Betting Against Quant: Examining the Factor Exposures of Thematic Indices

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August 2021

Abstract

We examine the performance characteristics of recently introduced thematic indices using standard asset pricing theory. We find that thematic indices generally have strong negative exposures towards the profitability and value factors, indicating that they hold growth stocks that invest now for future profitability. As such, investors in thematic indices are effectively trading against quant investors, who prefer stocks that are currently cheap and profitable. From an asset pricing perspective, the negative factor exposures of thematic indices imply low expected returns. As there is clearly a clientele for thematic indices, we discuss how investing in these strategies may be rationalized despite their unfavorable factor exposures.

JEL Classification: G11; G12; G14

The author thanks Matthias Hanauer and Pim van Vliet for valuable feedback on an earlier version of this paper. The views expressed in this paper are not necessarily shared by Robeco or its subsidiaries.

Introduction

Leading index providers such as MSCI and S&P have recently introduced a range of thematic stock indices. MSCI (2019) describes thematic investing as "a top-down investment approach that seeks to identify longer-term, structural trends that are expected to be dominant and important explanatory performance factors in a rapidly-changing world." Their thematic indices are designed around "emerging macro-economic, geopolitical and technological trends that are believed to be structural and transformative in nature and hence expected to influence society's behavior and needs over the long term." Similarly, S&P (2021) argues that their thematic indices provide investors access to "a series of technologically enabled, often disruptive industries, generally referred to in aggregate as the Fourth Industrial Revolution." Examples of these themes are cyber security, robotics, autonomous vehicles, and clean power.

This paper examines the performance characteristics of thematic indices by applying the widely accepted asset pricing model of Fama and French (2015). We find that thematic indices generally have strong negative exposures towards the profitability and value factors, indicating that they hold growth stocks that invest now for future profitability. As such, investors in thematic indices are effectively trading against quant investors, who prefer stocks that are currently cheap and profitable. From an asset pricing perspective, the negative factor exposures of thematic indices imply low expected returns. As there is clearly a clientele for thematic indices, we discuss how investing in these strategies may be rationalized despite their unfavorable factor exposures. Also, our conclusions should not be generalized to thematic investing in general, since our analysis is exclusively based on data from two index providers.

Data and methodology

We examine the thematic indices of S&P and MSCI.[1] Both these established index providers teamed up with third parties to create these indices. The S&P thematic indices were originally created by Kensho, but were rebranded to S&P Kensho after S&P acquired Kensho in 2018. MSCI collaborates with ARK Investment Management for their thematic indices. Interestingly, both S&P/Kensho and MSCI/ARK use advanced machine learning techniques to identify the stocks that correspond to a certain theme. For more information about their approaches we refer to the publicly available methodology documents and whitepapers. The S&P and MSCI thematic indices are paper constructs,

[1] The other major index firm, FTSE Russell, does not have a range of thematic stock indices. Some providers of thematic Exchange-Traded Funds use indices of Solactive, a relatively new provider that focuses on customized indices tailored towards the need of specific clients. Solactive reports the performance of their indices on their website, but historical monthly returns are not available for download. Bloomberg only launched its first thematic index (electric vehicles) in 2021.

but they are accessible to investors through various exchange-traded funds (ETFs) that have been introduced on these indices.

Our sample includes all S&P and MSCI thematic indices with at least 3 years of data as of end April 2021, which gives us 36 S&P indices and 12 MSCI indices. The number of stocks in these indices at the end of our sample is reported in Exhibit 1. The number of stocks in the S&P thematic indices ranges between 13 and 86, except for the two composite indices which contain up to about 500 stocks. This stands in contrast with the MSCI thematic indices, which typically contain several hundred stocks. Only two MSCI thematic indices have less than 100 stocks (about 60 each), while half of the twelve indices even contain over 500 stocks. Another important difference is that the S&P thematic indices use equal-weighting as the starting point, while the MSCI thematic indices use capitalization-weighting as the starting point. As we will see later this on, this causes large differences in their exposure towards the size factor.

INSERT EXHIBIT 1 ABOUT HERE

Monthly return data for the S&P and MSCI thematic indices is available from June 2013 onwards for the indices with the longest return history, which gives us almost 8 years of data history. It is important to note that a big part of this history consists of backfilled data, as the first S&P thematic indices were launched in 2016, while the MSCI thematic indices were launched as recently as 2020. Backfilled returns are likely to be biased upwards, for instance because of survivorship bias, but such biases are much less of a concern for estimating the factor exposures that are the subject of this study. For indices which have a shorter history we use the maximum available sample. All index returns are total returns in US dollars.

