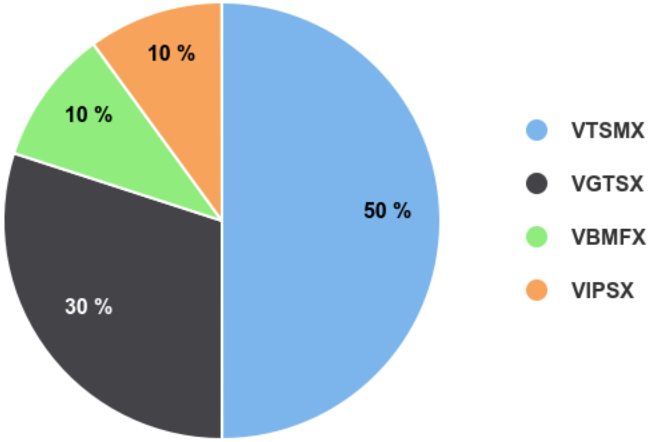
Report Parameters

Start Date	07/01/2000
End Date	03/31/2019
Initial Balance	$10,000
Optimization Goal	Maximize Sharpe Ratio
Rebalancing	Rebalance monthly

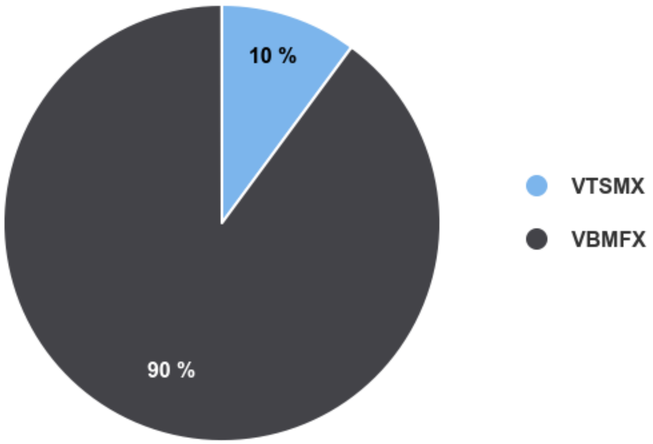
Provided Portfolio

Ticker	Name	Allocation	Min. Weight	Max. Weight
VTSMX	Vanguard Total Stock Mkt Idx Inv	50.00%	0.00%	100.00%
VGTSX	Vanguard Total Intl Stock Index Inv	30.00%	0.00%	100.00%
VBMFX	Vanguard Total Bond Market Index Inv	10.00%	0.00%	100.00%
VIPSX	Vanguard Inflation-Protected Secs Inv	10.00%	0.00%	100.00%



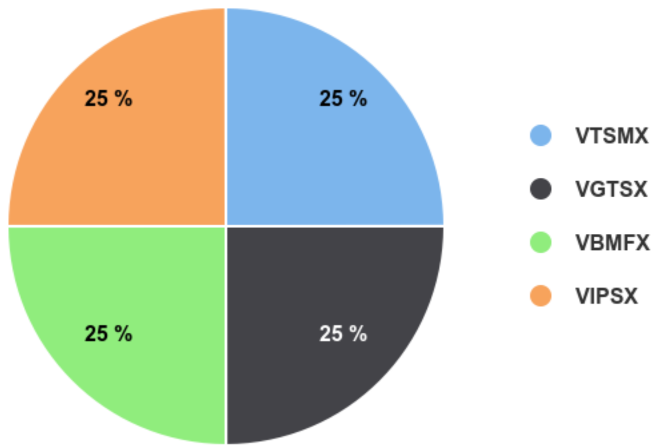
Maximum Sharpe Ratio

Ticker	Name	Allocation
VTSMX	Vanguard Total Stock Mkt Idx Inv	10.10%
VBMFX	Vanguard Total Bond Market Index Inv	89.90%



