



You Can't Always Trend When You Want¹

Executive Summary

Trend-following strategies have gone through a significant drawdown recently and delivered lower returns in the current decade compared to their multi-decade history.² Managed futures investors are naturally wondering if something has changed and whether the strategy can deliver better returns going forward. We developed a novel framework to understand what drives trend-following returns and examine various possible explanations for why trend following has struggled since the Global Financial Crisis. Our findings suggest that the lower returns in the current decade are due to fewer large moves across markets over this time period, as opposed to a decline in the strategy's ability to profit from trends. As a result, we believe trend-following strategies may see higher returns if markets exhibit similarly sized moves relative to their long-term history going forward.³

Key takeaways

- We present a novel empirical framework to attribute the impact of various drivers of trend-following performance.
- The lower performance of the strategy in the current decade is not explained by an inability for trend following to translate trends into profits or a lack of diversification across global markets.
- Instead, the average size of market moves across global markets has been more muted than usual in the current decade and is the primary explanatory factor for recent trend performance.
- There is little evidence to suggest this is a permanent structural change for markets, providing hope that trend-following strategies should be able to deliver performance more in line with long-term expectations going forward.

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¹ but if you allocate, over time, you just might find... you get what you need!

² As evidenced by the SG Trend Index and the hypothetical trend-following strategy described herein. Please read performance disclosures in the Disclaimers for a description of the investment universe and the allocation methodology used to construct the trend-following strategy. Hypothetical data has inherent limitations, some of which are disclosed in the Disclaimers.

³ There is no guarantee that this strategy will be successful. There is a potential for loss. For illustrative purposes only and not representative of any strategy that AQR currently manages. Past performance is not a guarantee of future performance.

Introduction

Trend-following strategies have gone through a significant drawdown recently and delivered lower returns in the current decade than historically. Even relative to performance as recent as the 2000s, total returns to trend following in the current decade have been notably lower. In part,

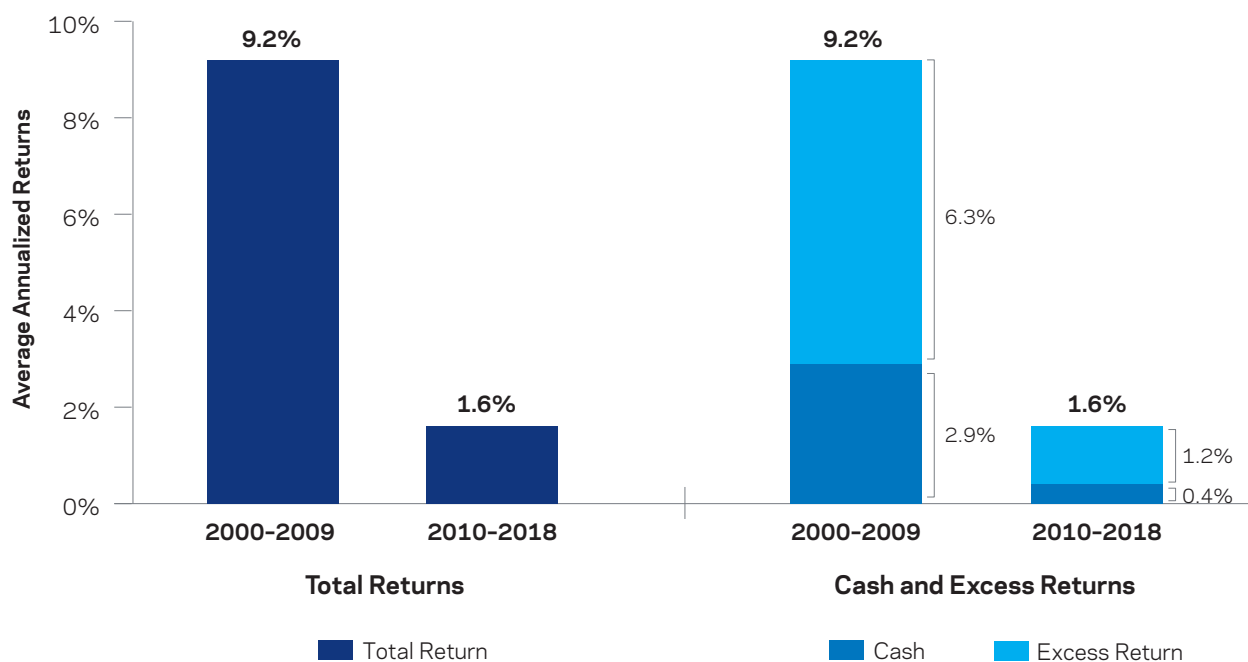
this is explained by the unusually low cash rates since the Global Financial Crisis. Even after accounting for lower cash rates in the current decade, however, **Exhibit 1** shows that excess returns to trend following have been muted in recent years.

