

# PRACTICAL GUIDE TO MULTI-FACTOR INVESTING IN CORPORATE BOND MARKETS



**BNP PARIBAS**  
**ASSET MANAGEMENT**

The asset manager  
for a changing  
world

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Why choose BNP Paribas Asset Management  
for multi-factor investing  
in corporate bond markets?

# FOREWORD



BNP Paribas Asset Management has been among the leaders in factor investing solutions since 2009. Our success is the result of our strong commitment to develop a recognised expertise in quantitative investments to serve your best interests as our investors, at a time when you are keen to diversify portfolios and target higher risk-adjusted returns.

Our teams work closely with investors to build innovative, unique and client-oriented solutions across all major asset classes. We offer factor investing solutions in equities, fixed income (corporate bonds, government bonds and currencies) and multi-asset strategies.

We also recognise that investors are integrating sustainability into their portfolios. For this reason we have recently integrated environmental, social and governance (ESG) factors into all of our multi-factor strategies. We believe this helps us to achieve better risk-adjusted returns over the long term – a benefit we are pleased to share with you, our investors.

Over the years, our combination of fundamental, academic views and quantitative modelling expertise has resulted in a robust multi-factor offering, which today has sustainability and low carbon goals fully integrated into its investment process.

We firmly believe the breadth of our factor investing expertise, combined with the outstanding depth of our research and our ESG goals, allows us to address the needs of all types of investors.

The principal strengths that add value for our clients and push industry standards higher include:

- Consistently robust academic research contributing to industry thought leadership
- A department of quantitative experts comprising more than 40 researchers, portfolio managers and investment specialists with 15 years of average experience<sup>1</sup>
- A recognised capacity to build innovative quantitative solutions tailored to specific client needs
- Expertise in multi-factor investing applied across all main asset classes and regions

## **Denis Panel**

Chief Investment Officer of Multi-Asset,  
Quantitative and Solutions at BNP Paribas Asset Management

<sup>1</sup> BNP Paribas Asset Management, 2020

# INTRODUCTION

The last decade has seen significant growth in factor investing strategies in terms of assets, offerings and providers, with a multitude of strategies proposed. The most rewarding effect of this intense coverage is the growth in investor acceptance. We believe the next stage in the evolution of factor investing will be its adoption in other asset classes such as corporate bond markets.

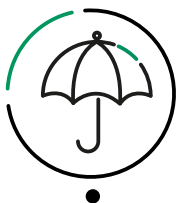
The traditional approach to bond investing essentially focuses on actively managing duration, credit risk and/or currency exposure – three investment activities that can be characterised as directional risks. Factor investing, on the other hand, aims to delve into all the other sources of risk – and returns – most likely to drive markets. The objective of factor-based strategies is thus to improve risk-adjusted returns by actively targeting these non-directional sources of performance, also called factor premiums (or factor alpha). In practical terms, it means that factor-based strategies are designed to generate performance without taking any active view on the direction of interest rates or corporate bond markets.

Factor investing in corporate bonds is, however, not as straightforward as in equities. Numerous differences must be taken into account when applying the concept to corporate bonds:

- (i) For each company there may be many bonds with different maturities and specifications, and hence with different risk.
- (ii) The risk of each bond changes as time passes because the time-to-maturity decreases.
- (iii) Corporate bonds trade in fragmented and opaque over-the-counter (OTC) markets.
- (iv) Corporate bonds offer relatively poor liquidity and many are difficult to trade since many investors hold them until maturity.
- (v) Unlike stocks, where investors may expect to earn outsized returns from companies that see their market capitalisation growing significantly over time, the returns earned by bond investors lending to those same companies will not be impacted as significantly by the growing equity capitalisation. A company whose market capitalisation is growing fast may simply increase its level of debt by issuing more bonds without necessarily having any significant impact on the returns earned by existing bond holders.

The development of factor investing can of course be traced back to the discovery of factors – although factor investing aims not only to identify the ‘best factors’, but to exploit them as well as possible.

The objective behind factor investing is not complex. We seek to tilt portfolios towards the cheapest, most profitable and well-managed companies with the lowest risk and strongest momentum. Not only does this seem intuitive as an investment philosophy, it has also been shown by academics to be a way of targeting higher risk-adjusted returns over the long term.



