

An Old Friend: The Stock Market's Shiller P/E

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It's been a long-time since we've discussed this, but since it's actually the source of some controversy,¹ now seems like a good time to re-examine the valuation of the entire U.S. stock market, and particularly the relevance and meaning of the Shiller P/E, a measure we have favored in the past.²

Recall that researchers have found that valuation measures have some power to forecast long-horizon (say 10-year) stock market returns. Of course, there is not one unique valuation measure known to be perfect, and most possible choices have their pros and cons. In particular, for many years, researchers and practitioners have made use of the price-to-earnings ratio. For every dollar you invest in the S&P 500, how many dollars of earnings do you get (not that an investor actually receives all the earnings)? Now, while the "price" in price-to-earnings is well specified, there is generally no agreement on what to use for earnings. One can use operating or total earnings. One can use forecasted or trailing earnings. One can use last quarter, last year, or even longer to measure earnings. Many other adjustments and methods are possible.

In particular, though we will touch on some of the other possibilities, we will focus primarily on two measures at the forefront of today's argument: A market P/E calculated using standard one-year trailing total earnings vs. what has come to be called the "Shiller P/E."³ The idea of the Shiller P/E arose from the observation that one-year earnings are highly volatile and probably mean-reverting. Thus, at times of very high earnings, the one-year P/E might look "too low" (stocks too cheap) and when earnings are very low, the opposite can occur and the one-year P/E might look "too high" (stocks too expensive). At extremes, like very bad recessions, earnings can get so low as to approach or pass zero, making the one-year P/E obviously silly (this almost happened in 2008/09).

What the Shiller P/E does to adjust for this problem is simple and effective, if obviously imperfect. Instead of using one-year trailing earnings, it uses the average of the prior 10 years of trailing earnings (inflation adjusted).⁴ Ten years is, of course, arbitrary. You would be hard-pressed to find a theoretical argument favoring it over, say, nine or 12 years. However, it struck its creators and many of us as reasonable and intuitive. It extends over one or two typical business cycles without going too deeply into the very distant past. Put simply, one-year P/E's represent what an investor pays for the last year's worth of S&P 500 earnings, again a very volatile number. In contrast, the Shiller P/E represents what an investor pays for the last 10 years' average real S&P 500 earnings. The hope is that this is a more stable measure that is more relevant to long-term future stock returns and earnings.

So, what do Shiller P/E's look like over history up until today?



Source: Robert Shiller's website, through September 2012.

¹ A notable version of this debate is chronicled in The New York Times in "Dueling Prisms for Valuing Stocks," October 14, 2012, and earlier in "Shiller vs. Siegel," April 27, 2011. Two good defenses of the Shiller P/E appear in The Economist in "In Defense of the Shiller P/E," May 18, 2011, and in "Defending Shiller (again)," September 13, 2011. These two articles effectively dispatch a few of the attacks on the Shiller P/E that I do not address at length. Readers who want more can do a simple internet search and find quite the raging battle.

² In early 2000 our quarterly letter called this the scariest chart ever.

³ This method was used by Campbell and Shiller in the mid- to late-1990s and was originally motivated by the methods of Graham and Dodd. It has also come to be called the CAPE (cyclically adjusted price-to-earnings) ratio.

⁴ Of course, since earnings tend to grow over time the prior ten year average is generally a slightly lower number than last year, and thus, Shiller P/E's average slightly higher than one-year P/E's. This has led some to criticize Shiller P/E's as by design too high and thus too bearish. We can dismiss that as silly off-the-bat as any of these measures only makes sense compared to their own history.

At 22.2 on September 30, 2012, the S&P 500 Shiller P/E is at almost exactly half its peak value during the 1999-2000 stock market bubble. It is about two-thirds its height in late 1929. However, while not near its prior peaks, today's Shiller P/E is high versus history. In fact, it's higher than it has been 80% of the time since 1926 (we only use the most commonly examined 1926-present for our analytics, showing the earlier values graphically back to 1880 for interest – including that data would not change our conclusions). Why do we care about it being higher than 80% of the time? The next table looks at S&P 500 real returns over every possible rolling decade since 1926 sorted by starting Shiller P/E's (as of September 30, 2012, we are in the 9th decile shaded blue):