Exhibit 1

Lower total returns to trend following in a time of lower cash rates

SG Trend Index Average Annualized Returns by Time Period

January 1, 2000 - December 31, 2018



Source: Bloomberg, AQR. The 3-Month T-Bill is the risk-free rate used to derive the risk-adjusted returns.

For the remainder of this paper, we investigate the factors that explain excess returns to trend following. We present a framework for analyzing trend performance

and use that framework to gain insight on why excess returns to trend following have been lower in the current decade compared to their multi-decade history.

A Novel Framework for Understanding the Drivers of Trend-Following Returns

Trend-following strategies are designed to take advantage of a tendency for financial markets to exhibit trending behavior. Intuitively, the performance of trend following depends in part on the size of the moves in the underlying markets that the strategy invests in. Large, prolonged moves in asset prices, both positive and negative, tend to be favorable for trend followers, while modest moves in asset prices can pose a challenge. When markets lack clear direction, trend-following processes tend to lose money from the back-and-forth movement of the market. In contrast, when markets move strongly in a given direction, trend-following processes are able to position themselves to benefit from the overall trend. We use this relationship to analyze trend following performance.

A few details about the analysis: To evaluate and quantify the relationship between trend performance and market movement, we use market data covering 67 markets across four asset classes, with some market data going back over 100 years. We use the simple trend-following approach described in *A Century*

of Evidence on Trend-Following Investing.⁴ For each market in each year, we consider the risk-adjusted performance of that market and the risk-adjusted performance of trend following on that market in that year.⁵ Risk-adjusting allows us to consider moves in low-volatility assets like Treasury futures together with moves in high-volatility assets like crude oil futures on a similar scale. When we consider the market moves, we consider the absolute values since trend following can benefit from both positive and negative moves in markets.

In **Exhibit 2**, we plot the historical simulated performance of trend following and the absolute size of the underlying market moves for each year over the 1880 to 2018 period. For visual simplicity, we show only one data point per calendar year, which represents the average trend-following performance across the asset universe and the average absolute size of underlying market moves in that given year.⁶ Exhibit 7 in the Appendix depicts each of the thousands of underlying data points, one for each market in each year.

4 The trend-following strategy is constructed as an equal-weighted combination of 1-month, 3-month, and 12-month time-series momentum strategies for 67 markets as far back as 1880, rebalanced monthly and with positions equally sized according to volatility. The combined strategy has an annualized ex-ante volatility target of 10% annualized. For more details on the strategy, please see Hurst, B., Y.H. Ooi, and L.H. Pedersen. "A Century of Evidence on Trend-Following Investing." *Journal of Portfolio Management*, Vol. 44, No. 1 (2017).

5 Trend followers benefit from market trends over various time horizons. While a one-year horizon is not the only relevant time period, it is an important one as it reflects the degree of large, prolonged market moves that are particularly relevant for medium- to longer-term trend followers. For robustness, we also conducted our study using shorter time horizons and found similar results to those presented here.

6 We risk-weight both underlying market risk-adjusted returns and trend-following returns by the trend-following risk taken in each market in the given year. This detail is important, as it allows us to translate average market trend-following risk-adjusted returns to overall portfolio-level trend-following risk-adjusted returns later in this piece.

Exhibit 2 shows there is a clear historical positive relationship between the average size of moves in individual markets in each year and the average risk-adjusted returns of a hypothetical trend-following strategy applied to each market. Fitting a linear model to the data yields an upward-sloping regression line, showing that trend following has historically been able to translate large moves in markets