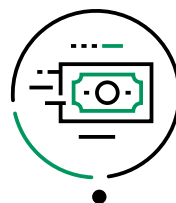
## LOW RISK

Preferring companies with a low risk profile



## QUALITY

Favoring companies with a proven business model



## VALUE

Selecting companies with attractive valuations



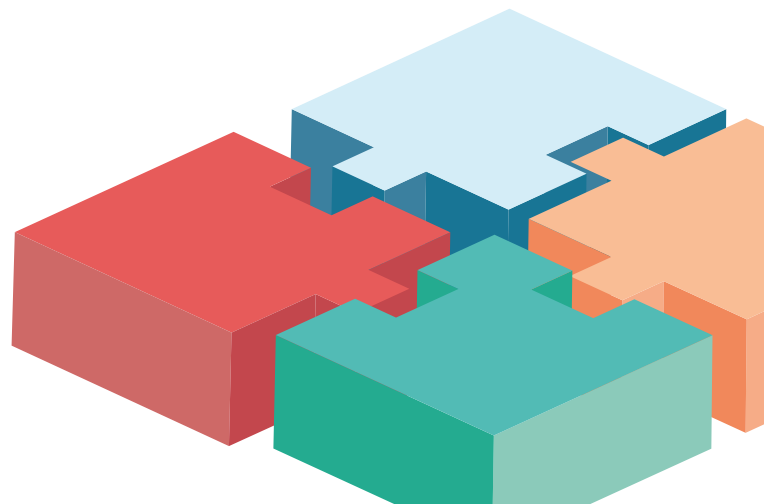
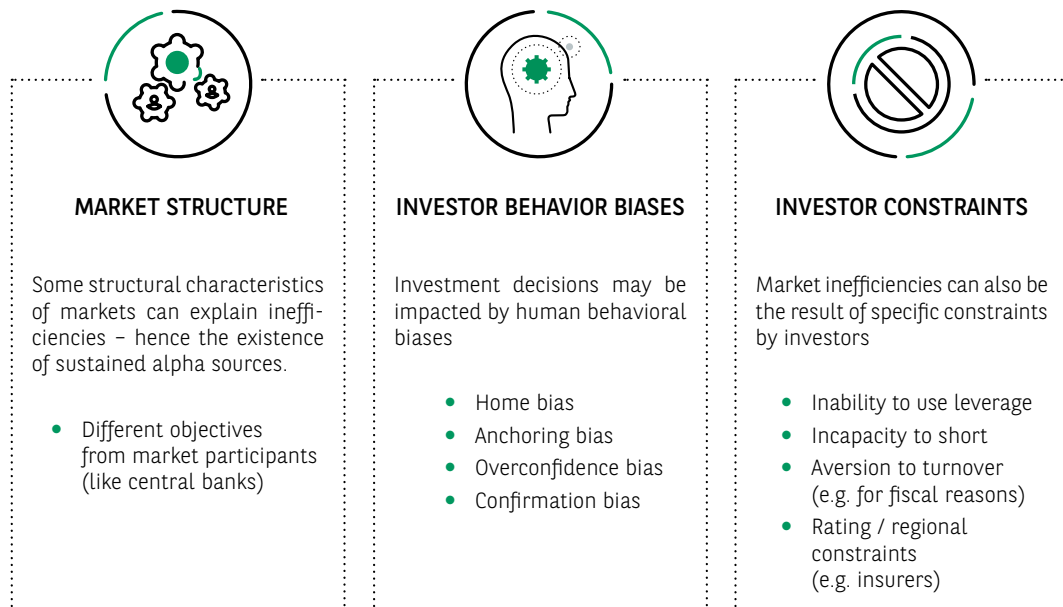
## MOMENTUM

Choosing companies on a positive trend

## WHAT IS A FACTOR?

Factors are characteristics of companies that can be used to compare a company with its peers. Factors tend to be classified into different styles: value, quality, low risk and momentum. Value factors measure how cheap a company is, quality factors measure how profitable and well managed a company is, risk factors measure how risky a company is and momentum factors measure how a company has been performing in the financial markets relative to its peers.

The existence and persistence of the premium of a factor can be linked to market inefficiencies, which may have different causes:



## BENEFITS OF FACTOR INVESTING IN CORPORATE BOND MARKETS

Factor investing in corporate bonds is still relatively new, certainly when compared to factor investing in equities.

It is remarkable that so far, not much attention has been devoted to assessing the extent to which such factors can also be used to design strategies capable of outperforming the corporate bond benchmark indices. After all, the total outstanding amount of corporate bonds issued by non-financial companies globally in 2018 was USD 12.95 trillion, according to the OECD.

Our research into multi-factor credit was carried out on US dollar investment grade (IG) and high yield (HY) bonds as well as on euro IG and HY bonds.

The three criteria that dictated the choice of those markets were: i) the size of the markets (i.e. the number of issuers and bonds); ii) the availability of reliable fundamental data; and; iii) the liquidity of the underlying securities.

Furthermore, we have favoured markets with longer data histories – where characteristics could be verified over a sufficiently long period, typically since 2000 – to be able to robustly assess the effect of factors on that investment universe.

The investment philosophy underpinning multi-factor investing in corporate bond markets is to use a set of diversified factors, as explained below, to rank and select corporate bonds. We blend value criteria – selecting bonds with attractive yield premiums relative to their credit risk – and quality and low-risk indicators to avoid the riskiest issuers. The result tends to be an effective balance.

Another critical feature of a multi-factor credit strategy is its portfolio construction. The goal is to build portfolios with no hidden beta. That means the strategy maintains the same risk profile as the underlying benchmark, both in terms of interest-rate duration and credit risk. By virtue of this approach, any outperformance over the benchmark will be 'pure alpha' created from bond selection.

