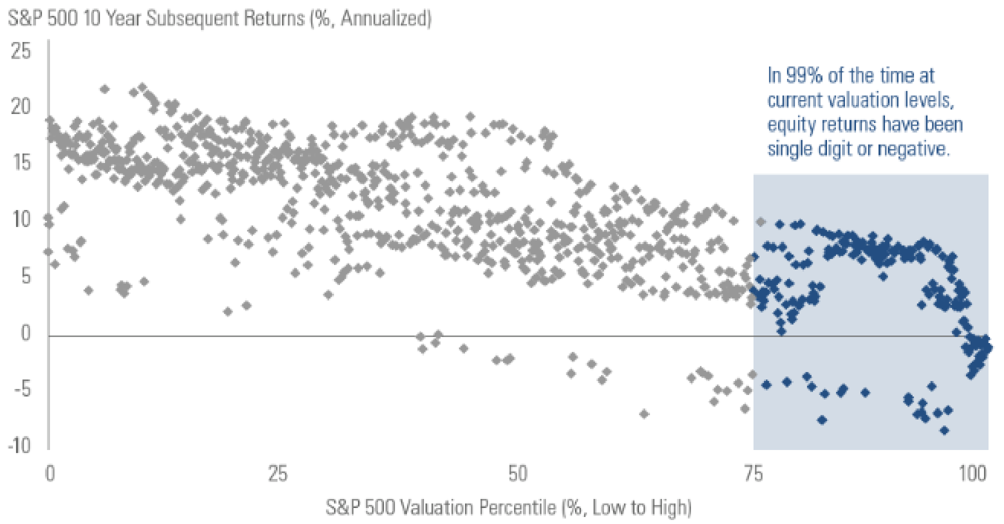
P/E Ratios and S&P 500 Returns

Introduction

I remember hearing once that P/E Ratios explain 30% of the movement in the market. Last month, I came across this article from CNBC offering further evidence using this chart:



Source: Bloomberg, Robert Shiller, and GSAM.

They used this chart as evidence that we should expect single-digit or negative returns in the S&P 500 over the next 10 years.

I've never been the type to trust other people's data. I like to see it myself. So I downloaded P/E Ratio data for the S&P 500 and ran a simple regression. The results were surprising. I only had a limited 10-year sample, but during that time, the P/E Ratio explained 22% of the variation in stock market returns over a 24-month period. That wasn't the surprising part. The surprising part is that they explain 76% of the variation of 30-month returns and 73% of the variation of 36-month returns! Wow! At current P/E levels of 28.96, this would lead us to expect the following returns:

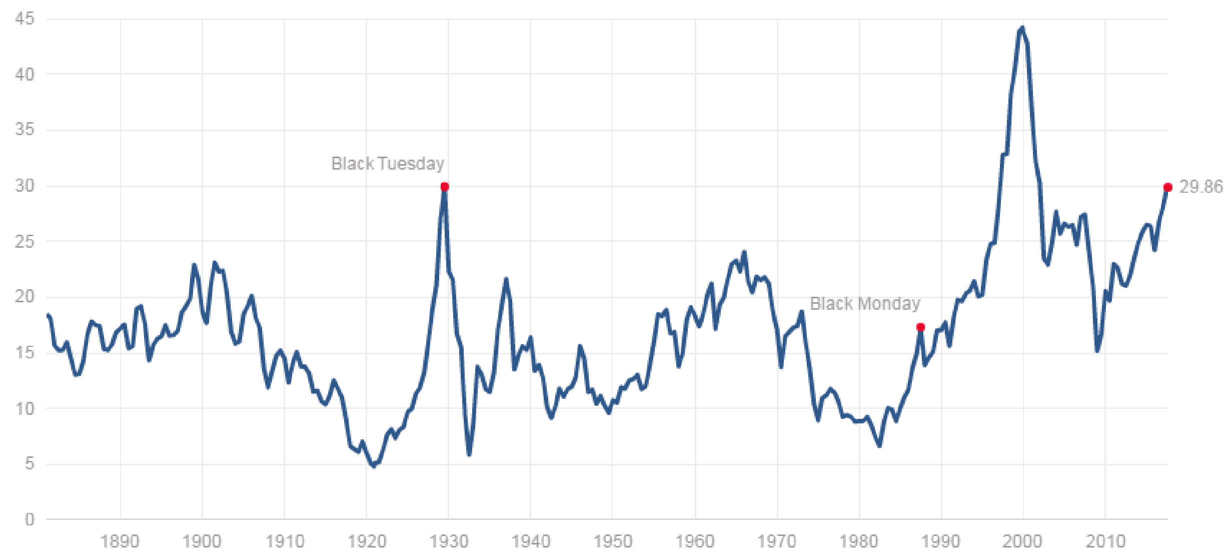
18-month: - 4.11%
24-month: - 3.04%
30-month: - 2.50%
36-month: - 1.30%
42-month: - 1.32%

The following is a pretty simple analysis, so let's see if I can keep this write-up brief.

