

### Model Description

Tactical asset allocation model results from Jan 2000 to May 2020 are based on simple moving average of each portfolio asset. Tactical asset allocation model trades are executed using the end of month close price each month based on end of month signals. The time period was constrained by the available data for Materials Select Sector SPDR ETF (XLB) [Jan 1999 - May 2020].

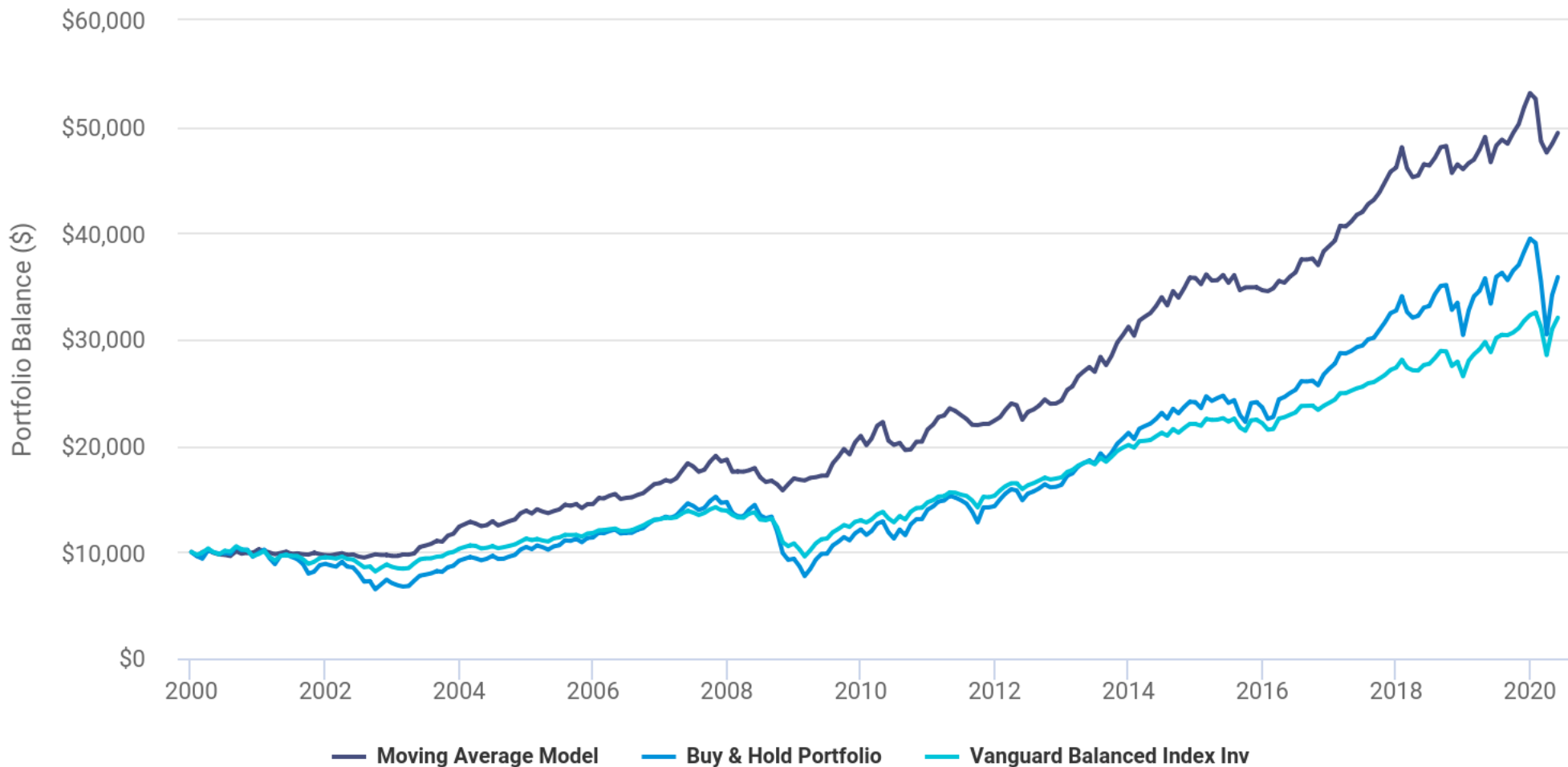
### Portfolio Allocation

Ticker	Name	Allocation
XLB	Materials Select Sector SPDR ETF	10.00%
XLE	Energy Select Sector SPDR ETF	10.00%
XLF	Financial Select Sector SPDR ETF	10.00%
XLI	Industrial Select Sector SPDR ETF	10.00%
XLK	Technology Select Sector SPDR ETF	20.00%
XLP	Consumer Staples Select Sector SPDR ETF	10.00%
XLU	Utilities Select Sector SPDR ETF	10.00%
XLV	Health Care Select Sector SPDR ETF	10.00%
NAESX	Vanguard Small Cap Index Inv	10.00%