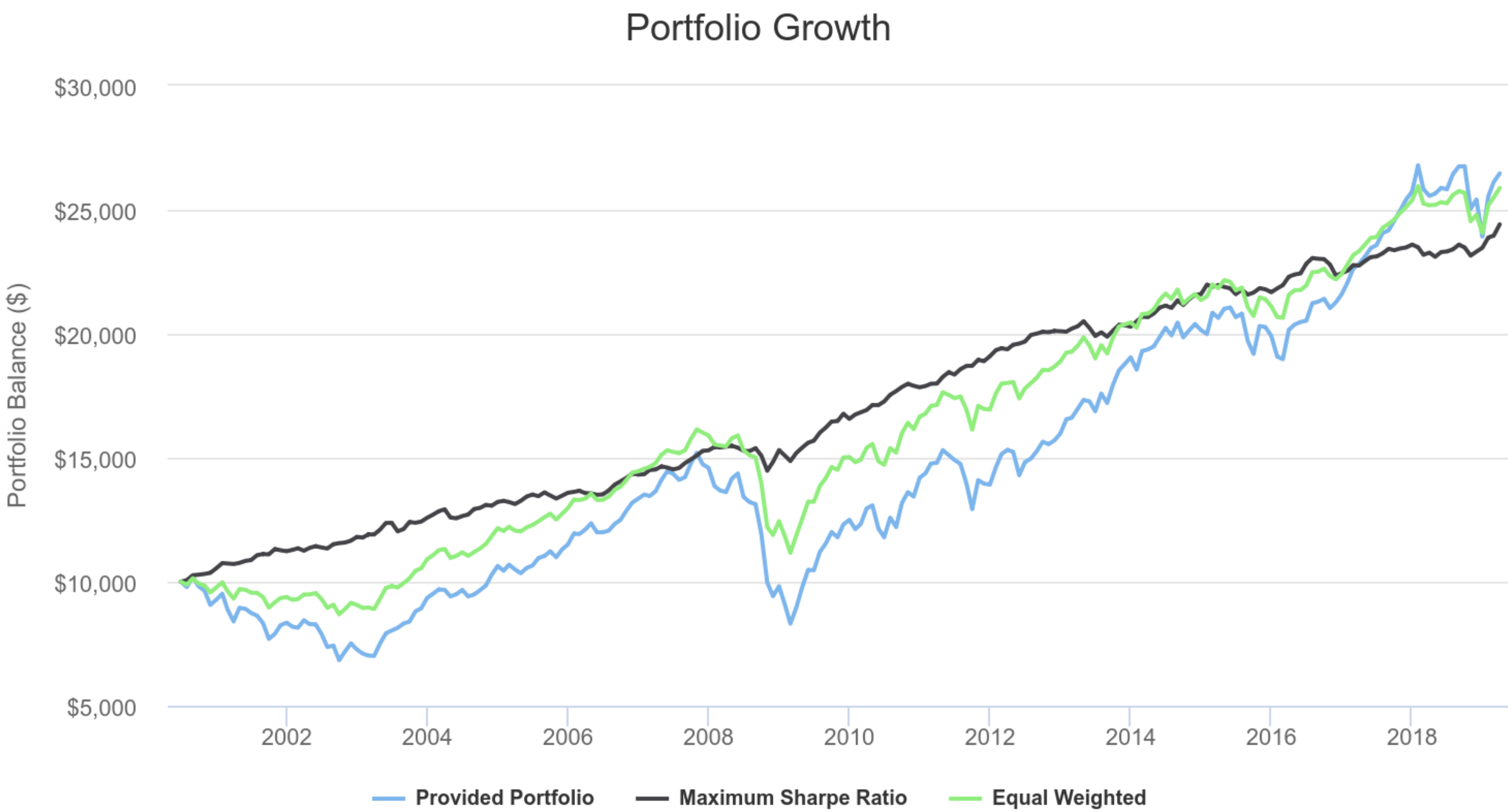
Equal Weighted

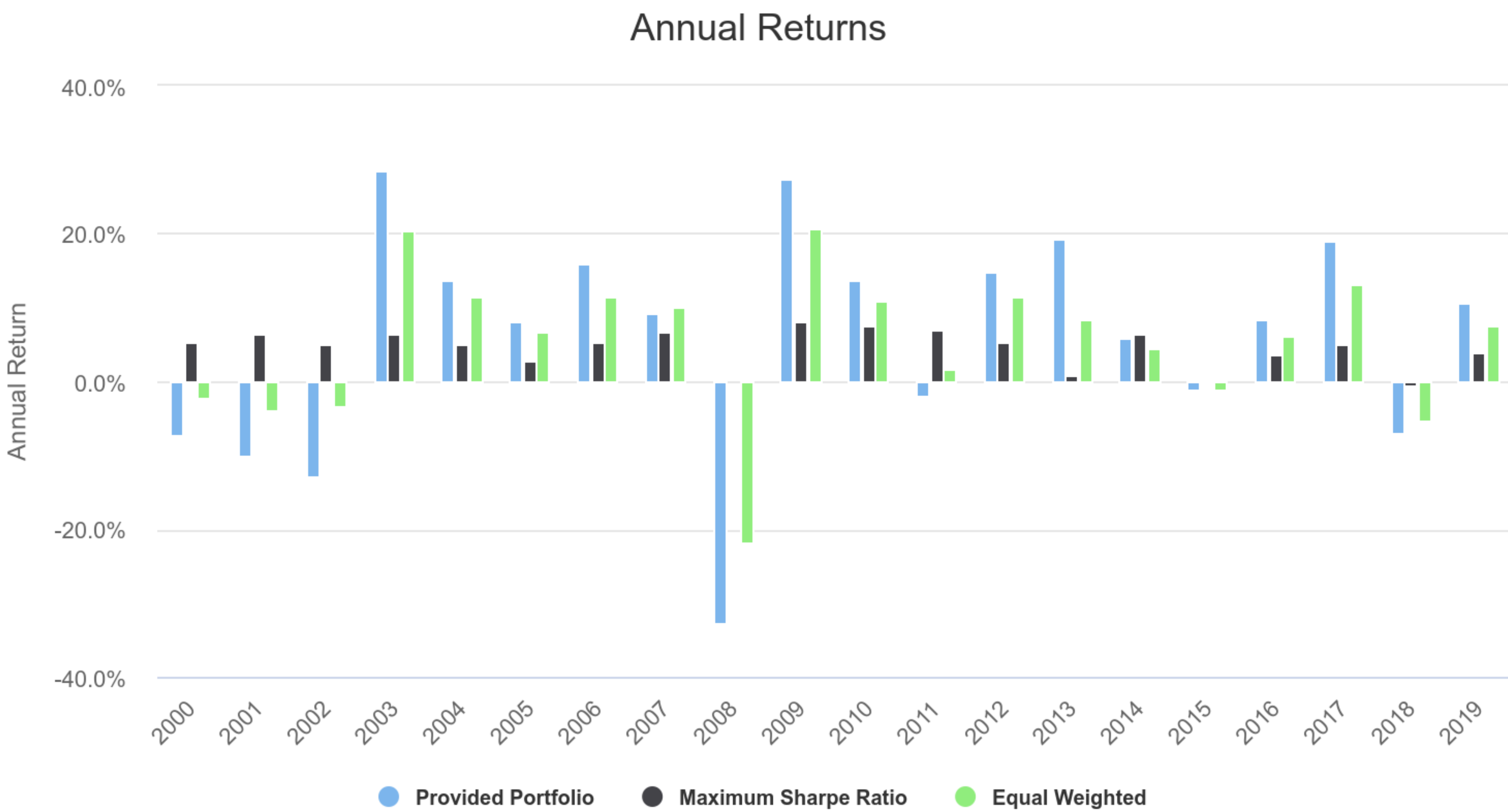
Ticker	Name	Allocation
VTSMX	Vanguard Total Stock Mkt Idx Inv	25.00%
VGTSX	Vanguard Total Intl Stock Index Inv	25.00%
VBMFX	Vanguard Total Bond Market Index Inv	25.00%
VIPSX	Vanguard Inflation-Protected Secs Inv	25.00%



Portfolio Performance

Metric	Provided Portfolio	Maximum Sharpe Ratio	Equal Weighted
Start Balance	$10,000	$10,000	$10,000
End Balance	$26,465	$24,410	$25,875
CAGR	5.33%	4.87%	5.20%
Expected Return	6.13%	4.93%	5.55%
Stdev	12.29%	3.28%	8.18%
Best Year	28.64%	8.25%	20.81%
Worst Year	-32.74%	-0.54%	-21.78%
Max. Drawdown	-45.33%	-6.49%	-30.83%
Sharpe Ratio (ex-ante)	0.38	1.04	0.49
Sharpe Ratio (ex-post)	0.36	1.01	0.48
Sortino Ratio	0.51	1.65	0.68
US Stock Market Correlation	0.97	0.36	0.91


Portfolio Growth
$30,000
$25,000
$20,000
$15,000
$10,000
$5,000
Portfolio Balance ($)
2002
2004
2006
2008
2010
2012
2014
2016
2018
Provided Portfolio
Maximum Sharpe Ratio
Equal Weighted


Annual Returns
40.0%
20.0%
0.0%
-20.0%
-40.0%
Annual Return
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Provided Portfolio
Maximum Sharpe Ratio
Equal Weighted

Risk and Return Metrics

Metric	Provided Portfolio	Maximum Sharpe Ratio	Equal Weighted
Arithmetic Mean (monthly)	0.50%	0.40%	0.45%
Arithmetic Mean (annualized)	6.13%	4.93%	5.55%
Geometric Mean (monthly)	0.43%	0.40%	0.42%
Geometric Mean (annualized)	5.33%	4.87%	5.20%
Volatility (monthly)	3.55%	0.95%	2.36%
Volatility (annualized)	12.29%	3.28%	8.18%
Downside Deviation (monthly)	2.49%	0.54%	1.61%
Max. Drawdown	-45.33%	-6.49%	-30.83%
US Market Correlation	0.97	0.36	0.91
Beta (*)	0.80	0.08	0.50
Alpha (annualized)	0.40%	4.28%	1.96%
R Squared	94.44%	12.65%	82.23%
Sharpe Ratio	0.36	1.01	0.48
Sortino Ratio	0.51	1.65	0.68
Treynor Ratio (%)	5.60	42.70	7.91
Calmar Ratio	0.89	1.01	0.86
Active Return	-0.67%	-1.12%	-0.80%
Tracking Error	4.19%	14.14%	8.30%
Information Ratio	-0.16	-0.08	-0.10
Skewness	-0.77	-0.71	-0.97
Excess Kurtosis	2.23	2.41	4.23
Historical Value-at-Risk (5%)	-6.55%	-1.27%	-3.77%
Analytical Value-at-Risk (5%)	-5.33%	-1.15%	-3.42%
Conditional Value-at-Risk (5%)	-8.34%	-1.98%	-5.49%
Upside Capture Ratio (%)	78.80	16.90	51.28
Downside Capture Ratio (%)	79.20	-2.79	45.15
Sustainable Withdrawal Rate	5.73%	7.00%	6.48%
Positive Periods	139 out of 225 (61.78%)	155 out of 225 (68.89%)	144 out of 225 (64.00%)
Gain/Loss Ratio	0.89	1.35	0.94

(*) US stock market is used as the benchmark for calculations. Value-at-risk metrics are based on monthly values.

