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1 February 2019

ALTERNATIVE BETA MATTERS

Quarterly Newsletter - Q1 2019

Introduction

Welcome to CFM's Alternative Beta Matters Quarterly Newsletter.

Within this report we recap major developments in the Alternative Industry, together with a brief overview of Equity, Fixed Income/Credit, FX and Commodity markets as well as Trading Regulations and Data Science and Machine Learning news. All discussion is agnostic to particular approaches or techniques, and where alternative benchmark strategy results are presented, the exact methodology used is given. It also features our 'CFM Talks To' segment, an interview series in which we discuss topical issues with thought leaders from academia, the finance industry, and beyond.

We have included an extended academic abstract from a paper published during the quarter, and one white paper. Our hope is that these publications, which convey our views on topics related to Alternative Beta that have arisen in our many discussions with clients, can be used as a reference for our readers, and can stimulate conversations on these topical issues.

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CEO, UN PRI

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The what, the why, and decisively, the how of ESG investing: observations from a Systematic Quant Manager

Quarterly review

Quantitative overview of key developments in Q4 2018

Alternative industry performance

Global markets lived through a tumultuous 2018, wrapping it up with a rollercoaster quarter. The S&P 500 Index booked a 14% fall in Q4, which included the worst December since 1931 (a -9.2% drop during the month). Markets were roiled early on during the quarter as Fed Chairman, Jerome Powell, chimed a distinctive hawkish tone, saying that Fed Policy is "a long way from neutral". The benchmark 10-year Treasury, briefly after (on October 5), climbed to a seven-year high of 3.23%, while the S&P 500 skidded 0.6%. The first week of October set the tone for the remainder of the quarter, with increasing volatility amidst a volley of persistent geopolitical risks. Global trade concerns and slowing economic growth (especially in China) weighed on most equity markets, with investors seeking the safety of bonds. The MSCI World index ended the quarter down 13.7%, while the Bloomberg Barclays Multiverse – the biggest (and broadest) global fixed income benchmark index – gained a modest 1%.

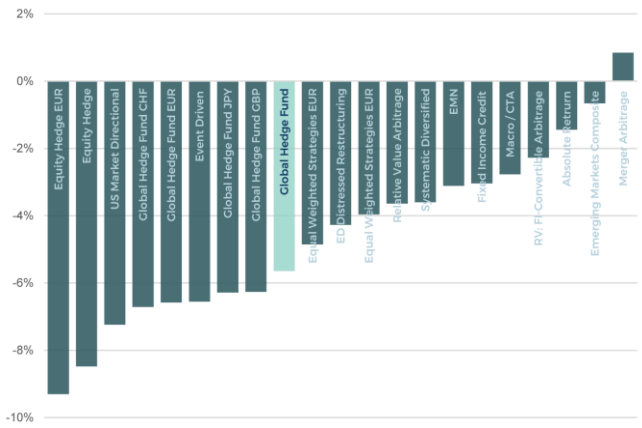
Commodity Trading Advisors (CTAs) rounded out a challenging quarter, in a challenging year, with the SG CTA[1] index falling -2.46% in Q4. October saw a majority of the losses (SG CTA lost 2.8%) owing to a strong trend reversal in Brent – the contract lost 13.1% between October 3, and October month-end on a large long position in Brent built up by non-commercial traders during Q3. The Barclay CTA Index[2] (-1.41% over the quarter) fared somewhat better.

The HFRX Global Hedge Fund Index, the oft-cited benchmark for hedge funds, lost 5.6% during the quarter – most of the losses booked in October. It was during the earnings season in the US, with certain companies reporting profit warnings (owing to, in some cases, the trade war and lower demand from China), that markets stuttered. The S&P 500 suffered a 7% fall over October.

The HFRX Equity Hedge EUR Index delivered the most negative returns: -9.30% over the quarter. October was also responsible for most of these losses. Conversely, the HFRX Merger Arbitrage Index fared best, gaining 0.85% - one of the only benchmark indices posting a gain in Q4.

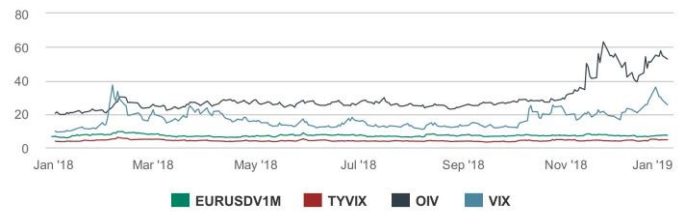
The average absolute correlation between futures contracts, often taken as an indicator of CTAs' ability to diversify, continued to trend up from Q3 2018, approaching 16% towards the end of December. The negative correlation between bonds and equities remained stable in a range between ~20% and ~25%. Meanwhile, the correlation between the MSCI World and Emerging Market indices reached a correlation of nearly 80% after a year during which the correlation trended upwards nearly unperturbed from 70% at the end of 2017.

HFRX Indices quarter performance



Total return for Equity Market Neutral (EMN) and CTA hedge fund indices over the past year[3]

The principal implied volatility indices across four asset classes over the past year[4]



[1] The Société Générale CTA index is an equal-weighted index of the twenty largest (as measured by assets under management) trend following CTAs, who are recognised as such within the industry and are open to new investment. For construction methodology and a full list of constituents, see: https://cib.societegenerale.com/en/prime-services-indices/

[2] The BarclayHedge CTA Index provides monthly performance data for a large selection of managed future managers, going back to 1980. Constituents and methodology can be obtained on the BarclayHedge website: https://www.barclayhedge.com/research/indices/btop/

[3] The EMN index is that calculated by HFR, while the CTA index is calculated by Société Générale

[4] For the EUR/USD exchange rate we use the Bloomberg defined EURUSDV1M ticker. The VIX, TYVIX, and OIV indices are calculated and published by the CBOE

The log of the dollar risk weighted average daily volume across futures on the four asset classes over the past year[5]

The return of the generic trender[6] referenced in the text over the past year

Equity indices

The final quarter of 2018 witnessed risk assets coming under increasing pressure. Global equities suffered the worst quarterly performance since Q3 2011 (the then height of the European debt crisis), with the MSCI World finishing 13.7% lower from Q3. It briefly entered bear-territory on December 25 – having fallen 20.1% from its peak on January 26. Despite a strong carry over from 2017, and a sustained positive rally between April and September, the February and October corrections dragged performance into the red: the S&P 500 ended down 6.2% for 2018 (-4.4% for the total return variant).

Markets slumped early on in the quarter as Fed chairman Powell hinted at a sustained tightening cycle. The final two weeks of the year saw the most dramatic volatility, as markets had to contend with a plethora of uncertainty, chief amongst which was a stalling economic growth cycle, exacerbated by various geopolitical concerns (but mainly the US-China trade and tariff dispute). Anxiety over several Tech firms further unsettled markets, with a profit warning from a key Apple Inc. supplier the most high profile distraction in the quarter. The S&P 500 fell 9.2% in December, the benchmark's worst December performance since 1931. A rotation to more defensive sectors were noted, with Utilities the best performer amongst the S&P 500 sectors. A darling of investors in Q1-Q3, Technology stocks, underperformed in Q4. The S&P 500 GICS 1 Technology sector lost 15.8% in Q4.

Small cap stocks were another casualty of a shift in market sentiment. The major motivation for their appeal in late 2017/early 2018 has since dissipated. Markets eyed smaller firms as the strengthening dollar in the first half of the year hurt larger ones (40% of sales of the S&P 500 comes from abroad). The dollar has lost some of its speed since, along with the tax benefits now starting to fizzle out. The Russell 2000 lost 20.5% in Q4, a nearly 6% concession to the S&P 500. The Russell 2000 was the best performing contract on a short position when applying our generic trender signal.

European stocks fared no better. The Eurostoxx 600 shed 13.7%, as European bourses tussled with the same issues as peers across the Atlantic. Trade, and a slowing global economy is a particular worry for the export-reliant German Dax that crashed 15.1%, dragged down by its heavy carmaker and banking constituents. Small cap European stocks were shunned even more by investors, as was the case in the US, with the CAC Small Cap index dropping 21%. The S&P 400 Mid-cap had the lowest RSI of 32 points on December 26.

The FTSE All Share Index fell 11% in pound terms, as the political drama that is Brexit thundered on. A fall in sterling, along with decent macroeconomic metrics (the UK witnessed the fastest wage growth in a decade) buffered substantial investor uncertainty about the effects of Brexit on UK economic growth. Eastern European exchanges did much better, along with a selection of other emerging markets (especially the Brazilian Bovespa), as hefty ETF inflows into emerging market stocks helped to lift demand in these markets. The MSCI Emerging Market index (MXEF) lost 7.8%, outperforming its developed market counterpart by 6% on expectations of a weaker dollar in 2019 and investors betting on a rebound in Argentina, Turkey, and Brazil after a tough year in these markets.

Not all emerging markets outperformed. The Chinese Equities' haemorrhage of 2018 continued, with the Shanghai SE Composite losing 11.7% in Q4 (and down 24.6% in 2018 – the second worst index, in local currency, amongst all global indices). Angst over the health of the Chinese economy has mounted, with key economic metrics slowing more than expected (notably the growth rate of Retail sales and Industrial output both falling to multiple year lows). Automobile sales that posted its biggest drop in seven years made most headlines.

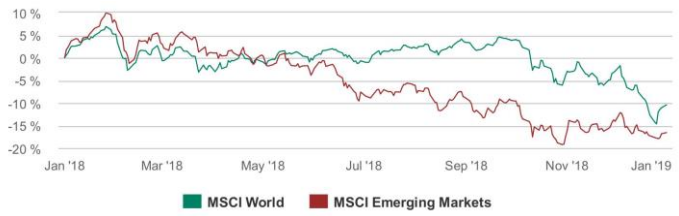
[5] We estimate effective FX volumes to be a factor of 5-10 more than this due to the extra liquidity available through the spot markets

[6] Our generic trender is calculated as laid out in our 'Two centuries of trend following' paper, which is available on our website: https://www.cfm.fr/insights/two-centuries-of-trend-following. The trend signal is calculated as the difference of the last price and an exponential moving average of the past 5 months' prices, divided by the volatility: $S_n(t) = \frac{p(t-1)-(p)_{n,t-1}}{\sigma_n(t-1)}$. The instruments are equally risk weighted in the portfolio

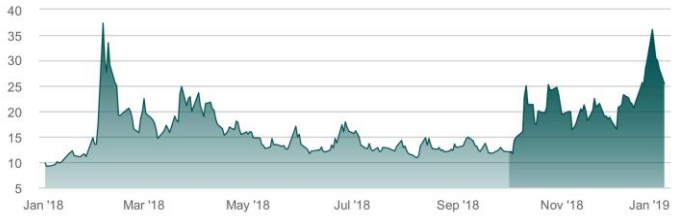
The Nikkei was the worst performing index with our generic trender applied. The Japanese benchmark also recorded the highest Relative Strength Index (RSI)[7] of 63 points on October 2.

Implied volatility picked up, with the CBOE VIX averaging ~16 points in Q4 (the index averaged ~ 11 points up until the end of September), while realised 10, 30, and 50 day volatility all reached or approached peaks for the year. Meanwhile, the CBOE Skew index, a widely tracked measure to gauge investors' sensitivity to skew risk, *i.e.* the likelihood of large 'outlier' returns in the S&P 500, receded from the all-time high of 159 on August 13, ending the year on 117.8.[8]

The return of the MSCI World and the MSCI Emerging Markets indices for the past year



CBOE VIX index



Stocks and equity factors

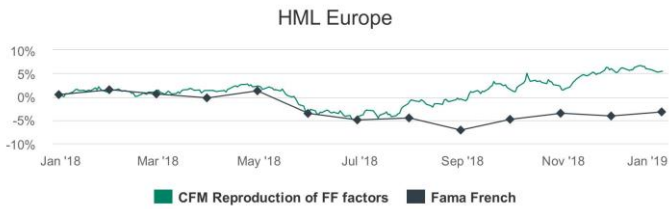
Factor-based investment strategies would be glad to see the back of 2018. Factor strategies experienced a third negative quarter, and were down overall for the year. The HFRX Equity Market Neutral Index, as a proxy, lost 2.7% over the quarter. Despite the underwhelming performance, the strategy outperformed the broader HFRX Global Hedge Fund Index by a not insignificant 2.8% in Q4.

A cursory look at long only implementations of factors, showed the MSCI World Low Vol Index performing best over Q4. The low volatility index typically outperforms in falling markets, with significant weight to defensive sectors, such as Utilities, that also outperformed against other sectors during the quarter. The MSCI World Low Volatility Total Return Index, however, still lost 7.3% - reflective of a choppy session for equities. Amongst the other MSCI World indices that employ a factor tilt, Momentum did worst as market trends turned abruptly and a global markets sell-off ensued (the S&P 500 rose 9% for the first three quarters, but ending the year down more than 6%). It lost its crown as best performing factor over the year, tipped by Low Vol during the final weeks. There was not much that split performance between the other main factors of Quality and Value, with Value ending the year as the worst performer.