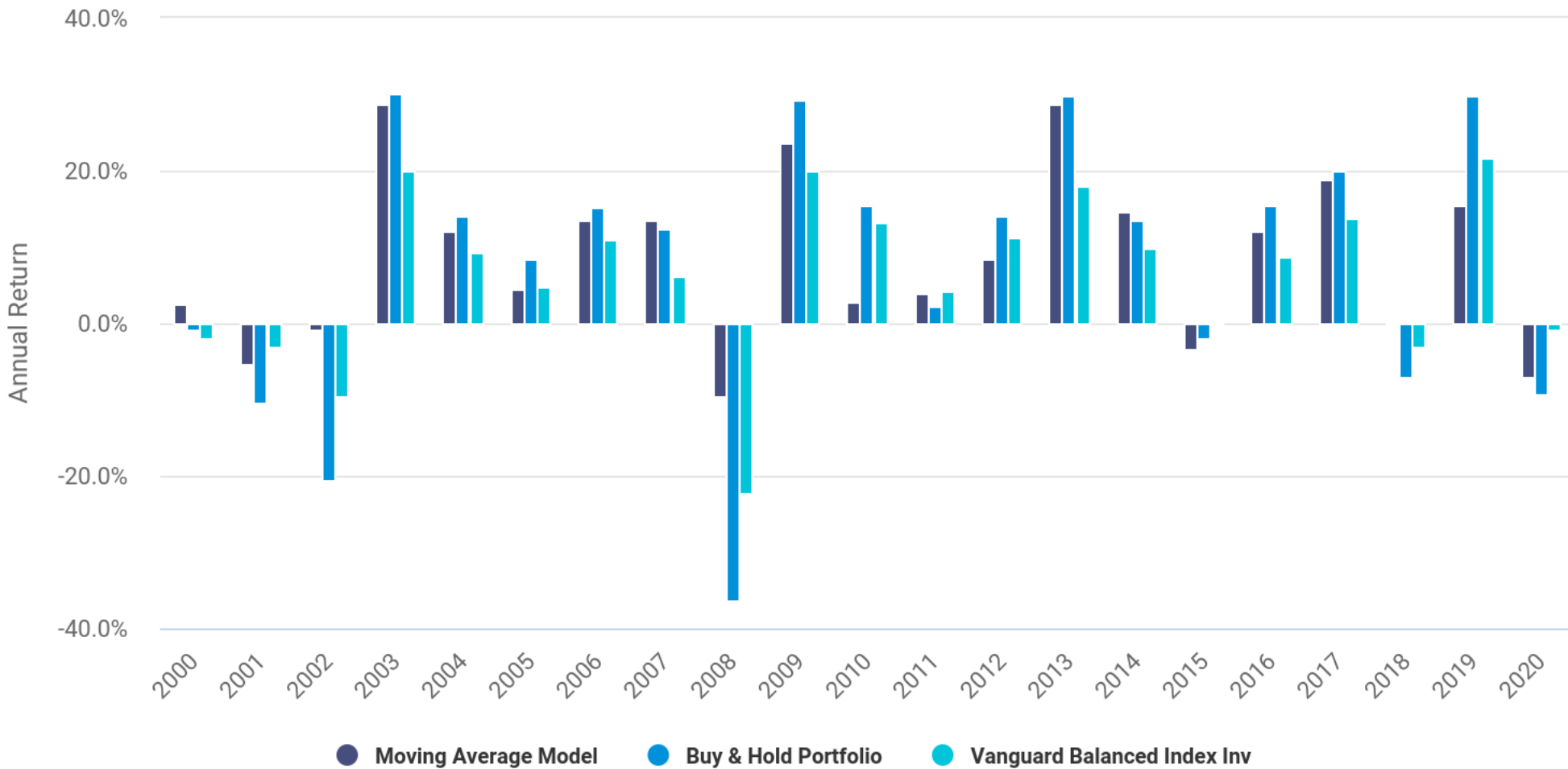
### Portfolio Performance (Jan 2000 - May 2020)

Metric	Moving Average Model	Buy & Hold Portfolio	Vanguard Balanced Index Inv
Start Balance	\$10,000	\$10,000	\$10,000
End Balance	\$49,413	\$35,848	\$32,032
CAGR	8.14%	6.45%	5.87%
Stdev	8.40%	15.04%	9.27%
Best Year	28.60%	30.10%	21.67%
Worst Year	-9.51%	-36.31%	-22.21%
Max. Drawdown	-17.01%	-49.06%	-32.57%
Sharpe Ratio	0.78	0.38	0.48
Sortino Ratio	1.22	0.54	0.69
US Stock Market Correlation	0.68	0.98	0.99

### Portfolio Growth



### Annual Returns



## Risk and Return Metrics (Jan 2000 - May 2020)

Metric	Moving Average Model	Buy & Hold Portfolio	Vanguard Balanced Index Inv
Arithmetic Mean (monthly)	0.68%	0.62%	0.51%
Arithmetic Mean (annualized)	8.52%	7.67%	6.32%
Geometric Mean (monthly)	0.65%	0.52%	0.48%
Geometric Mean (annualized)	8.14%	6.45%	5.87%
Volatility (monthly)	2.42%	4.34%	2.68%
Volatility (annualized)	8.40%	15.04%	9.27%
Downside Deviation (monthly)	1.48%	3.03%	1.81%
Max. Drawdown	-17.01%	-49.06%	-32.57%
US Market Correlation	0.68	0.98	0.99
Beta (*)	0.62	1.58	1.00
Alpha (annualized)	4.40%	-2.29%	0.00%
R Squared	46.67%	94.63%	100.00%
Sharpe Ratio	0.78	0.38	0.48
Sortino Ratio	1.22	0.54	0.69
Treynor Ratio (%)	10.62	3.66	4.51
Calmar Ratio	0.55	0.31	0.65
Active Return	2.27%	0.59%	N/A
Tracking Error	7.08%	6.39%	N/A
Information Ratio	0.32	0.09	N/A
Skewness	-0.46	-0.67	-0.68
Excess Kurtosis	0.79	1.45	1.92
Historical Value-at-Risk (5%)	-3.47%	-7.51%	-4.67%
Analytical Value-at-Risk (5%)	-3.30%	-6.52%	-3.89%
Conditional Value-at-Risk (5%)	-5.15%	-10.31%	-6.11%
Upside Capture Ratio (%)	96.47	154.44	100.00
Downside Capture Ratio (%)	73.92	165.67	100.00
Safe Withdrawal Rate	7.83%	5.69%	5.84%
Perpetual Withdrawal Rate	5.72%	4.19%	3.65%
Positive Periods	161 out of 245 (65.71%)	158 out of 245 (64.49%)	162 out of 245 (66.12%)
Gain/Loss Ratio	1.06	0.80	0.84

(\*) Vanguard Balanced Index Inv is used as the benchmark for calculations. Value-at-risk metrics are based on monthly values.

