

Strategies
for
Investing
in the
S&P 500



Magnus Erik Hvass Pedersen

S&P 500 vs. Government Bonds

(Part 1)

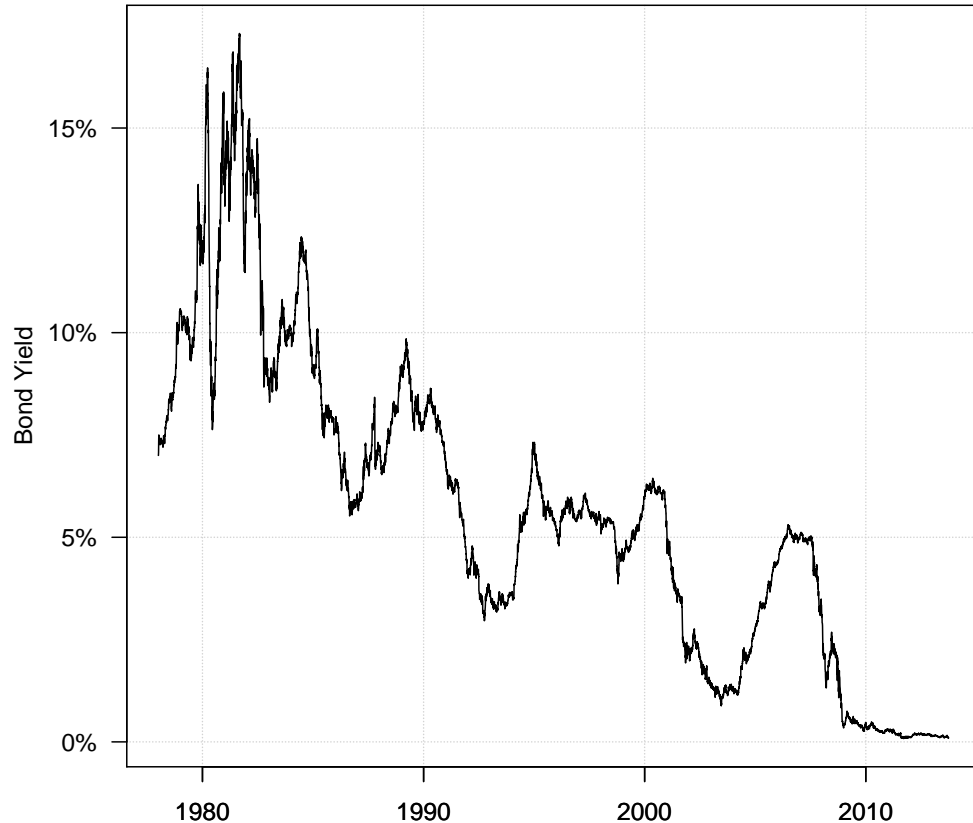
by

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What is a Government Bond?

- You can buy a so-called ‘bond’ from the government of USA.
- After a ‘maturity’ period, the US government repays you the money for the bond plus interests.
- So you are lending money to the US government.
- The interest is also called ‘bond yield’ or ‘return’.
- Example: If you buy a bond for \$1,000 with a one-year maturity and 5% yield then after one year you get \$1,050 in return.
- Bonds with maturity less than a year are often called Treasury Bills.

U.S. Gov. Bond – One Year Maturity (1978-2013)