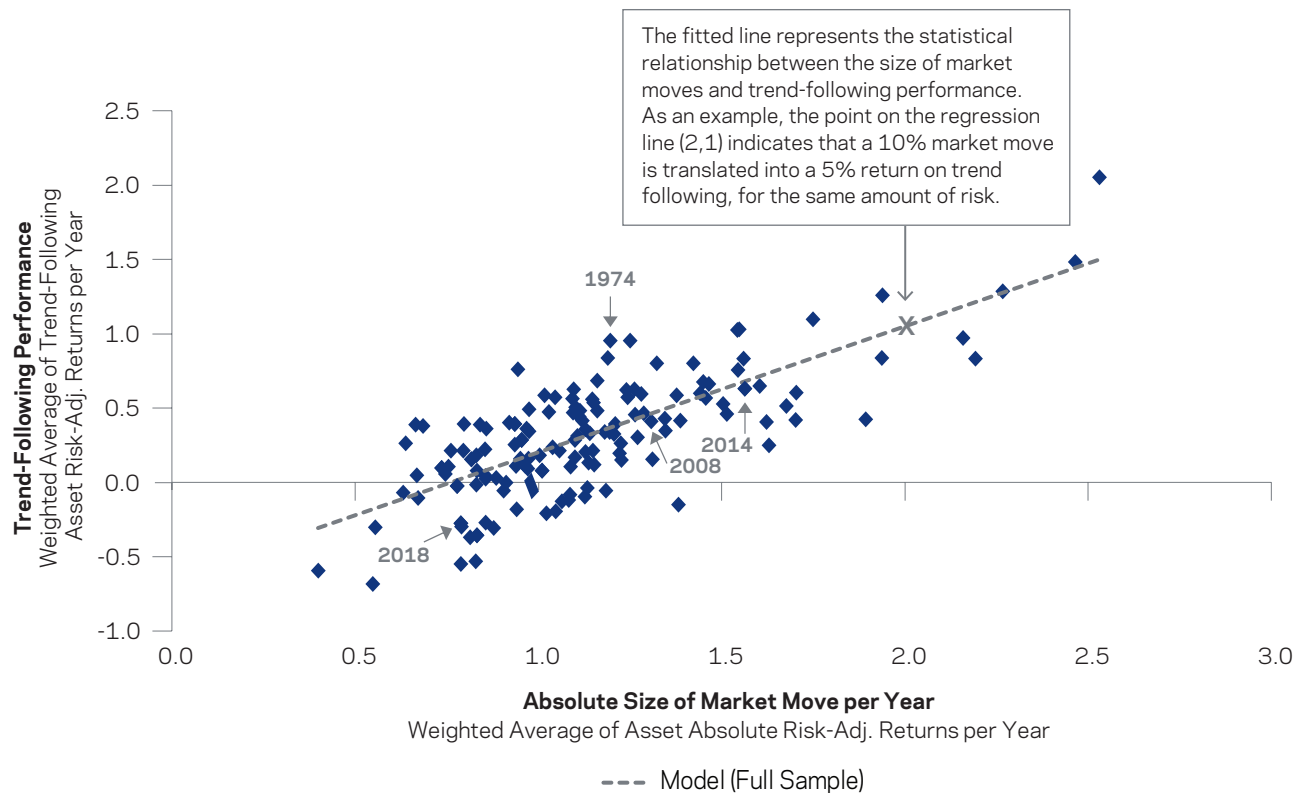
into positive risk-adjusted returns for the strategy. We call this attribute of the strategy trend efficiency as it describes how efficiently a market move is translated into trend-following profits. This relationship serves as the basis for an empirical framework that allows us to isolate what may cause trend-following performance to differ from the long-term results in any sub-period.

Exhibit 2

Trend following benefits in part from larger market moves

Hypothetical Trend-Following Performance vs. Size of Market Moves per Year

January 1, 1880 - December 31, 2018



Source: AQR. For each asset in each year, the absolute risk-adjusted return is calculated as the absolute value of the annual excess return divided by the realized volatility of the asset in that year. Risk-adjusted returns shown above represent the weighted average for each calendar year. Risk-adjusted returns are weighted by the trend-following risk taken in each market in each year. The 3-Month T-Bill is the risk-free rate used to derive the risk-adjusted returns. This analysis is provided for illustrative purposes only and is not based on an actual portfolio AQR manages. Please read performance disclosures in the Disclaimers for a description of the investment universe and the allocation methodology used to construct the trend-following strategy. Hypothetical data has inherent limitations, some of which are disclosed in the Disclaimers.

Given this relationship, we can test two hypotheses on recent trend performance using data from the current decade. The two hypotheses are:

1. Risk-adjusted market moves in the current decade have been unusually muted.
2. Markets have exhibited similarly large moves compared to the past, but trend following has not been able to profit from them in the same way it has historically.

