VecViz Aggregate Analytics Performance Summary Report

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31 May 2025

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Introduction

Here we summarize the out of sample performance of VecViz's investment analytics. We do so at a high level, in terms of percentage of objectives met, in aggregate, across horizons and lookback periods.

All of VecViz's analytic metrics are derived from its Vector Model of price probability. The primary purpose of this report is of course to guage how well the metrics are meeting their objectives. A secondary but also important objective is to help the reader determine if the performance of the metrics across horizons and lookback periods is reasonably consistent. This serves as an important check on both the metrics themselves and their respective evaluation methodologies.

Please see the "Important Considerations" section of this report for disclosure of at least some of the many ways this report likely falls short of its objective, and other important disclosures.

VecViz Analytic Metrics Assessed

1) Value at Risk (the 95th and 99th percentile downward)
2) Opportunity at Risk (the 95th and 99th percentile upward)
3) Expected Up and Down Body (the expected value between the current price and the forecasted 95th percentile price upward and downward, respectively)
4) Option Fair Values
5) V-Score rankings of expected forward price returns

Full Report Cards for each of these metrics can be found in the Appendix to this report. Charts, ticker level detail, and explanatory material supporting those Report Cards can be found in the metric specific Reports these report cards were excerpted from, which can be found in the "Reports" page of vecviz.com.

Assessment Criteria Overview

This report presents summary statistics that represent the % of objectives met for each of the metrics listed above. Each metric has 7 or more objectives, and each objective is evaluated across 16 horizon / lookback period combinations, utilizing ticker-model date level granularity, to a significant extent. The evaluation of most metrics in this report includes: 1) comparison to Gaussian / normal distribution based Sigma, as implemented by VecViz to reflect exponential time decay of observation weightings. The V-Score is an exception here - it is evaluated on

the basis of the consistency of its rankings with forward returns. 2) accuracy related metrics, such as mean absolute error. For example, we measure how close the actual breakage rate of 95% VaR forecasts was to the targeted 5.00% level. 3) the returns of metric oriented strategies. For example, we measure the impact of setting position sizes using Vector Model VaR instead of Sigma VaR on investment performance. The

Though the results are not incorporated into the Aggregate Summary report card presented in the section that follows, we also evaluate VaR and OaR on the basis of their Kupiec and Christoferson statistics, which are well established statistical tests of the consistency of their breakage rate with targeted levels and the independence of breakage events. The results of those tests are included in the Appendix of this document.

Vector Model Overview

The Vector Model uses systematic price channel identification and scoring in conjunction with machine learning to provide investors with volatility forecasts that reflect the asymmetric, jumpy, clustering, and price dependent behavior of realized and option implied volatility in the financial markets.

The sole input to Vector Model and the Sigma Model out of sample analytics are daily closing prices obtained from QuoteMedia.

The Vector Model was trained upon ~ 60,000 ticker model dates (TMD's) representing ~550 tickers (including equities, currencies, and commodities) and ~ 120 model dates spanning from March 9, 2002 to February 3, 2021. The Out of Sample period starts on 1/31/2022, nearly a full one year from the last model date included in the training data. All analytics discussed in this report are for model dates beyond January 31, 2022, making them fully out of sample.

This report includes Vector Model and Sigma model results for ~150 tickers. Only about twenty of these tickers were included in the Vector Model training data set discussed above. These tickers were selected using the following criteria at the time of selection: Top and Bottom 25 S&P 500 performers, Largest 25 publicly traded issuers in the LQD and HYG etf's, constituents of the Metals and Pharmaceuticals sector within the LQD and HYG etf's, and any other tickers that at the time drew significant financial media attention (Mag 7, meme-related stocks, bitcoin related stocks). We also included several major equity and debt-oriented ETF's. The complete Vector Model coverage universe discussed in this report includes the following tickers:

AA, AAP, AAPL, ABBV, ACGL, ADBE, AMAT, AMC, AMD, AMGN, AMZN, AVGO, AZN, AZO, BA, BAC, BALL, BBY, BHC, BHP, BIIB, BMY, BUD, BXP, CAH, CCL, CDNS, CHTR, CITI, CLF, CMA, CMCSA, CMG, CNC, COST, CPRT, CSCO, CSTM, CTLT, CVS, CYH, CZR, DHI, ELAN, EMB, ETRN, EXPE, FCX, FIS, FITB, FRA, FRCB, FSUGY, GBTC, GE, GILD, GLD, GME, GNRC, GOLD, GOOGL, GS, GSK, GT, GWW, HCA, HD, HLT, HON, HSBC, HYG, IEP, INTC, INTU, IRM, ISRG, JAZZ, JPM, KALU, KEY, KHC, LEN,

LLY, LNC, LQD, LUMN, LVS, LW, META, MNST, MOS, MRK, MS, MSFT, MSI, MSTR, MU, MUB, NAVI, NEM, NFLX, NVDA, NVS, NWL, ON, ORCL, ORLY, OXY, PCG, PEP, PHM, POST, PRGO, PWR, QCOM, QQQ, RIO, SBNY, SBUX, SIVBQ, SLV, SNY, SPY, T, TDG, TEVA, TFC, THC, TLT, TMUS, TRGP, TSLA, TXN, UAA, UNH, USB, VCSH, VFC, VICI, VNO, VST, VZ, WDC, WFC, WRK, WYNN, X, XOM, ZION, ZTS.

The Vector Model is described further in the FAQ and Blog of vecviz.com.

Sigma Overview

The core of Sigma, as presented alongside Vector Model output by VecViz, is the standard deviation of price-based returns that very likely gets discussed in any introductory book on risk or portfolio management. This is the same definition of volatility that is utilized in the Black Scholes option pricing formula.

Sigma's flaws as an estimate of forward volatility are well documented. Nevertheless, it remains perhaps the most popular metric for "risk" when it comes to investments, likely because of its simplicity and familiarity.

We present Sigma based on daily logarithmic price returns (akin to % changes in price), and a lookback period of two years. To enhance Sigma's accuracy, we apply a 6-month half-life rate of decay to the weightings applied to the daily returns used to calculate Sigma. This weighting scheme causes the most recent 6-month period to be weighted 8x the least recent 6-month period in the 2 year look back period.

Sigma is converted to probabilities by applying multipliers associated with the standard normal (i.e. Gaussian) distribution with a mean of 0 and sigma of 1.00. Thus, 95% OaR is assumed to be -1.645 sigma's lower than the current price and 99% OaR is presumed to be -2.326 sigma's lower than the current price.

Sigma based probability percentiles for longer time horizons are obtained by multiplying Sigma calculated from daily closing prices by the square root of the number of trading days in the given horizon. In doing so, we are assuming daily returns are independent and identically distributed. So, for example, the multiplier that converts daily horizon sigma to 1 year horizon sigma is the square root of 252 (~15.9).

All calculations for Sigma are based on the same pricing data obtained from QuoteMedia data used to calculate Vector Model OaR.

All Sigma estimates discussed in this report are for dates beyond January 31, 2022, the end of the training period for the Vector Model.

Please see the Expected Body Performance Report for how Expected Body analytics are calculated for Sigma, and the Option Fair Value Performance Report for how option fair values are calculated using Sigma in conjunction with the Black Scholes option pricing model. Both reports can be found in the "Reports" section of vecviz.com.

