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Justified Stock Prices, June 2018

William R. Cline
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Abstract

Despite modest overvaluation at end-2017, US stock prices are on track to rise significantly through end-2019 as major increases in earnings more than offset normalization of price-earnings ratios.

Framework

Economic theory states that the price of a stock today should equal the value, after appropriate discounting, of its expected future stream of earnings. On this basis, if there were no risk at all and if all future earnings were expected to be unchanged from the current year's earnings, the appropriate price of the stock would be the amount of the annual earnings divided by the discount rate (the appropriate way to discount over an unlimited time horizon). For example, if the stock is earning $20 per share annually, earnings are not expected to rise, and the interest rate is 4 percent, the stock would be worth $500 per share (20/0.04).

If the company is expected to achieve growing earnings over time, the stock would be worth more. The proper way to discount, in that case, is to use a net discount rate that subtracts the growth rate of earnings from discount rate. For example, if earnings are expected to grow at 2 percent annually, the proper long-term net discount rate would be 2 percent (4 percent discount rate minus 2 percent earnings growth rate). In this case, the stock in the example would be worth $1,000 (20/0.02). However, if the firm's future earnings have a significant range of risk, then it is also necessary to add a risk factor to the discount rate. For example, 20-year interest rates of AAA corporate bonds currently stand at 4 percent, whereas high-yield corporate bonds of over one-year maturity have an average yield of 6.3 percent.[1] On this basis, an extra risk component of the discount rate could amount to 2½ percent, bringing the net discount rate to 4.5 percent (4 percent standard minus 2 percent for growth plus 2.5 percent for risk). The stock in the example would then be worth $444 (20/0.045).

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[1] Data are for May 2018. See https://fred.stlouisfed.org/series/AAA;
https://fred.stlouisfed.org/series/BAMLH0A0HYM2EY

For an overall index of stock prices reflecting the corporate sector for the economy as a whole, one should expect the price/earnings ratio to be lower when interest rates are higher (because the discount rate in the denominator is higher). One should also expect the price/earnings ratio to be lower when there is greater risk in the economy, and/or when the prospects for future earnings are worse. The **Justified Stock Prices (JSP)** measure introduced in this report uses three macroeconomic variables to reflect these influences: the 10-year Treasury note interest rate, the rate of unemployment, and the rate of inflation (consumer price index). It turns out that a model using these three influences does a relatively good job of explaining the price/earnings ratio for the S&P500 over the past 6 decades – except for the period of the dotcom stock bubble.

The Model

I have found that the best fit for explaining the price-earnings ratio is the following statistical regression equation:

$$1)\ PE = 24.39 - 0.272\ i_{10} - 0.605\ u - 0.832\ inf + 8.15\ D_{9701}$$

where *PE* is the ratio of the end-of-year S&P500 index to the trailing 12-months operating earnings for the index; i_{10} is the average interest rate on the 10-year Treasury note during the year; *u* is the average unemployment rate during the year; *inf* is the percent increase in the consumer price index for the year above the previous year; and D_{9701} is a "dummy variable" set at "1" for 1997 through 2001 and "0" otherwise.[2]

The final term indicates that during the dotcom bubble the price-earnings ratio was higher than otherwise justifiable by about 8, at an average of about 26 instead of a level of 18 that could otherwise be explained.[3] The coefficient on the long-term interest rate indicates that a 100 basis point increase in the 10-year Treasury rate reduces the price-earnings ratio by 0.272 (e.g. from 18 to 17.728). Similarly, a rise in the unemployment rate by 1 percentage point reduces the PE ratio by 0.605, and a rise in the inflation rate by 1 percentage point reduces the PE ratio by 0.832. These impacts are all in the right direction, although the size of the coefficient on the interest rate is smaller than might have been expected.

Figure 1 shows the actual price-earnings ratio as well as the model-predicted ratio over the full period. In 2007 the two were practically identical, at 17.8 and 18.0 respectively. In 2008 in the Great Recession, ironically the actual price-earnings ratio rose above the predicted ratio, reflecting a collapse in the denominator (earnings, which fell from about $83 per share to about $50 per share. The actual and predicted values were close once again during 2009 through 2016, except for 2011 when the US debt ceiling standoff caused stock prices to stagnate despite a rise in earnings. Then by the end of 2017

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[2] The corresponding t-statistics are 18.4, -1.84, -2.83, -6.2, and 7.2, so four of the five variables are highly significant and the variable with the lowest significance (i_{10}) is significant at the 10 percent level. The degree of explanation is relatively high at R^2 *adj.* = 0.793. The estimate uses annual data for 1960-2017. S&P prices and earnings are from Damodaran (2018) for 1960-2014 and Standard and Poor's (2018) for 2015-17.
[3] For the entire period the average price-earnings ratio was 16.5.

the actual price-earnings ratio was about 11 percent higher than the model-predicted level (at 21.5 actual versus 19.3 predicted).