This sets our approach apart from many traditional investment processes, which tend to take significant directional positions to generate excess returns, usually by taking more credit risk than their benchmark.

The benefits of our 'beta-one' portfolio construction can be seen in the limited deviations of performance from the benchmark during sharp corrections – unlike many traditional credit funds that suffered periods of massive underperformance.



A source of **active returns** building on proven and efficient long-term sources of performance



A risk-oriented approach aiming to **align the risk** profile with the **index**



A **source of diversification** compared to traditional investments



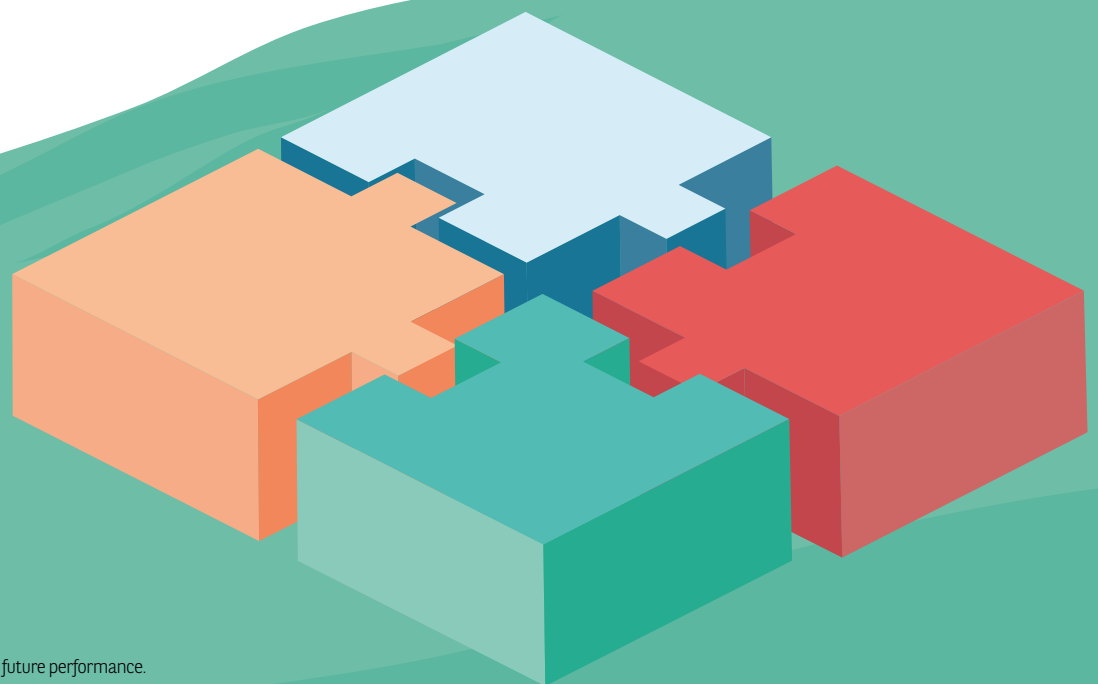
An investment process that includes **ESG integration**

## PANDEMIC IMPACT

An event that demonstrates to us the robustness of multi-factor strategies in corporate bond markets is the coronavirus crisis.

Corporate bonds, like other risk assets, underwent a brutal price correction in March 2020 as the impact of COVID-19 became apparent. The sell-off was due to both a sharp rise in risk aversion among investors and sector-specific or company-specific concerns. As a result, many funds underperformed in the following months. Yet this 'uncharted territory' also makes an interesting out-of-sample case study for assessing the behaviour and robustness of investment strategies – in particular, quantitative strategies such as multi-factor investing. The economic crisis caused by the coronavirus pandemic has had a severe impact on corporate bond markets. In coming months, numerous ratings downgrades and defaults will doubtless occur because of the economic shock. Meanwhile, the crisis has prompted unprecedentedly strong policy measures across the globe to provide support to businesses.

For those willing to remain invested in corporate bond markets, multi-factor strategies offer an attractive solution. Multi-factor strategies should continue to prove resilient to credit events due to their robust portfolio construction and the inclusion of quality and low-risk criteria in their selection of issuers.