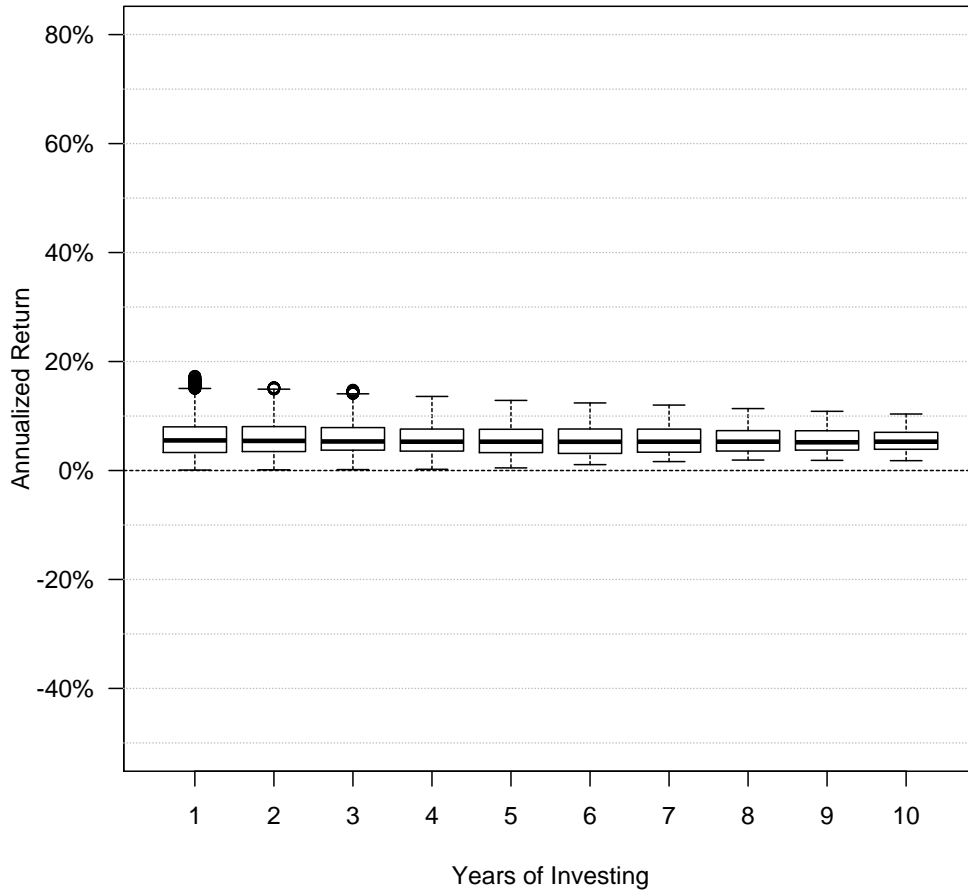
Plot shows the historical bond yield has changed over time.

In January 1980 it was over 12%.
In January 1990 it was over 8%.
In January 2000 it was over 6%.
In January 2010 it was about 0.4%.

What is Annualized Return?

- Example: If you buy a bond for \$1,000 with one-year maturity and 5% yield then after one year you get \$1,050 in return.
- If you then re-invest the \$1,050 in another bond with e.g. 8% yield then after another year you get \$1,134 in return (108% of \$1,050).
- So after 2 years you've earned a total of \$134 on your original \$1,000 investment. That's a total return of 13.4% over 2 years.
- The so-called annualized return is about 6.5%. It is a kind of average so that a 6.5% return for two years gives a total return of 13.4%.
- See the book on how to calculate annualized returns.

U.S. Gov. Bond – Annualized Return (1978-2013)



Annualized return from investing and re-investing in US government bonds.

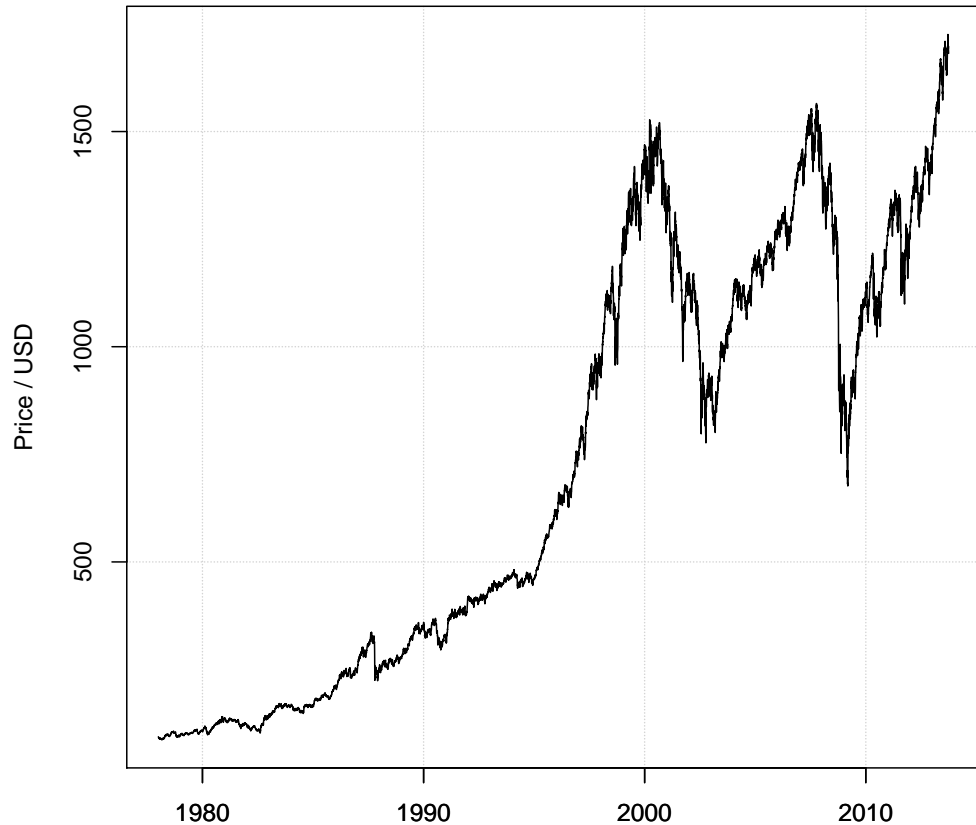
Box-plot shows statistics for all starting dates and investment periods up to 10 years during 1978-2013.

