marked to market.[9] These new standards, which required companies to "write down" asset values regardless of whether the asset was sold, were especially severe in economic downturns, when the market prices of assets are depressed. Furthermore, companies were not allowed to write tangible fixed assets back up, even if they recovered from a previous markdown, unless they were sold and recorded as "capital gain" income.[10]

An example of this earnings distortion is Time Warner's purchase of America Online (AOL) for $214 billion in January 2000, at the peak of the internet boom. AOL, a member of the S&P 500 at the time, registered a huge capital gain for shareholders when it was acquired by Time Warner, also an S&P 500 member, because the purchase price was far above book value, but that capital gain was never recorded in the S&P earnings data. In 2002, after the internet bubble popped, Time Warner was forced to write down its investment in AOL by $99 billion—at the time, the largest loss ever recorded by a US corporation. The combined profits and market value of AOL and Time Warner were not materially different after the tech bubble than before. But because the capital gains on AOL shares were never included as earnings, the aggregate earnings of the S&P 500 fell dramatically when AOL's market price tumbled. Many other companies also took large write-downs on assets acquired during the tech bubble.

The impact of write-downs was even more extreme in the Great Recession that followed the financial crisis. Before 2008, there was never a loss in any quarter in the historical reported earnings data that Shiller used, including the Great Depression of the 1930s. But GAAP earnings in the fourth quarter of 2008 experienced a loss of $23.25, caused primarily by the huge write-downs of two financial firms—AIG and Citigroup—and Bank of America, which together lost in excess of $80 billion. None of these losses would have been recorded in GAAP earnings before FAS Nos. 115, 142, and 144 were issued.

Some might claim that the large losses taken by financial firms in Q4 2008 offset the firms' unjustified extra profits from booking subprime mortgages before the crisis. But this claim finds little support in an examination of a time series of the earnings

data for the financial sector. From the 12-month period beginning in Q4 2003, when subprime lending began to grow rapidly, to the 12-month period ending June 2007, the peak level of financial firms' earnings, reported earnings of the S&P 500 financial sector rose 32%—which is less than the 42% for all S&P 500 companies over the same period.[11] Bianco and Wang (2015) showed that S&P 500 financial firms experienced $497 billion in write-downs and excess loss provisions over 2007–2010, dwarfing the profits made from subprime securitizations and premiums received from underwriting mortgage-related securities.

The Aggregation Bias in S&P 500 Index Earnings

A few companies with large losses affect the interpretation of the P/E of a stock index that includes those companies. A distortion related to the Standard & Poor's methodology for computing the P/E of an index—what I call the "aggregation bias"—overestimates the effective ratio of the index when a few companies generate large losses, as happened during the financial crisis. S&P adds together the dollar profits and losses of each S&P 500 company, without regard to the weight of each company in the index, to compute the aggregate earnings of the index. This procedure would be correct if each company were a division of the same conglomerate and one wished to determine the P/E of that conglomerate.[12]

But this methodology understates the valuation of a portfolio that contains independent companies—because the value of an individual stock can never go below zero no matter how great its losses become; the losses do not offset the equity values of other companies.[13] Although AIG alone had a weight of only under 0.2% in the S&P 500 at the time, its $63 billion loss more than wiped out the aggregate profits of the 30 most profitable companies in the S&P 500 in Q4 2008—companies whose market values composed almost half the index. This dramatic decline in reported earnings of the S&P 500 is a major reason why the CAPE ratio has remained so far above its mean since the financial crisis. Because the exact size of this aggregation bias is difficult to measure, I do not make any adjustment for it in the S&P earnings data. If one were to do so, it would move in the direction of increasing effective earnings in recessions.[14]

NIPA Profits

Because of changes in the definition of GAAP earnings, it is important to use a definition of corporate profits that has not changed over time, as in the series computed by the national income economists at the Bureau of Economic Analysis (BEA), which compiles the national income and product accounts (NIPAs). The BEA defines "corporate profits" as the income earned from the current production by US corporations—based on "adjusting, supplementing, and integrating financial-based and tax-based source data" (Hodge 2011, p. 22).[15] Annual data on corporate profits go back to 1928, and quarterly data to 1947. Andrew Hodge, an economist at the BEA, has indicated that line 45 of Table 1.12 of the National Income and Product Accounts Tables has the data most comparable to the profits reported by Standard & Poor's.

