



TCR - Trend Capture Rating[™] & Dynamic Risk Management

Arun Soni

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Summary

Trendrating's **TCR™** framework is a powerful risk management tool to mitigate a very important risk, the risk of poor performance. We introduce **TCR™** for capturing the aggregated momentum rating for markets, sectors/industries, and portfolios using the Trendrating Momentum Rating™ for aggregates¹. The market's momentum fluctuates over time and Trendrating is designed to robustly capture this time varying rating. In this document we demonstrate the strong correlation between **TCR™** and **Forward Returns**.

This paper presents a 15-year analysis of the time varying rating of a Global Market Portfolio² and its linkage to returns over subsequent holding periods; we also document the same for the Developed Europe & USA regional market portfolios. We calculate the portfolio rating at each holding period and measure the forward return over the subsequent holding period and find that periods with a high³ aggregate rating significantly outperform periods with a low⁴ aggregate rating. This implies that **TCR™** can have profound implications on portfolio return.

1 Introduction

Investors typically use a common set of metrics such as volatility (absolute or tracking error), risk-return trade-off measures (Sharpe Ratio, Information Ratio), and VaR to measure the aggregated risk-return profile of their holdings. Trendrating introduces the concept of **Trend Capture Rating™** for aggregates, henceforth referred to as portfolios, a forward looking risk metric that provides insight into the subsequent returns investors can expect for their portfolios over their desired holding period. Poor performance is a significant risk that plagues investment processes and most risk measures provide little insight into the portfolio expected return.

Trendrating issues security level ratings on an A to D scale. This security level rating maintains its robustness when aggregated to the portfolio level and offers a comprehensive framework to measure the aggregated momentum exposure for entire portfolios. The higher the rating of the portfolio, the greater the probability of higher returns in subsequent periods, along with a superior risk-return trade-off. The portfolio rating grade also scales from A to D but includes **pluses**⁵ and **minuses**⁶

In the quarterly holding period analysis for the **AC World**⁷ market portfolio, the periods with an aggregate rating of A,A-,B+ result in an annualised return of 8.74% with an annualised volatility of 7.85% versus an annualised return of -13.98% and annualised volatility of 15.04% for periods with an aggregate rating of D+,D,C-. The 1-month holding period analysis shows the same profile with annualised return and annualised volatility of 10.06% and 9.26% respectively for periods with the highest aggregate rating versus the corresponding figures of 1.76% and 25.37% for periods with the lowest aggregate rating.

The regional market portfolios display the same pattern of returns. For the **USA** portfolio with a quarterly holding period, periods with an aggregate rating of A,A-,B+ have an annualised return of 11.63% with an annualised volatility of 8.79%, versus periods with an aggregate rating of D+,D,C- have an annualised return of -15.87% and an annualised volatility of 20.53%. In the case of the **Developed Europe** portfolio for the quarterly holding period, the A,A-,B+ rated periods display an annualised return of 7.78%

¹ Markets, sectors, portfolios

² Market capitalisation weighted portfolio comprising of securities from developed and emerging markets

³ B+, A-, A

⁴ B, B-, C+, C, C-, D+, D

⁵ B+, C+ etc.

⁶ A-, B- etc.

⁷ All Country World - Developed & Emerging

with an annualised volatility of 8.66%, whilst periods with an aggregate rating of *D+,D,C-* have an annualised return and annualised volatility of -21.65% and 21.98% respectively.

2 Framework

The Trendrating Momentum Analytic offers an accurate mechanism for capturing momentum risk premia. This security level rating robustly aggregates to a portfolio level rating; Figure 1 contains the portfolio grading scale for the various TCR™. This portfolio grading scale provides investors with absolute clarity on expected portfolio performance. Trendrating's recommendation is that investors strive to hold portfolios with at least a **B+** TCR™ to ensure that the majority of the portfolio holdings are in a strong price up-trend.

For benchmarked strategies, we recommend that the portfolio's TCR™ should be at least equal to the benchmark's TCR™ to ensure that the portfolio does not suffer from underperformance.