Investors' preference for Growth stocks, despite a slump in the Technology sector in the US, was sustained, as EPS (in large part owing to the tax cuts) continued to grow, and subsequently outperformed Value names. However, the divergence between the two factors narrowed in Q4, with the spread between the Russell 1000 value and Russell 1000 growth indices contracting, reaching its lowest level since March. Small cap stocks were another victim of the market turmoil. Most small cap indices underperformed the broader market, with the S&P 600 Small Cap Index, for example, losing 20.4%.

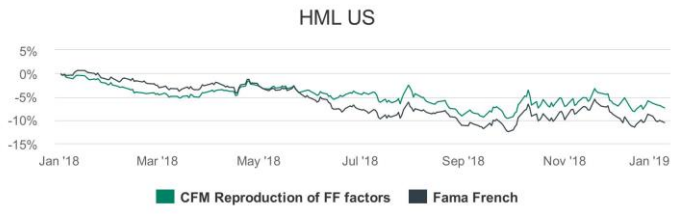
In a reproduction of the Fama-French-Carhardt factors, European equities continued to underperform in the Small Minus Big (SMB), or Size factor, However, both Japanese and US securities also slid in Q4. In the High Minus Low (HML) factor, European Value stocks gained, while US stocks moved largely sideways. Japanese Value securities, after reaching a peak in October, also gave up returns towards year-end. Momentum stocks in the Up Minus Down (UMD) factor saw volatile performance, with European and US performance slightly better than Japanese stocks. (US stocks maintained their lead and also finished the year ahead of the other regions.)

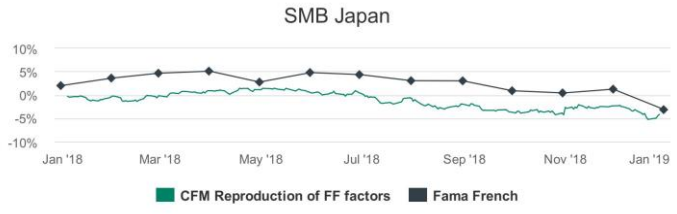
The Fama-French factors for the last year in Europe, Japan and US

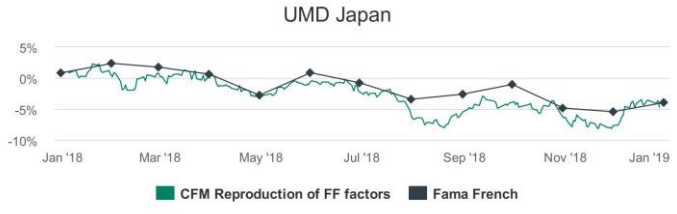


[7] Defined according to https://www.investopedia.com/terms/r/rsi.asp. The RSI varies between 0 and 100 with 70 implying an instrument is overbought and 30 implying the instrument is oversold.

[8] For more information on the CBOE Skew Index, please refer to the official documentation and themethodology on the official website: http://www.cboe.com/products/vix-index-volatility/volatility-indicators/skew







High Minus Low (HML) corresponds to a market neutral (MN) portfolio long the high book to price stocks and short the low book to price stocks. Small Minus Big (SMB) corresponds to a MN portfolio long the small market cap stocks and short the large market cap stocks. Up Minus Down (UMD) corresponds to a MN portfolio long the historical winners and short the historical losers. In each case, the grey line is downloaded from Kenneth French's website, while the green line is the CFM reproduction of the Fama-French portfolios. The methodology can be attributed to Eugene Fama and Kenneth French and is not explicitly used in any CFM product.

Fixed income

Reflecting general macroeconomic and geopolitical uncertainty, global bond prices rose, with the FTSE World Government Bond Index (WGBI) registering a 1.8% gain in Q4.

The US yield curve flattened, with yields on the short end (tenors <12 months) all picking up, while the benchmark 10-year yield dropped 40 basis points. A section (the 2-5 year spread) of US Yield Curve 'inverted' i.e. turned negative for the first time in a decade on December 3rd, 2018, with market commentators quick to point out that yield curve inversion acts a precursor to recessions. (A yield curve inversion appeared ~ 12-18 months before each of the last five US recessions).

After closing at a high above 3.2% on November 8, a surge in safe haven buying pushed the yield of the 10-year back below 3%, ending the period at 2.7%. Implied and realised volatility as a result increased, with implied volatility, the CBOE TYVIX acting as proxy, averaging 4.1 points, up from the 3.8 point average in Q3. The CME FedWatch Tool[9] put the probability for a January and March rate hike at 0% and 1.3% respectively, keeping the Fed Funds rate at 2.25-2.50% - in line with the Fed's expectation of only two rate hikes in 2019. Nevertheless, the Fed's job of having to choreograph the delicate manoeuvre of tightening monetary policy, without choking the US economy, is being made even more difficult with political pressure and critique over its tightening cycle. Despite a call out from

[9] The probabilities of the CME Group FedWatch Tool are calculated on 30-day Fed Fund futures contract prices, with further details and methodology to be found on their website: https://www.cmegroup.com/trading/interest-rates/countdown-to-fomc.html

Fed chair Powell on October 3 that interest rates were "a long way from neutral", the narrative quickly changed to "just below" neutral on November 28.

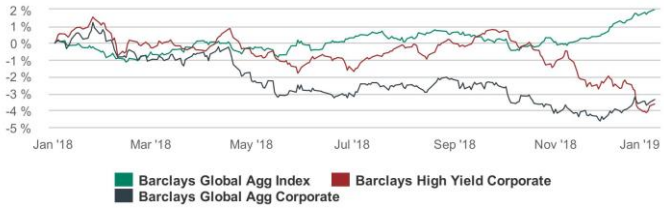
The yield on European sovereign debt followed its US counterparts lower, with the German 10-year Bund slipping to 0.24% (from 0.47% at the beginning of the quarter). The demand for European government bonds was driven by a lacklustre economic backdrop, with fears over the health of the German economy moving decidedly into the fray. Industrial Production for October came in at negative 0.5% MoM, and well below economists' expectations of an increase of 0.3%. A closely watched leading indicator for economic activity is the Ifo Business Climate Index, which ended the year at 101 – down from 104.6 after suffering 10 out of 12 monthly declines. Interest rate differentials between the US and major economies continued to decline somewhat, with the spread between the US and German 10-year bonds shrinking. The spread stood at 2.6% at the end of Q3, ~20 basis points higher than the 2.4% at the end of Q4.

Italian bonds outperformed their continental peers. After a tumultuous 2018, overshadowed by political instability, the Italian coalition government reached an agreement with the EU over the country's fiscal deficit targets, with the 10-year yield falling from a high of 3.3% on November 18, to 2.4% at quarter-end. Investors in Italian paper would have had to endure a lot of volatility in 2018 however, as the 10-year benchmark was hovering at a low of 1.5% in April.

Japanese bonds also rallied, with the benchmark 10-year JGB dipping below zero for the first time since September 2017. The 10-year gave back 13 basis points over the quarter, amidst an equity sell-off, haven buying, and the Bank of Japan (BoJ) cutting purchases of 5-to-10 year debt. The Japanese 10-year was the best performing contract over the period with our generic trender applied. It also reached the highest RSI of 68 points on December 21. The Australian 10-year, however, was the worst performing bond with our generic trender.

The benchmark Barclays Global Aggregate suite of indices offered mixed returns: the Total Return Index (Unhedged) returned 1.2% over the period (1.7% hedged), while the sister Global Aggregate Corporate Total Return Index lost 0.8%. Corporate bonds (especially high yield) underperformed sovereigns, on negative sentiment, and record-levels of corporate debt (the appeal of low interest rates had pushed companies to load up on cheap debt, with US corporate debt reaching an all-time high of 46% of GDP).

The return of Barclays Global Aggregate Bond Indices for the last year



Commodities

Commodities remained subject to similar global uncertainty and economic growth expectations as in Q3. Vagueness of the direction and outcome (if any) on trade talks between the US and China is weighing on sentiment for real assets. The strengthening dollar during the first half of the quarter (as commodities are priced in the greenback tends to have an inverse value relationship with raw material prices), and weakening global growth outlook put further downward pressure on demand.

The big news over the quarter was the drop in energy prices. The dramatic plunge was by virtue of a perfect storm of compounding factors. Declining economic activity in China – the world's largest energy importer; geopolitical forces turning against OPEC member Saudi Arabia following the murder of Jamal Khashoggi; and the US producing more shale gas all contributed to the oil price dynamics. While oil enjoyed some relief after OPEC announced a production cut of 1.2 million barrels per day in December, the relief was short-lived. A supply glut remained the baseline scenario, with the benchmark Brent future contract losing 35.8% in Q4, the biggest quarterly loss since Q4 2008 (the height of the Global Financial Crisis). WTI Crude was the best performing contract in applying our generic trender, with Brent short on its heels as the second best performing contract. Brent also registered the lowest RSI of 33 points on December 26, approaching oversold territory.

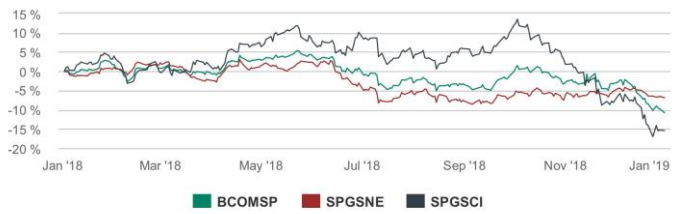
The S&P Goldman Sachs Commodity Index fell 23% in Q4, largely owing to the poor performance in energy markets, as the Non-Energy version of the index was flat (+0.1%). Volatility in energy markets naturally spiked, with Natural gas making headlines after an 18% daily move in November wiped out some energy option sellers. Natural gas, unsurprisingly as such, attained the highest RSI of 76 points on 15 November – well above the threshold of 70 that is considered overbought territory.

Performance amongst metals was mixed. Gold gained 7.7% in Q4, boosted by its allure as a diversifier and a store of value during times of market uncertainty. Copper,

however, had its worst year since 2015. The metal is interesting to monitor as it is historically cited as a shorthand gauge of global growth, it sank further in Q4 as the outlook for demand waned. The bellwether recorded its fourth consecutive negative quarter (the LME Copper spot price fell 5% in Q4) and ended the year down 17.5%.

In a reversal of the poor performance in Q3, soft commodities made slight gains, with the Bloomberg Softs Subindex eking out a 0.1% gain. Coffee and sugar, two of the worst performing commodities over 2018, both spiked in October as the Brazilian real surged on favourable political dynamics in Brazil. Both major exports for the Latin American country, the promise of reformist policies by then presidential candidate Jair Bolsonaro, aka 'Tropical Trump', sent the Brazilian real to a five-month high, with the Softs subindex in tow (the two have a strong historical correlation of ~70%). Despite the October surge in Sugar prices, the remainder of the year was dominated by the drop in oil prices with mills diverting more cane towards sugar manufacturing, boosting supply, as the plunge in Brent eroded the prospects for higher demand in ethanol. As a result of the dramatic inverse-v return profile of sugar in Q4, it was the worst performing contract in applying our generic trender.

The one year return of the S&P GSCI, GSCI Non-Energy, and Bloomberg Commodity Spot indices



FX

The greenback continued its strong showing in 2018, albeit at a gentler pace. And, although the dollar index (DXY) registered a 1.1% gain over the quarter (ending the year 4.4% stronger), three out of the last four weeks of the quarter (and the year) saw negative gains for the dollar. The policy interventions (tax cuts) enacted at the end of 2017 and a hawkish start of the year for the Fed that boosted dollar demand have largely played out. Reduced monetary policy differentiation with respect to advanced economies, and the dollar looking evermore overvalued relative to emerging market currencies started to weigh on sentiment. Long positions in the dollar by non-commercial traders, according to Commitments of Traders data, were slightly trimmed.

Volatility in December was stoked by a dovish Fed (signalling fewer rate hikes in 2019 and voicing caution about the outlook for US economic growth). With the expectations for interest rate hikes in 2019 lowered to two (from three), trade disputes unresolved, and the US Federal Government suffering a shutdown, the dollar stalled. And while the dollar made gains against most G10 currencies, it slipped to a 3-month low against the yen. The yen rallied on a typical safe-haven buying spree, despite the Bank of Japan keeping rates steady at its December meeting, soft economic data and a decline in benchmark Japanese bonds.

The British pound hit a 20-month low against the dollar on December 11, after Theresa May announced a delay in the Brexit vote. Pulling the Commons vote was to avoid a near-certain defeat as it was clear that a majority of MPs would vote against her deal. Growing uncertainty around Brexit was coming to a head during the final weeks of the year, sending implied volatility to the highest level since 2016 (when the Brexit referendum was held). The 1-month at-the-money implied volatility lurched from a quarterly low of 8.6 points on October 19, to 15 on November 15. The greenback gained 2.2% against sterling over the quarter.

