An EDHEC-Risk Institute Publication

The EDHEC European ETF and Smart Beta Survey 2016

May 2017

with the support of

Amundi ETF INDEXING SMART BETA
ASSET MANAGEMENT

EDHEC-RISK Institute

Printed in France, May 2017.
We thank Amundi ETF, Indexing & Smart Beta for its support for our research.

Table of Contents

About the Authors

Noël Amenc is Professor of Finance at EDHEC-Risk Institute and CEO of ERI Scientific Beta. He has conducted active research in the fields of quantitative equity management, portfolio performance analysis, and active asset allocation, resulting in numerous academic and practitioner articles and books. He is on the editorial board of the *Journal of Portfolio Management* and serves as associate editor of the *Journal of Alternative Investments* and the *Journal of Index Investing*. He is a member of the Monetary Authority of Singapore Finance Research Council. He holds a master's in economics and a PhD in finance.

Felix Goltz is Head of Applied Research at EDHEC-Risk Institute. He carries out research in empirical finance and asset allocation, with a focus on alternative investments and indexing strategies. His work has appeared in various international academic and practitioner journals and handbooks. He obtained a PhD in finance from the University of Nice Sophia-Antipolis after studying economics and business administration at the University of Bayreuth and EDHEC Business School.

Véronique Le Sourd has a Master's Degree in applied mathematics from the Pierre and Marie Curie University in Paris. From 1992 to 1996, she worked as a research assistant in the finance and economics department of the French business school HEC and then joined the research department of Misys Asset Management Systems in Sophia Antipolis. She is currently a senior research engineer at EDHEC-Risk Institute.

Executive Summary

Executive Summary

The present survey aims to provide insights into investor perceptions on exchange-traded funds (ETFs) and smart beta strategies. While there is ample discussion by market participants on these high growth areas of asset management and industry data is widely available, conducting a survey allows us to gather a systematic and quantified account of investors' views, experiences and future plans. We thus hope to provide useful insights, building on analysing the current responses and relating them to past results of our regular surveys.

Our survey gathered information from 211 European investment professionals concerning their practices, perceptions, and future plans. Our respondents are high-ranking professional within their organisations (35% belong to the executive management and 35% are portfolio managers),[1] with large assets under management (39% of respondents represent firms with assets under management exceeding €10bn).[2] Respondents are distributed across different European countries, with 19% from the United Kingdom, 60% from other European Union member states, 16% from Switzerland and 5% from other countries outside the European Union.[3]

Analysis of responses to our survey allowed us to shed light on several important questions regarding investor perceptions on ETFs and smart beta strategies. In particular, we gained fresh insight into the drivers of product adoption by investors and into the challenges investors are faced with when making decisions on implementing passive investing and smart beta strategies. Below, we provide a summary of our results by emphasising the key conclusions of our survey.

1. How do investors select and use ETFs?

1.1. What is the dominant purpose of ETF usage?

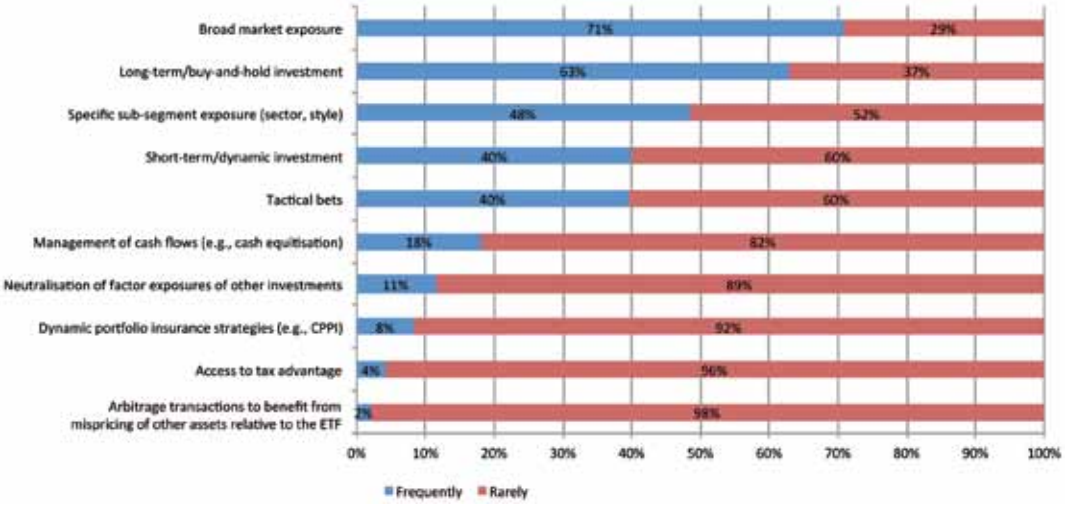
Our survey results clearly indicate that the current usage of ETFs is dominated by a truly passive investment approach. Despite the possibilities that ETFs offer – due to their liquidity – for implementing tactical changes, they are mainly used for long-term exposure.[4] Some 63% of respondents use ETFs for buy-and-hold investments, while only 40% of them use ETFs for tactical bets (see Exhibit 1). Looking at trends about ETFs usage in our successive surveys from 2009, the first year respondents were asked about it,[5] it appears that the use of ETFs for buy-and-hold investments has remain quite stable at over 60% since 2012.

Moreover, despite the intense product development, which has led to available products for a multitude of sub-segments of the markets (sectors, styles etc.), gaining broad market exposure remains the main focus of ETF users. As seen in Exhibit 1, 71% of respondents use ETFs to gain broad market exposure, versus 48% who use ETFs to obtain specific sub-segment exposure (sector, style). While some variations were observed for those figures over the period from 2009 to 2016[6], the values obtained in 2016 are equal to the long-term mean. The preference for broad market exposure is even more pronounced when looking at answers for specific asset classes where we see that 95% of respondents use broad market ETFs for equity investments, and 82% and 87% of respondents use broad market ETFs to invest in government bonds and corporate bonds, respectively.[7]

1 -See Exhibit 3.3 in Section 3 (Methodology and Data).
2 - See Exhibit 3.5 in Section 3 (Methodology and Data).
3 - See Exhibit 3.1 in Section 3 (Methodology and Data).
4 - One should refer to John C. Bogle, who declares that ETFs are "just great big gambling, speculative instruments that have definitely destabilized the market" (Zweig, 2011) and who argues that ETFs distract investors from long term investing because they can be traded so easily (Benz, 2011).
5 - See Exhibit 4.18 in Section 4 (Results).
6 - See Exhibit 4.18 in Section 4 (Results).
7 - See Exhibits 4.3 to 4.5 in Section 4 (Results).

Executive Summary

Exhibit 1: How often do you use ETFs for the following purposes?
This exhibit indicates the frequency of respondents using ETFs for each of the mentioned purposes. Respondents were asked to rate the frequency from 1 to 6. The "frequent" category would include ratings from 4 to 6 and "Rarely" would take into account ratings from 1 to 3 and non-responses.



Consistent with this desire to use ETFs for passive exposure to broad market indices, respondents show little appetite for seeing discretionary active strategies delivered in an ETF wrapper. In fact, with 14% of respondents mentioning it,[8] actively managed strategies are the least desired category expressed by respondents when we asked them for their wishes for future product development in the ETF space. In line with this expression of conservatism in their use of ETFs, which is mainly focused on traditional passive management, it can also be noted that investors are largely satisfied by ETFs in traditional asset classes but more reserved about ETFs for alternative asset classes. While 93% and 86% of respondents are satisfied with their use of ETFs to invest in equities and government bonds, respectively, only 45% and 33% are satisfied with their use of ETFs for infrastructure and hedge funds, respectively.[9] It thus appears that, while ETFs indeed offer numerous possibilities to move beyond traditional passive investing, the principal use of ETFs for traditional asset classes remains long-term investing in broad market indices.

8 - See Exhibit 4.10 in Section 4 (Results).
9 - See Exhibit 4.7 in Section 4 (Results).
10 - See Exhibit 4.19 in Section 4 (Results).
11 - See Exhibit 4.19 in Section 4 (Results).

1.2. What are the future growth drivers?

The ETF market indeed has seen tremendous growth over the past decade or so. At the end of December 2016, the assets under management (AUM) within the 1,560 ETFs constituting the European industry stood at $552bn, to be compared with 273 ETFs amounting to $94bn at the end of December 2006 (ETFGI, 2016). While such growth can be observed ex post from market data, our survey allows us to assess the drivers of such growth and the intentions of future ETF adoption by respondents. A remarkable finding from our survey is that a high percentage of investors (63%) actually plan to increase their use of ETFs in the future, despite the already high maturity of this market and high current adoption rates.[10] Moreover, the percentage of investors who indicate that their future ETF usage will increase is higher in the present survey than it was in our previous two (63% in 2016, compared with 55% in 2014 and 57% in 2015[11]). We thus observe a remarkably persistent tendency for future growth. It is interesting to analyse the reasons behind this trend. Several interesting results

Executive Summary

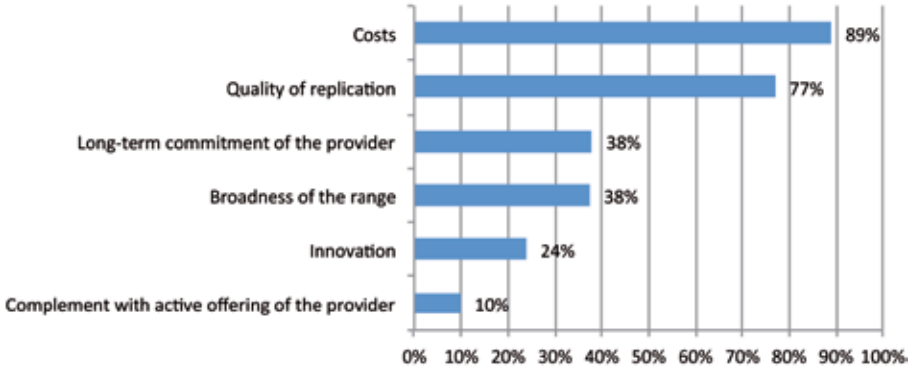
appear from our survey responses in terms of growth drivers in the ETF market. First, a clear finding is that lowering investment cost is the primary driver behind investors' future adoption of ETFs for 87% of respondents in 2016 (which is an increase from 70% in 2014).[12] However, investors are not only planning to increase their ETF allocation to replace active managers (68% of respondents in 2016), but are also seeking to replace other passive investing products through ETFs (49% of respondents in 2016).[13]

1.3. How do investors select ETFs?

Our survey provides direct evidence of the criteria investors use for selecting ETF providers. There are two criteria that dominate investors' preoccupations. The first one is costs, with a vast majority of respondents (89%) mentioning it. The second one is the quality of replication, with more than three quarters of respondents (77%) considering this criterion when selecting an ETF provider. These results are not surprising as these two criteria are related to the main motivations for using ETFs, namely reducing investment costs, while tracking the performance of the underlying index. It should be noted that cost and replication quality are two criteria which are easy to ground on an analytic basis of measurement of results which may also be product specific rather than provider specific. It is worth noting that such measureable product qualities are in the foreground of investor preoccupations. On the other hand, more potentially subjective quality criteria associated with a provider play a lesser role. With 38% of respondents for them both, long-term commitment of the provider and broadness of the range are two criteria that still play a reasonable role for respondents when choosing an ETF provider. However, with only 24% of respondents mentioning it, innovation seems less important for respondents. Finally, complementing the active offering of the provider appears to be important for only 10% of respondents (see Exhibit 2). Given that the key decision criteria are more product-specific and are actually "hard" measurable criteria, while "soft" criteria that may be more provider specific have lesser importance, competition for offering the best products can be expected to remain strong in the ETF market. This implies that it will be difficult to build barriers of entry for existing providers unless they are related to hurdles associated with an ability to offer products with low cost and high replication quality.

12 - See Exhibit 4.21 in Section 4 (Results).
13 - See Exhibit 4.20 in Section 4 (Results).

Exhibit 2: What criteria do you consider when selecting an ETF provider?
This exhibit indicates the criteria respondents consider when selecting an ETF provider. More than one response can be given.



Executive Summary

2. What are the key objectives driving the use of Smart Beta strategies?

2.1. What are the motivations and growth prospects for smart beta?

Smart beta strategies have continuously been in the spotlight in recent years and the increasing investor interest is obvious. Our survey allows some light to be shed on the drivers behind this interest and the actual usage of smart beta among investors. A first important result is that the quest for outperformance is the main driver of interest in smart beta. In fact, 75% of respondents agree that smart beta offers significant potential for outperformance.[14] Moreover the most important motivation behind adopting such strategies is to improve performance. On a scale from 0 (no motivation) to 5 (strong motivation), respondents give on average a score of 3.67 to improve performance, far ahead of other motivations that obtain scores from 1.59 (address regulatory constraints) to 3.18 (manage risk),[15] this latter, which is in second position among key motivations, being also an important element of choice of smart beta strategies. However, despite this strong motivation to use smart beta strategies to seek performance improvements, actual implementation of such strategies is still at an early stage, according to information from our respondents on their current and future usage. In fact, while 44% of respondents currently invest in smart beta strategies, another 29% do not but do are considering adopting such strategies in the future.[16] Moreover, among those respondents who have made investments in smart beta strategies, these investments typically make up only a small fraction of portfolio holdings. Two-thirds of respondents (67%) invest less than 20% of their total investments in smart beta strategies and only 10% of respondents invest more than 40% of their total investments in smart beta strategies.[17] Moreover, when asked about their use of smart beta and factor-based investment products in terms of assets over the near future, 57% of respondents indicate an increase of more than 10% while only 6% indicate a decrease.[18]

2.2. How do investors implement smart beta strategies?

Our survey allows for several insights into how investors implement their smart beta strategies and their exposure to desired factors. In terms of the actual product wrapper used for smart beta exposure, respondents favour passive funds that replicate smart beta indices (64% of respondents) but also use active solutions, i.e. approaches including a significant amount of discretion, albeit to a lesser extent (44% of respondents).[19]

Our survey also analyses how investors rate passive replication of smart beta indices and discretionary smart beta strategies on a range of criteria. If we look how respondents rate the list of advantages of each smart beta strategy category, it appears that discretionary strategies are preferred for the reactivity/dynamism they allow, with 68% of respondents indicating the ease to change portfolio allocation as the first advantage.[20] Replication of smart beta strategies is chosen for the reasons passive strategies are selected, namely costs (70% of respondents), transparency of methodology (68% of respondents) and availability of information (68%).[20] While passive replication of indices is seen as more advantageous on most criteria, the differences in perception across the two approaches are most notable in specific areas. The biggest advantage of replicating indices over using discretionary strategies is seen in the area of costs (70%

14 - See Exhibit 4.30 in Section 4 (Results).
15 - See Exhibit 4.42 in Section 4 (Results).
16 - See Exhibit 4.23 in Section 4 (Results).
17 - See Exhibit 4.24 in Section 4 (Results).
18 - See Exhibit 4.39 in Section 4 (Results).
19 - See Exhibit 4.26 in Section 4 (Results).
20 - See Exhibit 4.27 in Section 4 (Results).
21 - See Exhibit 4.28 in Section 4 (Results).

Executive Summary

of respondents see costs as an advantage for replication of smart beta strategies, versus 57% seeing costs as an advantage for discretionary smart beta strategies) and mitigating conflicts of interest between provider and investor (54% of respondents see it as an advantage for replication of smart beta strategies, versus 47% that see it as an advantage for discretionary smart beta strategies).[22] However, discretionary strategies are seen as having a slight advantage over index replication when it comes to the breadth of available products (54% for discretionary smart beta strategies, versus 51% for replication of smart beta strategies) and the possibility to account for specific investment beliefs (66% for discretionary smart beta strategies, versus 61% for replication of smart beta strategies[23]), undoubtedly due to the fact that most indices available today are rather standardised.

Our survey also allows us to differentiate between the types of uses respondents make of their factor exposure. It appears that the most frequent use respondents have of factor-based exposures is a strategic use to harvest long term premia (score of 3.06 on a scale from 0, no use, to 5, highly frequent use).[24] However, the least frequent approach in use today is tactical use based on short-term return expectations for factors (score of 1.72 on a scale from 0, no use, to 5, highly frequent use). These results suggest that the implementation of a factor based strategy rarely aims at factor return timing and much more frequently targets the extraction of long-term premia.

2.3. Do investors have the necessary information to evaluate smart beta strategies?

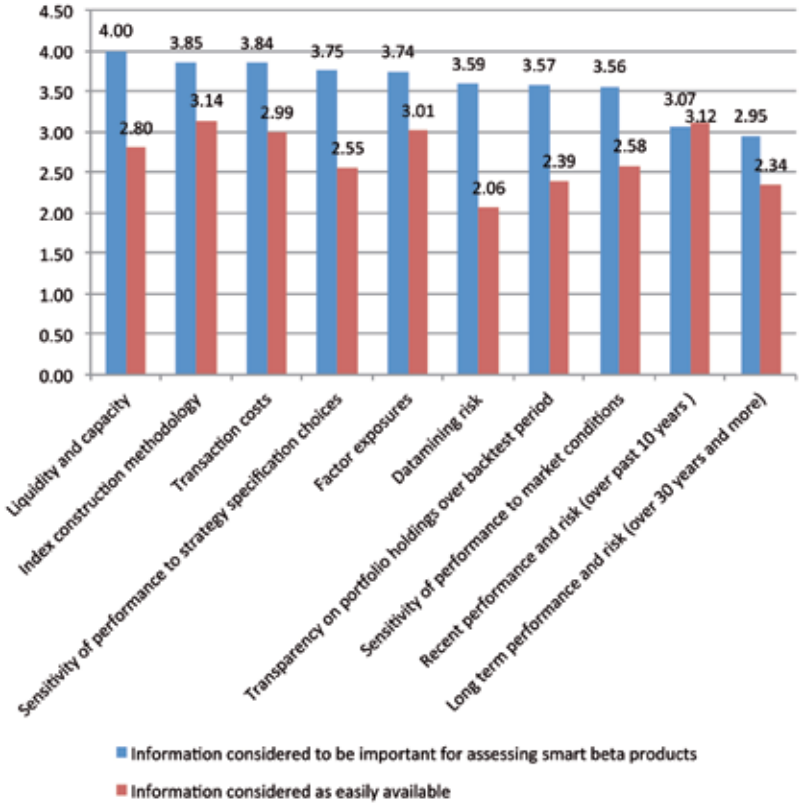
The results of our survey suggest that the transparency of smart beta strategies is a key component of their appeal. Some 89% of our respondents declare that smart beta indices require full transparency on methodology and risk analytics.[25] However, our respondents also cited a lack of transparency as the second most important hurdle to increasing smart beta investments.[26] To analyse the question of transparency and lack thereof in detail, we asked respondents about the information they consider important to assess smart beta. At the same time, respondents were asked whether they considered this information to be easily available. Their responses thus allowed us to assess the gap between required information and ease of access to this information (see Exhibit 3).

It is interesting to see the spread between the importance of and the accessibility to this information. It appears that the highest spread is observed for information respondents considered as crucial. For example, data-mining risk and information about transparency on portfolio holdings over a back-test period are two crucial pieces of information for respondents, with scores of 3.59 and 3.57, respectively. Data-mining risk is also the piece of information that appears to be the most difficult to obtain for respondents, with a score of 2.06, while information about transparency on portfolio holdings over a back-test period is among the three most difficult pieces of information to obtain, with a score of 2.39. Liquidity and capacity, which is the most important piece of information for respondents, with a score of 4, is also information relatively difficult to obtain, with a score of 2.80. Indeed, when we consider the gap between information importance and its availability,[27] information about liquidity and capacity comes in second in terms of importance of gap, just after data-mining risk. Even relatively basic information such as the index construction

22 - See Exhibit 4.29 in Section 4 (Results).
23 - See Exhibit 4.29 in Section 4 (Results).
24 - See Exhibit 4.38 in Section 4 (Results).
25 - See Exhibit 4.33 in Section 4 (Results).
26 - See Exhibit 4.43 in Section 4 (Results).
27 - See Exhibit 4.36 in Section 4 (Results).

Executive Summary

Exhibit 3: Information about Smart Beta Products
This exhibit indicates the information respondents consider important for assessing smart beta products on a scale from 0 (not important) to 5 (crucial) and which information they consider to be easily available on a scale from 0 (difficult to obtain) to 5 (easy to obtain).



methodology is not judged to be easily available (score of 3.14) relative to its importance (score of 3.85). On the contrary, information about recent performance and risk over the past 10 years is among the least important for respondents with a score of 3.07, but it is also one of the most easily available, exhibiting one of the highest score (3.12) across the board in terms of availability. The gap between information importance and its accessibility as seen by investors is displayed in Exhibit 3.

The fact that information that is regarded as important is not considered to be easily available clearly calls into question the information provision practices of smart beta providers. In fact, the only area in which no pronounced gap exists between the importance and the ease of accessibility scores is for performance numbers. Performance and risk information is judged to be moderately easily available and moderately important. All other areas show pronounced gaps between these two metrics. Two of the three items that are judged to be the least easily available are holdings over the back-test period and data-mining risks. Interestingly, both these items rank much higher on the importance score for investors than, for example, past performance. Moreover, there is a pronounced gap of 0.89 between importance of information items and their ease of accessibility, as shown by the means of their respective scores (3.59 and 2.70, respectively). Overall, though the gap has

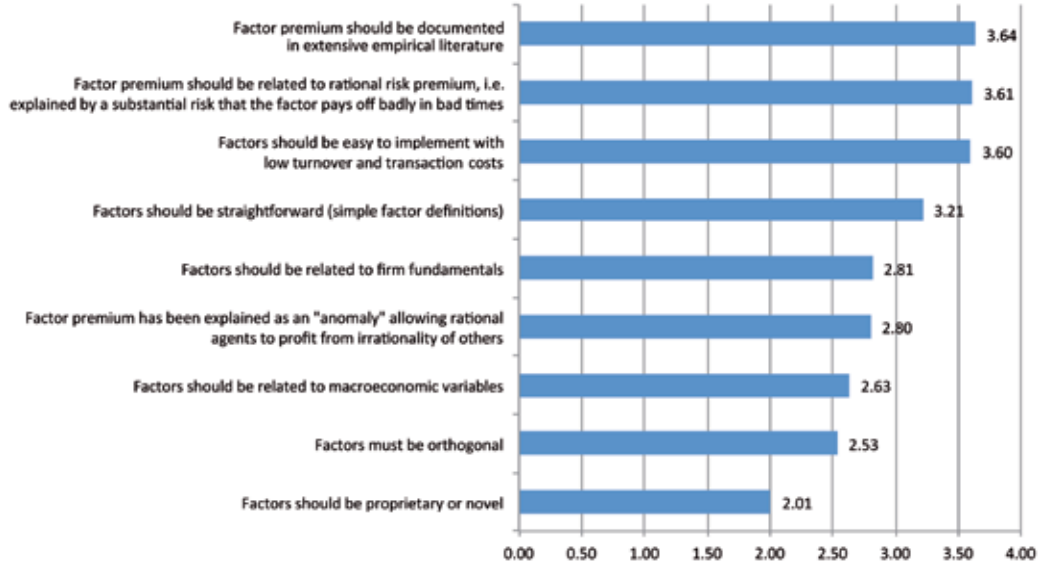
Executive Summary

narrowed compared to last year, these results suggest that there is still room for further improvement, as investors still do not believe that information considered important for assessing smart beta strategies is made available to them with sufficient ease.

2.4. What requirements do investors have about smart beta strategy factors?

From the results of our survey, it appears that respondents are primarily concerned with the documentation of the factor premium in extensive empirical literature (with a score of 3.64), closely followed by the existence of a rational risk premium (with a score of 3.61), and then by ease of implementation and low turnover and transaction costs, (with a score of 3.60) – see Exhibit 4 for detail. The existence of a rational explanation for factor risk premia is of principal importance to investors as it is probably related to the fact that a rational explanation suggests that the premium will be persistent. Indeed, if the literature interprets the factor premia as compensation for risk, the existence of the factor premia could also be explained by investors making systematic errors due to behavioural biases such as over- or under-reactions to news on a stock. However, whether such behavioural biases can persistently affect asset prices in the presence of some smart investors who do not suffer from these biases is a point of contention. In fact, even if the average investor makes systematic errors due to behavioural biases, it is still possible that some rational investors who are not subject to such biases might exploit any small opportunity resulting from the irrationality of the average investor. The trading activity of such smart investors may then make the return opportunities disappear. Therefore, behavioural explanations of persistent factor premia often introduce so-called "limits to arbitrage", which prevent smart investors from fully exploiting the opportunities arising from the irrational behaviour of other investors.

Exhibit 4: Requirements about Factors
This exhibit indicates the requirements respondents have in order to consider a given set of factors in their investment approach on a scale from 0 (not important) to 5 (absolutely crucial).



Executive Summary

3. Future Developments

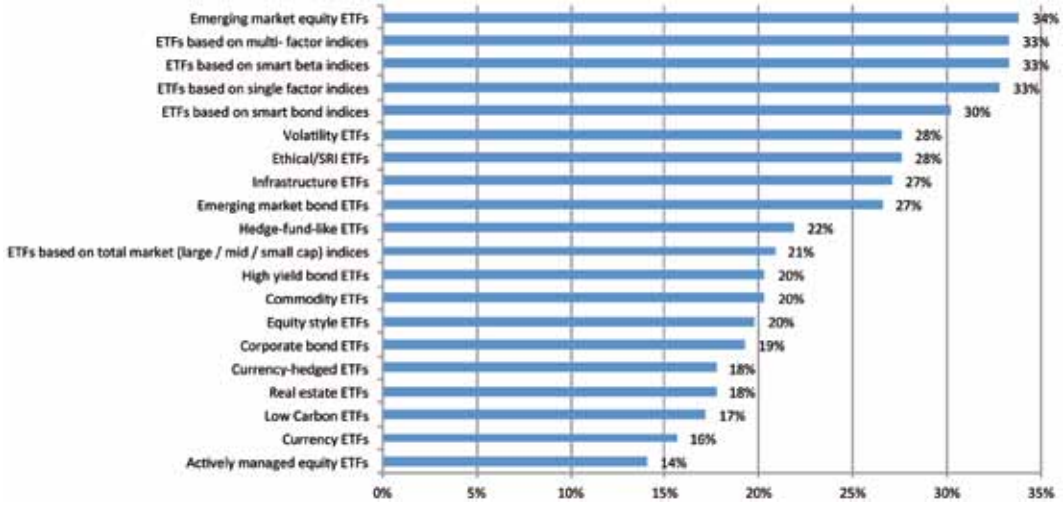
3.1. What are investor expectations for further development of ETF products?

Our survey allows us to define a bit more clearly the type of niche markets where investors would like to see further ETF product development. As shown in Exhibit 5, the top concerns for respondents are the development of ETFs in the equity asset class, with 34% of respondents demanding further development of emerging market equity ETFs. Additionally, for ETFs related to advanced forms of equity indices – namely those based on smart beta indices, multi-factor indices and on single-factor indices – 33% of respondents wished for further developments in each of these three areas. Moreover, if we aggregate the responses concerning smart beta indices, single-factor indices and multi-factor indices, we note that more than half of the respondents (54%) want further developments in at least one of these three categories, showing that the development of ETFs based on advanced forms of equity indices is now by far the highest priority for respondents. Alternatively, if we use our survey results to look at trends over time concerning the demand for ETFs based on emerging market equity, we see that a strong decline began in 2012, when 49% of respondents were demanding additional developments in this area – a percentage that had been relatively stable since 2006. Now that it lies at 34% in 2016, it seems that a share of respondents have shifted their demands from developments in emerging market equities to new forms of indices.

Regarding the further demand for ETFs based on smart beta indices, which shows a strong interest of respondents in alternative indices, the result is interesting as there have been a considerable number of smart beta ETF product launches (see Section 2.2 on smart beta strategies in the Background section of this document). The fact that a third of investors still see room for further product development may be explained by the fact that product launches have focused on relatively few popular strategies thus accounting for a small number of risk premia, such as the value premium and defensive equity strategies.

While products based on the equity asset class come first in respondent demands for further developments, additional demands

Exhibit 5: What type of ETF products would you like to see developed further in the future?
This exhibit indicates the percentage of respondents who would like to see further development in the future for different ETF products. Respondents were able to choose more than one product.



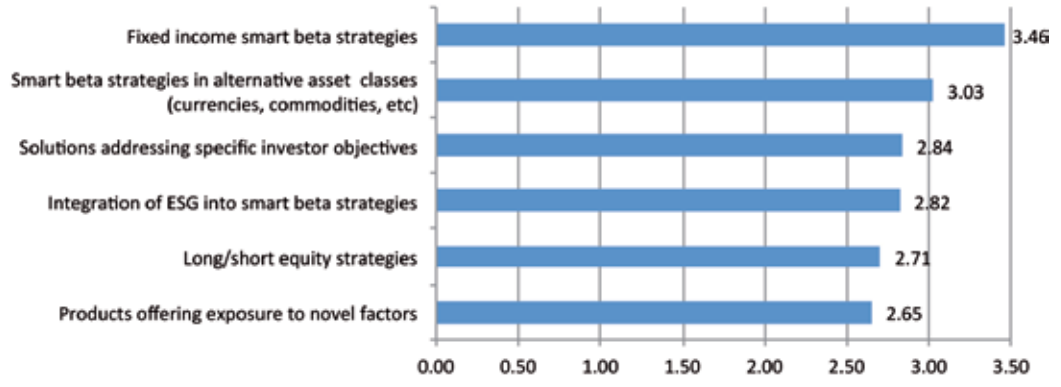
Executive Summary

for ETFs based on asset classes such as smart bond indices, volatility, Ethical/SRI, infrastructure and emerging market bonds are not so far behind, with 30%, 28%, 28%, 27% and 27% of respondents mentioning them, respectively.

3.2. Expectations on future development for smart beta products

Finally, respondents were asked about the smart beta solutions they think required further product development from providers. Our survey results indicate that respondents desire further development in the area of fixed income, as well as in alternative asset classes, which is not surprising as smart beta strategies were initially developed for equity investment (see Exhibit 6). On a scale from 0 (no further developments required) to 5 (further developments required with strong priority), fixed income smart beta strategy solutions obtain a score of 3.46. Solutions for smart beta strategies in alternative asset classes (currencies, commodities, etc) come just after with a score of 3.03. So, there is still a lack of products when it comes to asset classes other than equity investment, and this lack is particularly critical for the fixed income asset class that is largely used by investors. It also appears that respondents would like more customised solutions to be developed, in order to be in adequacy with specific investor objectives (score of 2.84). It is likely that the development of new products corresponding to these demands may lead to an even wider adoption of smart beta solutions.

Exhibit 6: Which type of solutions do you think require further product development from providers?
This exhibit indicates the types of solutions requiring further products developments from providers on a scale from 0 (not required) to 5 (strong priority). More than one response could be given. Non-responses are excluded.



Introduction

Introduction

The present survey aims to provide insights into investor perceptions on exchange-traded funds (ETFs) and smart beta strategies. While there is ample discussion by market participants on these high growth areas of asset management and industry data is widely available, conducting a survey allows us to gather a systematic and quantified account of investors' views, experiences and future plans. We thus hope to provide useful insights, building on analysing the current responses and relating them to past results of our regular surveys.

Since 2006, EDHEC has annually conducted a survey on European investors' views and uses of ETFs. Since 2013, in view of the considerable development of smart beta strategies over recent years, additional questions have been added, asking survey participants to share their opinions on products that track smart beta indices. In the present edition of the survey, we dedicate a large group of questions not only to these smart beta ETFs, but also to investors' general use and opinion of smart beta strategies. This survey brings together the main vehicles of passive investment, namely ETFs – which are standard and very liquid products that track indices – and strategies based on the new forms of indices.

ETFs are perhaps one of the greatest financial innovations of recent years. Unlike conventional index funds, ETF units trade on stock exchanges at market-determined prices, thereby combining the advantages of mutual funds and common stocks. Most of them represent passive instruments designed to track the performance of a financial index as closely as possible.

Like any other exchange-traded product (ETP), the prices of ETFs are determined by the corresponding supply and demand. Thus the price may deviate below or above the net asset value (NAV). However, ETFs are characterised by a transparent and fluid share creation process which ensures that the price remains close to the NAV. In fact, if an ETF appears to be undervalued compared to its NAV, then an arbitrager can buy the ETF units, redeem them at the custodian bank for the underlying securities and sell them on the market, thus making a profit.[28]

Although the first European ETF came on the market only in 2000, assets under management (AUM) of ETFs and other exchange-traded index products amounted to $552bn as at the end of December 2016 (ETFGI, 2016). In 16 years, ETFs have become a serious alternative to other financial products, such as futures or index funds, which allow participation in broad market movements. And the ETF market is still growing: while the first ETFs attempted to replicate the performance of broad equity markets, ETFs now exist for a wide range of asset classes including fixed-income, currencies and commodities, and within each asset class ETFs are venturing into covering more precise sub-segments (such as segments by yield or liquidity/size of securities) or employing innovative index construction methodologies (such as alternative weighting schemes or factor tilts.). Another focus of innovation has been to offer more varieties of equity ETFs with similar economic exposure and to provide detailed choices of how to gain this exposure, such as equity ETFs with different distributing share classes[29] and ETFs on currency-hedged indices.

28 - The indicative NAV (iNAV) is published intraday and can be compared to the price of the ETF almost in real time.
29 - For instance, Amundi ETF Euro Stoxx 50 has two distributing share classes: capitalising and dividend distributing. UBS ETF MSCI Emerging Markets TRN Index has institutional and retail share classes.

Introduction

Multi-asset ETFs also come to the stage, such as ETFs that replicate the portfolios containing both equities and bonds.

The development of readily-accessible index investment products may have positive effects for investors. In fact, recent research (Cremers et al., 2013) suggests that the prevalence of index replication products improves the levels of competition and efficiency of the fund management industry. At the same time, the rapid growth and innovation within the ETF market has led investors to closely examine the potential risks of ETFs. Recently, the standard practice of using a capitalisation-weighting scheme for the construction of indices has been the target of harsh criticism. Nowadays, growing demand for indices as investment vehicles has led to innovations including new weighting schemes and alternative definitions of sub-segments. There are also many recent initiatives for non-cap-weighted ETFs. These have been coined "Smart Beta ETFs" as they seek to generate superior risk-adjusted returns compared to standard market-capitalisation-based indices. The broad aim of this survey is to analyse the current practices and perceptions among ETF users in Europe, as well as among smart beta strategy users. By comparison of our results to those of our previous surveys, we aim to shed some light on trends within the ETF market and within smart beta strategy offer.

The EDHEC European ETF and Smart Beta Survey 2016 took the form of an online questionnaire addressed to European professionals in the asset management industry. The survey targeted institutional investors as well as asset management firms and private wealth managers. The questionnaire consists of one section covering the role played by ETFs in the survey respondents' asset allocation decisions, as well as their views on the future developments in the ETF market. In a second section, respondents were asked to give their opinions about products that track smart beta indices, and more generally on alternative equity beta strategies, in relation to the recent considerable development in these types of indices.

This survey proceeds as follows. Section 2 presents the background of the survey, which is made up of two parts. In the first part, we review the European ETF market and explain this financial product in more detail. The second part of the background is dedicated to smart beta strategies. The methodology used to conduct the survey and some information about survey respondents is described in Section 3. Results of the survey are detailed in Section 4, which, similarly to the background, is divided in two parts. The first part is dedicated to ETFs, including European investors' views on ETFs, their present uses of ETFs, and the future developments they wish to see. The second part is entirely dedicated to investor views on smart beta strategies and their desired areas for further improvement.

Introduction

2. Background

2. Background

2.1. ETFs

2.1.1. Overview of ETFs

ETFs are open-ended investment funds traded on a stock exchange. The first ETFs appeared in the United States in 1989 and they started trading in Europe in 2000. As at the end of December 2016 there were 4,808 ETFs worldwide managing $3,396bn in assets (ETFGI, 2016). The assets under management (AUM) within the 1,560 exchange-traded funds constituting the European industry stood at $552bn (ETFGI, 2016). While the large number of ETFs means that a large variety of indices are tracked – including indices on niche markets and innovative index methodologies on traditional asset universes – there is also a large choice of different ETFs that track the same or very similar indices. In Europe, at the end of January 2017, there were 19 ETFs that track the Euro Stoxx 50 index[30] for example. ETFs and other ETPs are still heavily oriented towards equity. Equity products account for about 66% of AUM in European ETFs and ETPs, fixed-income products account for about 25% of assets and commodity products account for about 8% with a negligible percentage of assets (1%) in ETFs and ETPs providing other types of exposures including multi-asset class exposures, currencies and alternative asset classes (BlackRock, 2016).

The European ETF market is mostly institutional. Though there are not exact figures, industry estimates in terms of the percentage of retail AUM range from 10% to 15%, according to Morningstar (2017). The European Securities and Markets Authority (ESMA) Securities and Markets Stakeholder Group[31] notes that while ETFs are a "very low cost alternative" to other UCITS funds, they are "very rarely, if at all, marketed for European individual investors" due to "differences in remuneration of the distribution channels".

In continental Europe, retail distribution has traditionally been controlled by banks, and to a lesser extent insurance companies, who have used their sales to market almost exclusively their in-house products. In 2015, 56% of the AUM in the European fund industry was controlled by third-party allocation and 44% by captive distribution channels (Giannotti and Maciver, 2016). However, the split is different from one country to another, with a dominance of captive distribution in Austria, France, Italy and Spain, while Sweden, UK and Netherlands use more third-party funds. In the United Kingdom, independent financial advisors (IFAs), dominate the retail market. These institutions and intermediaries have no direct incentive to promote ETFs, which by nature do not pay them commissions, unlike comparable unlisted vehicles, UCITS (Undertakings for Collective Investment in Transferable Securities) included.