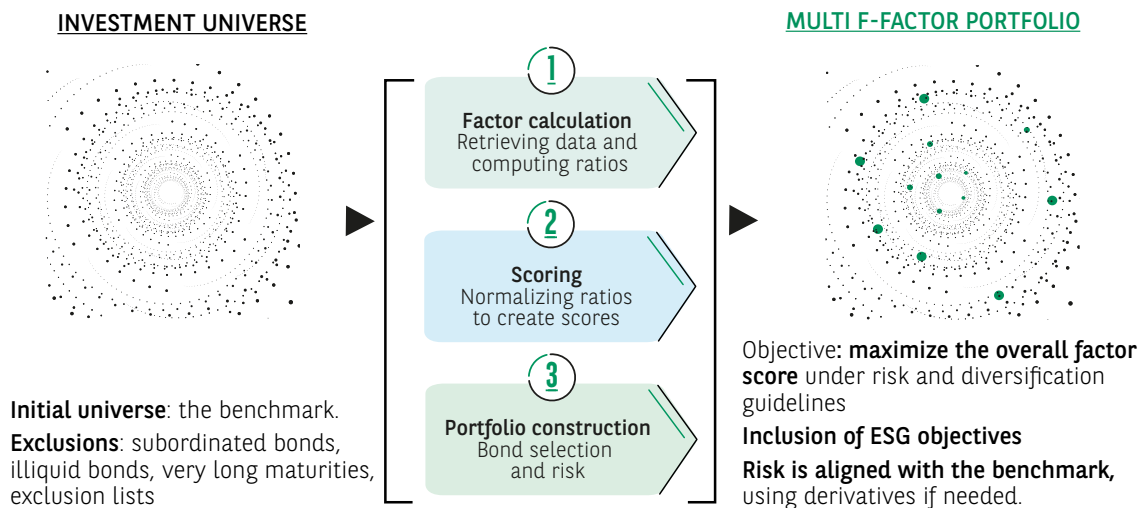


## INVESTMENT PHILOSOPHY AND PROCESS

The manner in which a portfolio is constructed can make a significant difference in terms of performance to the extent that all expected outperformance may be negated in poorly constructed, factor-tilted portfolios. Why? Because style factors are not alone in determining stock and corporate bond returns. Making sure that the other factors do not pollute your portfolio can make all the difference.

Taking into account the comparable levels of systematic risk exposures of the bonds, the returns of value, quality and low risk factors can be explained by the fact that the price of bonds from cheaper, more profitable and less risky companies should move favourably when compared to the price of bonds from expensive, riskier and less profitable companies.

### A SYSTEMATIC BOND SELECTION APPROACH



The idea of a reduction between a price and a hypothetical fundamental value is likely to play the key role for these factors. In turn, momentum should either;

a) capture the confirmation of such trends in the price of bonds that move towards reducing the distance between price and fundamental value,

or;

b) reflect investor anticipation of changes in the fundamentals of the company, i.e. anticipation of changes in the fundamental value. Momentum thus more likely arises due to investors joining a growing trend, and is hence more likely associated with the idea of investor behaviour.

Before simulating the historical performance of our factor strategies, we first filtered the universe by removing all non-senior debt from the respective Merrill Lynch index. This is important because these bonds are not comparable to senior bonds. We also removed bonds with the longest time to maturity, because there are too few of them; and illiquid bonds, such as those with a low face value or with stale prices. The filtered universe for US IG comprises some 1 000 bonds from 350 issuers at the outset and about 3 000 bonds from 700 issuers at the end of 2017. For euro IG there are about 250 bonds from 150 issuers at the start of the period and about 1 000 bonds from 350 issuers at the end. The US HY universe includes about 200 bonds from 100 issuers at the start and 600 bonds from 300 issuers at the end.



Then we apply the factor scoring:

- Factor values are calculated at the issue level, for each bond of the investment universe.
- Factor values are then centred per sector to avoid structural sector biases.

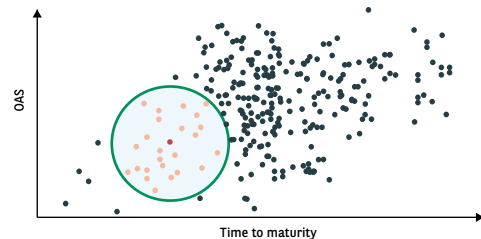
The next phase is strongly linked and dependent on checking for known risk variables, in particular option-adjusted spread (OAS), duration, size and sectors. We have developed a proprietary modelling approach – we call it local scoring – which does this simply and efficiently and can be shown to be superior to other approaches such as stratified sampling or optimisation, as demonstrated in our paper, Heckel et al. (2019).

### FACTOR SCORING

- Bonds are scored **on each factor**, between -2 and +2
- Scorings are **sector-neutral**
- A proprietary approach is used to rank bonds **versus bonds with similar risk** (*local scoring approach*)
- The final score of the bond is the mean of all its factor scores (equal weight per factor)

### LOCAL SCORING APPROACH

To avoid potential maturity or spread biases, each bond is scored locally, i.e. bonds are compared to similar bonds in terms of risk (spread and maturity)