We estimate the factor exposures of the thematic indices by regressing their returns on the factors in the Fama and French (2015) 5-factor model augmented with the momentum factor:

$$R_{i,t}^{e} = \alpha + \beta_i R_{m,t}^{e} + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + w_i WML_t + \varepsilon_{i,t} \qquad (1)$$

where $R_{i,t}^{e}$is the total return of index i in excess of the risk-free return on Treasury bills, $R_{m,t}^{e}$ the excess market return, SMB the size factor, HML the value factor, RMW the profitability factor, CMA the investment factor, and WML the momentum factor. Since the thematic indices invest globally we use the global versions of these factors. The data is obtained from the public data library of Kenneth French.[2]

In order to put the estimated factor exposures into perspective we compare their magnitude with the factor exposures of various other portfolios, namely 11 global GICS sector indices, 49 US industry portfolios, US decile portfolios for stocks sorted on value,

[2] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

profitability, or investment, and US 5x5 portfolios double-sorted on value and profitability, value and investment, or profitability and investment. The data for the GICS sector indices is from S&P, while the data for the other series is from Kenneth French. The factor exposures of the US stock portfolios are estimated using the US versions of the Fama-French factors.

Results

The estimated market betas of the thematic indices are shown in Exhibit 2. Almost all of the S&P thematic indices have a market beta above 1, with the average level amounting to 1.21. In addition to the market betas the graph also shows volatility ratios, calculated as the volatility of a thematic index divided by the market volatility over the same period. The volatility ratios capture not only differences in beta, i.e. systematic risk, but also the idiosyncratic risk that is present in the thematic indices. The volatility ratios are above 1 for all of the S&P thematic indices without exception, with an average of 1.67. This implies that the S&P thematic indices exhibit both elevated systematic risk and a sizable amount of idiosyncratic risk. For the MSCI thematic indices we find directionally similar but much less pronounced results. The average market beta of these indices is only slightly above 1, at 1.07, while the average volatility ratio is 1.22.

INSERT EXHIBIT 2 ABOUT HERE

The estimated size exposures of the thematic indices are shown in Exhibit 3. We observe that most of the S&P thematic indices have large positive exposures towards the size factor, with an average size beta of 0.65. This finding can be explained by the fact that S&P uses equal weighting as the starting point for the construction of its indices. For the MSCI thematic indices, which use capitalization weighting as the starting point, the estimated size exposures tend to be much smaller, amounting to only 0.10 on average.

INSERT EXHIBIT 3 ABOUT HERE

The exposures towards the other Fama-French factors are shown in Exhibit 4. We observe that almost all of the thematic indices have large negative exposures towards the value and profitability factors. For the S&P thematic indices this is again most pronounced, with an average exposure towards the value factor of -0.64 and an average exposure towards the profitability factor of -1.18. The MSCI indices have an average value exposure of -0.41 and an average profitability exposure of -0.57. Across all 48 thematic indices, only 4 have a positive exposure towards the value factor, and only 1 has a (marginally) positive exposure towards the profitability factor. These results indicate that the thematic indices invest heavily in stocks with weak profitability and expensive valuations.

INSERT EXHIBIT 4 ABOUT HERE

The S&P thematic indices exhibit mixed exposures towards the investment factor, with the average exposure being close to zero, at just 0.07. However, the MSCI thematic indices have mostly negative exposures towards the investment factor, equal to -0.39 on average. Since the investment factor is value-like, as shown by Fama and French (2015) and Blitz and Hanauer (2021a), this can be interpreted as additional anti-value exposure. The exposures towards the momentum factor are much smaller and close to zero on average, at -0.10 for the S&P thematic indices and 0.07 for the MSCI thematic indices. This is not surprising because the momentum factor reflects a highly dynamic portfolio, while the thematic indices are relatively stable. Although a theme may sometimes have good momentum, there will also be times when it is out of favor, so over the long run we would not expect to find large momentum exposures.

The idea behind asset pricing models is that the expected return of an asset is determined by its factor loadings. A higher market beta implies a higher expected return, but simply as a compensation for the higher systematic risk. Size exposure is only relevant for expected return if there exists a size premium. Blitz and Hanauer (2021b) show that the size premium has failed to materialize following its discovery about 40 years ago and that if there is a size premium at all, it is beyond the reach of investors. For these reasons we consider the exposures towards the remaining Fama-French factors most relevant for future expected returns. The average total exposure towards these factors amounts to -1.86 for the S&P thematic indices and -1.29 for the MSCI thematic indices, mainly driven by the large negative exposures towards profitability and value/investment. If we assume that these Fama-French factors have long-term annual premiums of 3% (which would be in line with their historical long-term realized averages) then this implies long-term expected average underperformances of 5.58% for the S&P thematic indices and 3.87% for the MSCI thematic indices.[3]

In order to put the factor exposures of the thematic indices into perspective we compare them with the factor exposures of various other common portfolios. Exhibit 5 shows aggregated exposures towards the value, profitability, investment, and momentum factors for the S&P and MSCI thematic indices compared to 11 global GICS sector indices, 49 US industry portfolios, US decile portfolios for stocks sorted on value, profitability, or investment, and US 5x5 portfolios double-sorted on value and profitability, value and investment, or profitability and investment. Each dot in the graph represents an individual portfolio.