The return profile of the aggregate rating buckets for the AC World⁸ portfolio in Table 1 illustrates that periods with a high aggregate rating have a much superior return profile across all metrics; IR⁹, Hit Rate¹⁰, and Average Return¹¹.

Portfolio	Information Ratio	Average Period Return (%)	Hit Rate (%)	Number Periods
A,A-,B+	1.11	2.19	66	29
B,B-	0.38	1.69	71	17
C+,C	-0.25	-0.77	60	10
D+,D,C-	-0.93	-3.48	25	4

Table 1: AC World - Quarterly

The annualised return and volatility shown in Figure 2 validate the efficacy of the portfolio grading system in Figure 1. Periods with a TCR™ of *A,A-,B+* provide a higher annualised return compared to periods with a lower TCR™, and with lower volatility.

3 Methodology

The universe for this analysis is constructed using a global set of securities from the following regions; USA, Developed Europe¹², Developed Asia¹³, Natural Resource¹⁴, Emerging Europe¹⁵, Emerging Asia¹⁶, and

⁸Global Market Portfolio of Developed & Emerging Markets

⁹Information Ratio - Annualised Return/Annualised Volatility

¹⁰Percentage of holding periods with positive returns

¹¹Average holding period return

¹²Germany, France, United Kingdom, Austria, Belgium, Italy, Switzerland, Sweden, Denmark, Finland, Netherlands, Ireland, Spain, Norway, & Portugal

¹³Japan, Hong Kong, Singapore, & South Korea

¹⁴Canada, Australia, New Zealand, & South Africa

¹⁵Greece, Israel, Cyprus, Czech Republic, Hungary, Poland, Turkey, & Russia

¹⁶China, Indonesia, India, Malaysia, Philippines, Pakistan, Thailand, & Taiwan

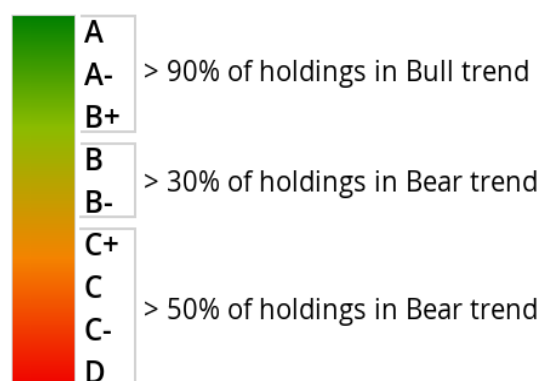


Figure 1: Portfolio Grade Definitions

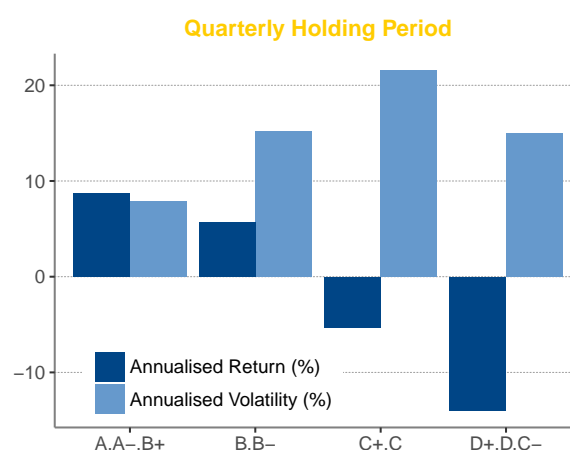


Figure 2: AC World - Risk & Return

Latin America¹⁷ with an aim to cover 80% to 90% of the investible universe in each country based on the twin criteria of market capitalisation and trading volume. The study comprises of 4,742 unique securities in the AC World portfolio over the 15-year period with roughly an average number of 2,127 securities per holding period. In each holding period, we exclude securities that are either not rated¹⁸ or do not have a return over the subsequent holding period. The average number of securities per holding period for the USA portfolio is 520 and the average number of securities for the Developed Europe portfolio per holding period is 442.

At the start of each holding period, the TCR™ is calculated using Trendrating's proprietary methodology for aggregating security level ratings using the portfolio positions to a portfolio level grade. We then calculate the price return over the subsequent holding period and repeat this exercise over the 15-year period. The individual portfolio rating grades are then grouped into four aggregate TCR™ buckets¹⁹, and the returns for all periods that fall in the same aggregate rating are linked to compute the return characteristics of each aggregate TCR™ bucket.