Provided Portfolio Returns

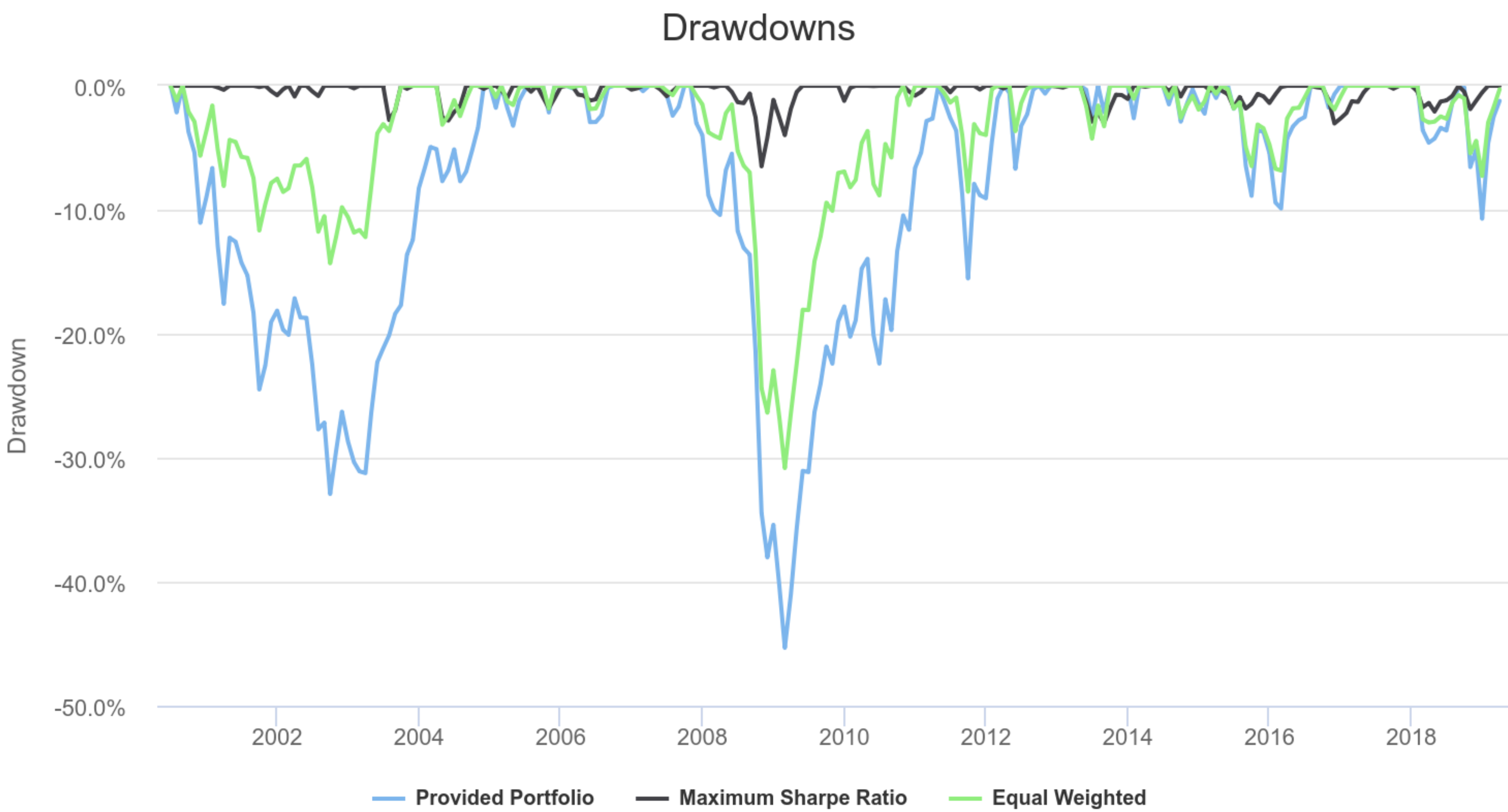
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Inflation	Balance
2000							-2.15%	4.15%	-3.70%	-1.76%	-5.98%	2.29%	-7.27%	3.39%	$9,273
2001	2.61%	-6.73%	-5.36%	6.46%	-0.37%	-1.93%	-1.21%	-3.55%	-7.57%	2.57%	4.52%	1.13%	-10.03%	1.55%	$8,343
2002	-1.89%	-0.51%	3.69%	-1.87%	-0.03%	-4.65%	-6.73%	0.76%	-7.90%	5.20%	4.46%	-3.26%	-12.89%	2.38%	$7,267
2003	-2.33%	-1.06%	-0.21%	7.07%	5.56%	1.41%	1.35%	2.18%	0.85%	4.96%	1.37%	4.76%	28.64%	1.88%	$9,349
2004	1.80%	1.79%	-0.17%	-2.73%	0.94%	1.82%	-2.71%	0.83%	1.80%	1.98%	4.40%	3.43%	13.73%	3.26%	$10,632
2005	-1.77%	2.33%	-1.79%	-1.46%	2.08%	0.88%	2.86%	0.74%	1.73%	-2.15%	2.85%	1.82%	8.21%	3.42%	$11,504
2006	3.82%	-0.20%	1.54%	2.06%	-2.94%	0.01%	0.58%	2.25%	1.31%	3.02%	2.46%	1.21%	16.03%	2.54%	$13,348
2007	1.24%	-0.44%	1.41%	3.31%	2.57%	-0.71%	-1.72%	0.74%	3.91%	2.91%	-3.03%	-0.98%	9.33%	4.08%	$14,594
2008	-5.06%	-1.28%	-0.47%	4.03%	1.43%	-6.60%	-1.54%	-0.61%	-9.06%	-16.58%	-5.46%	4.23%	-32.74%	0.09%	$9,816
2009	-7.69%	-8.30%	7.87%	8.98%	7.27%	-0.14%	7.05%	3.07%	3.96%	-1.75%	4.38%	1.50%	27.27%	2.72%	$12,493
2010	-2.96%	1.65%	5.15%	0.93%	-7.14%	-2.89%	6.68%	-3.00%	7.93%	3.33%	-1.29%	5.64%	13.59%	1.50%	$14,190
2011	1.31%	2.72%	0.19%	3.44%	-1.28%	-1.32%	-1.06%	-5.30%	-7.47%	9.03%	-1.00%	-0.27%	-1.94%	2.96%	$13,916
2012	5.03%	3.62%	1.14%	-0.54%	-6.19%	3.71%	0.97%	2.04%	2.44%	-0.63%	0.98%	1.77%	14.81%	1.74%	$15,976
2013	3.61%	0.34%	2.20%	2.09%	-0.32%	-2.32%	4.22%	-2.14%	4.26%	3.26%	1.34%	1.47%	19.24%	1.50%	$19,050
2014	-2.62%	4.06%	0.32%	0.64%	1.96%	1.83%	-1.50%	2.57%	-2.89%	1.45%	1.23%	-1.18%	5.76%	0.76%	$20,148
2015	-0.81%	4.29%	-0.98%	1.77%	0.26%	-1.85%	0.70%	-5.33%	-2.61%	5.82%	-0.17%	-1.77%	-1.16%	0.73%	$19,915
2016	-4.21%	-0.53%	6.25%	1.03%	0.53%	0.25%	3.43%	0.29%	0.55%	-1.75%	1.10%	1.57%	8.46%	2.07%	$21,600
2017	2.24%	2.41%	0.87%	1.31%	1.47%	0.52%	2.05%	0.44%	1.64%	1.69%	1.75%	1.23%	19.11%	2.11%	$25,729
2018	4.13%	-3.60%	-1.03%	0.35%	0.90%	-0.22%	2.37%	1.18%	0.02%	-6.42%	1.50%	-5.87%	-7.03%	1.91%	$23,919
2019	6.81%	2.24%	1.31%										10.64%	0.61%	$26,465

Maximum Sharpe Ratio Returns

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Inflation	Balance
2000							0.59%	1.99%	0.21%	0.30%	0.42%	1.79%	5.41%	3.39%	$10,541
2001	1.97%	-0.13%	-0.19%	0.41%	0.76%	0.31%	1.83%	0.39%	-0.10%	1.93%	-0.43%	-0.34%	6.53%	1.55%	$11,230
2002	0.49%	0.56%	-0.87%	1.03%	0.60%	-0.45%	-0.38%	1.55%	0.36%	0.22%	0.63%	1.30%	5.12%	2.38%	$11,805
2003	-0.21%	1.07%	-0.00%	1.61%	2.26%	0.02%	-2.76%	0.79%	2.32%	-0.24%	0.38%	1.25%	6.55%	1.88%	$12,579
2004	1.00%	1.07%	0.61%	-2.56%	-0.25%	0.71%	0.48%	1.78%	0.32%	0.93%	-0.25%	1.19%	5.08%	3.26%	$13,218
2005	0.32%	-0.35%	-0.62%	0.98%	1.33%	0.58%	-0.48%	1.12%	-0.90%	-0.92%	0.83%	0.90%	2.79%	3.42%	$13,588
2006	0.26%	0.34%	-0.72%	-0.07%	-0.41%	0.11%	1.20%	1.71%	0.96%	1.00%	1.22%	-0.31%	5.38%	2.54%	$14,318
2007	0.12%	1.19%	0.13%	0.86%	-0.33%	-0.52%	0.41%	1.35%	1.01%	1.02%	1.26%	0.13%	6.83%	4.08%	$15,296
2008	0.90%	-0.14%	0.21%	0.24%	-0.50%	-0.83%	-0.08%	0.79%	-1.93%	-4.06%	2.47%	3.17%	0.06%	0.09%	$15,305
2009	-1.46%	-1.44%	2.21%	1.39%	1.31%	0.52%	2.07%	1.28%	1.49%	0.11%	1.79%	-1.22%	8.25%	2.72%	$16,568
2010	1.06%	0.52%	0.56%	1.17%	-0.02%	0.88%	1.55%	0.85%	0.95%	0.72%	-0.45%	-0.34%	7.67%	1.50%	$17,839
2011	0.30%	0.51%	0.04%	1.49%	1.06%	-0.53%	1.19%	0.71%	0.02%	1.31%	-0.30%	1.05%	7.02%	2.96%	$19,091
2012	1.30%	0.39%	-0.21%	0.96%	0.22%	0.43%	1.35%	0.28%	0.36%	-0.08%	0.25%	-0.06%	5.29%	1.74%	$20,100
2013	-0.09%	0.62%	0.47%	0.99%	-1.30%	-1.62%	0.73%	-0.86%	1.23%	1.13%	-0.02%	-0.32%	0.92%	1.50%	$20,284
2014	1.07%	0.91%	-0.08%	0.70%	1.16%	0.35%	-0.43%	1.44%	-0.87%	1.12%	0.83%	0.08%	6.45%	0.76%	$21,592
2015	1.80%	-0.39%	0.26%	-0.28%	-0.26%	-1.08%	0.85%	-0.93%	0.38%	0.80%	-0.19%	-0.55%	0.38%	0.73%	$21,675
2016	0.71%	0.59%	1.56%	0.40%	0.19%	1.76%	0.98%	-0.12%	-0.06%	-0.95%	-1.93%	0.41%	3.54%	2.07%	$22,443
2017	0.46%	0.97%	-0.06%	0.79%	0.70%	0.11%	0.54%	0.78%	-0.24%	0.32%	0.15%	0.50%	5.13%	2.11%	$23,595
2018	-0.45%	-1.30%	0.36%	-0.71%	0.83%	0.09%	0.37%	0.81%	-0.47%	-1.40%	0.68%	0.68%	-0.54%	1.91%	$23,467
2019	1.77%	0.30%	1.90%										4.02%	0.61%	$24,410