Results For S&P 500 From Different Starting Shiller P/Es 1926-2012

Starting P/E		Avg. Real	Worst Real	Best Real	Standard
<u>Low</u>	<u>High</u>	<u>10 Yr Return</u>	<u>10 Yr Return</u>	<u>10 Yr Return</u>	<u>Deviation</u>
5.2	9.6	10.3%	4.8%	17.5%	2.5%
9.6	10.8	10.4%	3.8%	17.0%	3.5%
10.8	11.9	10.4%	2.8%	15.1%	3.3%
11.9	13.8	9.1%	1.2%	14.3%	3.8%
13.8	15.7	8.0%	-0.9%	15.1%	4.6%
15.7	17.3	5.6%	-2.3%	15.1%	5.0%
17.3	18.9	5.3%	-3.9%	13.8%	5.1%
18.9	21.1	3.9%	-3.2%	9.9%	3.9%
21.1	25.1	0.9%	-4.4%	8.3%	3.8%
25.1	46.1	0.5%	-6.1%	6.3%	3.6%

Sources: Robert Shiller's website and AQR analysis, through September 2012. Real return columns show the actual after inflation average, worst-case and best-case annualized returns over 10 years, based on the S&P 500 index's P/E at the start of each year from 1926 to 2002.

Ten-year forward average returns fall nearly monotonically as starting Shiller P/E's increase. Also, as starting Shiller P/E's go up, worst cases get worse and best cases get weaker (best cases remain OK from any decile, so there is generally hope even if it should not triumph over experience!). In particular, in the ninth bucket (where we are today at 22.2) the average real stock market return over the next decade does not break 1%. The worst case is a horrendous -4.4% real return per annum (those who think the disappointing post-2000 decade-long results can only happen from super high P/E's are mistaken), and the best case is very good, though less wonderful than the much better best cases from lower starting Shiller P/E's.

Obviously bucket nine is pretty ugly! There are important caveats, of course. Academics are still fighting about how seriously to take the above chart. Some think it's perfectly valid, others think it's the result of small-sample bias and other statistical problems.⁵ Furthermore, you would probably not want to take a large tactical position based only on the above. As we show, sometimes the Shiller P/E is wrong for a whole decade, let alone shorter periods. To examine its decade-long occasional inaccuracy, we include the standard deviation of the realized returns in each bucket around each bucket's mean. They are somewhat high relative to the differences in average return and usually relative to warring forecasters' best long-term guesses.^{6,7}

⁵ I personally think it is valid as, turning it around, I don't think earnings growth is very predictable by P/E's. This is basically the same question but framed differently in a way I find more intuitive. Though I admit given data limitations this conclusion is subject to ones "priors."

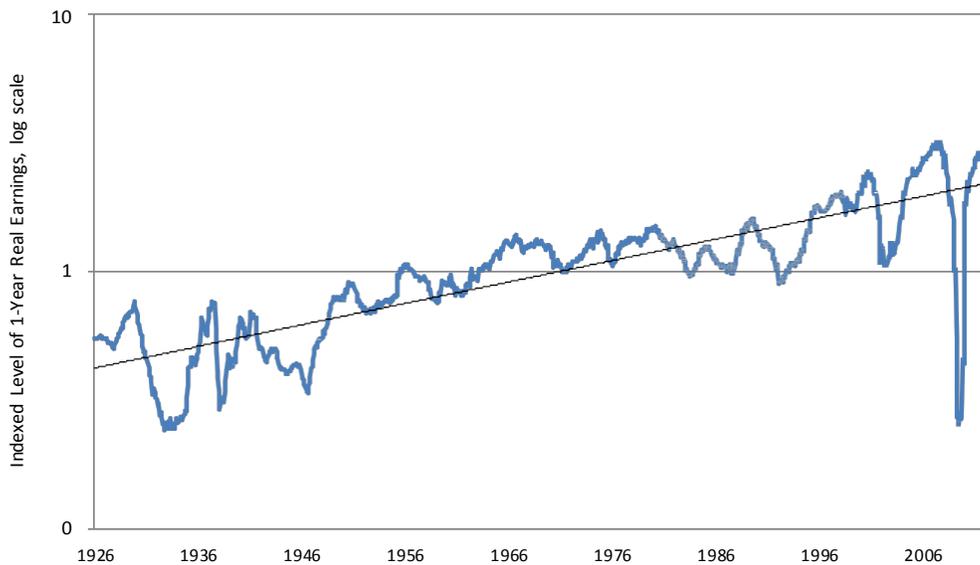
⁶ In a rare departure for me I have tried to broker peace at several conferences by pointing out to these warring forecasters that they differ by, say, only ½ a standard deviation in their outlook, meaning randomness swamps their differences. I have been unsuccessful. Only I have been surprised at this.