4 Analysis

4.1 Risk-Return Trade-off

We find a strikingly similar pattern in the return profile of the aggregate TCR™ buckets for the AC World portfolio and for each of the regional portfolios for all holding periods.

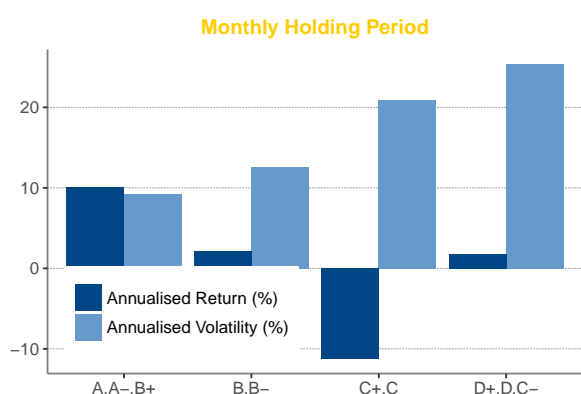


Figure 3: AC World - Risk & Return

Figure 3 compares the annualised return and annualised volatility of the aggregate TCR™ for the monthly holding period for the AC World portfolio, and the results mirror the risk-return trade-off witnessed for the quarterly holding period. The annualised return is largest for periods with the highest TCR™ along with the best risk-return trade-off as measured by an IR of 1.09.

The AC World portfolio has an aggregate TCR™ of A,A-,B+ in 93 months, which implies that roughly half the periods fall in lower rated buckets. Positioning of investor portfolio's with respect to momentum becomes crucial to mitigate the risk of underperformance in

these periods.

The strong risk & return trade-off in the AC World portfolio is mirrored in the regional market portfolios. Figure 4 plots the risk & return trade-off for the aggregate rating grades for the Developed Europe portfolio and Figure 5 plots the risk-return trade-off for the USA portfolio. **Appendix A** contains risk-return trade-off charts and return profile tables for the monthly holding periods for the USA and Developed Europe portfolios.

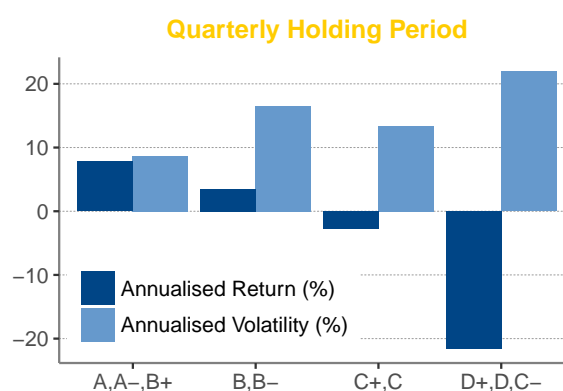


Figure 4: Developed Europe - Risk & Return

¹⁷Argentina, Brazil, Chile, Colombia, Mexico, Peru, & Venezuela

¹⁸Rating of N

¹⁹i. A,A-,B+;ii. B,B-;iii. C+,C;iv. D+,D,C-

We once again witness that periods with a TCR™ of A,A-,B+ generate an annualised return that is not only higher in magnitude, but also superior in terms risk-return trade-off. The periods with the highest aggregate TCR™ for the Developed Europe portfolio generate an annualised return of 7.78% versus an annualised return of -21.65% for periods with the lowest aggregate TCR™

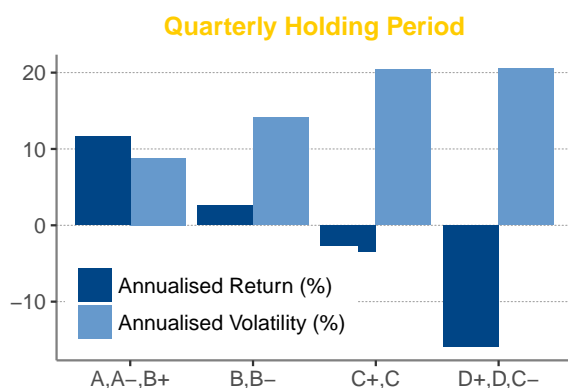


Figure 5: USA - Risk & Return

For the USA portfolio, periods with an aggregate TCR™ of A,A-,B+ have an IR of 1.32 versus an IR of -0.77 for periods with an aggregate TCR™ of D+,D,C-. Periods with the highest aggregate TCR™ generate an annualised return of 11.63% that is significantly higher than achieved by periods with a lower aggregate TCR™.