This can also be shown in a table...

U.S. Gov. Bond – 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	0.08%	3.3%	5.5%	5.8%	8.0%	17.3%	3.7%	0	-	0.75
2	0.13%	3.5%	5.4%	5.8%	8.1%	15.2%	3.6%	0	-	0.77
3	0.17%	3.7%	5.3%	5.8%	7.9%	14.8%	3.4%	0	-	0.75
4	0.22%	3.6%	5.3%	5.8%	7.6%	13.6%	3.2%	0	-	0.75
5	0.48%	3.3%	5.3%	5.8%	7.6%	12.9%	3.0%	0	-	0.76
6	1.08%	3.1%	5.3%	5.8%	7.6%	12.4%	2.8%	0	-	0.79
7	1.64%	3.4%	5.3%	5.8%	7.6%	12.0%	2.7%	0	-	0.86
8	1.91%	3.6%	5.3%	5.7%	7.3%	11.4%	2.6%	0	-	0.87
9	1.86%	3.8%	5.2%	5.7%	7.3%	10.9%	2.4%	0	-	0.90
10	1.80%	3.9%	5.3%	5.6%	7.0%	10.4%	2.3%	0	-	0.88

What is the S&P 500?

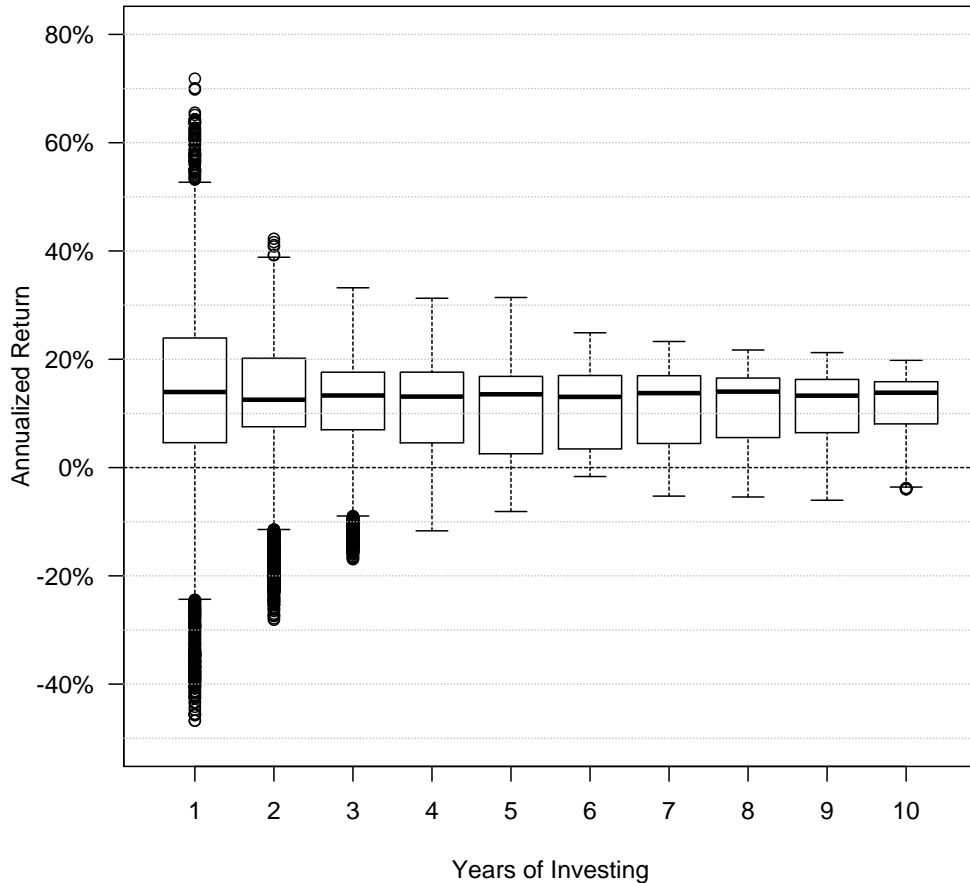


The S&P 500 is a stock-market index for 500 large US companies.