Emerging market currencies clawed back some of the heavy losses in Q2 and Q3. A dollar looking overvalued, along with a plunging oil price (many of the hardest hit currencies earlier in 2018 were from net oil importing countries) brought relief for current account balances, export competitiveness, and sent the MSCI Emerging Market Currency index up 0.7% in Q4.

When we apply our generic trender, the Israeli shekel was the best performing currency on a short position (the shekel has lost 2.8% of its value against the dollar in Q4). The real was the worst performer on a roller coaster quarter for the Brazilian currency, with good gains in October erased by a slide towards the end of the year.

The Indian rupee attained both the highest (58 points on November 30) as well as the lowest RSI (36 points on October 8).

Dollar Index (DXY) vs MSCI Emerging Market Currency Index

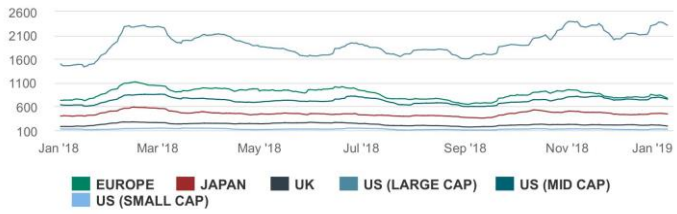
Trading news and regulation

Early in 2019, a consortium of brokers in the US announced the filing of an SEC application to launch a new stock exchange called 'MEMX', or the Members Exchange. Their aim is to challenge the oligopoly of the existing large exchange groups controlling most American markets. The previous high-profile exchange launch was IEX (of Flash Boys fame), an exchange that was aimed at countering the proliferation of high-frequency trading. The intention behind MEMX is, however, quite different. In fact, among others, it is sponsored by Virtu and Citadel, themselves high-profile HFTs. They claim that the new exchange will provide improved transparency – although it is not clear at this stage how this is in the interest of MEMX's founders. HFTs and proprietary trading firms have benefited handsomely from opaque market rules, by squeezing out excess profits from functionalities and order types only known to specialists like themselves. On the other hand, there is a clear upshot of this initiative that all investors can benefit from: MEMX intends to charge lower exchange fees than others, since these consume a large part of the shrinking profit margins of high-volume market makers. Technological fees billed by exchanges for access to real-time data and high-performance trading connections have also skyrocketed over the past years. This poses large problems for systematic traders, who often have no choice but to pay up. In October, the SEC declined fee increases by Nasdaq and NYSE on the grounds of not being justified by an improvement in service. More reasonable pricing of the exchanges' services across the board would be more than welcome by buy and sell-side alike.

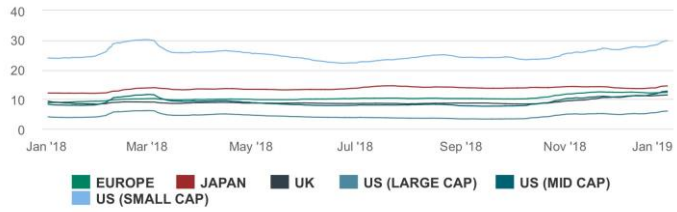
The New Year was ushered in with a rather dramatic flash crash of Japanese yen exchange rates. In the early hours of January 3, a bank holiday in Japan with particularly thin over-the-counter trading volumes, the yen rallied 3% versus the dollar (and up to 10% against other currencies), only to revert within the hour. Some investors have pointed a finger at the slowdown of the Chinese economy, trade wars, even a profit warning issues by Apple shortly before. However, in our opinion the most likely explanation seems to have been a large order executed in the absence of sufficient liquidity, catching market makers off guard. Such events frequently get frenzied coverage by the press, but unlike the 2010 Flash Crash which happened in US equities, in foreign exchange – an inherently opaque market – regulators have limited reach, and in this case we may never find out what really happened.

One of the highlights of US politics in December and January has been the partial shutdown of the government. Beyond the direct economic implications which are starting to show, several government agencies have stopped publishing their regular indicators that help traders price various products. Data are either delayed or not published by the CFTC, the Department of Agriculture and the Economics and Statistics Administration, to name but a few. Systematic trading strategies that would rely on the missing information, when properly conceived, are able to deal with such issues and to continue to function reasonably by adapting, much like human traders would.

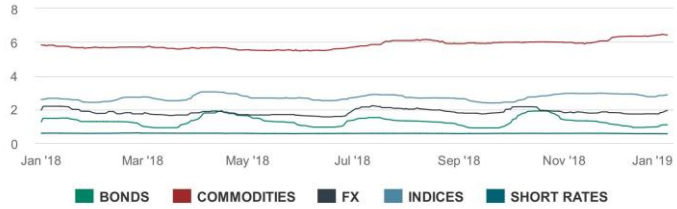
Average monthly dollar equity market volume in billion USD



Typical bid-ask spread in six major groups of equities in basis points



Average bid-ask spread on five future asset classes in basis points



Data Science & Machine Learning

CFM continues to fund and support the Challenge Data, a yearly data science competition open to all, with themes ranging from finding tumors in images to identifying sleep patterns in brain waves. CFM has proposed a finance-based challenge every year since the Challenge's inception in 2015. This challenge is a great tool for professors (especially those teaching finance and machine learning), who can have their students put their skills into practice.

The 2018 CFM challenge, where contestants were challenged to predict volatility, closed in December.

Participation in the second half of the year was strong, with newcomers making up half of the top 10 compared to the June 2018 ranking. The final top 10 also had substantial international presentation, notably from a graduate group at Princeton, but also as far afield as Latvia. The top contenders will be invited to share their insights during the final ceremony, and offered recruitment interviews.

The 2019 Challenge Data opening ceremony took place in January. This year's challenge is the holy grail of finance: prediction of returns. Since this is a notoriously difficult task, participants are tasked only with predicting the sign of returns (either positive or negative), which is a bit easier. The sign of the return over the last 30 minutes of the trading day must be predicted over many stocks and days, based on the preceding five-minute returns since the opening of the exchange. The data, moreover, has an interesting structure: there is not only the time series structure of the daily returns, but stocks also have some individual behaviour across days, and each day can influence the overall behaviour of the stocks. This structure leaves much room for some exciting ideas to emerge! Anyone can take part. See the official website for further details: https://challengedata.ens.fr/

Extended abstract

Co-impact: Crowding effects in institutional trading activity

Paper by Frédéric Bucci, Iacopo Mastromatteo, Zoltán Eisler, Fabrizio Lillo, Jean-Philippe Bouchaud and Charles-Albert Lehalle

Price impact is arguably one of the main sources of trading costs for asset managers: while unwinding their trading decisions, investors face losses induced by the reaction of markets to the information encoded in their order flow. But how can markets detect the activity of individual actors, given that only anonymous information is disseminated by exchanges?

In this study we empirically address this issue by analysing a large database consisting of 8 million trading decisions by institutional investors in the U.S. equity market.

Our analysis shows that even though markets are unable to detect individual investors, they are sensitive to the net order flow aggregated over all market actors. Hence, small investors taking idiosyncratic decisions only weakly (linearly) perturb the typical order flow, thus incurring small impact costs. On the other hand, investors that either i.) account for a large fraction of the net order flow or ii.) are correlated with the direction of the rest of the market incur larger losses due to impact. The latter case is particularly relevant for asset managers implementing popular trading strategies (index tracking, risk premia strategies, etc.), as their cost models not only have to factor in the impact of their own trading decisions, but also have to account for the impact of all market actors involved in a similar series of trades. From the perspective of these asset managers, such correlated trading activity will statistically induce extra costs, similar to the ones that they would be facing if they were being front-run by faster traders.

We postulate a statistical model to quantify the impact effects induced by the activity of other market actors (co-impact), and match our predictions against empirical data. In particular, we are able to explain the corrections to the empirical 'square-root law' for price impact that are measured in the regimes of small order size or large correlation with the market flow, a regime that is of particular relevance for investors operating in a crowded strategy space.

CFM Talks To

Fiona Reynolds

We sat down with Ms. Fiona Reynolds, CEO of the United Nations Principles for Responsible Investment (PRI), to discuss a range of contemporary responsible investment topics, all vying to define the future of the investment industry. In their London offices, we talked about the remarkable growth of the PRI since its formation only a little more than a decade ago, to some of the greatest challenges facing investors and our planet alike. Driven in large part by asset owners who are becoming evermore demanding and discerning in how their managers should account for Environmental, Social, and Governance (ESG) information in the investment decision and allocation process, the concept of ESG investment is moving into the mainstream.

Fiona has been at the helm of the PRI since 2013 and oversaw some of the biggest years of growth for the organisation. She came to the PRI from the Australian Institute of Superannuation Trustees (AIST) where she spent seven years as Chief Executive Officer. She also serves on a wide array of Boards, including the UN Global Compact and the Steering Committee for Climate Action 100+, the largest ever investor engagement initiative with listed companies. She was recently named as one of the 20 most influential people in ESG investing by Barron's.

"Most organisations, like ours, should ultimately set out with a mind-set, *if I do my job properly, I won't be needed anymore.*

CFM: *For those unfamiliar with the PRI, could you briefly summarise its mandate and objectives?*

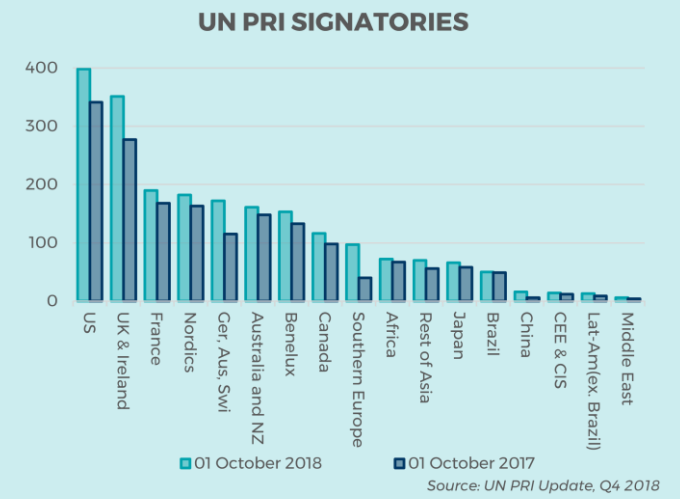
FR: The PRI was launched in 2006 by Kofi Annan, then Secretary General of the United Nations, with the aim of bringing sustainability into capital markets. There was at the time a good recognition that in order to solve sustainability issues, one would need the participation of the finance industry. On behest of the Secretary General, some of the world's largest and most important asset owners came together in drafting what became the six principles for responsible investment, with the aim to bring about the integration of ESG factors, of being active owners, and of being transparent – disclosing how a firm goes about accounting for, and implementing responsible investment. Once the principles were drafted, the question was how to put them into action, leading to the PRI Secretariat being born.

CFM: *We recently joined the ranks of PRI signatories. What is the latest signatory count?*

FR: Although the PRI is only 12 years old, I think the growth of the PRI is really the story of the incredible growth of responsible investment. Starting in 2006 with less than a 100 signatories, then mainly large asset owners, to today, where we've got 2,200 signatories who represent about $84 trillion of AUM. In the last two years, surprisingly to me, we have had the biggest years of growth ever. As the person who runs the PRI, I'm always thinking that every year we would have reached a saturation point – growing, but much slower. However, every year has seen bigger growth.

And I think the reason is that responsible investment is now, I wouldn't say it is fully in the mainstream, but it is becoming more than only being seen as a fringe concept. I just came back from the G20 in Argentina and responsible investment was something that was talked about by finance ministers, and by leaders of very large financial institutions in a way that it wasn't a few years ago. The momentum has been led by a group of committed asset owners who have been pushing for their managers to integrate ESG factors, along with sophistication in the topic that is being added all the time.

Most of these asset owners typically started thinking about how to integrate ESG into their equity portfolios, as were an overwhelming majority of asset managers that initially became signatories. I think there has been a longer tradition in the equity space because in some ways it's simpler. You can vote your shares, and you can directly engage with the management of companies etc. But, a shift is underway in trying to understand how to integrate ESG across all asset classes. And, now, the key test becomes: how do you incorporate ESG factors in a systematic fashion into every area of your investment activity. *That* is the journey we are on and still figuring out.



The PRI added 372 new signatories in the 12 months to October 2018, bringing the total number of global signatories to well over 2,000. Europe collectively has the largest number of signatories, followed by the US. There remains a sizeable gap between Europe (and the US and Canada) and emerging markets. The PRI has, however, identified various initiatives to boost greater adoption and engagement in these regions. Interested readers are encouraged to read the UN PRI 2018 Annual Report for more details.

CFM: *There remains, despite the impressive growth of the PRI, and ESG investment commanding plenty of headlines, many hold-outs. What do you consider as some of the key barriers to further growth and interest in ESG investment?*

FR: Data. The quandary facing many managers is how to get good data in a measurable, and comparable way. The other key issue is standards. In addressing this, the EU commission, for example, is releasing a draft taxonomy, and I think having a common language, and a set of common standards, is going to help in cementing a common goal in the industry, and, should accordingly facilitate a move to improve data.