Important considerations about the analytics and performance metrics presented in this report:

1) Past performance is no guarantee of future results. None of the content in this report is investment advice or an offer to buy or sell securities. VecViz is not an SEC investment advisor or broker-dealer. The staff of VecViz actively transacts in securities tied to many of the tickers discussed in this report. See VecViz's Terms and Conditions for more context and detail at https://vecviz.com/termsand- conditions/

2) Read ""Let me warn you…" of the limitations of VecViz's Analytics.", a blog entry on vecviz.com (https://vecviz.com/let-me-warn-you-of-the-limitations-of-vecvizsanalytics/)

3) Given that VecViz's Vector model is a novel, non-parametric approach to probability, with the exception of the Kupiec and Christoferson tests we feel it is important that performance for every model date is reflected in this report, so that the behavior of Vector Model analytics can be as well understood as possible. That said, doing so clearly results in overlapping horizons beyond 1d in duration, and that results in understated volatility metrics and skewed values of metrics that incorporate volatiltiy (such as Information Ratio and p-values for intercepts and slopes, i.e. Alpha and Beta). Thus please note that volatility oriented evaluation metrics should not be used for anything beyond comparison to similarly calculated evaluation metrics for other models, such as Sigma, or benchmarks, such as the SPY etf. Please also know that the data used for the Christoferson and Kupiec test was a subset of the overall dataset that was selected to have as many non-overlapping periods as possible from the start of the out of sample period on 1/31/2022 for each horizon.

4) We are not considering any incremental transaction costs that VecViz analytics may cause an investor to occur beyond what they would incur utilizing Sigma analytics for the same objectives.

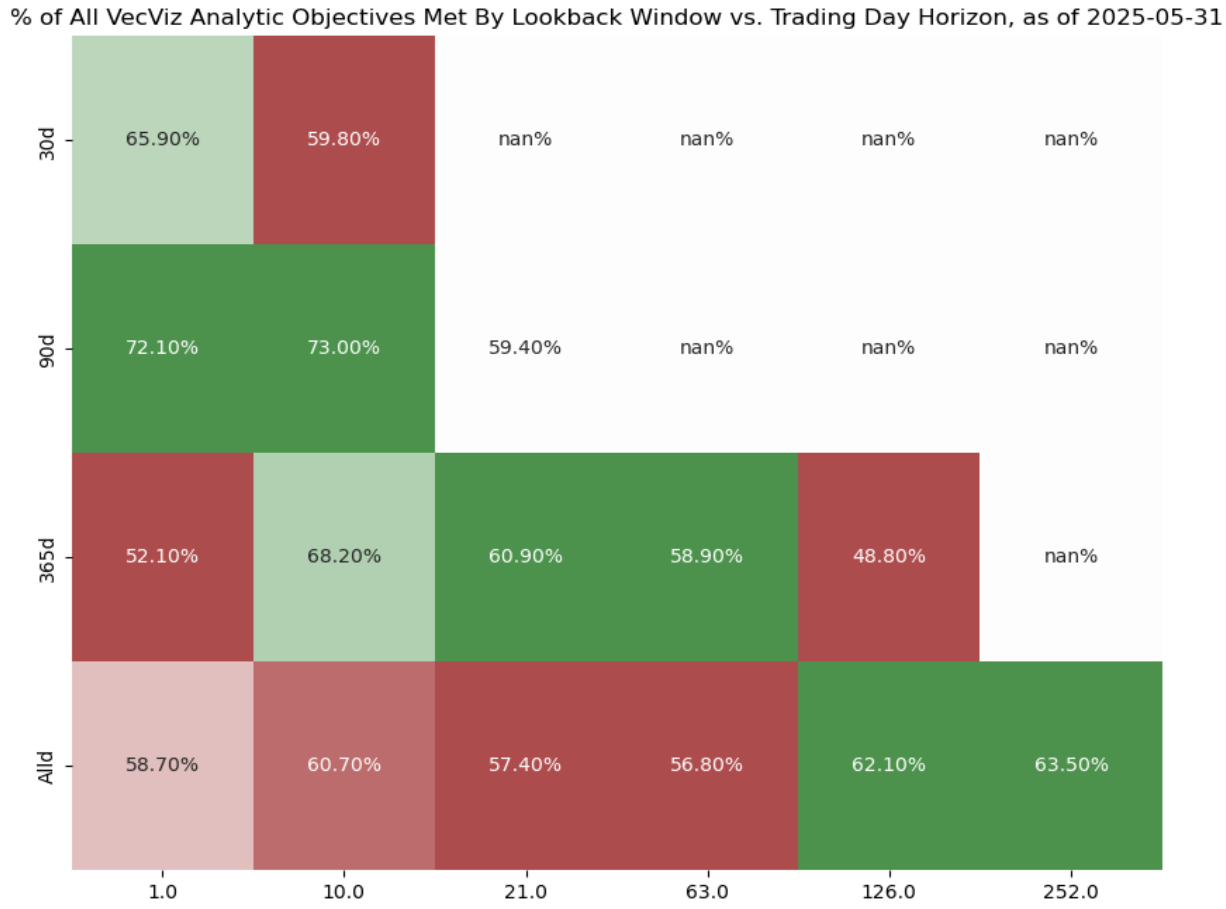
5) We are not incorporating any borrowing charges or repo credits or margin related costs for implied levered long or "short" positions in any of the return related metrics.

6) All analytics presented in this report assumes that prices are floored at $0.01. Since the coverage universe for this report includes only listed equities, that assumption is appropriate. However, if the Vector Model were applied to commodities or perhaps other potentially illiquid securities we would likely have to remove that floor for such tickers, and the resulting impact on model performance for such tickers has not yet been researched.

Thus, in summary, all metrics presented in this report are presented and are to be considered on a comparative basis. Do the bullish V-Score grouping outperform the bearish V-Score grouping? Do they outperform the benchmarks? How does their volatility and information ratio (IR = mean return / std dev) compare? These are the questions this report is structured to answer.

Aggregate VecViz Analytics "Report Card"

Encompasses VecViz's VaR, OaR, Expected Body, Option Fair Value, and V-Score metrics:



% of Each Metric's Performance Objectives Met by Lookback Period Across All Applicable Horizons

Window	VaR	OaR	ExpBody	OptionFV	V-Score	AggScore	AsOfDate
30	60.71	53.57	50	60	90	62.86	2025-05-31
90	61.9	69.05	66.67	60	83.33	68.19	2025-05-31
365	71.43	77.14	46.25	56	38	57.76	2025-05-31
All	41.67	71.43	47.92	56.67	81.67	59.87	2025-05-31

% of Each Metric's Performance Objectives Met by Horizon Across All Applicable Lookback Periods

Horizon	VaR	OaR	ExpBody	OptionFV	V-Score	AggScore	AsOfDate
1	64.29	71.43	45.31	55	75	62.21	2025-05-31
10	66.07	66.07	62.5	52.5	80	65.43	2025-05-31
21	54.76	71.43	50	50	70	59.24	2025-05-31
63	50	78.57	40.62	70	50	57.84	2025-05-31
126	39.29	67.86	50	70	50	55.43	2025-05-31
252	50	71.43	56.25	60	80	63.54	2025-05-31