⁷ You might also note that the standard deviations get smaller at extremes. That could be because at extreme cheapness or expensiveness our forecasts are truly sharper, or again it could be small sample bias where we simply have not seen the case where a Shiller P/E of 44 went way higher in the next decade but that possibility is out there.

Even with the caveat above, I would, if trading on a tactical outlook, give the Shiller P/E some small weight, particularly when it's above 30 or below 10.⁸ But I think this type of analysis is most useful not for a trading strategy but to set reasonable expectations. If today's Shiller P/E is 22.2, and your long-term plan calls for a 10% nominal (or with today's inflation about 7%-8% real) return on the stock market, you are basically rooting for the absolute best case in history to play out again, and rooting for something drastically above the average case from these valuations. This could happen. For instance, it could happen if total real earnings growth surprises to the upside by a lot for a very long time. But unless you are comfortable with forecasting that, or some other giant positive surprise, we believe one should give credence to the lower forecasted average returns from history. While market timing might not be the answer, changing your plans — assuming a lower expected market return, perhaps saving more or spending less, or making changes in your portfolio structure — are all worth serious consideration. I think the Shiller P/E is quite meaningful for planning.

So why do some people dismiss today's high Shiller P/E, saying it's not a problem? Why do they forecast much higher long-term real stock returns than implied by the Shiller P/E? Well, there are many different critiques, but one stands out. Some think the Shiller P/E is a generally reasonable concept, just not right at this moment. In particular, they point to the history of one-year earnings that we now graph along with a trend line⁹:

1-Year Real S&P 500 Earnings



Sources: Robert Shiller's website and AQR analysis, through September 2012.

They point out that we had two serious earnings recessions recently (though only the tail end of the 2000-2002 event makes it into today's Shiller P/E), including one that was a doozy following the 2008 financial crisis. They thus feel the final (the right end of the graph) strong earnings number is more relevant than that of the prior 10 years. In principle, we must grant that there are times that 10-year earnings may be misleading. They are by no means a panacea. If the last 10 years is much better or much worse than might be expected going forward, the Shiller P/E can indeed be locally "broken" as some would call it now. It's certainly possible that one-year earnings could give a more accurate picture at such times¹⁰. The question is, of course, are we in such a time right now?

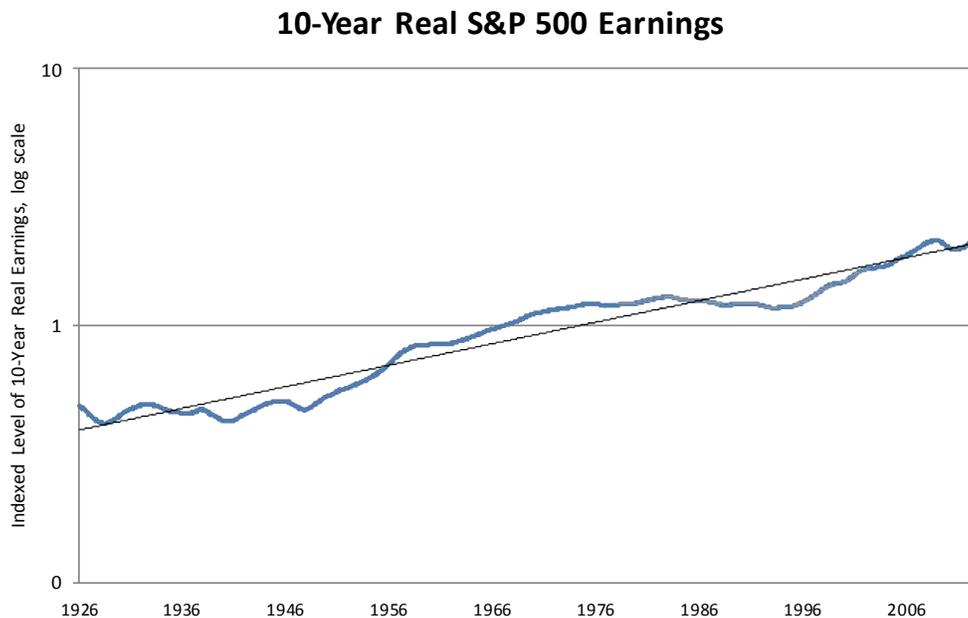
⁸ This is obviously just my opinion, though I believe I'm paraphrasing Paul Samuelson who near the top of the tech bubble, when he thought stocks should be underweighted, said something along the lines of "I have long thought market-timing to be a sin. I still do. But I now think one should sin a little."