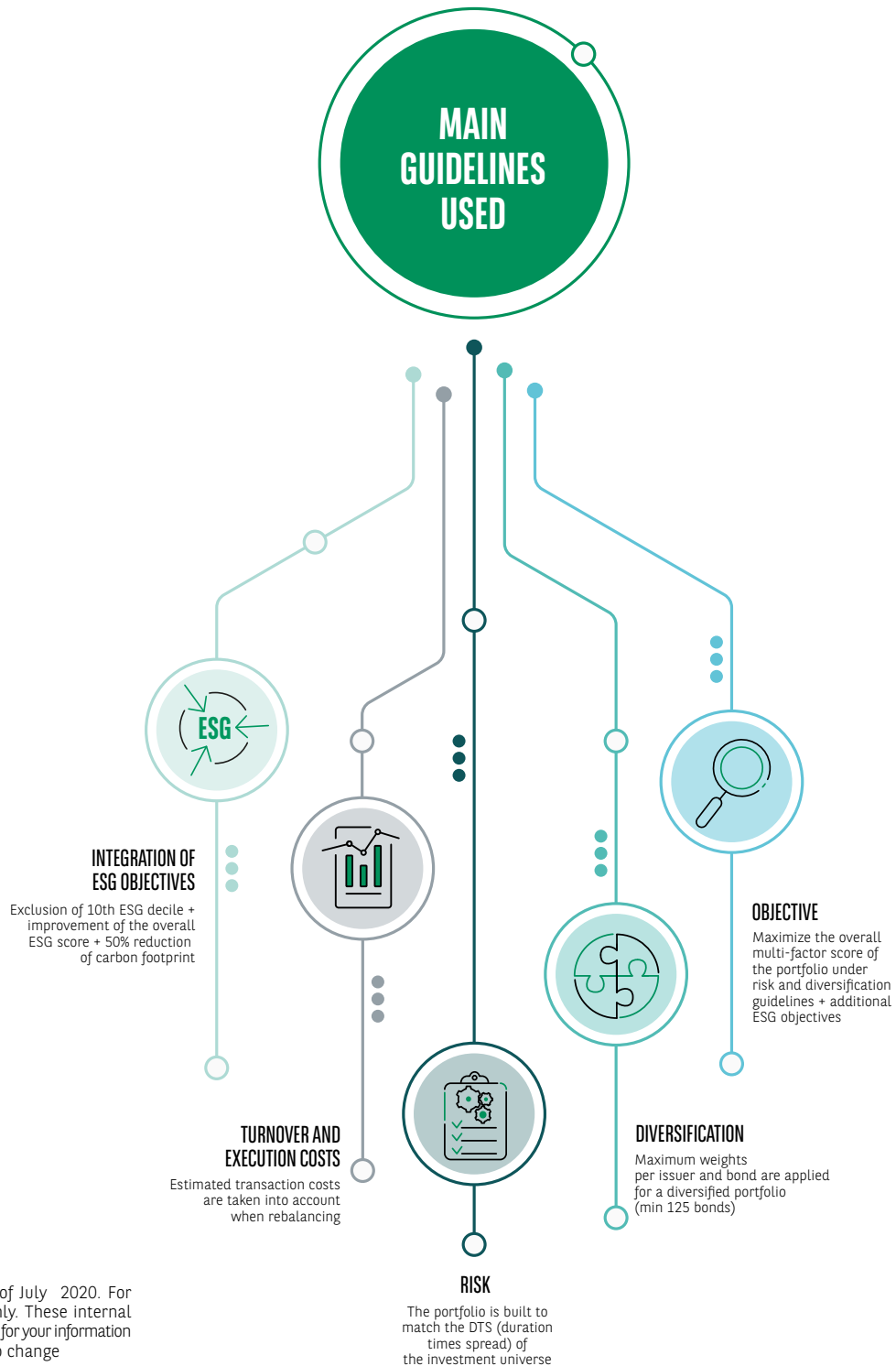


Source: BNP Paribas Asset Management, as of 2020

Once factor scores have been computed, a final multi-factor score is calculated at the issuer level, as the average of the scores for each factor. For each bond of the filtered universe, we apply an equal weight approach for each factor. The final step to determine issue weights is portfolio construction. This relies on the use of an optimiser to maximise the overall multi-factor score of the portfolio under predefined constraints of risk and diversification. The main constraints are:

- The DTS (duration times spread) of the portfolio that aims to match the DTS of the filtered investment universe
- A maximum weighting per bond and per issuer

The portfolio construction also takes estimated execution prices into account. In practice, for one bond in the portfolio to be replaced by another, the expected performance from the switch – which we link to the difference in the factor scores – needs to be greater than the transaction costs incurred. Given that we use a local score, we can construct the portfolio without any top-down constraints while still ensuring that the portfolio will pick bonds from all parts of the universe. Factor investing is about using style factors to tilt portfolios in favour of cheaper, outperforming corporate bonds from the most profitable and better managed, less risky companies. This is based on strong academic and empirical evidence that such corporate bonds should deliver the highest risk-adjusted returns.



Source: BNPP AM, as of July 2020. For illustration purpose only. These internal guidelines are mentioned for your information only and are subject to change

## NEUTRALISATION OF BIAS IN CORPORATE BOND MARKETS

The naïve approach to single factor investing is to simply select those bonds with the desired characteristic, and then find a weighting scheme that avoids creating too many problems in terms of liquidity and diversification. This leads to smart beta strategies that, while having some of the desired factor exposure, also involve unwanted risk biases related to the nature of the factor or the measure chosen for the factor.

