

Strategies
for
Investing
in the
S&P 500



Magnus Erik Hvass Pedersen

S&P 500 – 10-Year Forecasting

(Part 4)

By

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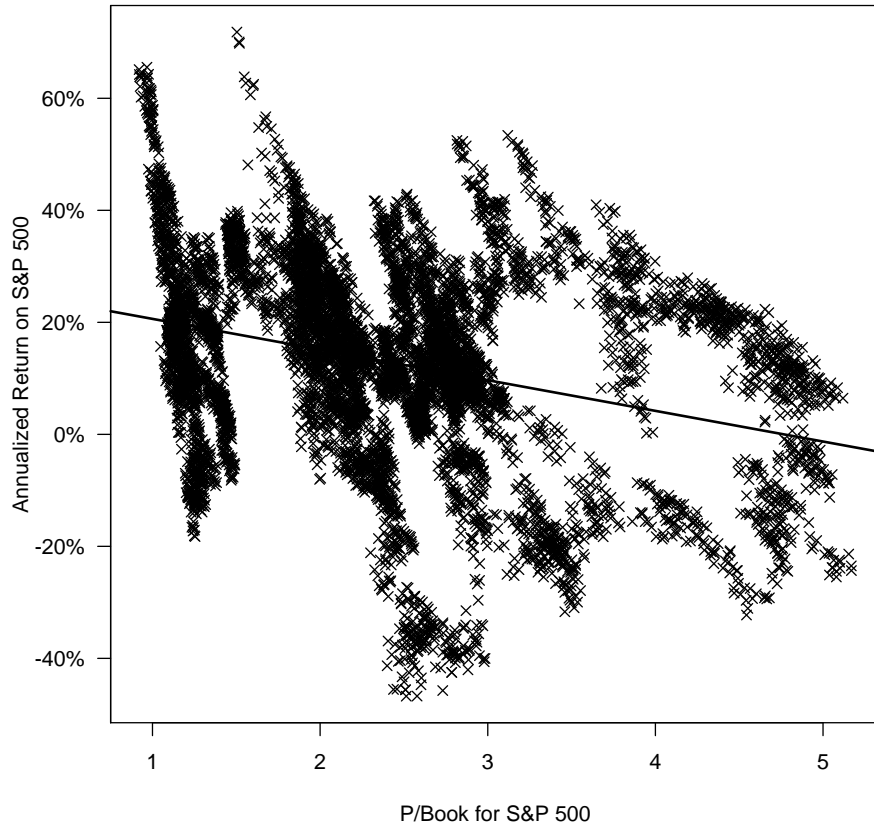
S&P 500 Historical Returns

- Consider the period 1978-2013.
- The average one-year return for the S&P 500 was 12.8%
- But the S&P 500 was very volatile with a standard deviation over 17% for annual returns. The greatest annual gain was over 70%, the greatest annual loss was almost (50%).
- Is the historical average a good estimate of future returns?
- ... or can we use financial information to make a better estimate?

P/Book

- P/Book (or Price-To-Book ratio) is the share-price divided by book-value.
- Book-value is an accounting measure of shareholder value, calculated as assets minus liabilities. It is the capital originally supplied by the founding shareholders and the earnings retained through years of operation.
- Sales and earnings are generally related to assets, e.g. more factories are needed to manufacture more products. And assets are related to equity.
- Future sales growth is wholly or partially funded by retained earnings.
- Hence P/Book estimates the share-price relative to future earning power.
- This only works for some companies, but S&P 500 is highly diversified.