Equal Weighted Returns

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Inflation	Balance
2000							-1.18%	2.59%	-2.08%	-0.83%	-2.83%	2.09%	-2.35%	3.39%	$9,765
2001	2.15%	-3.60%	-3.10%	4.04%	-0.17%	-1.26%	-0.08%	-1.73%	-4.57%	2.41%	1.88%	0.38%	-3.97%	1.55%	$9,378
2002	-1.16%	0.33%	2.00%	0.00%	0.57%	-2.43%	-3.91%	1.42%	-4.24%	2.49%	2.71%	-0.87%	-3.34%	2.38%	$9,065
2003	-1.41%	0.24%	-0.65%	4.61%	4.70%	0.77%	-0.57%	1.80%	1.88%	3.03%	0.97%	3.52%	20.35%	1.88%	$10,910
2004	1.48%	1.79%	0.42%	-3.14%	0.78%	1.26%	-1.30%	1.40%	1.28%	1.66%	2.70%	2.71%	11.43%	3.26%	$12,157
2005	-0.92%	1.41%	-1.26%	-0.30%	1.40%	0.75%	1.20%	1.36%	1.10%	-1.83%	1.82%	1.84%	6.69%	3.42%	$12,970
2006	2.61%	-0.13%	0.46%	1.49%	-1.88%	0.05%	1.00%	2.04%	0.88%	2.02%	2.06%	0.36%	11.42%	2.54%	$14,451
2007	0.73%	0.50%	1.03%	2.30%	1.19%	-0.41%	-0.35%	0.75%	2.99%	2.46%	-0.79%	-0.71%	10.04%	4.08%	$15,901
2008	-2.29%	-0.29%	-0.23%	2.12%	0.72%	-3.82%	-1.25%	-0.57%	-6.83%	-12.77%	-2.59%	4.64%	-21.78%	0.09%	$12,438
2009	-4.99%	-5.52%	6.36%	5.46%	5.61%	-0.03%	4.82%	2.30%	3.11%	-0.72%	3.40%	0.12%	20.81%	2.72%	$15,026
2010	-1.37%	0.65%	3.24%	1.00%	-4.46%	-0.98%	4.55%	-1.14%	5.14%	2.60%	-1.55%	3.11%	10.84%	1.50%	$16,655
2011	0.74%	1.85%	0.23%	2.99%	-0.61%	-0.76%	0.41%	-3.03%	-4.77%	5.95%	-0.76%	-0.14%	1.71%	2.96%	$16,941
2012	3.86%	2.23%	0.17%	0.19%	-3.66%	2.34%	1.18%	1.26%	1.70%	-0.10%	0.80%	1.15%	11.50%	1.74%	$18,888
2013	1.86%	0.18%	1.24%	1.74%	-1.65%	-2.65%	2.79%	-1.70%	3.38%	2.22%	0.40%	0.41%	8.31%	1.50%	$20,457
2014	-1.05%	2.73%	0.08%	0.88%	1.78%	1.18%	-0.96%	1.72%	-2.59%	1.03%	0.78%	-1.12%	4.41%	0.76%	$21,359
2015	0.69%	2.20%	-0.65%	1.45%	-0.26%	-1.58%	0.51%	-3.65%	-1.63%	3.59%	-0.30%	-1.36%	-1.18%	0.73%	$21,108
2016	-2.07%	-0.14%	4.51%	0.84%	0.03%	0.87%	2.42%	0.10%	0.54%	-1.31%	-0.60%	1.01%	6.20%	2.07%	$22,416
2017	1.77%	1.56%	0.71%	1.12%	1.17%	0.13%	1.55%	0.64%	0.75%	1.11%	0.93%	1.08%	13.25%	2.11%	$25,386
2018	2.22%	-2.70%	-0.27%	0.07%	0.43%	-0.19%	1.35%	0.60%	-0.26%	-4.48%	1.06%	-2.96%	-5.21%	1.91%	$24,062
2019	4.65%	1.25%	1.48%										7.53%	0.61%	$25,875



Drawdowns for Historical Market Stress Periods

Stress Period	Start	End	Provided Portfolio	Maximum Sharpe Ratio	Equal Weighted
Subprime Crisis	Nov 2007	Mar 2009	-45.33%	-6.49%	-30.83%

Drawdowns for Provided Portfolio (worst 10)

Rank	Start	End	Length	Recovery By	Recovery Time	Underwater Period	Drawdown
1	Nov 2007	Feb 2009	1 year 4 months	Apr 2011	2 years 2 months	3 years 6 months	-45.33%
2	Sep 2000	Sep 2002	2 years 1 month	Nov 2004	2 years 2 months	4 years 3 months	-32.92%
3	May 2011	Sep 2011	5 months	Mar 2012	6 months	11 months	-15.54%
4	Feb 2018	Dec 2018	11 months				-10.72%
5	Jun 2015	Feb 2016	9 months	Jul 2016	5 months	1 year 2 months	-9.89%
6	Apr 2012	May 2012	2 months	Sep 2012	4 months	6 months	-6.69%
7	Mar 2005	Apr 2005	2 months	Jul 2005	3 months	5 months	-3.22%
8	May 2006	May 2006	1 month	Sep 2006	4 months	5 months	-2.94%
9	Sep 2014	Sep 2014	1 month	Feb 2015	5 months	6 months	-2.89%
10	May 2013	Jun 2013	2 months	Jul 2013	1 month	3 months	-2.64%

Drawdowns for Maximum Sharpe Ratio (worst 10)

Rank	Start	End	Length	Recovery By	Recovery Time	Underwater Period	Drawdown
1	May 2008	Oct 2008	6 months	May 2009	7 months	1 year 1 month	-6.49%
2	Aug 2016	Nov 2016	4 months	May 2017	6 months	10 months	-3.04%
3	May 2013	Aug 2013	4 months	Feb 2014	6 months	10 months	-3.03%
4	Apr 2004	May 2004	2 months	Aug 2004	3 months	5 months	-2.80%
5	Jul 2003	Jul 2003	1 month	Sep 2003	2 months	3 months	-2.76%
6	Jan 2018	Apr 2018	4 months	Jan 2019	9 months	1 year 1 month	-2.08%
7	Feb 2015	Aug 2015	7 months	Mar 2016	7 months	1 year 2 months	-1.83%
8	Sep 2005	Oct 2005	2 months	Jan 2006	3 months	5 months	-1.81%
9	Dec 2009	Dec 2009	1 month	Feb 2010	2 months	3 months	-1.22%
10	Mar 2006	May 2006	3 months	Jul 2006	2 months	5 months	-1.20%