We have always taken the view that responsible investing is a big tent, and we are a big tent organisation. There isn't necessarily only one way to go about responsible investment – different asset owners might have different priorities, as do different countries, along with different regulations. And, for those reasons, the PRI is in essence a principle-based organisation, so that different entities can adapt to their own priorities. For us it is important that firms come to the table, and get involved in any way for which their structure and objectives would allow.

CFM: *Launched in 2017, the PRI "Blueprint for Responsible Investment" identified increased accountability as a key focus area for the PRI. This led to the adoption of more stringent checks and balances for signatories. What was the reason behind the move? And, do you have any concerns that this new policy might discourage firms from becoming signatories?*

FR: When the PRI was launched in 2006, no one was doing responsible investment. Firms may have had SRI (Socially Responsible Investing) funds, but responsible investment had not entered the mainstream discussion yet. It would have been very difficult to measure and set accountability back then. The idea was to get everyone started, but, 10 years on, there were much more expertise in the area, with many more providers and experts that could help firms to address the question of responsible investment. So it was time to say: if you are not really doing much by now, it is because you are probably not committed to doing it.

We have plenty of resources – working groups, case studies, along with plenty of other organisations that provide support and guidance. It was important, and timely to take another step in order to ensure real action is being taken by our signatories. But we were very conscious when we brought into effect our minimum requirements, of not to setting the bar to high.

While some of our signatories felt the minimum requirements were actually *not high enough*, there is no point asking everyone to run, if some can't yet walk. New entrants would then feel unable to come into the market. We didn't want to dissuade firms, especially firms in emerging markets.

We will continue to review our minimum standards, and they'll probably increase over time. In some ways, without regulating – because we are not a regulator – with the introduction of our minimum standards we are trying to drive real change across the industry.

CFM: *This is a parallel question, since there are many firms that are vocal, well-resourced, and have all the best intentions to follow their conviction in accounting for ESG information in their investment process. Others, meanwhile, may have signed up only to tick a box on an RFP, and do very little else. Are you worried that many in the industry might also be marketing products, void of any real and meaningful ESG incorporation?*

FR: That is a difficult thing for us. And I think it is difficult to measure accurately. There are many asset owners with many different views, with many different ESG approaches. Some might have screening requirements. Some of these might be for religious reasons for instance, or based on their membership base. Pension funds in the health sector do not want to invest in tobacco for example. Others will invest in tobacco though.

Amongst all these competing strategies, nevertheless, we take a view of integration, despite negative screening playing a particular role for certain asset owners. We believe, if you really want to make a difference, ultimately, integration is the way of achieving long term change. And, I think responsible investment is about affecting change.

CFM: *You mentioned religion as one possible issue that could justify a screening policy. Some might disagree that this is a valid reason for screening. In ESG, there is often this clash of normative convictions. Do you foresee this divergence in convictions to narrow in the future?*

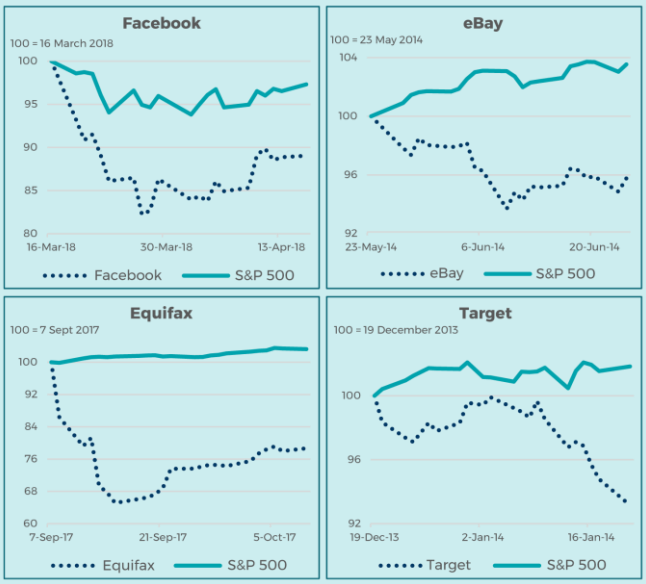
FR: I think clients will always have different requirements. As we were talking about tobacco and also engagement, many of our signatories would question the point of engaging with tobacco companies. Since they will argue that there is very little that we can ask them to change. They ultimately produce tobacco. With a big energy company, however, when talking about climate issues, one is able to engage and talk about the strategy of the firm in terms of transitioning to a low carbon economy. There are differences, but much less so when talking about core issue such as climate change where I think convergence is inevitable.

CFM: *ESG already encompasses quite a long list of topics. Flipping through your quarterly update, I noticed cybersecurity as one issue in which the PRI is engaged. There seems to be an ever growing list of topics that are being bundled into ESG. What are the limits of issues that could be listed under ESG?*

FR: The world changes so quickly today. Twenty years ago, you needn't have worried that much about cybersecurity, but now it is a real issue. Looking, for example, only at the privacy issues amongst tech companies and platforms, and the hacking that has happened in major organisations. It has become a fundamental problem. Yes, the list is indeed getting longer, and I think some investors will realise that they can't tackle every issue. Asset owners are likely to work with their managers, deciding to focus, for example, on a set of five issues for any particular period. Because, unless you are a huge organisation, with a huge amount of resources, it gets difficult to focus on a limitless set of issues.

The world is a pretty messy place at the moment, and I think if you look around the world what is happening in the US and recently in Paris with the 'gilets jaunes', if you look at Brexit, all these problems are a symptom of the fact that people feel that the economic and financial systems don't work for them. That is works for the few, instead of the many. People see that CEOs are still getting paid huge remuneration packages, people see that company xyz is not paying any tax in this or that country. Many are asking what their government is doing in response. I really think responsible investing is what the world needs in response because it addresses such a wide array of issues. Most of the institutional money that is managed is people's pension money. And they don't want to see it invested in a way that does them harm. Profit is a good thing, but as long as it is done in a way that creates value for all. I am not sure that a pension fund should only be thinking about your retirement money, without thinking about the world into which you retire.

"I am not sure that a pension fund should only be thinking about your retirement money, without thinking about the world into which you retire.



2018 was a bumper year for cyber attacks, with multiple breaches and millions of personal records compromised. The Cambridge Analytica / Facebook scandal stole most of the press highlights, but other historical data breaches were as costly – see above a selection of the largest data breaches and the immediate effect on these companies' stock price (the price of the individual firms and the S&P 500 index normalised to the date of when the scandal broke). Data breaches often lead to costly litigation, scrutiny by governments and regulators, and, in most cases, cause heavy reputational damage. It is inherently difficult to predict when or how severe any one data breach or cyber-attack might be. It does, however, have the potential to materially affect the target firm financially, especially in the modern market where the value of firms is stored in its intangible, rather than tangible assets. Lapses (and insipid responses to the aftermath of cyber attacks) could moreover draw into question the effective management and governance of the firm.

CFM: *There is evidence, notwithstanding the balance towards positive results, that ESG does not necessarily enhance returns, i.e. cannot be regarded as an alpha factor. All things being equal, should it make sense that asset owners look towards asset managers that provide an ESG offering even if that could mean lower returns?*

FR: It probably depends on your time horizon. If you're an asset owner that manages liabilities over a very long time period, I can't see, that over the long term, if one fails to consider ESG factors that one will be able to continue in producing excess returns compared to those who do. When we talk about academic evidence, we are only, at this stage, looking back 8 to 10 years, so I think it is hard to think that if asset managers are able to produce excess returns by not taking ESG into account that this will continue. If a manager continues, for example, to invest in coal or similar fossil fuels, at the moment they might be making good returns, but, if they stick to that conviction, and still do it in 10 to 15 years' time, then managers might be doing less well. But, if an asset manager has very short-term strategies, you might be less concerned. Our membership is largely as such very much focussed on long term investing.

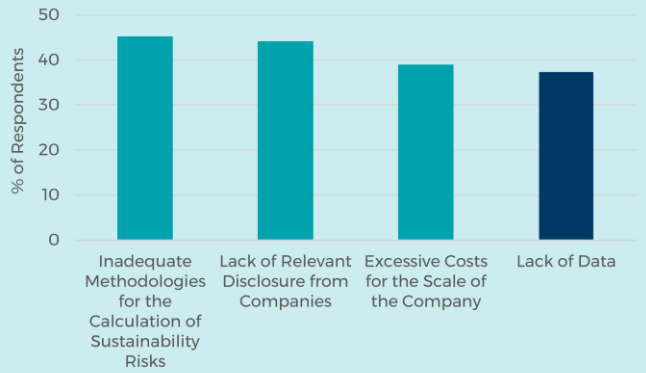
CFM: *This, let's call it the time horizon misalignment, is seemingly one of the core flashpoints of ESG investing. Do you think this is partly why some hedge funds and funds with short-term strategies have not been at the forefront of ESG? Do you think this will change?*

FR: Yes. When my team proposed to start a hedge fund working group, I was very sceptical. But, there were many large asset owners investing in hedge funds, who wanted to continue to invest in hedge funds. They came to us with the view that some hedge funds want to get involved and my team and I decided to establish a working group. We probably won't bring all hedge funds over the line, but from our perspective if we have a couple of hedge funds that are more engaged and are doing more research in this space, we are happier. We take the long term view, and I have been pleasantly surprised to see a small dedicated group of hedge funds that are committed to improving their investment practices.

CFM: *Many (if not most) managers rely to some extent on third party data providers for ESG ratings and research. Is the PRI engaged with the data service providers, and does the PRI have any view on how the hitherto questionable integrity of ESG data, may be improved?*

FR: Data is a major focus or us. Ten years ago, the biggest hurdle for responsible investment was a mind-set: ESG issues were not investment related issues, and were considered as policy issues for governments and the like. When the mind-set shifted, the next big hurdle became a claim that it is against one's fiduciary duty to consider ESG issues. Now, the biggest single hurdle is data and standards. We decided that driving meaningful data was, as laid out in our blueprint, one of the nine key areas of focus.

Plenty of our signatories think data is a barrier and PRI can probably act as an honest broker. Our interest is getting more traction in responsible investing, we don't sell a product or data, but we are getting together a group of stakeholders in order to fill the gaps in some of the data. It is a multi-year project, and we are working towards getting standardised, comparable data that is an investment friendly form. We believe the Task Force on Climate-related Financial Disclosures (TCFD) has provided a good framework and believe it could be used as a template in other areas. Our hope is to bring the industry together, acknowledge the problem, and ask how best to solve it.



Source: AIMA and CAIS Responsible Investment Survey, 2018

Some of the most commonly cited challenges by Hedge Funds surveyed by the Alternative Investment Management Association were all related to standards and data. In fact, lack of data was the fourth most commonly cited concerns amongst the managers surveyed.

CFM: *Would the PRI advocate for some form of regulatory oversight for sustainable reporting and data?*

FR: Yes. We would need it. And in some countries that is already happening, where regulators are requiring enhanced forms of reporting. We do work with regulators and certain governmental organisations and we have been heavily involved with the EU Action plan and 'HLEG', the High Level Expert Group on sustainable finance that is working its way through the EU commission. Within the PRI we have a policy and regulatory team, along with senior staff that engage with, and act on behalf of our signatories when regulatory topics are being discussed.

CFM: *What, from the perspective of the PRI, do you think is the most pressing issue in the next couple of years for the industry?*

FR: Most definitely climate change. Not to say that other issues we discussed today are any less important, but the time horizon to address climate-related concerns are getting shorter and shorter. We published a paper in September this year before the IPCC (Intergovernmental Panel on Climate Change) was published, reiterating the consensus that global warming needs to be limited to 1.5°c of pre-industrial warming. The Paris agreement calls for a limit of 2.0°c. But, at the current trajectory, the world is set to warm by over 3.4°c. It would spell utter disaster if the world warms beyond 3.4°c in terms of physical risks brought about by natural disasters. In our view, not enough is being done to address these risks and not enough action is being taken. We hold the view that if action is not ratcheted up to address these issues, by 2025 governments are likely to enact extreme measures, and that those measures are likely to have a severe impact on investment markets.

CFM: *What would be your wish list for asset managers in order to address climate change?*

FR: Act now. Or we are going to suffer later. We all live in this world, and as investors we don't have the luxury of going into a bubble thinking our actions will have no effect. No matter what type of investment manager you are, you need to be thinking of climate resilience, and question the nature of your portfolio. You need to be thinking what are likely changes in the climate going to mean for my investments? How are the companies that I'm invested in making the transition to a low or zero carbon environment, and do the companies have the skills on their board to navigate these challenges? Ultimately, investors and policy makers need to think about how we invest in the energy of the future, and not the energy of the past.

> **"How are the companies that I'm invested in making the transition to a low or zero carbon environment, and do the companies have the skills on their board to navigate these challenges?**

CFM: *What other elements do you deem most important in fighting climate change and boosting further ESG growth?*

FR: More stability from governments. For strategic, long term investment, it is crucial that you know what policies governments might enact if you want, for instance, to move from high carbon to low carbon investment. It is very challenging for long term investors if they cannot trust the longevity of government policy. A change of government is often accompanied by a change in climate-related, or renewable energy policy. How can you be a serious long term investor under such conditions? One needs stable government, with clear intent and I think investors have a role to play in getting the policy settings right.