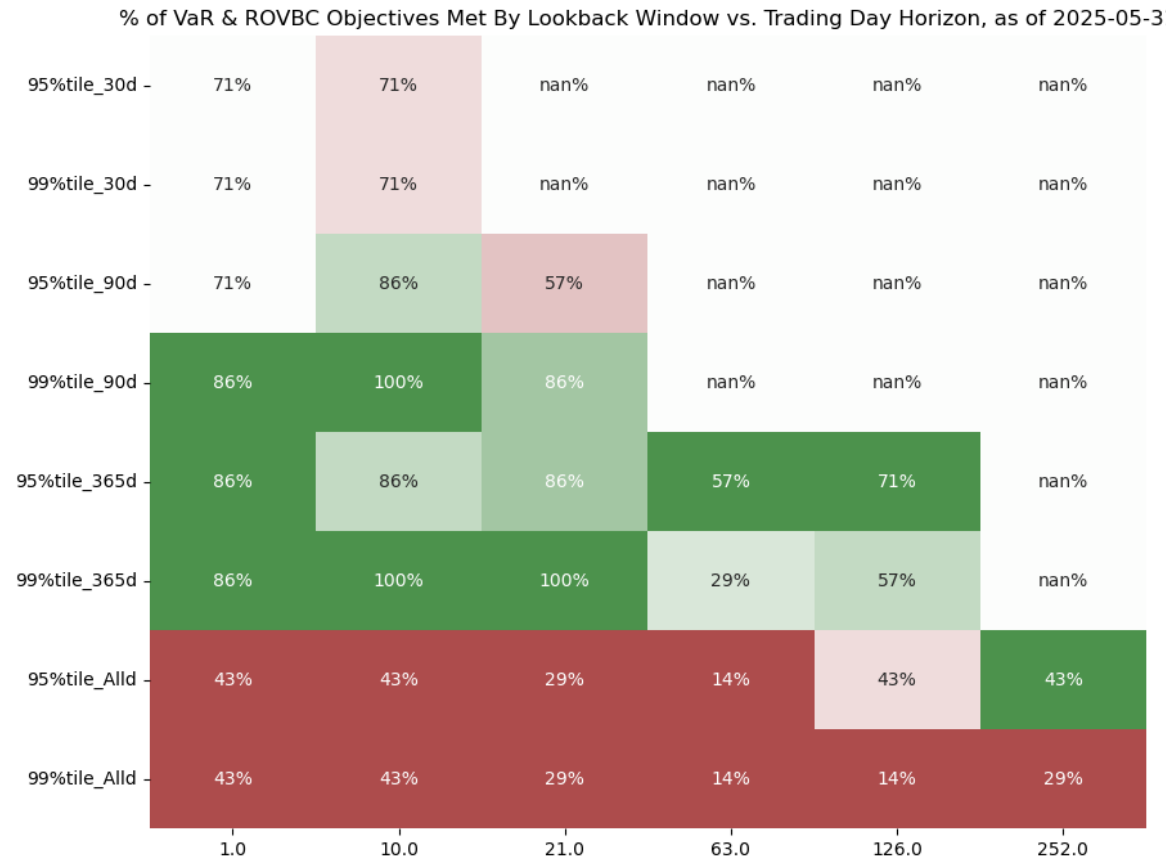
% of Each Metric's Performance Objectives Met Across All Horizons and Lookback Periods

Metric	% of Objectives Met	AsOfDate
VaR	57.14	2025-05-31
OaR	70.54	2025-05-31
ExpBody	51.17	2025-05-31
OptionFV	57.5	2025-05-31
V-Score	69.38	2025-05-31
AggScore	61.15	2025-05-31

Appendix 1: VaR Report Card Detail

Period examined: AllD = 2022-01-31 through 2025-05-29 while 365D /90D/ 30D include the 365/90/30 days ended 2025-05-29, respectively.

Sigma Comparison Report Card:



Vector Model Statistical Testing Report Card:

The Kupiec Proportion of Failures test statistic (listed as VaR_kStat in the table below), and its probability (VaR_pValK) are used to test the null hypothesis that the Vector Model's VaR breakage rate is consistent with expectations. The test statistic is calculated by comparing the number of VaR breaks experienced to the expected number of breaks given the total number of observations and the specified probability level. Breakage is measured at the individual ticker-model date level. The probability of the Kupiec statistic occurring is obtained from the

chi-squared distribution. The lower the Kupiec statistic, the higher the p-Value, and the more likely that the Vector Model's VaR breakage rate is consistent with expectations.

The Christoferson VaR Violation Independence test statistic (listed as VaR_chrStat in the table below) and its probability (VaR_pValChr) are used to test the null hypothesis that the VaR model violations are independent. The test statistic focuses on consecutive breakages over time. We measure breakage at the portfolio level, with portfolio breakage for a given period defined as equally weighted ticker level breakage for that period being beyond expectation given the specified probability level. The probability of the Christoferson statistic occurring is obtained from the chi-squared distribution. The lower the Christoferson statistic, the higher the p-Value, and the more likely that the Vector Model's VaR breakage is independent.

Kupiec and Christoferson test results for Sigma VaR can be found in the Appendix.

Period examined: 2022-01-31 through 2025-05-29. Note that for horizon periods greater than 1d we exclude enough model dates to assure no overlap between observation periods.

Model	Pctile	Horizon	VaR_kStat	VaR_pValK	VaR_chrStat	VaR_pValChr
Vector	95	1	0.29	0.59	15.11	0
Vector	95	10	22.93	0	0.04	0.84
Vector	95	21	2.27	0.13	0.07	0.79
Vector	95	63	2.9	0.09	0.12	0.72
Vector	95	126	0.33	0.57	0.37	0.54
Vector	95	252	0.06	0.8	nan	0
Vector	99	1	70.56	0	23.87	0
Vector	99	10	14.72	0	0.01	0.93
Vector	99	21	6.2	0.01	1.66	0.2
Vector	99	63	1.81	0.18	nan	0
Vector	99	126	0.55	0.46	nan	0
Vector	99	252	7.15	0.01	nan	0

Combined Summary Report Card By Objective:

Here we summarize the results by objective, starting with the Sigma comparison-based objectives, for which a sub-total is provided. Each lookback period, horizon and specified percentile receives equal weighting in these calculations.

Then summary results for the statistical tests are provided, with success defined as a p-value for the corresponding test statistic > 0.05, and each horizon and specified percentile receiving equal weighting.")

Period examined: 2022-01-31 through 2025-05-29.

VaR and ROVBC Criteria	Average Score(%)
1. Closer to Target VaR Breakage Than Sigma (i.e., smaller MAE)	65.62
2. Less Volatile VaR Breakage Across Model Dates Than Sigma	62.5
3. Less Volatile VaR Breakage Across Tickers Than Sigma	12.5
4. Higher ROVBC Than Sigma	75
5. Higher ROVBC Than Sigma, Adj. for Avg. VM-Sigma VaR Diff.	96.88
6. Alpha of ROVBC vs Sigma >0, Across Tickers and Model Dates	50
7. Alpha of ROVBC vs Sigma >0, By Ticker, Across Model Dates	56.25
Overall Comparison to Sigma Average	59.82
Kupiec Test of VaR Proximity to Target	58.3333
Christoferson Test of VaR Date Independence	50