⁹ Ignore the actual scale on the y-axis, it's arbitrary. Also note the scale is logged.

¹⁰ Of course, to one who believes earnings are mean reverting, we can already challenge them. If earnings revert to trend then one-year earnings are too high.

Not surprisingly, if one compares one-year earnings to history, things look much rosier, though the stock market is still not cheap.¹¹ Instead of a Shiller P/E that is in the 80th percentile versus history right now (expensive), the one-year P/E is in the 54th percentile since 1926 (trivially expensive). So we have to ask ourselves, is the argument against using the Shiller P/E today right? Are the past 10 years of real earnings too low to be meaningful going forward (meaning the current Shiller P/E is biased too high)?

Quite simply put, not even close. First, just like we did for one-year earnings above, let's just graph a rolling average of 10-year real S&P 500 earnings (a backwards looking 10-year average) along with a long-term trend line:



Though not as extreme as one-year earnings, 10-year real earnings used in the Shiller P/E are also currently slightly above their long-term trend. At their low after the financial crisis, they fell back to approximately long-term trend. It has not, in fact, been a bad prior decade for real earnings! The core argument of today's Shiller P/E critics is just wrong.

While the graph speaks for itself, there is some logic to go with the picture. Critics of the Shiller P/E point to the earnings destruction right after 2008 and ask how we can average in that period and think we have a meaningful number? After all, aren't we averaging in a once-in-a-hundred-year event? But they usually do not object at all to the very high earnings, for several years, right before the bubble popped in 2008. One view of earnings is that the 2008 event stands alone. It didn't have to happen, and doesn't have relevance to the future and should be excluded from our calculations lest it bias us to be sour pusses. That is not my view (granted I'm a bit biased to sour puss in general). Another very different view is that the earnings destruction post 2008 was making up for some earnings that, for several years prior, were "too high", essentially borrowed from the future. In this case, the post 2008 destruction is valid for inclusion as it's simply correcting a past wrong. Rather than invalidate the Shiller method, the 2008 earnings destruction following the prior earnings boom is precisely why the CAPE was created! Not surprisingly I fall into this latter camp.¹²

¹¹ Some get this wrong too comparing over way too short a period and declaring the one-year P/E cheap versus history.

¹² At some point in the future the pre-2007 earnings boom and 2008 bust will in order roll out of the Shiller P/E period. We may indeed want to adjust for this, not by using the very volatile one-year P/E's, but perhaps by not relying on just a ten year period but an average of a few different long-term periods so changes are not as abrupt as earnings exit the moving average. Again, there is no magic to ten years.

I think the above graph is a TKO. Those who say the Shiller P/E is currently “broken” have been knocked out. But, let’s humor the Shiller naysayers for a bit. Let’s create some other earnings measures that attempt (1) to not allow the 2008 earnings destruction to drive results as per the Shiller critics, but (2) are longer-term than one-year earnings as per Shiller fans.