CFM: *When you leave your office for the final time, what would you consider a successful tenure at the PRI?*

FR: If we don't have to use the words responsible investment anymore. That all investment is done in a responsible way, and all investment is done considering ESG factors. Most organisations, like ours, should ultimately set out with a mind-set of, if I do my job properly, I won't be needed anymore.

Disclaimer

THE TEXT IS AN EDITED TRANSCRIPT OF AN INTERVIEW WITH MS. REYNOLDS ON DECEMBER 3, 2018 AT THE OFFICE OF THE PRI IN LONDON. THE VIEWS AND OPINIONS EXPRESSED IN THIS INTERVIEW ARE THOSE OF THE PRI AND MAY NOT NECESSARILY REFLECT THE OFFICIAL POLICY OR POSITION OF EITHER CFM OR ANY OF ITS AFFILIATES. THE INFORMATION PROVIDED HEREIN IS GENERAL INFORMATION ONLY AND DOES NOT CONSTITUTE INVESTMENT OR OTHER ADVICE. ANY STATEMENTS REGARDING MARKET EVENTS, FUTURE EVENTS OR OTHER SIMILAR STATEMENTS CONSTITUTE ONLY SUBJECTIVE VIEWS, ARE BASED UPON EXPECTATIONS OR BELIEFS, INVOLVE INHERENT RISKS AND UNCERTAINTIES AND SHOULD THEREFORE NOT BE RELIED ON. FUTURE EVIDENCE AND ACTUAL RESULTS COULD DIFFER MATERIALLY FROM THOSE SET FORTH, CONTEMPLATED BY OR UNDERLYING THESE STATEMENTS. IN LIGHT OF THESE RISKS AND UNCERTAINTIES, THERE CAN BE NO ASSURANCE THAT THESE STATEMENTS ARE OR WILL PROVE TO BE ACCURATE OR COMPLETE IN ANY WAY.

FOR MORE INFORMATION ON THE PRI AND HOW TO ACCESS A LARGE CACHE OF RESEARCH, PLEASE LOOK AROUND ON THEIR WEBSITE: WWW.UNPRI.ORG

Other news

- CFM officially opened its Sydney office in November 2018. The opening coincided with a research seminar, hosted by our head of Alternative Beta strategies, Phil Seager, on the topic of crowding.
- CFM hosted its annual European Autumn Seminar in London on 14 November. We had the pleasure of welcoming Mr. R. David Edelman (former White House Technology Advisor to President Obama) and Paul Craven (Behavioural Economist and former Head of European Institutional Business at GSAM) amongst the speakers. See a summary of the event here: https://www.cfm.fr/assets/Uploads/Highlights-from-CFMs-London-Autumn-Seminar.pdf
- Our Co-Head of Execution, Zoltán Eisler, along with others from CFM presented research at the Market Microstructure Conference in December. More details about the conference and the topics can be found here: http://market-microstructure.institutlouisbachelier.org/Program.aspx?lng=EN#.XEtInWf3hNd
- Senior Research Advisor Charles-Albert Lehalle presented at the Bloomberg Quant (BBQ) Seminar in December in New York on Factor Investing and its Implementation Cost. See more details on the Bloomberg events page: https://go.bloomberg.com/attend/invite/quantseminarseries20181210/
- Charles-Albert also presented at the Columbia University Mathematical Finance Seminar on the optimal execution of large orders. See details on Columbia's website: http://stat.columbia.edu/seminars/mathematical-finance-seminar-archive/mathematical-finance-seminar-fall-2018/
- Marc Wouts, a researcher in the Alternative Beta team, presented his 'Jupytext' application (a tool that allows for converting an existing Jupyter notebook to a script or a Markdown document which allows for editing and sharing) at the PyParis conference in November. The slides and video presentation can be found on the conference website: http://pyparis.org/
- Laurent Laloux, our Chief Product Officer, presented at the CFM-sponsored Systematic Investment Strategies Symposium in December in New York on 'Major Quant Strategies in a New Macro Regime'. Details of the event can be found on Institutional Investor's website: https://www.iiforums.com/Institutional-Investor-Forums/Systematic-Investment-Strategies-Symposium?platform=hootsuite

- Laurent also presented at the TrackInsight European Summit 2018 in November on 'New Frontiers in Artificial Intelligence Applied to Investing'. The full agenda and further details are on the event's website: https://www.trackinsight.com/tes2018
- André Breedt, a research associate in the Alternative Beta team, took part in a panel discussion: 'ESG - what is it good for, and how to overcome data challenges' at the Neudata Alternative Data Summit in November in London. Details can be found here: https://www.neudata.co/conferences/alternative-data-london
- See the details of all our other upcoming events here: https://www.cfm.fr/events/
- Below is a selection of our recent papers:
  - Optimal cleaning for singular values of cross-covariance matrices: https://arxiv.org/abs/1901.05543
  - Slow decay of impact in equity markets: insights from the ANcerno database: https://arxiv.org/abs/1901.05332
  - Econophysics: Still fringe after 30 years?: https://arxiv.org/abs/1901.03691
  - Crossover from linear to square-Root market impact: https://arxiv.org/abs/1811.05230

Whitepaper

The what, why, and decisively, the how of ESG investing: observations from a Systematic Quant Manager

Executive summary

There is a common line being dragged through financial literature on the ever-increasing importance of ESG investing, to what extent it is primed to alter the investment industry, and how managers and investors should prepare for this 'mega trend'.[10] The line has become so ubiquitous as to be caught embarrassed if one is not aligned with this kind of thinking and seemingly agreed conviction.

It is therefore important to understand the implications of ESG integration into a portfolio. It is important when clients have particular requests relating to sustainable or responsible investment, that a manager can clearly articulate and explain the likely, or probable implications for the portfolio and what the impact (if any) may be on performance. It is important to explore and forecast the direction of the market, and the likely requests that one could receive from clients. It is important to understand and anticipate the most likely exclusion requests, and how they may align and compare with other clients' exclusion requests. Since socially responsible values are in flux, it is necessary to monitor and update ESG policies accordingly. It is important to understand the shifting sands of ESG investment to be ready and prepared to offer insights as to how ESG investment strategies may affect a portfolio.

As systematic quantitative managers, our rules-based strategies should pass a minimum statistical threshold before being put into production, but the strategy should also be underpinned by economic rational. An ESG approach certainly satisfies the latter requirement, but such approaches have, thus far, not passed the first hurdle. We have, through our research, identified a variety of pitfalls of accounting for ESG as a systematic quantitative

[10] ESG has often been cited as one of the few 'mega-trends' set to shape the asset management industry, along with Big Data and Machine learning. See for example: https://www.dbresearch.com/PROD/RPS_EN-PROD/Big_data_shakes_up_ESG_investing/RPS_EN_DOC_VIEW.calias?rwnode=PROD0000000000435639&ProdCollection=PROD0000000000478852

manager. Many of these same pitfalls have been identified by others, not only quants. We are committed to understanding and incorporating ESG information into our investment process when it becomes appropriate.

Introduction

A peculiar 'highlight' ringing in the New Year for the finance set of late, is the hotly anticipated 'Letter to CEOs' of Larry Fink. As CEO of the world's largest asset manager, BlackRock, the finance industry tends to sit up and take notice when you opine on what might be in store for the world and the industry.

In his 2018 letter,[11] entitled 'A Sense of Purpose', Mr Fink wrote that "a company's ability to manage environmental, social, and governance matters demonstrates the leadership and good governance that is so essential to sustainable growth". This lent a sizeable amount of credence to investors and advocates for sustainable investment, many of whom would have felt vindicated against some of the sceptics and naysayers. The 2019 letter pushed the same line. Entitled "Purpose & Profit", Mr Fink doubled down on his firm's conviction that "environmental, social, and governance issues will be increasingly material to corporate valuations".

It is not hard to find complementary commentary touting the rise in the importance of sustainable investment, or accounting for environmental, social, and governance issues, or ESG – the commonly used acronym that has become shorthand for the crusade of accounting for sustainability in investment practices.

The aim of this note is to scrutinise some of the most famous assertions of ESG investing, and highlight a selection of the major developments in the space. The inherent nature and nuanced character of ESG and sustainable investment allows for a much deeper dive into each of the unique topics, which is not the aim of this note. Although there is much room to add our own empirical input to the debate on these topics, our views are evolving on an on-going basis. We are taking this opportunity to reflect and highlight some of the common approaches employed by asset managers, but viewed and compared through the lens of a systematic quantitative manager. We will, throughout and in conclusion, refer to our own research, and future plans for ESG investment.

While the 'what' and the 'why' of ESG investing are largely settled issues, the 'how?' as the Bard put it: "There is the rub".

[11] You can find the letter on the BlackRock website here: https://www.blackrock.com/corporate/investor-relations/larry-fink-ceo-letter

The what

The 'What is ESG' question depends on who you ask. It includes a broad spectrum of investment possibilities, ranging from impact investing to green bond issuance. Once you start tinkering under the hood, the scope and the divergence of topics rolled under its umbrella quickly becomes dizzying.

Of course, most of these investment approaches are not directly relevant (or importable) for a systematic quantitative manager, and it is best left alone for the purposes of this note. ESG has, nevertheless, become the moniker for all things related to sustainable and responsible investment. Although no one (wholly agreed upon) definition exists, it is implicitly understood as an incorporation of ESG metrics into the security selection and allocation process. What this incorporation entails, equally carries competing views, leading to a wide array of product offerings.

What is it for a quantitative systematic manager? It presents as an opportunity to uncover hitherto unknown trading strategies, and an opportunity to find alpha. It might also present the opportunity to uncover risk mitigation strategies.

The why

Universal acknowledgment by the scientific community that climate change is real, serious, and likely to materially alter the future is probably the most visible and tangible issue that is driving interest in sustainable investment. The implications of climate change, directly affecting all aspects of daily life, makes it one of the few truly global issues. In 2018, when the world was battered by a slew of natural disasters, the talk of climate change, the damage being doled out by mankind, and talk of a transition to a zero-carbon world all received renewed fervour. There are, in addition, various other unique, distinctive developments that have driven the rise of ESG. It is useful to review some of these, in order to help us to understand how to respond.

Better performance (alpha) and improved risk profile

Most champions of ESG investing claim better performance. The intuition is after all sound: a 'sustainable'

company, being concerned for the environment, caring for its employees, and paying attention to how it's governed should lead to a better long-term risk/return profile than its unscrupulous cousins.[12] This means that a belief has taken hold that a company which is 'ethically' managed, should, all else being equal, outperform its less-ethical peers. By extension, a portfolio of firms that exhibit these traits should outperform over the long term. Survey evidence corroborates this belief: according to a survey by RBC Global Asset Management, fully 90% of Institutional investors believe that "ESG-integrated portfolios are likely to perform as well or better than non-ESG-integrated portfolios".[13] The survey moreover revealed that 34% of investors claim to incorporate ESG within their alternative investment holdings. The results are not universally conclusive, as the setting, tools, data, and strategy employed in the research can all potentially skew the results.

A different measure of value

The measure of value for a company is different today than in the past. The tangible/intangible ratio of valuation has shifted, with the value of a company increasingly locked up in the 'intangibles' (think of research and development, intellectual property – the code that makes google maps work for instance – or the brand value of a company etc.). By some estimate the value of a company is roughly 84% in intangibles – see figure 1.[14] History has shown that the brand of a company can suffer serious harm if certain risks manifest themselves. Threats of legal action and/or consumer boycotts can, and do affect firm valuation, and hit the bottom line when, for instance, poor governance manifests itself in corporate scandals. The emission scandal that rocked VW is an oft-used example, where, if one could have unearthed the red flags, then one could have taken appropriate steps in terms of exposure. The goal for ESG is thus clear: with a majority of the value of a company entrenched in the intangibles, ESG metrics act as a complementary measure of this value, and, identifying certain risk indicators will allow a portfolio manager to take appropriate action.