S&P 500 P/Book vs. 1-Year Returns

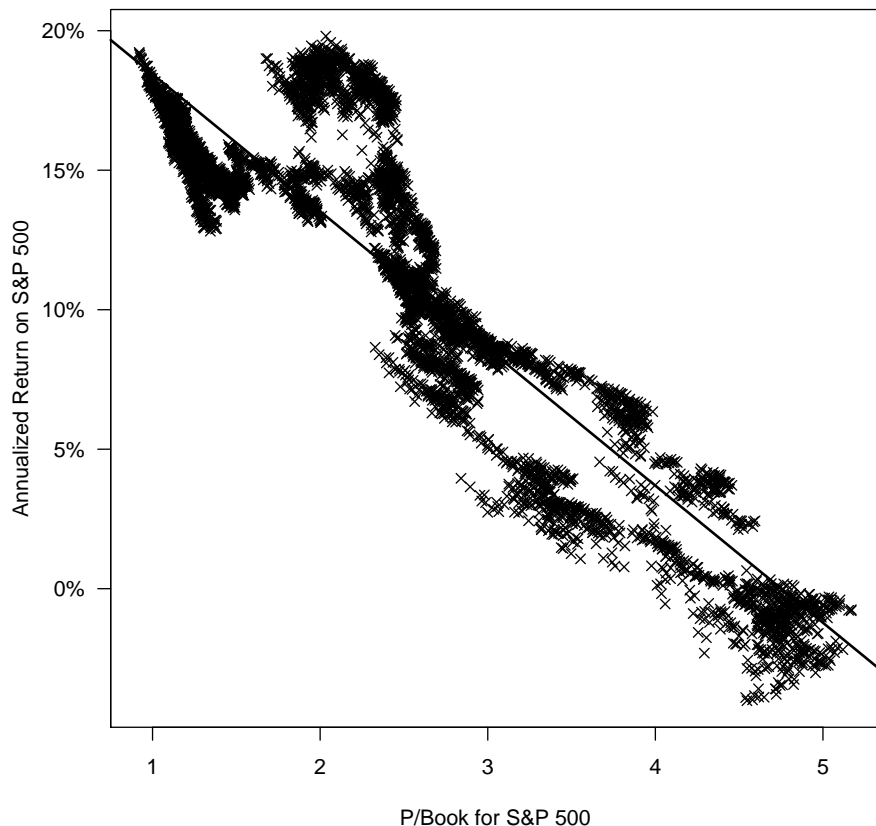


Scatter-plot of P/Book vs. 1-year returns during 1978-2013.

Poor linear fit with $R^2 = 0.09$

For 3-year and 6-year periods the linear fit has $R^2 = 0.30$ and 0.52 .

S&P 500 P/Book vs. 10-Year Returns



Scatter-plot of P/Book vs. 10-year total returns during 1978-2013, dividends are re-invested.

$$\begin{aligned} \text{Annualized Return} \\ \approx 23.4\% - 4.9\% \times \text{P/Book} \end{aligned}$$

Good linear fit with $R^2 = 0.81$
and p -value is less than $2.2e-16$
(almost zero)

Example: Estimating 10-Year Returns for S&P 500

On January 8, 1982 the P/Book was 1.09. Estimated 10-year return is:

$$\text{Annualized Return} \approx 23.4\% - 4.9\% \times P/Book = 23.4\% - 4.9\% \times 1.09 \approx 18.1\%$$

The actual 10-year return was 17.6%. Good estimate with (0.5%) error.

On January 12, 1990 the P/Book was 2.31. Estimated 10-year return:

$$\text{Annualized Return} \approx 23.4\% - 4.9\% \times P/Book = 23.4\% - 4.9\% \times 2.31 \approx 12.1\%$$

The actual 10-year return was 18.3%. Bad estimate with 6.2% error.

Estimation Error

- The linear relation is not perfect and estimation errors can be large.
- Largest estimation errors (aka. residuals) were (5.9%) and 6.7% in the S&P 500 data for the period 1978-2013.
- The residual standard error was 2.5% for this data.
- This error range should be taken into account when forecasting.
- ... but no guarantee that future returns are even within these errors.

Conclusion

- The P/Book of the S&P 500 can be used to estimate 10-year returns.
- But the estimation errors can be large.
- So it is only useful as a rough estimate.

The book has rebalancing strategies that use the P/Book of the S&P 500 to allocate between the S&P 500 and US Government Bonds.

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