If the first hypothesis is true, observations for the most recent time period should be located closer to the left-hand side of the x-axis, but a fitted line based only on those observations should be similar to the fitted line for the full

period. However, if the second hypothesis is true, the fitted line for the most recent time period should be shifted down or less upward-sloping to reflect diminished trend-following performance for any given risk-adjusted move in passive markets.

In **Exhibit 3**, we separate the data points for the current decade from the rest of the historical sample and fit a regression line using only those data points (and remember, there are hundreds of underlying data points that are averaged together for the purposes of visual simplicity). We then use this fitted line to identify which of the two hypotheses applies to the current decade. We see clearly that the first hypothesis best fits the observations, as

Exhibit 3

Large market moves have been scarce in recent years

Hypothetical Trend-Following Performance vs. Size of Market Moves per Year

January 1, 1880 - December 31, 2018



Source: AQR. For each asset in each year, the absolute risk-adjusted return is calculated as the absolute value of the annual excess return divided by the realized volatility of the asset in that year. Risk-adjusted returns shown above represent the weighted average for each calendar year. Risk-adjusted returns are weighted by the trend-following risk taken in each market in each year. The 3-Month T-Bill is the risk-free rate used to derive the risk-adjusted returns. This analysis is provided for illustrative purposes only and is not based on an actual portfolio AQR manages. Please read performance disclosures in the Disclaimers for a description of the investment universe and the allocation methodology used to construct the trend-following strategy. Hypothetical data has inherent limitations, some of which are disclosed in the Disclaimers.

many of the individual data points from the current decade show up on the left-hand side of the x-axis, and the fitted regression line does not differ meaningfully from the line fit using the full data sample. In other words, we find that market moves have been more muted on average in the years following the Global Financial Crisis, and there has not been a significant change to trend efficiency. Moreover, we see that trend following was still able to benefit from the large market moves that occurred during this period, notably in 2014, when the strategy performed well.

Overall, the opportunity set for a trend follower in the current decade was more limited relative to history, but when large market moves occurred, they were as profitable for the strategy as they have been historically. These findings lead us to believe

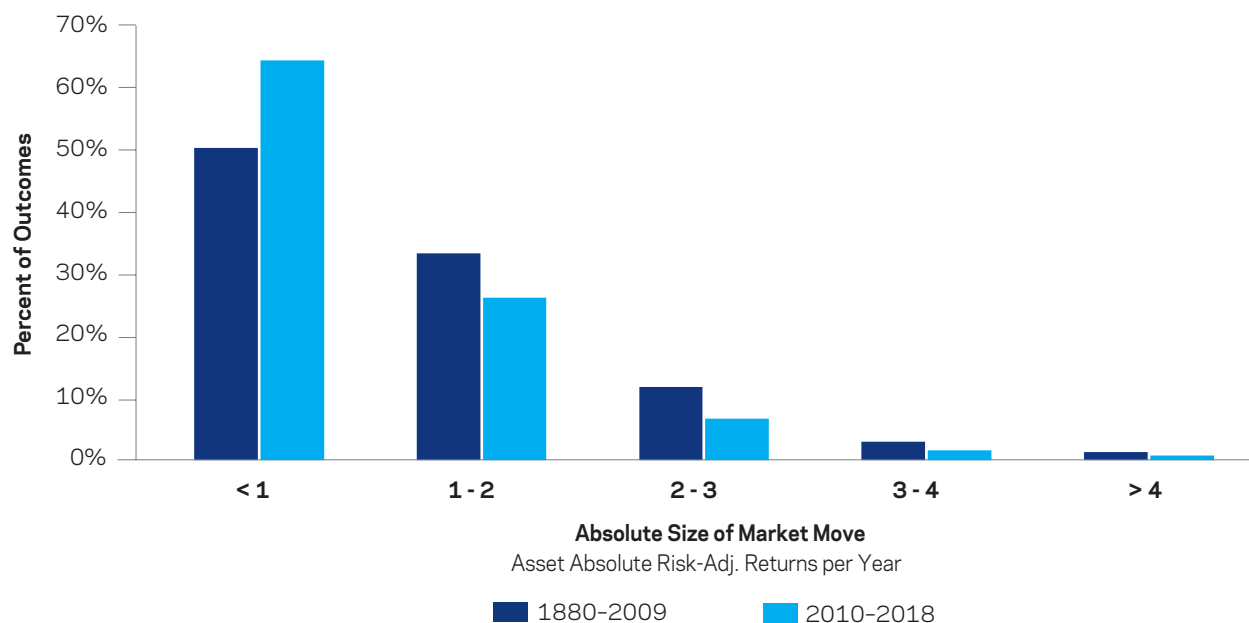
that the current decade has been a poor environment for the strategy and are not an indication of a change in the strategy's potential to profit from trends.