## Moving Average Model Returns

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Inflation	Balance
2000	-3.76%	3.80%	1.99%	-2.60%	-1.62%	-0.32%	-1.08%	4.69%	-2.32%	0.93%	-0.24%	3.39%	2.47%	3.39%	\$10,247
2001	-1.16%	-1.67%	-1.66%	1.18%	1.18%	-1.99%	0.48%	-0.87%	-0.38%	1.86%	-1.34%	-0.96%	-5.27%	1.55%	\$9,706
2002	-0.16%	1.07%	0.97%	-1.61%	0.40%	-1.99%	-1.04%	1.66%	1.53%	-0.61%	0.02%	-0.99%	-0.82%	2.38%	\$9,627
2003	0.05%	1.38%	-0.13%	1.11%	6.22%	1.23%	1.52%	2.62%	-0.69%	5.23%	1.48%	5.69%	28.60%	1.88%	\$12,380
2004	1.94%	1.75%	-1.28%	-1.96%	0.81%	2.93%	-3.10%	1.59%	1.64%	1.17%	4.49%	1.83%	12.21%	3.26%	\$13,891
2005	-1.93%	2.89%	-1.49%	-1.12%	1.47%	1.06%	3.20%	-0.68%	1.12%	-2.60%	2.57%	0.09%	4.45%	3.42%	\$14,510
2006	3.90%	-0.25%	1.73%	1.02%	-3.02%	0.71%	0.33%	1.51%	1.01%	2.79%	2.65%	0.54%	13.53%	2.54%	\$16,473
2007	1.73%	-0.76%	1.81%	4.23%	3.93%	-1.52%	-2.85%	1.11%	4.22%	2.96%	-2.74%	0.97%	13.49%	4.08%	\$18,696
2008	-6.17%	0.19%	-0.14%	0.72%	1.23%	-4.87%	-2.56%	0.70%	-1.95%	-3.54%	3.64%	3.32%	-9.51%	0.09%	\$16,919
2009	-0.70%	-0.42%	1.48%	0.36%	0.85%	0.00%	6.70%	3.38%	3.87%	-2.56%	5.89%	2.97%	23.65%	2.72%	\$20,920
2010	-4.17%	3.05%	5.92%	1.57%	-7.87%	-1.97%	0.94%	-3.31%	0.28%	3.72%	0.01%	5.66%	2.92%	1.50%	\$21,532
2011	2.15%	3.19%	0.60%	2.97%	-1.00%	-1.65%	-1.63%	-2.45%	-0.13%	0.51%	0.02%	1.40%	3.85%	2.96%	\$22,361
2012	1.50%	3.00%	2.52%	-0.63%	-5.77%	3.29%	0.95%	1.61%	2.38%	-1.65%	0.11%	1.18%	8.44%	1.74%	\$24,249
2013	4.15%	1.23%	3.73%	1.71%	1.55%	-1.63%	5.20%	-2.71%	3.18%	4.43%	2.27%	2.62%	28.60%	1.50%	\$31,185
2014	-2.69%	4.65%	1.21%	1.03%	2.03%	2.50%	-2.26%	4.04%	-1.79%	2.63%	2.84%	-0.05%	14.74%	0.76%	\$35,782
2015	-1.65%	2.60%	-1.57%	0.06%	1.39%	-2.04%	2.05%	-3.93%	0.76%	0.01%	0.02%	-0.80%	-3.25%	0.73%	\$34,619
2016	-0.25%	0.75%	2.03%	-0.47%	1.63%	1.08%	3.36%	-0.02%	0.28%	-1.67%	3.51%	1.31%	12.02%	2.07%	\$38,781
2017	1.30%	3.54%	-0.14%	1.14%	1.56%	0.60%	1.79%	0.91%	1.59%	2.27%	2.17%	0.85%	19.01%	2.11%	\$46,154
2018	4.15%	-4.09%	-1.84%	0.34%	2.33%	-0.25%	1.58%	2.10%	0.23%	-5.26%	1.76%	-0.97%	-0.32%	1.91%	\$46,008
2019	1.25%	0.65%	2.04%	2.50%	-4.83%	3.32%	1.17%	-0.78%	2.06%	1.72%	3.20%	2.51%	15.54%	2.29%	\$53,156
2020	-0.99%	-7.59%	-2.18%	1.69%	2.14%								-7.04%	-0.23%	\$49,413