The price of the S&P 500 is shown in this plot for 1978-2013.

The S&P 500 is very volatile. Greatest annual gain was over 70%. Greatest annual loss was almost (50%).

S&P 500 – Annualized Return (1978-2013)



Annualized return from investing in the S&P 500 and re-investing the dividends in the S&P 500.

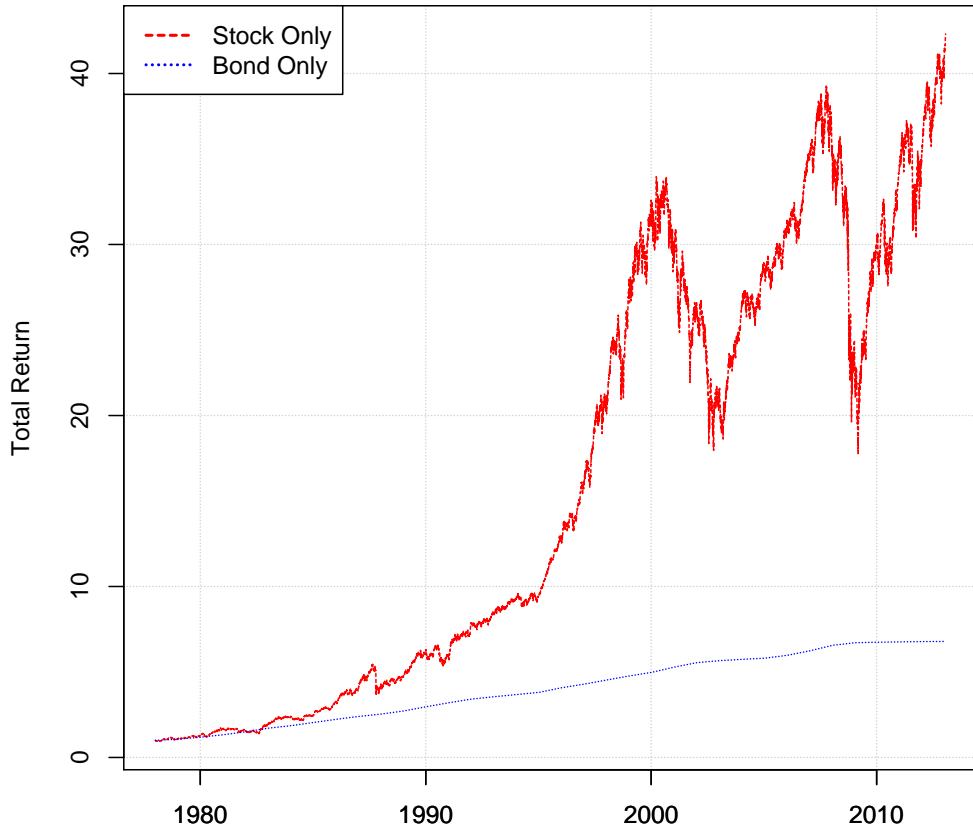
Box-plot shows statistics for all starting dates and investment periods up to 10 years during 1978-2013.

This can also be shown in a table...

S&P 500 – 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	(46.8%)	4.6%	14.0%	12.8%	23.9%	71.8%	17.3%	0.19	0.25	-
2	(28.1%)	7.5%	12.5%	12.0%	20.2%	42.2%	12.4%	0.14	0.23	-
3	(16.9%)	7.0%	13.3%	11.6%	17.6%	33.2%	10.5%	0.15	0.25	-
4	(11.7%)	4.6%	13.1%	11.4%	17.6%	31.3%	9.4%	0.18	0.25	-
5	(8.1%)	2.6%	13.5%	11.3%	16.8%	31.4%	8.4%	0.14	0.24	-
6	(1.7%)	3.4%	13.1%	11.3%	17.0%	24.9%	7.3%	0.04	0.21	-
7	(5.3%)	4.4%	13.8%	11.5%	17.0%	23.3%	6.7%	0.02	0.14	-
8	(5.4%)	5.6%	14.0%	11.5%	16.5%	21.7%	6.4%	0.04	0.13	-
9	(6.0%)	6.5%	13.3%	11.5%	16.3%	21.2%	6.1%	0.05	0.10	-
10	(4.0%)	8.1%	13.8%	11.5%	15.9%	19.8%	5.8%	0.07	0.12	-

