

Strategies
for
Investing
in the
S&P 500



Magnus Erik Hvass Pedersen

S&P 500 – Fixed Rebalancing

(Part 2)

by

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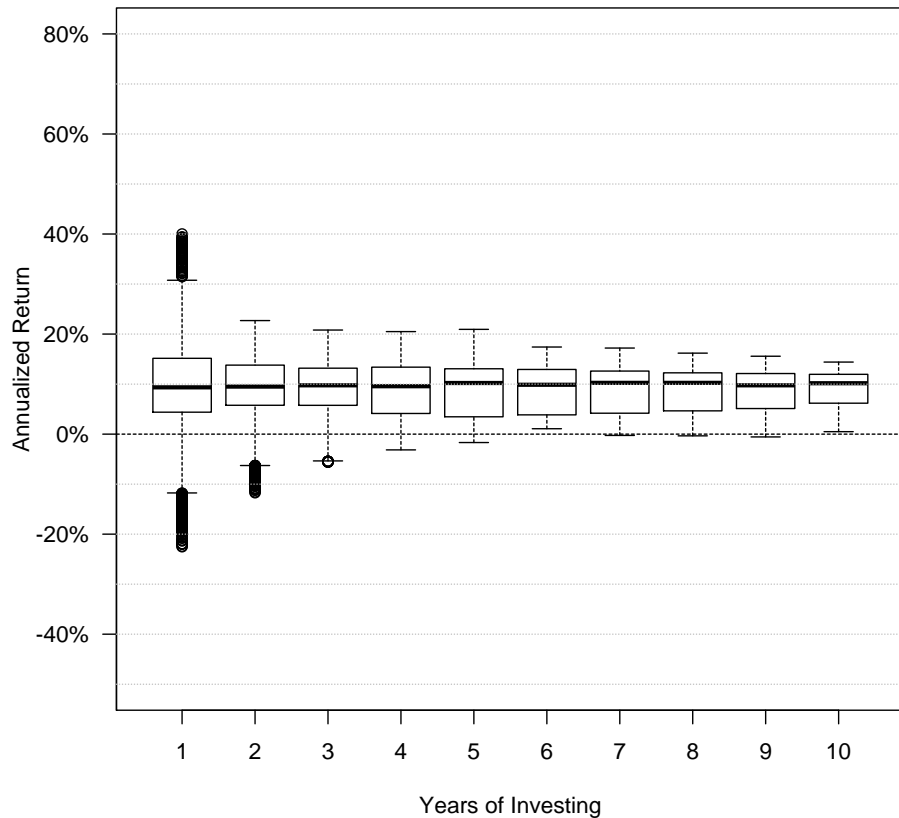
S&P 500 vs. US Government Bonds

- During the period 1978-2013 the average annualized return was almost 6% for US Government Bonds with 1 year maturity.
- The bond returns are guaranteed by the government of USA.
- The average annualized return for the S&P 500 was 11-13% depending on investment duration.
- But the S&P 500 was very volatile with a standard deviation of 17.3% for annual returns. The greatest annual gain was over 70%, the greatest annual loss was almost (50%).

Fixed Rebalancing

- Rebalance between S&P 500 and US Gov. Bonds to lower volatility.
- Example: We have \$2,000 and invest \$1,000 in S&P 500 for a 50/50 allocation. If the S&P 500 drops 20% (or \$200) and is offset slightly by a 2% dividend (or \$20) then after a year we have \$820.
- We also invested \$1,000 in US Gov. Bonds with 5% yield so after a year we have \$1,050 and the portfolio is \$1,050 + \$820 in stock = \$1,870.
- We lost \$130. If all was invested in S&P 500 then we'd have lost \$360.
- After the year we rebalance the portfolio to 50/50 so that $50\% \times \$1,870 = \935 is invested in the S&P 500 and \$935 is invested in US Gov. Bonds.

50/50 Rebalancing – Annualized Return (1978-2013)



Consider 50/50 rebalancing for all possible starting dates and investment periods up to 10 years during 1978-2013.

Box-plot shows statistics for the annualized return.