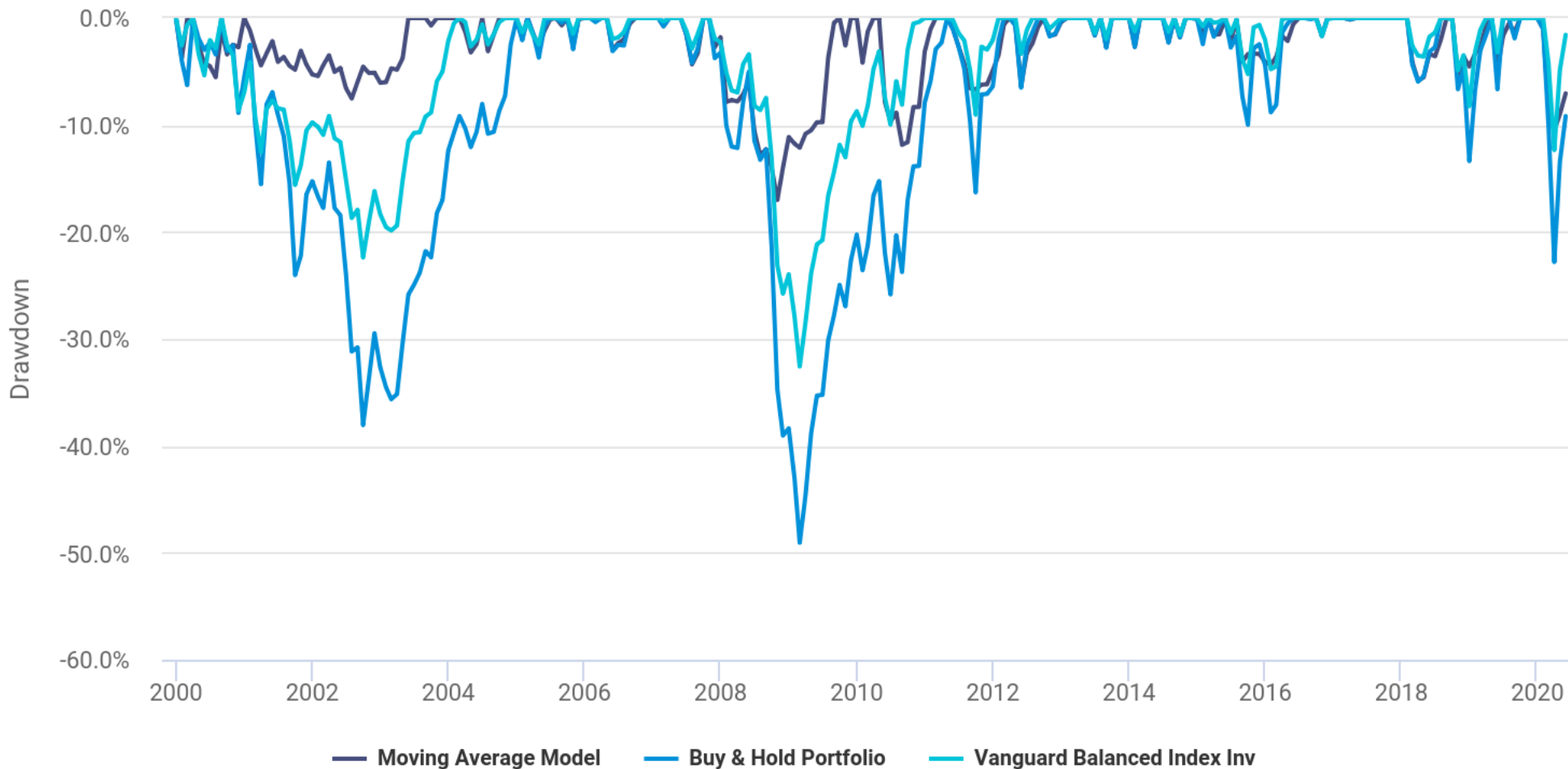
## Buy &amp; Hold Portfolio Returns

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Inflation	Balance
2000	-4.00%	-2.37%	8.39%	-1.88%	-1.12%	0.72%	-1.15%	6.85%	-3.06%	0.54%	-6.49%	3.65%	-0.94%	3.39%	\$9,906
2001	3.21%	-7.60%	-6.24%	8.83%	1.24%	-2.28%	-2.19%	-4.87%	-10.24%	2.40%	7.37%	1.46%	-10.29%	1.55%	\$8,886
2002	-1.69%	-1.28%	5.17%	-4.91%	-0.82%	-6.73%	-9.54%	0.56%	-10.50%	6.96%	6.44%	-4.51%	-20.53%	2.38%	\$7,062
2003	-2.77%	-1.70%	0.74%	7.35%	6.54%	1.22%	1.50%	2.65%	-0.74%	5.33%	1.51%	5.56%	30.10%	1.88%	\$9,188
2004	1.94%	1.71%	-1.26%	-1.95%	1.61%	2.93%	-3.03%	0.20%	2.21%	1.52%	5.18%	2.39%	13.97%	3.26%	\$10,471
2005	-1.93%	3.34%	-1.48%	-2.24%	3.06%	0.96%	4.34%	-0.44%	1.80%	-2.91%	3.70%	0.39%	8.55%	3.42%	\$11,367
2006	3.90%	-0.37%	1.74%	1.21%	-3.09%	0.61%	-0.07%	2.43%	1.24%	3.59%	2.66%	0.52%	15.12%	2.54%	\$13,086
2007	1.73%	-0.76%	1.81%	4.21%	3.92%	-1.49%	-2.75%	1.40%	4.47%	2.77%	-3.75%	0.54%	12.35%	4.08%	\$14,702
2008	-7.05%	-2.19%	-0.13%	4.85%	3.12%	-6.81%	-2.01%	1.10%	-10.29%	-17.09%	-6.55%	1.11%	-36.31%	0.09%	\$9,364
2009	-7.57%	-10.59%	8.68%	10.46%	5.80%	0.11%	7.92%	3.31%	3.94%	-2.65%	5.91%	3.07%	29.39%	2.72%	\$12,117
2010	-4.17%	3.04%	5.94%	1.59%	-7.91%	-4.98%	7.45%	-4.31%	8.81%	3.82%	0.04%	6.89%	15.49%	1.50%	\$13,994
2011	2.15%	3.21%	0.60%	2.95%	-1.02%	-1.64%	-2.15%	-5.13%	-7.38%	10.93%	0.06%	0.76%	2.21%	2.96%	\$14,304
2012	4.63%	3.60%	2.56%	-0.69%	-5.85%	4.24%	1.27%	1.87%	2.38%	-1.72%	0.28%	1.18%	14.10%	1.74%	\$16,321
2013	5.22%	1.23%	3.75%	1.73%	1.45%	-1.61%	5.23%	-2.77%	3.20%	4.41%	2.33%	2.61%	29.92%	1.50%	\$21,205
2014	-2.69%	4.65%	1.19%	1.04%	2.00%	2.52%	-2.29%	4.03%	-1.79%	2.58%	2.04%	-0.10%	13.65%	0.76%	\$24,100
2015	-2.34%	4.69%	-1.74%	1.10%	0.91%	-2.75%	1.10%	-5.72%	-2.88%	7.96%	0.37%	-2.01%	-2.02%	0.73%	\$23,614
2016	-4.61%	0.76%	7.33%	0.89%	1.56%	1.17%	3.20%	-0.10%	0.32%	-1.66%	3.90%	2.09%	15.37%	2.07%	\$27,244
2017	1.74%	3.57%	-0.12%	0.83%	1.26%	0.48%	2.02%	0.45%	2.41%	2.41%	2.69%	0.74%	20.05%	2.11%	\$32,705
2018	4.15%	-4.35%	-1.67%	0.56%	2.41%	0.44%	3.43%	2.20%	0.24%	-6.64%	2.04%	-9.06%	-7.00%	1.91%	\$30,416
2019	7.63%	3.98%	1.52%	3.43%	-6.65%	7.54%	1.06%	-1.89%	2.49%	1.52%	3.42%	3.10%	29.75%	2.29%	\$39,467
2020	-0.99%	-9.22%	-14.12%	12.15%	4.92%								-9.17%	-0.23%	\$35,848