INSERT EXHIBIT 5 ABOUT HERE

[3] If size is assumed to be a factor that is also rewarded with a premium of 3% then the total exposure towards rewarded factors becomes -1.21 on average for the S&P thematic indices and -1.19 for the MSCI thematic indices, implying long-term expected average underperformances of 3.63% and 3.57% respectively.

In the left part of the graph it is clearly visible that virtually all thematic indices have a negative aggregated factor exposure, and that the magnitude of this exposure is typically sizable. By comparison, the 11 global GICS sector indies and 49 US industry indices have factor exposures that are much more centered around, or even above zero. The most negative aggregated factor exposure is -0.76 for the global sectors (for Information Technology) and -1.60 for the US industries (Fun). For the three sets of decile portfolios we also observe symmetric factor exposures, with the most negative observation being -1.89 for the bottom profitability portfolio (which not only has a large negative exposure towards the profitability factor but also to the value and investment factors).

The most negative factor exposures in the control group are found for the double-sorted portfolios, in particular the portfolios containing stocks which simultaneously have bottom quintile value and bottom quintile profitability characteristics, or bottom quintile profitability and bottom quintile investment characteristics. Their aggregated factor exposures amount to -2.66 and -2.28 respectively. Although this is a bit more extreme than the average thematic index, quite a few of these indices have factor exposures that are more negative still. Thus, it is fair to say that the thematic indices generally resemble portfolios which are explicitly constructed to combine the worst profitability with the worst value/investment features.

Discussion

By going short in key asset pricing factors, investors in thematic indices are trading against quantitative investors who seek long exposure to the same factors. From an asset pricing perspective this implies that investors in thematic indices face a low expected return. Nevertheless, there is a clientele for these strategies. In this section we discuss possible motivations for investing in thematic indices despite their unfavorable factor exposures.

One explanation could be that investors in thematic indices expect factor premiums to be zero, or perhaps even negative, in the future, either structurally or at least over their intended investment horizon. Factor premiums may never have been real in the first place, but merely an illusion created by data mining. Or if they did exist in the past, they may have been arbitraged away by now. Factor premiums could also be temporarily absent or negative, for instance due to changes in investor sentiment or macro-economic conditions. For instance, Blitz (2020) finds that factors can experience entirely lost decades. More specifically, investors in thematic indices may believe that we are in a period of major industrial transformation which favors growth stocks over value stocks. Blitz (2021) finds that the kind of expensive, unprofitable stocks favored by thematic indices were the big winners over the 2018-2020 period. This is also illustrated in Exhibit

6, which shows the historical performance of the bottom value and bottom profitability intersection portfolio from the previously discussed 5x5 double sorts. Although this portfolio clearly underperforms on average, there have also been periods during which it performed strongly, including the most recent years. If factor premiums have (temporarily) disappeared or reversed sign, the negative factor exposures of thematic indices become irrelevant or can even be beneficial for return.

INSERT EXHIBIT 6 ABOUT HERE

A second explanation could be that investors in thematic indices believe that although the unfavorable factor exposures imply a drag on return, these indices can still deliver a solid outperformance due to the idiosyncratic component. Crucially, investors in thematic indices do not buy all stocks with weak profitability and expensive valuations, but a select group of stocks which happen to have these characteristics. Although the average stock with a weak profitability and an expensive valuation may underperform, specific themes may still be successful despite sharing these characteristics. Investors may also be attracted to thematic indices because of a preference for lottery-like payoffs, as in Shefrin and Statman (2000) and many subsequent studies. Similar to lottery tickets, the high idiosyncratic risk of thematic indices implies a small chance of a very high future return, if the selected theme becomes highly successful.

A third possibility is that investors are attracted to thematic indices because they chase the high past returns reported by these indices. To illustrate, Exhibit 7 reports the alphas associated with the regressions in the previous section. For the S&P thematic indices almost all alphas are positive, with an average of 0.79% per month (or 9.5% annualized) across all these indices. For the MSCI thematic indices the picture is a bit more mixed, but still the average monthly alpha amounts to 0.38% (or 4.6% annualized). As discussed in the data section, these figures are likely to be inflated because a large part of the return history of the thematic indices consists of hypothetical, backfilled returns. Ben-David, Franzoni, Kim, and Moussawi (2021) find that ETF providers launch funds based on niche themes with strong past performance, high media exposure, and positive sentiment, and argue that this appeals to retail and sentiment-driven investors. However, they also find that such funds tend to perform poorly after their launch, as the hype around them vanishes. Thus, thematic indices may be primarily targeting retail investors who are attracted to recent performance and appealing stories, instead of more sophisticated professional investors who are familiar with asset pricing theory.