The distribution of observed risk-adjusted market moves as shown in **Exhibit 4** also demonstrates the reduced frequency of large market moves in recent years. Most recently, comparatively modest risk-adjusted moves have been more common than historically, while more pronounced risk-adjusted moves have been relatively scarce. While this phenomenon could persist going forward, we do not believe the nature of markets has changed permanently in recent years and expect the magnitude and frequency of market moves going forward to look more similar to the full historical period, rather than the unusual behavior of the current decade.

Exhibit 4

Smaller market moves have been more prevalent in recent years

Empirical Distribution of Size of Market Moves, January 1, 1880 - December 31, 2018



Source: AQR. For each asset in each year, the absolute risk-adjusted return is calculated as the absolute value of the annual excess return divided by the realized volatility of the asset in that year. The 3-Month T-Bill is the risk-free rate used to derive the risk-adjusted return. The empirical distribution of outcomes shown above is derived by calculating the percentage of observations that fall into the categories specified. There are 3,841 observations from 1880 - 2009, and 563 from 2010 - 2018. For illustrative purposes only. Past performance is not a guarantee of future performance.

The analysis so far has focused on the average effectiveness of trend following in each market. We also consider as a third hypothesis whether trend-following performance, at the portfolio level, has been hindered in recent years by a lack of diversification. Some investors assert that underlying markets have exhibited higher correlations during the post-GFC period compared to the past due to the higher degree of involvement by central banks in markets. The risk-adjusted return of a diversified trend-following portfolio is related to the level of realized diversification across the individual market trend strategies within the portfolio. A lower degree of correlation across these individual market trend strategies tends to lead to better performance for the overall portfolio. Hence, we consider whether the underlying individual market trend strategies within a diversified trend-following portfolio have been less diversifying to each

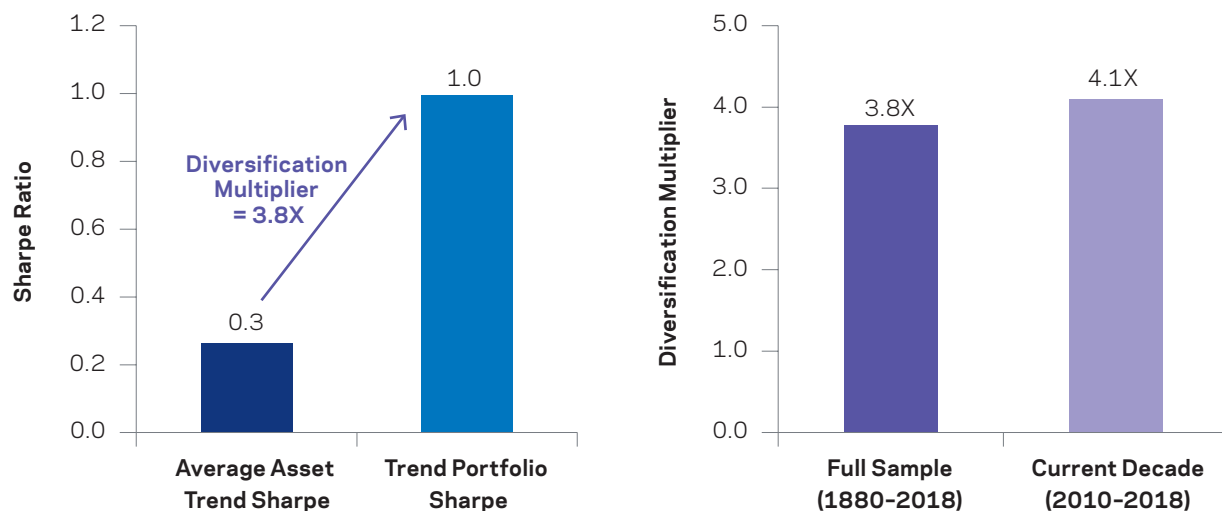
other in the current decade as another possible explanation of poor trend-following returns.