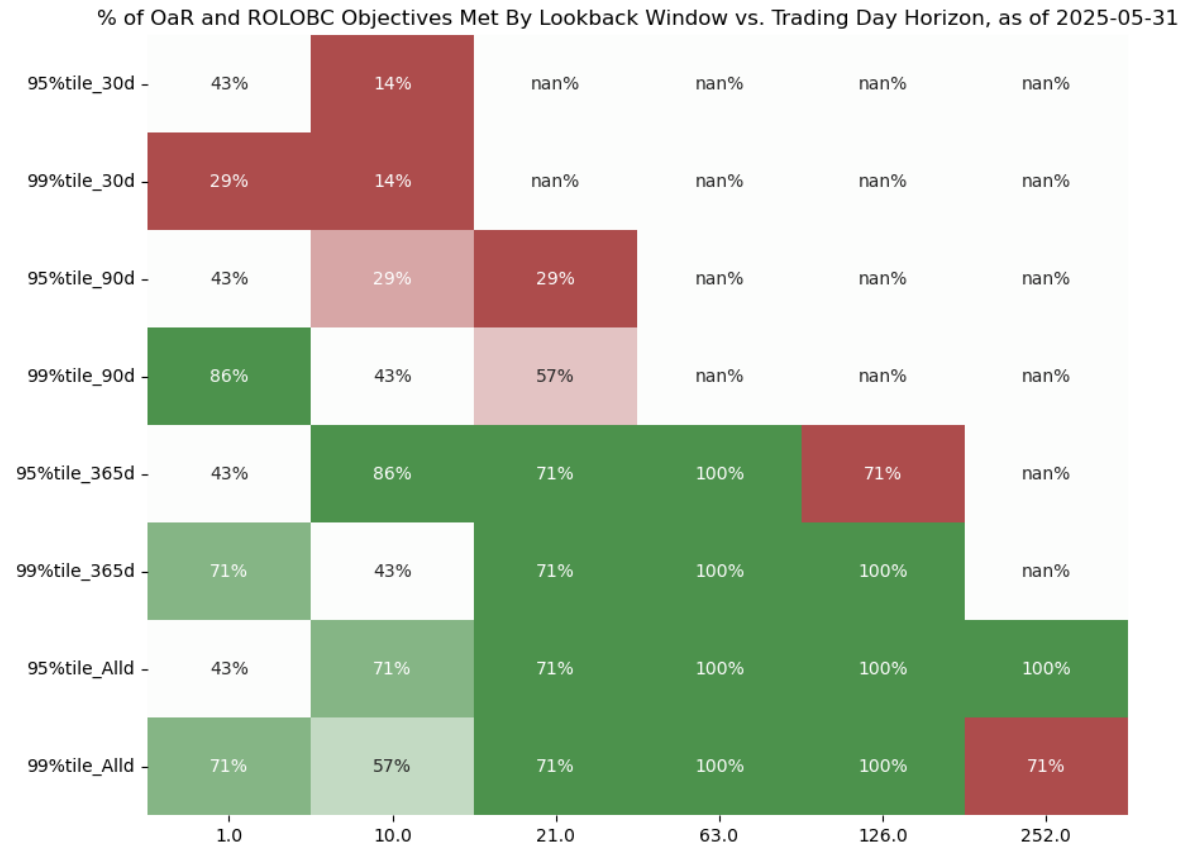
VaR and ROVBC Criteria by Fwd Hzn	1D	10D	21D	63D	126D	252D
1. Closer to Target VaR Breakage Than Sigma	75	75	50	50	75	50
2. Less Volatile VaR Breakage Across Model Dates Than Sigma	100	75	66.67	50	0	0
3. Less Volatile VaR Breakage Across Tickers Than Sigma	0	37.5	16.67	0	0	0
4. Higher ROVBC Than Sigma	75	87.5	83.33	25	75	100
5. Higher ROVBC Than Sigma, Adj. for Avg. VM-Sigma VaR Diff.	100	100	100	75	100	100
6. Alpha of ROVBC vs Sigma >0, Across Tickers and Model Dates	62.5	75	66.67	0	25	0
7. Alpha of ROVBC vs Sigma >0, By Ticker, Across Model Dates	75	75	66.67	0	50	0
TotalScore	69.64	75	64.29	28.57	46.43	35.71

VaR and ROVBC Criteria Across Lookback Window	30D	90D	365D	AllD
1. Closer to Target VaR Breakage Than Sigma	50	66.67	90	50
2. Less Volatile VaR Breakage Across Model Dates Than Sigma	50	83.33	80	41.67
3. Less Volatile VaR Breakage Across Tickers Than Sigma	25	16.67	20	0
4. Higher ROVBC Than Sigma	100	100	90	41.67
5. Higher ROVBC Than Sigma, Adj. for Avg. VM-Sigma VaR Diff.	100	100	100	91.67
6. Alpha of ROVBC vs Sigma >0, Across Tickers and Model Dates	75	100	70	0
7. Alpha of ROVBC vs Sigma >0, By Ticker, Across Model Dates	100	100	80	0
TotalScore	71.43	80.95	75.71	32.14

Appendix 2: OaR Report Card Detail

Period examined: AllD = 2022-01-31 through 2025-05-29 while 365D /90D/ 30D include the 365/90/30 days ended 2025-05-29, respectively.

Sigma Comparison Report Card:



Vector Model Statistical Testing Report Card:

The Kupiec Proportion of Failures test statistic (listed as OaR_kStat in the table below), and its probability (OaR_pValK) are used to test the null hypothesis that the Vector Model's OaR breakage rate is consistent with expectations. The test statistic is calculated by comparing the number of OaR breaks experienced to the expected number of breaks given the total number of observations and the specified probability level. Breakage is measured at the individual ticker-model date level. The probability of the Kupiec statistic occurring is obtained from the

chi-squared distribution. The lower the Kupiec statistic, the higher the p-Value, and the more likely that the Vector Model's OaR breakage rate is consistent with expectations.

The Christoferson OaR Violation Independence test statistic (listed as OaR_chrStat in the table below) and its probability (OaR_pValChr) are used to test the null hypothesis that the OaR model violations are independent. The test statistic focuses on consecutive breakages over time. We measure breakage at the portfolio level, with portfolio breakage for a given period defined as equally weighted ticker level breakage for that period being beyond expectation given the specified probability level. The probability of the Christoferson statistic occurring is obtained from the chi-squared distribution. The lower the Christoferson statistic, the higher the p-Value, and the more likely that Vector Model OaR breakage is independent.

Kupiec and Christoferson test results for Sigma OaR can be found in the Appendix.

Period examined: 2022-01-31 through 2025-05-29. Note that for horizon periods greater than 1d we exclude enough model dates to assure no overlap between observation periods.

Model	Pctile	Horizon	OaR_kStat	OaR_pValK	OaR_chrStat	OaR_pValChr
Vector	95	1	156.09	0	2.29	0.13
Vector	95	10	9.15	0	2.91	0.09
Vector	95	21	16.7	0	0.27	0.6
Vector	95	63	0	0.96	0.09	0.76
Vector	95	126	6.73	0.01	nan	0
Vector	95	252	0.06	0.8	nan	0
Vector	99	1	7.86	0.01	1.76	0.18
Vector	99	10	20.79	0	2.91	0.09
Vector	99	21	7.44	0.01	6.5	0.01
Vector	99	63	0.49	0.48	1.6	0.21
Vector	99	126	1.83	0.18	nan	0
Vector	99	252	2.45	0.12	nan	0

Combined Summary Report Card By Objective:

Here we summarize the results by objective, starting with the Sigma comparison-based objectives, for which a sub-total is provided. Each lookback period, horizon and specified percentile receives equal weighting in these calculations.

Then summary results for the statistical tests are provided, with success defined as a p-value for the corresponding test statistic > 0.05, and each horizon and specified percentile receiving equal weighting.")

Period examined: 2022-01-31 through 2025-05-29.