INSERT EXHIBIT 7 ABOUT HERE

A fourth and final explanation could be that investors in thematic indices are willing to accept a lower financial expected return due to unfavorable factor characteristics because they also take non-financial considerations into account. This argument applies in

particular to sustainability-related themes, such as clean energy. If investments in such themes can help contribute to a better world, than investors may not mind sacrificing some financial gains.

Altogether we conclude that various arguments can rationalize the choice to invest in thematic indices which are unattractive from a classical asset pricing perspective.

Conclusion

We regressed the returns of recently introduced thematic indices on standard asset pricing factors. We found that thematic indices generally have strong negative exposures towards the profitability and value factors, indicating that they hold growth stocks that invest now for future profitability. As such, investors in thematic indices are effectively trading against quant investors, who prefer stocks that are currently cheap and profitable. From an asset pricing perspective, the negative factor exposures of thematic indices imply low expected returns. As there is clearly a clientele for thematic indices, we discussed how investing in these strategies may be rationalized despite their unfavorable factor exposures.

Since our analysis is based on the thematic indices of two index providers, the conclusions should not be generalized to thematic investing in general. Themes can be defined in numerous ways, so it should also be possible to create themes with favorable or neutral factor exposures. Moreover, if a theme has negative factor exposures, investors may consider screening out the stocks with the worst profitability and valuation characteristics. In other words, active management might be applied to improve the factor characteristics of a thematic investment strategy. We leave this as a possible subject for future research.

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Exhibit 1: Number of stocks in the S&P (left) and MSCI (right) thematic indices as of April 2021