Indeed, the management fees charged by ETFs show that they come at low cost to investors. According to Deutsche Bank (2016), the asset weighted average total expense ratio (TER) of European ETFs that offer exposure to a standard stock market index was 31 basis points, while the asset weighted TER of European ETFs that offer exposure to standard fixed-income indices was 26 basis points and the TER for commodity index ETFs was 42 basis points. It should be noted that in spite of low average TERs, considerable differences exist across ETFs. On the one hand, TERs differ depending on the indices

30 - https://www.justetf.com/en/how-to/euro-stoxx-50-etfs.html.
31 - ESMA Policy Orientations on Guidelines for UCITS exchange-traded funds and structured UCITS (2011).

2. Background

that are tracked and are often higher for less standard indices. For example, iShares reports a TER of 7 basis points for an ETF on US large-cap stocks while it reports a TER of 68 basis points for an ETF on Emerging Markets small-cap stocks (Morningstar, 2017).[32] Moreover, pronounced differences exist across providers sometimes even for ETFs that track very similar indices. For example, the largest Europe-listed ETF to track the MSCI Europe Index has a total expense ratio of 35 basis points, while the cheapest fund tracking the MSCI Europe Index has a total expense ratio of 15 basis points.[33]

Despite strong growth since it came into existence, the ETF industry still only represents a fraction of the fund management industry: for the period from January 2011 to October 2016 the trading volume in ETFs on European exchanges ever exceeded 12% of the trading volume in cash equities in any given month over this period (Deutsche Bank, 2016). Over 2016, on the London Stock Exchange, ETF and securitised derivative trading equated to 7.6% of all equity trades, compared to 6.1% over 2015.[34] At the end of 2016, the AUM in the European ETF industry represented 7.5% of those of the overall fund management industry in Europe (Morningstar, 2017). A notable feature of the ETP industry is that it is highly concentrated: while more than 270 providers vied for the global market at the end of March 2016 (Investopedia, 2016),[35] the top three players controlled over 71% of the AUM, and the top ten players over 85% of the AUM (Deutsche Bank, 2016). In Europe, there were 43 providers present in November 2016 and there is slightly less concentration at the very top, with the top three players controlling 69% of the AUM. The dynamics of the industry have remained fairly constant since last year in terms of the number of players.

In the context of the large growth of ETFs, a collection of recent papers question the influence of ETFs increasing ownership on the liquidity of the ETF component securities. These papers especially investigate the US market, where the market share dedicated to ETFs is even higher than in Europe. An interesting and quite complete review is to be found in Ben-David, Franzoni, and Moussawi (2016). It should be noted that there is a debate in this literature, as authors have provided evidence both of positive and negative effects of ETF trading on market liquidity and efficiency, and further research may be needed to explain the sometimes divergent views. Israeli, Lee and Sridharan (2016) note that ETFs constitute about 30% of the daily value traded on US exchanges. Israeli, Lee and Sridharan (2016) evidence an increase of trading costs for those securities, associated with a decrease of liquidity. In the same way, Hamm (2014) reports an increase of illiquidity for those securities that are part of ETFs subject to increases of ownership. On the contrary, Glosten, Nallareddy, and Zou (2016) document an increase of information efficiency for securities that are part of ETFs experiencing higher trading, resulting from increased ownership. Israeli, Lee and Sridharan (2016) justify this difference in results by a different approach, as Glosten, Nallareddy, and Zou (2016) consider the current effect of increasing ownership on liquidity, while they test the effect in the future. Hamm (2014) explains this phenomenon by the fact that uninformed investors tend to depart from investment in individual stocks when they have the opportunity to invest

32 - See Garcia-Zarate (2017).
33 - See Revesz (2017a).
34 - See Revesz (2017b).
35 - See Ross (2016).

2. Background

in diversified ETFs or index funds – a result evidenced by greater illiquidity for stocks that are part of the more diversified ETFs. This economic consequence of the large development of index trading was already evoked by Wurgler (2011) and Broman (2016).

Ben-David, Franzoni, Moussawi (2015) argue that securities with higher ETF ownership exhibit higher volatility and are more likely to depart from the random walk. They notice that during turbulent market periods, arbitrage activity, which is necessary to reduce price discrepancy between ETFs and underlying securities, is limited. Consequently, ETF prices tend to diverge from those of the underlying securities.

However, Madhavan (2016) and Madhavan and Sobczyk (2016) have another point of view and detail that ETFs improve financial market information. According to them, ETFs will reflect new information before underlying securities, as long as arbitrage is frictionless. They are in line with Glosten, Nallareddy, and Zou (2016), who argue that stocks incorporate information more quickly as soon as they are part of ETFs. Their views are in accordance with Da and Shive (2016), who observe increasing comovements in returns of stocks that are included in an index, as well as with Wermers and Xue (2015), who report that ETFs enhance price discovery. Agarwal et al. (2016) document a correlation between the liquidity of ETFs and the liquidity of the security components of ETFs.

The growth of ETFs is explained by the fact that investors choose to replace investment in traditional index funds by investment in ETFs. Israeli, Lee and Sridharan (2016) relate that ETFs come more and more in replacement to traditional passive investment vehicles, such as index funds, closed-end-funds and index futures, as detailed in few recent studies. For example, Madhavan et al. (2014) argue that ETFs are a superior alternative compared to index futures, because of the mispricing that often occurs around the futures' rolling dates.

2.1.2. Understanding ETFs

As ETFs combine the diversification of index funds and the trading ease and flexibility of stocks listed on exchanges, they should be analysed from both standpoints. Like traditional index funds, ETFs usually attempt to track or replicate a particular index of equities, debts or other securities. Like mutual funds, ETFs are registered as open-ended funds, continuously offering new fund shares to the public and required to buy back outstanding shares on request and at a price close to their NAV. Shares in ETFs can be traded on the market throughout the trading day, using the whole gamut of order types. Although the designs of ETFs and mutual funds are similar, investors can treat ETFs as normal stocks, buying or selling ETF shares through a broker or in a brokerage account, just as they would buy the shares of any publicly traded company.[36] ETFs give investors access to a wide array of asset classes and investment strategies. Hence they are a type of investment vehicle and not an asset class in themselves.

<u>Full replication ETFs, sampling replication ETFs and swap-based ETFs</u>

An ETF's replication mechanism is one of its defining features. Indeed, ETFs come in three flavours: full index replication

36 - Sometimes ETFs are wrongly classified as closed-end funds, since both exhibit similar features, such as holding multiple securities and asset classes. Furthermore, both can be traded on exchanges. The most important difference from closed-end funds is that ETFs always trade very closely to their NAV, since any deviation can be exploited by arbitrageurs redeeming and then buying new units. Closed-end funds, by contrast, rarely trade at their NAV.

2. Background

funds, sampling replication and swap-based replication. An ETF is considered a full replicating index fund (sometimes also cash-based replication) if the ETF manager holds all the constituents of the underlying index in the same proportion as the constituent securities of the index. This is straightforward but may be costly and difficult to implement, especially if the index to be replicated is broad and contains a large number of securities. This is made even more difficult if it involves multiple jurisdictions and/or time zones.[37,38] These costs arise from liquidity problems with index constituents, clearing and settlement problems, and management of a large basket of securities. Such costs lead to performance deviations between the tracked index and its tracker. These deviations, which create tracking error, are made larger by differences between the index provider's assumptions relating to the taxation and reinvestment of dividends and the actual conditions faced by the fund in terms of taxation and treasury and cash management.[39]

To reduce both the expenses passed on to the investor and the tracking error, an index fund may engage in ancillary performance-enhancing activities. Securities lending is one such activity that is prevalent in ETFs that are replicated physically; a full replication ETF practising securities lending holds a portfolio that no longer corresponds to the index. While generating fees and possibly also minimising dividend-related withholding tax liabilities, securities lending involves assuming counterparty risk. Hence securities lending fees can be viewed as compensation earned in exchange for assuming counterparty risk.

To reduce costs, ETFs can also use statistical sampling strategies (also known as "representative sampling") to replicate the chosen index. Instead of fully replicating the index, the fund invests in only a fraction of the total index constituents. The aim is to replicate the index by focusing on highly liquid underlying instruments. This form is generally used for very broad indices, where it is less costly than full replication. But there is also the trade-off that it necessarily leads to tracking error, the magnitude of which depends on the accuracy of the sampling replication model. In addition, sampling replication could also engage in securities lending, which may lead to counterparty credit risk.

Rather than attempting to replicate the underlying index by holding (some or all of) its constituents, a synthetic ETF (often called a "swap-based ETF") enters into a swap agreement with a third-party that agrees to deliver the index returns to the ETF in exchange for the returns on a portfolio which is either held by the ETF (unfunded swap structure) or held in its name as collateral plus a fee (funded swap structure). The ETF holds (a claim to) a portfolio of 'physical' securities that are different from the index constituents and the swap counterparty delivers the return difference between the physical portfolio and the index tracked by the ETF.

An ETF usually has a single swap counterparty – often the parent bank of the fund provider. Some providers, however, use multiple counterparties for the swaps held by their ETFs. Through this arrangement, ETF providers transfer the tracking error risk to the swap counterparty. However, counterparty credit risk arises in the form

37 - In some instances (e.g. some emerging markets) access issues will make the full replication approach impossible.
38 - In some jurisdictions (e.g. the United States) diversification requirements imposed on funds will make it impossible for a fund to hold the index constituents in the proportion of the index.
39 - Typically, the index will assume that dividends are paid and reinvested as soon as the stock goes ex-dividend. However, the average time between the ex-dividend date and the payment date is typically weeks, and sometimes months.

2. Background

of the risk that the counterparty may fail to deliver the promised return differential. For European ETFs, which are generally UCITS funds, this counterparty risk is limited to 10% of the fund's value, or even 5% if the counterparty is not a credit institution, and before reaching this limit the swap position will be reset. To manage counterparty risk rigorously, exposure to this risk is assessed and monitored by the fund providers on a daily basis (Amery, 2008b). As a result of the 2008 credit crunch, the fund providers usually set a lower limit than the UCITS requirement (Amery, 2008b; Cheng, 2009).

At the same time, fund providers are also seeking other means of shedding counterparty risk. Over-collateralisation – a commonly used form for hedging credit risk – has been made part of the replication process of some swap-based ETFs. In over-collateralisation the collateral assets will have a higher value than the NAV of the ETF. In the event of counterparty default, the collateral will thus provide investors with a comfortable margin of protection. Some ETFs also cover counterparty risk by buying credit protection in the form of credit default swaps (CDS).

At the end of November 2016, more than one-fifth of European ETF AUM (21%) was represented by synthetic replication ETFs and roughly four-fifths of AUM (79%) is invested in physical replication ETFs (see Deutsche Bank, 2016).

Dividend distribution

Like conventional index funds, ETFs can deal with dividend payments in two ways. They may, for example, pay dividends to their shareholders. Dividend payments on the securities held in the fund remain in the fund in the form of cash until they are paid out at fixed time intervals. This leaves investors with the task of managing the reinvestment of these dividends, but also allows them to obtain periodic cash flows. In between the fund's dividend payment dates, the accumulation of cash in the fund due to stock dividends may lead to small deviations of performance from the index. ETFs may also reinvest dividends. These ETFs track the total return (including reinvested dividends) on the underlying index. The only cash flows the investor has to deal with are those occurring when the ETF is traded; for the investor, the management of dividends is thus simplified.

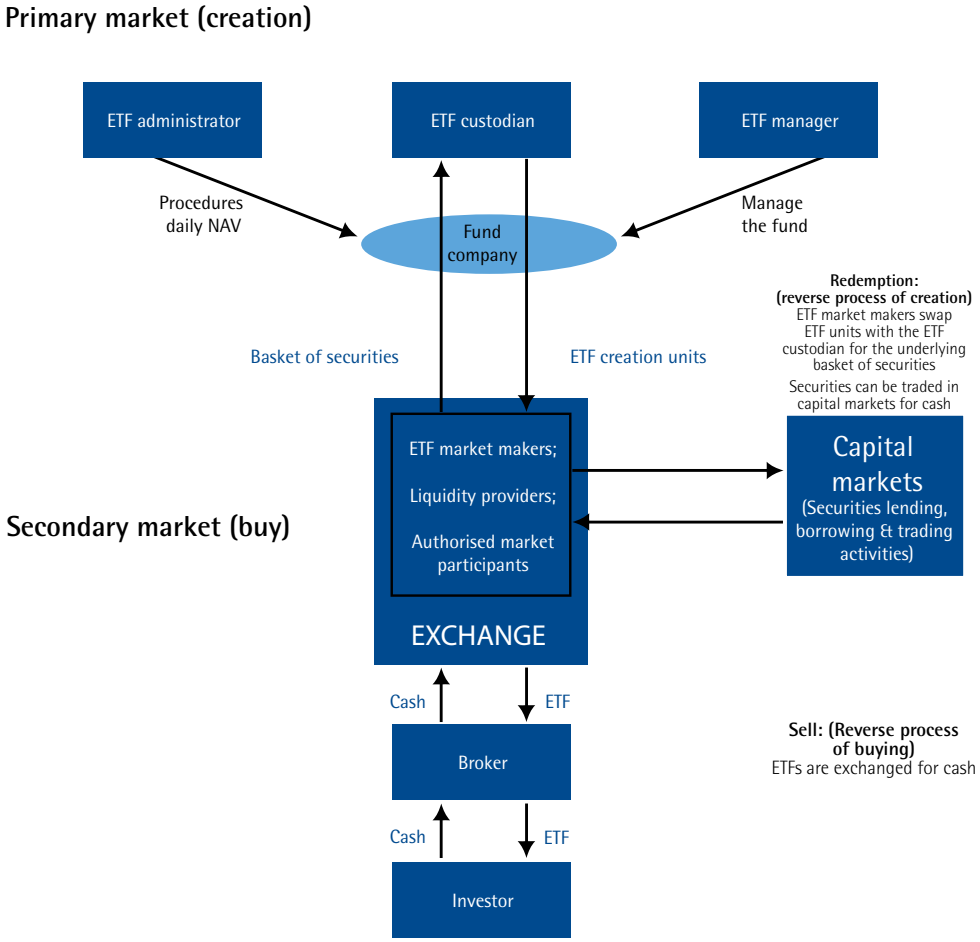
Primary and secondary markets

Although ETFs are registered as open-end funds, there are significant structural differences between ETFs and traditional mutual funds both in how their shares are issued and redeemed and in how their shares or units are traded. Exhibits 2.1 and 2.2 explain the operational structure and activities along the ETF transaction chain in the primary and secondary markets.

An ETF, as a registered fund company, is supported by a custodian holding its assets, an administrator producing daily NAV, and a management company looking after operations. The fund is created when authorised market participants such as institutional investors commit capital to seed a fund that will attempt to replicate an index. Unlike traditional mutual funds or unit investment trusts, shares in the ETF are created by the authorised market participant's depositing a specified block of securities with the ETF. The authorised market participant purchases the block of the underlying securities directly on

2. Background

Exhibit 2.1: Overview of Primary and Secondary Markets
The graph lays out the process of creating and redeeming an ETF in the primary market and trading it in the secondary market, indicating participants involved in this transaction flow.



the markets, based on the information contained in the portfolio composition file (PCF), a file prepared by the ETF manager. In return for this deposit, the authorised market participant receives a fixed amount of ETF shares with NAV amounting to the value of the replicated index. ETF shares are usually created or redeemed in lots of 50,000 or 100,000 or some other pre-specified size, known as creation units. Some or all of the ETF shares may then be sold on-exchange.

On the exchange, ETF market makers look at inventories and start quoting bid and ask prices for the ETF shares. Investors can buy ETF shares through their intermediary at the quoted "ask" price or sell shares at the quoted "bid" price. Intraday buy or sell prices depend on supply and demand and on the prices of the underlying securities. If the price of the ETF shares fluctuates and deviates from its NAV, market participants can step in and make an arbitrage profit on the differences. An indicative NAV (iNAV) is published every 15 seconds for ETFs, so the price can be compared almost continuously to this iNAV. If ETFs are undervalued compared to their NAV, arbitrageurs buy ETF units and redeem them at the custodial bank

2. Background

Exhibit 2.2: Typical Activities during an ETF Transaction in Primary and Secondary Markets

1	Liquidity providers and authorised market participants commit capital to seed a fund aiming at replicating an index.
2	Liquidity providers and authorised market participants purchase a basket of the underlying securities, based on the portfolio composition file (PCF) prepared by the fund company.
3	The market makers then exchange the basket of the underlying securities with the fund company (ETF custodian) for a set number of ETF units with an NAV, that is, the value of the replicating index.
4	On the exchange, ETF market makers start market making and quote bid and ask prices of the ETF units based on their inventory.
5	Investors can buy ETF units through their retail brokers at the quoted "ask"price, in exchange for cash.
6	Due to continuous intraday trading, the price of the ETF may fluctuate and deviate from its NAV. Moreover, the underlying index value may also go up or down during the trading day. These events create arbitrage opportunities for the market makers.
7	ETF units are created or redeemed on a daily basis, which enables the market makers to keep ETF prices close to the NAV.
8	The market makers can swap a set number of ETF units with the ETF custodian for the underlying basket of securities which can then be sold for cash in the secondary market.

in exchange for the underlying securities. If ETFs are overvalued, they buy the underlying securities, redeem them for creation units and then sell the created ETF shares on the markets. As a result, any mispricing of the NAV of the fund and the underlying security will be short-lived, and the price of the ETF is unlikely to deviate from the value of the underlying portfolio (see Mussavian and Hirsch, 2002 or Kalaycioglu, 2004).

Trading ETFs off-exchange

ETFs are frequently traded off-exchange, especially for very large orders. The first possibility is to engage in OTC trading of ETF shares. These so-called block trades may allow investors to benefit from tighter bid/ask spreads than they would on the exchange. The second possibility is to buy an ETF at unknown NAV. An order at unknown NAV that is emitted during the day will be executed at the closing NAV of the fund. These orders lead to a creation (buy order) or redemption (sell order) of ETF units, similar to what happens in a traditional mutual fund that is not traded on-exchange. This means of buying an ETF does not lead to any bid/ask spread since the order is executed at the NAV; the investor does bear creation and redemption costs.

2.1.3. ETFs for Different Asset Classes

In this description, we will mention only ETFs that allow access to the normal returns of an asset class or segment of assets. When we say "normal returns" we mean those that represent the reward for exposure to systemic risk factors. We do not mention ETFs that are actively managed or use structured forms of investment strategies – for instance, those offering exposure to specific payoff profiles through the use of derivatives, such as buy-write ETFs.[40] We describe the asset classes now covered by ETFs. In addition to the standard equity and fixed-income ETFs, we mention ETFs on a range of alternative asset classes.

Equity ETFs

ETFs that replicate stock market indices were the first on the market and are still the most important type.[41] Broad market ETFs attempt to replicate the returns of the entire stock market as reflected by a

40 - http://finance.yahoo.com/news/buywrite-etf-hits-market-130014274.html

41 - Actively managed ETFs are meant, like mutual funds, to deliver above-average returns. They charge more than traditional ETFs but, in general, less than mutual funds. They are supposed to have some of the advantages of ETFs, such as transparency, tax efficiency, and liquidity, all while being actively managed. However, since managers are paid for their stock selection, frequent disclosure of the underlying stock holdings would encourage investors to buy the underlying securities on their own instead of trading ETFs. On the other hand, if transparency is low, the price of ETFs would suffer significant deviation from the NAV of the underlying holdings.

2. Background

broad index such as the S&P 500 for the US or the Stoxx 600 for Europe. Such broad ETFs offer diversified exposure to general equity markets. They are thus a shortcut for investors seeking to hold a part of the market (Stock, 2006).

The aim of style ETFs is to replicate the returns on a particular investment style. In equity markets, firm size (large cap, small-cap) and investment style (growth, value) have been shown by Fama and French (1992) to be important determinants for the cross-sectional variation in expected stock returns. Style ETFs build on these findings and replicate the returns of such investment strategies. Sector ETFs focus on industry sectors, which they attempt to replicate. The motivation for relying on sector exposure to construct an equity portfolio is provided in a study by Ibbotson Associates (2002) that highlights the low correlation of different sectors and the low correlation of sectors and the market. Another study (Hamelink, Harasty and Hillion, 2001) shows that the benefits of sector diversification outweigh those of country diversification. Further evidence of the importance of sector and style diversification is provided by Vardharaj and Fabozzi (2007). Finally, ETF providers have moved from providing exposure to mature markets to providing exposure to emerging market equity, either in the form of global emerging market indices or in the form of specific country exposures.

Fixed-income ETFs

In addition to equity markets, ETFs may provide exposure to fixed-income markets. These ETFs can, of course, provide exposure to broad market indices as well as to more specific segments. Maturity-segment ETFs reflect the returns on investments in debt with terms to maturity ranging from short to long. Inflation-protected bond ETFs invest only in inflation-protected bonds.

Due to the recent sovereign debt crisis, the choice of countries included in government bond indices has been the subject of some discussion. Drenovak, Uroševic and Jelic (2010) have shown that differences in countries included have resulted in pronounced differences in performance. Some providers dissected the universe into high rated issuers and low rated issuers so that they could offer investors a clear picture. Also, one could see that emerging market sovereign bonds seem to be perceived more favourably compared to developed market bonds since investors consider the often lower debt-to-GDP ratio in emerging markets compared to developed countries (Yousuf, 2011; McCall, 2011). Following this trend, many ETF providers have started to launch local currency emerging market bond ETFs.[42]

ETFs not only track government bond indices but also broad corporate bond indices. In addition, a few sub-segment corporate bond ETFs are available to investors, for instance, financials vs. ex-financials, investment grade vs. high-yield, and short-term vs. all maturities.

CDS ETFs are another way to access to the corporate credit market other than corporate bond ETFs. CDS ETFs represent the performance for continuously investing in CDS as a protection seller/buyer. Unlike corporate bond ETFs, CDS ETFs are less sensitive to interest rate changes as the interest rates embedded are the overnight rates which lead to a close to zero duration (Deutsche Bank, 2010).

42- Amundi ETF has its Global Bond Emerging Market iBoxx in 2010. iShares launched local currency emerging market debt ETFs in June 2011. There are also Market Vectors Emerging Market Local Currency Bond ETF and WisdomTree Emerging Market Local Debt ETFs listed in the US.

2. Background

Money market ETFs

There are also ETFs designed to replicate the returns of short-term cash instruments. These funds offer investors a way to invest in various cash-like short-term securities, including commercial paper, repurchase agreements, Treasury bills, and certificates of deposit. These funds have drawn investor attention for the interest rates they pay, usually higher than those of certificates of deposit, and for their TERs, lower than those of money market mutual funds (Johnson, 2010). Moreover, money market ETFs usually provide a degree of diversification not easily achieved by individual investors and are seen as safer than bank deposits (Amery, 2008a).

Currency ETFs

Currency ETFs invest in a single currency or basket of currencies. There are two main investment strategies for currency ETFs. In the first, passive tracking, movements in a particular currency or a basket of currencies are replicated. In the second, systematic currency trading, long/short positions in various currencies are taken. Examples of currency trading strategies are the carry trade and the momentum strategy. The carry trade consists simply of borrowing the low-yield currency and buying the high-yield currency. The academic literature has identified the carry trade as a source of a risk premium similar to the risk premia for value or small-cap stocks.[43] The momentum strategy reflects the view that currencies will continue performing as they have been. Taking long positions in the currencies with the highest returns, short positions in the currencies with the lowest returns, or both positions, will lead to returns higher than those of a buy-and-hold strategy. Currency ETFs have attracted investors as they can be used for hedging or diversification (Jagerson, 2007).

43 - See Brunnermeier et al. (2008) or Jurek (2007) for an analysis of these strategies.

Volatility ETFs

Volatility ETFs are products which intend to mimic the performance of a volatility index through rolling the index future/forward contracts. The volatility index was first introduced to the equity markets in 1993 (Whaley, 2008), and has since become a hotspot among investors. A key point to note is that volatility of equity returns tends to move in opposite directions (i.e. they are strongly negatively correlated). Hence, taking a long position on volatility could diversify equity risk (Hill and Rattray, 2004; Szado, 2009). In addition, negative correlation and high volatility are particularly pronounced in stock market downturns, offering protection against stock market losses when it is needed the most and when other forms of diversification are not very effective (Jacob and Rasiel, 2009).

Unlike volatility-linked ETNs – which are unsecure, unsubordinated debt securities (see Goltz and Stoyanov, 2012) – volatility ETFs are funds. In Europe, they follow UCITS regulation. Hence, there is less credit risk exposure.

Alternative asset class ETFs

The concept of ETFs has been extended to alternative investments. These investment products enable investors to gain simple access to alternative investment opportunities such as hedge funds, commodities, real estate or infrastructure. ETFs on alternative asset classes allow investors to diversify portfolios but do not require the infrastructure needed for direct investments and manager selection in alternative asset classes, infrastructure

2. Background

they may be unfamiliar with. The benefits of using alternative index ETFs in a global portfolio have been analysed by Pezier (2008).

ETFs in the alternative investment universe must deal with illiquid underlying assets, an obligation at odds with one of the main objectives of ETFs, that is, to provide high liquidity. As a result, ETFs must usually rely on liquid proxies of the asset class that can only approximate the price movements in these asset classes.

Hedge fund ETFs, for example, can rely on hedge fund factor models that make it possible to replicate the performance of broad hedge fund indices by investing in more standard and thus more liquid assets. Hedge fund ETFs can also be set up with the help of managed account platforms: these ETFs enable investors to invest directly in hedge funds via so-called parallel managed accounts of hedge fund managers. To ensure the liquidity of the ETFs, only hedge fund managers who are active in strategies known for their liquidity are selected. Commodity ETFs are based mostly on commodity futures, although some funds also invest directly in such precious metals as gold. Illiquid underlying holdings are also a problem for real estate ETFs. Real estate ETFs usually replicate real estate indices that are based on real estate investment trusts (REITs), listed collective equity investment vehicles that provide relatively high liquidity. They may also invest in a basket of real estate stocks. Infrastructure ETFs invest in stocks or indices from three clusters: energy, transportation, and utilities (see Fuhr and Kelly, 2009).

2.1.4. Alternatives to ETFs: Other Index-Tracking Vehicles

In addition to ETFs, there is a variety of financial products that allow simple trades of large baskets of assets: traditional index funds, futures, and total return swaps (TRS). Because of their similar features, they can be regarded – depending on the investment purpose – as alternatives to ETFs.

The closest of these alternatives are traditional index funds, which are in fact the predecessors of ETFs. Index funds can be viewed as unlisted ETFs, to which they are very similar, except that they can be bought from and sold only to the managing company of the mutual fund (primary market). As ETFs are growing rapidly, the academic literature has addressed the question of whether ETFs are replacing index funds. Agapova (2011) finds that the asset inflows to ETFs do not reflect asset outflows from conventional index funds. Blitz, Huij and Swinkels (2012) find little difference in terms of benchmark relative performance between European index funds and ETFs. However, Guedj and Huang (2008) show that ETFs can be substitutes for index funds that track large, broad, well-diversified and liquid indices because both of them offer investors a fairly identical investment vehicle. Overall, there is no clear consensus in the literature as to whether the growth of ETFs is coming at the expense of index funds, and there is relatively little recent evidence that accounts for current investor perceptions.

Investors can also opt for derivative instruments (futures and TRSs) to trade large baskets of assets. Futures are standardised forward contracts that make it possible to trade baskets of assets (bonds, equities,

2. Background

or commodities) at a certain date in the future. Since these derivatives are traded on-exchange, they are highly liquid. A TRS, by contrast, is not traded on-exchange; it is an OTC contract. Here, the total return of an index or a single security is swapped for fixed regular cash flows. A TRS is similar to a standard swap except that the total return (cash flows plus capital depreciation/appreciation) is swapped, and not cash flows alone. As with any swap, the parties do not transfer actual ownership of the assets. A TRS exposes investors to counterparty credit risk because it is traded OTC, whereas a future is an exchange-traded instrument and thus benefits from clearing-house mechanisms that mitigate counterparty credit risk.

2.1.5. Benefits and Uses of ETFs

Given that they are hybrids of stocks and funds, ETFs provide institutional and private investors with a number of combined benefits and, as a result, improve the ways they invest. ETFs are much easier to trade than funds. Moreover, a single ETF trade can provide much broader exposure than a single stock trade. They are also tax efficient.

Ease of trading

The ease of trading ETFs is the result of their liquidity and transparency. The advantage of highly liquid markets such as the ETF market is that large amounts of assets can be traded without making a large impact on the market. The liquidity of ETFs stems from their listing on-exchange and from direct provision of ETFs by authorised participants. Investors can enter or exit at any time. Small trades can be executed whenever the exchange is open and at market prices that change from moment to moment, which shows a higher degree of liquidity than traditional index funds, priced once a day at the close. Any type of order used in trading stocks can be used in trading ETFs. For larger trades, ETF shares can be handled efficiently by authorised participants under the in-kind creation and redemption process.

Transparency

ETFs are considered more transparent than mutual funds. The detailed composition of the fund is published on a daily basis, and the NAV is frequently computed and made available to the market during trading hours. Investors are able to see what exactly goes into the ETF, and the investment fees are clearly laid out. In the light of pricing scandals that have affected the mutual fund industry, the transparency of ETFs has become quite a draw; indeed, at the outset, it served as an impetus for the growth of the market.

Cost

One of the primary advantages of ETFs is that they offer all of the benefits associated with index funds at much lower cost. Because of the essence of index-tracking, ETFs obviously charge less than actively-managed funds. Moreover, even though, like stocks, they involve commissions, their lower costs may make them more attractive than traditional index funds. It is useful to distinguish two aspects of costs, TERs and transaction costs.

Firstly, ETFs charge management fees and other operating fees. The TER offers a fair standard by which to compare such costs, since management fees alone might lead to misconceptions.

Secondly, ETF shares must be bought by investors, either on- or off-exchange, and

2. Background

the investor incurs transaction costs. If ETF shares are bought or sold on-exchange or OTC, the investor incurs transaction costs that amount to brokerage fees, as well as half the bid/ask spread. If ETFs are bought at an unknown NAV, the investor does not bear costs in form of bid/ask spreads, but in the form of creation/redemption costs.

Costs differ significantly from one ETF to another. Differences are found in both TERs and transaction costs (either bid/ask spreads or creation/redemption fees). These differences are not merely a result of the different index or asset class tracked by the ETF; indeed, the costs of ETFs that track similar segments or even the same index may differ.

The cost advantage of ETFs over other indexing instruments obviously depends on the benchmark. For large institutional investors, mandates to replicate an index are usually less costly but also less liquid than an ETF. But ETFs usually charge less than other open-ended index funds. Moreover, the costs are specific to the context in which the index products are used. In particular, the position size and frequency of trading determine the relative merits of each instrument. Kostovetsky (2003), for example, finds that for large investments ETFs are preferable to index funds, while for small amounts, the high transaction costs make ETFs less attractive unless the holding period is long. Gastineau (2001) notes the reasons that make ETFs more cost efficient than index funds. First, ETFs are usually very large funds, allowing economies of scale and, second, expenses for the transfer agency function of mutual funds are not incurred with ETFs.

Obtaining broad and diversified market exposure

ETFs allow investors to gain instant and diversified access to various markets. Once an investor buys an ETF, he gets exposure to the entire market for the underlying assets and diversification of systematic risk. Moran (2003) has argued that ETFs are a useful means of achieving diversification. In addition, the portfolio of ETFs can provide more customised diversification. A cautious investor who wants to invest in real estate and fixed-income, for example, could easily form a portfolio by trading ETFs that track real estate indices and fixed-income ETFs, and he could structure the fixed-income portion by splitting it into medium-term and short-term bonds or government bonds and corporate bonds. Miffre (2006) has shown that the ability to construct portfolios of country-specific ETFs makes it possible for the equity investor to obtain risk-adjusted performance better than that obtained by holding a global index fund.

Trading with high tax efficiency

Tax-conscious investors have lately begun to prefer ETFs to mutual funds. The special tax rules on conventional mutual funds require that realised capital gains be passed to shareholders, a requirement that is widely regarded as increasing the tax burden on buy-and-hold investors (Dickson and Shoven, 1995; Dickson, Shoven and Sialm, 2000). Although ETFs are subject to the same tax rules as mutual funds, their distinct "redemption in-kind" mechanism, allowing an investor to redeem a large number of ETF shares by swapping ETFs for the underlying stock, does not incur capital gains. Poterba and Shoven (2002) compared the before- and after-tax returns of SPDR (an ETF that holds the securities

2. Background

in the S&P 500) and the Vanguard Index 500 fund from 1994 to 2000 and they find that tax effects are favourable for the ETF. Some investors even use ETFs for such tax manoeuvring as realising capital losses and getting around restrictions on wash-sales (Bansal and Somani, 2002).[44]

We now turn to more specific ways of using ETFs. These strategies offer more flexible approaches to investors than simple long positions in a given asset class or segment. We provide below an overview of advanced types of ETF products, as well as of advanced ways of using ETFs in portfolio practice.

2.1.6. Tracking Error and Liquidity

Tracking error and liquidity are the two most crucial criteria for evaluating the quality of an ETF. So it is important to know how to assess them.

44 - A wash-sale is the sale of a security at a loss followed by the immediate repurchase of the identical security. Wash-sales are used to reduce the tax burden, since other capital gains can often be offset by these capital losses and thereby reduce total taxable gains.

Tracking error

There are many ways to assess the tracking quality of an ETF. First, and quite evidently, it is possible to analyse the difference between the returns on the ETF and those on the index. Second, the correlation of the two assets can be used to determine the tracking quality. Another simple method of analysing tracking error is to compare the mean returns of both assets. There are, however, more sophisticated means of evaluating tracking error. These means include asymmetric or downside tracking error (which is the relative return equivalent to downside risk measures such as semi-variance in an absolute-return context), co-integration analysis (see Engle and Sarkar (2006) for an application to the tracking quality of ETFs) or Bayesian analysis (see Rossi (2012) for an explanation of their approach which decomposes tracking error into temporary and permanent components).

Tracking Error across Different Types of Indices

The number of ETFs has been growing steadily over the past decade. Though the purpose of an ETF is to track the underlying index, not all ETFs could achieve this objective with the highest accuracy. There are a number of studies dedicated to investigating the differences in tracking error across various types of indices.

Rompotis (2011) studies three active ETFs and three corresponding passive ETFs in the US and finds that the active ETFs have higher discrepancy than their passive counterparts in terms of index returns. This is easily explained by the fact that the purpose of active ETFs is not to track the index, but rather to beat it. It is expected that active ETFs would have higher tracking error. ETFs built on strategies such as leveraged ETFs and inverse ETFs also experience higher deviations compared to the traditional ETFs (Rompotis, 2010a).

Other than the difference between active and passive ETFs, liquidity may also affect the tracking error. Ackert and Tian (2000) finds that MidCap SPDRs trade at a large discount, whereas the price of Large Cap SPDRs does not differ significantly from their NAV. Rompotis (2008, 2010b) also shows that the tracking error is positively affected by the bid-ask spread, which is the commonly used indicator for liquidity. Vardharaj, Fabozzi and Jones (2004) find that the tracking error tends to increase when the volatility of the benchmark increases.

2. Background

Rompotis (2009) also finds that ETFs that track international indices have higher tracking error than those tracking local country indices. This difference in tracking error comes from the expense ratio and the volatility of the ETFs. Jares and Lavin (2004) analyse ETFs traded in the US market but that have significant exposure to the Asian markets and find that the less overlapping hours there are between foreign stock exchanges and the US exchanges, the more the tracking error there is. A similar conclusion was reached by Johnson (2009), who analysed 20 foreign country ETFs which tracked the S&P 500. In addition, Maister et al. (2010) show that ETFs that track emerging market indices exhibit higher tracking error than those that track indices in other market segments. They conclude that the major source of this increase in the ETF tracking error relates to the SEC diversification requirements, as some of the indices have overweighted certain companies beyond the limits set by the SEC. This means that regulation prevents funds from matching the actual index weights.

Unlike the previous studies, which mainly focus on equity ETFs, Drenovak, Uroševic and Jelic (2010) investigate the driving factors for sovereign ETFs that track error. They showed that the fixed-income tracking error is affected by the maturity, and the average CDS spread of the constituents. Bond ETFs with longer maturities as well as widening CDS spreads would tend to have more volatile tracking error.

ETF Tracking Quality

The tracking quality of ETFs may be characterised by several indicators, including not only the tracking error but also the tracking difference. The tracking difference is the difference between ETF total return and the total return of the replicated index, while the tracking error evaluates the volatility of the difference in return between an ETF and its benchmark.

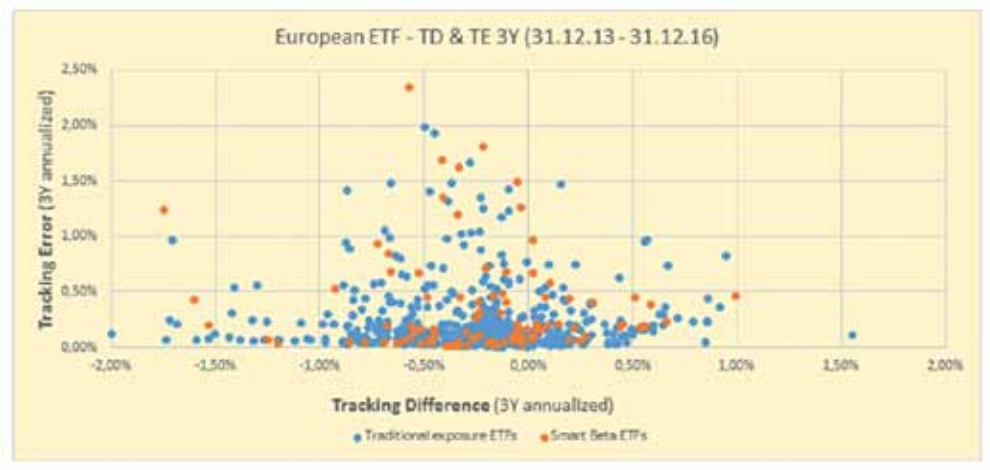
Bonelli (2015) shows that depending on whether we consider the level of tracking error or the level of tracking difference, the ranking of ETFs that track the same index may greatly differ. For example, he observes that tracking error varies significantly across the different ETFs that all track the MSCI World Index (from 0.02% to 0.22%). The ETF with the lowest tracking error relative to the index has one of the highest tracking differences (-0.42%), and thus greatly underperforms its benchmark, while an ETF which has one of the highest tracking errors (0.21%) is also the one with the lowest tracking difference (-0.19%).