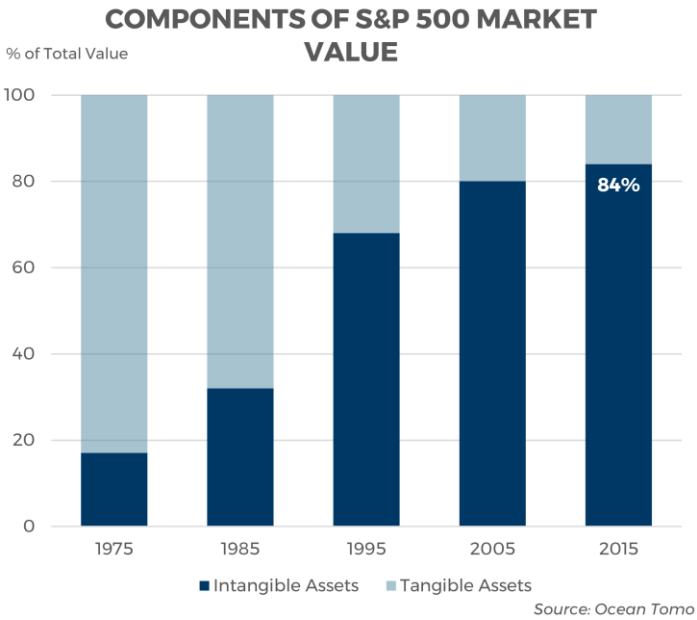


Figure 1: The methodology and full results can be found in the research paper referenced at the end of the paper. The ratio of intangible to tangible assets today are the inverse of 30 years ago. Intangible assets are commonly the most complicated to identify, and to value. Brand, reputation, customer satisfaction, social license to operate, and stakeholder relations etc. are all assets that contribute to the valuation of a firm. These assets are difficult to quantify through traditional financial analysis (and to compare cross-sectional), and are more sensitive to the material issues that resort under an ESG classification matrix. It is becoming ever more relevant to find robust measurement tools for intangible assets, since traditional investment methodologies that put emphasis on current (or short-term) earnings, are becoming less relevant (or exact). The 'Intangible Asset Market Value' study (IAMV) by Ocean Tomo has been extended to include other major indices, with similar results.

Long live the stakeholder

The increased attention of ESG is also a product of a mounting challenge to the 'Friedman doctrine' of the 1950s. Discussing the purpose of corporate governance, the doctrine highlights the alignment of the incentives of shareholders ("principals") and executives of the firm ("agents"), whereby the agents act in the best interest of the shareholders, aiming to maximise their wealth. This mantra is being challenged by contemporary thinking on the subject, where a focus has moved from the shareholder, to the stakeholder, with the momentum of the sustainable investment movement threatening to jump the guardrails of orthodox financial theory, i.e. ignoring the principals of shareholder wealth

[12] CFM also attempts to adhere to such principles in a belief that such a strategy has the highest probability of generating long term success.

[13] See the result of the survey, entitled "Responsible Investing. Charting a Sustainable Advantage" on the RBC website: http://www.rbcgam.com/corporate-governance-and-responsible-investment/esg.html

[14] Refer to the study by Ocean Tomo, entitled Intangible Asset Market Value. http://www.oceantomo.com/2015/03/04/2015-intangible-asset-market-value-study/

maximisation, in favour of stakeholder utility maximisation (the customers, communities, workers and businesses interconnected with the firm). Such a paradigm shift in business is inherently a focus on long-term profitability and sustainability, away from shareholder-centric short term profit maximisation. This rational marries well with the principles of ESG and ESG-focussed investment.

This transition is being witnessed by investors who are becoming more vocal in pressuring business leaders to consider long term sustainability (or "purpose" – refer again to the letters of Mr Fink). Along with the increase of concentrated ownership, an effect of the steady and sustained rise of passive investing, has made the trio of BlackRock, Vanguard, and State Street together, the majority owner in 88% of firms of the S&P 500.[15] This concentrated ownership lends immense influence. They are able to play a pivotal role in shareholder meetings, and exert considerable sway over the board and management. They are uniquely positioned to advance a particular agenda, and, it seems thus far, that these asset management behemoths have taken a pro-sustainability approach.

In turn, large institutional investors are putting increased pressure on managers to incorporate an ever-growing list of sustainable investment requests, and, are expected to communicate their policy of sustainable investment. Traditionally confined to rules-based systematic investment strategies, the quantitative (most often short-term oriented) investment community was able to escape the scrutiny. There was a belief that the inherent nature of the strategies of most systematic quantitative investors was immune to the pressures of asset owners. Although that is in part still the case, the tide is turning and the status quo is being challenged.

Millennials…

Proponents of ESG investing point to a shift in investing style and priorities that the massive transfer of wealth within the coming decades will bring about.[16] 'Millennials', it is said, have a stricter view on socially responsible investment, and will demand that asset managers become more discerning in how they invest. Commentators and academics argue that a newer generation will have different investment objectives than their parents, with millennials being also quite vocal in their convictions. The departure of the head of the Cambridge Endowment fund in 2018 being a high-profile result of where growing pressure from students (and staff) calling for the endowment to dump its fossil fuel holdings led to a concrete outcome.[17] (The endowment decided not to pursue the divestment strategy after investigation of its fossil fuel holdings).

Harking back to Mr Fink's 2019 letter to CEOs, millennials were singled out as one of the driving forces towards '"purpose" along with profits, citing a study in which millennials, when asked what "the primary purpose of businesses should be", sixty-three percent more of them said "improving society" rather than "generating profit."

Disruptions in the market and the need to innovate

A spate of disrupting forces in the global economy is (and has been) taking its toll. The past decade has seen a surge in the scope and influence of social media and technology companies, with large industrial companies yielding some of its erstwhile might. Electric cars have disrupted the auto industry, with heritage automakers all scrambling to compete and roll out their own visions of the future. Climate change and related activities are, as it looks now, set to act as a serious disruption. All of this has translated into a shortening of companies' longevity, reflected in the tenure of companies in the S&P 500 over the last 50 years. A study by Innosight shows that the average tenure of companies on the S&P 500 was 33 years in 1965, dropping to 20 years by 1990.[18] They forecast a further drop to 14 years by 2026. For companies to succeed in the long term, and whether the increased scope (and rate) of disruptions, it is therefore of increasing importance to monitor and adapt to a changing landscape. If the 'mega-trend' of sustainable investment and ESG are to come to full fruition, companies unable to adapt are likely to fall by the wayside.

[15] See Fichter et al. Hidden power of the Big Three? Passive index funds, re-concentration of corporate ownership, and new Financial risk

[16] By one estimate from Cerulli Associates, U.S. households will transfer $68 trillion over the next 25 years. Eliopoulos et al. highlight this "generational component", of investment conviction where millennials (and Gen Xers etc.) show a strong desire of wanting to integrate ESG into investment decision making. They claim that millennials "have a clear desire to have a positive social impact, to make their investment dollars work for causes they think are important". See: The Next Wave of ESG Integration: Lessons from Institutional Investors

[17] Interested readers are referred to an article in Chief Investment Officer: https://www.ai-cio.com/news/cambridge-university-cio-senior-staff-resign/

[18] Please refer to their corporate longevity briefing: https://www.innosight.com/insight/creative-destruction/

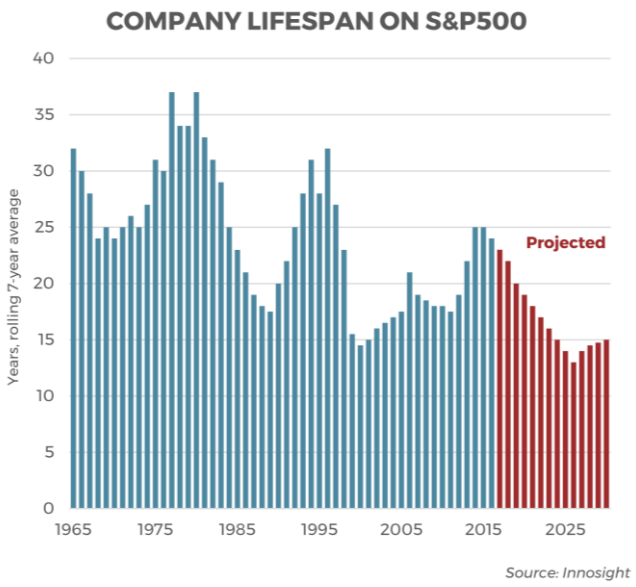


Figure 2: Tenure of companies in the S&P 500. An Innosight study shows that the time companies spend on the list oscillates in cycles, mirroring the overall state of the economy and are subject to disruption from new technologies, including social media, electrical vehicles and related innovation, biotech, cloud computing. If their projections hold true, the expected tenure of a company on the S&P 500 benchmark is expected to approximately 12 years by 2027.

Is ESG investment mainstream?

Not yet.

For all the talk of ESG investment, one would be forgiven for thinking that the market is awash with ESG offerings and a large uptake of ESG-based investment principles. This, however, does not seem to be the case. That the nominal number of ESG offerings (especially by index trackers) have exploded might be true, but many of these funds have relatively low AUM. A cursory look at the size of ESG ETFs for example betray this rather modest demand of ESG interest from the broad market. Only a few of the largest ESG ETFs crack the $100 million AUM mark, with the total size of the ESG ETF market estimated at only ~$23 billion. That is an insignificant amount compared to the $4.4 trillion assets in global ETFs.[19]

According to the Global Sustainable Investment Alliance, approximately $22.89 trillion was managed under the auspices of sustainable investment.[20] The figure may overstate the scale at which sustainable investment has made gains, since the largest component of the headline figure is exclusionary screening. While it is true that screening is a commonly employed tool, it is a stretch to claim that any strategy that constrains a portfolio by some elementary screening process could (or should) be counted towards the whole industry headline figure. It is unclear, since the data is self-reported by respondents to the study, whether every dollar is invested in a responsible way. One could hardly argue that a fund that peddles a pedestrian ESG exclusion list should be wholly counted as part of the global responsible AUM. (It would of course be very challenging to measure what part of such a fund is responsibly invested.)

The how

There exist a multitude of different ways for asset managers to incorporate ESG information into their portfolios. However, managers that choose to account for ESG information in whatever guise are confronted with an immediate, normative dilemma. While most (not all) would agree that tobacco manufacturers have no social benefit, and could easily exclude these companies from their portfolio, the decision becomes more nuanced when having to decide on, for example, energy firms.

Doing well by (thinking one is) doing good

Energy companies are an interesting case for climate change evangelicals, since most large energy companies are still in the business of producing and refining fossil-fuel products. As the science on the topic of climate change is settled, advocates for a transition to a more sustainable future of energy should be supported. Nevertheless, the world remains incessantly reliant on abundant, cheap energy sources, with nearly one billion people, or 13% of the world still lacking access to electricity.[21] The vast majority of these live in emerging countries, where, governments argue, they have the right to pursue policies – including power generation from fossil fuels – to support economic growth. This demands large scale electrical infrastructures – most often using fossil fuel. This leaves policy makers in a quandary: how does one provide access to energy and yet curb climate change. Of course, this is not a binary choice, with many new energy projects consisting of renewables, and many existing power plants being overlooked in favour of renewable options. Consensus, still however, is that global electrification is

[19] See the EY Global ETF Survey 2017: https://www.ey.com/gl/en/industries/financial-services/asset-management/ey-global-etf-survey-2017

[20] Or, roughly a quarter of the total global assets under professional management. See the GSIA report here: http://www.gsi-alliance.org/

[21] According to the International Energy Agency. See their 2017 'Energy Access Outlook. From Poverty to Prosperity': https://www.iea.org/publications/freepublications/publication/WEO2017SpecialReport_EnergyAccessOutlook.pdf

impossible without the use of some form of fossil fuel derived alternative in the short to medium term.

Getting to the rub

There are, broadly speaking, seven commonly employed ESG strategies. Remaining consistent, we again refer to the GSIA report and its breakdown of the commonly used strategies - see Figure 3.

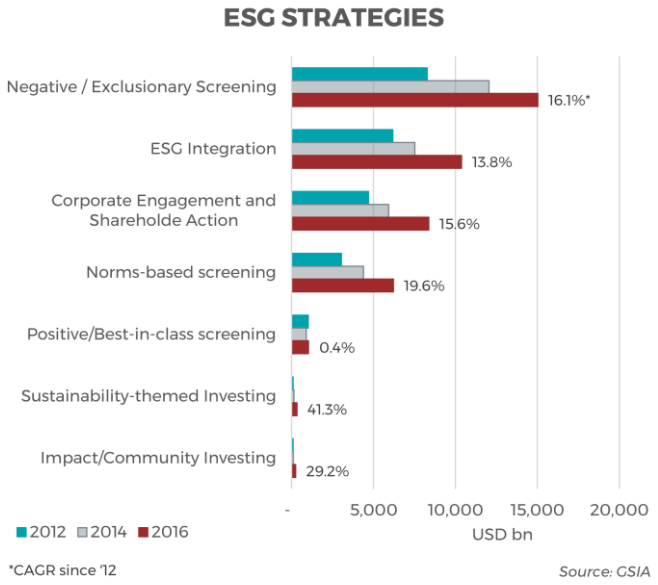


Figure 3: There are broadly speaking, seven primary methods of accounting for ESG information. All of these methods have shown impressive growth, with Screening and Integration the two preferred methods.

Screening

Negative or exclusionary screening remains the most ubiquitous strategy, for obvious reasons. It is arguably the easiest way of accounting for a certain investment objective, as the manager can simply eliminate certain 'dubious' securities (or sectors) from an investable universe that run counter to the investor's (or the asset manager's) investment convictions. This is a very blunt approach, whereby the subtleties of individual companies' efforts on ESG issues are unheeded. It also does not make allowances for idiosyncratic positive metrics amongst securities trapped under the same classification. Many oil companies spend a significant amount of capital on research and development, often on renewable energy sources. Many of these companies, while certainly reliant on their core business for the foreseeable future, are inherently plugged into the energy ecosystem and best placed to navigate through a transition to a low-carbon economy.[22]

There are, nevertheless, two key issues with this approach. It enforces a pre-defined normative judgment on investors (otherwise it has to be tailor-made to each investor, making it much more operationally costly), and will probably diminish the diversity of the portfolio. Incorporation of ESG information into a portfolio through a screening protocol will imply, in most cases, a more restricted universe and/or additional constraints which could affect future performance.