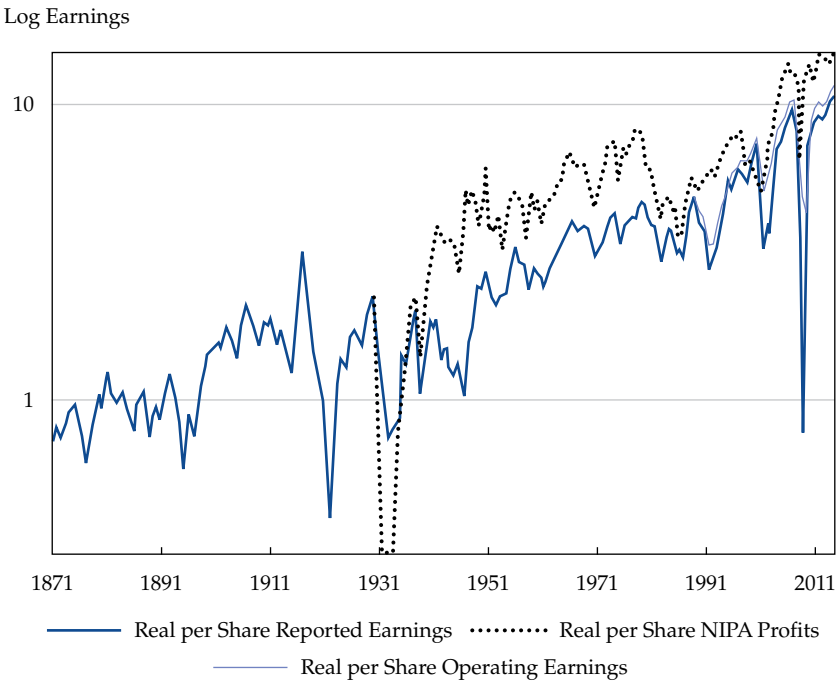
Figure 3 plots after-tax per share earnings recorded by three different series: (1) the reported earnings series published by Standard & Poor's and used in the Shiller–Campbell analysis; (2) S&P operating earnings, the companion series first published by Standard & Poor's in 1989; and (3) real after-tax corporate profits as published in the NIPAs adjusted for changes in the number of shares outstanding.[16] It is easy to see that the sharp declines of S&P reported earnings have increased markedly in the last decades.

Variability of Earnings

Table 2 confirms the increase in the volatility of S&P reported earnings by computing the percentage decline in each of the three measures of earnings from 1929 to the present, during the business cycles as defined by the National Bureau of Economic Research. The volatility of S&P reported earnings has increased dramatically in the last three business cycles. Before 1989, the percentage decline in S&P reported earnings was *less than* the percentage decline in NIPA profits in every recession except 1937–1938. The average magnitude of the earnings decline in recessions was 23.9% for S&P reported earnings and 37.3% for NIPA profits. But in the last three recessions, S&P reported earnings fell by more than twice as much as NIPA profits. In the 1990 recession, S&P reported earnings fell 42.8% while NIPA profits fell only 4%. In 2001, S&P reported earnings fell 55.3% and NIPA declined 24.3%. In the Great Recession, NIPA fell 53% while S&P reported earnings declined 92.1%.

As noted earlier, it is puzzling that the decline in S&P reported earnings in the 2008–09 recession—when the maximum decline in GDP was just over 5%—was much greater than the decline in S&P reported earnings in the Great Depression, when GDP declined five times as much. NIPA corporate profits, unlike S&P reported earnings, were negative in 1931 and 1932, far more in line with other economic data. These disparities also suggest that there has been a change in the S&P methodology from likely understating declines in

Figure 3. Real per Share Stock Earnings, 1871–January 2015



earnings during economic downturns to significantly overstating them.

The accounting profession has analyzed the trends and sources of the volatility of reported earnings. Givoly and Hayn (2002) found that accounting standards have become more conservative over time, particularly by requiring mark-to-market accounting in the case of asset impairment. Dichev and Tang (2008) surmised that changes in accounting standards are primarily responsible for increased earnings variability. Other researchers, conceding that changes in standards are one source of increased volatility, also point to the growing number of companies that consider both intellectual property and R&D important. Such companies, which have more flexibility in reporting when costs are taken, can be a source of increased volatility. Donelson, Jennings, and McInnis (2011) determined that although accounting standards definitely play a role in increasing earnings volatility, special item charges not connected with accounting standards may be more important.