Similar results were obtained for two other indices, namely the MSCI Emerging Markets Index and the MSCI Europe Euro Index. Bonelli (2015) concludes that tracking error is not representative of the under- or outperformance of ETFs with respect to their benchmark, but serves first of all to evaluate the relative risk of daily deviations and is of more concern for short-term, rather than for mid-term or long-term, investors. Long-term investors may be more interested by measuring the tracking difference, as its level provides a more relevant indication of costs of ownership than does the expense ratio. Indeed, if ETF replication were perfect, the tracking difference would be equal to the ETF expense ratio.

2. Background

It is a common belief that ETFs that track 'smart beta' indices (non-market cap weighting schemes and/or factor exposure) exhibit weak replication quality due to friction costs implied by the possibility of more frequent and wide index rebalancing. Exhibit 2.3 is an illustrative analysis of the performance of smart beta vs. traditional exposure ETFs vis-à-vis their respective benchmarks. It shed lights on replication accuracy with no consideration of the risk/return profile of the associated benchmarks. The analysis covers a universe of 732 Europe-domiciled ETFs that exhibit a three-year track record (Jan 2014 – Dec 2016) that can be analysed on www.trackinsight.com.

Exhibit 2.3: Performance of Smart Beta vs. Traditional Exposure ETFs



Source: www.trackinsight.com

The analysis tends to demonstrate there is NO evidence that Smart Beta ETFs would possibly exhibit poor performance relative to their benchmarks that are tracking non-market cap weighting schemes.

Average Tracking Difference is strictly the same on the two universes, medians are close and dispersion around the mean is comparable. This analysis tends to contradict the common belief that smart beta benchmarks imply higher replication frictions due to more frequent or sizeable rebalancing.

Exhibit 2.4: Detailed Statistics on Tracking Difference and Tracking Error Measures

		3Y TD			3Y TE		
	# ETFs	Mean	Median	Standard deviation	Mean	Median	Standard deviation
Traditional Exposure	637	-0.24%	-0.18%	0.414%	0.20%	0.10%	0.28%
Smart Beta	95	-0.24%	-0.21%	0.461%	0.36%	0.17%	0.46%

When it comes to the Tracking Error, we can however observe a higher level of daily volatility for smart beta ETF relative returns which can be explained by the need for rebalancing the portfolios outside of the rebalancing windows of market cap ETFs on the one hand, but possibly by a bias towards less liquid securities for some smart beta strategies resulting in higher volatility in execution costs, with no significant impact on net costs in the long run.

2. Background

Liquidity

The second key issue with indexing instruments is liquidity. Practitioners, of course, are highly familiar with liquidity, but the finance literature has yet to come to a consensus on theory and on empirical methodology. Practitioners, for example, have long used a number of liquidity measures, but academic articles continue to debate their merits. Popular liquidity indicators are market spreads, turnover, and AUM. Several authors in the finance literature have proposed more advanced liquidity measures, as proposed by Amihud (2002) and Acharya and Pedersen (2005).

Of course, the number of transactions in ETF shares is not necessarily indicative of the liquidity of an ETF. For several reasons, in fact, ETFs may be classified as highly liquid even if relatively few ETF shares change hands. The first is that the market maker has a contractual obligation towards the stock exchange and towards the ETF provider to fulfil its role as market maker for a given transaction size and with a determined maximum spread. Therefore, even if trading volume is low on a given day, ETF investors can trade at any time of the day. The second reason is that in Europe most ETF transaction volume actually takes place off-exchange, either by trading ETF shares OTC or at unknown NAV. The volume traded on-exchange is thus not a reliable indicator of the actual transaction volume.

The true liquidity of an ETF is the liquidity of the underlying securities. After all, any deviation of the price of the ETF from the price of the basket of securities is easily arbitraged away through the creation and redemption mechanism. This arbitrage depends only on the liquidity of the underlying securities. As described above, the market maker swaps ETF units with the ETF custodian for the basket of securities of the ETF, so it is the liquidity of securities in this basket that matters.

The bid-ask spread is a common indicator of an asset's liquidity. It has been documented in detail how the bid-ask spread of an ETF can be broken down into its components (see Amundi ETF, 2011). Since market makers have to make a hedge when they trade ETFs with clients, one part of the ETF spread is reserved for them to buy/sell the underlying. Usually, the ETF bid-ask spread comprises five components: the spread of the underlying, taxes, exchange costs, the carry cost of the ETF as well as the margin of the market maker. In this case, the spread of the ETF will often be affected by the location of the underlying market, the number of constituents, the trading hours and the size of the order.

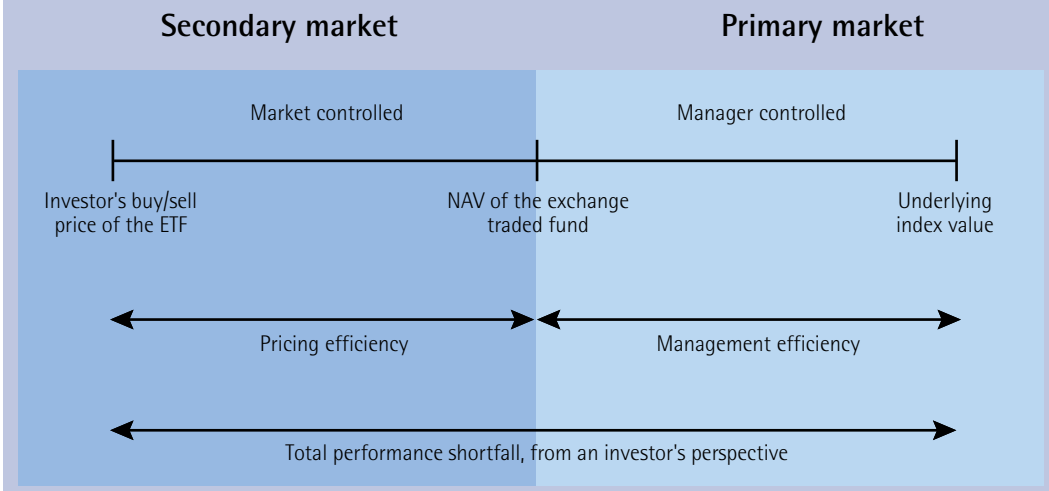
Calamia, Deville and Riva (2013) provide extensive empirical evidence on the drivers of bid-ask spreads. Their results suggest that the size of an ETF (in terms of AUM or volume traded), the replication method, and market fragmentation influence the bid-ask spread (also see Stoll (2000), Rompotis (2010b), or Agrrawal and Clark (2009) for analyses of determinants of bid-ask spreads). Thirumalai (2004) shows that there is a positive relationship between the bid-ask spread and volatility – securities which are more volatile tend to have larger spreads. Furthermore, Rompotis (2008, 2010b) demonstrates that the bid-ask spread is positively related to the absolute value of the premium (the difference between the price and the NAV) as well as the tracking error. According to these empirical results, higher bid-ask spreads tend to occur together with higher volatility and tracking error.

2. Background

Pricing and Performance Drift

Although index ETFs are designed to track an index passively and provide exposure to its risk and performance features, ETFs that for legal reasons cannot fully replicate an index need to be managed more actively. Any deviation of an ETF's returns from the underlying index returns results in a performance gap. Unlike index funds, which can be bought and sold only at their daily NAV, ETFs can be exchanged in secondary markets at ask/bid prices that may differ from their NAV. Exhibit 2.5 provides a description of the sources of deviation that ETFs may encounter.

Exhibit 2.5: Performance Shortfall of an ETF



For an investor, the total performance shortfall (or gain) is the right measure with which to identify the gap between the performance of the ETF and that of its underlying index. This gap should be measured as the return difference between the underlying index and the ETF – taking into account the investor's actual buying price. This price, however, is not easy to obtain, and might require studying specific transactions to take into consideration the specific market impact of such trades.

The total performance shortfall can be conceived as the sum of the ETF management inefficiencies and market inefficiencies. Since the former lie within the ETF management itself, they can be controlled by the fund management company. Given that they depend on the market makers, supply and demand, and transaction costs, the latter are beyond the control of the ETF company.

Net Asset Value versus Market Price

An ETF has an NAV calculated with reference to the market value of the securities held. NAV is the total value of the fund after netting the market value of each underlying share in its holdings, cash, accruals, fees, operating costs and other liabilities and divided by the number of issued shares. For fully replicated index trackers, the NAV should be exactly the same as or very close to the fund's underlying index value (this is not true for index-tracking leveraged ETFs which offer a multiple of the return on the underlying index.) On-exchange, however, the market price of an ETF, like that of a stock, is determined by supply and demand. ETFs are bought and sold at their market

2. Background

prices, which may be at a premium or discount to their NAVs. When the market price of an ETF is not equal to its NAV, arbitrage opportunities are created and the creation and redemption process brings the fund's market price back to its NAV.

The intraday NAVs of ETFs are also usually calculated every fifteen seconds by third-party vendors; the market prices of the underlying index constituents are taken into account so that investors can tell whether the ETF is fairly priced. This intraday NAV, also known as indicative net asset value (iNAV) or indicative optimised portfolio value (IOPV), is different from the daily NAV of the fund, which is computed after the market closes for the day.

In empirical studies, Marshall, Nguyen and Visaltanachoti (2012) show that ETF mispricing occurs reasonably frequently. Usually, such mispricing is small, but leveraged/inverse ETFs show greater mispricing. Marshall, Nguyen and Visaltanachoti (2012) find the mispricing due to a decrease in ETF liquidity. Petajisto (2011) finds that this mispricing is greatest for ETFs holding international or illiquid securities, which corresponds to the fact that increased transactions costs for illiquid underlying securities will deter arbitrage at smaller levels of ETF premia.

Dolvin (2010) shows that price deviation can lead to arbitrage opportunities. Shum (2010) analyses the international ETFs and shows that Asian ETFs are trading at a premium/discount compared to their underlying indices in the US as ETFs could anticipate the market reaction to the movement of the US market due to the time difference. However, Engle and Sarkar (2006) find that in the US ETFs have highly efficient prices, though their conclusions for international ETFs are different. In fact, the authors find that the premia or discounts on fund NAVs are usually small and disappear very quickly, a disappearance that confirms the view that the creation and redemption mechanism of ETFs effectively limits and destroys arbitrage opportunities.

Performance Drift

Ideally, ETFs should derive their value and volatility only from the market movements of the underlying index or market prices of the constituent securities of this index. But perfect replication is not always possible; in fact, performance drift is inevitable. An index portfolio is only a paper portfolio and requires virtually no management, administration, asset buying or selling, custody, and so on. An ETF, by contrast, holds assets physically, manages them, distributes dividends and handles a relationship with investors. These operations incur costs. So to keep costs down and make sure they are consistent it is necessary to understand the components of these costs. Several costs can be a drag on ETF performance, some related to the direct costs of implementing the strategy, others to the way the index is replicated and exceptions handled:

- Implementation: ETFs need not replicate indices by buying or selling the underlying securities. They are paper portfolios calculated on the basis of market prices and weightings of their underlying securities. The underlying securities may not be very liquid and, given the large size of an ETF portfolio, the price of a constituent security may go up as a result of high demand during implementation. This cost, also known

2. Background

as portfolio construction/rebalancing cost or transition cost, which also includes the actual transaction costs, results in a performance drag on the ETF portfolio.

- Management fees and other operational expenses: unlike ETF portfolios, indices do not incur management fees, administrative costs and other operating expenses. Often expressed in terms of TER as a percentage of the NAV, these costs are deducted from the ETF assets and the daily NAV is affected accordingly (daily accrual). When dividends and interest income are paid, usually every quarter or twice a year, total management expenses are deducted from the payment and the NAV of the ETF returns to the index value.
- Transaction costs in the secondary market: investors buying or selling ETFs on-exchange through their broker must shoulder brokerage commissions, bid/ask spreads, the market impact of a large transaction, stamp duty, transaction levies charged by the exchange, and so on. These costs make ETF returns lower than those of the underlying index.
- Cash drag: if ETFs pay dividends they usually do so every quarter or twice a year. However, the underlying securities pay dividends sporadically throughout the year. While the index value reflects full dividend reinvestment, an ETF portfolio holds extra cash that has no capital appreciation, no returns. This generates a minor disparity between the ETF portfolio value and the underlying index value. Tracking error caused by this phenomenon is called "cash drag" because the ETF portfolio holds extra cash that drags its performance down.
- Mispricing costs in secondary markets: an ETF may trade at lower than (discount) its NAV or higher than (premium) its NAV. Factors such as unmatched supply and demand, illiquid underlying securities, and market inefficiency may contribute to the move of trading prices away from NAV. Since ETF shares can be created or redeemed anytime during trading hours by authorised market participants or arbitrageurs, this disparity does not last long.

On the other hand, there are also several ways that ETF managers can offset some of the replication costs. In some cases an ETF can yield higher returns than the index to be replicated through the following:

- Securities lending: ETF providers can lend their securities to other market participants and thereby earn lending fees.
- Tax benefits: in some countries it is possible to partly recover withholding taxes through the purchase of single stocks during the period of dividend payments. Blitz, Huij and Swinkels (2012) show that a large proportion of the underperformance not accounted for by the TER is due to dividend taxes.
- Management of index events: intelligent management of index component changes and other events can generate additional returns for the ETF. However, if done unsuccessfully, such management may also lead to underperformance of the index.

2. Background

2.2. Smart Beta Strategies

Recently, the standard practice of using a capitalisation-weighting scheme for the construction of indices has been the target of harsh criticism. Nowadays, growing demand for indices as investment vehicles has led to innovations including new weighting schemes and alternative definitions of sub-segments. There are also many recent initiatives for non-cap-weighted ETFs. Since the first fundamental factor-weighted ETF launched in May 2000 (Fuhr and Kelly, 2011), there have been quite a number of ETFs introduced to track non-market-cap-weighted indices,[45] including equal-weighted ETFs, minimum variance ETFs, characteristics-weighted ETFs, etc.[46] These have been coined "Smart Beta ETFs" as they seek to generate superior risk-adjusted returns compared to standard market-capitalisation-based indices. According to Lyxor (2017), the AUM of European smart beta ETFs reached €27.4bn at the end of 2016, representing an increase of 50% compared to the end of 2015, and accounting for 12% of total assets. AUM in strategic-beta ETFs quadrupled over the last four years (Morningstar, 2017).[47] According to ETFGI, at the end of January 2017, there were globally 1,208 smart beta equity ETFs and ETPs and 150 providers of such funds, listed on 37 exchanges in 32 countries.

45 - For instance, PowerShares adopted a fundamental index methodology and launched PowerShares FTSE RAFI ETFs that cover both the US and global markets since 2005. Wisdom Tree introduced a series of ETFs weighted by different fundamental factors, such as dividends and earnings since 2006. RevenueShares launches some revenue-weighted ETFs in 2008.
46 - Rydex introduced the first equal-weighted ETF in 2003. It tracks the S&P Equal Weight Index. iShares and Ossiam also launched equal-weighted ETFs in 2011. In May 2011, PowerShares launched the first beta and the first volatility weighted ETFs.
47 - See Garcia-Zarate (2017).
48 - Text established with the contribution of Frédéric Ducoulombier and Ashish Lodh.

Difference between Defensive Strategies and the Low Risk Factor[48]

- In academia, there are two types of defensive equity strategies with very different objectives, but they are often confused as they both lead to a reduction in risk.
- Low volatility factor harvesting strategies aim to extract the well-documented Low Risk premium, but have an implicit defensive bias as a by-product of the stocks these strategies hold.
- Minimum volatility strategies explicitly target the lowest risk portfolio on the efficient frontier and are deeply rooted in Modern Portfolio Theory, but they provide access to the Low Risk premium as a by-product of holding low volatility stocks.
- The Minimum Variance portfolio does not aim at generating high average returns through exposure to the low volatility premium, but rather aims at the lowest possible volatility irrespective of expected returns. However, given the importance of volatility parameters compared to correlation parameters in the optimisation, this portfolio ends up being largely concentrated in low volatility stocks and sometimes presents a high level of unrewarded specific risks.

Introduction

In the context of defensive equity investing, investors often confuse being exposed to a defensive strategy, such as Efficient Minimum Volatility, and benefitting from the reward to the Low Risk factor. The reason being the two types of defensive strategies (i.e. Low Volatility and Minimum Volatility) that respectively derive from different academic traditions (i.e. factor investing and modern portfolio theory) can produce comparable levels of risk reduction in practice. While factor-investing strategies aiming to extract the Low Risk factor premium were introduced in a long/short setting and as such could be market neutral, their long-only unleveraged implementations

2. Background

(i.e. Low Volatility/Beta strategies) naturally acquire a defensive character as they overweight low risk stocks.

Modern Portfolio Theory Minimum Volatility strategies, on the other hand, are intended to be defensive, as they explicitly aim to identify the portfolio with the lowest risk on Markowitz's (1952) efficient frontier. While they give no consideration to factor exposures and explicitly rely on exploiting both low individual stock volatilities and low pair-wise correlations between stocks, traditional implementations of Minimum Volatility investing can be expected to produce portfolios that are dominated by low risk stocks and, as such, could indirectly produce significant exposure to the Low Risk factor (assuming sufficient diversification of idiosyncratic risk). ERI Scientific Beta makes a clear distinction between these two approaches, which, even though they have points in common (low beta, exposure to low volatility risk), do not have the same objectives or the same long-term performance and risk.

The Low Risk factor

The Low Risk factor occupies a particular place in the asset pricing literature as the performance of low risk strategies appears to directly contradict the central prediction of the CAPM, namely that returns should be linearly related to systematic market risk (as measured by market beta, i.e. the covariance between the returns of the portfolio and those of the market standardised by the variance of market returns). Below we underline that the said performance is one of the strongest results in empirical finance, that it has spurred a rich literature on the rewarded factors in asset prices and that it is supported by theoretical justifications.

The lack of empirical success for the CAPM, the founding model of asset pricing theory, prompted a search for better asset pricing models which led to theoretical advances starting with Black's (1972) restricted borrowing CAPM and, following the proposal of multi-factor models with Merton's (1973) inter-temporal CAPM and Ross's (1976) arbitrage theory of capital asset pricing, to the search for and identify priced factors in equity returns beyond market risk, the single factor posited by the CAPM, and from Fama and French (1992, 1993) onwards to their inclusion in multi-factor pricing models.

While the low risk "anomaly" first documented by Friend and Blume (1970), Black, Jensen, and Scholes (1972), Miller and Scholes (1972) and Haugen and Heins (1972, 1975), was responsible for triggering the work that led to these theoretical and empirical advances in multi-factor asset pricing, the "anomaly" has survived to this day[49] and has been rejuvenated by recent theoretical work. Influential work by Ang et al. (2006, 2009) finds that stocks with high total volatility underperform and that stocks with high recent idiosyncratic volatility have low average returns that are not explained by the size, book-to-market and momentum effects of Fama and French (1992, 1993) and Jegadeesh and Titman (1993). While a number of papers try to explain away the idiosyncratic volatility results of Ang et al. (see Martellini, 2013 for a review), others, such as Chen et al. (2012) defend it as a common phenomenon.

49 - Black (1993) contends that this evidence is stronger than the corresponding evidence for the factors introduced by Fama and French (1992, 1993). Empirical studies documenting the performance of low risk portfolios also include Haugen and Baker (1991); Jagannathan and Ma (2003); Fama and French (2004); Clarke, de Silva and Thorley (2006) and Baker, Bradley, and Wurgler (2011). While the aforementioned studies concern U.S. markets, the same effect has been documented for global equity markets by Blitz and van Vliet (2007), Baker, Nardin and Haugen (2012) and Baker, Bradley, Taliaferro (2014), among others.

2. Background

Stambaugh, Yu and Yuan (2015) justify the negative relation between idiosyncratic volatility and average return by restrictions on short sales that limit the shorting of overpriced stocks (which they contend exhibit the negative relationship, particularly in periods of high investor sentiment).[50] Complementing behavioural explanations of the performance of defensive strategies, Baker, Bradley and Wurgler (2011) note that tracking error constraints in benchmarked institutional management discourage arbitrage activity in both high-alpha low-beta stocks and low-alpha high-beta stocks.

Following on from Black (1972, 1993), Frazzini and Pedersen (2014) present a model of leverage-constrained investment that explains why investors seeking a high degree of market risk[51] cause low-beta assets to overperform high-beta assets on a risk-adjusted basis. They document that the "betting against beta" strategy, which is long leveraged low-beta assets and short high-beta assets, produces significant positive risk-adjusted returns. Importantly, they show that the poor returns of the strategy when funding constraints become tight are consistent with liquidity-constrained investors having to sell leveraged positions in low-risk assets in bad times, providing a risk-based justification for the observed premium.

Nature and limits of defensive strategies

The implementation of Low Risk factor harvesting in a long-only and zero-leverage environment creates a defensive risk/return profile as a by-product, while the practical implementation of defensive Minimum-Volatility strategies will typically lead to portfolios dominated by low volatility stocks, which could potentially reap some of the benefits of the Low Risk factor as a side effect. Note that the confusion between Minimum Volatility strategies deriving from Modern Portfolio Theory and Low Volatility factor strategies owes a lot to MSCI, which has been marketing its Minimum Volatility indices as Low Volatility Factor indices. Below we discuss separately the properties and limitations of the two kinds of defensive strategies.

Minimum volatility strategies

In the Markowitz framework, the Global Minimum Variance portfolio is a remarkable portfolio that lies on the efficient frontier and provides the lowest possible portfolio volatility. Identifying this portfolio requires the variance-covariance matrix as an optimisation input. From a theoretical standpoint and as explained by Tobin (1958), minimum variance portfolios are not optimal in the presence of a riskless asset since they are dominated by a combination of the optimal risky portfolio maximising the risk/return trade-off (tangency portfolio) and the riskless asset. In this context, the minimum variance portfolio coincides with the optimal risky portfolio only when the expected returns of all assets are identical, a rather unrealistic optimality condition.

In practice however, identifying the tangency portfolio in the traditional manner is extremely difficult as it requires estimation of the expected returns for use in optimisation. Indeed, as shown by Merton (1980), a long history is required to estimate an expected return that is known to be constant, and there is no reason why such an expected return should be a constant. The higher degree of estimation

50 - Hong and Sraer (2015) show how, in the presence of short-sale restrictions, disagreement amongst investors on the future cash flows of firms leads to overpricing of stocks. As disagreement increases with a stock's beta, high beta stocks, which are more sensitive to aggregate disagreement than low beta ones, are only held in equilibrium by optimists as pessimists are sidelined. This greater divergence of opinion creates relative overpricing of high beta stocks. Analyst over-optimism regarding high-growth high-volatile stocks and insufficient discernment on the part of investors reacting to these forecasts has been put forward as a behavioural explanation of the Low Volatility effect by Hsu, Kudoh, and Yamada (2013).

51 - Note that this is different from an irrational preference for highly volatile "lottery stocks" and "glamour stocks" that has been offered as a behavioural explanation for the Low Risk phenomenon.

2. Background

error associated with estimating the tangency portfolio in the traditional way could more than offset the benefits of an absence of optimality risk. For illustration, Jorion (1985) or Jagannathan and Ma (2003) find that tangency portfolios do not perform as well as the global minimum variance portfolios when assessed on out-of-sample Sharpe Ratio.

However, even though the Global Minimum Variance portfolio is easier to estimate, there are nonetheless challenges in constructing this type of portfolio. Unconstrained minimum variance optimisation typically produces portfolios that are extremely concentrated (in a small number of low volatility stocks) and suffer from severe sector biases (Chan, Karceski, Lakonishok, 1999). Furthermore, as optimised concentrated portfolios, they should be expected to exhibit very high turnover if parameters are time-varying, and they do (e.g. Clarke, de Silva and Thorley, 2011).

As for documentation of the concentration of minimum volatility portfolios, Clarke, de Silva and Thorley (2011) observe that their long-only minimum variance portfolio is constituted on average of 12% of their 1,000-security universe while DeMiguel et al. (2009) note that "short-sale-constrained minimum-variance portfolios (...) tend to assign a weight different from zero to only a few of the assets". These difficulties often result therefore in unconstrained minimum volatility-type portfolios, being portfolios that are concentrated and poorly diversified over a small number of low-volatility stocks. In order to remedy this problem, asset managers or index providers impose absolute and/or relative deconcentration constraints. But the cure is often worse than the illness, because this set of rigid ad-hoc constraints is in fact the veritable driver of the performance of minimum-volatility strategies without there being any academic justification whatsoever for the nature or value of the constraints chosen, which depend more in this case on in-sample calibration than on a concern for out-of-sample robustness. Sold with an objective of efficient diversification, in many cases minimum-volatility strategies hardly use the portfolio decorrelation budget and have fairly low levels of diversification and thus high degrees of idiosyncratic risk, the diversifiable risk that is not rewarded according to standard asset pricing theory.

Low volatility strategies

The typical Low Volatility strategy does not rely on an optimisation procedure but instead selects stocks with low historical volatility and then applies an ad-hoc weighting scheme that may or may not take into account differences in the individual volatilities of selected stocks. For illustration; capitalisation-weighting disregards individual volatilities whereas inverse volatility (as used by the S&P 500 Low Volatility Index) or variance as well as volatility-tilted capitalisation weighting let individual volatilities impact constituent weights.

Such Low Volatility approaches rely solely on low-volatility stocks, which should be beneficial if such stocks carry better risk-adjusted rewards than stocks that are more volatile. That is the premise of factor investing strategies tilting towards Low Risk stocks. Note that these approaches disregard the potential of volatility reduction that

2. Background

lies in correlations between securities. Naturally, ignoring correlations has practical advantages since the number of correlation coefficients in a universe of stocks increases with the squared number of stocks and correlation estimates are hard to estimate reliability (Longin and Solnik, 1995).

As is usually the case with industry implementations of factor investing, narrow factor-based stock selections and the use of weighting schemes favouring concentration lead to highly-concentrated portfolios, which have been documented to exhibit high turnover and a strong proportion of specific volatility (e.g. Amenc et al., 2016). Ultimately, these strategies that are explicitly exposed to low-volatility stocks suffer from the same defect as minimum volatility-type strategies – their high degree of concentration, which deprives them of one of the clear benefits of Modern Portfolio Theory since the seminal work of Harry Markowitz: diversification.

Addressing the concentration issue

Minimum volatility strategies

Irrespective of whether an investor regards low volatility stocks as attractive or unattractive, it is clear that the traditional minimum volatility strategy leads to poorly diversified portfolios and does not fully exploit correlations. As mentioned, popular implementations of low volatility strategies can be just as concentrated and disregard correlations completely.

Various approaches have been proposed to remedy the concentration issue of optimisation-based strategies, the most straightforward being to impose weight constraints. Imposing rigid security-level bounds reduces the ability of the optimiser to exploit the information in the variance-covariance matrix, but can help to obtain more "reasonable" portfolios: absolute upper bounds promote diversification while lower bounds reduce implementation costs by doing away with small holdings. In addition, security-level upper bounds couched in relative terms (i.e. as multiples of security-level weights within the capitalisation-weighted index of the underlying universe) are used to reduce concentration in small (and typically less liquid) securities. Portfolio-level weight constraints are also routinely used to reduce country and sector biases, although this can exacerbate the concentration issue at the security level. It should be underlined that, as more constraints are added, the solution is taken further away from the theoretically optimal portfolio. More worryingly, this makes the performance of the resulting portfolios highly sensitive to the choice of constraints, which comes with significant robustness risk. Indeed, choosing constraints to produce excellent in-sample performance will typically lead to disappointing out-of-sample results (on the effects of back-test over-fitting on out-of-sample performance, refer to Bailey et al. 2014).

A more flexible approach has been introduced drawing on "norm constraints". DeMiguel et al. (2009) introduce an approach which limits the overall amount of concentration at the portfolio level (e.g. by constraining the sum of squared weights) rather than imposing caps on all stocks individually. The authors show that using

2. Background

such flexible concentration constraints instead of rigid upper and lower bounds on individual stock weights allows for a better use of the correlation structure. The approach is found to produce portfolios that typically have higher out-of-sample Sharpe ratios than competing approaches.

Low volatility strategies

The concentration of traditional low volatility strategies (and of other factor-based strategies) is caused by explicit choices of narrow factor-based selections and/or concentrated weighting schemes that aim to maximise the factor scores of portfolios. This concentration issue does not arise in the context of diversified factor-tilted solutions, where one relies on broad security selections and diversified weighting schemes. Diversified factor-tilted indices enjoy reduced exposure to idiosyncratic and other non-rewarded risks of all kinds, including relative industry and country biases; mitigate the risk of concentration into small and illiquid securities; and reduce turnover from changes in security-level factor scores (since broad factor-based selections are more stable and score-blind diversification strategies are unaffected by changes in scores). While the investment industry has favoured concentrated factor tilts, the seminal empirical and theoretical literature on factor investing underlines the importance of diversification and no case has been made in support of inefficient factor-tilted portfolios.

On the contrary and from a theoretical standpoint, Cochrane (1999) emphasises that any portfolio should be constructed so as to provide the efficient risk/return trade-off, in a mean-variance sense, at a given level of factor exposure. Fama (1996) shows that rewarded factors can be understood as multi-factor mean-variance efficient portfolios themselves. From an empirical standpoint, Amenc et al. (2016) find that, for a given breadth of selection, diversified portfolios deliver higher returns and risk-adjusted returns and have higher probabilities of outperforming the broad market than capitalisation-weighted portfolios. Analysed in the Carhart framework, they produce much higher alphas and alphas per unit of residual standard deviation as well as a higher reduction in idiosyncratic volatility. They also observe that moving from a broad (half-universe) to a narrow (quintile) selection produces higher gross returns. It also increases volatility and tracking error, resulting in at best marginal gains in risk-adjusted performance before taking into account the costs of severely heightened turnover and reduced liquidity associated with narrower selections. In the end, they document that the benefits of (naively) diversifying factor-tilted portfolios based on broad selections far outweigh those of shifting to narrow selections while remaining cap-weighted. Such diversified factor-tilted portfolios produce much better performance and risk-adjusted performance in the medium and the long term, while only marginally impacting turnover.

Conclusion

Constructing a robust defensive strategy involves integrating the risk of excessive concentration and that of poor diversification of specific risk, which is very present in traditional approaches and offerings for both minimum volatility indices and low

2. Background

volatility factor indices. In recent months, investors have focused on the overpricing of low volatility stocks, without this overpricing being the subject of genuine academic consensus,[52] and have continued to neglect the problem of the excessive concentration and poor diversification of low volatility portfolios, which the low volatility strategies based on fundamental weighting do not solve for example.

Our research (Amenc, Ducoulombier and Lodh, 2016) summarised in the following article shows that better and more robust performance is built on this point of improving the diversification of defensive strategies.

Long-Term Rewarded Equity Factors: What Can Investors Learn from Academic Research?

The venerable "academic grounding"

Equity index products that claim to provide exposure to factors which have been well documented in academic research, such as value and momentum, among others, have been proliferating in recent years. Interestingly, providers across the board put strong emphasis on the academic grounding of their factor indices.[53] It therefore appears useful to analyse what academic research has to say on equity factors in order to understand what we can learn from such research on designing or evaluating factor indices. When analysing academic publications on equity factor investing, three important lessons emerge, which are addressed in the sections below.

Lesson One: "Be serious with data"

When establishing which factors carry a reward by way of empirical analysis, it is important to understand that this is a rather daunting task. In fact, since the paper by Merton (1980), it has become well-known that researchers struggle to estimate expected returns reliably, simply because there are very few data points that can be relied on to estimate long-term expected returns: the starting price level and the end date price level. Of course, this is also true for factor returns.

Given this difficulty, when testing whether a factor carries a positive premium, academic research conducts a thorough assessment, including the analysis of very long-term data (covering time spans of at least 40 years), analysis across different regions and asset classes, and various corrections for possible data-mining biases. Importantly, these studies are open to criticism. Numerous papers are written to question previous empirical results (see for example the debate on the "low volatility puzzle"). For these reasons, academic research is much more capable of providing meaningful conclusions than a product back-test for a given factor index product. Even if a back-test is conducted very thoroughly by a product provider, it is hard to believe that the provider is able to conduct as thorough an analysis of the whole academic community, whose members have strong incentives not only to publish their own results but also to challenge the results of others by way of replicated tests. Therefore, factors which have undergone academic "validation" constitute a much stronger empirical justification than a mere product back-test.

52 - While the rationale for a reward to holding low risk (low beta or low volatility) stocks is based on an ample amount of peer reviewed academic evidence, claims that the low volatility effect exists solely because of increasing overpricing are solely based on providers' brochures and absent from the body of peer reviewed academic evidence. It should also be noted that, even in principle, it is unclear how the low risk effect which has been documented consistently on long-term US equity data (close to a century of data), international equity data and other asset classes, could be driven by "overpricing", which by definition should be a short-term phenomenon. For further reasons to reject claims about overpricing of factors, we refer to Asness (2016).

53 - For example, consider the following quotes from marketing material of index providers: "MSCI currently identifies six equity risk premia factors... They are grounded in academic research..."; "In developing the Russell High Efficiency Factor Index series...we ensured that all of our factor specifications were consistent with academic research findings," "The FTSE Global Factor Index Series is... designed to represent...factor characteristics for which there is a broad academic consensus"; ERI Scientific Beta: "factor indices are meant to be investable proxies for rewarded factors that have been analysed in the academic literature."

2. Background

The first important characteristic of empirical evidence on factor premia, as mentioned above, is that this evidence is derived based on tests applied to long-term data. In fact, studies on US equity data typically span at least 40 years of data, and in many cases, data goes as far back as the 1920s. For illustrative purposes, Exhibit 2.6 provides an overview of results obtained on key factors with long-term US data.

Exhibit 2.6: US Evidence on Equity Factor Premia

Factor	Factor Definition	Period	Premium	t-stat	Source
Market	Excess returns of cap-weighted equity index	1926-2008	7.72% (annual)	3.47	Ang et al. (2009)
Size	Stocks with low vs. high market cap	1926-2008	2.28% (annual)	1.62	Ang et al. (2009)
Value	Stocks with high vs. low book-to-market	1926-2008	6.87% (annual)	3.27	Ang et al. (2009)
Momentum	Stocks with high vs. low returns over past 12 months (omitting last month)	1926-2008	9.34% (annual)	5.71	Ang et al. (2009)
Low Risk	Stocks with low vs. high risk (beta, volatility or idiosyncratic volatility)	1926-2012	0.70% (monthly)	7.12	Frazzini-Pedersen (2014)
Profitability	Stocks with high vs. low profitability (e.g. return on equity or gross profitability)	1963-2013	0.17% (monthly)	2.79	Fama-French (2014)
Investment	Stocks low vs. high investment (change in total assets)	1963-2013	0.22% (monthly)	3.72	Fama-French (2014)

A second important characteristic of empirical research on factor premia is the assessment across different regions and asset classes. In fact, merely deriving a result from US data, even if it holds in long-term data, does not allow the findings to be generalised to other geographic or investment contexts. From the standpoint of generalisation, it is therefore interesting if results can be confirmed on equity markets for other geographies or even in entirely different asset classes. Research has made considerable progress in this direction over the past decade, with surprisingly strong confirmation of the US equity results in other investment universes.

Exhibit 2.7: Empirical Evidence for Selected Factor Premia

	US Equities	International Equities	FCC
Size	Banz (1981); Fama and French (1993)	Heston, Rouwenhorst and Wessels (1999); Fama and French (2012)	N.A.
Value	Basu (1977); Rosenberg, Reid and Lahnstein (1985); Fama and French (1993)	Fama and French (2012)	Asness, Moskowitz and Pedersen (2013)
Momentum	Jegadeesh and Titman (1993); Carhart (1997)	Rouwenhorst (1998)	Asness, Moskowitz and Pedersen (2013)
Low Risk	Ang et al. (2006); Frazzini and Pedersen (2014)	Ang et al. (2009); Frazzini and Pedersen (2014)	Frazzini and Pedersen (2014)
Profitability	Novy-Marx (2013); Hou, Zhang and Xue (2014); Fama and French (2014)	Ammann, Odoni and Oesch (2012)	N.A.
Investment	Cooper, Gulen and Schill (2008); Hou, Zhang and Xue (2014); Fama and French (2014)	Watanabe et al. (2013)	N.A.

2. Background

A third important precaution taken by empirical research before jumping to conclusions on the premium for a given factor is to adjust for data-mining or so-called "Multiple Testing". In fact, standard statistical tests are only valid when we test a given single hypothesis, such as that high book-to-market stocks carry a premium over low book-to-market stocks. However, in practice researchers may run several tests, for example trying out a large number of metrics until they find one that leads to significant results. This is also known as data-snooping or data-mining. To consider why such multiple testing may lead to false inference, consider a simple example. Assume you simulate data for 100 variables (potential "factors") that have a zero mean. You would then expect to find about five variables with a mean ("premium") significantly different from zero. This suggests that, even though the true mean ("premium") on all of the variables ("factors") is zero in the simulation, the statistical inference will tell you that some of the means are significantly positive, as long as you run enough tests.

In order to adjust for this problem, researchers have come up with tighter requirements for significance levels to take into account the possibilities of multiple testing. For example, Harvey, Liu and Zhu (2015) adjust t-ratios that are used for evaluating the significance of factor premia to take into account the fact that researchers have run many tests across hundreds of factors to document their premia. Interestingly, when applying these methods to standard equity risk factors, researchers find that the main factors, such as value and momentum among others, remain statistically significant.

Despite the thorough evidence supporting the existence of premia for the main factors, there is continuous debate over the set of relevant equity factors. In fact, research often debates whether a factor has disappeared or a new factor has appeared. While questioning the baseline results and discussing relevant actors is obviously useful, investors in practice should be prudent before making abrupt changes to their set of factors or the associated investment beliefs. As mentioned before, the measurement of a risk premium is highly sensitive to the chosen sample (Merton, 1980), and estimates of factor premia are subject to considerable uncertainty. Therefore, any conclusions based on empirical evidence should only be drawn from studying very long time periods, and conducting tests across different data sets. Moreover, any arguments in favour of the disappearance of standard factors or the appearance of new factors should not be investigated based on empirical evidence alone, but should also consider the underlying economic mechanisms, an issue we turn to in the next section.