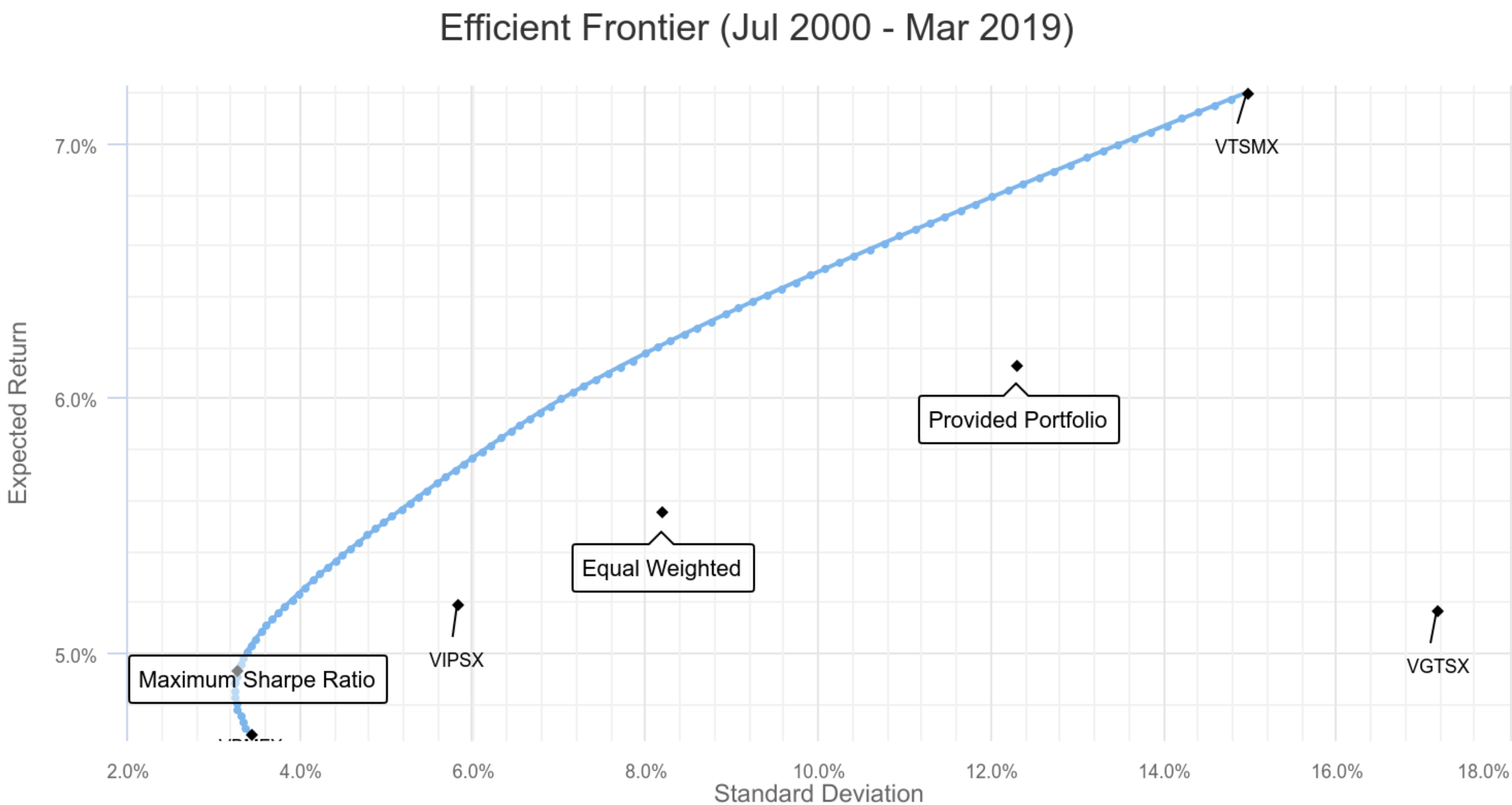
Drawdowns for Equal Weighted (worst 10)

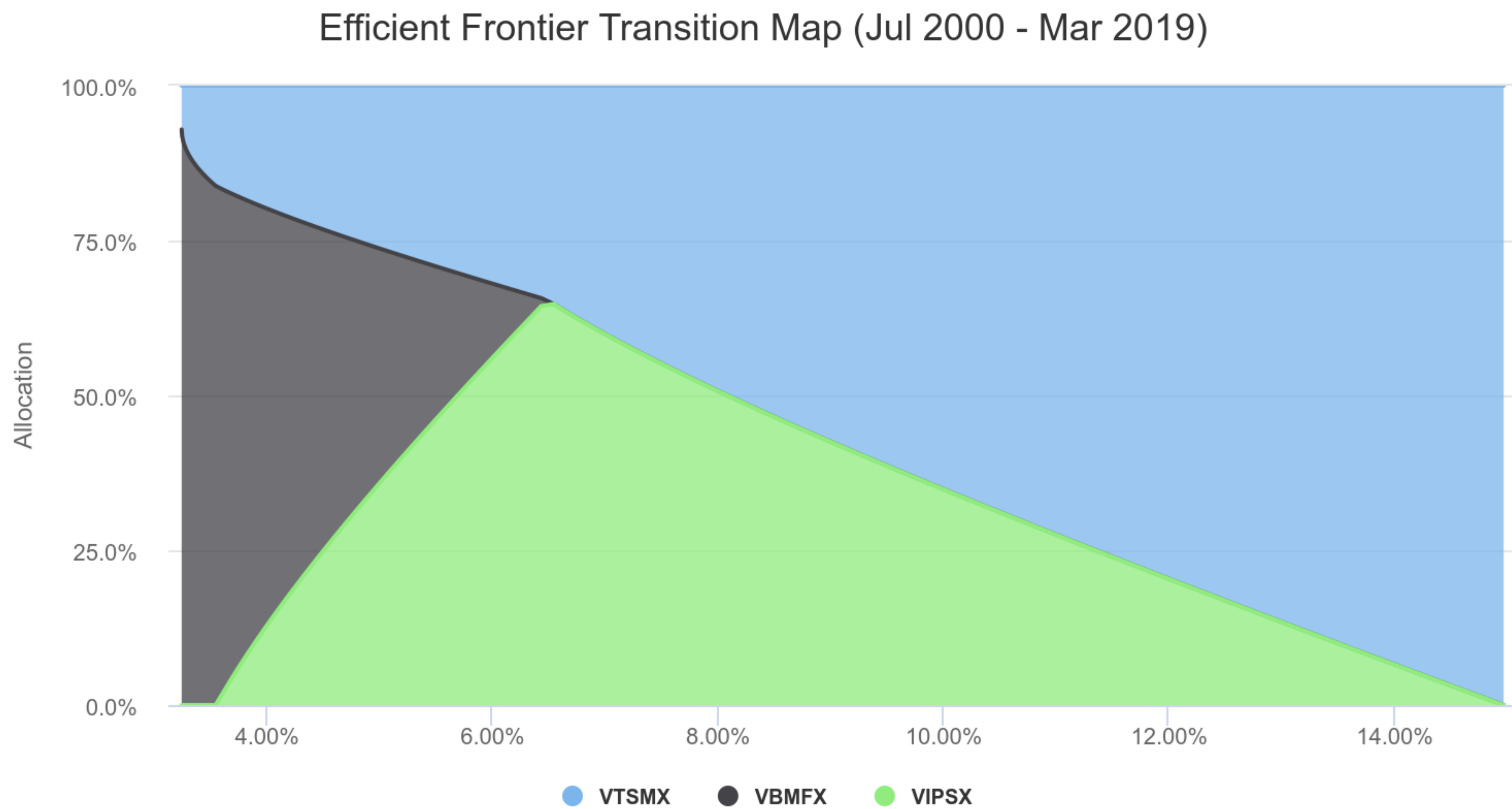
Rank	Start	End	Length	Recovery By	Recovery Time	Underwater Period	Drawdown
1	Nov 2007	Feb 2009	1 year 4 months	Oct 2010	1 year 8 months	3 years	-30.83%
2	Sep 2000	Sep 2002	2 years 1 month	Oct 2003	1 year 1 month	3 years 2 months	-14.31%
3	May 2011	Sep 2011	5 months	Feb 2012	5 months	10 months	-8.54%
4	Feb 2018	Dec 2018	11 months				-7.27%
5	May 2015	Feb 2016	10 months	Jul 2016	5 months	1 year 3 months	-6.83%
6	May 2013	Jun 2013	2 months	Sep 2013	3 months	5 months	-4.26%
7	May 2012	May 2012	1 month	Aug 2012	3 months	4 months	-3.66%
8	Apr 2004	Apr 2004	1 month	Sep 2004	5 months	6 months	-3.14%
9	Sep 2014	Sep 2014	1 month	Feb 2015	5 months	6 months	-2.59%
10	Oct 2016	Nov 2016	2 months	Jan 2017	2 months	4 months	-1.90%

Efficient Frontier Assets

#	Asset	CAGR	Expected Return (*)	Standard Deviation	Sharpe Ratio (*)	Min. Weight	Max. Weight
1	Vanguard Total Stock Mkt Idx Inv (VTSMX)	6.00%	7.20%	14.96%	0.380	0.00%	100.00%
2	Vanguard Total Intl Stock Index Inv (VGTSX)	3.61%	5.17%	17.16%	0.213	0.00%	100.00%
3	Vanguard Total Bond Market Index Inv (VBMFX)	4.62%	4.68%	3.43%	0.925	0.00%	100.00%
4	Vanguard Inflation-Protected Secs Inv (VIPSX)	5.01%	5.19%	5.81%	0.633	0.00%	100.00%

(*) Expected return is annualized from historical monthly mean return. Ex ante Sharpe Ratio calculated using historical 1-month treasury bill returns as the risk-free rate (1.51% annualized).