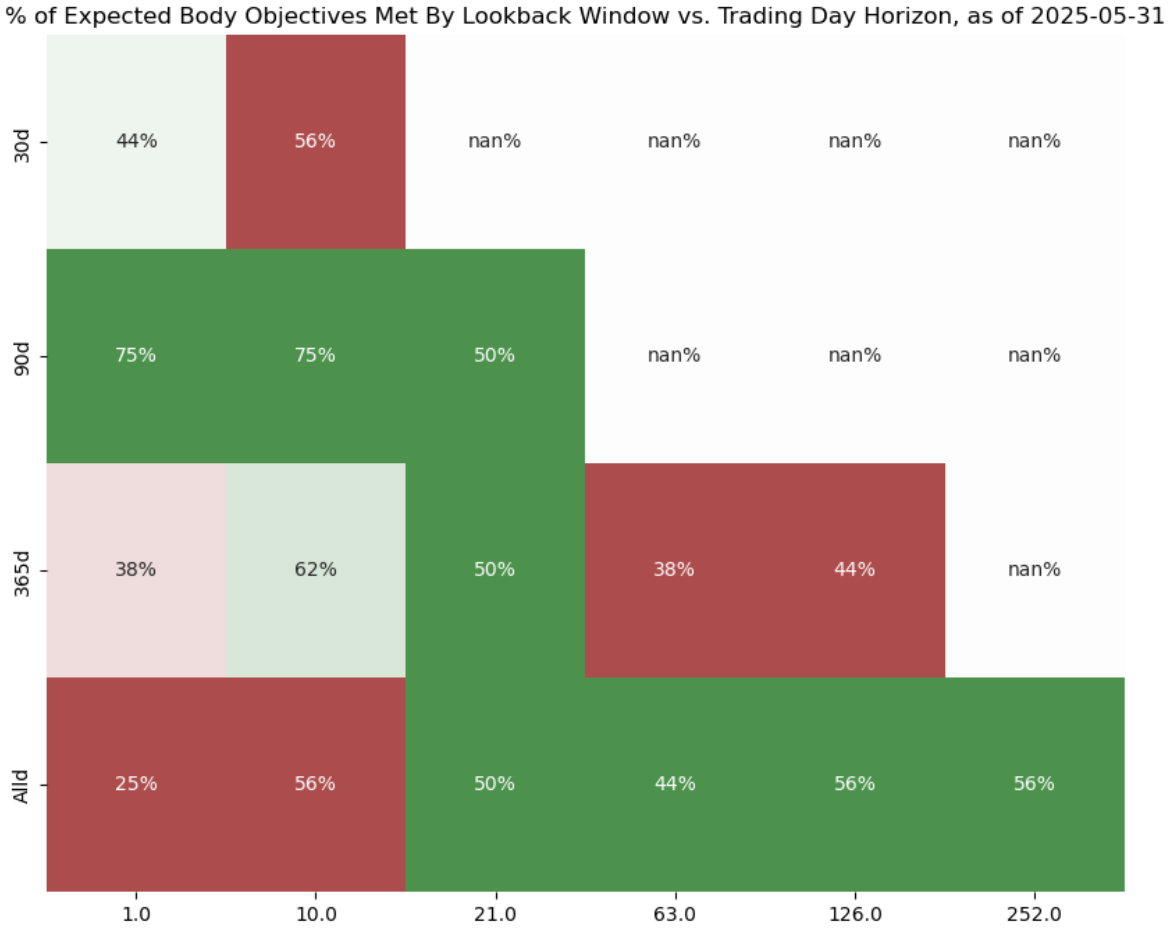
OaR and ROLOBC Criteria	Average Score(%)
1. Closer to Target OaR Breakage Than Sigma	68.75
2. Less Volatile OaR Breakage Across Model Dates Than Sigma	90.62
3. Less Volatile OaR Breakage Across Tickers Than Sigma	37.5
4. Higher ROLOBC Than Sigma	96.88
5. Higher ROLOBC Than Sigma, Adj. for Avg. VM-Sigma OaR Diff.	50
6. Alpha of ROLOBC vs Sigma >0, Across Tickers and Model Dates	53.12
7. Alpha of ROLOBC vs Sigma >0, By Ticker, Across Model Dates	62.5
Overall Comparison to Sigma Average	65.62
Kupiec Test of VaR Proximity to Target	41.6667
Christoferson Test of OaR Date Independence	58.3333

OaR and ROLOBC Criteria By Fwd Hzn	1D	10D	21D	63D	126D	252D
1. Closer to Target OaR Breakage Than Sigma	62.5	75	33.33	100	100	50
2. Less Volatile OaR Breakage Across Model Dates Than Sigma	100	62.5	100	100	100	100
3. Less Volatile OaR Breakage Across Tickers Than Sigma	0	0	33.33	100	100	100
4. Higher ROLOBC Than Sigma	100	87.5	100	100	100	100
5. Higher ROLOBC Than Sigma, Adj. for Avg. VM-Sigma OaR Diff.	12.5	25	66.67	100	100	50
6. Alpha of ROLOBC vs Sigma >0, Across Tickers and Model Dates	37.5	25	50	100	75	100
7. Alpha of ROLOBC vs Sigma >0, By Ticker, Across Model Dates	62.5	37.5	50	100	75	100
TotalScore	53.57	44.64	61.9	100	92.86	85.71

OaR and ROLOBC Criteria Across Lookback Window	30D	90D	365D	AllD
1. Closer to Target OaR Breakage Than Sigma	50	83.33	80	58.33
2. Less Volatile OaR Breakage Across Model Dates Than Sigma	50	83.33	100	100
3. Less Volatile OaR Breakage Across Tickers Than Sigma	0	16.67	50	50
4. Higher ROLOBC Than Sigma	75	100	100	100
5. Higher ROLOBC Than Sigma, Adj. for Avg. VM-Sigma OaR Diff.	0	16.67	70	66.67
6. Alpha of ROLOBC vs Sigma >0, Across Tickers and Model Dates	0	16.67	60	83.33
7. Alpha of ROLOBC vs Sigma >0, By Ticker, Across Model Dates	0	16.67	70	100
TotalScore	25	47.62	75.71	79.76

Appendix 3: Expected Body Report Card Detail

Period examined: AllD = 2022-01-31 through 2025-05-29 while 365D /90D/ 30D include the 365/90/30 days ended 2025-05-29, respectively.



EB Criteria	Average Score(%)
1. Smaller EUB MAE (mean absolute error)	6.25
2. Smaller EUB MAE after 95%tile adjustment	12.5
3. Less adjusted EUB MAE Variability across dates	18.75
4. Less adjusted EUB MAE Variability across tickers	18.75
5. Smaller EDB MAE	37.5
6. Smaller EDB MAE after 95%tile adjustment	50
7. Less adjusted EDB MAE Variability across dates	43.75
8. Less adjusted EDB MAE Variability across tickers	37.5
9. Greater ROEUB	62.5

EB Criteria	Average Score(%)
10. Greater ROEUB after adjusting for EUB magnitude	68.75
11. ROEUB alpha across tickers and dates > 0	62.5
12. ROEUB alpha across dates > 0	68.75
13. Greater ROEDB	100
14. Greater ROEDB after adjusting for EDB magnitude	87.5
15. ROEDB alpha across tickers and dates > 0	50
16. ROEDB alpha across dates > 0	93.75
Overall Average	51.17