For instance, naïve price momentum will naturally have a highly variable beta: when markets rise, banks outperform, not specifically because they have an intrinsically strong momentum, but because banking is a high beta sector.

Much of the discussion about factor timing is related to this conundrum: does factor timing mean the timing of any residual unwanted risks of naïve factor strategies (beta, sector or country deviations) or the timing of the actual true alpha from the factor? We do not need factor strategies to take active positions on these other subjects. Our research suggests that it is possible to remove these biases and that doing so actually improves the intensity of factor exposures.

In our view, factor strategies are the most effective when:

- They use a breadth of diversifying indicators
- They are managed targeting constant risk over time
- They are beta neutral, macro-sector neutral and region neutral
- They are unbiased on the basis of market capitalisation exposures.

All these criteria can improve and stabilise the alpha from factors, although unfortunately, they do not directly yield either an investable strategy or a common vocabulary.

### Corporate bonds: Spread and duration

It is important to note that bond market returns are generated somewhat differently to those from equity markets. A bond investor who holds the bond to maturity earns the yield of the bond ('the coupon'), unless the issuer defaults on its debt payments. The yield of a bond can be decomposed into the yield the investor would earn from a government bond of the same duration, plus a spread to compensate for the probability of default by the company. The spread is usually positive, reflecting the fact that there is a higher probability the company will default than there is of the government defaulting. The spread is itself also a function of duration. A lower duration tends to lead to a lower spread as it reflects the shorter time the investor will be at risk of default. However, imbalances in offer and demand as well as changes in the expected ability of the company to repay debt at the longer horizons may lead to lower spreads for longer durations.

If the investor sells the bond to another investor at a later stage then the price of the transaction will reflect the new yield negotiated. The new spread negotiated is a function of a) the new duration; b) the current offer and demand; c) the impact of changes in the expected economic conditions on the probability that the issuer will be able to repay the debt until maturity; and d) any changes in the idiosyncratic risk associated with the company's business.

### Corporate bonds: Sectors, currencies and size

In much the same way as equities, sectors explain differences in spreads and in spread changes over time, and therefore on the returns of corporate bonds in excess of matched duration bonds.

More important than which region, it is the currency in which the bond is issued that becomes the predominant factor in corporate bond markets. It makes sense to compare bonds issued in the same currency. Companies issue corporate bonds in different currencies primarily to hedge exposure to foreign exchange rates. But they may also do so due to strategic decisions to diversify their investor base and, occasionally, because of constraints on issuing in their local markets. But, issuing in different currencies may bring different regulatory schemes to bear, which explains, for example, why larger issues tend to be denominated in EUR, GBP and JPY while smaller issues tend to be in USD.

As with equities, the size of a company can also influence corporate bond returns. Smaller companies have less capacity to absorb economic shocks and therefore tend to be at higher risk of defaulting.

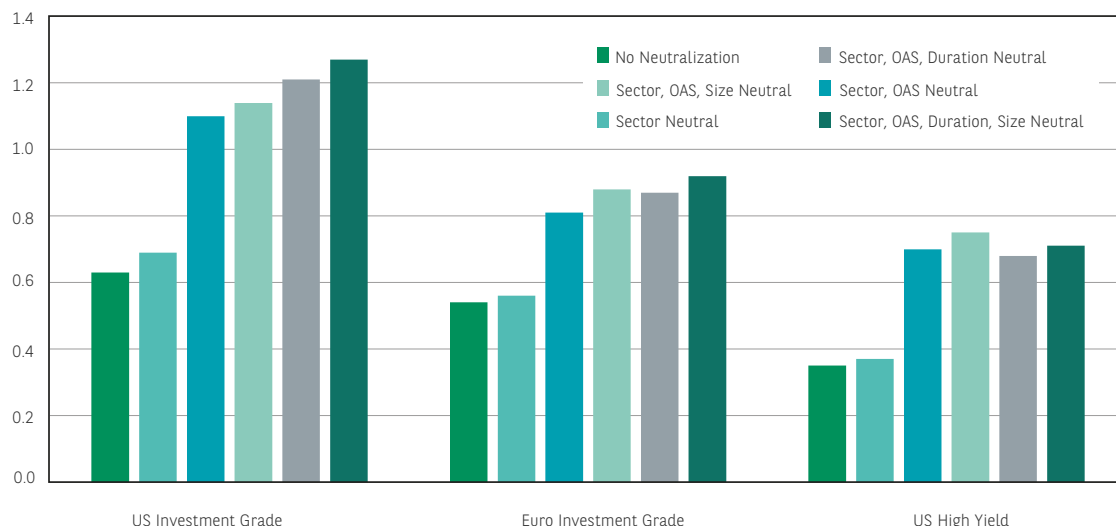
### Corporate bonds: Style factors

It was only recently that style factors were found to play an important role in explaining the returns of corporate bonds. Again, as with equities, style factors include value, quality, low risk and momentum. In our paper “Factor Investing in Corporate Bond Markets: Enhancing Efficacy” due out this year, we show that when comparing corporate bonds from the same sector with similar duration and spread, and issued by companies of comparable size, the average excess returns tend to be higher from those issued by cheaper companies (value), that are more profitable and better managed (quality), that appear less risky (low risk) and that have been performing better (momentum). Furthermore, the results were similar for IG corporate bonds issued in USD and EUR, and for HY bonds issued in USD.