## Vanguard Balanced Index Inv Returns

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Inflation	Balance
2000	-2.57%	1.98%	3.97%	-3.33%	-2.10%	3.47%	-0.79%	4.90%	-2.53%	-0.94%	-5.38%	1.84%	-2.04%	3.39%	\$9,796
2001	3.04%	-5.34%	-3.62%	4.61%	0.86%	-0.80%	-0.11%	-3.09%	-4.77%	2.19%	3.77%	0.83%	-3.02%	1.55%	\$9,501
2002	-0.45%	-0.84%	1.99%	-2.30%	-0.40%	-3.97%	-4.22%	0.95%	-5.44%	4.26%	3.58%	-2.59%	-9.52%	2.38%	\$8,596
2003	-1.47%	-0.39%	0.58%	5.22%	4.34%	0.88%	0.06%	1.66%	0.41%	3.21%	0.96%	3.03%	19.87%	1.88%	\$10,304
2004	1.70%	1.29%	-0.37%	-2.31%	0.66%	1.47%	-1.89%	0.99%	1.15%	1.30%	2.52%	2.57%	9.32%	3.26%	\$11,265
2005	-1.34%	0.99%	-1.29%	-0.84%	2.76%	0.72%	2.11%	-0.10%	0.11%	-1.47%	2.58%	0.45%	4.65%	3.42%	\$11,789
2006	2.12%	0.15%	0.69%	0.54%	-1.96%	0.16%	0.50%	2.00%	1.68%	2.43%	1.80%	0.47%	11.02%	2.54%	\$13,088
2007	1.08%	-0.32%	0.65%	2.60%	1.90%	-1.15%	-1.72%	1.43%	2.45%	1.47%	-1.94%	-0.32%	6.16%	4.08%	\$13,895
2008	-2.91%	-1.78%	-0.19%	2.83%	0.98%	-4.98%	-0.44%	1.23%	-6.04%	-11.59%	-3.43%	2.44%	-22.21%	0.09%	\$10,809
2009	-5.18%	-6.48%	6.10%	6.40%	3.58%	0.50%	5.28%	2.62%	2.98%	-1.33%	3.88%	1.03%	20.05%	2.72%	\$12,976
2010	-1.50%	2.10%	3.74%	1.74%	-4.45%	-2.75%	4.50%	-2.33%	5.59%	2.52%	0.14%	3.66%	13.13%	1.50%	\$14,680
2011	1.36%	2.26%	0.23%	2.35%	-0.18%	-1.21%	-0.72%	-2.81%	-4.39%	6.98%	-0.28%	0.92%	4.14%	2.96%	\$15,287
2012	3.40%	2.49%	1.62%	0.04%	-3.34%	2.28%	1.17%	1.55%	1.58%	-1.01%	0.51%	0.66%	11.33%	1.74%	\$17,019
2013	3.03%	0.98%	2.36%	1.39%	0.74%	-1.41%	3.33%	-1.95%	2.56%	2.83%	1.60%	1.29%	17.91%	1.50%	\$20,068
2014	-1.24%	3.02%	0.21%	0.36%	1.71%	1.57%	-1.28%	2.95%	-1.57%	2.09%	1.74%	0.01%	9.84%	0.76%	\$22,043
2015	-0.77%	2.95%	-0.44%	0.10%	0.63%	-1.42%	1.31%	-3.72%	-1.45%	4.61%	0.24%	-1.41%	0.37%	0.73%	\$22,124
2016	-2.81%	0.28%	4.59%	0.54%	1.04%	0.93%	2.64%	0.06%	0.08%	-1.68%	1.61%	1.21%	8.63%	2.07%	\$24,034
2017	1.25%	2.48%	0.02%	0.93%	0.89%	0.55%	1.28%	0.42%	1.26%	1.31%	1.79%	0.78%	13.75%	2.11%	\$27,340
2018	2.71%	-2.61%	-0.93%	-0.09%	1.93%	0.40%	2.01%	2.31%	-0.13%	-4.76%	1.48%	-4.93%	-2.97%	1.91%	\$26,529
2019	5.55%	2.10%	1.65%	2.39%	-3.21%	4.63%	0.97%	-0.11%	0.80%	1.39%	2.24%	1.64%	21.67%	2.29%	\$32,278
2020	0.82%	-4.22%	-8.48%	8.55%	3.45%								-0.76%	-0.23%	\$32,032

### Drawdowns



#### Drawdowns for Historical Market Stress Periods

Stress Period	Start	End	Moving Average Model	Buy & Hold Portfolio	Vanguard Balanced Index Inv
Dotcom Crash	Mar 2000	Oct 2002	-7.52%	-38.06%	-22.39%
Subprime Crisis	Nov 2007	Mar 2009	-17.01%	-49.06%	-32.57%