Some financial economists, including Andrew Smithers of the United Kingdom, believe that management's manipulation of earnings leads to both an overstatement of earnings and an increase in their volatility. Smithers (2014a, 2014b) has maintained that managers manipulate earnings in order to reach short-term goals on which their bonuses and the value of their options depend. Certainly, many of the earnings reported by tech companies are overstated because they do not include option expenses. But since 2004, both operating and S&P reported earnings do include option expenses, in line with the FASB requirement that all companies expense options no later than 2006.[17]

The large gap between the S&P 500 reported earnings series and NIPA profits in the Great Recession prompted the BEA to issue Hodge (2011).[18] The author confirmed that "a key source of the high volatility in the S&P 500 quarterly reported earnings is asset write-downs," citing the charges taken by AIG and other prominent financial companies in 2008 and 2009.

CAPE Ratio with Alternative Earnings Series

Table 3 shows summary statistics for the CAPE forecasting regressions using S&P reported earnings, S&P operating earnings, and NIPA profits. Because the S&P operating earnings series is available from 1989 and the NIPA profits from 1928, the S&P reported earnings series is spliced into those series in the earlier years. Because the recent mark-to-market rules are applied more stringently to reported earnings than to operating earnings, the S&P operating earnings series, appended to the reported earnings data, may be calculated more consistently than the reported earnings series.

In forecasting future 10-year real stock returns, the highest R^2 is achieved by using NIPA profits for specifications of the CAPE regression, with either

Table 2. Earnings Declines in Recessions, 1929–2014

Recession		Change in After-Tax Real Earnings		
Peak	Trough	NIPA	S&P Reported	S&P Operating
August 1929	March 1933	–126.3%	–66.6%	
May 1937	June 1938	–41.3	–47.4	
February 1945	October 1945	–24.1	–21.8	
November 1948	October 1949	–22.9	–2.8	
July 1953	May 1954	–25.0	–1.6	
August 1957	April 1958	–32.5	–27.7	
April 1960	February 1961	–22.3	–13.6	
December 1969	November 1970	–28.7	–20.6	
November 1973	March 1974	–24.8	–21.1	
January 1980	July 1980	–28.7	–16.0	
July 1981	November 1982	–33.9	–23.7	
July 1990	March 1991	–4.0	–42.8	–32.1%
March 2001	November 2001	–24.3	–55.3	–33.3
December 2007	June 2009	–53.0	–92.1	–58.2
Average, 1871–1989		–37.3	–23.9	
Average, 1989–2002		–27.1	–63.4	–41.2

Table 3. CAPE Ratio Summary Statistics, 1881–2014

	Reported Earnings		Operating Earnings		NIPA Profits	
Variable	Price Index CAPE	Total Return CAPE	Price Index CAPE	Total Return CAPE	Price Index CAPE	Total Return CAPE
R^2 of forecasting equation	34.98%	33.71%	36.08%	34.57%	40.09%	35.83%
Average CAPE	16.20	19.84	15.69	19.26	13.08	16.14
January 2015 CAPE	25.04	27.78	22.01	24.46	15.54	17.28
Above mean	54.59	40.03	40.31	26.95	18.84	7.07
January 2015 projected stock return	2.20	2.81	2.92	3.66	4.41	5.25

the price index portfolio or the total return portfolio. For the price index CAPE, the overvaluation of the equity market in January 2015 drops from 54.6% for reported earnings to 40.3% for S&P operating earnings and 18.8% for NIPA profits. For the total return CAPE, the overvaluation drops from 40.0% to 27.0% to only 7.1% for NIPA profits. For NIPA profits, the CAPE model forecasts for January 2015–January 2025 a 10-year annualized real return on the S&P 500 of 4.41% for the price index portfolio and 5.25% for the total return portfolio. The latter return is more than 3 pps higher than that of the standard CAPE model using reported earnings—and only 1.45 pps below the 6.70% long-term average real return on equities.