### Corporate bonds: The evidence

As with equities, we compared crude approaches to factor investing (where duration, spread, sectors and size are not controlled) with our method, in which we purified the portfolio by making sure that any duration, spread, sector or size biases are removed. The exercise was carried out for a combination of six value factors, 11 quality factors, four low risk factors and 12 momentum factors, for IG bonds in USD and IG bonds in EUR, and for HY bonds in USD. Some of results in the chart below were taken from our paper while others have not yet been published. In the chart, we compare the information ratio of the different approaches to constructing factor-tilted portfolios. Information ratios increase with removal of exposures to sectors, spread, duration and size.

### INFORMATION RATIO: CORPORATE BOND STYLE FACTORS



Source: Bank of America Merrill Lynch, Worldscope, IBES and BNP Paribas Asset Management. Based on monthly returns. Jan-00 to Dec-17 in USD for IG USD and in EUR for IG EUR. Jan-03 to Dec-17 in USD for HY USD. Estimated transaction costs were included as specified in the paper. For illustration purpose only. Past performance is not indicative of current or future performance

## MANAGING PORTFOLIO RISKS WITH DERIVATIVES

One of the main objectives of our investment process is to produce portfolios that are well aligned with their benchmark in terms of both interest risk and credit risk.

These considerations are incorporated at three different stages of the investment process. Firstly, the individual factors themselves are built in order to avoid directional biases, i.e. to avoid tilts in terms of duration or credit risk. Secondly, during portfolio construction, one of the guidelines for the portfolio is to keep the Duration Times Spread (DTS, the product of duration and spread) in line with that of the investment universe. Finally, the portfolio risk is precisely aligned with the benchmark using highly liquid derivatives (bond futures for duration and CDS indices for credit risk).

One of the reasons why derivatives are needed is linked to the exclusions that are applied to the investment universe. In particular, our investment process excludes subordinated bonds – as these securities are not comparable to other corporate bonds using factors. Since subordinated bonds bear a higher risk on average than their investment universe, excluding these bonds leads to low-beta portfolios, i.e. portfolios that lack credit risk relative to the benchmark.

Hence, Credit Default Swaps Indices (iTraxx for Europe or CDX for the US) are used for risk management purposes. The goal is to compensate for the relative lack of credit risk in our portfolios. However, this should not be considered as leverage, as it is only done in order to ensure that the credit risk is in line with that of the index (i.e. a credit beta of 1 relative to the benchmark).



## SUSTAINABILITY AND LOW CARBON POLICY

The extent and breadth to which investors are integrating sustainability into their investments are rising rapidly. A few years ago, there was much debate over the benefits of sustainable investing and the risk/return impact it has for an investor. In our view, there is no longer any such debate: Sustainability is now widely recognised as a long-term driver of returns and a mitigator of risk. Integrating environmental, social and governance (ESG) goals when building a portfolio means asset managers acquire a deeper and richer understanding of potential reputational, operational and financial risks. Ultimately, it allows us to make better-informed investment decisions for our clients.

### REASONS WHY SUSTAINABILITY MATTERS TO BNP PARIBAS ASSET MANAGEMENT



**Our sustainable investment beliefs further underpin our conviction about embedding ESG objectives into the core of our investment approach.**

<sup>1</sup> ESG: Environmental Social and Governance.  
Source: BNP Paribas Asset Management - As of 2020.

As such, a core approach to sustainability is now integrated into all our multi-factor strategies. We believe ESG integration helps us achieve better risk-adjusted returns over the long term.

### Sustainability integration

Historically, the main focuses of sustainable investing were exclusions, stewardship, thematic investing and awareness. Today, sustainable objectives – and in particular ESG standards – are fully integrated into a wide range of investments. Sustainability has become a core, rather than a peripheral, component of investment strategies. Integrating sustainability objectives has become crucial in meeting investors' expectations and needs. We believe sustainability integration helps us achieve better risk-adjusted returns over the long term. The quantitative teams integrate sustainability in three different forms across all our investment strategies:

- Exclusions based on BNPPAM's Responsible Business Conduct and United Nations Global Compact
- ESG score improvement versus the Index ESG score.
- Carbon reduction versus the index carbon footprint.

### 1. EXCLUSIONS

- **UN Global Compact Exclusions** (including watch list) are based on a universal benchmark of assessing companies when concerns have arisen regarding human rights, labor, environment and anti-corruption.
- **BNPP Sector exclusions:** companies which according to BNPP sector policies are significantly involved in palm oil and wood pulp, nuclear energy, coal-fired power stations, controversial weapons, asbestos, mining, oils sands, tar sands, certain agricultural sectors.