## Drawdowns for Moving Average Model (worst 10)

Rank	Start	End	Length	Recovery By	Recovery Time	Underwater Period	Drawdown
1	Nov 2007	Oct 2008	1 year	Sep 2009	11 months	1 year 11 months	-17.01%
2	May 2010	Aug 2010	4 months	Feb 2011	6 months	10 months	-11.85%
3	Jan 2020	Mar 2020	3 months				-10.50%
4	Jan 2001	Jul 2002	1 year 7 months	May 2003	10 months	2 years 5 months	-7.52%
5	May 2011	Sep 2011	5 months	Mar 2012	6 months	11 months	-6.70%
6	Apr 2012	May 2012	2 months	Sep 2012	4 months	6 months	-6.36%
7	Feb 2018	Mar 2018	2 months	Aug 2018	5 months	7 months	-5.86%
8	Apr 2000	Jul 2000	4 months	Dec 2000	5 months	9 months	-5.53%
9	Oct 2018	Oct 2018	1 month	Apr 2019	6 months	7 months	-5.26%
10	May 2019	May 2019	1 month	Sep 2019	4 months	5 months	-4.83%

## Drawdowns for Buy &amp; Hold 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	-49.06%
2	Sep 2000	Sep 2002	2 years 1 month	Feb 2005	2 years 5 months	4 years 6 months	-38.06%
3	Jan 2020	Mar 2020	3 months				-22.81%
4	May 2011	Sep 2011	5 months	Feb 2012	5 months	10 months	-16.30%
5	Oct 2018	Dec 2018	3 months	Apr 2019	4 months	7 months	-13.37%
6	Jun 2015	Sep 2015	4 months	May 2016	8 months	1 year	-9.98%
7	May 2019	May 2019	1 month	Jun 2019	1 month	2 months	-6.65%
8	Apr 2012	May 2012	2 months	Aug 2012	3 months	5 months	-6.50%
9	Jan 2000	Feb 2000	2 months	Mar 2000	1 month	3 months	-6.27%
10	Feb 2018	Mar 2018	2 months	Jul 2018	4 months	6 months	-5.95%

## Drawdowns for Vanguard Balanced Index Inv (worst 10)

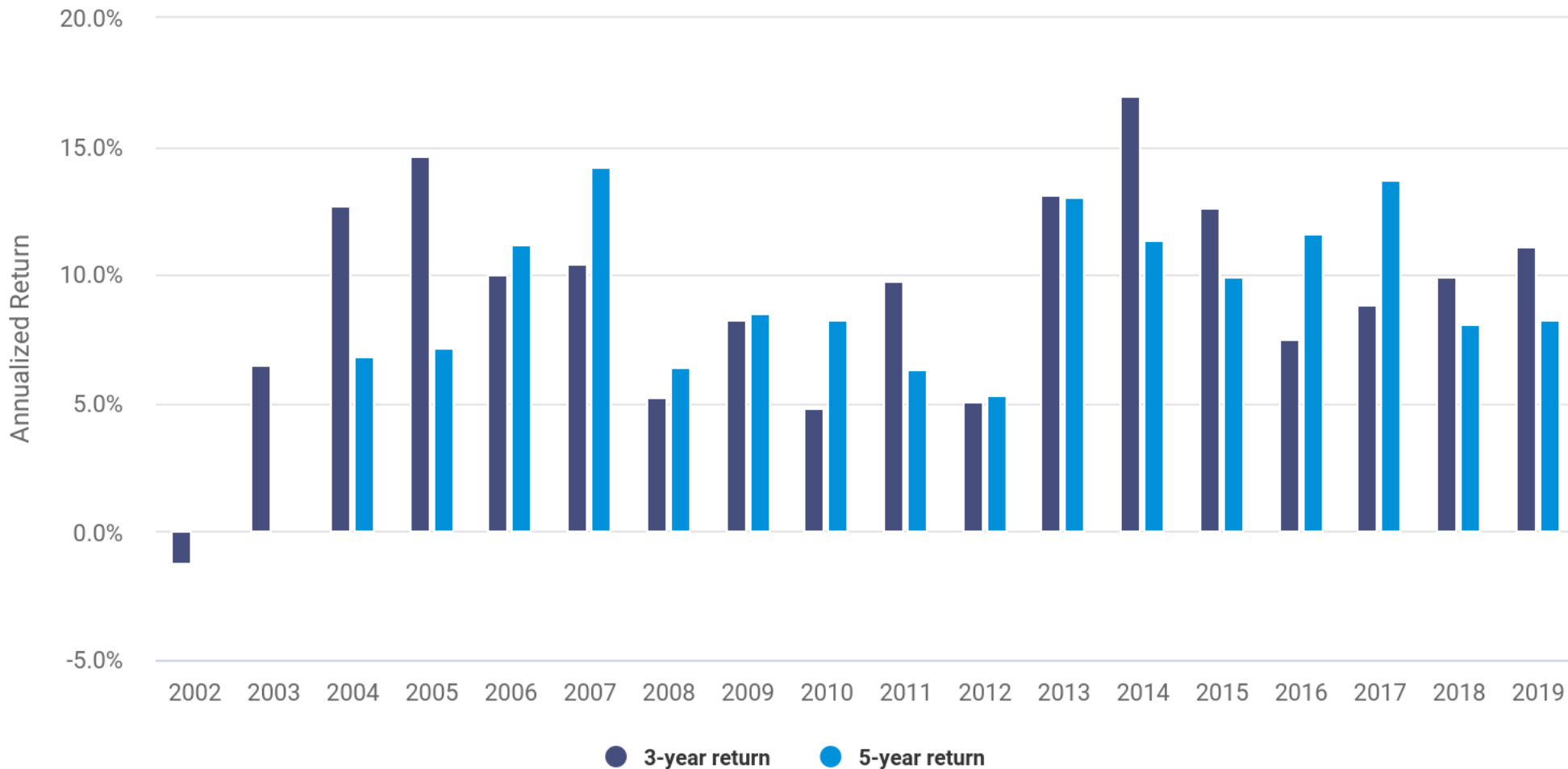
Rank	Start	End	Length	Recovery By	Recovery Time	Underwater Period	Drawdown
1	Nov 2007	Feb 2009	1 year 4 months	Dec 2010	1 year 10 months	3 years 2 months	-32.57%
2	Sep 2000	Sep 2002	2 years 1 month	Feb 2004	1 year 5 months	3 years 6 months	-22.39%
3	Feb 2020	Mar 2020	2 months				-12.34%
4	May 2011	Sep 2011	5 months	Jan 2012	4 months	9 months	-9.03%
5	Sep 2018	Dec 2018	4 months	Mar 2019	3 months	7 months	-8.23%
6	Apr 2000	May 2000	2 months	Aug 2000	3 months	5 months	-5.35%
7	Jun 2015	Sep 2015	4 months	Apr 2016	7 months	11 months	-5.23%
8	Feb 2018	Apr 2018	3 months	Jul 2018	3 months	6 months	-3.60%
9	May 2012	May 2012	1 month	Jul 2012	2 months	3 months	-3.34%
10	May 2019	May 2019	1 month	Jun 2019	1 month	2 months	-3.21%