Efficient Frontier (Jul 2000 - Mar 2019)
Expected Return
7.0%
6.0%
5.0%
VTSMX
Provided Portfolio
Equal Weighted
VIPSX
VGTSX
Maximum Sharpe Ratio
2.0%
4.0%
6.0%
8.0%
10.0%
12.0%
14.0%
16.0%
18.0%
Standard Deviation


Efficient Frontier Transition Map (Jul 2000 - Mar 2019)
100.0%
75.0%
50.0%
25.0%
0.0%
Allocation
4.00%
6.00%
8.00%
10.00%
12.00%
14.00%
VTSMX
VBMFX
VIPSX

Efficient Frontier Points

#	VTSMX	VGTSX	VBMFX	VIPSX	Expected Return (*)	Standard Deviation (*)	Sharpe Ratio (*)
1	0.00%	0.00%	100.00%	0.00%	4.68%	3.43%	0.925
2	0.55%	2.38%	97.07%	0.00%	4.70%	3.36%	0.951
3	1.73%	1.50%	96.78%	0.00%	4.73%	3.33%	0.967
4	2.91%	0.61%	96.48%	0.00%	4.75%	3.30%	0.983
5	4.04%	0.00%	95.96%	0.00%	4.78%	3.28%	0.998
6	5.05%	0.00%	94.95%	0.00%	4.80%	3.26%	1.012
7	6.06%	0.00%	93.94%	0.00%	4.83%	3.25%	1.023
8	7.07%	0.00%	92.93%	0.00%	4.85%	3.24%	1.032
9	8.08%	0.00%	91.92%	0.00%	4.88%	3.25%	1.039
10	9.09%	0.00%	90.91%	0.00%	4.91%	3.26%	1.043
11	10.10%	0.00%	89.90%	0.00%	4.93%	3.28%	1.044
12	11.11%	0.00%	88.89%	0.00%	4.96%	3.30%	1.044
13	12.12%	0.00%	87.88%	0.00%	4.98%	3.34%	1.041
14	13.13%	0.00%	86.87%	0.00%	5.01%	3.38%	1.035
15	14.14%	0.00%	85.86%	0.00%	5.03%	3.43%	1.028
16	15.15%	0.00%	84.85%	0.00%	5.06%	3.48%	1.019
17	16.16%	0.00%	83.84%	0.00%	5.08%	3.54%	1.009
18	16.77%	0.00%	81.27%	1.96%	5.11%	3.61%	0.998
19	17.36%	0.00%	78.60%	4.04%	5.13%	3.68%	0.986
20	17.94%	0.00%	75.94%	6.12%	5.16%	3.75%	0.974
21	18.52%	0.00%	73.27%	8.20%	5.18%	3.82%	0.961
22	19.11%	0.00%	70.61%	10.29%	5.21%	3.90%	0.949
23	19.69%	0.00%	67.94%	12.37%	5.23%	3.98%	0.936
24	20.28%	0.00%	65.27%	14.45%	5.26%	4.06%	0.924
25	20.86%	0.00%	62.61%	16.53%	5.28%	4.14%	0.911
26	21.44%	0.00%	59.94%	18.61%	5.31%	4.23%	0.899
27	22.03%	0.00%	57.28%	20.70%	5.34%	4.31%	0.887
28	22.61%	0.00%	54.61%	22.78%	5.36%	4.40%	0.875
29	23.20%	0.00%	51.94%	24.86%	5.39%	4.49%	0.863
30	23.78%	0.00%	49.28%	26.94%	5.41%	4.59%	0.851
31	24.37%	0.00%	46.61%	29.02%	5.44%	4.68%	0.839
32	24.95%	0.00%	43.95%	31.10%	5.46%	4.78%	0.828
33	25.53%	0.00%	41.28%	33.19%	5.49%	4.87%	0.817

#	VTSMX	VGTSX	VBMFX	VIPSX	Expected Return (*)	Standard Deviation (*)	Sharpe Ratio (*)
34	26.12%	0.00%	38.61%	35.27%	5.51%	4.97%	0.806
35	26.70%	0.00%	35.95%	37.35%	5.54%	5.07%	0.795
36	27.29%	0.00%	33.28%	39.43%	5.56%	5.17%	0.785
37	27.87%	0.00%	30.61%	41.51%	5.59%	5.27%	0.774
38	28.45%	0.00%	27.95%	43.60%	5.61%	5.37%	0.764
39	29.04%	0.00%	25.28%	45.68%	5.64%	5.47%	0.755
40	29.62%	0.00%	22.62%	47.76%	5.66%	5.58%	0.745
41	30.21%	0.00%	19.95%	49.84%	5.69%	5.68%	0.736
42	30.79%	0.00%	17.28%	51.92%	5.72%	5.79%	0.727
43	31.38%	0.00%	14.62%	54.01%	5.74%	5.89%	0.718
44	31.96%	0.00%	11.95%	56.09%	5.77%	6.00%	0.710
45	32.54%	0.00%	9.29%	58.17%	5.79%	6.11%	0.702
46	33.13%	0.00%	6.62%	60.25%	5.82%	6.21%	0.693
47	33.71%	0.00%	3.95%	62.33%	5.84%	6.32%	0.686
48	34.30%	0.00%	1.29%	64.42%	5.87%	6.43%	0.678
49	35.24%	0.00%	0.00%	64.76%	5.89%	6.54%	0.670
50	36.51%	0.00%	0.00%	63.49%	5.92%	6.65%	0.663
51	37.77%	0.00%	0.00%	62.23%	5.94%	6.77%	0.655
52	39.04%	0.00%	0.00%	60.96%	5.97%	6.89%	0.647
53	40.31%	0.00%	0.00%	59.69%	6.00%	7.02%	0.639
54	41.58%	0.00%	0.00%	58.42%	6.02%	7.15%	0.631
55	42.85%	0.00%	0.00%	57.15%	6.05%	7.28%	0.623
56	44.12%	0.00%	0.00%	55.88%	6.07%	7.42%	0.615
57	45.39%	0.00%	0.00%	54.61%	6.10%	7.56%	0.607
58	46.66%	0.00%	0.00%	53.34%	6.12%	7.70%	0.600
59	47.93%	0.00%	0.00%	52.07%	6.15%	7.84%	0.592
60	49.20%	0.00%	0.00%	50.80%	6.17%	7.99%	0.584
61	50.47%	0.00%	0.00%	49.53%	6.20%	8.14%	0.576
62	51.74%	0.00%	0.00%	48.26%	6.23%	8.29%	0.569
63	53.01%	0.00%	0.00%	46.99%	6.25%	8.44%	0.562
64	54.28%	0.00%	0.00%	45.72%	6.28%	8.60%	0.555
65	55.55%	0.00%	0.00%	44.45%	6.30%	8.75%	0.547
66	56.82%	0.00%	0.00%	43.18%	6.33%	8.91%	0.541
67	58.09%	0.00%	0.00%	41.91%	6.35%	9.07%	0.534
68	59.36%	0.00%	0.00%	40.64%	6.38%	9.24%	0.527

#	VTSMX	VGTSX	VBMFX	VIPSX	Expected Return (*)	Standard Deviation (*)	Sharpe Ratio (*)
69	60.63%	0.00%	0.00%	39.37%	6.40%	9.40%	0.521
70	61.90%	0.00%	0.00%	38.10%	6.43%	9.57%	0.514
71	63.17%	0.00%	0.00%	36.83%	6.46%	9.73%	0.508
72	64.44%	0.00%	0.00%	35.56%	6.48%	9.90%	0.502
73	65.71%	0.00%	0.00%	34.29%	6.51%	10.07%	0.496
74	66.98%	0.00%	0.00%	33.02%	6.53%	10.24%	0.490
75	68.25%	0.00%	0.00%	31.75%	6.56%	10.42%	0.485
76	69.52%	0.00%	0.00%	30.48%	6.58%	10.59%	0.479
77	70.79%	0.00%	0.00%	29.21%	6.61%	10.76%	0.474
78	72.06%	0.00%	0.00%	27.94%	6.63%	10.94%	0.469
79	73.33%	0.00%	0.00%	26.67%	6.66%	11.11%	0.464
80	74.60%	0.00%	0.00%	25.40%	6.69%	11.29%	0.459
81	75.87%	0.00%	0.00%	24.13%	6.71%	11.47%	0.454
82	77.14%	0.00%	0.00%	22.86%	6.74%	11.65%	0.449
83	78.41%	0.00%	0.00%	21.59%	6.76%	11.83%	0.444
84	79.68%	0.00%	0.00%	20.32%	6.79%	12.01%	0.440
85	80.95%	0.00%	0.00%	19.05%	6.81%	12.19%	0.435
86	82.22%	0.00%	0.00%	17.78%	6.84%	12.37%	0.431
87	83.49%	0.00%	0.00%	16.51%	6.87%	12.55%	0.427
88	84.76%	0.00%	0.00%	15.24%	6.89%	12.73%	0.423
89	86.03%	0.00%	0.00%	13.97%	6.92%	12.92%	0.419
90	87.30%	0.00%	0.00%	12.70%	6.94%	13.10%	0.415
91	88.57%	0.00%	0.00%	11.43%	6.97%	13.28%	0.411
92	89.84%	0.00%	0.00%	10.16%	6.99%	13.47%	0.407
93	91.11%	0.00%	0.00%	8.89%	7.02%	13.65%	0.404
94	92.38%	0.00%	0.00%	7.62%	7.05%	13.84%	0.400
95	93.65%	0.00%	0.00%	6.35%	7.07%	14.03%	0.397
96	94.92%	0.00%	0.00%	5.08%	7.10%	14.21%	0.393
97	96.19%	0.00%	0.00%	3.81%	7.12%	14.40%	0.390
98	97.46%	0.00%	0.00%	2.54%	7.15%	14.59%	0.387
99	98.73%	0.00%	0.00%	1.27%	7.17%	14.78%	0.383
100	100.00%	0.00%	0.00%	0.00%	7.20%	14.96%	0.380

(*) Ex-ante values shown for portfolio return and volatility. Ex ante Sharpe Ratio calculated using historical 1-month treasury bill returns as the risk-free rate (1.51% annualized).