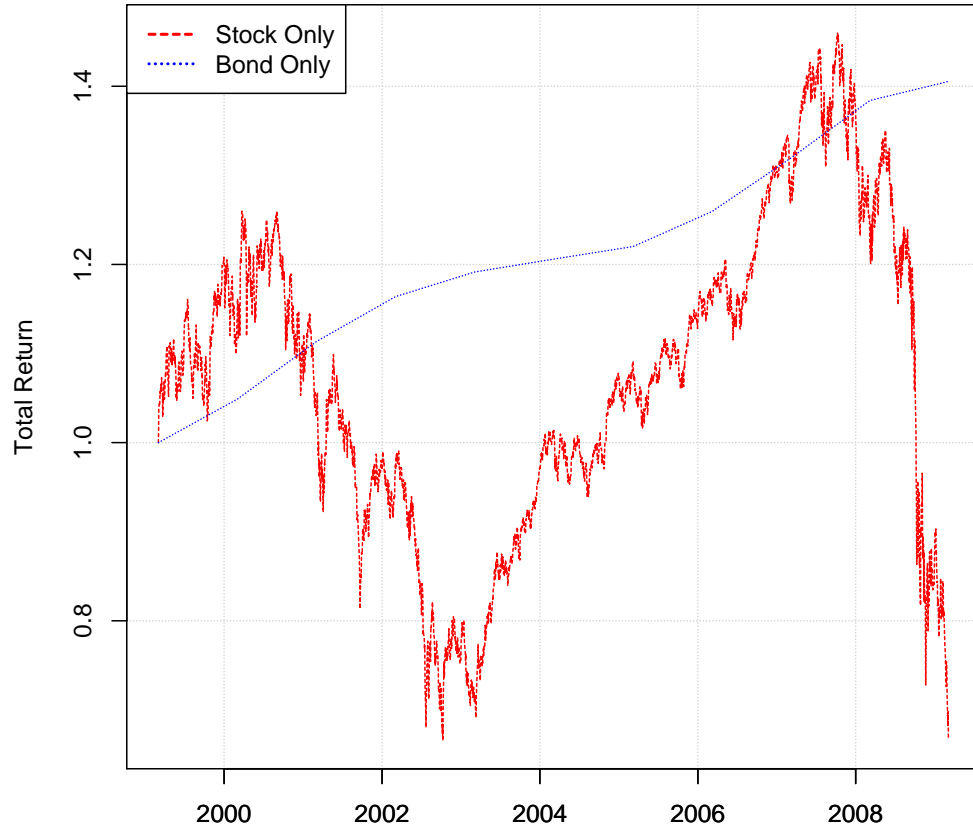
Long-Term Relative Performance (1978-2013)



In this 35 year period the S&P 500 greatly out-performed US Government Bonds.

It is tempting to conclude that the S&P 500 is always better than bonds in the long-term. But ...

S&P 500 Worse Than U.S. Government Bond



Example of S&P 500 performing worse than US Government Bonds. Investment period is 10 years. Starting date is March 3, 1999.

These are total returns, so dividends and bond yields are reinvested.

Probability of S&P 500 Under-Performing Bonds

Annualized Returns of S&P 500				
Years of Investing	(...)	Probability of Loss	Probability < Bond-Only	Probability < Stock-Only
1	(...)	0.19	0.25	-
2		0.14	0.23	-
3		0.15	0.25	-
4		0.18	0.25	-
5		0.14	0.24	-
6		0.04	0.21	-
7		0.02	0.14	-
8		0.04	0.13	-
9		0.05	0.10	-
10		0.07	0.12	-

These are historical probabilities (frequencies) for 1978-2013.

Probability of loss decreased with longer investment duration.

Probability of under-performing US Gov. Bonds also decreased with longer investment duration.

Conclusion

During the period 1978-2013:

- US Gov. Bonds had average annualized return of almost 6%.
- S&P 500 had average annualized return of 11-13% depending on investment duration.
- But S&P 500 sometimes had very large gains and losses.
- Probability of S&P 500 under-performing US Gov. Bonds was 25% for one-year investment periods and 12% for ten-year periods.

Strategies for Investing in the S&P 500



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