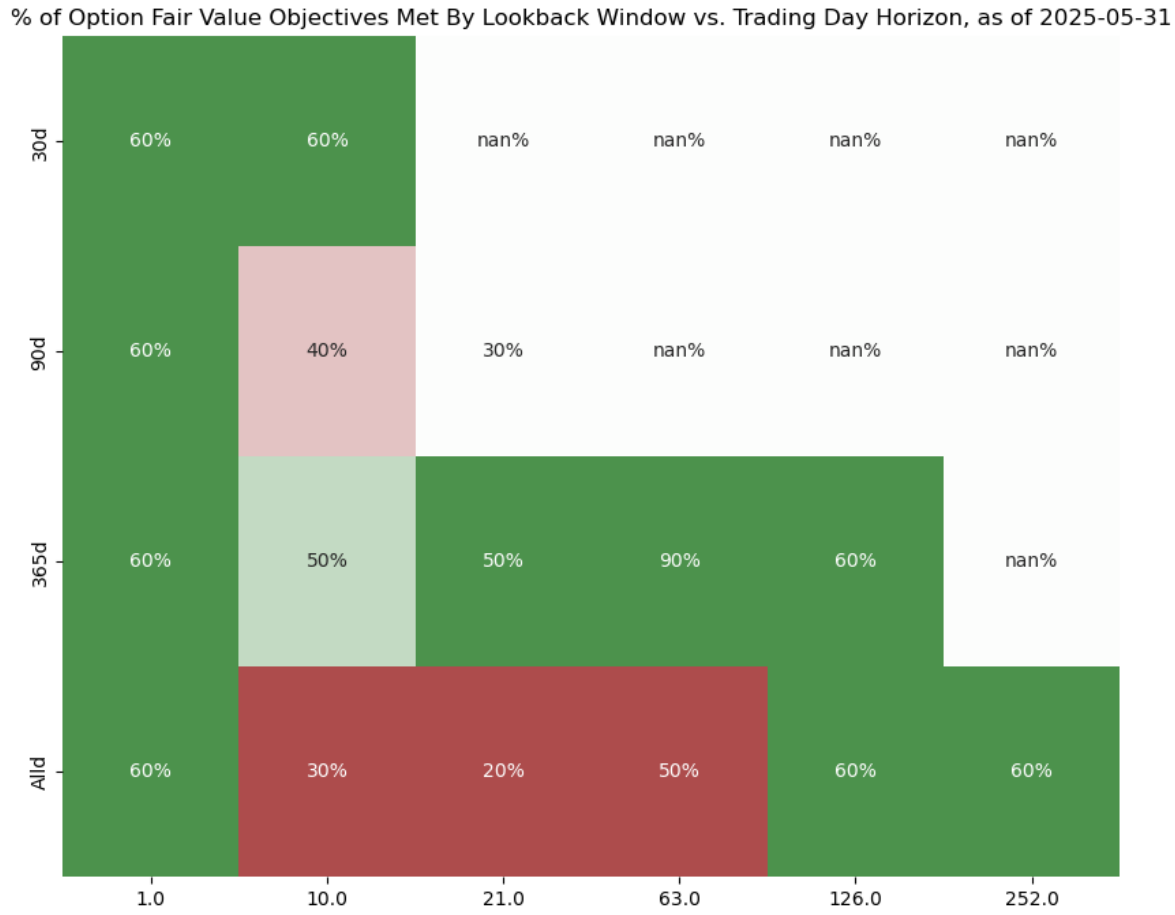
EB and ROEB Criteria by Fwd Hzn	1D	10D	21D	63D	126D	252D
1. Smaller EUB MAE (mean absolute error)	0	25	0	0	0	0
2. Smaller EUB MAE after 95%tile adjustment	0	50	0	0	0	0
3. Less adjusted EUB MAE Variability across dates	25	50	0	0	0	0
4. Less adjusted EUB MAE Variability across tickers	25	25	33.33	0	0	0
5. Smaller EDB MAE	0	50	33.33	50	50	100
6. Smaller EDB MAE after 95%tile adjustment	50	50	33.33	50	50	100
7. Less adjusted EDB MAE Variability across dates	25	75	33.33	0	50	100
8. Less adjusted EDB MAE Variability across tickers	75	50	33.33	0	0	0
9. Greater ROEUB	25	50	66.67	100	100	100
10. Greater ROEUB after adjusting for EUB magnitude	25	75	66.67	100	100	100
11. ROEUB alpha across tickers and dates > 0	25	50	66.67	100	100	100
12. ROEUB alpha across dates > 0	100	100	66.67	50	0	0
13. Greater ROEDB	100	100	100	100	100	100
14. Greater ROEDB after adjusting for EDB magnitude	100	100	100	0	100	100
15. ROEDB alpha across tickers and dates > 0	50	75	66.67	0	50	0
16. ROEDB alpha across dates > 0	100	75	100	100	100	100
TotalScore	45.31	62.5	50	40.62	50	56.25

EB and ROEB Criteria by Lookback Window	30D	90D	365D	AllD
1. Smaller EUB MAE (mean absolute error)	50	0	0	0
2. Smaller EUB MAE after 95%tile adjustment	50	33.33	0	0
3. Less adjusted EUB MAE Variability across dates	0	66.67	0	16.67
4. Less adjusted EUB MAE Variability across tickers	0	100	0	0
5. Smaller EDB MAE	50	66.67	0	50
6. Smaller EDB MAE after 95%tile adjustment	100	100	0	50
7. Less adjusted EDB MAE Variability across dates	100	0	20	66.67
8. Less adjusted EDB MAE Variability across tickers	50	100	40	0
9. Greater ROEUB	0	33.33	80	83.33
10. Greater ROEUB after adjusting for EUB magnitude	0	66.67	80	83.33
11. ROEUB alpha across tickers and dates > 0	0	33.33	80	83.33
12. ROEUB alpha across dates > 0	100	66.67	80	50
13. Greater ROEDB	100	100	100	100
14. Greater ROEDB after adjusting for EDB magnitude	100	100	80	83.33
15. ROEDB alpha across tickers and dates > 0	50	100	80	0
16. ROEDB alpha across dates > 0	50	100	100	100
TotalScore	50	66.67	46.25	47.92

See the prior page for associated definitions of the criteria.

Appendix 4: Option Fair Value Report Card Detail

Period examined: AllD = 2022-01-31 through 2025-05-29



OFV Criteria	Average Score(%)
1. Closer RFR Proximity: NTM	43.75
2. Closer RFR Proximity: DOOTM	37.5
3. Smaller Max Loss By Date: NTM	56.25
4. Smaller Max Loss By Date:: DOOTM	100
5. Avg Excess P&L >Excess Max Loss By Date (if any):NTM	68.75
6. Avg Excess P&L >Excess Max Loss By Date (if any):DOOTM	100
7. Smaller Max Loss By Ticker: NTM	0
8. Smaller Max Loss By Ticker: DOOTM	50
9. Avg Excess P&L >Excess Max Loss By Ticker (if any):NTM	12.5
10.Avg Excess P&L >Excess Max Loss By Ticker (if any):DOOTM	56.25
Overall Average	52.5

OFV Criteria	Average Score(%)

OFV Criteria, Average Across Fwd Horizon	1D	10D	21D	63D	126D	252D
1. Closer RFR Proximity: NTM	0	25	33.33	100	100	100
2. Closer RFR Proximity: DOOTM	0	25	33.33	50	100	100
3. Smaller Max Loss By Date: NTM	100	0	0	100	100	100
4. Smaller Max Loss By Date:: DOOTM	100	100	100	100	100	100
5. Avg Excess P&L >Excess Max Loss By Date (if any):NTM	100	50	0	100	100	100
6. Avg Excess P&L >Excess Max Loss By Date (if any):DOOTM	100	100	100	100	100	100
7. Smaller Max Loss By Ticker: NTM	0	0	0	0	0	0
8. Smaller Max Loss By Ticker: DOOTM	75	75	33.33	50	0	0
9. Avg Excess P&L >Excess Max Loss By Ticker (if any):NTM	25	0	0	50	0	0
10.Avg Excess P&L >Excess Max Loss By Ticker (if any):DOOTM	100	75	33.33	50	0	0
Overall Average	60	45	33.33	70	60	60

OFV Criteria, Average Across Lookback Windows	30D	90D	365D	ALLD
1. Closer RFR Proximity: NTM	50	0	60	50
2. Closer RFR Proximity: DOOTM	50	33.33	40	33.33
3. Smaller Max Loss By Date: NTM	50	33.33	60	66.67
4. Smaller Max Loss By Date:: DOOTM	100	100	100	100
5. Avg Excess P&L >Excess Max Loss By Date (if any):NTM	50	33.33	80	83.33
6. Avg Excess P&L >Excess Max Loss By Date (if any):DOOTM	100	100	100	100
7. Smaller Max Loss By Ticker: NTM	0	0	0	0
8. Smaller Max Loss By Ticker: DOOTM	100	66.67	60	16.67
9. Avg Excess P&L >Excess Max Loss By Ticker (if any):NTM	0	0	40	0
10.Avg Excess P&L >Excess Max Loss By Ticker (if any):DOOTM	100	66.67	80	16.67
Overall Average	60	43.33	62	46.67

Appendix 5: V-Score Report Card Detail

Here we summarize the results to be found in the section that follows, "Historic Average Performance By V-Score Grouping". We present here the % of the maximum score that can be obtained by applying the following criteria to the Average Returns and Information Ratios we calculate for each V-Score grouping / Model Date Lookback Period / Forward Time Horizon.