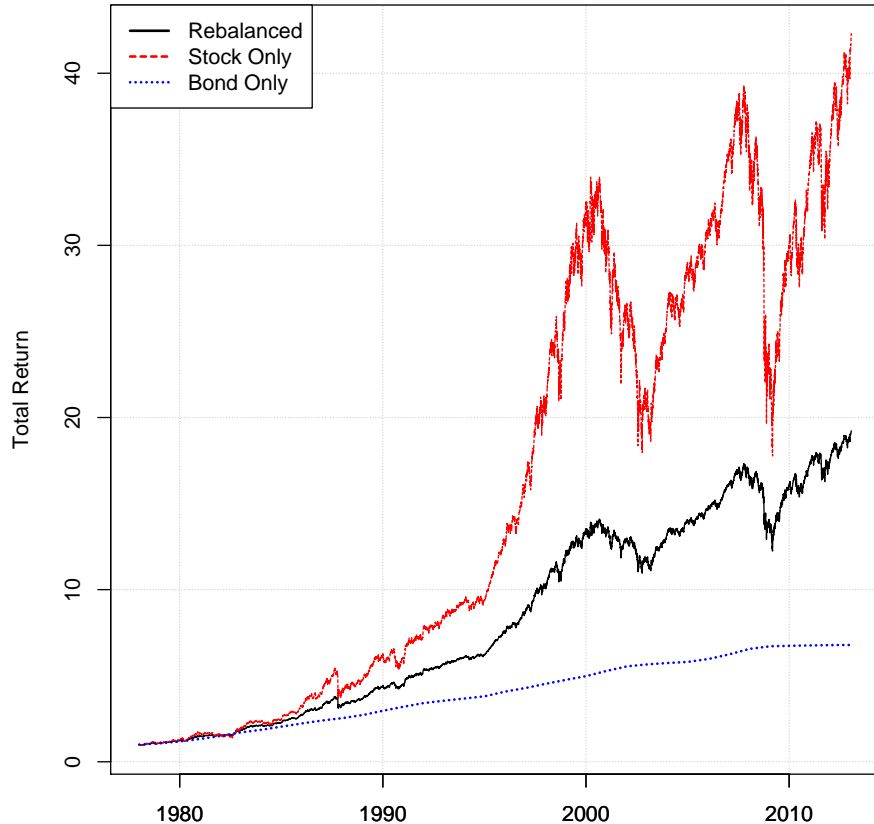
This can also be shown in a table...

50/50 Rebalancing – Annualized Return (1978-2013)

Years of Investing	Min	1 st Qrt.	Median	Mean	3 rd Qrt.	Max	Stdev	Probability of Loss	Probability < Bond-Only	Probability < Stock-Only
1	(22.5%)	4.4%	9.4%	9.3%	15.2%	40.0%	9.1%	0.13	0.25	0.75
2	(11.7%)	5.8%	9.5%	9.1%	13.8%	22.7%	6.8%	0.11	0.21	0.74
3	(5.6%)	5.8%	9.8%	9.0%	13.2%	20.8%	5.9%	0.11	0.22	0.73
4	(3.2%)	4.1%	9.6%	8.9%	13.4%	20.5%	5.5%	0.07	0.22	0.71
5	(1.7%)	3.5%	10.2%	8.9%	13.1%	21.0%	5.1%	0.004	0.20	0.73
6	1.1%	3.9%	9.9%	8.9%	12.9%	17.4%	4.6%	0	0.16	0.71
7	(0.3%)	4.2%	10.3%	8.9%	12.6%	17.2%	4.3%	0.0006	0.11	0.80
8	(0.3%)	4.7%	10.3%	8.9%	12.3%	16.2%	4.1%	0.002	0.08	0.85
9	(0.6%)	5.1%	9.8%	8.9%	12.1%	15.6%	3.9%	0.004	0.09	0.88
10	0.5%	6.2%	10.2%	8.9%	12.0%	14.4%	3.8%	0	0.09	0.85

Example: Investing for 2 years had mean annualized return 9.1%, min (11.7%), max 22.7%, stdev 6.8%. Investing for 10 years had mean 8.9%, min 0.5%, max 14.4%.

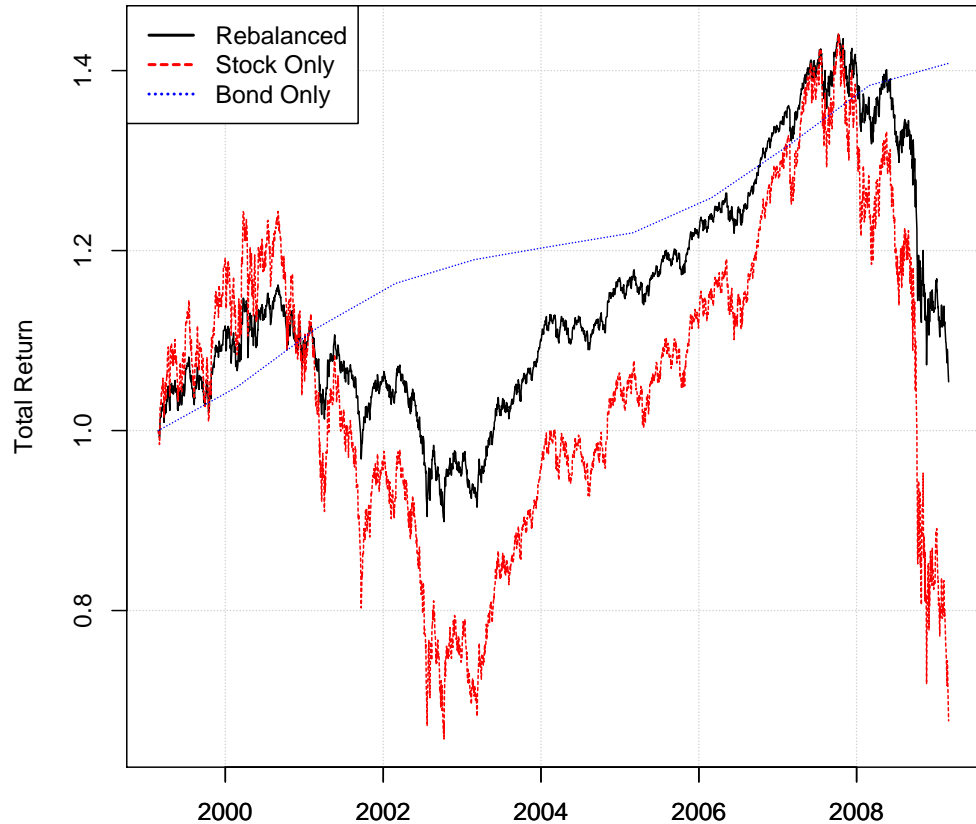
Long-Term Relative Performance (1978-2013)