Portfolio Components

Ticker	Name	CAGR	Stdev	Best Year	Worst Year	Max DD	Sharpe Ratio	Sortino Ratio	US Mkt Correlation
VTSMX	Vanguard Total Stock Mkt Idx Inv	6.00%	14.96%	33.35%	-37.04%	-50.89%	0.36	0.51	1.00
VGTSX	Vanguard Total Intl Stock Index Inv	3.61%	17.16%	40.34%	-44.10%	-58.50%	0.21	0.29	0.87
VBMFX	Vanguard Total Bond Market Index Inv	4.62%	3.43%	8.43%	-2.26%	-3.99%	0.90	1.50	-0.11
VIPSX	Vanguard Inflation-Protected Secs Inv	5.01%	5.81%	16.61%	-8.92%	-12.50%	0.62	0.93	0.02

Monthly Correlations

Ticker	Name	VTSMX	VGTSX	VBMFX	VIPSX	Provided Portfolio	Maximum Sharpe Ratio	Equal Weighted
VTSMX	Vanguard Total Stock Mkt Idx Inv	-	0.87	-0.11	0.02	0.97	0.36	0.91
VGTSX	Vanguard Total Intl Stock Index Inv	0.87	-	0.02	0.16	0.96	0.42	0.95
VBMFX	Vanguard Total Bond Market Index Inv	-0.11	0.02	-	0.79	0.01	0.89	0.20
VIPSX	Vanguard Inflation-Protected Secs Inv	0.02	0.16	0.79	-	0.15	0.76	0.35

Return Decomposition

Ticker	Name	Provided Portfolio	Maximum Sharpe Ratio	Equal Weighted
VTSMX	Vanguard Total Stock Mkt Idx Inv	$10,804	$2,726	$6,197
VGTSX	Vanguard Total Intl Stock Index Inv	$3,516		$3,610
VBMFX	Vanguard Total Bond Market Index Inv	$1,069	$11,685	$2,999
VIPSX	Vanguard Inflation-Protected Secs Inv	$1,076		$3,069