Figure 1
Actual and Predicted S&P500 Price-Earnings Ratio

pe: actual   pe^: predicted
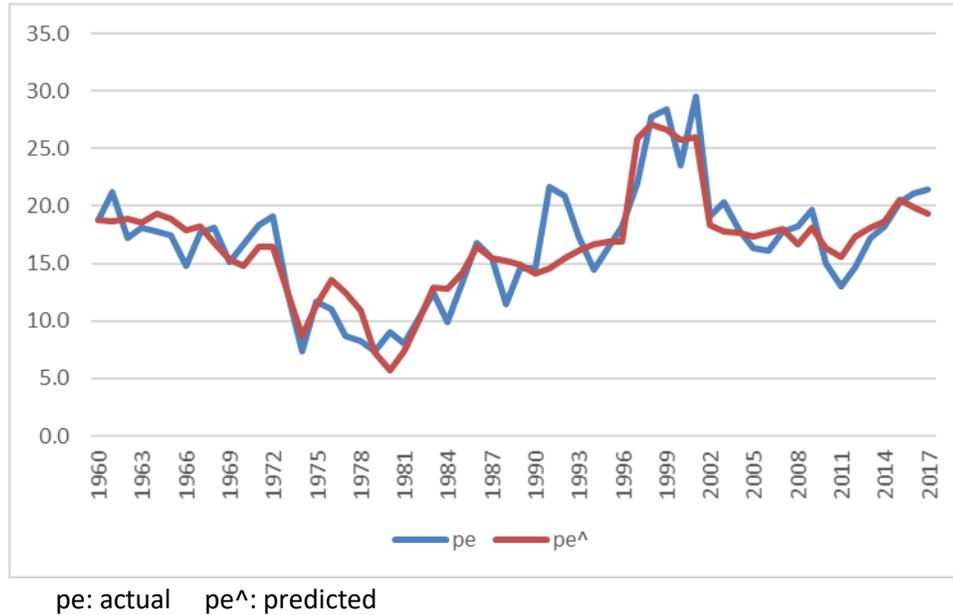
Outlook

  The Congressional Budget Office (CBO, 2018) has projected the average 10-year Treasury rate at 3 percent for 2018 and 3.7 percent for 2019. It places average unemployment at 3.8 percent in 2018 and 3.3 percent in 2019, and projects average inflation (CPI) at 2.2 percent for both years. Applying these values to equation 1) yields a year-end *PE* of 19.4 for 2018 and 19.6 for 2019.

  As shown in table 1, Standard and Poor's (2018) reports consensus operating earnings estimates at $157 per share for 2018 and $175 per share in 2019. The rapid increase (by 26 percent in 2018 and an additional 11 percent in 2019) reflects gains from the cut in the corporate tax rate from 35 percent to 21 percent as well as a strong economy in 2018-19. The International Monetary Fund projects US growth at 2.9 percent in 2018 and 2.7 percent in 2019 (IMF, 2018).[4] ***The combination of major increases in earnings with only a minor cutback in the price-earnings ratio leaves the projected S&P 500 index at 3064 by end-2018 and 3417 by end-2019, boosting the index about 15 percent this year and another 12 percent next year.***

Table 1

Actual and Projected S&P500 Earnings, PE, and Index Level, 2007-19

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[4] However, the IMF also projects the US economy will return to its long-term potential growth rate of 1¾ percent by 2021, reflecting demographics and a more slowly growing labor force.

	Earnings	PE	S&P500
2007	82.54	17.8	1468.4
2008	49.51	18.2	903.3
2009	56.86	19.6	1115.1
2010	83.77	15.0	1257.6
2011	96.44	13.0	1257.6
2012	96.82	14.7	1426.2
2013	107.3	17.2	1848.4
2014	113.01	18.2	2058.9
2015	100.45	20.3	2043.9
2016	106.26	21.1	2238.8
2017	124.51	21.5	2673.6
2018	157.51	19.4	3063.6
2019	174.67	19.6	3416.9

Shaded area: projected

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