I will use the following three measures to attempt this (and include the one-year and Shiller P/E’s for comparison):

- a) A version of the Shiller P/E that simply uses the median one-year real earnings level over the prior decade instead of the mean (the “Shiller Median” in the table below). This is just like the Shiller P/E but it is not unduly influenced by huge outliers. If I’m right, that outliers like the 2008 and after earnings bust are actually making up for other events, then this method may be worse than using the mean as in the Shiller P/E (as the boom extended across more years it will influence the median too bullishly). But it should be more acceptable to today’s Shiller P/E critics.
- b) A P/E that uses the maximum one-year earnings over the last decade in forming the market’s P/E (the “Max ‘E’ P/E”). This might sound unduly bullish, but again, as with the Shiller P/E and our other P/E measures, we are comparing it to itself through time.¹³ It is relevant if the maximum represents achievable earnings going forward if things get back to “normal”.
- c) Finally a P/E that uses an in-sample econometrically dodgy fitted best “E” for earnings (the “Best ‘E’ P/E”). This uses both the prior one-year and 10-year real earnings in a regression to fit the next 10-year real earnings over the whole 1926- present period. It is cheating but hey, we’re all friends here.¹⁴

The following table shows the mean for each of our four P/E measures from 1926-present, the current value (September 30, 2012) of each, and where this current value stacks up percentile-wise versus the past.

Characteristics of Different P/Es 1926-2012

	1-Yr P/E	Shiller P/E	Shiller Median	Max "E" P/E	Best "E" P/E
Mean	17.0	17.6	17.5	12.5	17.0
9/30/2012	16.4	22.2	20.3	15.2	20.4
Ending Percentile	54%	80%	70%	73%	73%

Source: Robert Shiller’s website and AQR analysis, through September 2012.

The Shiller P/E is indeed the highest versus its own history (80th percentile). However, all of the others are much closer (in percentile) to the Shiller P/E than to the one-year P/E. I have not done an exhaustive search of these measures, but the simple ones I have tried support the Shiller method far more than using the one-year P/E.

There are many other critiques and defenses of the Shiller P/E and the exercise of using valuation metrics in general. I cannot refute each to exhaustion but I’ll attempt a quick survey.

Some critiques are ones that I, and others, have addressed in other places. For instance, some say you shouldn’t look at the stock market’s valuation alone but at the so called Fed Model¹⁵. Others say that now, because companies pay out less in dividends than in the past, growth will be forever higher (Rob Arnott and I find empirically the exact opposite result). Some outright hucksters still use the trick of comparing current P/E’s based on “forecast” “operating” earnings with historical average P/E’s based on total trailing earnings.

¹³ I first saw this method in the work of John Hussman.

¹⁴ For those interested, in-sample from 1926-present the log of the next 10 years real earnings is best approximated by about 75% the log of prior ten years’ real earnings and 25% the log of last years’ real earnings (forcing weights to sum to 100% for presentation here not in the regression when they almost sum to 100%) plus an intercept. Thus there is indeed some role for more recent earnings, in the presence of ten year real earnings, but it’s a small one versus the longer term. Our best fit P/E measure is thus effectively (ignoring some convexity issues) 75% the Shiller P/E and 25% the one-year P/E.

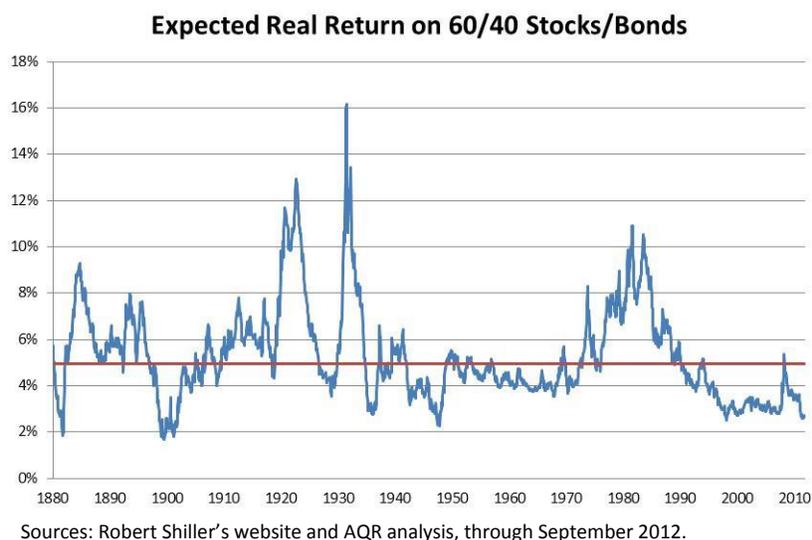
¹⁵ The Fed Model is based on money illusion. It actually may have some use for market timers as even a misspecified model can be useful if investors return to it consistently. Also, the Fed Model also may have use and theoretical consistency in only a relative value sense if its usual nominal interest rate is replaced with a real one. Though again caution is urged as even if stocks are expensive on their own, but cheap relative to bonds, the outcome is not clear. Due to stocks longer “duration,” if both return to long-term average value it may not be pleasant for those long stocks versus bonds.