Lesson Two: "Being serious with data is not enough"

In addition to convincing empirical evidence, the existence of a factor premium should be supported by a compelling economic rationale. Kogan and Tian (2015) make this point prominently when they write: "*We should place less weight on the data the models are able to match, and instead closely scrutinise the theoretical plausibility and empirical evidence in favour of or against their main economic mechanisms.*"

2. Background

To illustrate why the existence of an economic rationale is an important requirement for considering a factor to be rewarded, it is useful to take the equity market risk premium as an example. From an empirical perspective, the equity risk premium can be statistically indistinguishable from zero even for relatively long sample periods. However, economic reasoning suggests that stocks *should* have higher rewards than bonds. Clearly, even if the premium for holding equity is well-documented empirically, investors are reluctant to hold too much equity due to its risks. Similar reasoning can be applied to additional equity risk factors. Instead of focusing only on the empirical evidence, investors' due diligence should look at why there *should* be a risk premium for a given factor in the first place. In other words, investors should ask what the economic rationale for a factor premium is, to form an opinion on its existence and persistence.

The existence of factor premia can be explained in two different ways – a risk-based explanation and a behavioural-bias explanation. The risk-based explanation postulates that the risk premium is compensation to investors who are willing to take additional risk by being exposed to a particular factor. Additional risk exists when assets that correspond to a given factor tilt tend to provide poor pay-offs in bad times, thus exposing investors to a risk of losses in times when their economic situation is already poor, their consumption is low, and marginal utility of consumption is high. The behavioural explanation predicates that the factor premia exist because investors make systematic errors due to behavioural biases such as over- or under-reactions to news on a stock.

Whether such behavioural biases can persistently affect asset prices is a point of contention given the presence of smart market participants who do not suffer from these biases. For behavioural explanations to be relevant, it is necessary to assume that – in addition to biases – there are so called "limits to arbitrage" (i.e. some market characteristics, such as short-sale constraints and funding-liquidity constraints) that prevent smart investors from fully exploiting the opportunities arising from the irrational behaviour of other investors.

If the risk premium can only be explained by behavioural reasoning, it is expected to disappear in the absence of limits to arbitrage. On the other hand, a risk factor with a strong rationale or risk-based explanation is more likely to continue to have a premium in the future. Therefore, it is perhaps more reassuring for an investor to have a risk-based explanation.

We refer to Exhibit 2.8 for a brief list of risk-based and behavioural explanations of each factor.

2. Background

Exhibit 2.8: Economic Mechanisms behind Main Factors

	Risk-Based Explanation	Behavioural Explanation
Size	Low liquidity, high distress and downside risk is compensated by higher returns.	Limited investor attention to smaller cap stocks
Value	Costly reversibility of assets in place: high sensitivity to economic shocks in bad times	Overreaction to bad news and extrapolation of the recent past leads to under-pricing
Momentum	High-expected-growth firms are more sensitive to shocks to expected growth	Investor overconfidence and self-attribution bias leads to returns continuation in the short term
Low Risk	Liquidity-constrained investors have to sell leveraged positions in low-risk assets in bad times when liquidity constraints become binding	Investor disagreement about high-risk stocks leads to overpricing due to short-sale constraints
Profitability	Firms facing high cost of capital will invest only in the most profitable projects	Investors do not discern high and low profitability in growth firms
Investment	Low investment reflects firms' limited scope for projects given high cost of capital	Investors under-price low investment firms due to expectation errors

Lesson Three: "Be practical"

A common criticism of academic research on factor premia is the supposed impracticality of academic factor definitions, simply because most results in academic research abstract from transaction costs and other implementation issues such as turnover. It is indeed the case that many academic studies do not necessarily aim to consider implementation issues. In fact, product providers often justify deviations from academic factors with implementation needs. That said, while early studies indeed abstract away from implementation issues, recent academic research addresses this shortcoming. In particular, recent research examines whether the premia to common equity risk factors survive net of transaction costs. Moreover, recent research assesses whether we can use mitigation strategies to ease implementation when harvesting these premia.

Novy-Marx and Velikov (2014) assess turnover and estimate transaction costs for common factor strategies. They find that the net-of-cost factor premia mostly remain significant. Exhibit 2.9 provides a summary of their findings.

Exhibit 2.9: Net-of-cost Factor Premia, as reported by Novy-Marx and Velikov (2014) – See their Table 3.
All values are monthly. Factors are based on cap-weighted decile portfolios. Portfolios are rebalanced annually for most factors but monthly for low idiosyncratic volatility and momentum. Factors are return differences between two extreme decile portfolios (cap-weighted). The time period is from July 1963 to December 2013.

(Monthly)	Gross premium		Turnover	T-costs	Net premium	
	Avg.	[t-stat]			Avg.	[t-stat]
Size	0.33%	[1.66]	1.23%	0.04%	0.28%	[1.44]
Value	0.47%	[2.68]	2.91%	0.05%	0.42%	[2.39]
Momentum	1.33%	[4.80]	34.52%	0.65%	0.68%	[2.45]
Low Volatility	0.63%	[2.13]	24.59%	0.52%	0.11%	[0.37]
Profitability	0.40%	[2.94]	1.96%	0.03%	0.37%	[2.74]
Investment	0.56%	[4.44]	6.40%	0.10%	0.46%	[3.60]

In addition to assessing whether the returns to simple strategies are robust to transaction costs, research has tested adjusted implementations of factor premium strategies that try to ease implementation. Novy-Marx and Velikov (2014) test

2. Background

several mitigation strategies and find that such approaches can substantially ease implementation while sustaining most of the return benefits, which often results in improvements in net-of-cost factor premia.

Frazzini, Israel and Moskowitz (2012) conduct a similar analysis and find that after taking into account realistic transaction costs, factor premia remain significant, especially when making adjustments to ease implementation: "*We measure the real-world transaction costs and price impact function…and apply them to size, value, momentum, and short-term reversal strategies. […] Strategies designed to reduce transaction costs can increase net returns and capacity substantially, without incurring significant style drift. We conclude that the main anomalies…are robust, implementable and sizeable.*"

Moreover, Amenc, Goltz and Lodh (2012) provide a clear implementation framework for factor-tilted indices in a long-only context with an aim of providing factor-tilted indices that are not only implementable, but also well-diversified. Practical implementation of such well-diversified indices leads to risk/return improvements over simple cap-weighted quintile portfolios,[54] as well as to considerable investability improvements through lower turnover and fewer average days to trade at rebalancing (Amenc et al., 2016).

54 - On average across six well-documented factors, diversified multi-strategy indices have a Sharpe ratio of 0.7 compared to an average Sharpe ratio of 0.56 for cap-weighted quintile portfolios.

In summary, while much of the early evidence did not consider practical implementation issues, more recent research confirms that the standard factors lead to rewards even net of implementation considerations. Moreover, straightforward adjustments to strategy design that ease implementation lead to even more pronounced premia net of transaction costs. Therefore, there is a strong case that academically-grounded factors can be used to design implementable strategies. Given this evidence, when considering deviating from academic factor definitions, investors should be careful to not throw out the baby (academic grounding) with the bathwater (unrealistic assumptions on implementation issues).

Conclusion: What "academic grounding" does not mean

The fact of the matter is that many factor-investing strategies and indices offered by product providers create a considerable mismatch with academic definitions. Exhibit 2.10 provides an overview of factor definitions retained in several commercially-available factor indices and contrasts them with the Fama and French (2012, 2014) factor definitions, which are widely used in academic research, and which test either the empirical evidence on these factors or assess their economic rationale.

The mismatch between the provider definitions and the standard academic definitions is striking. While the Fama and French definitions rely on straightforward variables and make a choice of selecting one key metric to come up with a factor score for each stock in a transparent and simple way, the proprietary definitions from providers use different sets of variables, as well as various adjustments and often consist of complex combinations of several variables. For example, some factor scores are calculated relative to the industry or regional groups a stock belongs to. Some providers use

2. Background

Exhibit 2.10: Mismatch with Academic Factor Definitions – Examples

Provider	Value	Momentum	Quality
Fama-French (2012, 2014)	Price-to-Book	Past 12-month return (omitting last month)	ROE (operating profits divided by book equity)
Goldman Sachs Equity Factor Index World	Value score from proprietary risk model (Axioma) relative to stock's regional industry group	Residuals from cross-sectional regression of 12-month return (omitting last month) on stock volatility	Composite based on asset turnover, liquidity, ROA, operating CF to assets, accruals, gross margin, leverage
MSCI Multi Factor Indices	Sector-relative composite based on Enterprise Value/ Operating CF, Forward P/E, Price to Book	Composite score based on excess return divided by annual volatility over past 12 months and past six months	Composite based on return on equity, standard deviation of earnings, debt-to-equity
FTSE Global Factor Index Series	Composite based on cash flow to price, net income to price, and country-relative sales to price	Mean/Standard Deviation of "average residual" from 11 rolling window regressions of past 36 months returns on country and industry index	Composite based on operating CF to debt, net income to assets, annual change in (sales over assets), accruals
Deutsche Bank Equity Factor Indices	Composite based on inverse of Enterprise Value to EBITDA and dividend yield	12-month return (omitting last month) minus risk adjustment times idiosyncratic volatility score	Composite based on return on invested capital and net operating assets growth

such industry or region adjustments for certain variables within a given factor score while not using it for other variables that make up the same factor score. Moreover, providers often use variables that are quite far removed from the original factor definition, such as the change in sales over total assets or the leverage in quality scores, as compared to the simple use of a profitability measure by Fama and French. Overall, the different index providers are in stark disagreement with how academic research defines these factors.

In general, such proprietary definitions increase the amount of flexibility providers have in testing many variations of factors and thus pose a risk of data-mining, and all the more so in that it remains unclear why these adjustments are made and in particular whether there are any fundamental economic reasons for using some of these variables and adjustments for a given factor. In fact, it appears that providers sometimes explicitly aim at selecting ad-hoc factor definitions which have performed well over short-term back-tests. As an illustration, consider the following statements from white papers that select factor definitions for factor indices based on back-testing various combinations of variables on a particular data set spanning a time period of about 13 years:[55]

- "*For each composite value index, factors are selected on the basis of the most significant t-stat values*"
- "*Our preferred measure of momentum is the Residual Sharpe Ratio, which displays relatively high risk-adjusted performance outcomes, and relatively low levels of volatility*".

Moreover, some providers have launched "enhanced" factor indices which replace the factor definitions in their standard factor indices with new and improved recipes.

55 - As reported in FTSE (2015a) and FTSE (2015b).

2. Background

Of course, selecting proprietary combinations or making proprietary tweaks to variable definitions offers the possibility of improving the performance of a factor index in a back-test. The question is whether the improvement of the "enhanced" factor definition will also hold going forward, especially if there is no solid economic foundation for it. There is clearly a risk that one ends up with what academics have termed "lucky factors". Harvey and Liu (2015) show that by snooping through data on a large number of candidate factors and retaining those with the highest t-stat, one takes the risk of uncovering flukes, which will not repeat out of sample. Perhaps even more importantly, it is unclear what, if anything, factors with extensive proprietary tweaks still have in common with the factors from academic research. Therefore, the empirical evidence in favour of the academic factors and their economic grounding cannot be transposed to such new proprietary factors.

In the absence of a clear relation with standard academic factors, such proprietary factor strategies are merely ad-hoc constructs resulting from product back-tests. In fact, to find out whether any of these new proprietary factors are indeed related to the well-documented academic factors, one would first need to assess how they align empirically with standard factors. This point was also made clear by Eugene Fama in a recent interview. When discussing the topic of the value factor and more proprietary versions of this factor, he states, "*Now everybody talks about value...Some stuff is fly-by-night. There are like 45 versions of that and every guy has their own marketing ploy. The acid test is you put it in the three-factor model and it says it is a value portfolio.*"

In the end, a minimum requirement for good practice in factor investing is to avoid creating a mismatch with academic factors. This can be achieved easily by referring to indicators for which academic research has provided thorough tests and economic explanations, and by refraining from proprietary "tweaks".

Alternatively, when using novel or proprietary factors, one needs to make sure that they are thoroughly tested (i.e. tested in very long-term data, across asset classes, for robustness to data-mining and to transaction costs) as well as linked to economic mechanisms. Of course it seems like a heroic objective for a product provider to aim to replicate the work that the whole academic community has conducted on standard factors, only by assessing the robustness of its own proprietary factor. Therefore, one can make a reasonable case that proprietary factors may never be able to reach the amount of thorough testing that their standard academic counterparts benefit from.

Given the strong emphasis providers put on the "academic grounding" of their factor strategies, it is indeed surprising that they then chose to implement products that represent a gross mismatch with academic factor definitions and that do not respect the key academic principle of parsimony. Instead of paying lip service to an "academic grounding" and coming up with a marketing innovation of tweaked factors, perhaps it is time that product providers actually used academic research in their product

2. Background

development. Moreover, investors should hold providers to high standards and conduct thorough due diligence on the soundness of particular implementations of factor investing.

It is also worth emphasising that a key idea behind the use of simple standard factors is to obtain robustness through parsimony. Parsimony refers to the idea that one can explain "a lot" with "a little". While proprietary factor definitions may be able to explain more in-sample, they also pose a risk of picking up noise, which one can avoid with more parsimonious factor definitions such as the standard factors from the literature. The statistician George E.P. Box (1976) famously argued in favour of parsimony by writing that "over-elaboration and over-parameterisation is often the mark of mediocrity". Indeed, the parsimony of standard academic equity factor definitions may be preferable to over-elaboration and over-parameterisation of tweaked proprietary factors that are sometimes proposed by product providers.

We proceed now to the presentation of the survey methodology and data. The main results of the survey – European investors' views and use of ETFs and smart beta strategies– are found in Section 4.

2. Background

3. Methodology and Data

3. Methodology and Data

3.1. Methodology

The EDHEC European ETF and smart beta survey 2016 was completed using an online questionnaire distributed to professionals within the European asset management industry, and subsequent e-mail communication with them. This survey targeted different professional asset managers that have experiences with ETF instruments and smart beta strategies, including institutional investors, asset management companies and private wealth managers.

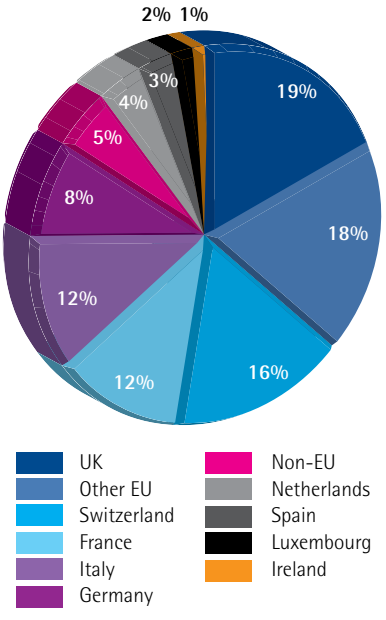
The questionnaire consisted of two main sections. In the first section, the survey participants are asked about the role ETFs play in their asset allocation decisions, as well as about their satisfaction with different ETF products. We also invited the survey participants to express how they view their use of the ETFs for the coming years, as well as to indicate the type of ETF products they would like to see further developed. The second section of the questionnaire is dedicated to smart beta strategies, relating to the recent considerable development in smart beta indices. Respondents were asked to provide their opinions on products that track smart beta indices. They were asked about their current use of smart beta solutions in their portfolio allocation, the difficulties they are facing and their needs in terms of further development in alternative equity beta strategies.

3.2. Data

The email containing a link to the questionnaire was sent out in December 2016. The first response was received on 13 December and the last on 6 February. In total, we received 211 answers to our survey, among which 9% (19 respondents) declared that they have never invested in ETFs. However, as a large part of the survey was dedicated to smart beta strategies, these participants were invited to skip the ETF part of the survey and directed to the second part of our survey, since our aim is to include only experienced ETF investors in the ETF section.

Our survey is aimed at European investment professionals. Thus, the 211 respondents to the survey are based in Europe, a large part of which are from the UK, Switzerland and France (47% of the respondents). The exact breakdown of the respondents' country can be seen in Exhibit 3.1. We can see from these numbers that our sample gives a fair representation of the European investment market by geography.

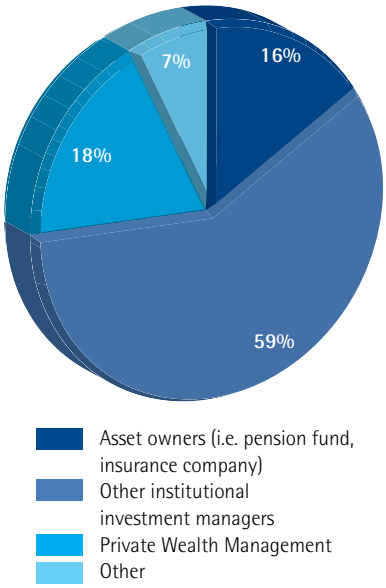
Exhibit 3.1: Country Distribution of Respondents
This exhibit indicates the percentage of respondents that have their activity in each of the mentioned countries. Percentages are based on the 211 replies to the survey.



3. Methodology and Data

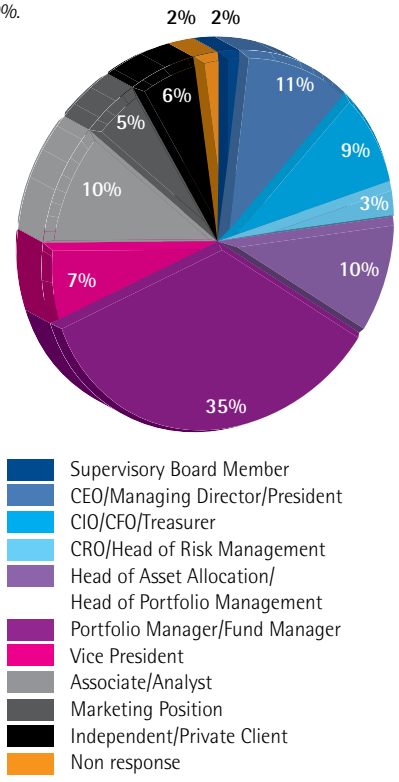
We also asked participants about their institution's principal activity, allowing us to distinguish between professionals in institutional investment management and those in private wealth management. With 75% of the survey participants, institutional managers are the largest professional group represented in this study (the total of Asset Owners and Other Institutional Investors as shown in Exhibit 3.2). About 18% of respondents belong to the private wealth management industry. Finally, the remaining 7% is made up of other professionals within the financial services industry, such as investment bankers or industry representatives.

Exhibit 3.2: Main Activity of Respondents' Institution
This exhibit indicates the distribution of respondents according to their institution's principal activity.



It is important to qualify respondents by their job function. In fact, we would expect that given the importance of choosing investment instruments such as ETFs or competing index products for investment organisations, it would be fairly high ranked executives or portfolio management specialists that would be most suited to answer our questionnaire. Many of the respondents indeed occupy high-ranking positions: 13% are board members and CEOs, and 22% are directly responsible for the overall investments of their company (such as CIOs, CROs, or Heads of Portfolio Management). More than a third (35%) of the survey participants are portfolio or fund managers (see Exhibit 3.3).

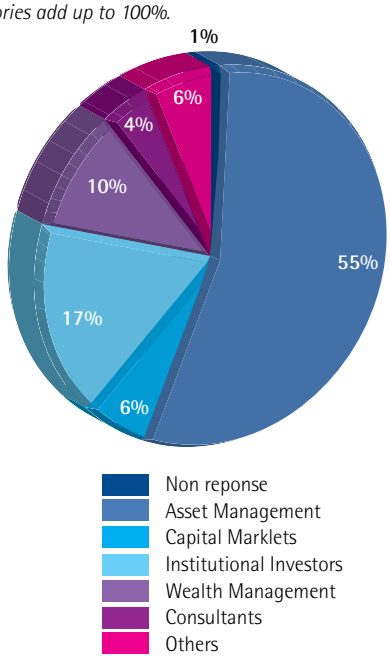
Exhibit 3.3: Function of Survey Respondents
This exhibit indicates the distribution of respondents based on their positions held in the company. Percentages are based on the 211 replies to the survey. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



We also ask the respondents about the nature of their activity. From Exhibit 3.4, we can see that more than half of the respondents (55%) are asset managers.

3. Methodology and Data

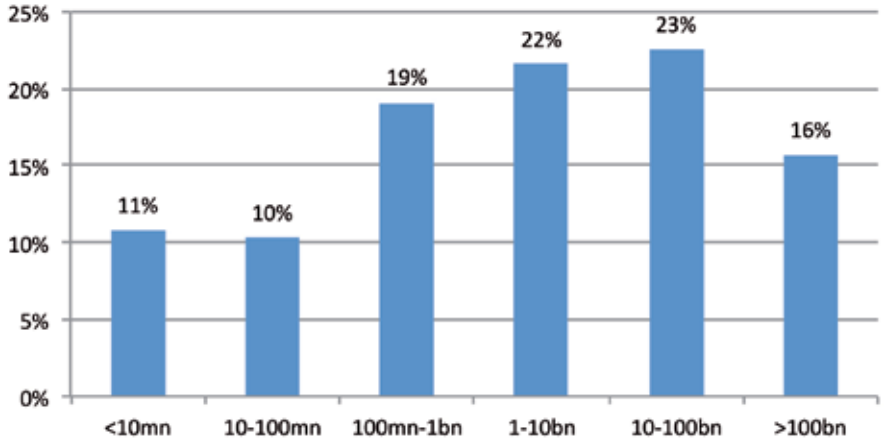
Exhibit 3.4: Nature of Survey Respondent Activity
This exhibit indicates the distribution of respondents based on the nature of their activity in the company. Percentages are based on the 211 replies to the survey. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



Finally, Exhibit 3.5 shows the AUM of the companies for which the survey respondents work. About two-fifths (38%) of the firms in the group of respondents are large firms that have over €10bn in AUM. Another two-fifths (41%) of respondents are from medium-sized companies, with AUM of between €100m and €10bn. We also capture the opinions of small firms, with about one-fifth (21%) having AUM of less than €100m. This feature on the size breakdown implies that the European ETF and Smart Beta Survey 2016 mainly reflects the views of medium- to large-sized companies, which account for 79% of the respondents.

Taken together, we believe that this regional diversity and fair balance of different asset management professionals make the survey largely representative of European ETF and smart beta strategy investors. After having described the sample that our survey is based on, we now turn to the analysis of the responses that we obtained from these survey participants.

Exhibit 3.5: Assets under Management (in EUR)
This exhibit indicates the distribution of respondents based on the AUM which they reported. Percentages are based on the 211 replies to the survey, excluding non responses.



4. Results

4. Results

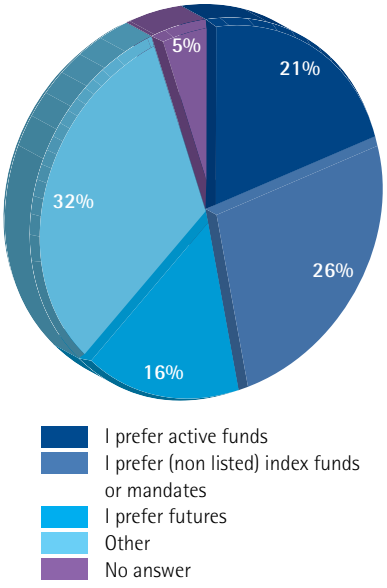
In this section, we present the main results of this survey and discuss possible explanations for the respondents' answers. There are two main sections in this survey. In the first part, we take a close look at the use of and satisfaction with ETFs in practice. We also invite survey participants to express their views on future developments in the ETF market. Furthermore, we investigate the role ETFs play in asset allocation decisions, including the reasons for investing in ETFs. Finally, we compare the results of the ETF section of this year's survey to previous ETF surveys from 2006 to 2015 in order to get further insight into trends over time.

The second section is dedicated to smart beta strategies. Respondents are asked to give their opinions about products that track smart beta indices, in relation to the recent considerable development in these types of indices. They were also asked about their current use of smart beta solutions in their portfolio allocation, the difficulties they are facing and their needs in terms of further development in alternative equity beta strategies. We also compare the results of this smart beta section to previous results drawn from our surveys since 2013, which is when smart beta-related questions were first introduced.

4.1. ETFs

For a number of years now, ETF products have continue to gain increased attention. This first section is based on the answers given by 192 respondents from among our sample of 211 who invest in ETFs, and it allows us to highlight ETF perspectives from the investor viewpoint. Before that, we did, however, ask the additional 19 respondents the reason(s) why they do not invest in ETFs. From among these 19 respondents, 8 of them, representing 42% of the sample, indicated that they use instruments other than ETFs for the purposes of passive management, with 5 of them (26%) indicating that they preferred non-listed index funds and mandates, and 3 of them (16%) stating that they preferred futures), 6 of them, representing 32% of the sample gave various reasons for not using ETFs, mainly relating to organisational constraints. Finally, 4 of them (21% of respondents) do not use ETFs because they did not invest in passive management products and were exclusively active managers (see Exhibit 4.1). It is interesting to note that, for comparable sample sizes, the proportion of respondents that do not use ETFs is lower in 2016 when compared to the previous editions of our ETF survey (e.g. 18% in 2015, 15% in 2014 and 16% in 2013), which leads us to believe that the proportion of investors that use ETFs has increased.

Exhibit 4.1: Motivations for not investing in ETFs
This exhibit indicates the reasons given by respondents for not investing in ETFs. Percentages are based on the 19 survey respondents that do not invest in ETFs.



4. Results

In this section, we begin by analysing the use of ETFs in different asset classes, both in terms of the number of investors and in terms of the amount of investment; we then look at satisfaction with ETFs reported by investors. We equally look at the investment strategies used in the industry, as well as the criteria considered to select an ETF provider, including tracking error and cost. Additionally, survey participants were invited to express their views on the future developments in the ETF markets. Finally, we display the trends in the use of ETFs observed over the past decades.

4.1.1. Use of ETFs in different asset classes

First, we look into the relative importance attached to ETFs and other investment instruments in each asset class. Exhibit 4.2 summarises the use of ETFs or ETF-like products among investors who invest in the relevant asset classes. For instance, 91% and 84% of respondents have used ETFs or ETF-like products for their equity or sector investments, respectively. Meanwhile, 67% of respondents use ETFs to invest in smart beta, which is quite similar to 2015. 65% and 62% of respondents use ETFs to invest in corporate and government bonds respectively. Compared to the high use of ETFs in the equity class, the use of ETFs to invest in bonds appears quite weak. Within alternative asset classes, more than three quarters (76%) of investors who invest in commodities actually employ ETFs. Volatility ETFs are used by more than two-fifths (44%) of investors who hold such assets, while real estate and SRI ETFs are both used by a third (33%) of investors. Infrastructure and money market funds are used by less than a third (31% and 28%, respectively) of investors. However, currencies (19%) and hedge funds (9%) are the asset classes in which the fewest investors have employed ETFs for their portfolios.

We observe a high stability between 2015 and 2016 in the percentage of respondents using ETFs for some asset classes, including equities, sectors, smart beta, government bonds and corporate bonds). Alternatively, the percentage of respondents using ETFs is highly volatile from one year to another, with great differences observed in 2016, compared to 2015. This is the case for SRI, volatility, real estate, and infrastructure asset classes. Hence we can see that – while ETFs are used across a wide spectrum of asset classes – the main use is in the area of equities, sectors and commodities. This is likely to be linked to the popularity of indexing in these asset classes as well as to the fact that equity indices, sector indices and commodity indices are based on highly liquid instruments, which makes it straightforward to create ETFs on such underlying securities. In addition, given that liquidity is one of the major benefits of an ETF, and that this is dependent on the liquidity of the underlying securities, it would make sense that ETFs based on the most liquid underlying securities are the most popular.

Concerning equity and bond classes, respondents were asked to detail the various categories of ETFs they invest in (see Exhibits 4.3 to 4.5). The vast majority of respondents invest in broad market ETFs (95% for equity investment, 82% and 87% for government bonds and corporate bonds, respectively). In addition, more than half of them also invest in sector ETFs

4. Results

Exhibit 4.2: Use of ETFs and ETF-like products
This exhibit indicates the percentage of respondents that reported using ETFs or ETF-like products for asset classes/investment styles that they have already invested in/used. We also displayed 2015 results to show the evolution of results between the two years. The percentages have been normalised by excluding the non-responses.

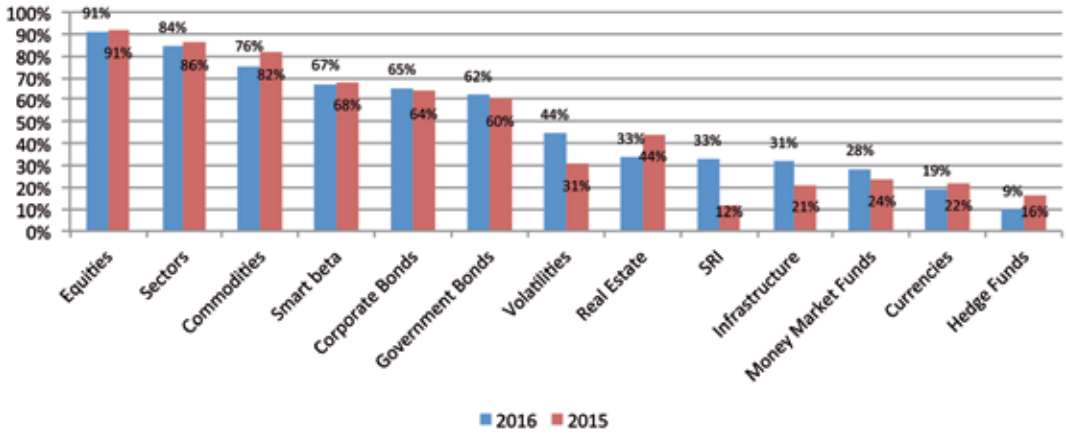


Exhibit 4.3: Categories of Equity ETFs Respondents Invest In
This exhibit indicates the categories of equity ETFs respondents invest in. The percentages are based on the sole respondents that invest in Equity ETFs. We also displayed 2015 results to show the evolution of results between the two years.

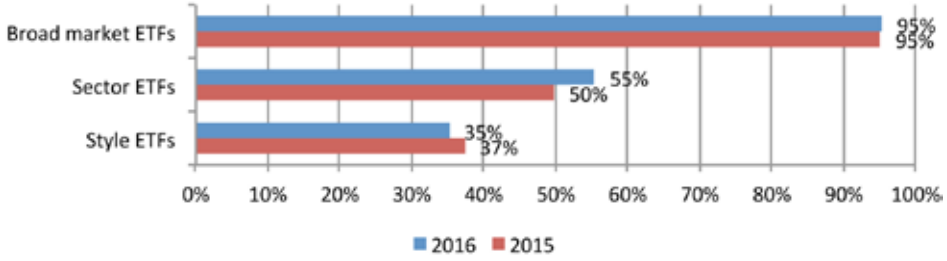


Exhibit 4.4: Categories of Government Bond ETFs investors invest in
This exhibit indicates the categories of government bond ETFs respondents invest in. The percentages are based on the sole respondents that invest in government bond ETFs. We also displayed 2015 results to show the evolution of results between the two years.

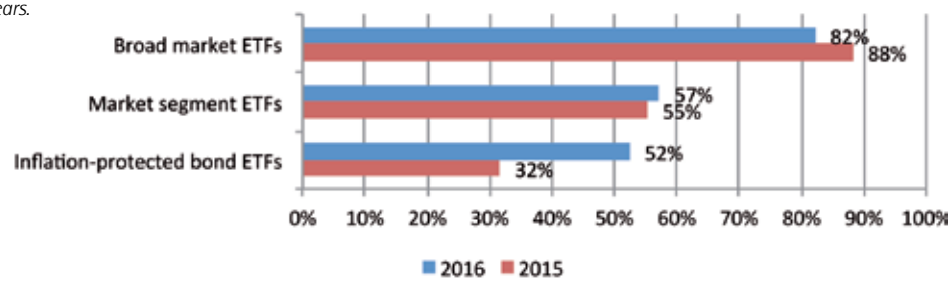
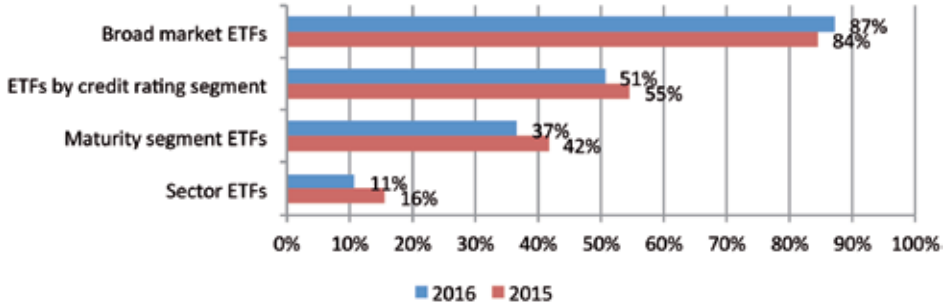


Exhibit 4.5: Categories of Corporate Bond ETFs investors invest in
This exhibit indicates the categories of corporate bond ETFs respondents invest in. The percentages are based on the sole respondents that invest in corporate bond ETFs. We also displayed 2015 results to show the evolution of results between the two years.



4. Results

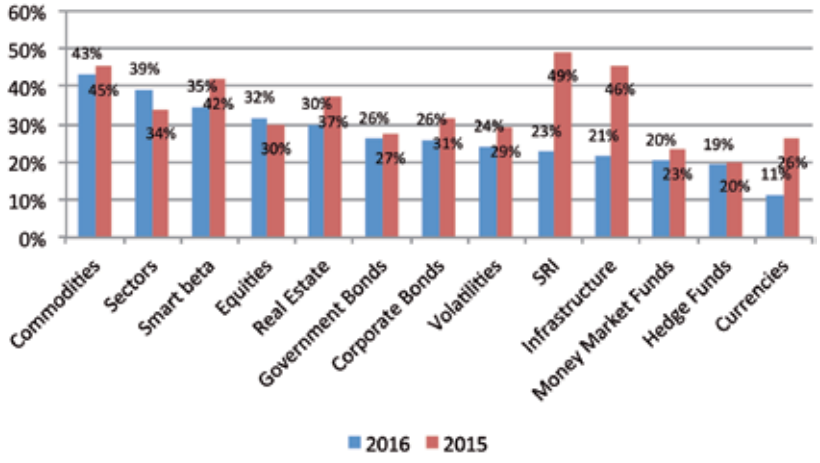
(55%) for equity investments, in market segment ETFs (57%) and in inflation-protected bond ETFs (52%) for government bond investments, and in credit rating segment ETFs (51%) for corporate bond investments. The use of style ETFs within the equity asset class is much lower (35%). This is also the case for the amount of respondents that use maturity segment ETFs within the corporate bond asset class (37%). Lastly, only 11% of respondents use sector ETFs within the corporate bond asset class. While most of these results are similar to those obtained in 2015, there is a remarkable increase in the use of inflation-protected bond ETFs, with 52% of respondents using them in 2016, compared to 32% in 2015.

Thus, it appears from the three exhibits that, for both equities and bonds, investors use broad market ETFs much more frequently than ETFs based on finer market segments. This may possibly be explained by the fact that offerings on the finest segments are generally more recent, less known and less suited to the needs of investors.

To complement the results displayed in Exhibit 4.2, Exhibit 4.6 shows for each asset class, the percentages of the amounts invested that are accounted for by ETFs or ETF-like products. It differs from the questions asked in Exhibit 4.2, which shows the rate of ETF usage for those respondents who invest in the respective asset class/investment category. Here, Exhibit 4.6 reflects the intensity of usage for those investors who do use ETFs. It shows that ETFs account for a sizeable share of overall assets across different asset classes.

Indeed, for the average respondent to this question, ETFs account for 43% of total commodities investment, 39% of sector investment, 35% of smart beta investment, 32% of equity investment, 30% of real estate investment, 26% of both government bond and corporate bond investment, 24% of volatility investment and 23% of SRI investment. Infrastructure ETFs and money market fund ETFs accounted for 21% and 20% of average investment in these asset classes, respectively, while hedge fund

Exhibit 4.6: The Percentage of Total Investment Accounted for by ETFs or ETF-like Products
This exhibit indicates the average percentage of total investment accounted for by ETFs or ETF-like products for each asset class. We only consider respondents that do use ETFs for the given asset class. Thus the percentage indicates the volume invested in ETFs compared to all investments in the asset class, for those respondents who do use ETFs. We also displayed 2015 results to show the evolution of results between the two years. The percentages have been normalised by excluding the non-responses.



4. Results

ETFs accounted for 19% of average investment in this asset class. Finally, the lowest share of investment in ETFs is for currencies with 11% invested via ETFs in their universe. Hence the results of these two questions show that not only are ETFs widely used across most asset classes, but they also make up a significant proportion of investors' portfolios. However, this proportion is lower on average than the one declared last year for most asset classes, except equities and sectors. The highest decrease is to be observed with SRI, infrastructure and currencies, in correlation with the decrease of satisfaction with ETFs for these asset classes, compared to 2015 (see Exhibit 4.7). It should be noted that, for these three asset classes, the sample of respondents is still narrow, compared to the larger number of respondents using ETFs for most of the other asset classes. In 2016, only 11, 13 and 14 respondents used ETFs to invest in infrastructure, currency and SRI, respectively. For example, we observe large variations in the percentage of total investment accounted for by ETFs in SRI and infrastructure asset classes, where the number of respondents has increased significantly since last year (4 and 7 respondents, respectively, in 2015, compared to 14 and 11 respondents, respectively, in 2016), suggesting that those who recently used ETFs to invest in these asset classes only devote a restricted percentage of their total investments to ETFs, lowering the average percentage of investment accounted for by ETFs for the whole sample for these asset classes.