We quantify the level of diversification within a trend-following portfolio by defining a “diversification multiplier,” which is the scaling factor that multiplies the average individual market Sharpe ratio to give us the portfolio-level Sharpe ratio, as shown in **Exhibit 5**.⁷ A higher multiplier means a portfolio has more diversified bets. Exhibit 5 shows the diversification multipliers for full data sample and for the current decade. Notably, the diversification multiplier for the hypothetical trend-following strategy has not been materially different in recent history than in the full sample. Hence, an unusual lack of diversification does not appear to explain trend following’s recent underperformance relative to history.

Exhibit 5

Trend-following performance also depends on diversification

Quantifying Diversification by Time Period, January 1, 1880 - December 31, 2018



Source: AQR. The average asset trend Sharpe is the weighted average Sharpe ratio from trend following on each asset in the strategy. Asset Sharpe ratios are weighted by the trend-following risk taken in each market. The 3-Month T-Bill is the risk-free rate used to derive the Sharpe ratio. This analysis is provided for illustrative purposes only and is not based on an actual portfolio AQR currently manages. Diversification does not eliminate the risk of experiencing investment losses. Please read performance disclosures in the Disclaimers for a description of the investment universe and the allocation methodology used to construct the trend-following strategy. Hypothetical data has inherent limitations, some of which are disclosed in the Disclaimers.

7 More explicitly, the diversification multiplier is defined as follows: Trend-Following Portfolio Sharpe = Diversification Multiplier * Average Individual Asset Trend Sharpe.

Conclusion

In conclusion, we find that the main culprit behind trend following's challenging performance in recent years is a lack of large risk-adjusted market moves (positive or negative), and not an inability for trend following to translate trends into profits or a lack of diversification. **Exhibit 6** shows why the current decade has differed from the long-term performance by decomposing that difference using our framework. The decomposition clearly shows that the unusual lack of large moves across global markets during the current decade in the wake of the Global Financial Crisis is the main driver of recent poor trend-following returns. Exhibit 6 also shows that if the magnitude of market moves

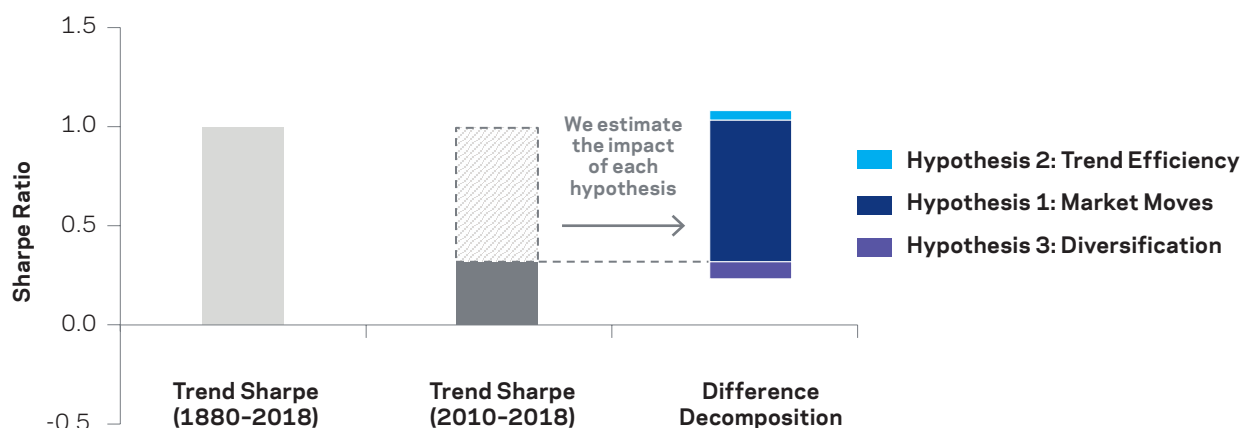
were in line with history, trend-following performance in the current decade may have been in line with full sample results, all else equal. Years such as 2014 provide recent examples of large market moves, with the large collapse in crude oil and related commodities as well as the significant strengthening of the U.S. dollar when quantitative easing ended in the U.S. These are among the few large market moves in the current decade which translated into strong profitability for trend following.⁸ Looking ahead, while we cannot for certain say when markets will exhibit sustained large moves, we expect that they eventually will, and that trend-following strategies will be able to profit from them accordingly.