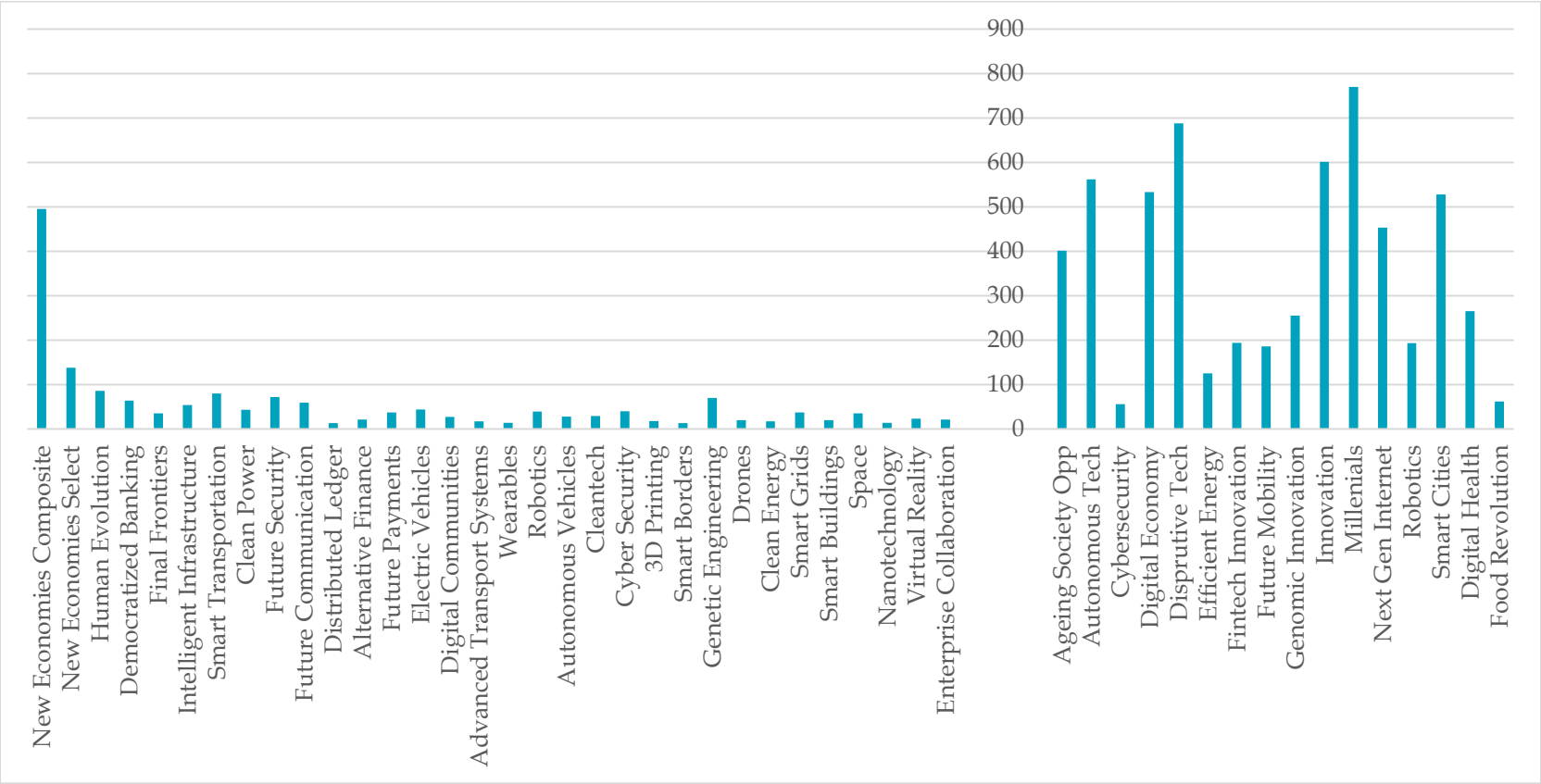

Exhibit 2: Market betas and volatility ratios of S&P (left) and MSCI (right) thematic indices, June 2013 – April 2021

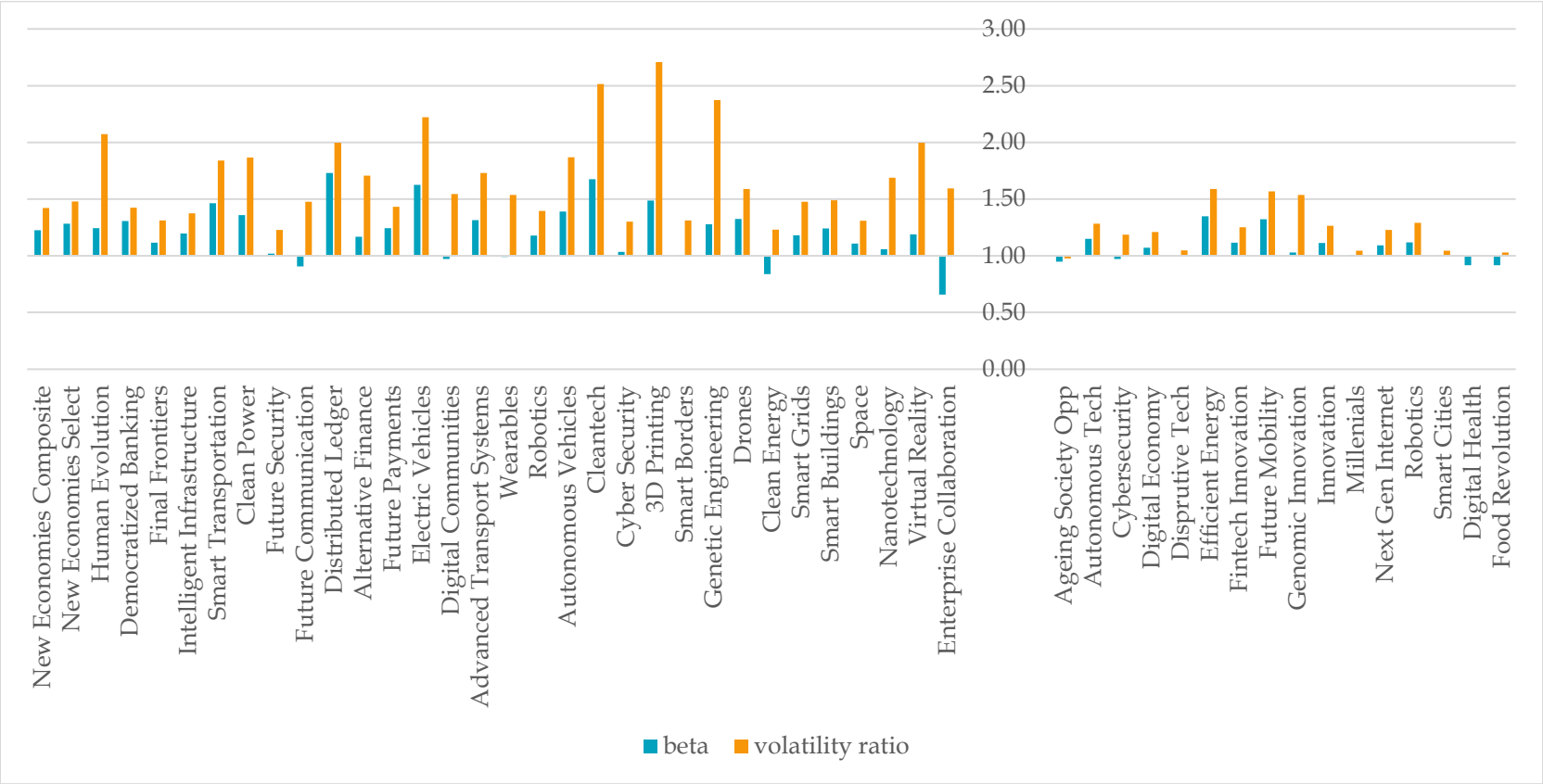

Exhibit 3: Size (SMB) exposures of S&P (left) and MSCI (right) thematic indices, June 2013 – April 2021