Figure 4 depicts the CAPE ratio calculated for 1987–2014 by using the price index portfolio for S&P reported earnings, S&P operating earnings, and NIPA profits. All these series are plotted relative to their long-term mean as calculated from the 1871–2014 data. **Figure 5** does the same for the total return portfolio. Shifting from reported earnings to operating earnings to NIPA profits reveals a reduction in the degree of overvaluation, and the overvaluation is reduced even more by using Shiller's total return methodology.

Conclusion

The CAPE ratio is a very powerful predictor of long-term real stock returns. But because of changes in the way GAAP earnings are calculated, particularly with respect to mark-to-market mandates, the use of S&P 500 reported earnings in CAPE calculations biases CAPE ratios upward and forecasts of real stock returns downward. In this research, I take no position on whether the recent changes in accounting conventions are "right" or whether current earnings are too high or too low relative to some "true" value. Accurate evaluation of the CAPE model requires

Figure 4. Price Index CAPE Ratio relative to Long-Term Mean, 1987–January 2015

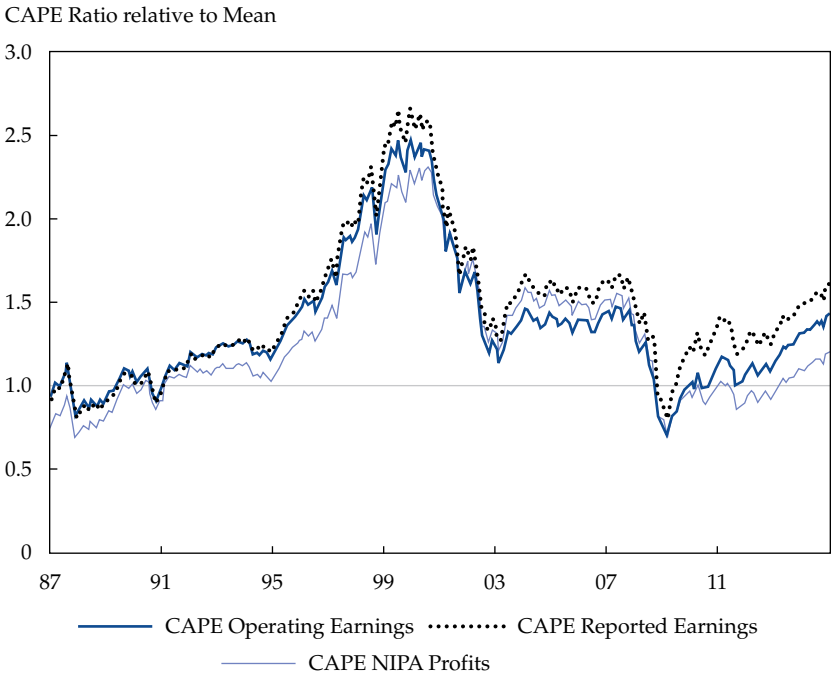
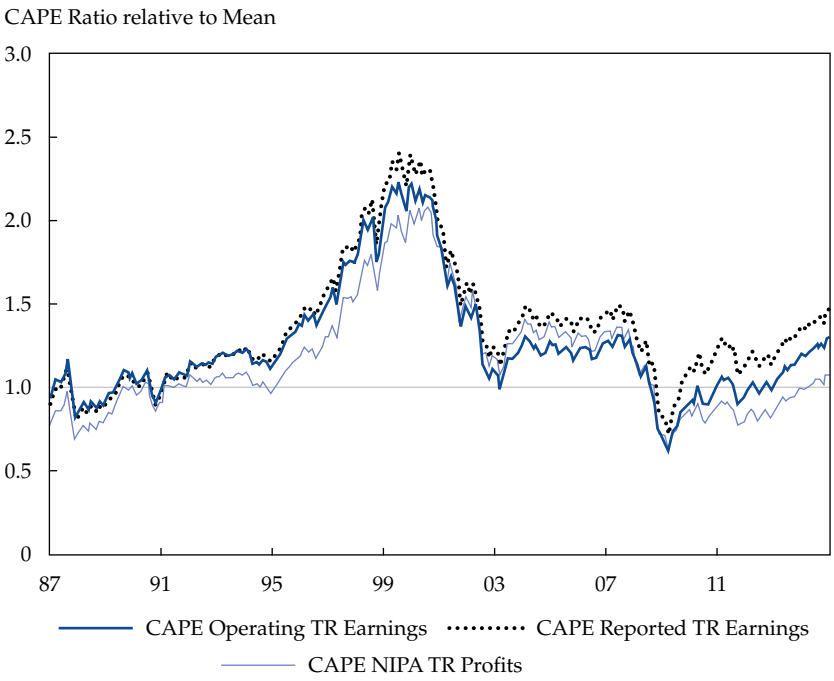