## Rolling Returns (Jan 2000 - May 2020)

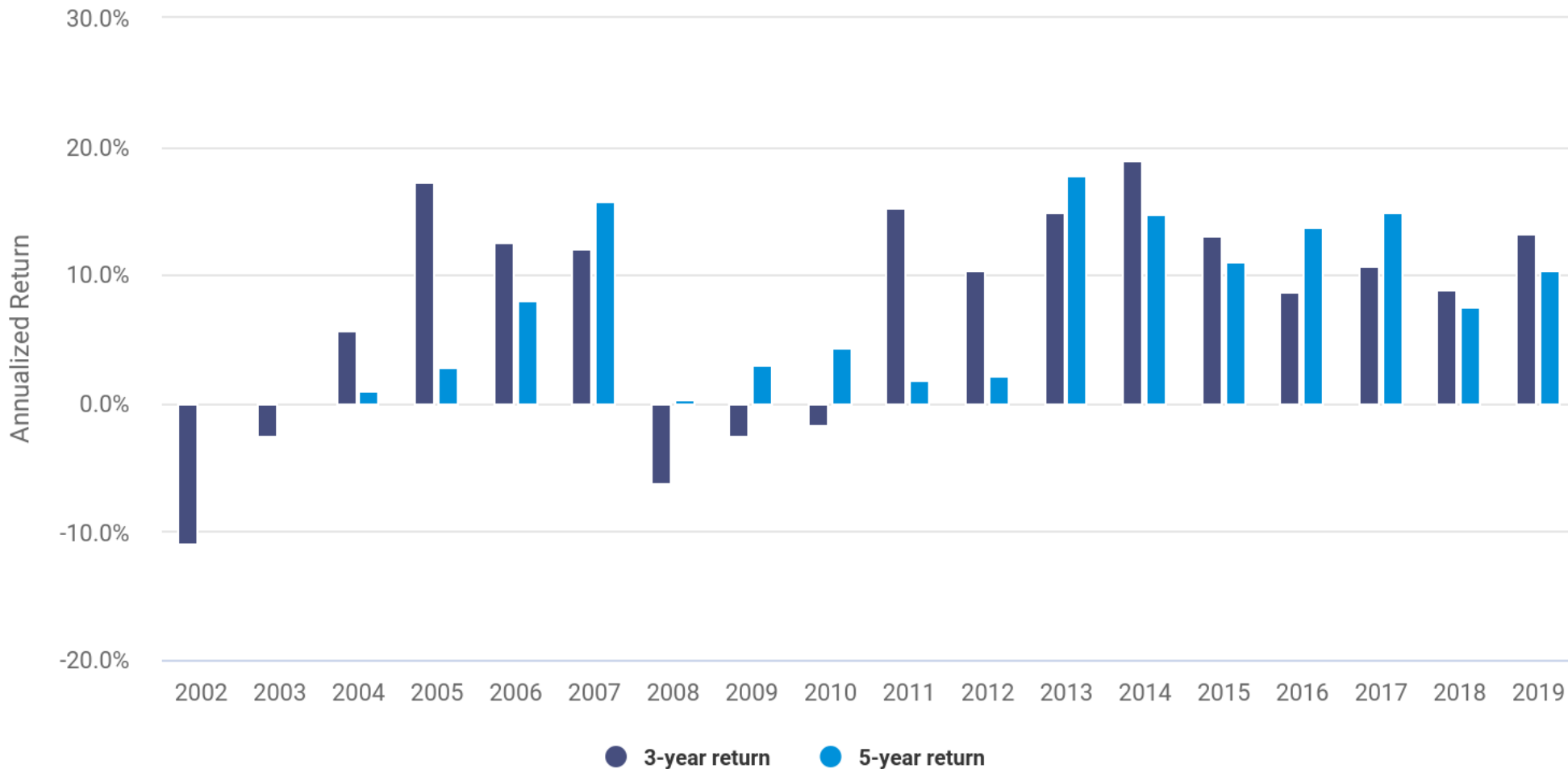
Roll Period	Moving Average Model			Buy & Hold Portfolio			Vanguard Balanced Index Inv		
	Average	High	Low	Average	High	Low	Average	High	Low
1 year	9.22%	28.60%	-9.51%	8.65%	30.10%	-36.31%	6.61%	21.67%	-22.21%
3 years	9.24%	16.97%	-1.26%	7.63%	18.99%	-10.95%	6.28%	12.98%	-4.92%
5 years	9.39%	14.20%	5.34%	8.07%	17.76%	0.38%	6.53%	13.17%	0.96%
7 years	9.48%	11.86%	7.04%	8.08%	14.13%	0.75%	6.58%	10.77%	1.86%
10 years	9.19%	10.52%	7.66%	7.73%	12.53%	1.94%	6.48%	9.54%	2.64%
15 years	9.42%	11.01%	8.45%	8.01%	10.76%	5.96%	6.53%	8.02%	5.41%