In addition, some critics say you can't compare today to the past because accounting standards have changed, and the long-term past contains things like World Wars and Depressions. While I don't buy it¹⁶, this argument applies equally to the one-year P/E which many are still somehow willing to use. Also it's ironic that the chief argument of the critics, their big gun that I address exhaustively above, is that the last 10 years are just too disastrous to be meaningful (recall they are actually mildly above average). Does it seem to anyone else but me that the critics have a reason to exclude everything that might make one say stocks are expensive, and instead pick time periods for comparisons and methods of measurement that will always (adapting on the fly) say stocks are fair or cheap?

Finally, some critics even point out the stunningly obvious "it doesn't always work."¹⁷ While it's indeed important to remember that no valuation measure is near perfect (I stress that in my initial table), I do believe that the Shiller P/E is a reasonable method, an unbiased method (it's been 15+ years since it was created so nobody cherry picked it to fit the current period), and a method that is decidedly not "broken" based on today's inputs. It has very limited use for market timing (certainly on its own) and there is still great variability around its predictions over even decades. But, if you don't lower your expectations when Shiller P/E's are high without a good reason — and in my view the critics have not provided a good reason this time around — I think you are making a mistake.

In Case You Were Not Depressed Enough by the Above

Closely paralleling the work in Asness and Ilmanen (Institutional Investor May 15, 2012; please see that publication for more specifics though we use a slightly simpler formation here) below we calculate our proxy for the expected long-term return on not just stocks, but the traditional 60/40 portfolio of U.S. stocks and government bonds (shown again back to 1880 but the average line in red is calculated only over 1926-2012):



To get the expected real return on stocks you invert the Shiller P/E to get an earnings yield.¹⁸ For bonds we compare 10-year nominal yields on Treasury Bonds to forecasted long-term inflation (here we use nothing fancier than trailing three-year inflation). Take 60% of the stock market number and 40% of the bond market number and you get the above graph, an estimate of the expected long-term forward looking real return on the whole 60/40 portfolio. Needless to say it's now very low versus history (2.2% real as of September 30, 2012). This is coming as expected real returns to stocks are low (as

¹⁶ I do believe there were World Wars and Depressions.

¹⁷ Back in the early 2000s a writer for a major magazine was very critical of "University of Chicago Professor Craig Asness" for forecasting lower than normal stock returns based on higher than normal Shiller P/E's (among other reasons). His critique was literally that, there are some decades when this forecasting method fails. That was and is true as the R-squared doesn't get near 100% (as I have repeatedly stressed). In fact the chief decade of failure he pointed to was the 1990s. One great way to have this method fail is to have the period in question end in a depression or a bubble. Anyway, I don't wish to be paranoid, but given I was writing similar things to professor Craig Asness at the time, and given I went to the University of Chicago, and given there is no professor Craig Asness there now or ever, I can't help thinking this writer meant me.

¹⁸ This expected real return on stocks is not as bad as the earlier table we showed as the table incorporates the real life mean reversion we've seen in P/E's over 1926-present while the method here implicitly assumes P/E's stay above average at their current level. P/E's staying high is definitely a possibility if P/E's were "too low" in the past, as many researchers believe.

discussed at length above) and bond real yields are very low. Both have been low or very low before, but less often at the same time (e.g., in early 2000 when the total was similar, stocks were considerably worse looking, but bonds very attractive versus history).

Asness and Ilmanen discuss this all in much greater depth, including what we think investors can do about it.¹⁹

¹⁹ When we say “investors” we mean some investors. In aggregate investors are stuck with the cap weighted results (assuming the canonical 60/40 is close to this).

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