Figure 5. Total Return CAPE Ratio relative to Long-Term Mean, 1987–January 2015



that the earnings series used observe consistent and uniform conventions across time, and the reported earnings series computed by Standard & Poor's does not conform to this requirement. The CAPE model estimated with corporate NIPA profits instead of the Standard & Poor's reported earnings series exhibited higher explanatory power and forecast significantly higher stock returns.

This article has benefited greatly from comments made by Clifford Asness. I thank the Q Group for comments on an earlier version of this article, and I especially thank Cathy Schrand of the accounting department at the Wharton School of the University of Pennsylvania for the interpretation and use of many current accounting practices.

Editor's note: This article was reviewed via our double-blind peer review process. When the article was accepted for publication, the author thanked the reviewer in his acknowledgments, and the reviewer was asked whether he agreed to be identified in the author's acknowledgments. Clifford Asness was the reviewer for this article.

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Notes

1. See also Campbell and Shiller (1988). On 21 July 1996, Robert Shiller posted on his website his paper "Price Earnings Ratios as Forecasters of Returns: The Stock Market Outlook in 1996," which served as the basis for his presentation to the Federal Reserve.
2. More exactly, each month over the past 10 years is represented by the 12-month-lagged per share earnings, which are deflated by the CPI (consumer price index) in each month and the 120 months of lagged data are then averaged. Monthly data are obtained by interpolating quarterly data since 1926 and annual data before 1926. For more details on the data series, see Shiller (1990, 2000).
3. The CAPE ratio is calculated from 1881 on because 10 years of past earnings are required to compute the ratio.
4. Shiller (1996) forecast that the S&P 500 Index would decline by 38.07% over the next 10 years. Although the S&P 500 appreciated by 41% over that period and real annual stock returns averaged 5.6%, the S&P 500 fell more than 60% from October 2007 to March 2009, partly vindicating Shiller's bearishness.
5. This estimate is computed by determining the real price path that keeps the CAPE ratio constant at 25.04 for each of the next 10 years, assuming that the future growth of real dividends and earnings per share equals the historical average.
6. Some researchers (e.g., Arnott and Asness 2003) have claimed that a lower dividend payout ratio does not lead to higher future per share earnings growth because management does not effectively use the cash saved from lower dividends to increase the company's value. Whatever the reason for the higher growth rate, a change in the growth trend of real per share earnings will raise the CAPE ratio.
7. When companies report their earnings, they frequently exclude additional items, such as litigation costs, pension costs associated with changing market rates or return assumptions, stock option expenses, and so on.
8. The terms *non-GAAP earnings*, *pro forma earnings*, and *earnings from continuing operations* all refer to operating earnings.
9. These rules are no longer called "FAS." All the rules are now organized in one accounting standards codification (ASC), and the FASB periodically issues an accounting standards update (ASU).
10. The International Financial Reporting Standards (IFRS) allow write-ups of asset values in some situations.
11. Operating earnings for the financial sector grew 39%, compared with 47% for all S&P 500 companies.
12. That is exactly how Standard & Poor's justified its earnings computation procedure in a bulletin posted on its website after I published my criticism of S&P's methodology; see Siegel (2009).
13. A more rigorous proof of this statement is based on the facts that the value of equity is an option on the value of the company and that the sum of the values of 500 options on each company must exceed the value of an option on the earnings of a hypothetical conglomerate that contains each S&P 500 company.
14. One procedure to reduce the bias is to weight the losses or gains of companies by their market value in the same way that Standard & Poor's does when it calculates returns. In this case, outsized losses of companies selling at low valuations are discounted. This procedure has little impact during bull markets but would have increased reported per share earnings for the S&P 500 in 2008 by nearly 80%.
15. In particular, tax accounting measures come from the IRS (*Statistics of Income (SOI): Corporation Income Tax Returns*): www.irs.gov/pub/irs-soi/07coccr.pdf.
16. The actual S&P divisor (published on the Standard & Poor's website) is used for 1964–2013 to deflate real NIPA profits. The average change in the divisor is 1.36% a year, and this change is extended back to the beginning of the NIPA series in 1928. The cumulative change in the divisor reduces real NIPA profits in 2013 by a factor of 3.13. This NIPA per share profit series is then spliced to the S&P 500 reported earnings series by equating the 10-year averages for 1929–1939 for both series.
17. Moreover, companies regularly expense R&D costs instead of capitalizing them, a practice that understates true earnings.
18. For more details, see Dichev and Tang (2008); Donelson et al. (2011); Srivastava (2014)—all of whom agree that changes in accounting standards are a significant source of variability, though they differ on whether it is the primary source.