In any event, screening has become a mainstay of the ESG landscape, and is likely to remain a common tool enforced in many mandates. Whilst many managers maintain their own lists, most asset owners could provide their own. Most of these lists nevertheless have a common theme, with controversial weapons, tobacco, and fossil fuels the usual suspects. These lists also have a high correlation with the exclusion list of Norges Bank, which has become somewhat of a yardstick for exclusion lists in the industry.[23]

A major drawback of this approach, often invoked by disgruntled shareholders, is that exclusion eliminates the possibility of playing the role of 'activist' investor, whereby through a stake in a company, shareholders can exercise their voting right. This, along with direct access to management, can put pressure on the firm to address certain shortcomings. Besides negative (or exclusionary screening), investors could employ positive screening, i.e. the deliberate inclusion, or overweighting of firms (sectors) that exhibit best-in-class characteristics on all or certain ESG metrics.

Running a simulation in our Equity Market Neutral portfolio, with an arbitrary screen – we remove all securities from 4 subsectors, namely, Coal, Oil, Gas, and Oil & Gas Services – we observe a Sharpe ratio reduction of ~ 3% in the simulated backtest.[24] The removal of these sectors equates to an approximately 5% reduction in individual securities in a worldwide portfolio. This reduction in Sharpe is consistent with randomly eliminating any other sector in an equity market neutral portfolio.

[22] The reader might find the "business readiness" league table of the Carbon Disclosure Project (CDP) interesting. See the ranking of the largest oil and gas companies on their readiness for a transition to a low carbon economy on the CDP's website: https://www.cdp.net/en/investor/sector-research/oil-and-gas-report

[23] The 'Observation and Exclusion of Companies' are published and updated on the website of Norges Bank: https://www.nbim.no/en/responsibility/exclusion-of-companies/

[24] The securities, while not entirely eliminated from the pool of eligible securities, are systematically forced to receive a null predictor position, but, these stocks remain eligible for hedging purposes.

Integration

ESG integration is held out as the benchmark strategy by diehard ESG disciples as the strategy investors should endeavour to adopt. It is also the most involved, and complex.

There is a wealth of academic research showing that ESG integration (in its many guises) could produce excess returns, while some contradicting research shows the opposite (or no effect). Many studies reveal U-shaped equity returns, where both best-in-class and worst-in-class ESG stocks have performed above the market. Our own research[25] has shown that any residual performance by integrating ESG as a predictor can be wholly explained by the quality factor. As we argued in our research, we believe the main stumbling block for adoption of ESG integration in a systematic way is the lack of consistent and reliable data.

Data

Quality, Comparability, Materiality: these will be key.

All investment decisions are reliant on data, and most investment decisions are based on structured and standardised data. Typical ESG data is neither. ESG information is ill-defined and is compiled from an infinitely vast heterogeneous set of issues. It is not as well defined as most financial metrics, based on regulated corporate and reported balance sheet information.

Most of the mainstream ESG data providers are reliant on company provided disclosures, and moreover apply a distinctive methodological process in aggregating the data. This vendor-aggregated data is as such laden with subjectivity, all of which leads to low agreement between data providers.[26] The dizzying array of competing rating agencies and data providers make it very tricky for managers to decide on which vendors to use and rely on. This would require the usual data testing and verification, which is both costly and time consuming. Some have conducted research, by incorporating – in a proprietary manner – a stream of varying data vendors. Any study however that relies on one, or any amount of proprietarily aggregated streams of data providers, will be subject, to some extent, to the same discrepancies at source.

In figure 3 we plot the rankings of two popular data providers of the constituents of the S&P 500. There is a ~ 50% correlation between the two providers on the ranking of the S&P 500 – companies of which 80% report on sustainability measures.

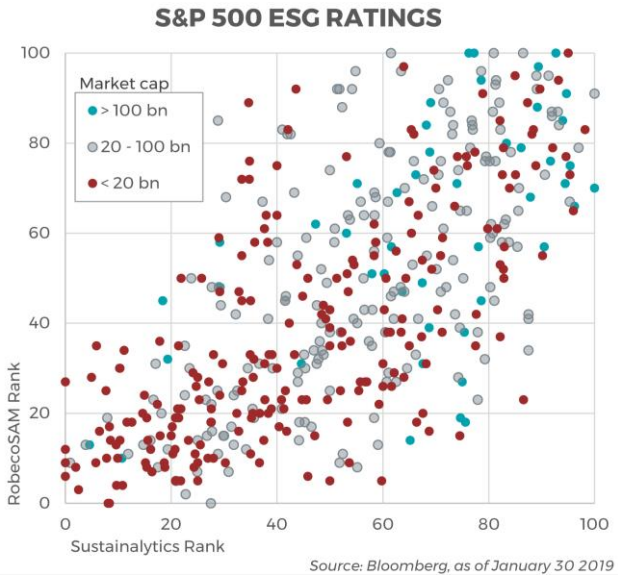


Figure 4: We plot the ratings assigned by Sustainalytics against those of RobecoSam – both well-known and oft-used provider of ESG ratings. We strictly included securities that feature a ranking by both rating firms, bringing the total to 469 securities. There is low level of agreement between the two rating agencies, with lower coverage observed on lower market cap constituents. The smaller cap constituents also typically feature lower rankings than larger-caps. This is consistent with much of the criticism directed at ratings i.e. tilted in favour of larger cap firms, the firms that have the resources, corporate and social responsibility departments with internal know-how of not only responding, but responding in such a way to rating agencies' surveys as to maximise their score. This does not amount to 'greenwashing' as such (another pervasive problem), it is merely a way of optimising a score. It is conceivable that rating firms also place a much higher emphasis on larger caps, with rating analysts focusing their efforts much more on these firms.

A relatively short history of extra-financial information related to ESG offered by data vendors, typically no more than 10-15 years, with only monthly – and often only yearly updates – further makes the search for statistically significant results difficult. The data also reveals biases, market cap and country biases most commonly. Tilting a portfolio based on simple ESG rankings might therefore expose a portfolio to unintended secondary market exposures or concentrations, likely to European stocks in a global portfolio for example.

An often overlooked aspect of ESG rating data, is the downstream connectedness of firms with suppliers. Even if a company can boast an impressive headline ESG rating, the rating of its downstream suppliers might be much

[25] See our academic paper "IS ESG an Equity Factor or Just and Investment Guide" available on our website.

[26] The low agreement of ratings between data vendors is a well-documented problem. See for instance Aaron et al. Do Ratings of Firms Converge? Implications for managers, Investors, and Strategy Researchers.

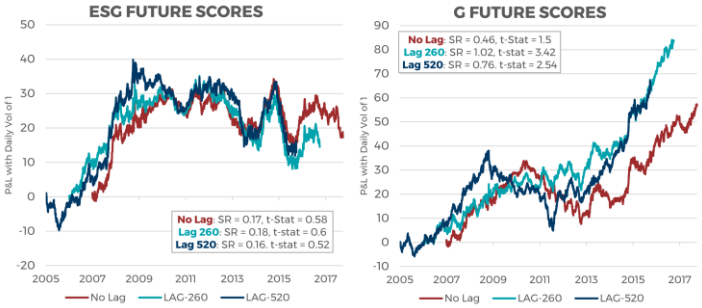
lower. It seems reasonable to account for the ESG profile of a company's suppliers, especially if the dependency (or connectedness) is high. One example is that of Foxconn. Foxconn is a key supplier to a majority of notable Technology firms. While all points to Apple being a company of high corporate responsibility credentials, its main supplier, Foxconn, has been subject to multiple allegations of poor labour practices, and, according to ESG rating vendors, scores very poorly.[27] One method to account for this, from a sustainability perspective, is to incorporate this connectedness (reliance) by increasing or decreasing the target company's ESG rating based on the rating of the supplier. A measure such as revenue earned from the target company could be used as a proxy to appropriately reweigh the ESG score of the target firm.

Of course, exclusion and integration could go hand-in-hand, where an initial rudimentary screen on a securities universe, is followed by an integration approach. Applicable ESG-signals (based on the ESG fundamentals of companies) can be appropriately weighted alongside other factors. The weight of the companies in the portfolio can be adjusted based on the weight that is given to the ESG signal. The difference might not be trivial, depending at what stage the incorporation is done, i.e. integration vs blending of identified ESG signals. ESG signals may take on different weightings depending on the needs of the client (how sensitive or high their conviction threshold is) or based on performance, the portfolio can be tweaked, creating a dynamically adjusted ESG portfolio.

Testing if ESG data contains Alpha

We run a simulation, with a lag of 260 and 520 days (one and two calendar years respectively), using the future ESG information as our signal. We test in effect, whether future ESG information could deliver alpha. On a worldwide universe of firms, we only use the future (perfectly known to us) ESG predictor. Results are disappointing – see Panel 1. Knowing in advance the future ESG scores of companies does not seem to deliver positive returns. With a lag of 260 days (knowing the ESG scores one calendar year in advance), the strategy delivers a Sharpe ratio of 0.18 with a t-statistic of 0.6 – consistent with noise. When we increase the lag to 520 days, the Sharpe ratio is even lower. One can conclude that either the market has already priced in this ESG information, a hat tip to the efficient market hypothesis disciples, or that the market does not give any weight to this information.

Consistent with our previous research, we consider the same simulation, but only with governance information as our signal. Those results are more interesting. Going long the best governance-rated firms, and short the worst rated, we obtain a Sharpe ratio of 1, with a significant t-statistic of 3.42. Governance metrics seems to contain information about future price movements. However, our research shows that this is a proxy for other information, such as profitability, which has more predictive power.



Panel 1

ETFs

ETFs have become a popular delivery method for ESG convictions. Themed, ESG ETFs have emerged as a niche and an alluring alternative to the humdrum market-cap ETFs, and, allow for a simple alignment with one's particular moral, or ethical objectives. It may even act as a diversification factor in a larger portfolio. These themed ETFs are a symptom (and a response) of the zeitgeist in the asset management industry, where passive investment is augmented by the trend in ESG.

The love-affair between ESG and ETFs has blossomed and allows for endless options to cater to all the trendy preferences of investors. A look into the size and constituents of ESG ETFs, however, reveals an interesting pattern. For one, despite the hype and interest, the inflows into these funds have been lacklustre. One of the most prominent (and earliest) ESG-focused ETFs is the iShares MSCI KLD 400 Social ETF. As of January 2018, the ETF had ~ $1.2 billion assets under management. The main culprit for low demand has ostensibly been the higher cost as compared to their more pedestrian, vanilla brethren (in an ever more cost sensitive environment). The lacklustre demand has not dissuaded other heavyweights in the passive investment space, with Vanguard launching (and responding to the higher cost concern) the Vanguard ESG US Equity ETF. Charging only 12 basis points (comparable

[27] The allegations over poor working conditions and suicides at Foxconn have been well documented. On the behest of Apple, the Fair Labor Association launched an inspection of Foxconn, and found "excessive overtime and problems with overtime compensation; several health and safety risks; and crucial communication gaps that have led to a widespread sense of unsafe working conditions among workers". See the report here: http://www.fairlabor.org/report/foxconn-investigation-report.

to some of its flagship ETFs), the fund has received only $135 million of inflows since its launch in September 2018.

Investors, spoilt for choice by the profusion of ESG tilted ETFs, and wishing to allocate funds to specific, narrowly defined causes, might be disappointed to learn that their (more expensive) ETF seems, at least within its top constituents, to resemble most other ETFs. A hallmark of ESG tilted or screened ETFs is a heavy exposure to technology stocks, with the largest ETFs by assets under management consistently overweight technology stocks, and frequently containing at least one pharmaceutical stock or large bank within the top 10 holdings. This is sensible when looking at the average score of telecoms in the MSCI ratings – and the fact that they have the added benefit of being large market cap stocks. (We have eluded in the past to the strong market cap bias observed in ESG ratings.)

It is a real challenge to beat the market, if you are essentially just tracking it. While this is beneficial from the stand point of still having an ESG mandate, with a low tracking error to the market, it emboldens the naysayers in that it does not seem to produce excess return.