As in the case of the AC World portfolio, out of the 60 quarterly holding periods, the Developed Europe portfolio has the highest aggregate TCR™ in 28 quarterly periods whilst the USA portfolio scores the highest aggregate TCR™ in 32 quarterly periods. Investors now have a clear signal of downward market

trend in around half the periods and thus the opportunity to adjust their portfolios to obtain a TCR™ higher than that of the market/benchmark.

4.2 Return Profile

The analysis results indicate that a high aggregate TCR™ for a portfolio translates into a superior risk-return trade-off. However, it is essential that the return profile display consistency in terms of a strong average return over the holding period in conjunction with a high hit rate. A high average return is highly desirable but averages can be skewed by a few outliers, so a high hit rate in conjunction with a high average return provides confidence with respect to the mean return.

Portfolio	Information Ratio	Average Period Return (%)	Hit Rate (%)	Number Periods
A,A-,B+	1.09	0.84	67	93
B,B-	0.17	0.24	63	51
C+,C	-0.54	-0.81	44	25
D+,D,C-	0.07	0.39	55	11

Table 2: AC World - Monthly

Table 1 shows the return profile of the aggregate ratings for the AC World portfolio for the monthly holding period analysis. It is evident that periods with a high aggregate TCR™ yield a superior return profile across all metrics, similar to the results for the quarterly holding period.

The individual holding period returns for each aggregate TCR™ bucket confirm the superiority of the returns that have an A,A-,B+ aggregate TCR™. A majority of the periodic returns for this aggregated rating are large positive values in comparison to the negative return periods.

Figure 6 shows the quarterly periodic returns for the AC World portfolio for periods with an aggregate TCR™ of A,A-,B+ whilst Figure 7 shows the quarterly periodic returns for the AC World portfolio's C+,C aggregate TCR™.

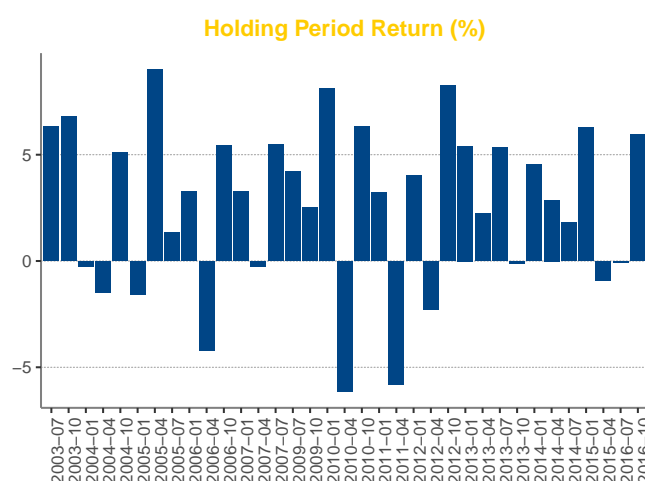


Figure 6: AC World - "A,A-,B+" Quarterly

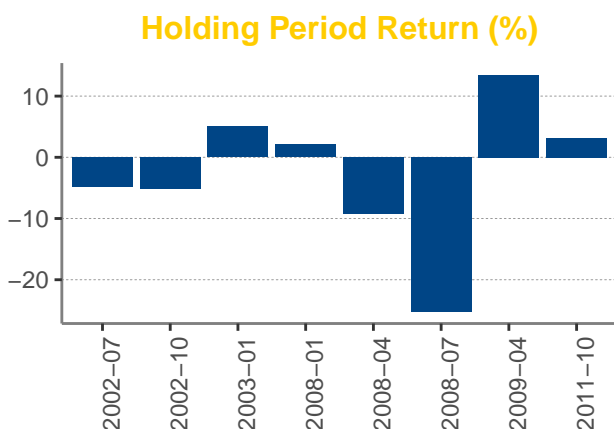


Figure 7: AC World - "C+,C" Quarterly

Figure 8 illustrates the large negative returns investors can experience during periods where the market has a low aggregate TCR™. It emphasises that investors must be vigilant to the positioning of their portfolios with respect to momentum, as phases where the entire market has a low TCR™ can be dangerous, but also ones that provide ample opportunity for outperformance.