Satisfaction with ETFs will be presented in the next sub-section.

4.1.2. Satisfaction with ETFs

We continue our analysis with a general assessment of the satisfaction of ETF products by asset class. Only those respondents who use ETFs in the respective asset class are asked to report their degree of satisfaction. This means that our results can be interpreted as the satisfaction rates of investors who actually have experience in using ETFs. Exhibit 4.7 shows that, across all asset classes, a large majority of users are satisfied with their ETFs. Satisfaction is remarkably high (more than 80%) for six out of 13 asset classes, including equities, sectors, government bonds, real estate, money market funds, and corporate bonds. This is particularly so for equities with a satisfaction rate in excess of 90%. SRI, smart beta and commodities have quite good satisfaction levels in the 70% to 80% bracket. Volatilities and currencies have lower satisfaction levels, although these are still in the 60% to 70% bracket. The lowest levels of satisfaction, obtained for infrastructure and the hedge fund classes, are not too bad as 45% and 33% of users are satisfied, respectively.

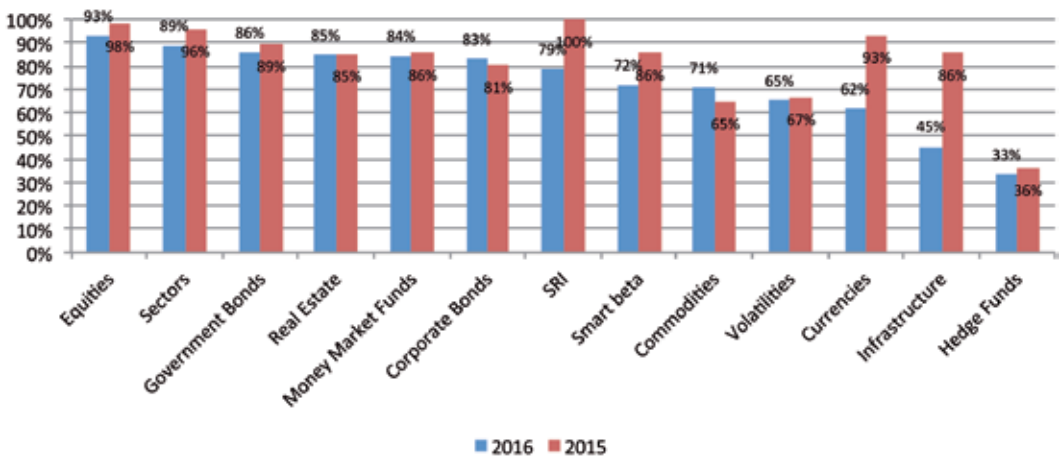
Compared to 2015, the satisfaction levels are a little lower for most of the assets classes, including equities, sectors, government bonds, money market funds, volatilities and hedge funds. Highest satisfaction levels are only obtained for corporate bonds and commodities. For the real estate asset class, the level of satisfaction with ETFs is similar to that observed in 2015. The largest decrease in satisfaction level is observed for infrastructure, currency, SRI, and to a lesser extent, smart beta asset classes. The use and perception of smart beta strategies will be fully developed in the second part of the result section

4. Results

of this survey. For asset classes with a narrow sample of respondents using ETFs to invest in these asset classes, such as infrastructure, currency and SRI (11, 13 and 14 respondents, respectively in the 2016 survey), it is not surprising to observe a level of satisfaction quite volatile from one year to another. For example, there were only four respondents who used ETFs to invest in the SRI asset class in 2015, versus 14 in 2016. All four declared themselves satisfied with ETFs in 2015 while, this year, 11 of the 14 were satisfied. The great increase in the number of respondents using ETFs with this asset class thus creates a fairly significant variation in the percentage of satisfaction. In the same way, there were only seven respondents who used ETFs to invest in infrastructure in 2015, versus 11 in 2016. The number of satisfied respondents for this asset class was similar over the two years with six in 2015 and five in 2016, but it seems that the additional respondents using ETFs for this asset class this year are not as satisfied. In what concerns currencies, if the number of respondents did not vary much compared to 2015 (13 respondents in 2016, compared to 15 in 2015); we observe this year a satisfaction level much closer with that obtained in 2014 (70%), after the exceptional 93% satisfaction rate observed in 2015.

The reasons for satisfaction or dissatisfaction may vary by asset class. Constructing truly representative indices in alternative asset classes may be a challenge, especially when doing so involves attempts to attain the investability which is necessary to construct an ETF where effective arbitrage can take place. There is often a trade-off between investability and representativity, with index providers limiting the constituents of hedge fund indices to be the most investable, but by excluding certain funds, representativity will be decreased. Another problem faced when constructing a representative index is that there is a lack of informational disclosure with regard to performance by a large number of hedge funds that should be part of the index due to a lack of regulation requiring such disclosures (Goltz, Martellini, and Vaissié, 2007.) Similar to issues with hedge fund indices,

Exhibit 4.7: If you use ETFs or ETF-like products, are you satisfied with them?
This exhibit indicates the percentage of investors who are satisfied with ETFs or ETF-like products they have used for each asset class. The percentages have been normalised by excluding the non-responses. We also displayed 2015 results to show the evolution of results between the two years.



4. Results

the construction of volatility indices also requires the presence of a liquid option market, which raises the challenge of enhancing the availability of the product range (Whaley, 2008; Goltz et al., 2011). We notice that the ETFs with the highest and most consistent satisfaction rates over a period covered by our surveys are those based on the most liquid asset classes and we discuss this along with other time trends in Section 4.1.5.

It is interesting to note that volatility indices are among the four asset classes with ETF satisfaction rates under 70%. This may be related to the fact that they do not directly track a volatility index but a volatility futures index. This does not result in accurate exposure to the volatility index, whose changes in value can be quite different to those of the volatility futures index. This effect has been discussed in detail by Goltz and Stoyanov (2012). Commodity indices – an asset class for which the sample of respondents using ETFs is of a reasonable size – scored fifth lowest in terms of satisfaction rate. There are many different commodity indices (see Feldman, 2006; Dunsby and Nelson, 2010; Arnott et al., 2014), but no consensus on which is the best. If investors are not satisfied with commodity index construction rules, they will be less satisfied with ETFs based on those indices, compared to other asset classes.

Moreover, when it comes to alternative asset classes, it may not be easy to implement economically meaningful long-only exposures. In particular, while long-only (and thus easy-to-implement) exposure to standard asset classes such as stocks and bonds provides access to a number of well-documented risk premia (such as the equity risk premium for stocks, and the credit and term premium for bonds), many alternative asset classes do not necessarily give access to risk premia through long-only investing. For example, it has been argued that long/short positions in commodity futures are necessary to capture risk premia in commodity markets while long only exposure to commodity prices is not expected to give rise to any risk premium (see for example Fuertes, Miffre and Fernandez-Perez, 2013).

4.1.3. The Role of ETFs in the Asset Allocation Process

As ETFs offer investors attractive benefits like liquidity, cost efficiency and product variety, they have become an important instrument for asset allocation strategies. In this section, we analyse the purpose of ETF investments. In fact, one of the unique benefits of conducting a survey of ETF users is that we not only get information on the frequency and intensity of usage, but we are also able to inquire about the purposes for which ETFs are used and how their role in asset allocation is perceived.

We begin the analysis with the investors' rationales behind their use of ETF products. Investment in ETFs may be more of long-term or short-term nature. Also, when using ETFs, investors may aim to gain broad market exposure or, alternatively, to gain access to specific segments of the market through ETFs on sectors or styles. Beyond such a broad categorisation of use, we also assess how often ETFs are used for specific purposes such as neutralising factor exposures or arbitraging related assets. More specifically, we ask how often the survey participants employ ETFs

4. Results

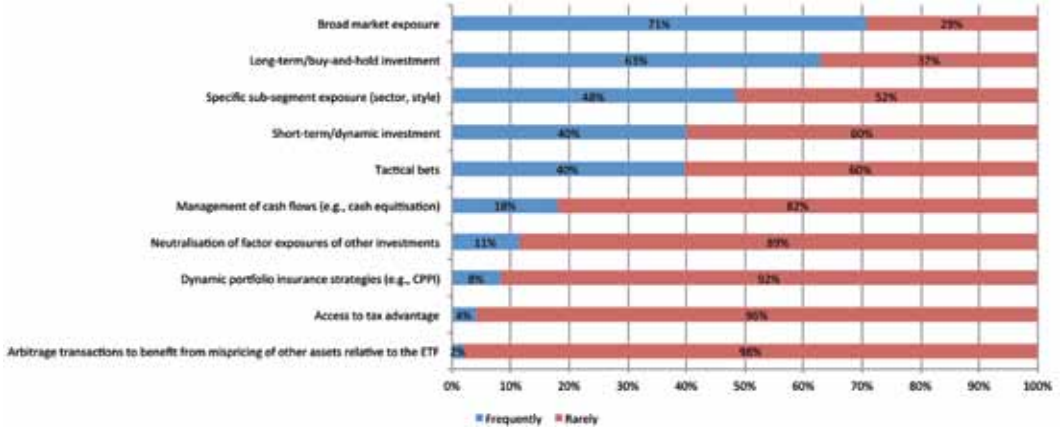
for different investment purposes on a scale from never (score 0) to always (score 6). Exhibit 4.8 shows the answers by classifying all respondents into two groups: If respondents rated their usage to be 3 or less, we group them into rare users, otherwise into frequent users.

The results show that 71% of respondents use ETFs frequently for achieving broad market exposure. 63% of respondents use ETFs for buy-and-hold investments. 48% of respondents use ETFs to obtain specific sub-segment exposure, while two-fifths of respondents use them for short-term (dynamic) investments or for tactical bets (40% for both). ETFs are less frequently used to manage cash flows (18%), to neutralise factor exposures related to other investments (11%), for dynamic portfolio insurance strategies (8%), tax advantages (4%) or to capture arbitrage opportunities (2%).

These results show that investment in ETFs is mainly associated with a long-term exposure to broad market indices. Still, frequent use for market sub-segments exposure, as well as for tactical bets or for short-term exposure in this year's findings indicates that other investment purposes are important as well. This is not a surprising result given that the liquidity, low cost and product variety benefits of ETFs should make them viable tools for such purposes.

Respondents were then asked to give some insight on the important criteria they look when selecting an ETF provider. Respondents were proposed a list of criteria, including broadness of the range, quality of replication, innovation, costs, as a complement with an active offering of the provider, and long-term commitment of the provider. The results are displayed in Exhibit 4.9. There are especially two criteria that come first in respondent motivations to select an ETF provider. The first one is costs, with a vast majority of 89% of respondents mentioning it. The second one is the quality of replication, with more than three-quarters of respondents (77%) considering this criterion when selecting an ETF provider. This result is not surprising as these two criteria are

Exhibit 4.8: How often do you use ETFs for the following purposes?
This exhibit indicates the frequency of respondents using ETFs for each of the mentioned purposes. Respondents were asked to rate the frequency from 1 to 6. The "frequent" category would include ratings from 4 to 6 and "Rarely" would take into account ratings from 1 to 3 and non-responses.



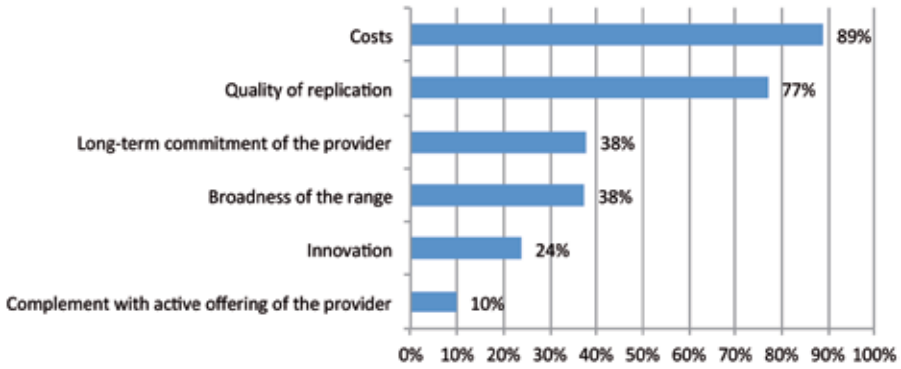
4. Results

related to the main motivations for using ETFs, namely reducing investment costs, while tracking the performance of the underlying index in the best way. With 38% of respondents for them both, long-term commitment of the provider and broadness of the range are also two criteria that are quite important for respondents when choosing an ETF provider. With only 24% of respondents mentioning it, innovation seems less important for respondents. Finally, 10% of respondents consider it important to select an ETF as a complement with the active offering of a provider.

In last year's survey, respondents were asked in a somewhat different way about the subject, since the questioning focused on the critical elements for choosing an ETF. However, some results can still be compared and it appears that there is an increase in the importance respondents give to these criteria when selecting ETFs. In 2015, costs appeared to top this list of respondents' considerations, with 73% of them having indicated that total expense ratio was a critical criterion to select an ETF – an already high value which has grown even more, considering that 89% of respondents are now concerned with costs when they select an ETF provider. In what concerns the quality of replication, 57% of respondents considered tracking error as critical for selecting an ETF in 2015, compared with 77%of respondents in 2016. In 2015, 33% of respondents were concerned with the house reputation, compared with 38% of respondents looking at the long-term commitment of the provider in 2016. Finally, and perhaps the most spectacular increase, while only 15% of respondents were concerned by the depth of the range in 2015, there are now 38% of respondents who consider the broadness of the range when selecting an ETF provider.

Cost is a critical factor that affects portfolio performance. It is a general quality for all types of investment, and under more pressure as the industry becomes more competitive. Whenever an investor considers a product, the cost is always an important question which may determine the choice of investment. According to Carhart (1997), the common factors in stock returns and the differences in both mutual fund expenses and transaction costs almost entirely explain the persistence of mutual fund returns. Hence aside from the underlying index being tracked by the ETF (which will determine exposure to common factors)

Exhibit 4.9 What criteria do you consider when selecting an ETF provider?
This exhibit indicates the criteria respondents look when selecting an ETF provider. More than one response can be given



4. Results

the level of fund expenses is an important determinant of performance. French (2008) also illustrates the importance of cost in relation to investment performance by showing that the effect of U.S. investors switching from an active to a passive investment strategy with lower costs, between 1980 and 2006, would result in an increase of average annual returns by 67 basis points.

ETF costs include the total expense ratio (TER), as well as cost of liquidity, and brokerage fees. The TER, which includes management fees, is a cost that will erode the NAV of the ETF over time and is unrelated to the trading activity, as opposed to brokerage fees which, when aggregated, will be related to the volume of trading that takes place. The present result shows that respondents are strongly scrutinising costs within ETFs, even though they are already a comparatively low cost vehicle. This may be seen as a result of the recent focus that has been placed on the 'hidden costs' that investors are being charged relating to securities lending fees by the regulators.

The primary goal of an ETF is to track the performance of an underlying index, explaining why the quality of replication is very important for investors. The tracking quality of ETFs may be characterised by several indicators, including not only the tracking error but also the tracking difference. The tracking difference is the difference between ETF total return and the total return of the replicated index, while the tracking error evaluates the volatility of the difference in return between an ETF and its benchmark. Bonelli (2015) shows that depending on whether we consider the level of tracking error or the level of tracking difference, the ranking of ETFs that track the same index may differ greatly. For example, considering a collection of five ETFs that track the MSCI World Index, he observes that tracking error varies significantly across the different ETFs that track the same index (from 0.02% to 0.22%). The ETF with the lowest tracking error relative to the index has one of the highest tracking differences (-0.42%), and thus greatly underperforms its benchmark, while an ETF with one of the highest tracking errors (0.21%) also has the lowest tracking difference (-0.19%). Similar results were obtained for two other indices, namely the MSCI Emerging Markets Index and the MSCI Europe Euro Index. Bonelli (2015) concludes that tracking error is not representative of the under- or outperformance of ETFs with respect to their benchmark, but serves first of all to evaluate the relative risk of daily deviations, and it is more a concern for short-term investors than for their mid-term or long-term counterparts. Long-term investors may be more interested in tracking difference, as its level provides information about ETF costs. Indeed, if ETF replication were perfect, the tracking difference would be equal to the ETF expense ratio. Thus, the lower the tracking difference, the lower the expense ratio.

4.1.4. Future development of ETFs

So far, our questions have focused mainly on the current usage of ETFs. A clear advantage of our survey methodology (where we have access to a sample of investment management professionals) is that we can also analyse the plans for the future rather than just observe

4. Results

realisations. Thus, in a last set of questions in this section on ETFs, we offer a glimpse into the future by asking survey participants about their views on their use of ETFs in the future. This allows us to gain some perspective on future developments on the demand side of the ETF industry.

First, we try to define a bit more clearly the type of niche markets where investors would like to see further product development. Over the last 10 years the industry has become more mature and there are over 1,500 ETFs in the European market (ETFGI, 2016), hence it will be very interesting to see where the gaps in the market are in terms of investor demand. Exhibit 4.10 illustrates the types of ETFs that respondents would like to see further developed in the future. Respondents were given the option of selecting more than one answer.

As shown in Exhibit 4.10, ETFs based on emerging markets equity (34%) are the top concern of respondents. Just behind with 33% of respondents, ETFs based on multi-factor, on smart beta and on single-factor indices are second ex-aequo on the list. This indicates strong interest in alternative indices. Alternative indices include those that are equally weighted or based on fundamental company characteristics (see Arnott, Hsu and Moore, 2005, or Amenc, Goltz and Le Sourd, 2009, for an introduction to such weighting schemes), or on weights derived from portfolio optimisation (see e.g. Amenc et al., 2010). This latter result is interesting as there have been a considerable number of product launches in the area of smart beta ETFs (see Section 2.2 of this document for background on smart beta strategies). The fact that a third of investors still see room for further product development may be explained by the fact that product launches have focused on relatively few popular strategies representing a small number of risk premia such as the value premium and defensive equity strategies. Indeed, the first generation of smart beta benchmarks were embedded solutions which did not distinguish the stock picking methodology from the weighting methodology. As such, they obliged the investor to be exposed to particular systematic risks which represented the very source of their performance (see Amenc, Goltz and Martellini, 2013). Given the increasing discussion on harnessing multiple factor premia from equity investing, including factors such as momentum, size, and quality, among others, it is perhaps not surprising that investors still see room for further product development. In addition, the arrival of the Smart Beta 2.0 offers yet increased investor interest for this type of product. The Smart beta 2.0 approach enables investors to explicitly choose exposure to systematic risk factors, as well as to choose the weighting scheme of the smart beta benchmark (see Amenc, Goltz and Martellini, 2013). Further questions on smart beta strategies are presented in Section 4.2 of this document.

ETFs based on smart bond indices, volatility ETFs, Ethical/SRI ETFs, infrastructure ETFs and emerging market bond ETFs also rank quite highly with 30%, 28%, 28%, 27% and 27% of respondents choosing them, respectively.

Compared to last year's results, there has been an increase in the demand for product development within 11 categories

4. Results

Exhibit 4.10: What type of ETF products would you like to see developed further in the future?
This exhibit indicates the percentage of respondents who would like to see further development in the future for different ETF products. Respondents were able to choose more than one product.

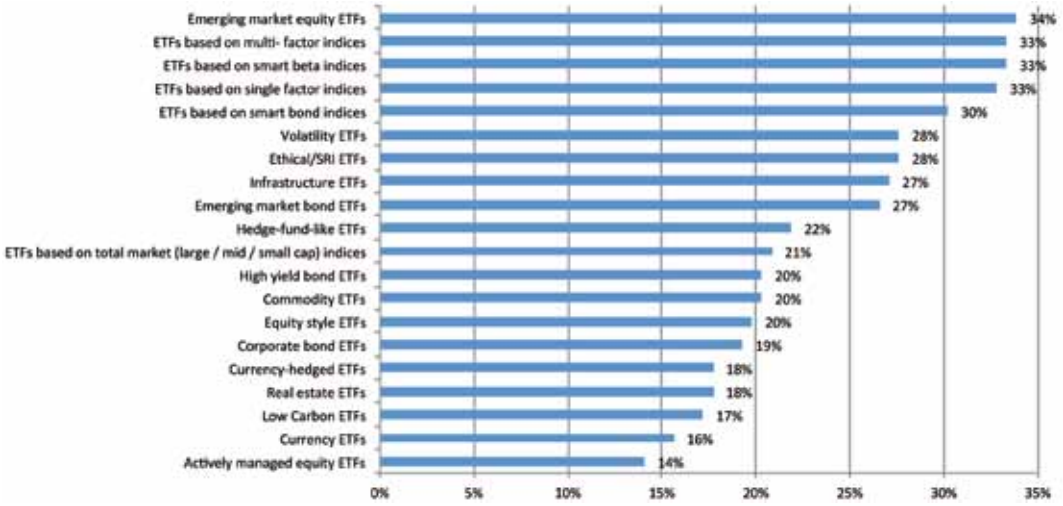


Exhibit 4.11: Largest increases in demand for product development in 2016
This exhibit shows the types of ETFs for which there were increases in terms of demand for future product development between 2015 and 2016, ranked in decreasing order of percentage increase.

What type of ETF products would you like to see developed further in the future?	2015	2016	% Increase
Ethical/SRI ETFs	16.7%	27.6%	10.9%
Infrastructure ETFs	16.7%	27.1%	10.4%
ETFs based on multi-factor indices	27.2%	33.3%	6.1%
Low Carbon ETFs	11.7%	17.2%	5.5%
Actively managed equity ETFs	8.9%	14.1%	5.2%
Commodity ETFs	16.7%	20.3%	3.6%
High yield bond ETFs	17.2%	20.3%	3.1%
ETFs based on smart bond indices	28.3%	30.2%	1.9%
Hedge-fund-like ETFs	20.6%	21.9%	1.3%
Emerging market bond ETFs	25.6%	26.6%	1.0%
Currency ETFs	15.0%	15.6%	0.6%

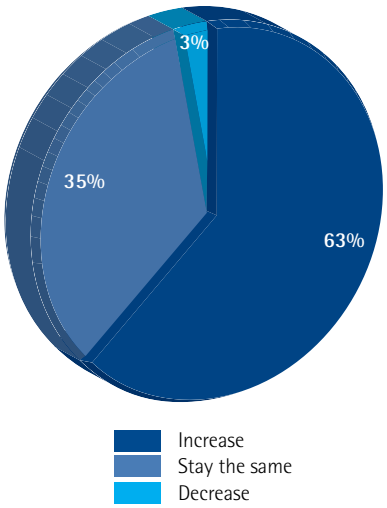
of ETFs, namely, ethical/SRI, infrastructure, multi-factor indices, low carbon, actively managed equity, commodity, high yield bonds, smart bond indices, hedge-fund-like, emerging market bond and currency (see Exhibit 4.11). The slight decrease in demand for other categories of ETFs may be the result of increased satisfaction with products already developed within these areas in recent years.

Despite a slight decrease in demand, smart beta indices still represent the area of most interest to respondents in terms of product development. Overall, the equity asset class gathers the highest rate of demand this year, with demand for ETFs based on emerging market equities ranking first, and ETFs based on multi-factor indices, smart beta indices and single-factor indices ranking second ex-aequo. Additional results concerning smart beta strategies will be developed in the second part of this survey, fully dedicated to smart beta strategies.

4. Results

After establishing priorities for new ETF product development, we then asked respondents to comment on how they planned their future use of ETFs. From Exhibit 4.12 we can see that about two-thirds of respondents (63%) report that they expect to increase their use of ETFs. Another third (34%) indicated that their use of ETFs would stay the same. By summing the percentage of respondents who answered "Increase" or "Stay the same", we have a total of 97% of respondents, meaning that only 3% of respondents plan to decrease their use of ETFs.

Exhibit 4.12: How do you predict your future use of ETFs? This exhibit indicates the respondents' forecasts about their future use of ETFs.



In addition, respondents who declared that they planned to increase their use of ETFs were also asked about their motivations for planning such an increase (the results are displayed in Exhibit 4.13). It appears that increasing the use of ETFs will serve as a substitute to the use of active managers for a vast majority of respondents (68% versus 74% in 2015), while 49% (versus 64% in 2015) of them will substitute them in favour of other index products. Comparisons with previous years are to be found in Exhibit 4.20 in Section 4.1.5, which displays trends over years.

These results should be associated with the disappointing performance of active management. Many academic papers were dedicated to analysing of the ability of active management to deliver positive alpha and persistent performance. Among the recent studies, Barras, Scaillet and Wermers (2010), covering the period 1975 to 2006, found that more than 75% of actively managed US equity funds delivered a null performance after taking into account trading costs and expenses. Furthermore, 24% of the funds delivered negative alpha, while only 0.6% of them attained positive alpha after deducting fees. In addition, the authors noted a large decrease in the proportion of skilful managers over the past 20 years, with 14.4% of funds generating positive alphas in early 1990, compared with only 0.6% in late 2006. At the same time, an increase in the number of active funds generating negative alphas was observed, from 9.2% to 24.0%. In the same way, over the period from 1984 to 2006, Fama and French (2010) show that few active funds are able to produce returns high enough to compensate management fees.

In this context, investors may see the use of ETFs as more profitable and less costly than the use of active managers. ETFs allow investors to mimic the performance of all types of asset classes, including various smart beta products, while limiting costs. Indeed, investors are now offered a wide range of smart beta ETFs with the promise of achieving performance at lower costs compared to active management (Osterland, 2015).[56]

56 - http://www.cnbc.com/2015/10/06/smart-beta-and-stupid-fund-tricks.html

4. Results

This hypothesis is confirmed as survey respondents declare that this replacement will first of all be motivated by costs for a vast majority of them (87%, versus 80% in 2015). The second motivation given by respondents is performance (58% of them, versus 50% in 2015); liquidity is not far behind with 55% of respondents (versus 45% in 2015). Finally, 47% of respondents (versus 46% in 2015) cite transparency as a motivation. These results confirm those of last year, in terms of relative importance for the various occurrences. Furthermore, the results were even more pronounced this year for all four motivations for choosing ETFs, as all percentages were higher than those obtained in 2015 (see Exhibit 4.14). Comparisons with previous years are to be found in Exhibit 4.21, which displays the trends over the years.

In a recent paper, Malkiel (2013) argues that a considerable increase has been observed in the costs of active management in the United States over the period from 1980 to 2011. However, it appears that the fees charged by active funds were not compensated by higher performance for active funds than for passive funds. Rather, the level of underperformance of active funds relative to passive funds was largely equal to the difference in fees between active and passive funds. Any increase in costs is thus perceived as a

Exhibit 4.13: Increase in the use of ETFs will serve as...
This exhibit indicates the reasons given by respondents for planning to increase their use of ETFs. More than one response could be given.

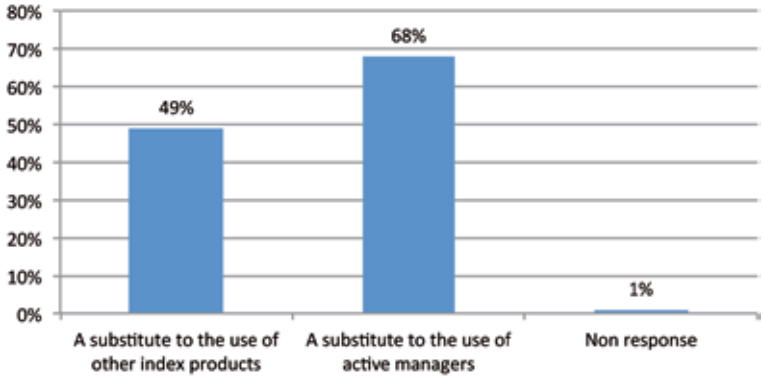
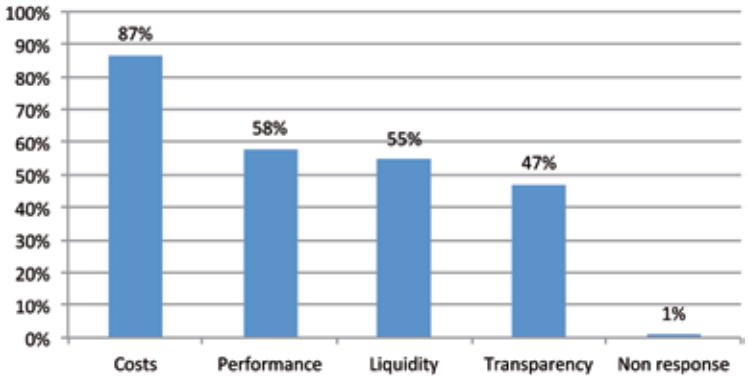


Exhibit 4.14: Increase in the use of ETFs will be motivated by...
This exhibit indicates the motivations given by respondents for planning to increase their use of ETFs. More than one response could be given.



4. Results

further loss of performance for investors. In view of our survey results, it is possible that the preference for ETFs shown by investors (who perceive them as low-cost tools and who have a tendency to replace active funds with ETFs) constitutes a coherent response to the increase of fees in the management industry as described by Malkiel (2013). This is all the more likely given that the leading reason investors give as a motivation for increasing ETF use is cost (see Exhibit 4.14). Investors now seem to be well aware of the effects of costs on long-term performance.

4.1.5. Trends: Use of and Satisfaction with ETFs over Time

Over the past decade, investment in ETFs has increased significantly, as already shown in Section 2.1. However, since ETFs are still a rather new class of financial products, all benefits and possible uses are not yet fully known to all potential investors. Hence, not only is the investment in standard ETFs growing, but so are more advanced products and sophisticated ways of using them. In this section, we compare the results of the ETF section of the ETF and Smart Beta Survey 2016 with the answers we obtained in previous ETF surveys taken in 2006, and from 2008 to 2015. This comparison will shed some light on how the current state of ETF usage compares to past years and will provide some insight into the evolution of ETF usage to today.

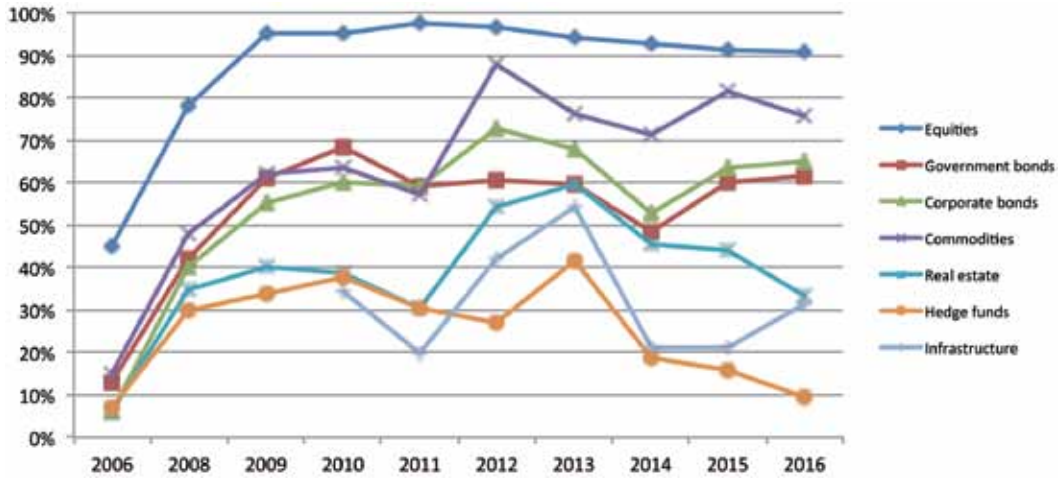
Use of ETFs

When comparing the usage of ETFs and ETF-like products over time, we observe a sign of increasing propagation of their adoption over the past decade. The usage of ETFs and ETF-like products in Exhibit 4.15 refers to the number of respondents who use ETFs among all respondents who invest in a particular asset class. In other words, it is the frequency of the usage. Since 2006, the increase of the percentage of respondents using ETFs in traditional asset classes has been spectacular. In 2006, the rate of use was under 20% for six out of seven asset classes and none of the asset class reached the 50% level of ETF use. At that time, 45% of respondents used ETFs to invest in equities, compared with 91% in 2016. As for governments and corporate bonds, the result went from 13% and 6% in 2006, to 62% and 65%, respectively, in 2016. A dramatic increase from 15% of respondents in 2006 to 76% in 2016 was also observed for commodities, while the share of respondents using ETFs to invest in real estate evolved from 6% in 2006 to 33% in 2016.

After a large increase in the use of ETFs for investing in bond asset classes between 2014 and 2015, both for government and corporate bonds, we observe another slight increase this year compared to last year. In 2015, 60% and 64% of respondents used ETFs to invest in government and corporate bonds, respectively, compared with 62% and 65% of respondents in 2016. This stability at a quite high threshold in ETF use for investing in bond asset classes is likely related to the high level of satisfaction observed over several years, with government bonds enjoying a satisfaction rate of around 90% since 2012, and corporate bonds enjoying a satisfaction rate ranging from 80% to 90% since 2011 (see Exhibit 4.17). With 76% of respondents using ETFs, commodities show a decrease of 6 points compared to last year. This decrease follows the large

4. Results

Exhibit 4.15: Use of ETFs or ETF-like products over time
This exhibit indicates the use of ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2016.



increase observed between 2014 and 2015. However, the percentage of ETF users remains higher in 2016 compared to 2014. The equity class showed quite a stable rate in the use of ETFs for some years, above 90%. Other asset classes, such as real estate, infrastructure or hedge funds, exhibit large variations in their rate of use compared to that of last year, after relative stability between 2014 and 2015. For the real estate and hedge fund asset classes, this variation results in a decrease, with 33% and 9% of respondents, respectively, using ETFs in 2016, compared to 44% and 16%, respectively, in 2015. Alternatively, the infrastructure asset class experienced an increase in the use of ETFs from 21% in 2015 to 31% in 2016. It appears that (with the exception of real estate, infrastructure and hedge funds) all rates of use are quite high, above 60%. It should be noted that, in Exhibit 4.15, we only present the asset classes for which we have data since at least 2009; other asset classes (including volatilities, sectors, SRI, Money market funds, currencies and smart beta) were introduced into our survey more recently.

Exhibit 4.16 compares the fraction of our respondents' portfolios that is invested in ETFs.[57] Hence, in Exhibit 4.16, the usage of ETFs or ETF-like products refers to the density of usage in each asset class. While the equity asset class is the one most widely used for ETF investment by investors, it is currently not the asset class with the highest proportion or density of ETF investment. In 2008, 22% of the investment in the equity asset class was made using ETFs, compared to 32% in 2016. As for government and corporate bonds, the increase in the proportion of ETF investment is more spectacular, having respectively accounted for 10% and 7% of total investment in 2008, compared to 26% in 2016 for them both. The increase in the use of ETFs to invest in commodities and real estate has also been particularly significant during this period, with the former having 16% of total investment accounted for by ETFs in 2008, compared to 43% in 2016; as for real estate, in 2008 it had 7% of total investment accounted for by ETFs, compared to 30% in 2016.

57 - Since this question was not asked in the EDHEC European ETF Survey 2006, we can only provide a comparison with answers from 2008 to 2016.

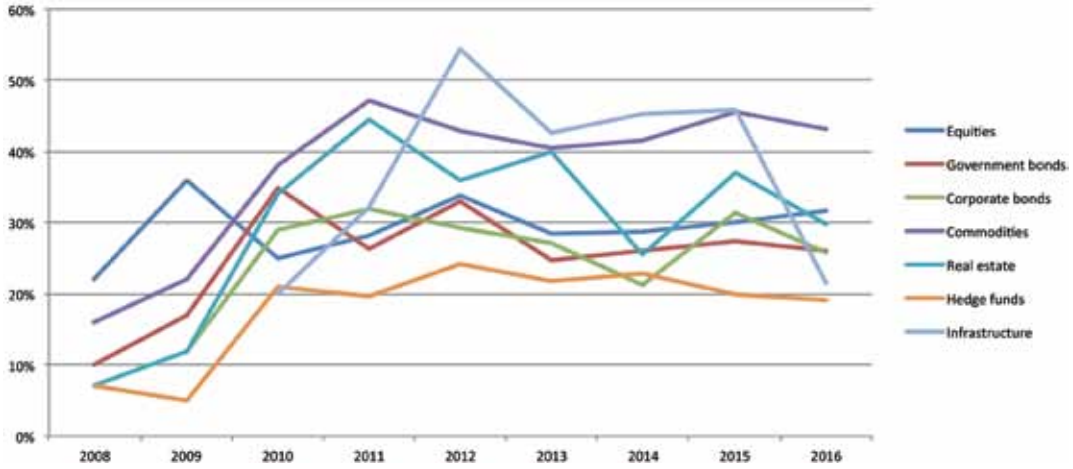
4. Results

In 2016, we observe that to the exception of equity asset class, for which we observe an increase of 2% in the market share, the other six asset classes have noted a decrease in their ETF market share, compared to the previous year. This decrease is slight for, government bonds and hedge funds (-1% for each of them) as well as for commodities (-2%). If we consider that this decrease followed the increase observed last year for six of the seven asset classes, it appears that ETF market share has been quite stable for the equity, commodity, government bond and hedge fund asset classes for some years, suggesting that users have reached a satisfactory level of ETF usage for these asset classes and are not looking to expand beyond this level. The decrease is a little higher for corporate bonds (-5%) and real estate (-7%). However, for these two asset classes the market share remains higher than in 2014. In what concerns infrastructure, we observe a considerable decrease (-21%) in the market share between 2015 and 2016, bringing the market share level back down to that observed in 2010.

Satisfaction with ETFs

Satisfaction with standard ETFs has generally remained at high levels as shown in Exhibit 4.17. Compared to 2015, five out of seven asset classes exhibit slight variations in the satisfaction rate. We observe a 5% decrease in satisfaction with equity ETFs. However, the satisfaction rate remains high at 93%, the highest satisfaction rate among all the asset classes. The high rate of equity ETF satisfaction, which has consistently been in the region of 90% since our first survey in 2006, may be due to the greater consensus for equity indices. Equity indices have the longest history of development and the most number of innovations, which consequently carries over to equity ETFs. Investors are therefore more familiar with equity indices as well as their drawbacks. Given the large variety of alternative weighting schemes for equity indices, investors have a wide range of products to invest in. Government bonds is the other asset class among those with the highest rates of satisfaction in terms of ETF use to have encountered a moderate decrease (-3%)

Exhibit 4.16: Percentage of total investment accounted for by ETFs or ETF-like products
This exhibit indicates the percentage of total investment accounted for by ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of the EDHEC ETF survey from 2008 to 2016.