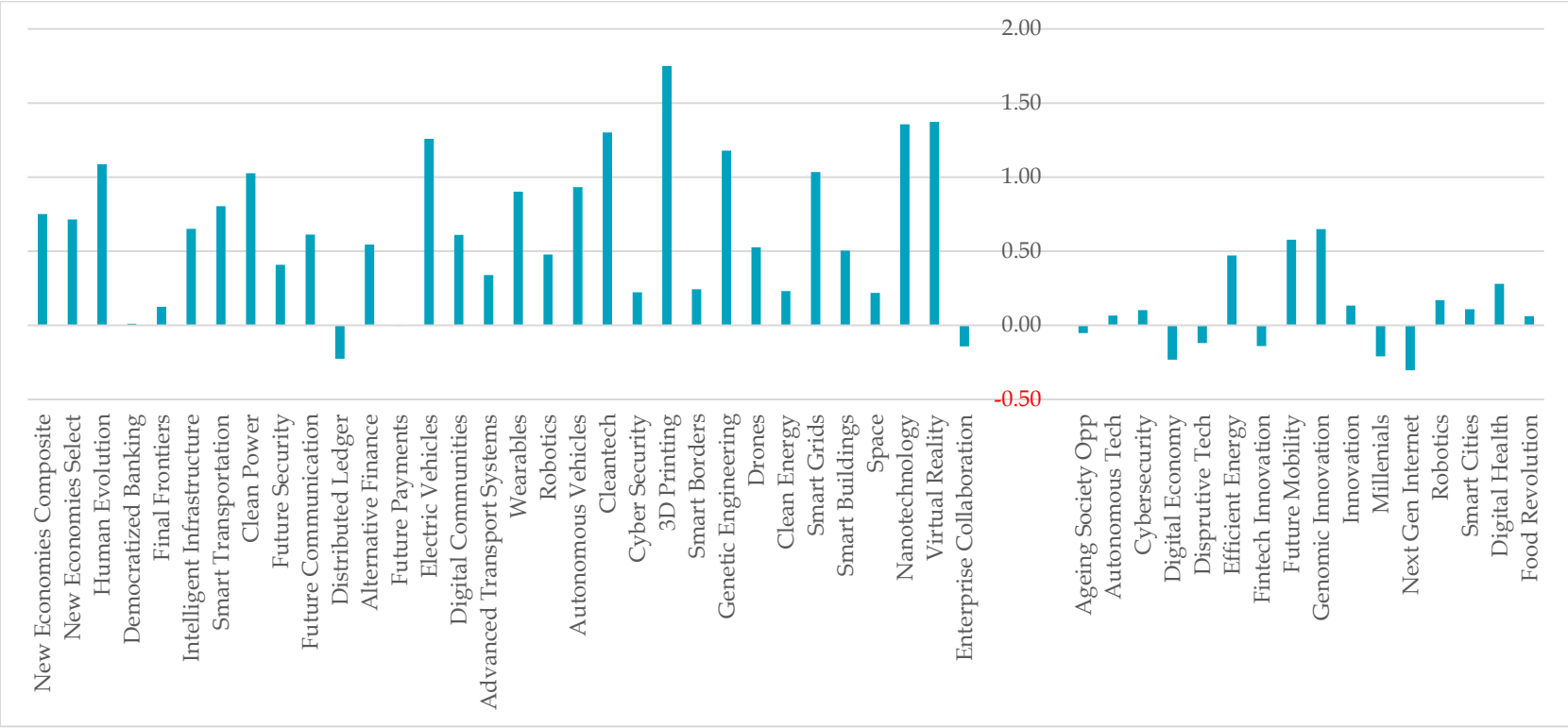

Exhibit 4: Exposures to the value (HML), profitability (RMW), investment (CMA), and momentum (WML) factors of S&P (left) and MSCI (right) thematic indices, June 2013 – April 2021