The composition of ESG ETFs is an amusing insight into how ESG can easily stray into normative judgement. Take for example the Inspire Corporate Bond Impact ETF. The fund seeks to track its namesake index, consisting of 250 investment grade corporate bonds of US companies aligned with "biblical values". These values are measured by the 'Inspire Impact score', as set by the 'Biblically Responsible Investing Institute', or BRII. The BRII issues an exclusion list of companies that "are of concern to Christians" in which the Inspire ETF cannot invest.[28] These exclusions of the BRII, are amongst others, companies that receive a perfect score on the 'Human Rights Campaign Equality Index' – an organisation that advocates for equal treatment of individuals that identify as LGBTQ in the workplace. Whilst promoting equality in the workplace may run counter to their conviction, the Inspire Impact ETF is however free to include arms and weapons firms, as it does, with General Dynamics included as a constituent. General Dynamics, one of the largest US arms manufacturers is, however, routinely excluded from a whole host of controversial weapons lists, including the Norwegian Sovereign Wealth Fund's exclusion list (again, which is often considered, and copied, as a benchmark for exclusion).

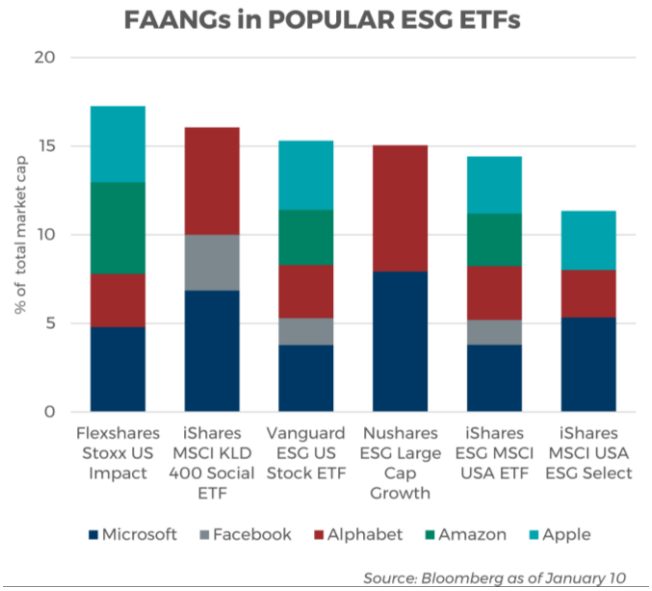


Figure 5: A selection of the largest ETFs all feature a sizeable allocation to technology firms.

It is for all these reasons that ESG investments are succumbing to a growing worry of "mis-selling".[29] Investors, one may rightly assume, would expect that a themed or issue-targeted ESG ETFs are markedly different from a market-cap index. While this is sometimes the case, it is commonly not. This worry may threaten to undermine the growth of ESG investment as investors become disillusioned, and at the same time, more savvy on ESG investment.

We as systematic managers would run the same tricky gauntlet as discretionary managers, in that our ESG investment conviction may run counter to some clients' convictions.

Divestment

Another method having gained traction (although, by no means a new strategy), is that of divestment. That is to say deliberately, and, in most cases, quite vocally selling holdings in a company as a way to publically reprimand the actions of a firm. The distinction between negative screening and divestment is more than just a subtle difference, since divestment is more of an activist slant than simply eliminating certain firms from an investable universe. It has become a popular tool (and threat) especially from large asset owners who often have substantial holdings in any one firm.

Whether divestment is effective in bringing about change or altering the behaviour of the core business practices of

[28] See https://www.briinstitute.com/screens.htm#fn4

[29] A recent article in the Financial Times highlights the issue over "mis-selling of products marketed as having strong environmental, social and governance credentials" with a vast majority of financial advisers "very" or "fairly" concerned "about the potential for allegations of mis-selling" of ESG-badged investments. The article is available on the FT website: https://www.ft.com/content/2d3f7683-65a6-3171-8cbb-66ff5ab34405

firms is unclear. Many advocates of this approach claim that divestment will increase the cost of capital for the firms, forcing them to either change their business model, or, go out of business. Although the logic may seem sound, the market will always offer sufficient investors that do not share the same moral objections, or operate under the same policy scrutiny, that would still buy these stocks. Even if a targeted and coordinated divestment campaign drives down share prices, this would likely trigger opportunistic buying from neutral investors if the fall in price represents a short-term discount.

For a systematic quant investor the method of divestment throws up the same core problem as screening: a reduction in diversification and hedging opportunities.

The future: where are we now? And where do we go from here?

Data and the measurement of intangibles

It is clear that ESG data presents as both the biggest impediment to security selection, and (probably) the most commercial opportunity. ESG also fits nicely into the contemporary thinking that traditional indicators could (and should) be augmented with non-traditional data in forming a more holistic view of firm risk and value.

The story of ESG is in large part the story of alternative data, with the unstructured nature of data an opportunity for systematic quant investors being uniquely positioned to uncover and discern between what information could be alpha generating or not. As it stands, managers could either tap into the vast choice of commercially available data sources (while being cognisant of the hazards of this approach), or employ their own skill to scrutinise alternative data. This will, either way, imply a cost to those managers willing to make an investment in this research.[30]

It is, however, clear that many Hedge Funds remain uneager to embark on such an endeavour. A survey by Unigestion reveals that more than half of European-based hedge funds are reluctant about ESG integration, compared to nearly 70% of US-based hedge funds.[31]

A main concern for the lack of interest, is the unease about the quality of data. That data should be improved is a widely agreed objective, advocated by the finance industry and non-governmental organisations.[32] A few organisations are making strides into setting the pace for data quality and comparability. The Task Force on Climate-related Financial Disclosures (TCFD), which helps companies identify climate-related risks, is one. There are, furthermore, various policy initiatives driving an increase in corporate disclosures related to ESG issues. According to the Governance & Accountability Institute, 85% of S&P 500 Companies published some form of sustainability report in 2017. This is up from the 20% that published these type of reports in 2011, despite different levels of transparency.

There are claims that machine learning, big data and artificial intelligence are enabling better analysis of ESG data. Despite the benefits and opportunities this presents in a systematic framework, this claim should be met with some caution. Machine learning is not always uniquely positioned to tackle all problems in finance. A recent paper by Arnott et al. highlights one of the "crucial limitations" of machine learning, namely "data availability", since machine learning applications work best when there exists a vast amount of data. While the amount of data that could pertain to ESG-like issues has increased, one is susceptible to overfitting and finding spurious relationships with data that are not relevant, or material.

Another barrier often cited for ESG investment practices is the limited understanding of the material ESG issues affecting firms. It is likely that firms will allocate more resources and expertise if they are truly committed to ESG investment.

How much more important might it become? What does the future hold?

Likely, very important.

BlackRock, for example, is projecting global sustainable ETF assets to grow to $400 billion by 2028.[33] Large pension funds have the opportunity, gravitas, and seemingly, a shared conviction in taking it upon themselves to act as sustainable investment activists. Whereas politicians and governments are hamstrung by election cycles, pension funds are fundamentally

[30] One estimate puts the market for ESG data at $505 in 2018 (ESG content and indices), with this figure expected to reach $745 by 2020. See a study by Opimas, entitled ESG Data: Mainstream Consumption, Bigger Spending. http://www.opimas.com/research/428/detail/#

[31] See: The adoption of ESG criteria among hedge fund and private asset managers: a survey by Unigestion. https://www.unigestion.com/publication/the-adoption-of-esg-criteria-among-hedge-fund-and-private-assets-managers-a-survey-by-unigestion/

[32] Of course, strict standards and comparability metrics could potentially stymie innovation amongst data providers, although this is by no means our base case scenario.

[33] See 'An Evolution in ESG Indexing'. BlackRock whitepaper. https://www.ishares.com/us/literature/whitepaper/an-evolution-in-esg-indexing.pdf

managers of long term liabilities. They need to harbour a long term view, and the consensus is that sustainability matters for the long term.

Growing interest in, and awareness of sustainable investment should expand the knowledge base of the topic, and drive sophistication. Standards should become aligned, and data improved.

There are a myriad of reporting initiatives and regulatory projects that will bound firms to increase their reporting quantity and quality, all the while being more closely aligned with more exacting reporting standards. Data providers will be able to crunch this data and reduce some of the existing misalignment. The rating agencies are therefore likely to focus their attention on quantifying more metrics, as this is what the market would likely dictate. A shift towards the increased reliance on data is well under way, and a desire from asset managers for quality, and voluminous data should provide the necessary impetus towards this focus. Nevertheless only when there is an overwhelming belief in the market that data is relevant, accurate, and comparable, are managers likely to adopt it more extensively.

A hitherto gap in what is considered 'ethical' in investment is likely to narrow, as markets converge towards a common alignment: for instance, the United Nations' Sustainable Development Goals, or SDGs – the broad framework for economic growth and sustainable development supported by most governments is being assimilated into many institutional investors' sustainable investment strategies.

There is however one topic that is likely to galvanise support and agreement amongst investors and managers. Climate change is often cited as the single biggest threat facing the planet. The World Economic Forum annual Global Risk Report (2019) lists 'Extreme weather events' as the single biggest global risk in terms of likelihood. This is followed by 'Failure of climate-change mitigation and adaptation' and 'Natural disasters' in second and third place respectively. There is wide consensus that the transition towards a low carbon economy is vital, and that companies are likely to come under intense scrutiny to account for their activities.

It is also in the 'E-pillar' where more materially important metrics could be quantified and are more easily comparable across industries. Institutions like the 'Carbon Disclosure Project' or CDP have taken to task the measurement of companies' impact on the environment, and, measuring their readiness for the low-carbon transition. All of this could (and should) serve as a tonic for further adoption and research into ESG measures.

ESG Migrating to a catch all for quality

From a systematic quantitative perspective, Governance, or, more specifically, the "Quality" of a company may hold the most relevant information for security selection. Our belief is in part founded on our existing research that revealed some promise for the governance factor. Although all of the exposure was fully explained by the quality factor, ESG metrics related to governance might find a place in our suite of quality predictors. Some candidates have been identified and are being researched.

For systematic managers, we believe these governance factors should have a natural universally applicable characteristic, and as such, these indicators should be comparable across all sectors. We could expect to find governance factors that are equally relevant *and* material for all firms, across all sectors. This would be more relevant for a systematic quant approach and should lend increased gravitas to any such governance factors.

For those who subscribe to the Efficient Market Hypothesis, all information should already be incorporated into the price of the company. If there is an underestimation or mispricing of ESG information, this should manifest itself at some point in the future price of a security. The premise of ESG being relevant for valuation is therefore that there is currently, i.) A mispricing of ESG factors, and ii.) Possibly a misunderstanding of how these ESG factors impact the risk and valuation of the company. If this is the case, and analysts have difficulty identifying or quantifying relevant factors that are material to valuations, systematic quant investors are well-equipped to uncover these.

Summary

It should come as little surprise that the research on ESG investing is inconclusive. Analysts often use competing databases, and those who do proprietary research do so with different methodologies. A lack of consistent, comparable data, is, in our opinion, the single largest stumbling block of hoping to find statistically significant patterns in an ESG-tilted strategy.

It is also difficult, and probably misguided to compare the 'ESGness' of portfolios, since no portfolios will have the same ESG strategy, benchmark, or use the same underlying data to construct the portfolio. One feasible solution could be to agree on, and assign an aggregated ESG rank to existing benchmarks by using an independent scoring system. By aggregating (and probably controlling for the market cap bias) scores across

a benchmark, this ESG score could be compared to a portfolio. This however would be tricky with a long/short market neutral strategy.

In a recent New York Times article,[34] the author argued in favour of credit card companies scrutinising and potentially regulating the purchase of weapons. As the scope of ESG increases, one could imagine a time when companies themselves, like credit card companies, become 'activists', not allowing the purchase of certain goods that run counter to their own (the company's) set of normative beliefs. This, as the spokesperson for Visa said will set "a dangerous precedent". The scope of ESG and activist actions, however well-intentioned, could have negative consequences. Although the crusade of eliminating the burning of fossil fuels to satisfy our energy demands is, most would agree, a laudable initiative, it could hamper economic growth in many developing markets. It could hinder the right of providing access to electricity – not only for households but also industries which is vital for economic development. Aggressive decarbonisation could be choreographed by targeted policy, which, with carbon taxation as one proposal, will require poorer countries to pay disproportionately more (energy consumption is projected to grow the most in developing nations).[35] Reduced access to cheap electricity could stymie economic growth.

There is little argument that most will agree or be supportive of the lauded objectives of socially responsible investment. Few will argue that tobacco companies serve a communal purpose or contribute to the well-being of society. What is akin to an artful walking of a tightrope is balancing the morally supportive intentions of an honest ESG approach with the mandate of managing money, based on empirical results, to the best of one's ability. Current, vendor provided data simply does not allow for the systematic implementation of an ESG strategy.

Our results show that integrating ESG convictions by either employing a discretionary screen, and eliminating socially reprehensible firms (based on) from our investment universe, or integrating ESG scores sourced from commercially available datasets does not enhance risk-adjusted returns. This is not to say that, armed with the right data, ESG could not be a future driver of quantitative systematic returns.

ESG investment is a complicated and nuanced topic. We don't have all the answers yet, but we have the tools.

[34] https://www.nytimes.com/interactive/2018/12/24/business/dealbook/mass-shootings-credit-cards.html

[35] See Covert et al. Will we Ever Stop using Fossil Fuels? Journal of Economic Perspectives, vol. 30, no. 1, winter 2016, pp. 117–138.

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