The regional market portfolios too display similar consistency of return where the return profile of the periods with the highest aggregate TCR™ is superior in every measure to the return profile of periods with a lower aggregate TCR™.

Table 3 highlights the superior metrics for the A,A-,B+ aggregate TCR™ for the Developed Europe portfolio. Whilst the periods with an aggregate TCR™ of B,B- show a higher hit rate than those with the highest aggregate TCR™, their mean return is significantly lower, with periodic holding returns showing a high degree of dispersion as evidenced by a lower IR.

Portfolio	Information Ratio	Average Return (%)	Period	Hit Rate (%)	Number Periods
A,A-,B+	0.90	1.98		64	28
B,B-	0.21	1.21		82	17
C+,C	-0.20	-0.48		56	9
D+,D,C-	-0.98	-5.39		33	6

Table 3: Developed Europe - Quarterly

Table 4 contains the return metrics for the USA portfolio. Periods with an aggregate TCR™ of A,A-,B+ comfortably outpace the returns in the rest of the periods.

The following set of charts compare the periodic returns of the different aggregate TCR™ for the quarterly holding period for the Developed Europe and USA portfolios. Figure 9 and Figure 10 compare the holding period returns for the Europe portfolio's A,A-,B+ aggregate TCR™ and D+,D,C- aggregate TCR™

It is noteworthy that while the C+,C aggregate TCR™ displays a strong hit rate, it is vulnerable to large negative returns. Table 1 shows that the C+,C aggregate TCR™ has a mean return of -0.77% despite having a hit rate of 60%.

Figure 8 shows the quarterly periodic returns for the AC World portfolio for periods with an aggregate TCR™ of D+,D,C-. This aggregate TCR™ displays an extremely poor return profile on every measure, be it a risk-return trade-off or consistency of returns, as evidenced by a poor average holding period return of -3.48% and a low hit rate of 25%.

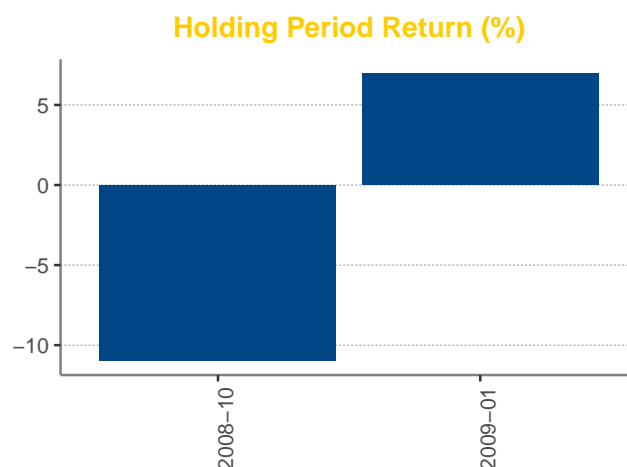


Figure 8: AC World - "D+,D,C-" Quarterly

Portfolio	Information Ratio	Average Return (%)	Period	Hit Rate (%)	Number Periods
A,A-,B+	1.32	2.88		72	32
B,B-	0.18	0.89		57	14
C+,C	-0.17	-0.37		55	11
D+,D,C-	-0.77	-3.86		33	3

Table 4: USA - Quarterly

respectively. The bulk of the periods that carry an aggregate TCR™ of A,A-,B+ demonstrate positive return. There are a few periods where this aggregate TCR™ experienced negative returns but these returns are smaller in magnitude in comparison to the positive return periods.