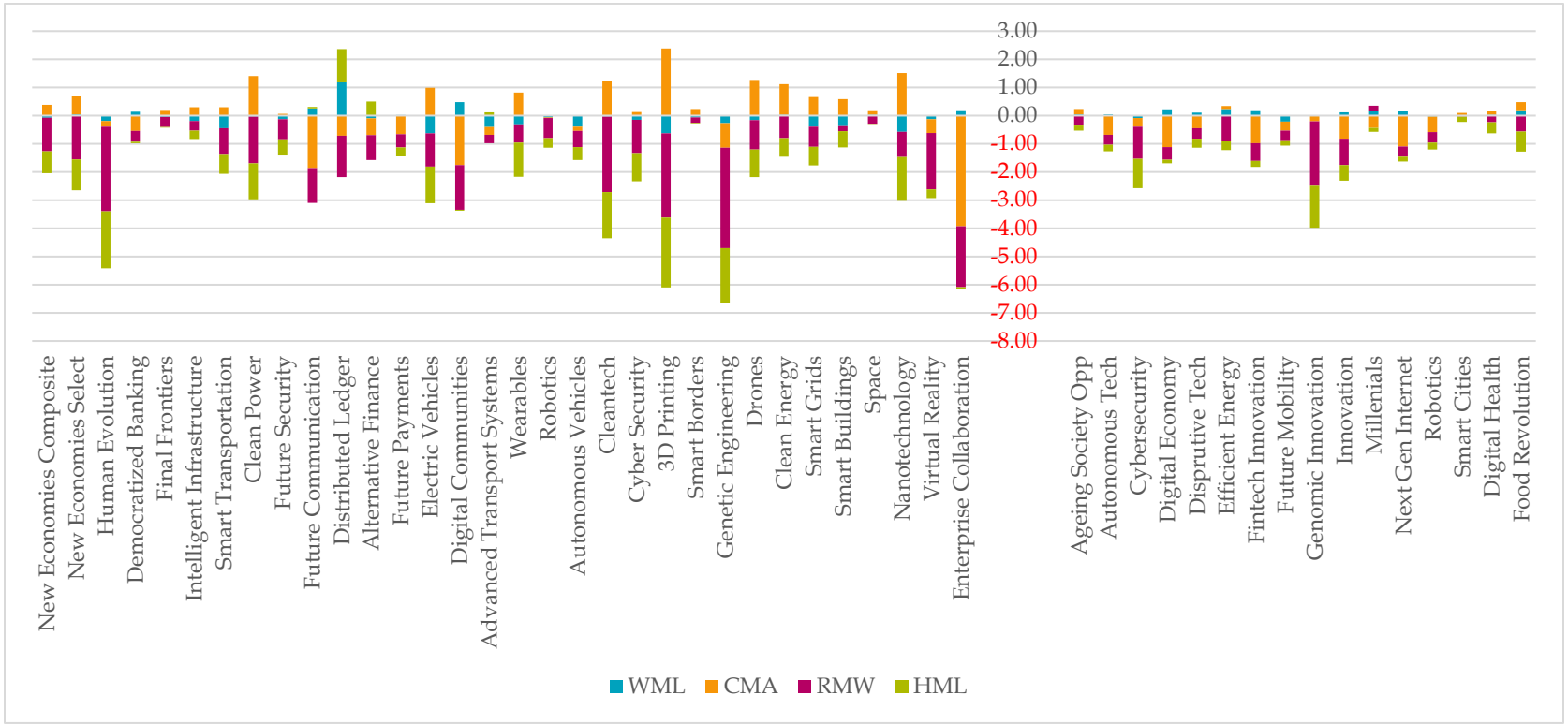

Exhibit 5: Aggregated exposure to the value, profitability, investment, and momentum factors of thematic indices versus various other stock groupings, June 2013 – May 2021