Exhibit 6

Smaller market moves are the primary driver of recent trend performance

Attribution of Difference in Hypothetical Trend-Following Sharpe Ratios

January 1, 1880 - December 31, 2018



Source: AQR. The 3-Month T-Bill is the risk-free rate used to derive the Sharpe ratio. The Sharpe ratios are based on the hypothetical trend-following strategy backtest, net of estimated transaction costs and gross of fees. Differences in Sharpe ratios are estimated by incrementally changing one aspect of the model. Difference in Sharpe due to market moves is calculated from the difference in the Sharpe ratio for the specific decade shown versus the implied Sharpe ratio from utilizing market moves over the full sample. Difference in Sharpe ratio due to trend efficiency is measured based on the implied incremental change in Sharpe ratio from utilizing model coefficients that correspond to the full sample model. Difference in Sharpe ratio due to diversification is measured based on the implied incremental change in Sharpe ratio from utilizing the full sample diversification multiplier. Diversification does not eliminate the risk of experiencing investment losses. The chart above is a hypothetical illustration and not representative of an actual investment. Please read performance disclosures in the Disclaimers for a description of the investment universe and the allocation methodology used to construct the trend-following strategy. For illustrative purposes only and not representative of any portfolio that AQR currently manages. Hypothetical data has inherent limitations, some of which are disclosed in the Disclaimers. Please read important disclosures in the Disclaimers.

8 See Exhibit 7 in the Appendix.

Appendix

Exhibit 7

Full data sample

Hypothetical Trend-Following Performance vs. Size of Market Moves per Asset per Year

January 1, 1880 - December 31, 2018



Source: AQR. For each asset in each year, the absolute risk-adjusted return is calculated as the absolute value of the annual excess return divided by the realized volatility of the asset in that year. The 3-Month T-Bill is the risk-free rate used to derive the risk-adjusted returns. This analysis is provided for illustrative purposes only and is not based on an actual portfolio AQR manages. Please read performance disclosures in the Disclaimers for a description of the investment universe and the allocation methodology used to construct the trend-following strategy. Hypothetical data has inherent limitations, some of which are disclosed in the Disclaimers.

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The SG Trend Index is designed to track the largest 10 (by AUM) CTAs and be representative of the managed futures trend-following space.

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Trend-Following Strategy

The Hypothetical Trend-Following Strategy model uses data from January 1880 onward. The investment strategy is based on trend-following investing which involves going long markets that have been rising and going short markets that have been falling, betting that those trends over the examined look-back periods will continue. The strategy was constructed with an equal-weighted combination of 1-month, 3-month, and 12-month trend-following strategies for 67 markets across 4 major asset classes: 29 commodities, 11 equity indices, 15 bond markets, and 12 currency pairs. Since not all markets have return data going back to 1880, we construct the strategies using the largest number of assets for which return data exist at each point in time. We use futures returns when they are available. Prior to the availability of futures data, we rely on cash index returns financed at local short rates for each country. Please see Figure 2 for additional details. The strategy targets a long-term volatility target of 10% but does not limit volatility during periods where realized volatility may be higher or lower than this number.

Hypothetical performance is gross of advisory fees and net of transaction costs, unless stated otherwise. In order to calculate net-of-fee returns, we subtracted a 2% annual management fee and a 20% performance fee from the gross-of-fee, net-of-transaction-cost returns to the strategy. Actual fees may vary depending on, among other things, the applicable fee schedule. AQR's fees are available upon request and also may be found in Part 2A of its Form ADV. The transactions costs used in the strategy are based on AQR's estimates of average transaction costs for each of the four asset classes, including market impact and commissions. The transaction costs are assumed to be twice as high from 1993 to 2002 and six times as high from 1880-1992. The transaction costs used are shown in Figure 1.