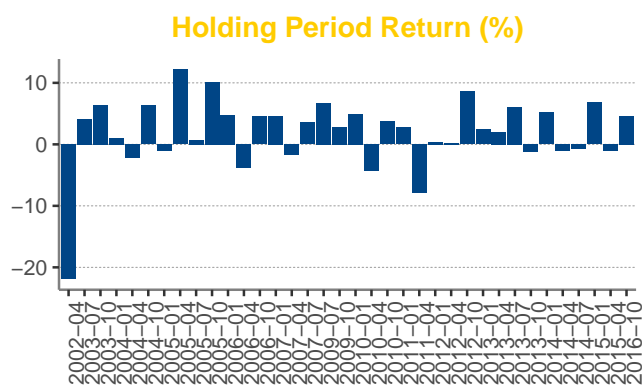


Figure 9: Developed Europe - "A,A-,B+" Quarterly

The point to note is that during market dislocations, the entire market can go through consecutive periods of low rating and these are the periods during which investors experience deep and prolonged drawdowns.

Figure 11 shows that as with the AC World and Developed Europe portfolios, the periods with an aggregate TCR™ of A,A-,B+ for the USA portfolio, display large positive holding period returns.

The USA portfolio has only 3 quarterly holding periods with an aggregate TCR™ of D+,D,C-, so one cannot draw a statistically significant conclusion, but the anecdotal evidence shows that the general rule still holds where the majority of the returns carry large negative values.

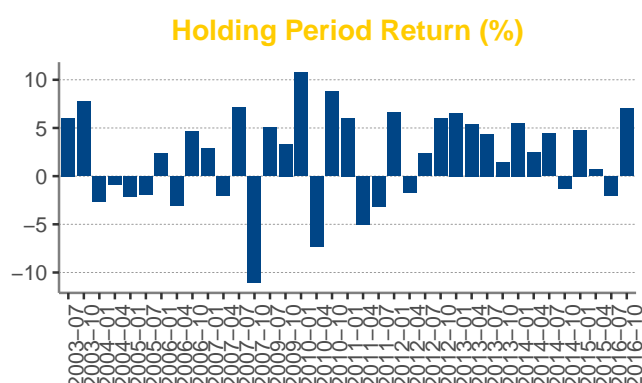


Figure 11: USA - "A,A-,B+" Quarterly

framework in being a robust forward looking indicator of portfolio return, and hence a vital tool for risk management and portfolio construction.

In the 20% - 30% instances where the Trendrating model's trend capture proves to be inaccurate, the resulting loss is limited, whilst the gains in the 70% - 80% instances when the model is correct are much larger.

The picture is a mirror image for periods that carry an aggregate TCR™ of D+,D,C-, where the bulk of the period returns are negative with large negative values that underscore the point that a low TCR™ carries a significant risk of underperformance.

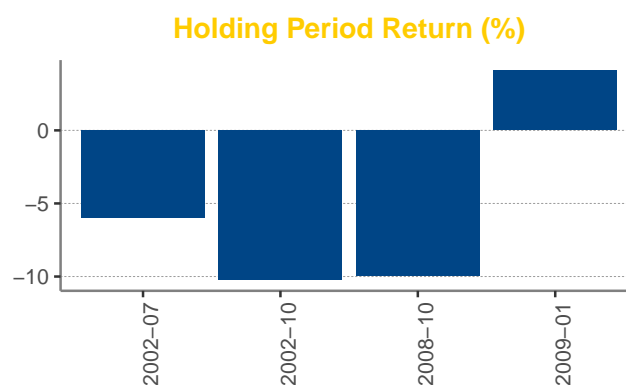


Figure 10: Developed Europe - "D+,D,C-" Quarterly

It is a widely accepted that the bulk of poor performance in investment portfolios arises due to deep drawdowns during market downturns. A low rating for the entire market implies that a majority of the securities are displaying a negative price trend, and these are precarious times for investor portfolios because a few securities can inflict considerable damage to the portfolio return.