4. Results

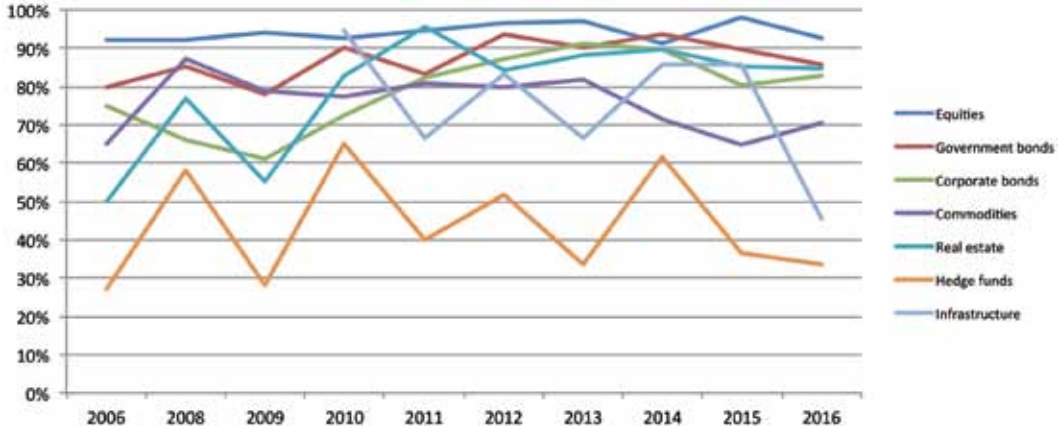
in its satisfaction rate, which was still high at 86% in 2016. Corporate bond ETFs encountered an increase in satisfaction of 2%, reaching 83% in 2016.

The commodity asset class, which has seen a decrease in the level of ETF satisfaction since 2014, exhibits a 6% increase in satisfaction over 2015 to reach a level of satisfaction of 71%, quite similar to that observed in 2014. Hedge fund assets exhibits a moderate decrease in satisfaction of 3% with ETFs compared to last year, after the considerable decrease observed between 2014 and 2015. With 33% of respondents satisfied with ETFs, this is the lowest satisfaction rate among the seven assets classes displayed in Exhibit 4.17. For real estate ETFs, the level of satisfaction is similar in 2016 compared to 2015 at 85%. Finally, the most spectacular variation in satisfaction rate observed this year is for infrastructure ETFs, with a decrease of 41%. This result is correlated with the decrease in the market share for infrastructure ETFs displayed in Exhibit 4.16.

Since the beginning of our period of observation, the satisfaction rates for hedge fund and infrastructure ETFs have been the two most volatile. It clearly seems that the less liquid and less mature ETF markets experience the most varying levels of satisfaction. The rate of satisfaction for hedge fund ETFs clearly displays a saw tooth shape, with high figures in 2008, 2010, 2012 and 2014 (58%, 65%, 52% and 62%, respectively) and lower figures in 2006, 2009, 2011, 2013, 2015 and 2016 (27%, 28%, 40%, 33%, 36%, and 33%, respectively). Similar saw tooth shape is observed for the rate of satisfaction for infrastructure ETFs, with high figures in 2010, 2012, 2014 and 2015 (95%, 83%, 86% and 86%, respectively) and lower figures in 2011, 2013, and 2016 (67%, 67%, and 45%, respectively).

This may be due to the suitability of ETFs to more liquid asset classes or the fact that investor expectations are still adjusting with regard to the benefits and drawbacks of ETFs based on those asset classes. For instance, we observed large variations through years in the number of users of ETFs for these two asset classes,

Exhibit 4.17: Satisfaction with ETFs or ETF-like Products over time
This exhibit indicates the percentages of respondents that are satisfied with ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2016.



4. Results

as well as in the share of investment dedicated to ETFs. However, it should be noted that the sample of respondents who indicated their level of satisfaction with infrastructure ETFs was very small, with only 11 providing responses this year, compared to 7 in 2015. Similarly, the sample of respondents who answered whether or not they were satisfied with hedge fund ETFs was also quite small, with only 6 providing responses in 2016 and 11 in 2015. As a result, the impact of a single respondent having a change of opinion since last year has a considerable impact on the result.

Use of ETFs for different purposes

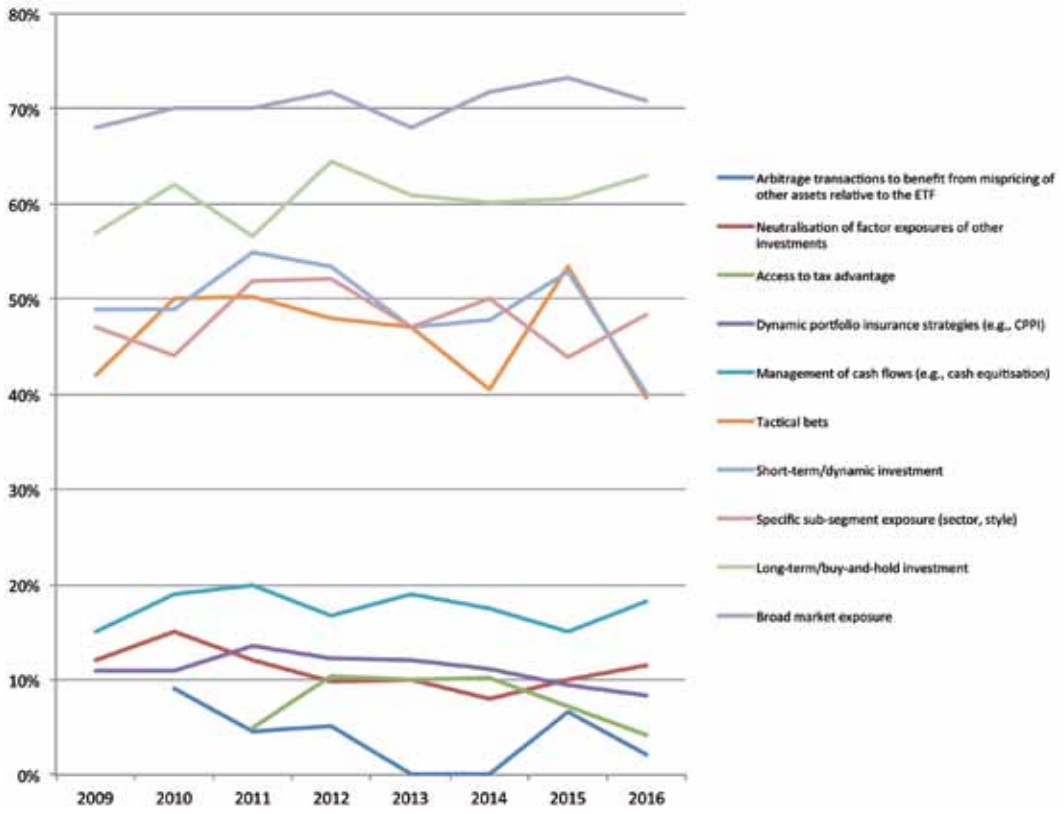
It is interesting to note that, while arbitrage trading between ETFs and the underlying basket of cash securities was an activity used by a considerable fraction of respondents in the past, there is currently very low interest in this type of use, suggesting that respondents perceive ETF pricing relative to NAV to be precise. In 2010, the percentage of respondents who frequently used ETFs for arbitrage purposes was 10%. In 2012, only 5% of respondents frequently used ETFs for arbitrage. In 2016, only 2% of the respondents declared that they frequently used ETFs for arbitrage (see Exhibit 4.18).

58 - The question was not asked in the survey before 2009.

Future use of ETFs

Finally, we also look at the investors' expected usage of ETFs over time. The results are shown in Exhibit 4.19. The results suggest that despite the past

Exhibit 4.18: Frequent use of ETFs for the following purposes over time.
This exhibit indicates the percentages of respondents frequently using ETFs for each of the mentioned purposes over time. Respondents were asked to rate the frequency from 1 to 6. The "frequent" category would include ratings from 4 to 6. The percentages are based on the results of ETF survey 2009 to 2016.[58]



4. Results

Exhibit 4.19: How do you plan the evolution of your use of ETFs?
This exhibit indicates the future potential to change the use of ETFs by investors over time. The percentages are based on the results of the EDHEC ETF survey in 2006, and from 2008 to 2016.

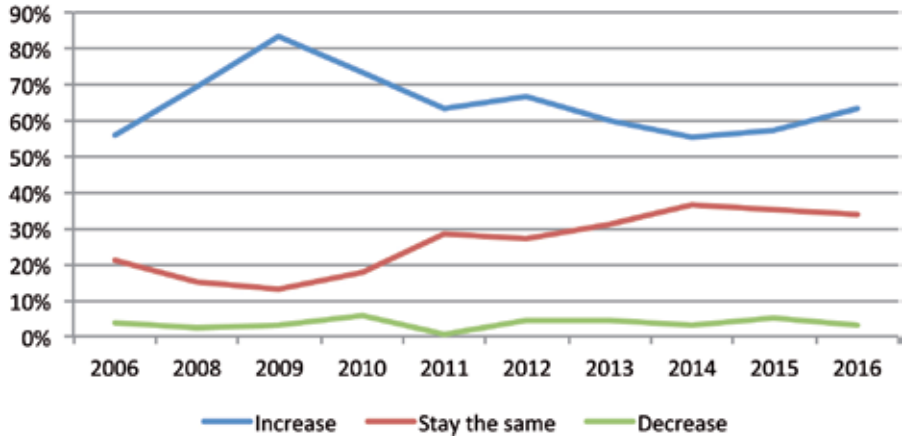
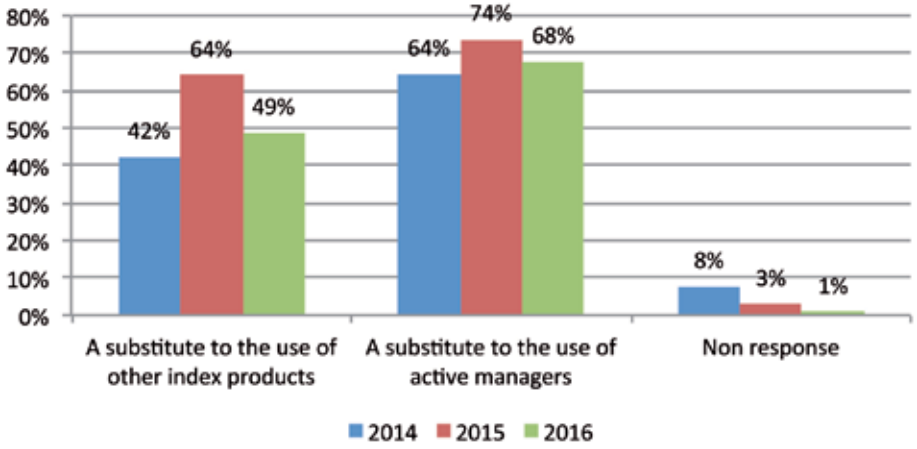


Exhibit 4.20: Increase in the use of ETFs will serve as...
This exhibit indicates the reasons given by respondents for planning to increase their use of ETFs. More than one response could be given.



growth and increasing maturity of the ETF market, investors are still looking to increase (or to at least maintain) their use of ETFs. By summing the percentage of respondents who answered "Increase" or "Stay the same", the total has stayed above 90% since 2009. Since 2013, the percentage of respondents planning to increase their use of ETFs has remained around 60%, while the percentage of respondents who answered that their use of ETFs would stay the same is around 35% over the same period, leaving only around 5% of respondents since stating that they planned to reduce their use of ETFs. Against the backdrop that this survey only covers respondents who are already ETF investors, this increase in expected usage is even more remarkable.

Since 2014, we ask respondents who stated that they planned to increase their use of ETFs about their motivations for planning such an increase. The results are displayed in Exhibit 4.20. Since then, a vast majority of respondents, starting at around two-thirds of them in 2014 and even reaching three-quarters of them in 2015, indicated that increasing the use of ETFs would serve as a substitute to the use

4. Results

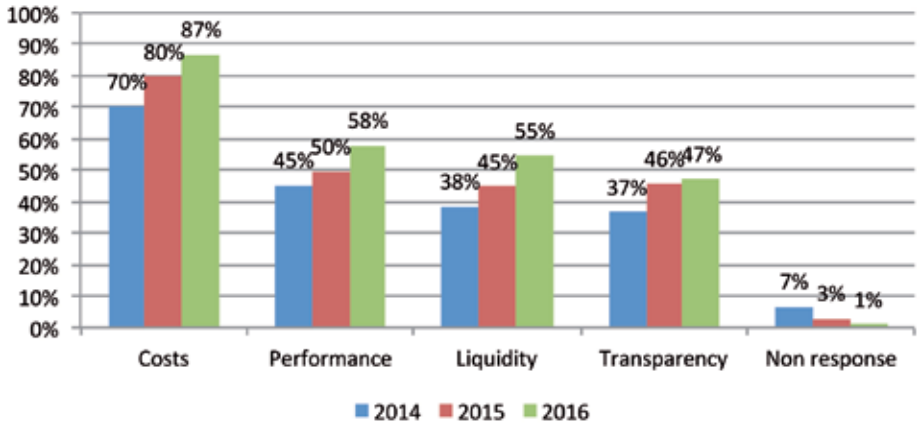
of active managers. As explained in Section 4.1.4, this result should be associated with the disappointing performance of active management. Investors may see the use of ETFs as more profitable and less costly than the use of active managers. With an average of more than half of the respondents, over the three years, substituting ETFs in favour of other index products is also a major reason for the increasing use of ETFs.

The hypothesis of reducing costs with an increase in the use of ETFs is confirmed as survey respondents declare that this replacement will first of all be motivated by costs, with a still increasing percentage from 70% in 2014 to 87% in 2016 (see Exhibit 4.21). The second motivation given by respondents is performance, with a still increasing percentage from 45% in 2014 to 58% in 2016. Liquidity is the third criteria given, starting with 38% of respondents in 2014 and reaching 55% of respondents in 2016 – roughly the same as performance. Transparency is the last criteria given, with 37% of respondents in 2014 versus 47% in 2016. It should be noted that the percentage of respondents whose increases in ETF use were motivated by transparency remained quite similar in 2016, compared to 2015.

Smart beta ETFs

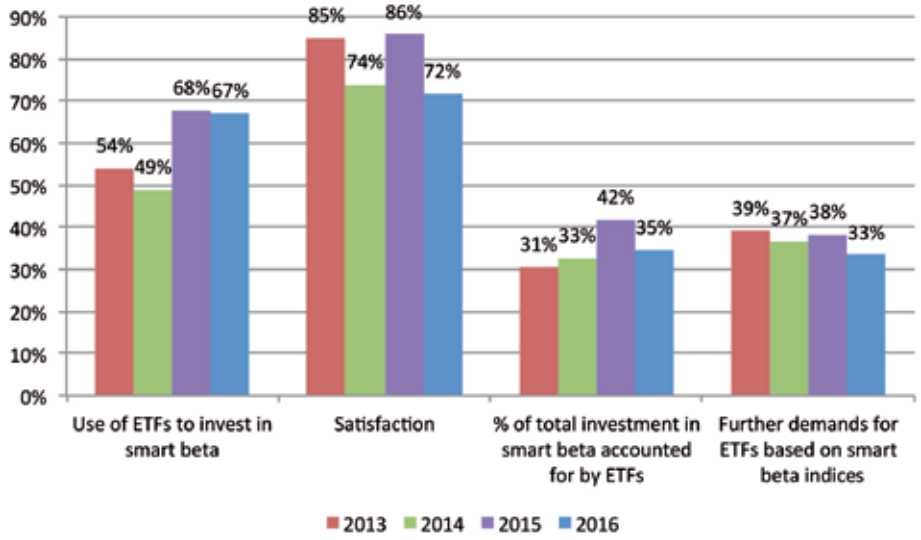
In this first section of the survey, we collected initial results about investor perceptions of smart beta strategies, through their use of smart beta ETFs, showing their increasing interest, as well as the high satisfaction rate with ETFs within this asset class (see Exhibit 4.22). About two-thirds of respondents (67%) used ETFs or ETF-like products to invest in smart beta in 2016, a considerable increase compared to 49% in 2014. Since 2013, the satisfaction rate with smart beta ETFs is quite high, though we observe variations from one year to another. Also since 2013, around one-third of smart beta investing is made through ETFs. Finally, around one-third of respondents still have further demands in 2016 for ETFs based on smart beta indices, a percentage that has slightly decreased since 2013 when 39% of respondents had further demands. The large use of ETFs based on smart beta indices, as well as the wishes for additional developments, fully

Exhibit 4.21: Increase in the use of ETFs will be motivated by...
This exhibit indicates the motivations given by respondents for planning to increase their use of ETFs. More than one response could be given.



4. Results

Exhibit 4.22: Smart Beta ETFs: Use and Satisfaction
This exhibit indicates the use of and satisfaction with smart beta ETFs from 2013 to 2016.



justify that a large share of our survey is dedicated to smart beta strategies, the results of which will be presented in the following section.

4.2. Smart Beta Strategies

The results of the first section of the survey have shown interest of respondents for ETFs that track smart beta indices. In this second section of the survey, we invite survey participants to give their opinion on smart beta strategies beyond their use through ETFs. While questions about smart beta products were first introduced in our 2013 survey, this group of questions were considerably developed this year, in view of the increasing interest of these strategies to improve passive investment. The emergence of Smart Beta products offers exposure to a variety of alternatively weighted indices. Indeed, there is recent evidence that combining optimal portfolios constructed under different assumptions results in a higher probability of outperformance (compared to the cap-weighted index) over market cycles than any one alternatively constructed weighting scheme. Hence it would make sense that investors would benefit from exploiting such diversification-based strategies.

For instance, Amenc et al., (2012a) show that a global minimum variance strategy does well in adverse market conditions, while Maximum Sharpe Ratio (MSR) portfolios provide greater access to the upside of equity markets. As the relative performance of these two diversification approaches depends on market conditions, they show that a combination of both approaches leads to a smoother conditional performance and higher probability of outperformance of the cap-weighted index.

In this section, we begin by analysing the use of smart beta strategies, in terms of the number of investors and in terms of the amount of investment, as well as the strategies used to invest in smart beta solutions. Respondents were then invited to share their opinions on smart

4. Results

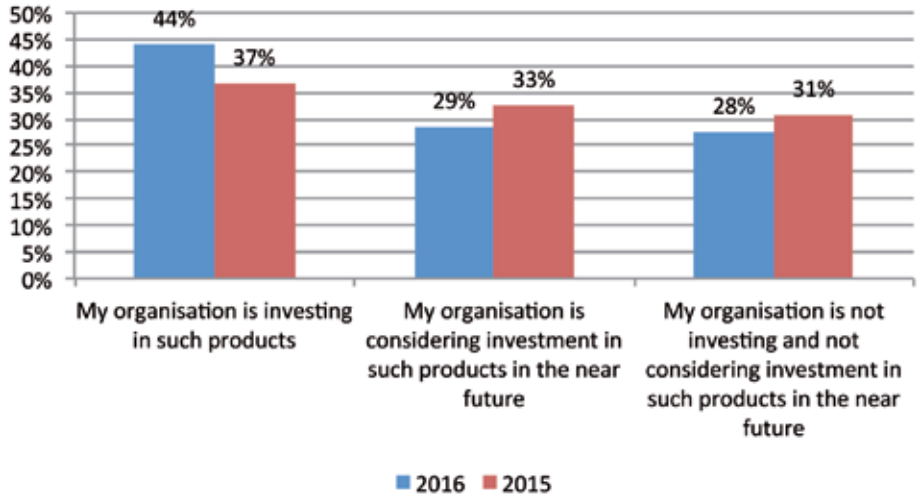
beta indices and on the information they require before investing in smart beta strategies. They were also asked to express their views on the evolution of their planned future use of smart beta strategies. Finally, we look at the trends in the use of smart beta strategies observed over the last four years.

4.2.1. Use of smart beta strategies

Respondents were first asked about their use of products that track smart beta indices. From Exhibit 4.23, we can see that 44% of respondents already use products that track smart beta indices, and that 29% of them are considering investing in such products in the near future. These results show that investors already have large interest in such products. Compared to last year, we see a large increase in the share of respondents that already use products that track smart beta indices. Consequently, we observe a decrease in the percentage of respondents that consider investment in such products in the near future. However, the cumulative percentage of those that already invest or that are considering investing in smart beta in the near future is still higher in 2016 than in 2015, which gives room for further development of this investment in the near future.

For those who already invest in smart beta strategies, respondents were asked the percentage of total investment already invested in smart beta solutions. The results are displayed in Exhibit 4.24. Two-thirds of respondents (67%) invest less than 20% of their total investments in smart beta strategies. If we compare these results to those presented in Exhibit 4.23, it appears that, while there are more and more respondents who invest in smart beta strategies, a vast majority of them still dedicate a restricted share of investment to smart beta strategies. About a quarter of them (23%) invest between 20% and 40% of their total investments in smart beta strategies, while only 10% of respondents invest more than 40% of their total investments in smart beta strategies. These results confirm that there is still room for further development

Exhibit 4.23: Use of Products that Track Smart Beta Indices
This exhibit indicates the percentages of respondents that reported using products that track smart beta indices. Non-responses are excluded. We also displayed 2015 results to show the evolution of results between the two years.



4. Results

Exhibit 4.24: Percentage of Total Investment already invested in Smart Beta Solutions
This exhibit indicates the average percentage of total investment already invested in smart beta solutions. We only consider respondents that already use smart beta strategies. Non-responses are excluded.

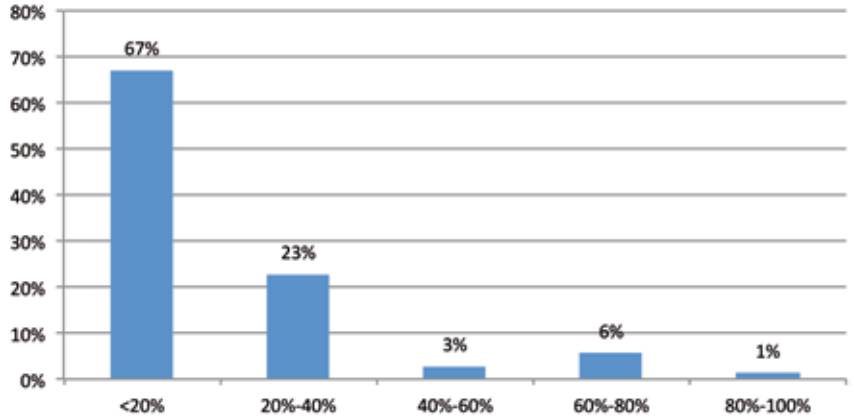
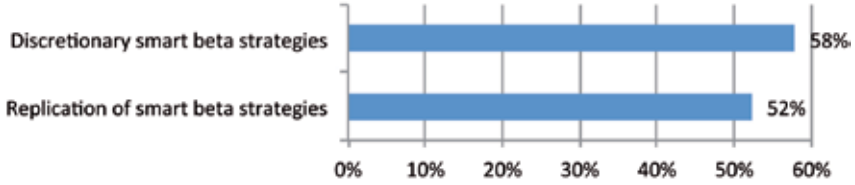


Exhibit 4.25: Strategies used to invest in Smart Beta Solutions
This exhibit indicates the categories of smart beta strategies respondents invest in. The percentages are based on the sole respondents that already use smart beta strategies. More than one response could be given. Non-responses are excluded.



of this investment in the near future.

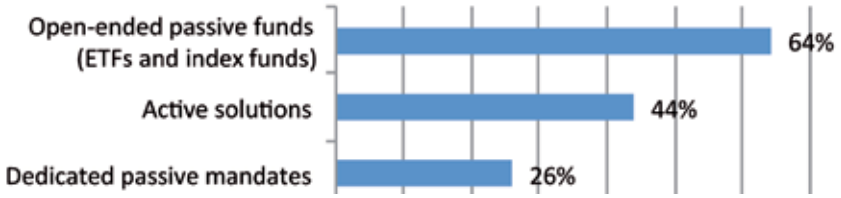
Respondents already investing in smart beta strategies were also asked to detail the category of smart beta strategies they invest in. The results are displayed in Exhibit 4.25. It appears that slightly more respondents use discretionary smart beta strategies rather than resort to replication of smart beta strategies (58%, versus 52%). Only 10% of respondents use both categories of strategies.

Respondents already investing in smart beta strategies were finally asked to explicitly state the wrapper they use to invest in smart beta strategies. The results are displayed in Exhibit 4.26. It appears that a majority of respondents (64%) use open-ended passive funds (ETFs and index funds) as a wrapper for smart beta strategies. 44% of them use active solutions, while about a quarter of them (26%) use dedicated passive mandates. While the vast majority of respondents (72%) use only one category of wrapper, some of them use two or three different categories of wrapper. 8% of respondents use both categories of passive wrappers. Some respondents use active solutions and only one category of passive wrapper – open-ended passive funds for 10% of them and dedicated passive mandates for 4% of them. Finally, 6% of respondents declare using the three categories of wrappers.

The remaining questions of the smart beta section of the survey were proposed to all respondents whether or not they already invest in smart beta strategies. Respondents were asked to rate the advantages of discretionary smart beta

4. Results

Exhibit 4.26: Wrapper used to invest in Smart Beta Solutions
This exhibit indicates the categories of wrapper respondents use to invest in smart beta strategies. The percentages are based on the sole respondents that already invest in smart beta strategies. More than one response could be given. Non-responses are excluded.



strategies and of replication of smart beta strategies. The results are displayed in Exhibit 4.27 for discretionary smart beta strategies and in Exhibit 4.28 for the replication of smart beta strategies. Exhibit 4.29 compares the favourable scores for both strategies. For both strategies, the majority of respondents have a favourable opinion of almost all their characteristics. The only exception is 'mitigating possible conflict of interest, provider versus investor', for discretionary smart beta strategies, for which only 47% of respondents find it favourable. All other characteristics are considered to be favourable for more than 50% of respondents.

Some characteristics receive similar scores for both categories of strategies, as the ease to change portfolio allocation over time, which is considered as favourable for 68% of respondents, both for discretionary smart beta strategies and replication of smart beta strategies. Other characteristics receive favourable scores in the same ranges for both strategies, but with a slight advantage for replication of smart beta strategies. Among these are the availability of information for assessing strategies, transparency of methodology, and ease of use as building blocks in portfolio allocation, with 68%, 68%, and 67% of respondents, respectively, finding them favourable for the replication of smart beta strategies, versus 65%, 64%, and 65%, respectively, for discretionary smart beta strategies. For other characteristics, the slight advantage is to be found for the discretionary smart beta strategies. Among these are the possibility to create alignment with investment beliefs and the broadness of the available solutions with 66% and 54% of respondents, respectively, finding them favourable for discretionary smart beta strategies, versus 61% and 51%, respectively, for replication of smart beta strategies.

It is mainly in terms of cost that respondents find that replication of smart beta strategies has a definite advantage over discretionary smart beta strategies, as 70% of respondents find costs favourable for the former, against only 57% for the latter. To a lesser extent, 'mitigating possible conflict of interest provider versus investor' is considered to be more favourable with replication of smart beta strategies (54% of respondents), than with discretionary smart beta strategies (47% of respondents). Exhibit 4.29 provides more detail.

4. Results

Exhibit 4.27: Advantages of Discretionary Smart Beta Strategies
This exhibit indicates how respondents rate the advantages of discretionary smart beta strategies. Respondents were asked to rate the various advantages from 0 (not favourable) to 5 (highly favourable). The "favourable" category would include ratings from 3 to 5 and "not favourable" would take into account ratings from 0 to 2. Non-responses are excluded.

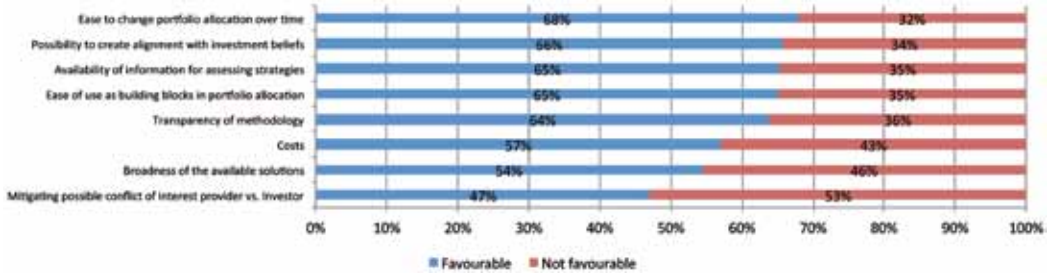


Exhibit 4.28: Advantages of Replication of Smart Beta Strategies
This exhibit indicates how respondents rate the advantages of replication of smart beta strategies. Respondents were asked to rate the various advantages from 0 (not favourable) to 5 (highly favourable). The "favourable" category would include ratings from 3 to 5 and "not favourable" would take into account ratings from 0 to 2. Non-responses are excluded.

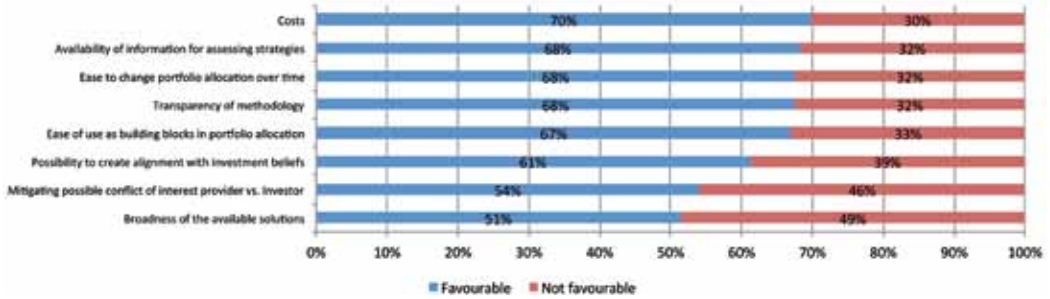
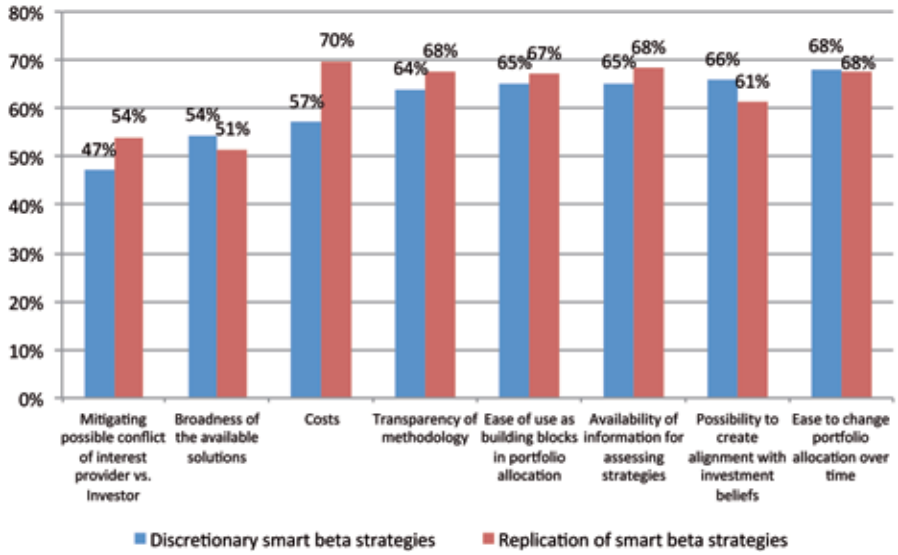


Exhibit 4.29: Comparison of the Advantages of Replication of Smart Beta Strategies with the ones of Replication of Smart Beta Strategies
This exhibit compares the favourable scores obtained for each advantage of discretionary smart beta strategies and replication of smart beta strategies. Non-responses are excluded.



4. Results

4.2.2. Smart beta indices

Investors were then asked about their agreement with different propositions. Smart beta indices were developed to overcome the shortcomings of cap-weighted indices, among which were their poor risk-adjusted performance (Haugen and Baker, 1991; Grinold, 1992; Schwartz, 2000; Cochrane, 2005; Arnott, Hsu and Moore, 2005; Amenc, Goltz and Le Sourd, 2006; Goltz and Le Sourd, 2011, among others). So, respondents were first asked if, in their view, smart beta indices provided significant potential to outperform cap-weighted indices in the long term.

From Exhibit 4.30, we can see that a vast majority of respondents agree that smart beta indices provide significant potential to outperform cap-weighted indices in the long term, as three quarters of them (75%) indicate they agree or strongly agree with this argument among which 12% of them strongly agree with this assertion. The results are remarkably similar to those obtained last year in terms of distribution between the four possible answers. It thus appears that a vast and stable group of investors are now convinced of the superiority of smart beta indices in terms of performance over the long term.

Then, respondents were asked if they thought smart beta indices allowed factor risk premia such as value and small-cap to be captured. From Exhibit 4.31, it appears

Exhibit 4.30: Do you think Smart Beta indices provide significant potential to outperform cap-weighted indices in the long term? This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded. We also displayed 2015 results to show the evolution of results between the two years.

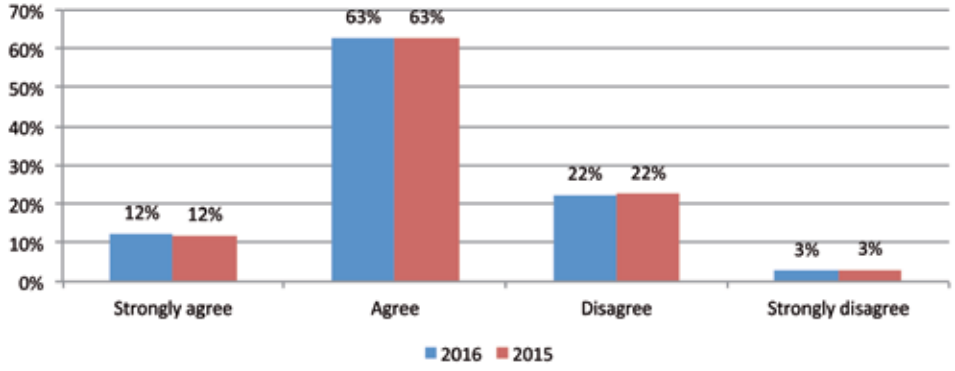
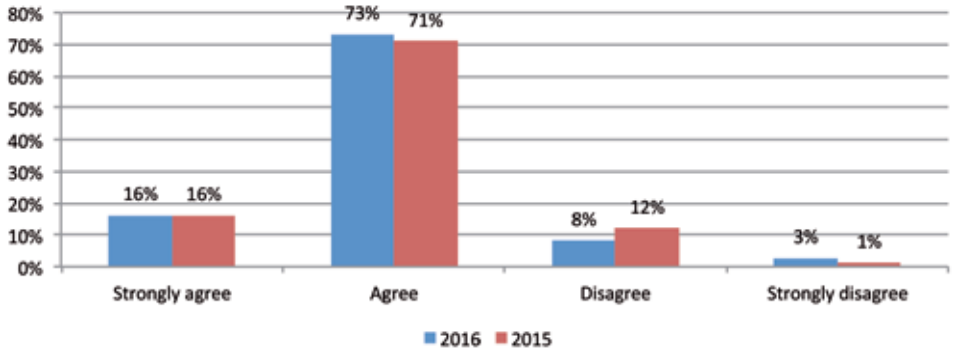


Exhibit 4.31: Do you think Smart Beta Indices allow factor risk premia such as Value and Small-Cap to be captured? This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded. We also displayed 2015 results to show the evolution of results between the two years.



4. Results

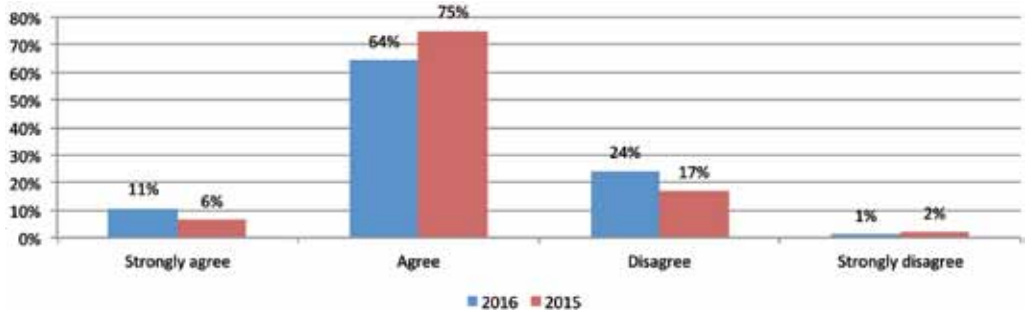
that a vast majority of respondents (89%) agree or strongly agree that smart beta indices allowed such factor risk premia to be captured, a percentage even higher than the already high value of 87% obtained in 2015 particularly that to an increase among respondents who agree with the statement.

Another important shortcoming of cap-weighted indices documented in the literature is their overly concentration (see Tabner, 2007; Malevergne et al., 2009). So, respondents were asked if they thought smart beta indices allowed the concentration of cap-weighted indices in very few stocks or sectors to be avoided. Here again, from Exhibit 4.32, we can see that a large share of respondents, namely three-quarters of them (75%) agree or strongly agree that smart beta indices allow the concentration of cap-weighted indices in very few stocks or sectors to be avoided, which represents a slight decrease compared with 81% of respondents in 2015. The decrease is only observed among those respondents who agreed with the statement (64% in 2016, versus 75% in 2015), as respondents who strongly agreed with the statement were more numerous this year (11%, versus 6% in 2015).