Bibliography

Arnott, Robert D., and Clifford S. Asness. 2003. "Surprise! High Dividends = Higher Earnings Growth." *Financial Analysts Journal*, vol. 59, no. 1 (January/February): 70–87.

Bianco, David, and Ju Wang. 2015. "Financial Write-Downs and Loan Loss Provisions." *Deutsche Bank US Equity Strategy* (11 August).

Bunn, Oliver D., and Robert J. Shiller. 2014. "Changing Times, Changing Values: A Historical Analysis of Sectors within the US Stock Market 1872–2013." Working paper (May).

Campbell, John Y., and Robert J. Shiller. 1988. "Stock Prices, Earnings, and Expected Dividends." *Journal of Finance*, vol. 43, no. 3 (July): 661–676.

———. 1998. "Valuation Ratios and the Long-Run Stock Market Outlook." *Journal of Portfolio Management*, vol. 24, no. 2 (Winter): 11–26.

Dichev, Ilia D., and Vicki Wei Tang. 2008. "Matching and the Changing Properties of Accounting Earnings over the Last 40 Years." *Accounting Review*, vol. 83, no. 6 (November): 1425–1460.

Donelson, Dain C., Ross Jennings, and John McInnis. 2011. "Changes over Time in the Revenue-Expense Relation: Accounting or Economics?" *Accounting Review*, vol. 86, no. 3 (May): 945–974.

Givoly, Dan, and Carla Hayn. 2002. "Rising Conservatism: Implications for Financial Analysis." *Financial Analysts Journal*, vol. 58, no. 1 (January/February): 56–74.

Greenspan, Alan. 1996. "The Challenge of Central Banking in a Democratic Society." Speech delivered at the Annual Dinner and Francis Boyer Lecture of the American Enterprise Institute for Public Policy Research, Washington, DC (5 December).

Hodge, Andrew W. 2011. "Comparing NIPA Profits with S&P 500 Profits." *Survey of Current Business*, vol. 91, no. 3 (March): 22–27.

Mehra, Rajnish, and Edward C. Prescott. 1985. "The Equity Premium: A Puzzle." *Journal of Monetary Economics*, vol. 15, no. 2 (March): 145–161.

Shiller, Robert. 1990. *Market Volatility*. Cambridge, MA: MIT Press.

———. 1996. "Price Earnings Ratios as Forecasters of Returns: The Stock Market Outlook in 1996" (21 July): http://www.econ.yale.edu/~shiller/data/peratio.html.

———. 2000. *Irrational Exuberance*. Princeton, NJ: Princeton University Press.

Siegel, Jeremy J. 2009. "The S&P Gets Its Earnings Wrong." *Wall Street Journal* (25 February): A13.

Smithers, Andrew. 2014a. "'True' Profits and Published Profits." *Financial Times* (18 September): http://blogs.ft.com/andrew-smithers/2014/09/true-profits-and-published-profits.

———. 2014b. "'True' Profits and Published Profits: Part Two." *Financial Times* (24 September): http://blogs.ft.com/andrew-smithers/2014/09/true-and-published-profits-part-two.

Srivastava, Anup. 2014. "Why Have Measures of Earnings Quality Changed over Time?" *Journal of Accounting and Economics*, vol. 57, no. 2–3 (April–May): 196–217.