In this 35 year period the 50/50 rebalancing performed better than US Gov. Bonds but worse than the S&P 500.

But this is not always the case ...

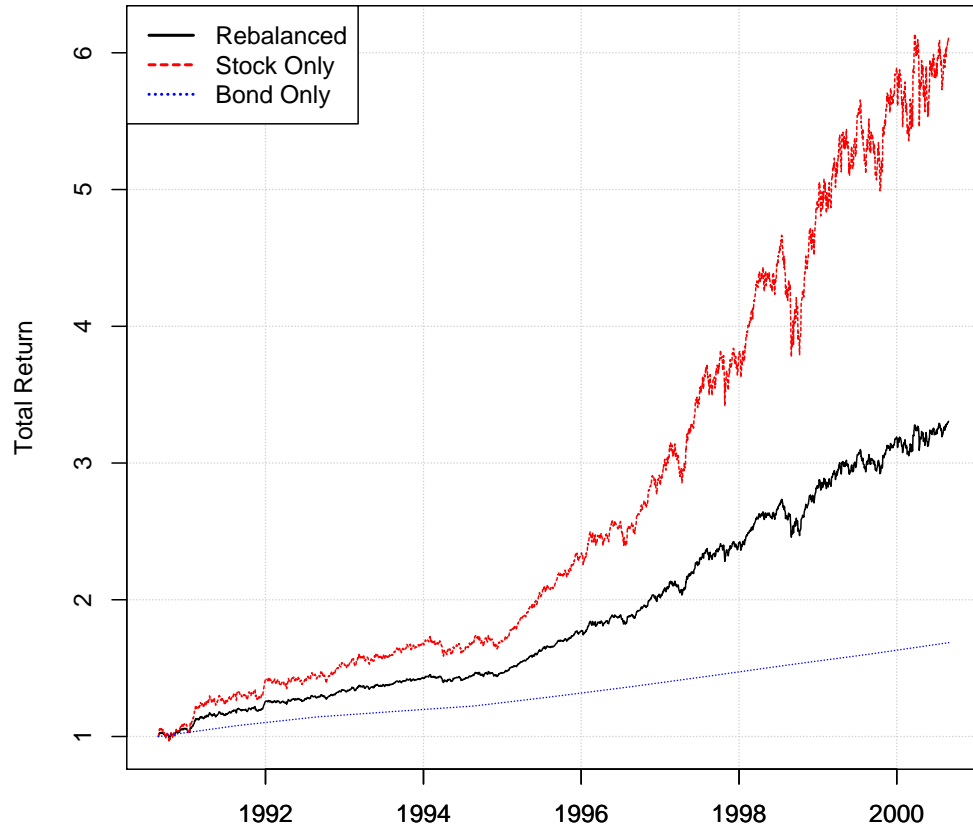
Example: Rebalancing is BETTER Than S&P 500



Example of 50/50 rebalancing performing better than S&P 500 and worse than US Gov. Bonds.

Investment period is 10 years.
Starting date is February 25, 1999.

Example: Rebalancing is WORSE Than S&P 500



Example of 50/50 rebalancing performing worse than S&P 500 and better than US Gov. Bonds.

Investment period is 10 years.
Starting date is August 23, 1990.

Probability of Under-Performance

50% Stock / 50 % Bond Rebalancing				
Years of Investing	(...)	Probability of Loss	Probability < Bond-Only	Probability < Stock-Only
1	(...)	0.13	0.25	0.75
2		0.11	0.21	0.74
3		0.11	0.22	0.73
4		0.07	0.22	0.71
5		0.004	0.20	0.73
6		0	0.16	0.71
7		0.0006	0.11	0.80
8		0.002	0.08	0.85
9		0.004	0.09	0.88
10		0	0.09	0.85

- These are historical probabilities (frequencies) for 1978-2013.
- Probability of loss decreases with longer investment duration.
- Probability of under-performing US Gov. Bonds decreases with longer investment duration.
- Probability of under-performing S&P 500 is high at 0.71-0.88.

Conclusion

- Rebalancing has average annualized returns between the S&P 500 and US Gov. Bonds.
- Rebalancing has lower probability and magnitude of loss than S&P 500.
- Rebalancing is better for short-term investing than full investment in the S&P 500.

The book also studies rebalancing with 25% stock and 75% bonds, and 75/25.

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