P/E Ratios and S&P 500 Returns

P/E Ratio Data

The P/E data I used came from: http://www.multpl.com/shiller-pe/. This site presents Robert Schiller's 10-year, Cyclically Adjusted PE Ratio. It presents the super-useful graph below and also allows the user to download annual or monthly data. Monthly data was used in this analysis.

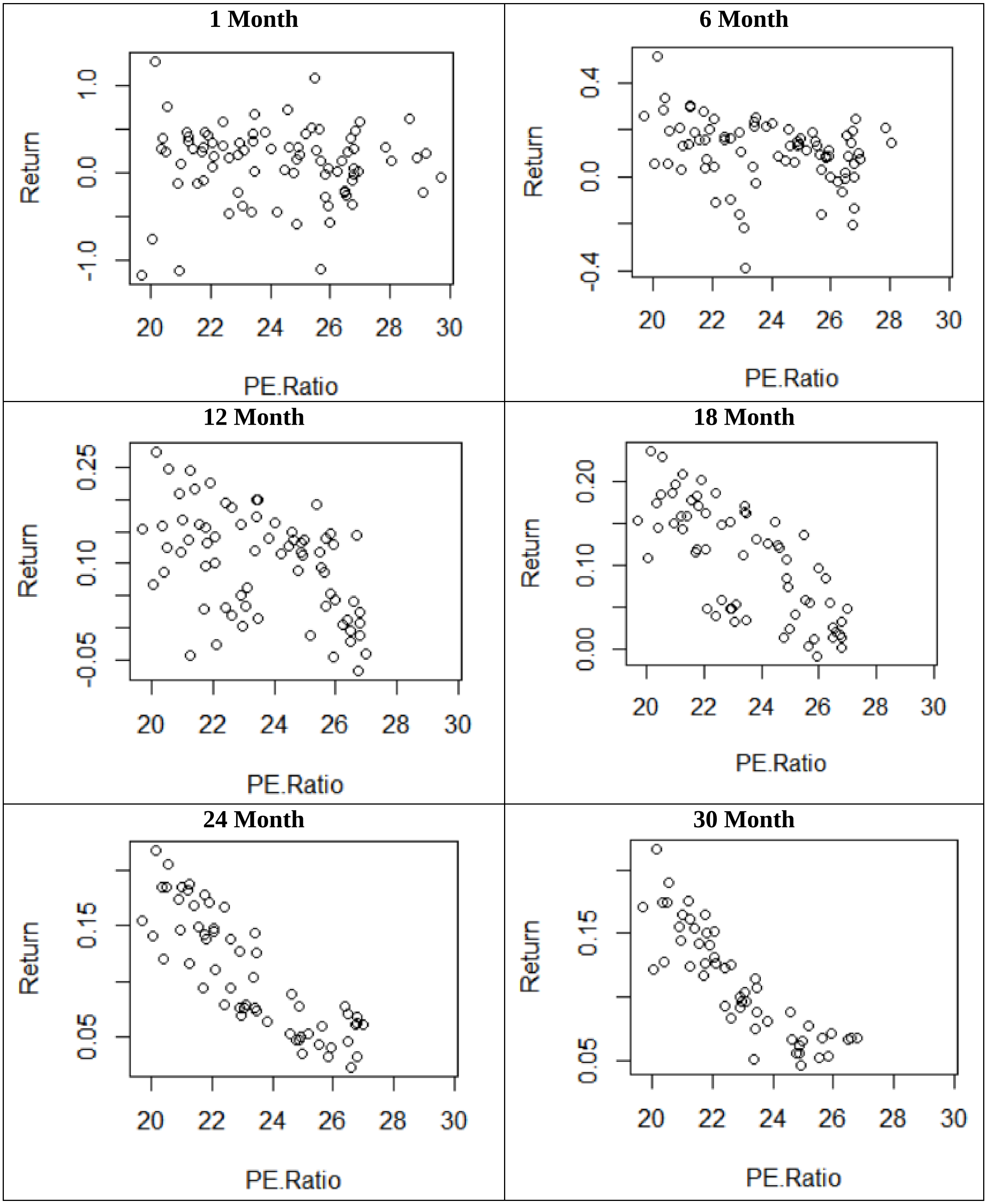


Analysis

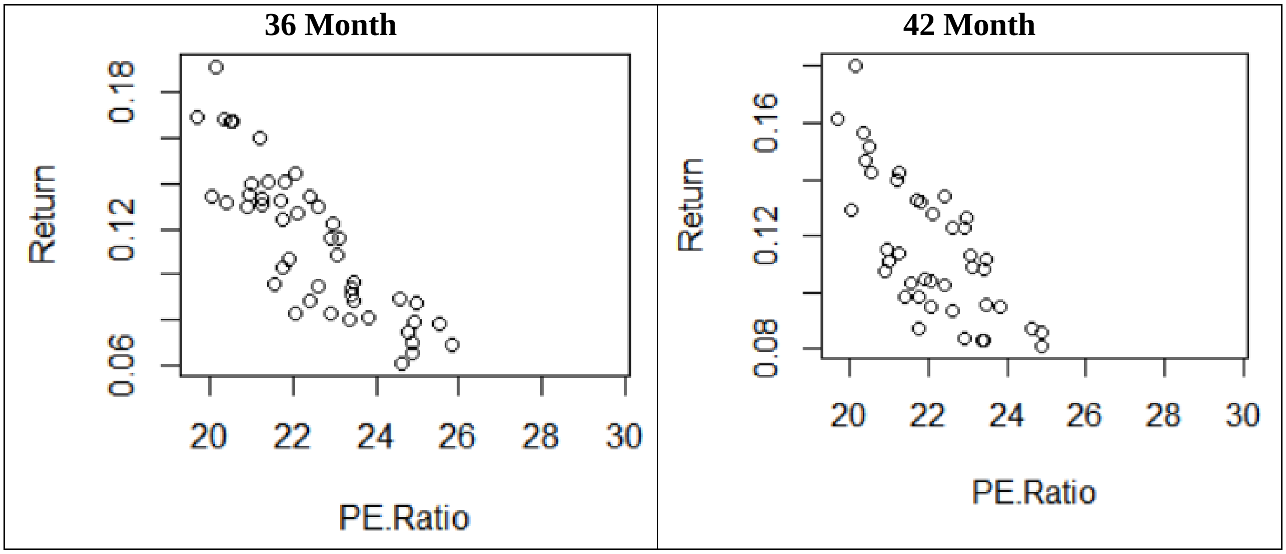
10-years of historical quotes for VOO (Vanguard's S&P 500 index) were downloaded from Google via quantmod. These were joined with the P/E Ratio data and filtered to only include the 1st trading day of each month along with the P/E ratio from the end of the previous month. The following R code was then used to calculate returns over a given LEAD time (in months), plot these against P/E Ratios, and do a simple linear regression.

```
# NOTE: df.monthly contains columns named Date, Close, and PE.Ratio

LEAD <- 36

df.monthly$Return <- with(
  df.monthly,
  log(lead(Close, LEAD)/Close)) * 12/LEAD       # annualized log returns

with(df.monthly,
     plot(PE.Ratio, Return))

summary(lm(Return ~ PE.Ratio, data=df.monthly))
```

P/E Ratios and S&P 500 Returns



P/E Ratios and S&P 500 Returns



As can be seen in the plots above, the model is unable to predict 1-month or 6-month returns. However, at 12-months a correlation does start to appear, and it strengthens as we look at 18-, 24-, and 30-months. The table below provides R-squared, Adjusted R-Squared, and coefficients for each of the regressions. The 30-month prediction is the most accurate. The 24-month and 36-month predictions are also just as accurate. The high-powered models have similar coefficients, allowing us to estimate 24-month to 36-month returns with roughly the same formula.

Period	R-Squared	Adj. R2	Intercept	Slope
1-Month	0.0007	-0.01179	0.224669	-0.004516
6-Month	0.0866	0.07442	0.540115	-0.018101
12-Month	0.2257	0.2145	0.524288	-.017922
18-Month	0.5452	0.538	0.640713	-.022832
24-Month	0.7125	0.7075	0.591222	-.020817
30-Month	0.7578	0.753	0.560620	-.019613
36-Month	0.7309	0.7249	0.502556	-.017265
42-Month	0.517	0.5046	0.406384	-.013169

These coefficients were used to produce the predicted returns in the introduction. The model is predicting a -2.5% return over the next 30 months.