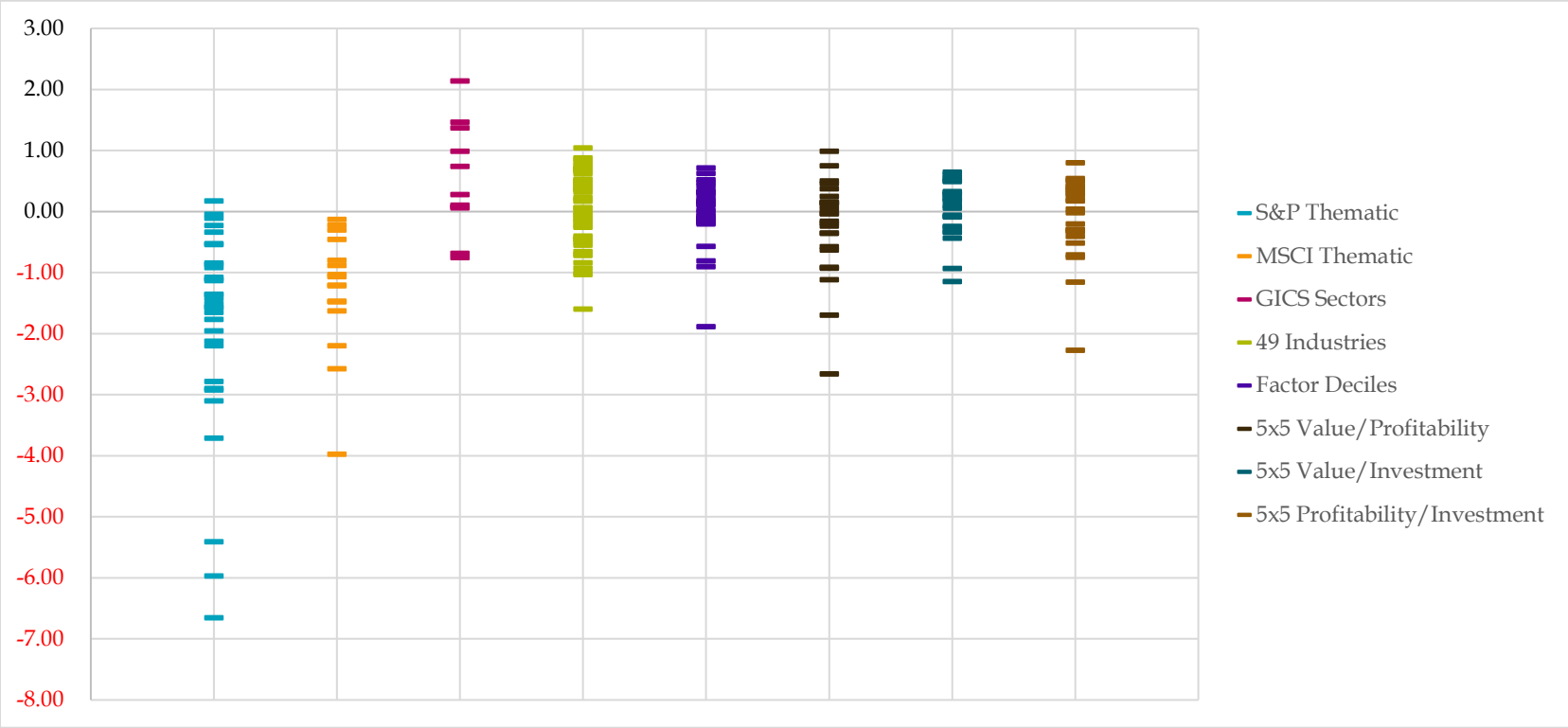

Exhibit 6: Annual market-relative returns of stocks that are simultaneously in the bottom quintile of value and the bottom quintile of profitability, 1964-2020

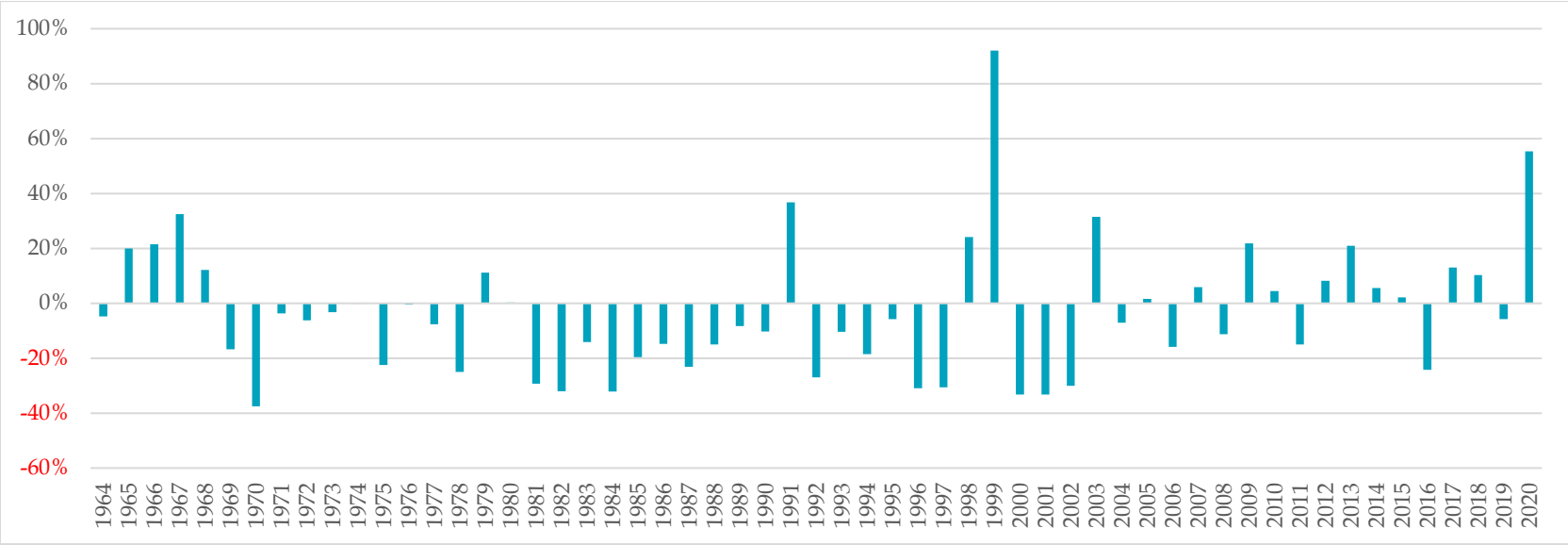

Exhibit 7: Six-factor alphas (monthly) of S&P (left) and MSCI (right) thematic indices, June 2013 – April 2021