Further, respondents were asked if they thought that smart beta indices require full transparency on methodology and risk analytics diversification. From Exhibit 4.33, we can see that the vast majority of respondents (89%) agree or strongly agree with this statement, a percentage showing a slight decrease compared to the very high figure of 94% obtained in 2015, but which is quite comparable with the 88% obtained in 2014. Further, when breaking down this figure, slightly more respondents are strongly agreed with the statement (46%), than those who simply agreed with it (43%).

These results confirm earlier research on the need for transparency of index investors in general. In particular, in a survey conducted among European investors on their perception of index transparency, Amenc and Ducoulombier (2014) found strong conviction among respondents that the transparency currently offered by index providers is, in general, inadequate. Moreover, their results show that the rise of strategy indices makes transparency even more important and that opacity undermines the credibility of reported track records, in particular for new forms of indices. When reviewing existing indices and

Exhibit 4.32: Do you think Smart Beta indices allow the concentration of cap-weighted indices in very few stocks or sectors to be avoided?
This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded. We also displayed 2015 results to show the evolution of results between the two years.



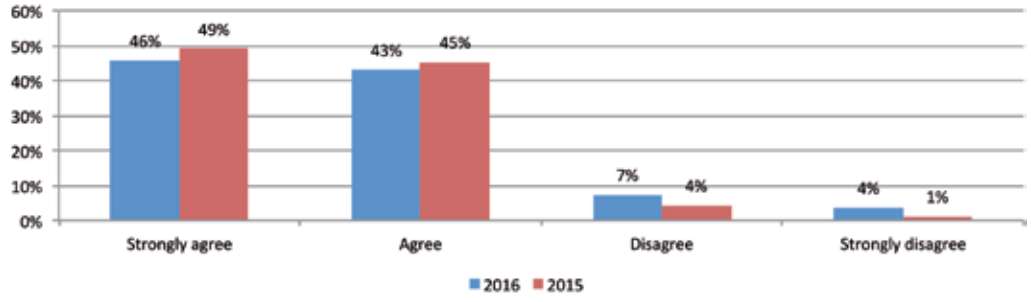
4. Results

their disclosure practices, Amenc and Ducoulombier (2014) find that a number of providers failed to disclose the full calculation methodology that would allow for replication of their strategy indices (e.g. formulae or procedures were not properly described or specified, proprietary or third party models were used but not provided). They also find that for smart beta indices used by UCITS, only three out of five index firms provided a full history of their index closing levels. In the Edhec-Risk Alternative Equity Beta Investing survey, Amenc et al., (2015a) find similar strong evidence on severe shortcomings of alternative equity beta strategies in terms of the transparency they offer investors. In fact, "limited information on risks" and "limited access to data" appear to be some of the biggest hurdles in terms of alternative equity beta adoption by investors. Moreover, when asked about the importance of different assessment criteria when evaluating advanced beta offerings, respondents saw transparency as one of the key criteria.

Finally, respondents were asked if they thought diversification across several weighting methodologies allowed risk to be reduced and added value. From Exhibit 4.34, we can see that more than four-fifths of respondents (83%) agree or strongly agree that diversification across several weighting methodologies allows risk to be reduced and adds value, a percentage even higher than that obtained last year (79%); however, this increase is only due to respondents agreeing with this statement.

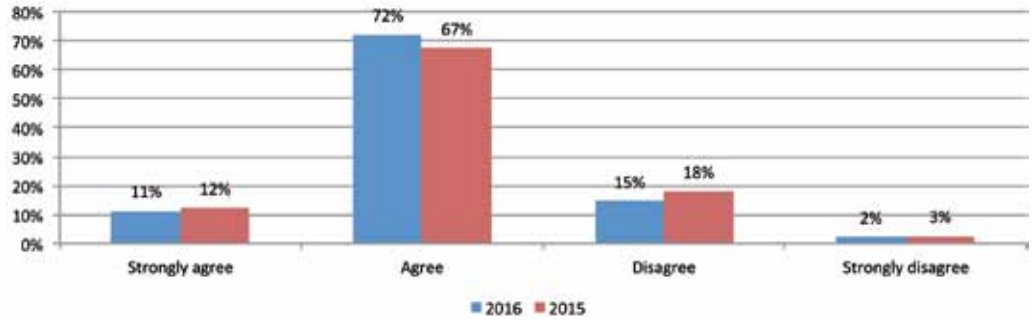
These results are in line with a rich academic background. Indeed, as demonstrated by Kan and Zhou (2007), Tu and Zhou (2011), and Amenc et al., (2012b), combining the different weighting schemes helps to diversify away unrewarded risks and parameter estimation errors. Stock-specific risk (such as management decisions, product success, etc.) is reduced through the use of a suitable diversification strategy. However, due to imperfections in the model, residual exposures to unrewarded strategy-specific risks remain. For example, Minimum Volatility portfolios are often exposed to significant sector biases. Similarly, in spite of all the attention paid to the quality of model selection and the implementation methods for these models, the specific operational risk remains present to a certain extent. The robustness of the Maximum Sharpe Ratio scheme depends on a good estimation

Exhibit 4.33: Do you think smart beta indices require full transparency on methodology and risk analytics?
This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded. We also displayed 2015 results to show the evolution of results between the two years.



4. Results

Exhibit 4.34: Do you think that diversification across several weighting methodologies allows risk to be reduced and adds value? This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded. We also displayed 2015 results to show the evolution of results between the two years.



of the covariance matrix and expected returns. The parameter estimation errors of optimised portfolio strategies are not perfectly correlated and therefore have potential to be diversified away (Kan and Zhou, 2007; Amenc et al., 2012b). A Diversified Multi-Strategy approach,[59] which combines the five different weighting schemes in equal proportion, enables the non-rewarded risks associated with each of the weighting schemes to be diversified away.

In conclusion, respondents show great interest in products based on smart beta indices as they see them as providing potential improvement in their investment, and this interest is still growing (or is at least remaining at comparable high levels), as shown by a comparison with the results of last year. In addition, they have major concerns about the quality of these products, as 89% of them think that smart beta indices require full transparency on methodology and risk analytics.

4.2.3. Information about smart beta strategies

We then asked respondents about the information they consider important to assess smart beta. At the same time, respondents were asked whether they considered this information easily available (see Exhibit 4.35). It is thus interesting to see the spread between the importance of and the accessibility to this information. It appears that the highest spread is observed for information respondents considered as crucial. For example, data-mining risk and information about transparency on portfolio holdings over a back-test period are two crucial pieces of information for respondents, with scores of 3.59 and 3.57, respectively. Data-mining risk is also the information that appears to be the most difficult to obtain for respondents, with a score of 2.06, while information about transparency on portfolio holdings over a back-test period is among the three most difficult pieces of information to obtain, with a score of 2.39. Even relatively basic information such as the index construction methodology is not judged to be easily available (score of 3.14) relative to its importance (score of 3.85). On the contrary, information about recent performance and risk over the past ten years is among the least important for respondents with a score of 3.07, but it is also one of the most easily available, exhibiting one of the highest scores (3.12) across the board in terms of availability.

59 - Diversified Multi-Strategy weighting is an equal weighted combination of the following five weighting schemes – Maximum Deconcentration, Diversified Risk-Weighted, Maximum Decorrelation, Efficient Minimum Volatility and Efficient Maximum Sharpe Ratio (Lodh and Sivasubramanian, 2015).

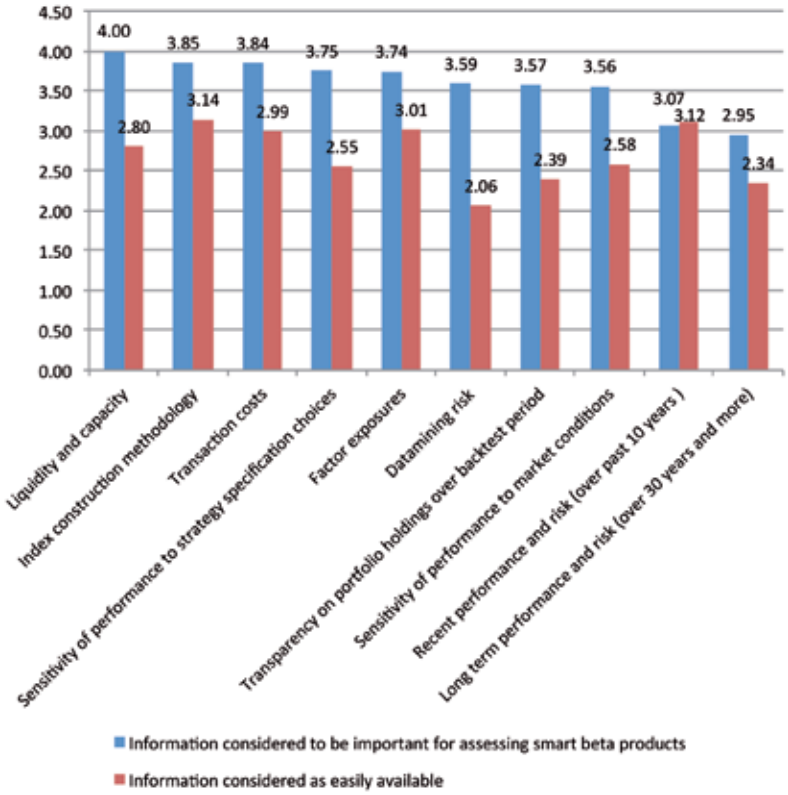
4. Results

The gap between information importance and its accessibility as seen by investors is displayed in Exhibit 4.36.

It is interesting to note that, compared to last year, the gap between information importance and its accessibility is perceived as narrower for most of the information. However, there are three exceptions to that, namely liquidity and capacity, transaction costs and long-term performance and risk, for which respondents perceive a wider gap than last year. There are in particular two kind of information for which respondents perceive a considerable improvement between the importance of information and its accessibility, compared to last year. These are transparency on portfolio holdings over the back-test period and index construction methodology.

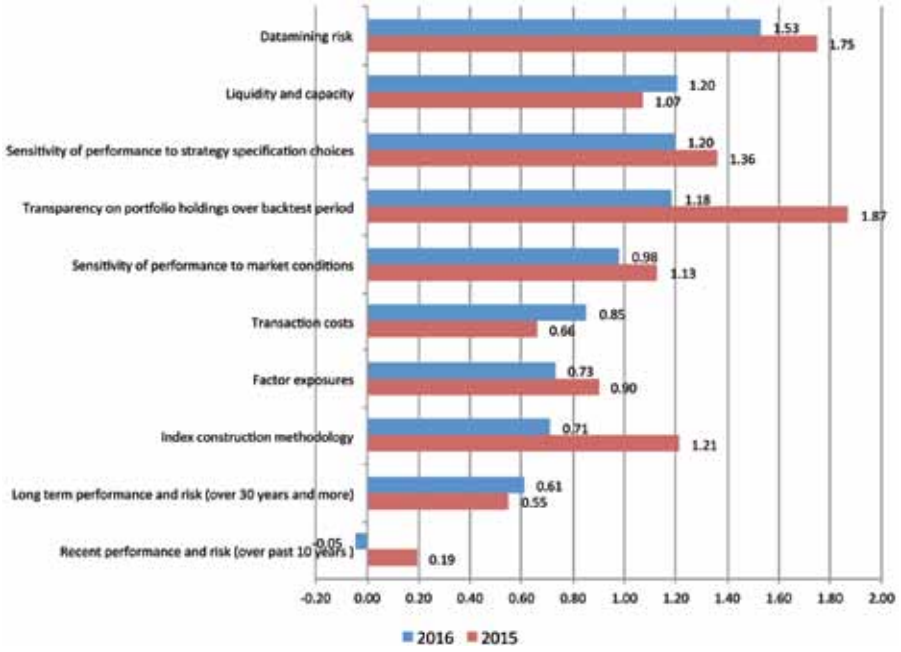
The fact that information that is regarded as important is not considered to be easily available clearly calls into question the information provision practices of smart beta providers. In fact, the only area in which no pronounced gap exists between the importance and the ease of accessibility scores is for performance numbers. Performance and risk information is judged to be moderately easily available and moderately important. All other areas show pronounced gaps between these two metrics. Two of the three items that are judged to be the least easily available are holdings over the back-test period and data-mining risks. Interestingly, both

Exhibit 4.35: Information about Beta Products
This exhibit indicates the information respondents consider important for assessing smart beta products on a scale from 0 (not important) to 5 (crucial) and which information they consider to be easily available on a scale from 0 (difficult to obtain) to 5 (easy to obtain).



4. Results

Exhibit 4.36: Gap between information importance and its accessibility
This exhibit indicates the gap between information importance and its accessibility according to investors. We also displayed 2015 results to show the evolution of results between the two years.



these items rank much higher on the importance score for investors than, for example, past performance. Moreover, there is a pronounced gap of 0.89 between importance of information items and their ease of accessibility, as shown by the means of their respective scores (3.59 and 2.70, respectively). Overall, although there has been some development compared to last year, these results suggest that there is still room for further improvement, as investors still do not believe that information considered important for assessing smart beta strategies is made available to them with sufficient ease.

4.2.4. The importance of factors as performance drivers

The last group of questions of this section of the survey was related to the factors inherent in equity strategies and how these factors explained the performance of these strategies.

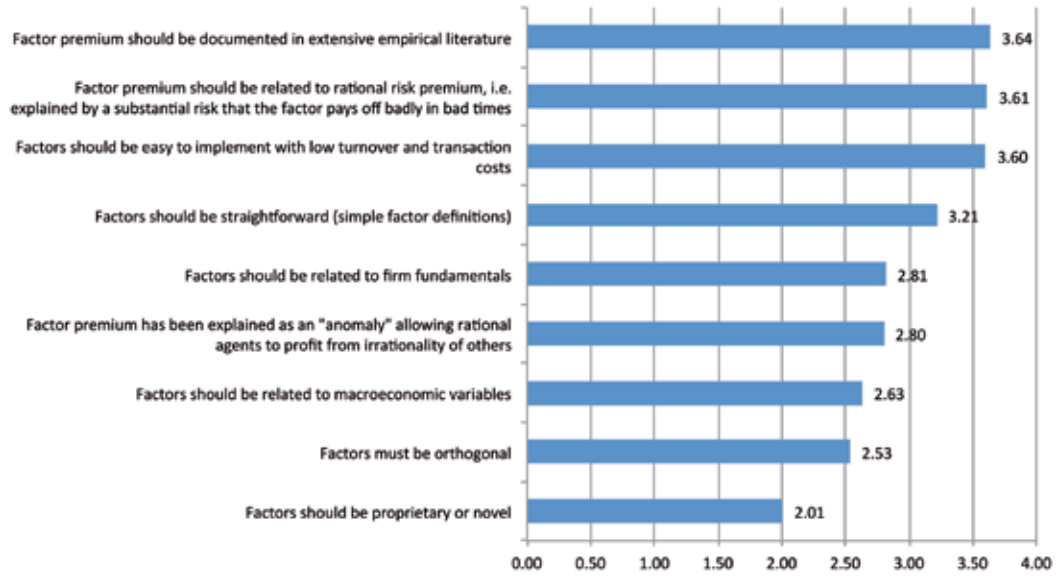
Respondents were more specifically asked about their requirements to consider the selection of a given set of factors in their investment approach. They were proposed to rate a list of factor characteristics from 0 (if the assertion was not important) to 5 (if it was absolutely crucial). The results are displayed in Exhibit 4.37. It appears that (with the exception of one of the two new propositions introduced this year, namely factors should be proprietary or novel) all the other proposed characteristics receive quite high scores, ranging from 2.53 to 3.64. However, respondents are primarily concerned with the existence of extensive empirical literature documented factor premium, with a score of 3.64, closely followed by the existence of a rational risk premium with a score of 3.61, as well as by ease of implementation and low turnover and transaction costs, with a score of 3.60. The least important requirement for them is that factors should be proprietary or novel, with a score of 2.01.

4. Results

From the results it appears that the existence of a rational explanation for factor risk premia is of principal importance to investors. This is probably related to the fact that a rational explanation suggests that the premium will be persistent. Indeed, if the literature interprets the factor premia as compensation for risk, the existence of the factor premia could also be explained by investors making systematic errors due to behavioural biases such as over- or under-reactions to news on a stock. However, whether such behavioural biases can persistently affect asset prices in the presence of some smart investors who do not suffer from these biases is a point of contention. In fact, even if the average investor makes systematic errors due to behavioural biases, it could still be possible that some rational investors who are not subject to such biases exploit any small opportunity resulting from the irrationality of the average investor. The trading activity of such smart investors may then make the return opportunities disappear. Therefore, behavioural explanations of persistent factor premia often introduce so-called "limits to arbitrage", which prevent smart investors from fully exploiting the opportunities arising from the irrational behaviour of other investors. The most commonly mentioned limits to arbitrage are short-sale constraints and funding-liquidity constraints. The main economic explanations for the value, momentum, low volatility and small cap factors are detailed in Amenc et al. (2014), and those of high profitability and investment feature in Amenc et al. (2015).

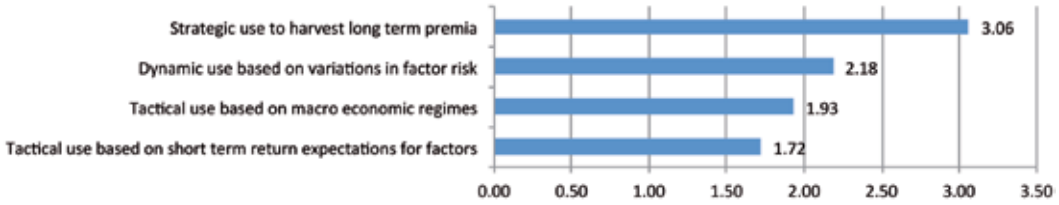
To conclude this sub-section about factors, respondents were asked about the kinds of uses they make of smart beta / factor-based exposures. They were proposed to rate a list of propositions from 0 (if they do not have this use of smart beta / factor-based exposures) to 5 (if this use of smart beta / factor-based exposures was highly frequent). The results are displayed in Exhibit 4.38. It appears that, the most frequent use respondents have for smart

Exhibit 4.37: Requirements about Factors
This exhibit indicates the requirements respondents have in order to consider a given set of factors in their investment approach on a scale from 0 (not important) to 5 (absolutely crucial).



4. Results

Exhibit 4.38: Use of smart beta / factor-based exposures
This exhibit indicates the use respondents make of smart beta / factor-based exposures on a scale from 0 (no use) to 5 (highly frequent use).

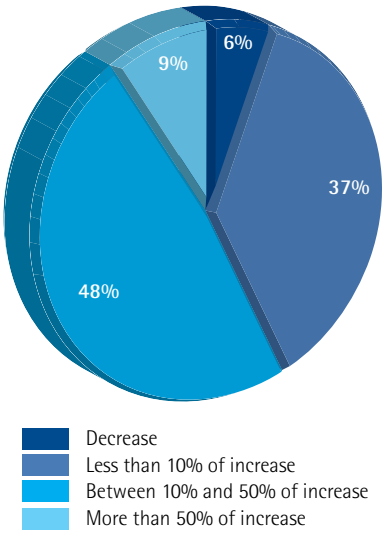


beta / factor-based exposures is a strategic use to harvest long-term premia, with a score of 3.06. Other uses are less frequent, such as dynamic use based on variations in factor risk (2.18), tactical use based on macroeconomic regimes (1.93) and tactical use based on short-term return expectations for factors (1.72).

4.2.5. Future developments for smart beta strategies

Finally, the last group of questions in the smart beta survey sections were dedicated to future perspectives and additional requirements for smart beta strategies. First, respondents were asked whether or not they planned to increase their investment in smart beta or factor-based products in the near future. The results are displayed in Exhibit 4.39. It appears that a vast majority of respondents (94%) plan to increase their investment in smart beta products over the next three years, while only 6% of them plan to decrease it. Among those who planned to increase their investment, more than a third (37%) only planned a moderate increase of less than 10%. Alternatively, almost half of them (48%) considered a more substantial increase of between 10% and 50%, while only 9% of respondents thought of increasing their investment in smart beta strategies by more than 50%.

Exhibit 4.39: Evolution planned for the use of smart beta / factor-based investment products in terms of assets over the near future
This exhibit indicates whether respondents plan to increase or decrease their use of smart beta / factor-based investment products (in terms of assets) over the next 3 years. Non-responses are excluded.



These results indicate that the investment in smart beta will increase in the coming years, not only in number of investors, as shown by the results in Exhibit 4.23, but also in terms of assets for each investor, which is not surprising as the current share of investment dedicated to smart beta strategies is relatively restricted for a majority of respondents, as shown in Exhibit 4.24.

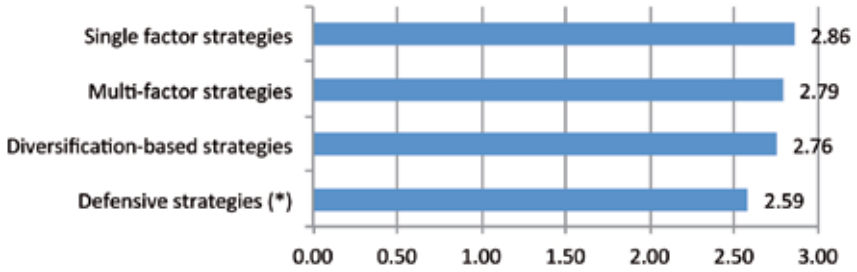
Respondents were then asked to detail the strategies they plan to use in the future. They were proposed to rate a list of strategies from 0 (if they did not

4. Results

plan to use it in the future) to 5 (if they planned to use it very frequently). The results are displayed in Exhibit 4.40. It appears that the average scores obtained for the four strategies were quite high and lay in a very narrow spread, from 2.59 for defensive strategies to 2.86 for single-factor strategies. Between the two, multi-factor strategies obtained a score of 2.79 for future perspective of investment, while diversification-based strategies obtained a quite similar score of 2.76. It therefore appears that respondents are aiming to diversify their new investment in smart beta strategies across the different categories of strategies even though single- and multi-factor strategies, which are the most familiar to investors, exhibit a very slight advantage in terms of future use.

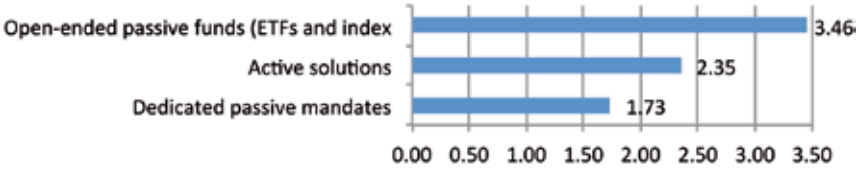
As respondents already investing in smart beta strategies were asked to detail the wrapper they use to invest in smart beta strategies (see Exhibit 4.26), all respondents were asked about the wrapper they planned to use in the future to invest in smart beta strategies. The results are displayed in Exhibit 4.41. Not surprisingly, the wrapper already used by a majority (64%) of respondents, namely open-ended passive funds (ETFs and index funds) is also the wrapper respondents plan to use the most frequently in the future, with a score of 3.46. The other two categories of wrapper are far behind. Active solutions, which obtain the second score for future uses, with 2.35, were also in the second position among the wrappers already used by respondents. Finally, dedicated passive mandates obtain the lowest score of 1.73 for futures uses, consistent with the lowest share of 26% of respondents using them, among those who already invest in smart beta products.

Exhibit 4.40: Strategies planned to be used in the future to invest in smart beta
This exhibit indicates the categories of strategies respondents plan to use in the future to invest in smart beta on a scale from 0 (never use) to 5 (use very frequently). More than one response could be given. Non-responses are excluded.



(*) e.g. Minimum or low volatility strategies

Exhibit 4.41: Wrapper planed to be used in the future to invest in Smart Beta Solutions
This exhibit indicates the categories of wrapper respondents plan to use in the future to invest in smart beta strategies on a scale from 0 (never use) to 5 (use very frequently). More than one response could be given. Non-responses are excluded.



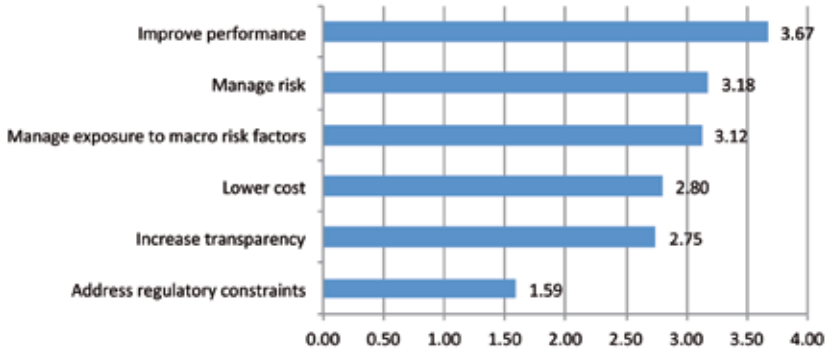
4. Results

Respondents were then asked about their key motivations to use smart beta strategies in the portfolio. They were proposed to rate a list of motivations from 0 (no motivation), to 5 (strong motivation). The results are displayed in Exhibit 4.42. Above all, to improve performance was the first motivation given by respondents to invest in smart beta strategies, with a score of 3.67. Managing risk and Managing exposure to macro risk factors followed closely with scores in the same range (3.18 and 3.12, respectively). The motivations that ranked fourth and fifth were to lower costs and to increase transparency, with scores of 2.80 and 2.75, respectively. Finally, far behind the others, the least pressing motivation for investors to use smart beta strategies was to address regulatory constraints, with a score of 1.59.

It is not surprising that among the motivations to invest in smart beta strategies, improvement of performance, obtains such a high score. Smart beta indices appear to be an alternative to investment in cap-weighted indices which provides poor performance. Early papers by Haugen and Baker (1991) or Grinold (1992) provide empirical evidence that market-cap-weighted indices provide an inefficient risk/return trade-off. From the theoretical standpoint, the poor risk-adjusted performance of such indices should come as no surprise, as market-cap-weighting schemes are risk/return efficient only at the cost of heroic assumptions. An extensive body of literature has shown that the theoretical prediction of an efficient market portfolio breaks down when some of the highly unrealistic assumptions of the CAPM do not bear out. Smart beta strategies, whose goal is to improve index efficiency, are therefore promising in terms of performance (see Amenc, Goltz, Martellini and Retkowsky, 2010). For similar reasons, respondents perceive the management of risk as better addressed with smart beta strategies.

The answers to this question are consistent with those provided in Section 4.2.2, where 75% respondents agreed that smart beta indices provide significant potential to outperform cap-weighted indices in the long term, 89% of them agreed that smart beta indices allowed factor risk premia such as value and small cap to be captured, and 83% of them agreed that diversification across several weighting methodologies allowed risk to be reduced and added value.

Exhibit 4.42: Key motivations to use smart beta strategies in the portfolio
This exhibit indicates the key motivations to use smart beta strategies in the portfolio on a scale from 0 (no motivation) to 5 (strong motivation). More than one response could be given. Non-responses are excluded.



4. Results

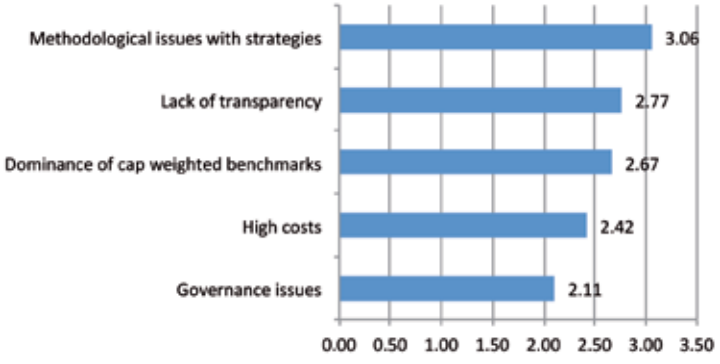
Respondents were also free to give additional motivations for using smart beta strategies in the portfolio. 9 respondents (constituting about 4% of the sample) made contributions. The main arguments they gave were to satisfy client demand and to obtain a better/risk return trade-off. One respondent also mentioned the wholesale acceptance of the utility and reliability of smart beta strategies by the academic community.

Respondents were also asked about the major hurdles that prevent them from increase their use of smart beta strategies. They were proposed to rate a list of hurdles from 0 (no hurdle), to 5 (significant hurdle). The results are displayed in Exhibit 4.43. The major hurdle appears to be the methodological issues with strategies, with a quite high score of 3.06. The lack of transparency and the dominance of cap-weighted benchmarks followed closely with a score of 2.77 and 2.67, respectively. Finally, at the bottom of the list of hurdles, respondents give a score of 2.42 to high costs and 2.11 to governance issues. We note that none of the hurdles obtained a low score.

The fact that methodological issues and lack of transparency are the two major hurdles mentioned by investors that prevent them from using smart beta strategies is to be put in perspective with the results shown in Exhibit 4.33, where 89% of respondents declared that smart beta indices required full transparency on methodology and risk analytics. Respondents are not fully satisfied with the level of transparency offered by existing smart beta products and still see room for improvement. The dominance of cap-weighted indices is the third major hurdle that prevents respondents from increasing their use of smart beta strategies. This is a problem that is often denounced (see e.g. Arnott et al., 2010). Cap-weighted indices are still considered as the reference benchmark and it may be difficult to change this thinking.

Respondents were also free to detail additional hurdles that prevent them for increasing their investment in smart beta strategies. 25 respondents (constituting about 12% of the sample) made contributions. The main arguments they give were related to the difficulty in communicating with their clients

Exhibit 4.43: Major hurdles to increase your use of smart beta strategies in the portfolio
This exhibit indicates the major hurdles to increase the use of smart beta strategies in the portfolio on a scale from 0 (no hurdle) to 5 (significant hurdle). More than one response could be given. Non-responses are excluded.



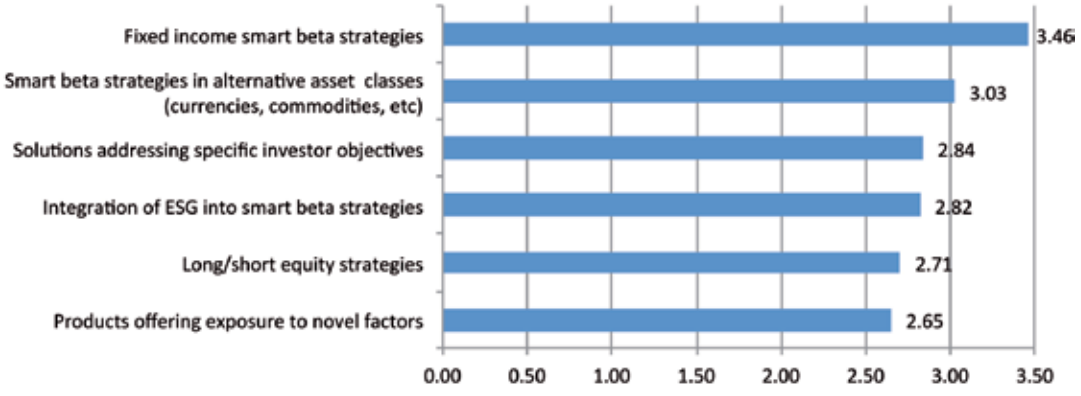
4. Results

about these strategies, due to a lack of consensus between providers when describing their strategies. The difficulty to explain the concept was not restricted to communication with clients, but was also to be found in communication with board members. So, some respondents think that the improved performance they may obtain from smart beta strategies is not worth the effort. Some respondents gave more precisions about the methodological issues they encountered with smart beta strategies. Others highlighted the lack of products in the sectors they want to invest in, given that the majority of smart beta products are equity-related. Lastly, some of them think that the performance of a specific smart beta strategy may decrease if too many investors flock to it.

Finally, respondents were asked about the solutions they think required further product development from providers. They were proposed to rate a list of solutions from 0 (not required), to 5 (strong priority). The results are displayed in Exhibit 4.44. It appears that all the propositions obtained quite a high score, as scores ranged from 2.65 to 3.46. Among those, respondents identified the development of fixed income smart beta strategies to be a priority, with a score of 3.46. Smart beta strategies in alternative asset classes (currencies, commodities, etc.) closely followed with a score of 3.03. The other proposals followed fairly closely with a score of 2.84 for solutions addressing specific investor objectives, and a score of 2.82 for integration of ESG into smart beta strategies. Long/short equity strategies and products offering exposure to novel factors obtained scores of 2.71 and 2.65, respectively.

It is not surprising that respondents require further development in the area of fixed income and in alternative asset classes, as smart beta strategies were first developed for equity investment. There is consequently still a lack of products in when it comes to other asset classes and this is particularly acute for the fixed income asset class, which is largely used by investors. It also appears that respondents would like more customised solutions to be developed, in order to be consistent with specific investor objectives. It is likely that the development of new products corresponding to these demands may lead to an even wider adoption of smart beta solutions.

Exhibit 4.44: Which type of solutions do you think require further product development from providers?
This exhibit indicates the types of solutions requiring further products developments from providers on a scale from 0 (not required) to 5 (strong priority). More than one response could be given. Non-responses are excluded.



4. Results

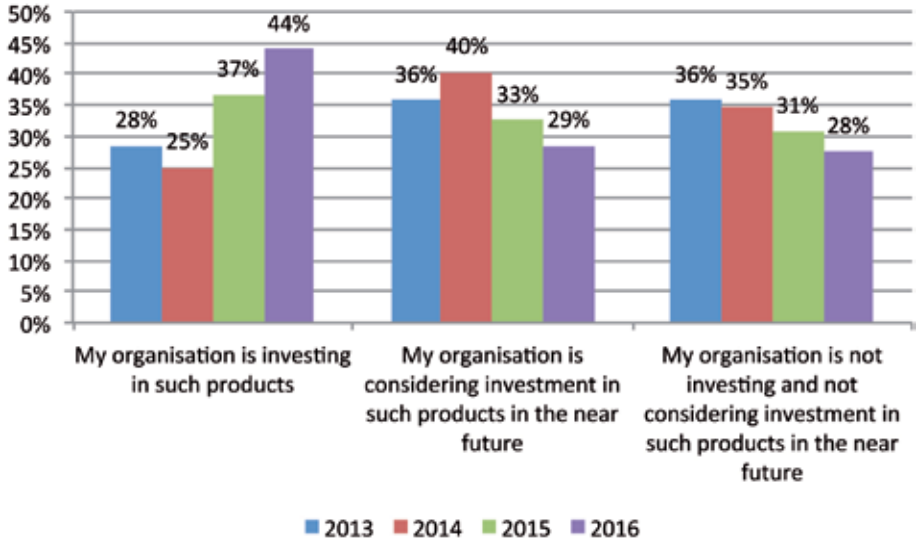
4.2.6. Trends: use of and satisfaction with smart beta strategies over time

Over the recent years, smart beta strategies have undergone considerable development and are increasingly used by investors, as shown in the present survey. As most of the questions presented in this section were first introduced this year, the comparison of results obtained over the last four years will mainly focus on the perception respondents have of smart beta indices.

Exhibit 4.45 shows an increasing trend in the number of smart beta product investors. Since 2013, the increase has been more than 50%. From one year to another, we also see that the cumulative percentages of those who are already investing in smart beta products and those who are considering investment in such products in the near future has been constantly increasing from 64% in 2013, to 73% in 2016, showing a constant decline in the proportion of respondents who are not considering investment in such products in the near future.

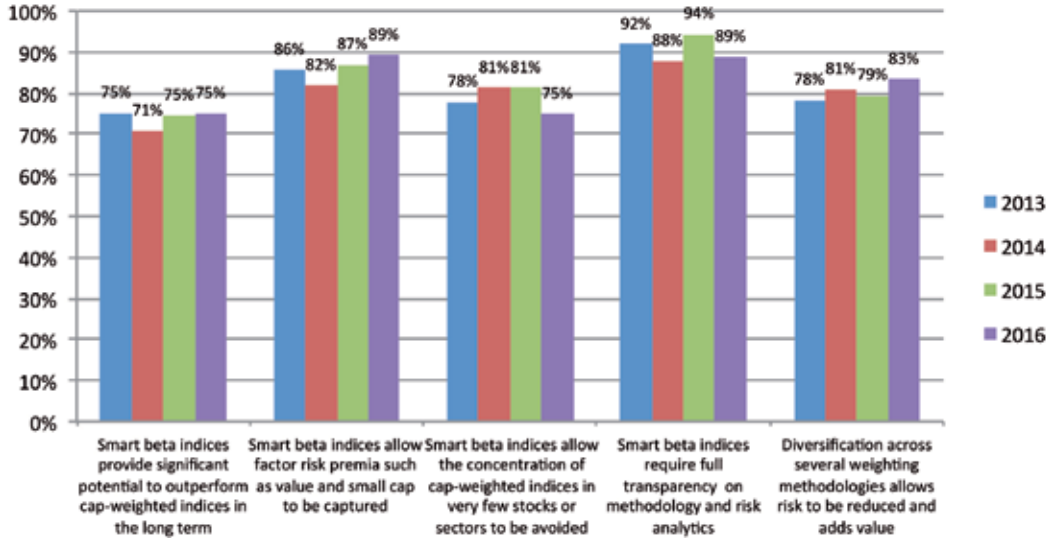
Exhibit 4.46 summarises the opinions of respondents invited to comment on the distinctive characteristics of smart beta indices compared to the cap-weighted indices over four years. It appears that as soon as 2013, a vast majority of respondents (at least three-quarters of them) were already convinced of the advantages smart beta indices provide in terms of performance gains, index deconcentration and risk reduction, compared to cap-weighted indices. We therefore do not observe a dramatic increase over the four years in the proportion of respondents who have a favourable opinion of smart beta index characteristics, since very high proportions of respondents had already identified the advantage of smart beta indices since they were first included in the survey. This favourable opinion was confirmed in the following years, even slightly progressing with regard to the opinion that smart beta indices allow factor risk premia such as value and small cap to be captured (86% of respondents agreed with it in 2013, versus 89% in 2016) and with regard to

Exhibit 4.45: Use of products that track Smart Beta indices
This exhibit indicates the percentages of respondents that reported using products that track smart beta indices. Non-responses are excluded. The percentages for 2013 to 2015 are based on the results of the EDHEC ETF survey from 2013 to 2015.