### 2. ESG INTEGRATION

- The overall objective of the ESG integration policy of the fund is to offer investors a portfolio which has an improved ESG score



### 3. CARBON REDUCTION OBJECTIVES

- 50% Carbon reduction versus Carbon footprint index

That ESG considerations have become core to our strategy implies an evolution in our approach. In the case of multi-factor investing, this means going beyond exclusions to focus on ESG integration at the portfolio construction level. The advantage of such an approach is that if a company's expected returns are outstanding from a financial point of view, it can still be part of the portfolio despite a relatively lower sustainability score.

As illustrated, multi-factor investment strategies involve both exclusions and integrations as the two main complementary sustainability pillars required by investors.

By adding ESG objectives to factor investing strategies, investors consider sustainability as a third distinguishing feature of their investment, in addition to the return and risk. Looking ahead, investors will be able to tailor their investments based on three major objectives: the return they expect, the risk they are willing to take and the sustainable objectives they seek.

Quantitative techniques are well suited for integrating sustainability goals: BNP Paribas Asset Management is convinced that by integrating ESG factors into our investment process, we will gain a deeper and richer understanding of the risks that we face. Consequently, over the longer term, we will make better-informed decisions for our clients. Moreover, as we transition from the exclusion-only approach, our integration process now allows us to reach the core investments of our customers and accompany them in having a stronger positive impact on our world.

#### Carbon reduction

Low carbon investing matters with regards to both the environmental threat and its economic rationale. Investors have adopted decarbonation as one of four measures, along with divestment, shareholder engagement and green investments, to take action against risks associated with climate change.

Our goal of a 50% reduction in carbon footprint aims at covering scopes 1 and 2. Scope 1 consists of direct emissions from owned or controlled sources. Scope 2 covers indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting company. Scope 3 includes all the other remaining indirect emissions that occur in a company's value chain.

From now, our carbon footprint reduction is comprehensively implemented across all portfolios managed with a factor-based investment approach. We believe the risk/return profile of our strategy will be similar over the long term. Both our quantitative equity and fixed-income strategies now integrate the environmental objective of carbon reduction as a key feature among our sustainability integration goals.

## OUR TEAM



**QUANTITATIVE  
RESEARCH GROUP**

**MULTI-ASSET,  
QUANTITATIVE AND  
SOLUTIONS (MAQS)**

**SUSTAINABILITY  
CENTRE**



**- Denis Panel -**

CIO, MAQS Team



**- Isabelle Bourcier -**

Quantitative & Index

**CIB STRATEGIES**

**ETF / INDEX**



**- Olivier Laplenie -**

Quantitative Fixed Income



**- Laurent Lagarde -**

Quantitative Equity



# WHY CHOOSE BNP PARIBAS ASSET MANAGEMENT FOR MULTI-FACTOR INVESTING IN CORPORATE BOND MARKETS?

▼

Dedicated quantitative investment team  
and proprietary research



Large range of Multi-factor strategies in Equity,  
Fixed Income and Multi-Asset



Systematic, bottom up and risk controlled  
source of returns



Robust risk controls in place to maintain the portfolio  
risk in line with the predefined risk budget



Sustainability integration and low carbon policy



Diversification from traditional active managers



## RISKS

Investments are subject to market fluctuations and other risks inherent to investing in securities. The value of investments and the income they generate may rise or fall and it is possible that investors may not recover their initial investment.

Investors may be exposed to other risks defined below:

**LOSS OF CAPITAL RISK:** Investments are subject to market fluctuations and other risks inherent to investing in securities. The value of investments and the income they generate may rise or fall and it is possible that investors may not recover their initial investment.

**COUNTERPARTY RISK:** This risk relates to the quality or the default of the counterparty with which the management company negotiates, in particular involving payment for/delivery of financial instruments and the signing of agreements involving forward financial instruments. This risk is associated with the ability of the counterparty to fulfil its commitments (for example: payment, delivery and reimbursement).

**LIQUIDITY RISK:** This risk arises from the difficulty of selling an asset at a fair market price and at a desired time due to lack of buyers.

**OPERATIONS AND CUSTODY RISK:** Some markets are less regulated than most of the international markets; hence, the services related to custody and liquidation for the funds on such markets could be more risky.

**RISK ASSOCIATED WITH DERIVATIVES:** In order to hedge (hedging derivative investments strategy) and/or to leverage the yield of the sub fund (trading derivative investment strategy), the sub fund is allowed to use derivative investments' techniques and instruments under the circumstances set forth in Appendices 1 and 2 of the prospectus (in particular, warrants on securities, agreements regarding the exchange of securities, rates, currencies, inflation, volatility and other financial derivative instruments, contracts for difference [CFDs], credit default swaps [CDs], futures and options on securities, rates or futures). The investor's attention is drawn to the fact that these derivatives include leveraging. Because of this, the volatility of these sub funds is increased.

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