Average Price Return:

1. Positive V-Scores > Avg Ticker > NegV-Scores
2. Positive VaR Adjusted V-Scores >Avg Ticker > Negative VaR Adjusted V-Scores
3. Positive V-Score Rank Order corresponds to Price Returns
4. Negative V-Score Rank Order corresponds to Price Returns
5. The differential between Positive and Negative V-Scores is greater on a VaR adjusted basis than on an unadjusted basis.

Information Ratio (+1 if met):

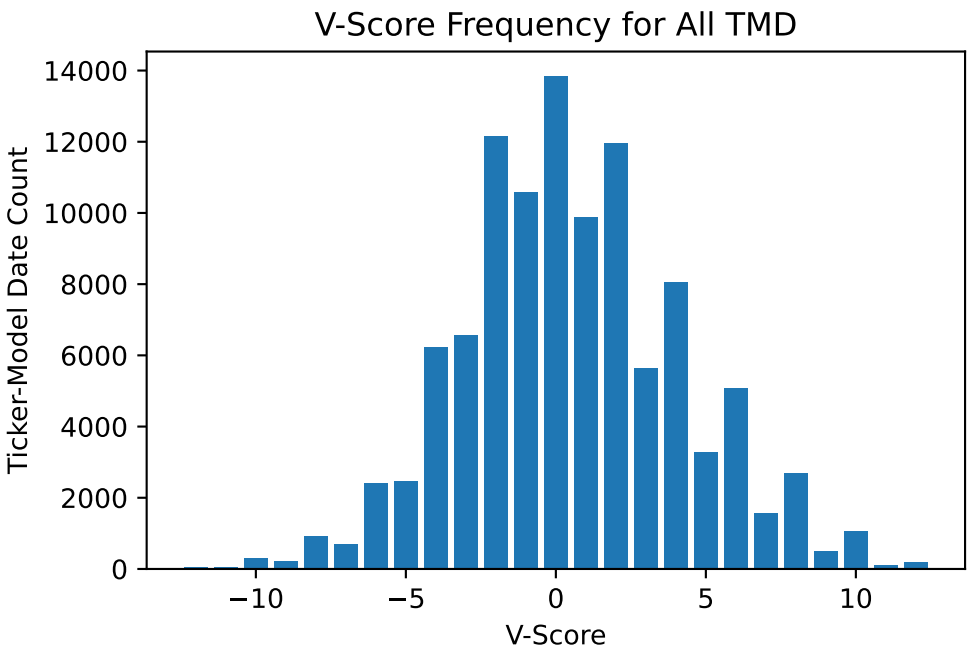
1. Positive VaR Adjusted V-Scores > All Positve V-Scores
2. Negative VaR Adjusted V-Scores < All Negative V-Scores
3. Positive VaR Adjusted V-Scores> Avg Ticker
4. Negative VaR Adjusted V-Scores < Avg Ticker
5. Positive VaR Adjusted V-Scores > "SPY" etf

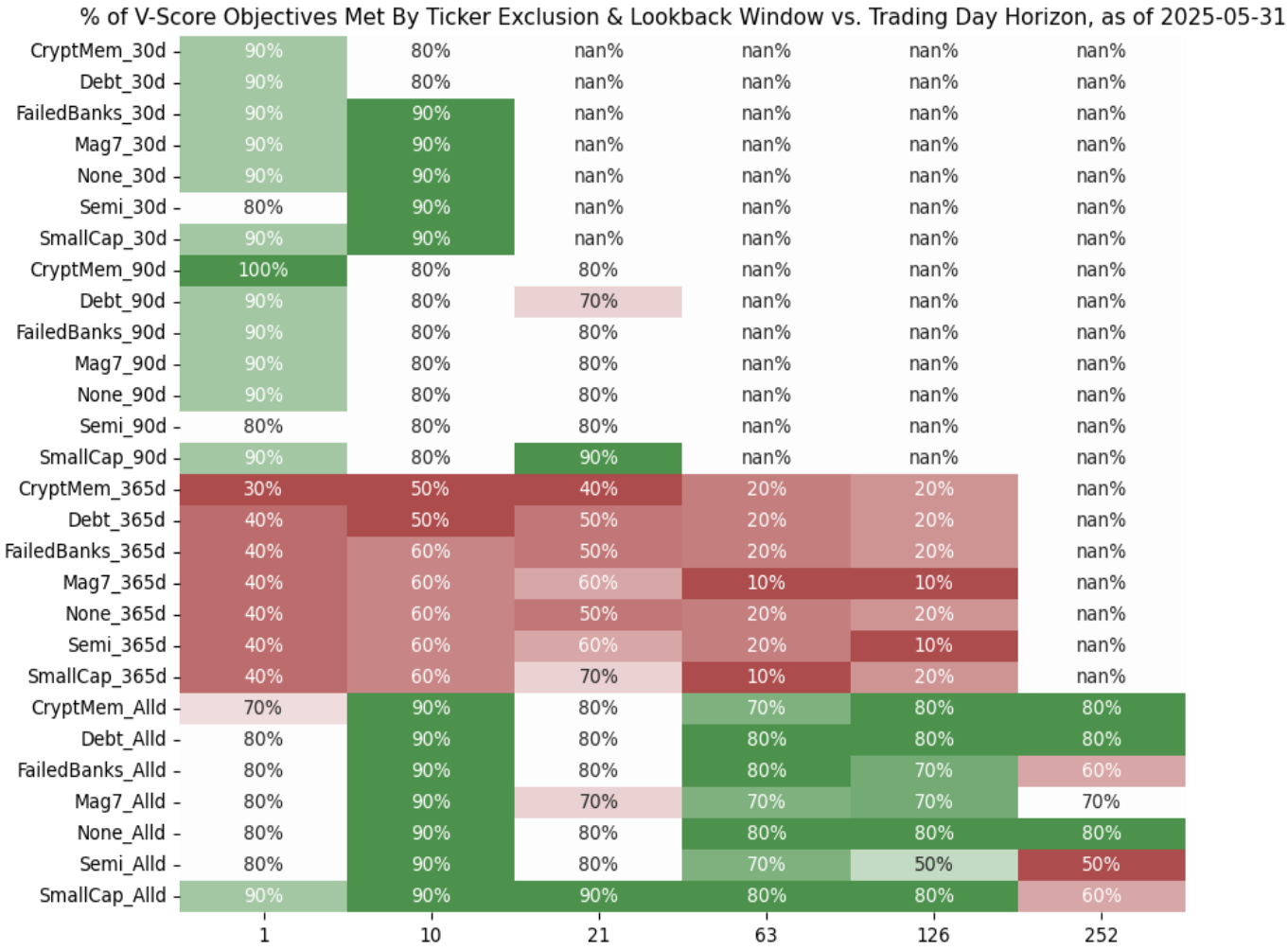
Ticker Exclusion Groupings:

1. None: all ~150 tickers covered included, none excluded
2. CryptMem: excludes MSTR, GBTC, AMC, GME
3. FailedBanks: excludes SIVBQ, SBNY, FRCB
4. SmallCap: excludes NAVI, LUMN, CYH, NWL, KALU, IEP, POST, GT, BHC
5. Mag7: excludes NVDA, NFLX, MSFT, AMZN, GOOGL, META, TSLA
6. Semi: excludes NVDA, AMD, AVGO, MU, AMAT, CDNS, TXN, ON, QCOM, INTC, WDC
7. Debt: excludes TLT, LQD, MUB, VCSH, HYG, EMB, FRA