The difference in the magnitude of returns between periods with a high aggregate TCR™ and those that with a low aggregate TCR™ validates the efficacy of the Trendrating Portfolio Rating

5 Conclusion

We believe that investors can use Trendrating's **Trend Capture Rating™** framework as a dynamic risk management tool to mitigate the risk of poor performance. The TCR™ has multiple use cases that can help investors position their portfolios positively with respect to future performance. It can be used as an allocation tool for market and/or sector allocation as well as a decision support tool to determine the level of portfolio concentration²⁰. Investors can use the market's TCR™ to determine whether they should be fully invested or whether they should increase the cash allocation in their portfolios.

During deep bear markets, it is quite possible that there may not be enough securities in an up-trend phase within any single region, and the TCR™ can be used to determine the level of concentration investors should introduce into their portfolios in order to minimise drawdown risk. In such market phases, where the entire market carries a low TCR™, it is still possible to form portfolios whose TCR™ will be higher than that of the overall market or benchmark. Therefore the **TCR™** becomes a valuable decision tool for portfolio construction. In market up-trends, when there is often a disconnect between underlying fundamentals and a security's price trend, the portfolio must participate to the maximum possible potential in the bull trend in order to reduce the risk of under-performance. A high TCR™ ensures that a portfolio is positioned appropriately.

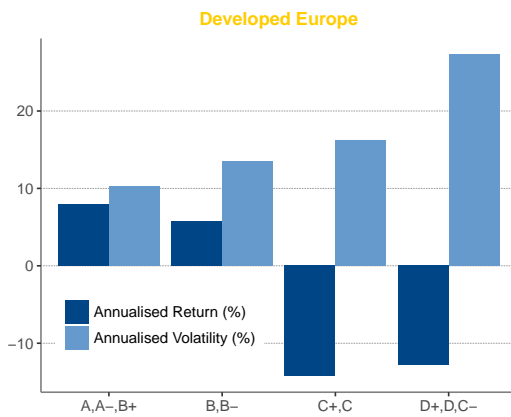
The TCR™ framework is not dependent on the frequency of the holding period, because the results from the 1-month and 3-month holding periods display very similar return patterns. The Trendrating model uses a self-adjusting time window to capture price trends. The trend capture for each security is absolute & independent of one another. The model generates security level ratings when it deems that an inflection point in the security's price trend has occurred, and not on the basis of any fixed time period. The algorithm's self-adjusting time window is the primary reason for the model's high accuracy rate. Its ability to distinguish between a true inflection point and noise further increase its accuracy rate and robustness of its ratings.

Investors now have a forward looking framework at their disposal that will allow them to implement dynamic risk management to mitigate the most important risk, the risk of poor performance. Trendrating's **TCR™** framework facilitates momentum rating of aggregates, thereby adding a much required tool to the portfolio management and risk management arsenal.

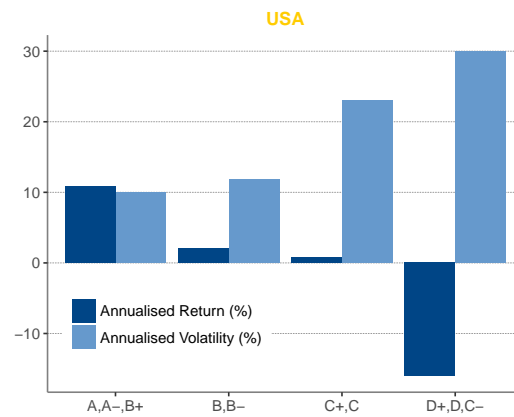
²⁰In terms of number of securities in the portfolio

Appendix

A Monthly Holding Period Results



(a) Developed Europe



(b) USA

Portfolio	Information Ratio	Average Return (%)	Period	Hit Rate (%)	Number Periods
A,A-,B+	0.77	0.69	63	82	82
B,B-	0.43	0.54	58	57	57
C+,C	-0.88	-1.16	42	19	19
D+,D,C-	-0.47	-0.84	50	22	22

(c) Developed Europe

Portfolio	Information Ratio	Average Return (%)	Period	Hit Rate (%)	Number Periods
A,A-,B+	1.09	0.91	66	96	96
B,B-	0.17	0.23	62	50	50
C+,C	0.03	0.28	52	25	25
D+,D,C-	-0.53	-1.11	56	9	9

(d) USA