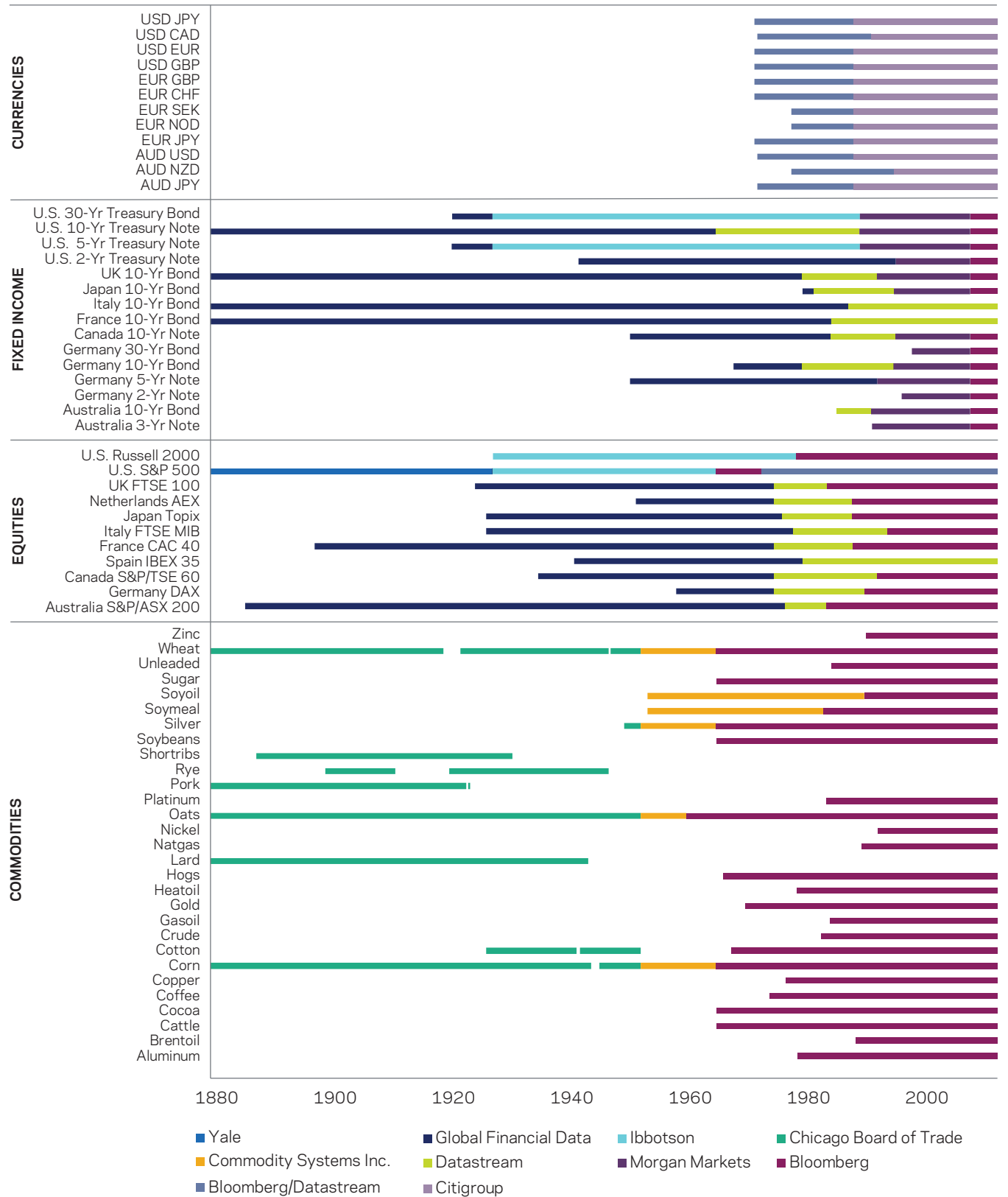
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The benchmark and relevant cash rate is assumed to be 3-month Treasury bills. Prior to 1929 when 3-month Treasury bills became available, the benchmark and relevant cash rate is assumed to be the NYSE call money rates (the rates for collateralized loans) through 1920, and returns on short-term government debt (certificates of indebtedness) from 1920 until 1929.

Figure 1

Asset Class	Time Period	One-Way Transaction Costs (as a % of notional traded)
Equities	1880 - 1992	0.34%
	1993 - 2002	0.11%
	2003 - Present	0.06%
Fixed Income	1880 - 1992	0.06%
	1993 - 2002	0.02%
	2003 - Present	0.01%
Currencies	1880 - 1992	0.18%
	1993 - 2002	0.06%
	2003 - Present	0.03%
Commodities	1880 - 1992	0.58%
	1993 - 2002	0.19%
	2003 - Present	0.10%

Figure 2





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