Finally, an understanding of the relative frequency of each V-Score is key to understanding the V-Score's performance and to its interpretation:

Period examined: All model dates from 2022-01-31 through 2025-05-29


V-Score Frequency for All TMD
Ticker-Model Date Count
14000
12000
10000
8000
6000
4000
2000
0
−10
−5
0
5
10
V-Score



V-Score Criteria	Average Score(%)
1. PxRet: PosVS > AvgTicker > NegVS	71.43
2. PxRet: VaRAdjPosVS > AvgTicker > VaRAdjNegVS	81.25
3. PxRet: PosVS Rank Order	30.36
4. PxRet: NegVS Rank Order	37.5
5. PxRet: VaRAdj_PosNegVSDiff > PosNegVSDiff	81.25
6. IR: VaRAdjPosVS > PosVS	76.79
7. IR: VaRAdjNegVS < NegVS	92.86
8. IR: VaRAdjPosVS > AvgTicker	70.54
9. IR: VaRAdjNegVS < AvgTicker	86.61
10. IR: VaRAdjPosVS > SPY	44.64
Overall Average	67.32

V-Score Criteria by Fwd Hzn	1D	10D	21D	63D	126D	252D
1. PxRet: PosVS > AvgTicker > NegVS	96.43	67.86	66.67	50	50	85.71
2. PxRet: VaRAdjPosVS > AvgTicker > VaRAdjNegVS	75	100	100	50	50	100
3. PxRet: PosVS Rank Order	3.57	50	9.52	28.57	42.86	100
4. PxRet: NegVS Rank Order	89.29	0	23.81	35.71	50	0
5. PxRet: VaRAdj_PosNegVSDiff > PosNegVSDiff	75	100	100	50	50	100
6. IR: VaRAdjPosVS > PosVS	75	100	100	50	42.86	42.86
7. IR: VaRAdjNegVS < NegVS	100	100	76.19	100	78.57	100
8. IR: VaRAdjPosVS > AvgTicker	75	92.86	76.19	50	35.71	57.14
9. IR: VaRAdjNegVS < AvgTicker	100	100	95.24	50	50	100
10. IR: VaRAdjPosVS > SPY	53.57	75	66.67	0	0	0
TotalScore	74.29	78.57	71.43	46.43	45	68.57

V-Score Criteria by Lookback Window	30D	90D	365D	AllD
1. PxRet: PosVS > AvgTicker > NegVS	85.71	100	17.14	97.62
2. PxRet: VaRAdjPosVS > AvgTicker > VaRAdjNegVS	100	100	40	100
3. PxRet: PosVS Rank Order	50	4.76	0	61.9
4. PxRet: NegVS Rank Order	42.86	52.38	54.29	14.29
5. PxRet: VaRAdj_PosNegVSDiff > PosNegVSDiff	100	100	40	100
6. IR: VaRAdjPosVS > PosVS	100	100	40	88.1
7. IR: VaRAdjNegVS < NegVS	100	76.19	94.29	97.62
8. IR: VaRAdjPosVS > AvgTicker	100	100	20	88.1
9. IR: VaRAdjNegVS < AvgTicker	100	100	57.14	100
10. IR: VaRAdjPosVS > SPY	100	100	5.71	30.95
TotalScore	87.86	83.33	36.86	77.86

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Appendix 6: Sigma Kupiec and Christoferson VaR tests.

The Kupiec Proportion of Failures test statistic (listed as VaR_kStat in the table below), and its probability (VaR_pValK) are used to test the null hypothesis that the VaR model breakage is consistent with expectations. The test statistic is calculated by comparing the number of VaR breaks experienced to the expected number of breaks given the total number of observations and the specified probability level. Breakage was measured at the individual ticker-model date level. The probabilty of the Kupiec statistic occuring is obtained from the chi-squared distribution. The lower the statitic, the higher the p-Value, and the more likely that Sigma's VaR breakage is consistent with expectations.

The Christoferson VaR Violation Indepence test statistic (listed as VaR_chrStat in the table below) and its probabilty (VaR_pValChr) are used to test the null hypothesis that the VaR model violations are independent. The test statistic focuses on consecutive breakages over time. We measure breakage at the portfolio level, with portfolio breakage for a given period defined as equally weighted ticker level breakage for that period being beyond expecataion given the specified probability level. The probabilty of the Christoferson statistic occuring is obtained from the chi-squared distribution. The lower the statitic, the higher the p-Value, and the more likely that Sigma VaR breakage is independent.

Kupiec and Christoferson results for the Vector Model can be found in the Report Card section.
#“‘

Period examined: 2022-01-31 through 2025-05-29. Note that for horizon periods greater than 1d we exclude enough model dates to assure no overlap between observation periods.

Model	Pctile	Horizon	VaR_kStat	VaR_pValK	VaR_chrStat	VaR_pValChr
Sigma	95	1	109.34	0	10.57	0
Sigma	95	10	3.81	0.05	0.13	0.72
Sigma	95	21	29.9	0	0.25	0.61
Sigma	95	63	12.46	0	nan	0
Sigma	95	126	19.23	0	nan	0
Sigma	95	252	13.73	0	nan	0
Sigma	99	1	427.53	0	30.42	0
Sigma	99	10	98.95	0	0.3	0.58
Sigma	99	21	0	0.98	1.67	0.2
Sigma	99	63	0	0.96	0.73	0.39
Sigma	99	126	0.31	0.58	nan	0
Sigma	99	252	0.44	0.51	nan	0

Appendix 7: Sigma Kupiec and Christoferson OaR tests.

The Kupiec Proportion of Failures test statistic (listed as OaR_kStat in the table below), and its probability (OaR_pValK) are used to test the null hypothesis that OaR model breakage is consistent with expectations. The test statistic is calculated by comparing the number of OaR breaks experienced to the expected number of breaks given the total number of observations and the specified probability level. Breakage was measured at the individual ticker-model date level. The probabilty of the Kupiec statistic occuring is obtained from the chi-squared distribution. The lower the statitic, the higher the p-Value, and the more likely that Sigma OaR breakage is consistent wtih expectations.

The Christoferson OaR Violation Indepence test statistic (listed as OaR_chrStat in the table below) and its probabilty (OaR_pValChr) are used to test the null hypothesis that the OaR model violations are independent. The test statistic focuses on consecutive breakages over time. We measure breakage at the portfolio level, with portfolio breakage for a given period defined as equally weighted ticker level breakage for that period being beyond expecataion given the specified probability level. The probabilty of the Christoferson statistic occuring is obtained from the chi-squared distribution. The lower the statitic, the higher the p-Value, and the more likely that Sigma OaR breakage is independent.

Kupiec and Christoferson results for the Vector Model can be found in the Report Card section.

Period examined: 2022-01-31 through 2025-05-29. Note that for horizon periods greater than 1d we exclude enough model dates to assure no overlap between observation periods.

Model	Pctile	Horizon	OaR_kStat	OaR_pValK	OaR_chrStat	OaR_pValChr
Sigma	95	1	180.41	0	4.93	0.03
Sigma	95	10	1.81	0.18	1.41	0.23
Sigma	95	21	13.48	0	0.12	0.73
Sigma	95	63	10.02	0	0.34	0.56
Sigma	95	126	0.11	0.74	-0	1
Sigma	95	252	11.04	0	nan	0
Sigma	99	1	205.68	0	10.45	0
Sigma	99	10	29.55	0	0.03	0.86
Sigma	99	21	21.99	0	0.1	0.76
Sigma	99	63	20.56	0	nan	0
Sigma	99	126	9.52	0	nan	0
Sigma	99	252	21.78	0	nan	0