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

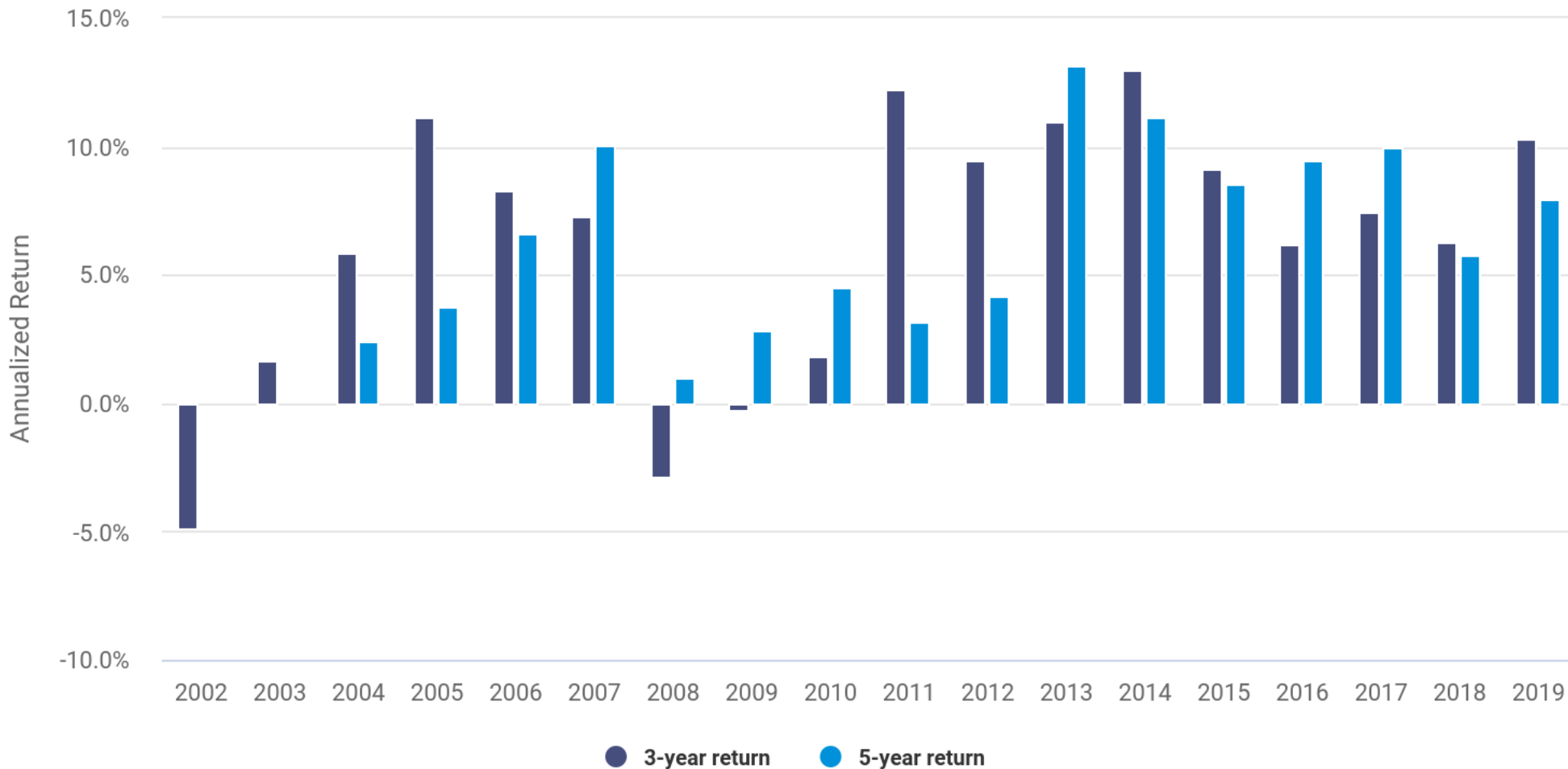
### Moving Average Model Rolling Returns



### Buy & Hold Portfolio Rolling Returns



### Vanguard Balanced Index Inv Rolling Returns



**Notes:**

- Past performance is no guarantee of future results, which may vary. All use is subject to terms of service.
- Investing involves risk, including possible loss of principal. The value of the investments and the income derived from them may fluctuate over time.
- All portfolio returns presented are hypothetical and backtested. Hypothetical returns do not reflect trading costs, transaction fees, or taxes.
- The backtested performance results are created by retroactively applying the specified investment strategy or methodology to historical data. Backtested models are developed with the benefit of hindsight but might not have foresight of the future.
- The results are based on information from a variety of sources we consider reliable, but we do not represent that the information is accurate or complete.
- The results do not constitute investment advice or recommendation, are provided solely for informational purposes, and are not an offer to buy or sell any securities.
- The results are based on the total return of assets and assume that all received dividends and distributions are reinvested.
- The annual results for 2020 are based on full calendar months from January to May.
- The results for the buy-and-hold comparison portfolios assume annual rebalancing
- The results for the tactical asset allocation model assume monthly rebalancing trades
- Risk free returns (out of market) are based on 3-month treasury bill returns or the selected asset
- The moving average signal is based on total return and accounts for splits and dividends
- Monthly moving average period calculations are based on end-of-month samples
- Additional trading costs and taxes for tactical asset allocation models are not reflected in the results
- CAGR = Compound Annual Growth Rate
- Stdev = Annualized standard deviation of monthly returns
- Sharpe and Sortino ratios are calculated and annualized from monthly excess returns over the risk free rate (3-month treasury bill)
- Stock market correlation is based on the correlation of monthly returns
- Drawdowns are calculated based on monthly returns excluding cashflows
- Refer to the FAQ section regarding the data sources and methodology descriptions