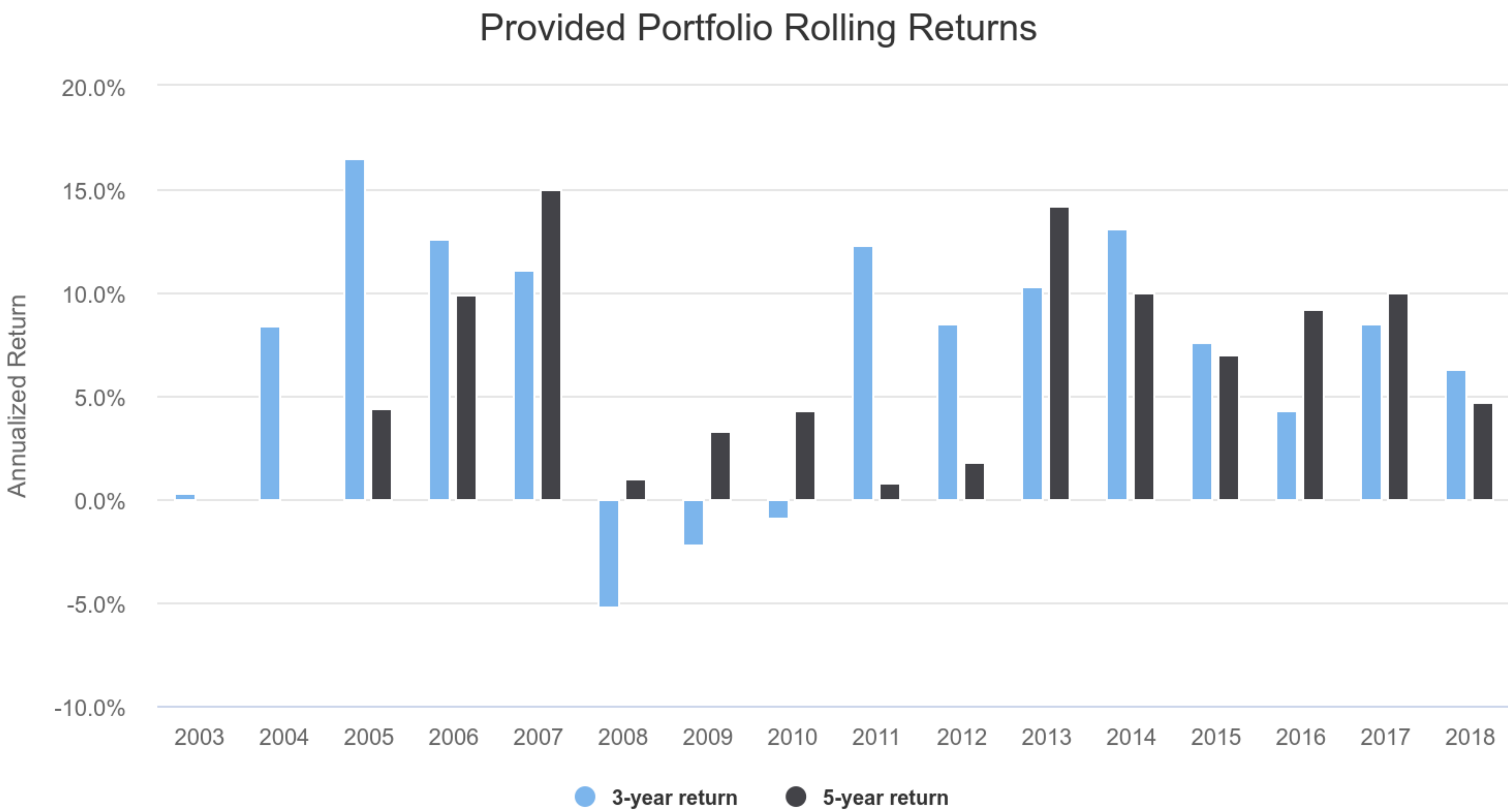
Risk Decomposition

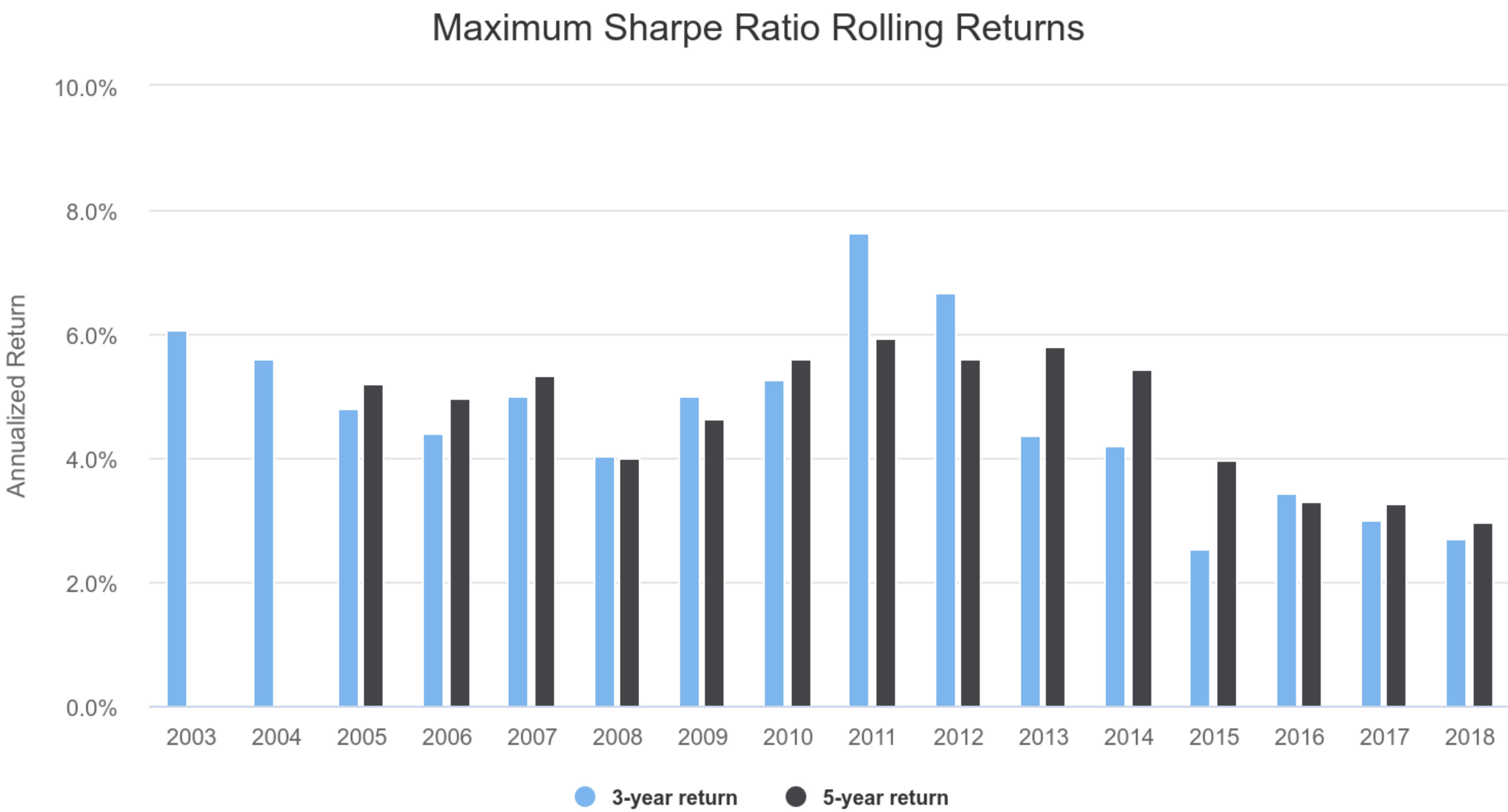
Ticker	Name	Provided Portfolio	Maximum Sharpe Ratio	Equal Weighted
VTSMX	Vanguard Total Stock Mkt Idx Inv	59.16%	16.41%	41.50%
VGTSX	Vanguard Total Intl Stock Index Inv	40.12%		50.07%
VBMFX	Vanguard Total Bond Market Index Inv	0.01%	83.59%	2.15%
VIPSX	Vanguard Inflation-Protected Secs Inv	0.70%		6.29%

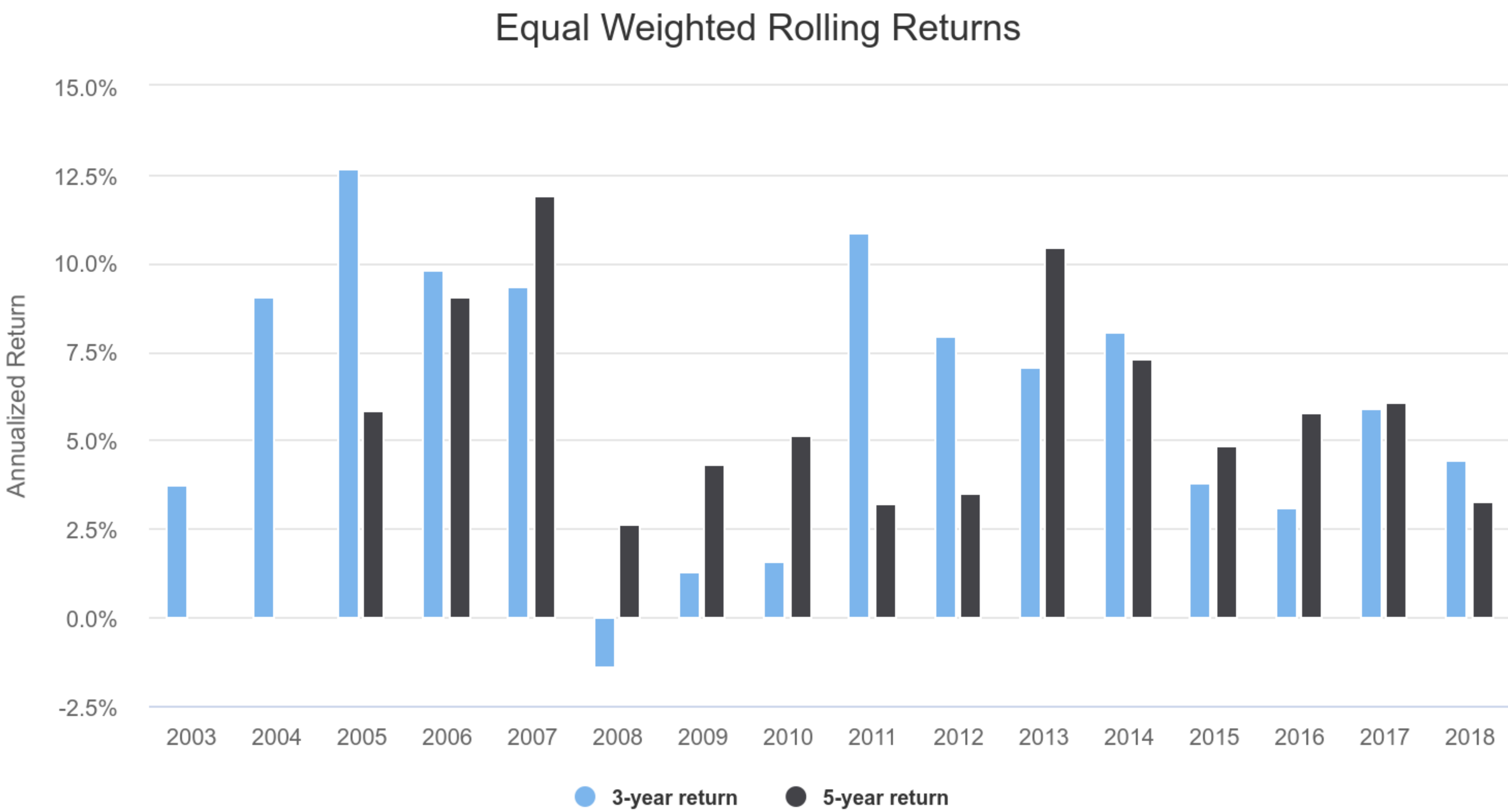
Rolling Returns

Roll Period	Provided Portfolio			Maximum Sharpe Ratio			Equal Weighted		
	Average	High	Low	Average	High	Low	Average	High	Low
1 year	6.58%	28.64%	-32.74%	4.58%	8.25%	-0.54%	5.64%	20.81%	-21.78%
3 years	6.98%	16.55%	-5.15%	4.67%	7.65%	2.55%	6.08%	12.68%	-1.39%
5 years	6.82%	14.96%	0.84%	4.71%	5.92%	2.96%	5.95%	11.90%	2.66%
7 years	6.46%	10.64%	2.35%	4.83%	5.75%	2.99%	5.82%	7.85%	4.12%
10 years	6.39%	9.32%	4.35%	4.94%	5.47%	4.37%	5.84%	7.62%	4.49%
15 years	6.76%	8.79%	5.23%	4.65%	4.92%	4.24%	5.94%	7.11%	5.27%

Result statistics are based on annualized rolling returns over full calendar year periods


Provided Portfolio Rolling Returns
20.0%
15.0%
10.0%
5.0%
0.0%
-5.0%
-10.0%
Annualized Return
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
3-year return
5-year return


Maximum Sharpe Ratio Rolling Returns
Annualized Return
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
3-year return
5-year return


Equal Weighted Rolling Returns
Annualized Return
15.0%
12.5%
10.0%
7.5%
5.0%
2.5%
0.0%
-2.5%
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
3-year return
5-year return

Notes:
- Past performance is not a guarantee of future returns and data and other errors may exist. See Disclaimer and Terms of Use
- The year range is automatically adjusted based on the selected year range and available return data for the specified assets
- The annual results for 2000 are based on full calendar months from July to December
- The annual results for 2019 are based on full calendar months from January to March
- See methodology section of the FAQ for more information on portfolio optimization and its limitations.
- CAGR = Compound Annual Growth Rate
- Stdev = Annualized standard deviation of monthly returns
- Sharpe ratio is calculated and annualized from monthly excess returns over the risk free rate (1-month treasury bill)
- Drawdowns are calculated based on monthly returns.
- The backtested results include monthly rebalancing of portfolio assets to match the specified allocation.
- The results use total return and assume that all dividends and distributions are reinvested. Taxes and transaction fees are not included.