4. Results

Exhibit 4.46: Agreement of respondents with statements about smart beta indices
This exhibit indicates the percentage of respondents that agree or strongly agree with the statement about smart beta indices. Non-responses are excluded. The percentages for 2013 to 2015 are based on the results of the EDHEC ETF survey from 2013 to 2015.



the opinion that diversification across several weighting methodologies allowed risk to be reduced and added value (78% of respondents agreeing with it in 2013, versus 83% in 2016).

Respondents also have requirements concerning smart beta indices. Since 2013, about 90% of them think that smart beta indices require full transparency on methodology and risk analytics. While slight variations around this value have been observed over the years, there is still a large consensus among investors about this requirement, indicating that respondents are still not satisfied with the current level of smart beta index transparency. Transparency is not only the best protection against the risks arising from conflicts of interests, but it is also instrumental in improving the informational efficiency of the indexing industry. In view of the increased diversification and sophistication of the rapidly growing indexing industry, achieving informational efficiency should be a key priority. While transparency is important for market indices (i.e. indices that aim to represent a given market or segment), it is all the more so for smart beta indices. Indeed, while these new forms of indices can provide investors with improved risk-reward profiles or other benefits, they bring distinct risks of their own. Unfortunately, these indices' low level of transparency, which is routinely justified by the use of proprietary models, makes the evaluation of risks difficult.

4. Results

References

References

- Acharya, V. and L. Pedersen. 2005. Asset Pricing with Liquidity Risk. *Journal of Financial Economics* 77: 375-410.
- Ackert, L. F. and Y. S. Tian. 2000. Arbitrage and Valuation in the Markets for Standard & Poor's. Depositary Receipts. *Financial Management* 29: 71:88.
- Agapova, A. 2011. Conventional Mutual Index Funds versus Exchange Traded Funds. *Journal of Financial Markets* 14(2): 323-343.
- Agarwal, V., P. Hanouna, R. Moussawi, and C. Stahel. 2016. Do ETFs Increase the Commonality in Liquidity of Underlying Stocks? Working paper, Villanova University.
- Agrrawal, P. and J. Clark. 2009. Determinants of ETF Liquidity in the Secondary Market: A Five-factor Ranking Algorithm. ETFs and Indexing 1: 59-66.
- Amenc, N. and F. Ducoulombier. 2014. Index Transparency – A Survey of European Investors' Perceptions, Needs and Expectations. EDHEC-Risk Institute Publication (March).
- Amenc, N., F. Ducoulombier, F. Goltz, A. Lodh and S. Sivasubramanian. 2016. Diversified Or Concentrated Factor Tilts? *Journal of Portfolio Management* 42(2): 64-76.
- Amenc, N., F. Ducoulombier, F. Goltz and L. Tang. 2012a. What are the Risks of European ETFs? EDHEC-Risk Institute Position Paper.
- Amenc, N., F. Ducoulombier and A. Lodh. 2016. ERI Scientific Beta Defensive Strategies: Bringing Diversification to, and Going Beyond, Traditional Approaches. ERI Scientific Beta White Paper (March).
- Amenc, N., F. Goltz, K. Gautam and S. Sivasubramanian. 2015. The Dimension of Quality Investing/ High Profitability and Low Investment Smart Factor Indices. Scientific Beta White Paper (November).
- Amenc, N., F. Goltz, K. Gautam and S. Sivasubramanian. 2016. Concentrated versus Diversified. Alternatives for Implementing Factor Indices (forthcoming).
- Amenc, N., F. Goltz and V. Le Sourd. 2006. Assessing the Quality of Stock Market Indices: Requirements for Asset Allocation and Performance Measurement. EDHEC-Risk Institute.
- Amenc, N., F. Goltz and V. Le Sourd. 2009. The Performance of Characteristics-based Indices. *European Financial Management* 15(2): 241–278.
- Amenc, N., F. Goltz, V. Le Sourd, and A. Lodh. 2015a. Alternative Equity Beta Investing: A Survey. EDHEC-Risk Institute Publication (July).
- Amenc, N., F Goltz, and A. Lodh. 2012. Choose Your Betas: Benchmarking Alternative Equity Index Strategies. *Journal of Portfolio Management* 39(1): 88-111
- Amenc N., F. Goltz, A. Lodh A. and L. Martellini. 2012b. Diversifying the Diversifiers and Tracking the Tracking Error: Outperforming Cap-Weighted Indices with Limited Risk of Underperformance. *Journal of Portfolio Management* 38 (3): 72-88.
- Amenc, N., F. Goltz, A. Lodh and L. Martellini. 2014. Scientific Beta Multi-strategy Factor Indices: Combining Factor Tilts and Improved Diversification. Scientific Beta White Paper.
- Amenc, N., F. Goltz and L. Martellini. 2013. Smart Beta 2.0. EDHEC-Risk Institute Position Paper.

References

- Amenc, N., F. Goltz, L. Martellini and P. Retkowsky. 2010. Efficient Indexation: An Alternative to Cap-Weighted Indices. EDHEC-Risk Institute Publication.
- Amery, P. 2008a. Money Market ETFs in Europe. IndexUniverse (21 July).
- Amery, P. 2008b. More on Counterparty Risk (Swap-Based ETFs). IndexUniverse (14 October).
- Amihud, Y. 2002. Illiquidity and Stock Returns: Cross-section and Time-series Effects. *Journal of Financial Markets* 5: 31-56.
- Ammann, M., S. Odoni and D. Oesch. 2012. An Alternative Three-Factor Model for International Markets: Evidence from the European Monetary Union. *Journal of Banking & Finance*. Elsevier, 36(7): 1857-1864.
- Amundi ETF. 2011. How the Bid/offer Spread of an ETF Breakdown? (May).
- Ang, A., R. Hodrick, Y. Xing and X. Zhang. 2006. The Cross-Section of Volatility and Expected Returns. *Journal of Finance* 61(1): 259-299.
- Ang, A., R. Hodrick, Y. Xing and X. Zhang. 2009. High Idiosyncratic Volatility and Low Returns: International and Further U.S. Evidence. *Journal of Financial Economics* 91: 1-23.
- Arnott, R. D., J. C. Hsu and P. Moore. 2005. Fundamental Indexation. *Financial Analysts Journal* 61(2): 83-99.
- Arnott, R. D., D. Chaves, J. Gunzberg, J. Hsu, and P. Tsui. 2014. Getting Smarter about Commodities. *Journal of Indexes* (November/December).
- Arnott, R., V. Kalesnik, P. Moghtader, and C. Scholl. 2010. Beyond Cap-weight. *Journal of Indexes* (January/February): 16-29.
- Asness, C. S. 2016. My Factor Philippic (June 22). Available at SSRN: http://ssrn.com/abstract=2799441
- Asness, C., T. Moskowitz, and L. H. Pedersen. 2013. Value and Momentum Everywhere. *Journal of Finance* 68(3): 929-985.
- Bailey, D. H., J. Borwein, M. López de Prado and Q.J. Zhu. 2014. Pseudo-Mathematics and Financial Charlatanism: The Effects of Backtest Over-fitting on Out-Of-Sample Performance. Notices of the AMS 61(5): 458.
- Baker, M., B. Bradley and R. Taliaferro. 2014. The Low-Risk Anomaly: A Decomposition into Micro and Macro Effects. *Financial Analysts Journal* 70(2): 43-58.
- Baker, M., B. Bradley and J. Wurgler. 2011. Benchmarks as Limits to Arbitrage: Understanding the Low Volatility Anomaly. *Financial Analysts Journal* 67(1): 1-15.
- Baker, L. Nardin and R. Haugen. 2012. Low Risk Stocks Outperform within all Observable Markets of the World. SSRN Working Paper.
- Bansal, V. K. and A. Somani. 2002. Exchange Traded Funds: Challenge to Traditional Mutual Funds. *Review of Business* 23(3): 40-44.
- Banz, R. W. 1981. The Relationship between Return and Market Value of Common Stocks. *Journal of Financial Economics* 6: 3-18.

References

- Barras, L., O. Scaillet, and R. Wermers. 2010. False Discoveries in Mutual Fund Performance: Measuring Luck in Estimated Alphas. *Journal of Finance* 65(1): 179-216.
- Basu, S. 1977. Investment Performance of Common Stocks in Relation to their Price-Earnings Ratios: A Test of the Efficient Market Hypothesis. *Journal of Finance* 12: 129-156.
- Ben-David, I., F. A. Franzoni, and R. Moussawi. 2016. Exchange Traded Funds (ETFs). Swiss Finance Institute Research Paper Series n°16-64 (forthcoming in the *Annual Review of Financial Economics* 9, 2017).
- Ben-David, I., F. A. Franzoni, and R. Moussawi. 2015. Do ETFs Increase Volatility? Working paper. Available at: https://www.sec.gov/comments/s7-11-15/s71115-1.pdf.
- Benz, C. 2011.Bogle: Investors have Tough Time with ETFs. Morningstar (October, 11). Available at www.morningstar.com.
- Black, F. 1972. Capital Market Equilibrium with Restricted Borrowing. *Journal of Business* 45(3): 444-455.
- Black, F. 1993. Beta and Return. *Journal of Portfolio Management* 20(1): 8-18.
- Black, F. M. Jensen and M. Scholes. 1972. The Capital Asset Pricing Model: Some Empirical Tests. Studies in the Theory of Capital Markets. Praeger Publishers Inc.
- BlackRock. 2016. BlackRock Global ETP Landscape – Industry Highlights (December).
- Blitz, D., J. Huij and L. Swinkels. 2012. The performance of European index funds and exchange-traded funds. *European Financial Management* 18(4): 649-662.
- Blitz, D. C. and P. Van Vliet. 2007. The Volatility Effect: Lower Risk without Lower Return. *Journal of Portfolio Management* 34(1): 102-13.
- Bonelli, M. 2015. Exchange Traded Funds: Toward a Tailored Selection Approach. Working Paper (April).
- Box, G. E. P. 1976. Science and Statistics. Journal of the American Statistical Association 71: 791–799.
- Broman, M. S. 2016. Liquidity, Style Investing and Excess Comovement of Exchange-Traded Fund Returns. *Journal of Financial Markets* 30: 27-53.
- Brunnermeier, M. K., S. Nagel and L. H. Pedersen. 2008. Carry trades and currency crashes. National Bureau of Economic Research (NBER) Working Paper No. 14473.
- Calamia, A., L. Deville, and F. Riva. 2013. Liquidity in European equity ETFs: What really matters? Working paper.
- Carhart, M. 1997. On Persistence in Mutual Fund Performance, *Journal of Finance* 52 (1): 57-82.
- Chan, L. K. C., J. Karceski and J. Lakonishok. 1999. On Portfolio Optimization: Forecasting Covariances and Choosing the Risk Model. *Review of Financial Studies* 12(5): 937–974.
- Chen, L. H., G.J. Jiang, D. Xu and T. Yao. 2012. Dissecting the Idiosyncratic Volatility Anomaly. SSRN Working Paper.

References

- Cheng, G. 2009. Interview with Deutsche Bank's Thorsten Michalika: How the world's first hedge fund ETF works. Daily Markets (26 April).
- Clarke, R., H. De Silva and S. Thorley. 2006. Minimum-Variance Portfolios in the US Equity Market. *Journal of Portfolio Management* 33(1): 10.
- Clarke, R., H. De Silva and S. Thorley. 2011. Minimum Variance Portfolio Composition. *Journal of Portfolio Management* 37(2): 31-45.
- Cochrane, J.H., 1999. Portfolio Advice for a Multifactor World. The Center for Research in Security Prices Working Paper, 491.
- Cochrane, J.H. 2005. Asset Pricing (Revised Edition). Princeton University Press.
- Cooper, M. J., H. Gulen and M. J. Schill. 2008. Asset Growth and the Cross Section of Stock Returns. *Journal of Finance* 63(4): 1609-1651.
- Cremers, M., M.A. Ferreira, P.P. Matos, and L.T. Starks. 2013. The Mutual Fund Industry Worldwide: Explicit and Closet Indexing, Fees, and Performance. Working paper.
- Da, Zhi, and S. Shive. 2016. Exchange Traded Funds and Asset Return Correlations. Working paper, Notre Dame University.
- DeMiguel, V., L. Garlappi, F. Nogales and R. Uppal. 2009. A Generalized Approach to Portfolio Optimization: Improving Performance by Constraining Portfolio Norms. *Management Science* 55(5):798-812.
- Deutsche Bank. 2010. Fixed-income ETFs (September).
- Deutsche Bank. 2016. *European Monthly ETF Market Review* (9 December).
- Dickson, J. and J. Shoven. 1995. Taxation and mutual funds: An investors' perspective. In J. Poterba (ed.). *Tax policy and the economy* 9. Cambridge: MIT Press: 151-181.
- Dickson, J., J. Shoven and C. Sialm. 2000. Tax externalities of equity mutual funds. *National Tax Journal* 53 (2): 608-627.
- Dolvin, S. 2010. S&P ETFs: Arbitrage opportunities and market forecasting. *Journal of Index Investing* 1(1): 107-116.
- Drenovak, M., B. Uroševic and R. Jelic. 2010. European bond ETFs: Tracking errors and sovereign debt crisis. Working paper.
- Dunsby, A. and K. Nelson. 2010. A Brief History of Commodities Indexes. *Journal of Indexes* (May/June).
- Engle, R. and D. Sarkar. 2006. Premiums-discounts and exchange-traded funds. *Journal of Derivatives* 13 (4): 27-45.
- ETFGI. 2016. ETFGI monthly newsletter December 2016. Available at www.etfgi.com.
- ETFGI. 2017. ETFGI monthly newsletter January 2017. Available at www.etfgi.com.
- European Securities and Markets Authority. 2011. ESMA's discussion paper on guidelines for UCITS exchange-traded funds and structured UCITS.
- Fama, E., 1996. Multifactor Portfolio Efficiency and Multifactor Asset Pricing. *Journal of Financial and Quantitative Analysis* 31(4): 441-465.

References

- Fama, E. and K. French. 1992. The cross section of expected stock returns. *Journal of Finance* 47(2): 427-65.
- Fama, E. and K. French. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33(1): 3-56.
- Fama, E.F. and K.R. French. 2004. The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspectives* 18(3): 25-46.
- Fama, E. and K. French. 2010. Luck versus Skill in the Cross Section of Mutual Fund Returns. *Journal of Finance* 65(5): 1915-1947.
- Fama, E. F. and K. R. French. 2012. Size, Value, and Momentum in International Stock Returns. *Journal of Financial Economics* 105: 457-472.
- Fama, E. F. and K. R. French. 2014. A Five-Factor Asset Pricing Model. Working Paper.
- Feldman, R. 2006. Not all commodity indexes are created equal (part one of a two part series). Investor solutions.
- Frazzini, A., R. Israel and T. Moskowitz. 2012. Trading Costs of Asset Pricing Anomalies. Working paper.
- Frazzini, A. and L. H. Pedersen. 2014. Betting Against Beta. *Journal of Financial Economics* 111 (1): 1-25.
- French, K. 2008. The Cost of Active Investing. National Bureau of Economic Research (NBER)
- Friend, I. and M. Blume. 1970. Measurement of Portfolio Performance under Uncertainty. *American Economic Review* 60(4): 561-575.
- FTSE Russell. 2015a. Factor Exposure Indices – Value Factor. Available at: http://www.ftse.com/products/downloads/FTSE_Value_Factor_Paper.pdf. Accessed on 1 July 2015.
- FTSE Russell. 2015b. Factor Exposure Indices – Momentum Factor. Available at: http://www.ftse.com/products/downloads/FTSE_Momentum_Factor_Paper.pdf. Accessed on 1 July 2015.
- Fuertes, A. M, J. Miffre, and A. Fernandez-Perez. 2013. Commodity Strategies Based on Momentum, Term Structure and Idiosyncratic Volatility. Working paper.
- Fuhr, D. and S. Kelly. 2009. ETF landscape industry review year end 2009. BlackRock.
- Fuhr, D. and S. Kelly. 2011. ETF landscape industry review May 2011. BlackRock.
- Garcia-Zarate, J. 2017. Why Passive Funds are Growing in Popularity. *Morningstar* (February).
- Gastineau, G. 2001. Exchange-traded funds: An introduction. *Journal of Portfolio Management* 27: 88-96.
- Giannotti, T, and F. Maciver. 2016. Distribution Transition. Fund Buyer Focus. Available at: http://fundbuyerfocus.com/2016/02/941/
- Glosten, L., S. Nallareddy, and Y. Zou. 2016. ETF Trading and Informational Efficiency of Underlying Securities. Working paper, Duke University.

References

- Goltz, F., R. Guobenzaite and L. Martellini. 2011. Introducing a New Form of Volatility Index: The Cross-Sectional Volatility Index. EDHEC-Risk Institute Publication.
- Goltz, F. and V. Le Sourd. 2011. Does Finance Theory Make the Case for Capitalization-Weighted Indices? *Journal of Index Investing* 2(2): 59-75.
- Goltz, F., L. Martellini and M. Vaissié. 2007. Hedge fund indices: Reconciling Investability and Representativity. *European Financial Management* 13 (2): 257-286.
- Goltz, F. and S. Stoyanov. 2012. The Risks of Volatility ETNs: A Recent Incident and Underlying Issues. EDHEC-Risk Institute Publication.
- Grinold, R. 1992. Are Benchmark Portfolios Efficient? *Journal of Portfolio Management* 19(1): 34-40.
- Guedj, I. and J. Huang. 2008. Are ETFs replacing index mutual funds? University of Texas at Austin Working Paper.
- Hamelink, F., H. Harasty and P. Hillion. 2001. Country sector or style: What matters most when constructing global equity portfolios? An empirical investigation from 1990-2001. Working paper, FAME.
- Hamm, S. J. W. 2014. The Effects of ETFs on Stock Liquidity. Working paper, Ohio State University. Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1687914.
- Harvey, C. R., Y. Liu, and H. Zhu. 2015. ...and the Cross-Section of Expected Returns. Working paper.
- Harvey, C. R, and Y. Liu. 2015. Lucky Factors. Working paper
- Haugen, R.A. and N.L. Baker. 1991. The Efficient Market Inefficiency of Capitalization-Weighted Stock Portfolios. *Journal of Portfolio Management* 17(3): 35-40.
- Haugen, R.A. and A.J. Heins. 1972. On the Evidence Supporting the Existence of Risk Premiums in the Capital Market. Available at SSRN: http://ssrn.com/abstract=1783797.
- Haugen, R. A. and A.J. Heins. 1975. Risk and the Rate of Return on Financial Assets: Some Old Wine in New Bottles. *Journal of Financial and Quantitative Analysis* 10(5): 775.
- Heston, S. L., G. K. Rouwenhorst and R. Wessels. 1999. The Role of Beta and Size in the Cross-Section of European Stock Returns. *European Financial Management* 5(1): 9-27.
- Hill J. and S. Rattray. 2004. Volatility as a tradable asset: Using the VIX as a market signal, diversifier and for return enhancement. Equity Product Strategy, Goldman Sachs & Co.
- Hong, H.G. and D.A. Sraer. 2015. Speculative Betas. *Journal of Finance*, Forthcoming.
- Hou, K., L. Zhang and C. Xue. 2014. Digesting Anomalies: An Investment Approach, *Review of Financial Studies*, forthcoming.
- Hsu, J.C., H. Kudoh and T. Yamada. 2013. When Sell-Side Analysts Meet High-Volatility Stocks: An Alternative Explanation for the Low-Volatility Puzzle. *Journal of Investment Management* 11(2).
- Ibbotson Associates. 2002. Stocks, bonds, bills and inflation. 2002 yearbook. Chicago.

References

- Invesco PowerShares. 2015. The Evolution of Smart Beta ETFs. Gaining Traction in the Institutional Community. Available at: https://www.invesco.com/static/us/investors/contentdetail?contentId=818a00bb8885c410VgnVCM100000c2f1bf0aRCRD&dnsName=us.
- Israeli, D., C. M. C. Lee and S. Sridharan. 2016. Is there a Dark Side to Exchange Traded Funds (ETFs)? An Information Perspective. (Stanford University Graduate School of Business Research Paper n°15-42). Available at SSRN: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2625975.
- Jacob J. and E. Rasiel. 2009. Index volatility futures in asset allocation: A hedging framework. Lazard Investment Research.
- Jagannathan, R. and T. Ma. 2003. Risk Reduction in Large Portfolios: Why Imposing the Wrong Constraints Helps. *Journal of Finance* 58(4): 1651-1684.
- Jagerson, J. 2007. Currency ETFs simplify forex trades. Investopedia.
- Jares, T.E. and A.M. Lavin. 2004. Japan and Hong Kong exchange-traded funds (ETFs): Discounts, returns and trading strategies. *Journal of Financial Services Research* 25(1): 57-69.
- Jegadeesh, N. and S. Titman. 1993. Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *Journal of Finance* 48(1): 65-91.
- Johnson, M. 2009. Leveraged ETFs (still) under fire. ETF database (21 July).
- Johnson, M. 2010. Picking the right money market ETF. ETF database (28 January).
- Jorion, P., 1985. International Portfolio Diversification with Estimation Risk. *Journal of Business* 58(3): 259-278.
- Jurek, J. W. 2007. Crash-neutral currency carry trades. Working paper. Princeton University - Bendheim Center for Finance.
- Kalaycioglu, S. 2004. Exchange-traded fund flows. Working paper. University of Rochester.
- Kan, R. and G. Zhou. 2007. Optimal Portfolio Choice with Parameter Uncertainty. *Journal of Financial and Quantitative Analysis* 42(3): 621-656.
- Kogan, L. and M. Tian. 2015. Firm Characteristics and Empirical Factor Models: a Model-Mining Experiment. Working paper
- Kostovetsky, L. 2003. Index mutual funds and exchange-traded funds. *Journal of Portfolio Management* 29 (4): 80-92.
- Lodh, A. and S. Sivasubramanian. 2015. Scientific Beta Diversified Multi-Strategy Index. ERI Scientific Beta Publication (July).
- Longin, F. and B. Solnik. 1995. Is the Correlation in International Equity Returns Constant: 1960–1990? *Journal of International Money and Finance* 14(1): 3-26.
- Lyxor ETF Research. 2017. European Smart Beta ETF Market Trends. Q4 2016 in brief.
- Madhavan, A. 2016. Exchange-Traded Funds and the New Dynamics of Investing. Oxford University Press.

References

- Madhavan, A., U. Marchioni, W. Li, and D. Du. 2014. Equity ETFs vs. Index Futures: A Comparison for the Fully-Funded Investor. *Journal of Index Investing* 5 (2): 66-75.
- Madhavan, A., and A. Sobczyk. 2016. Price Dynamics and Liquidity of Exchange-Traded Funds. Forthcoming in the *Journal of Investment Management*.
- Maister, D., M. Schorr, D. Perlman and S. Minar. 2010. Exchange-traded funds: Average tracking error rose meaningfully in 2009. *Journal of Index Investing* 1(1): 132-162.
- Malevergne, Y., P. Santa Clara and D. Sornette. 2009. Professor Zipf Goes to Wall Street. National Bureau of Economic Research.
- Malkiel, B. G. 2013. Asset Management Fees and the Growth of Finance. *Journal of Economic Perspectives* 27(2): 97-108.
- Markowitz, H. 1952. Portfolio Selection. *Journal of Finance* 7(1): 77-91.
- Marshall, B., N. Nguyen and N. Visaltanachoti. 2012. ETF arbitrage: Intraday Evidence. Working Paper.
- Martellini, L. 2013. Understanding the Low Volatility Anomaly. EDHEC-Risk Institute Newsletter (May).
- McCall, M.D. 2011. McCall's call: Time for emerging bond ETFs. IndexUniverse (9 September).
- Merton, R. C. 1973. An Intertemporal Capital Asset Pricing Model. *Econometrica* 41(5): 867-887.
- Merton, R. 1980. On Estimating the Expected Return on the Market: an Exploratory Investigation. *Journal of Financial Economics* 8: 323-361.
- Miffre, J. 2006. Country-specific ETFs: An efficient approach to global asset allocation. Cass Business School Working Paper.
- Miller, M.H. and M. Scholes. 1972. Rates of Return in Relation to Risk: A Re-examination of Some Recent Findings. In: Studies in the Theory of Capital Markets. New York: Praeger Publishers Inc.
- Moran, M. 2003. Managing costs and risks with ETF tools. ETF and Indexing: 14-25.
- Morningstar. 2017. A Guided Tour of the European ETF Marketplace (February). Available at: http://media.morningstar.com/uk/MEDIA/ETF/AGuidedTouroftheEuropeanETFMarketplace2017.pdf.
- Mussavian, M. and J. Hirsch. 2002. European exchange-traded funds: An overview. *Journal of Alternative Investments* 5: 63-77.
- Novy-Marx, R. 2013. The Quality Dimension of Value Investing. Simon Graduate School of Business Working Paper.
- Novy-Marx, R. and M. Z. Velikov. 2014. A Taxonomy of Anomalies and their Trading Costs. Working paper.
- Osterland, A. 2015. Smart beta ... and stupid fund tricks. Available at: http://www.cnbc.com/2015/10/06/smart-beta-and-stupid-fund-tricks.html. (6 October).

References

- Petajisto, A. 2011. Inefficiencies in the Pricing of Exchange-Traded Funds. Working Paper.
- Pezier, J. 2008. The relative merits of alternative investments in passive portfolios. *Journal of Alternative Investments* 10 (4): 37-49.
- Poterba, J. M. and J. B. Shoven. 2002. Exchange-traded funds: A new investment option for taxable investors. *American Economic Review* 92 (2): 422-27.
- Revesz, R. 2017a. European Equity ETFs stage strong start to 2017. ETF Strategy (February).
- Revesz, R. 2017b. ETF trading volumes reaching new highs in US and Europe. ETF Strategy (February). Available at: https://www.etfstrategy.co.uk/etf-trading-volumes-reaching-new-highs-in-us-and-europe-15142/.
- Rompotis, G. 2008. Performance and trading characteristics of German passively managed ETFs. *International Research Journal of Finance and Economics* 15: 210-223.
- Rompotis, G. 2009. Performance and trading characteristics of iShares: An evaluation. *The ICFAI Journal of Applied Finance* 15(7): 24-39.
- Rompotis, G. 2010a. A survey on leveraged and inverse ETFs. Paper presented at the Annual Conference of HFAA. Lemesos, Cyprus. (17-18 December).
- Rompotis, G. 2010b. Active versus passive ETFs: An investigation of bid-Ask spread (10 March 2010). *The IUP Journal of Applied Finance* 16(3): 5-25.
- Rompotis, G. 2011. Active vs. Passive management: New evidence from exchange-traded funds. *International Review of Applied Financial Issues and Economics* 3(1): 169-186.
- Rosenberg B., K. Reid, and R. Lanstein. 1985. Persuasive Evidence of Market Inefficiency. *Journal of Portfolio Management*, 11: 9-17.
- Ross, S.A. 1976. The Arbitrage Theory of Capital Asset Pricing. *Journal of Economic Theory* 13: 341-360.
- Ross, S. 2016. How Big Is the Global ETF Market? (BLK, STT). Investopedia (July). Available at: http://www.investopedia.com/articles/etfs/071216/how-big-global-etf-market-blk-stt.asp.
- Rossi, G. 2012. Measuring the tracking error of exchange traded funds: an unobserved components approach, UBS.
- Rouwenhorst, G. K. 1998. International Momentum Strategies. *Journal of Finance* 53(1): 267-284.
- Schwartz, T. 2000. How to Beat the S&P500 with Portfolio Optimization. DePaul University. Working Paper.
- Shum, P. 2010. How passive are international ETFs? A study of their intraday behaviour. *Journal of Index Investing* 1(3): 74-74.
- Stambaugh, R.F., J. Yu and Y. Yuan. 2015. Arbitrage Asymmetry and the Idiosyncratic Volatility Puzzle. *Journal of Finance* 70(5): 1903-1948.
- Stock, H. J. 2006. The ETF explosion. Bank Investment Consultant 14 (5): 22-27.

References

- Stoll, H.R. 2000. Friction. *Journal of Finance* 55(4): 1479-1514.
- Szado, E. 2009. VIX, Futures and Options: A Case Study of Portfolio Diversification during the 2008 Financial Crisis. *Journal of Alternative Investments* 12(2): 68-85.
- Tabner, I. 2007. Benchmark Concentration: Capitalization Weights versus Equal Weights in the FTSE 100 Index. University of Stirling. Working Paper.
- Thirumalai, R. S. 2004. Active vs. passive ETFs. Kelley School of Business Working Paper. Indiana University, Bloomington.
- Tobin, J. 1958. Liquidity Preferences as Behavior towards Risk. *Review of Economic Studies* 25(2): 65-68.
- Tu, J. and G. Zhou. 2011. Markowitz meets Talmud: A Combination of Sophisticated and Naïve Diversification Strategies. *Journal of Financial Economics* 99(1): 204-215.
- Vardharaj, R. and F. J. Fabozzi. 2007. Sector, style, region: Explaining stock allocation performance. *Financial Analysts Journal* 63 (3): 59-70.
- Vardharaj, R., F. J. Fabozzi, and F. J. Jones. 2004. Determinants of tracking error for equity portfolios. *Journal of Investing* 13(2): 37-47.
- Watanabe, A., Y. Xu, T. Yao and T. Yu. 2013. The Asset Growth Effect: Insights from International Equity Markets, *Journal of Financial Economics* 108 (2), 529-563.
- Wermers, R., and J. Xue. 2015. Intraday ETF Trading and the Volatility of the Underlying. Working paper, University of Maryland, Study sponsored by Lyxor Asset Management.
- Whaley, R. 2008. Understanding VIX. Working Paper.
- Wurgler, J. 2011. On the Economic Consequences of the Growing Popularity of Index Trading. Working paper, New York University.
- Yousuf, H. 2011. Emerging market bonds take on safe haven status. CNN Money (2 September).
- Zweig, J. 2011. Why a Legendary Market Skeptic is Upbeat about Stocks. *Wall Street Journal* (September, 10).

References

About Amundi ETF, Indexing & Smart Beta

About Amundi ETF, Indexing & Smart Beta

Amundi is the largest European Asset Manager in terms of AUM, with over €1.1 trillion worldwide[1].

The Amundi ETF, Indexing and Smart Beta business line is one of the group's strategic business areas and totalizes more than 70 bn€ AuM[2].

Built on strong commitments on cost efficiency, innovation and transparency, the Amundi ETF platform ranks among the top-five European ETF providers with more than 100 ETFs and more than 500 listings across Europe[3].

On Indexing and Smart Beta, innovation and customization are at the core of the client-oriented approach. The objective is to provide investors with robust, flexible and highly cost efficient solutions, leveraging on Amundi pricing power and extensive resources, including first class research capabilities in SRI and Factor investing.

1 - Amundi figures as of 31 March 2017. No.1 European asset manager based on global assets under management (AUM) and the main headquarters being based in Continental Europe - Source IPE "Top 400 asset managers" published in June 2016 and based on AUM as at December 2015.
2 - Source: Amundi ETF, indexing & Smart Beta as of 31/03/2017
3 - Source: Deutsche Bank European Monthly ETF Market Review, March 2017.

About EDHEC-Risk Institute

About EDHEC-Risk Institute

Founded in 1906, EDHEC is one of the foremost international business schools. Accredited by the three main international academic organisations, EQUIS, AACSB, and Association of MBAs, EDHEC has for a number of years been pursuing a strategy of international excellence that led it to set up EDHEC-Risk Institute in 2001. This institute now boasts a team of close to 50 permanent professors, engineers and support staff, as well as 38 research associates from the financial industry and affiliate professors.

The Choice of Asset Allocation and Risk Management and the Need for Investment Solutions

EDHEC-Risk has structured all of its research work around asset allocation and risk management. This strategic choice is applied to all of the Institute's research programmes, whether they involve proposing new methods of strategic allocation, which integrate the alternative class; taking extreme risks into account in portfolio construction; studying the usefulness of derivatives in implementing asset-liability management approaches; or orienting the concept of dynamic "core-satellite" investment management in the framework of absolute return or target-date funds. EDHEC-Risk Institute has also developed an ambitious portfolio of research and educational initiatives in the domain of investment solutions for institutional and individual investors.

Academic Excellence and Industry Relevance

In an attempt to ensure that the research it carries out is truly applicable, EDHEC has implemented a dual validation system for the work of EDHEC-Risk. All research work must be part of a research programme, the relevance and goals of which have been validated from both an academic and a business viewpoint by the Institute's advisory board. This board is made up of internationally recognised researchers, the Institute's business partners, and representatives of major international institutional investors. Management of the research programmes respects a rigorous validation process, which guarantees the scientific quality and the operational usefulness of the programmes.

Six research programmes have been conducted by the centre to date:

- Asset allocation and alternative diversification
- Performance and risk reporting
- Indices and benchmarking
- Non-financial risks, regulation and innovations
- Asset allocation and derivative instruments
- ALM and asset allocation solutions

These programmes receive the support of a large number of financial companies. The results of the research programmes are disseminated through the EDHEC-Risk locations in Singapore, which was established at the invitation of the Monetary Authority of Singapore (MAS); the City of London in the United Kingdom; Nice and Paris in France.

EDHEC-Risk has developed a close partnership with a small number of sponsors within the framework of research chairs or major research projects:

- ETF and Passive Investment Strategies, *in partnership with Amundi ETF*
- Regulation and Institutional Investment, *in partnership with AXA Investment Managers*
- Asset-Liability Management and Institutional Investment Management, *in partnership with BNP Paribas Investment Partners*
- New Frontiers in Risk Assessment and Performance Reporting, *in partnership with CACEIS*
- Exploring the Commodity Futures Risk Premium: Implications for Asset Allocation and Regulation, *in partnership with CME Group*

About EDHEC-Risk Institute

- Asset-Liability Management Techniques for Sovereign Wealth Fund Management, *in partnership with Deutsche Bank*
- The Benefits of Volatility Derivatives in Equity Portfolio Management, *in partnership with Eurex*
- Structured Products and Derivative Instruments, *sponsored by the French Banking Federation (FBF)*
- Optimising Bond Portfolios, *in partnership with the French Central Bank (BDF Gestion)*
- Risk Allocation Solutions, *in partnership with Lyxor Asset Management*
- Infrastructure Equity Investment Management and Benchmarking, *in partnership with Meridiam and Campbell Lutyens*
- Risk Allocation Framework for Goal-Driven Investing Strategies, *in partnership with Merrill Lynch Wealth Management*
- Investment and Governance Characteristics of Infrastructure Debt Investments, *in partnership with Natixis*
- Advanced Modelling for Alternative Investments, *in partnership with Société Générale Prime Services (Newedge)*
- Advanced Investment Solutions for Liability Hedging for Inflation Risk, *in partnership with Ontario Teachers' Pension Plan*
- Active Allocation to Smart Factor Indices, *in partnership with Rothschild & Cie*
- Solvency II, *in partnership with Russell Investments*
- Structured Equity Investment Strategies for Long-Term Asian Investors, *in partnership with Société Générale Corporate & Investment Banking*

The philosophy of the Institute is to validate its work by publication in international academic journals, as well as to make it available to the sector through its position papers, published studies, and global conferences.

To ensure the distribution of its research to the industry, EDHEC-Risk also provides professionals with access to its website, www.edhec-risk.com, which is entirely devoted to international risk and asset management research. The website, which has more than 70,000 regular visitors, is aimed at professionals who wish to benefit from EDHEC-Risk's analysis and expertise in the area of applied portfolio management research. Its quarterly newsletter is distributed to more than 200,000 readers.

EDHEC-Risk Institute: Key Figures, 2014-2015

Number of permanent staff	48
Number of research associates & affiliate professors	36
Overall budget	€6,500,000
External financing	€7,025,695
Nbr of conference delegates	1,087
Nbr of participants at research seminars and executive education seminars	1,465

About EDHEC-Risk Institute

Research for Business

The Institute's activities have also given rise to executive education and research service offshoots. EDHEC-Risk's executive education programmes help investment professionals to upgrade their skills with advanced risk and asset management training across traditional and alternative classes. In partnership with CFA Institute, it has developed advanced seminars based on its research which are available to CFA charterholders and have been taking place since 2008 in New York, Singapore and London.

In 2012, EDHEC-Risk Institute signed two strategic partnership agreements with the Operations Research and Financial Engineering department of Princeton University to set up a joint research programme in the area of asset-liability management for institutions and individuals, and with Yale School of Management to set up joint certified executive training courses in North America and Europe in the area of risk and investment management.

As part of its policy of transferring know-how to the industry, in 2013 EDHEC-Risk Institute also set up ERI Scientific Beta. ERI Scientific Beta is an original initiative which aims to favour the adoption of the latest advances in smart beta design and implementation by the whole investment industry. Its academic origin provides the foundation for its strategy: offer, in the best economic conditions possible, the smart beta solutions that are most proven scientifically with full transparency in both the methods and the associated risks.

EDHEC-Risk Institute Publications and Position Papers (2014-2017)

EDHEC-Risk Institute Publications (2014-2017)

2017

- Martellini, L. and V. Milhau. Mass Customisation versus Mass Production in Retirement Investment Management: Addressing a "Tough Engineering Problem" (May).
- Esakia, M., F. Goltz, S. Sivasubramanian and J. Ulahel. Smart Beta Replication Costs (February).

2016

- Amenc, N., F. Goltz, V. Le Sourd. Investor Perceptions about Smart Beta ETFs (August).
- Giron, K., L. Martellini and V. Milhau Multi-Dimensional Risk and Performance Analysis for Equity Portfolios (July).
- Maeso, J.M., L. Martellini. Factor Investing and Risk Allocation: From Traditional to Alternative Risk Premia Harvesting (June).
- Amenc, N., F. Goltz, V. Le Sourd, A. Lodh and S. Sivasubramanian. The EDHEC European ETF Survey 2015 (February).
- Martellini, L. Mass Customisation versus Mass Production in Investment Management (January).

2015

- Blanc-Brude, F., M. Hasan and T. Whittaker. Cash Flow Dynamics of Private Infrastructure Project Debt (November).
- Amenc, N., G. Coqueret, and L. Martellini. Active Allocation to Smart Factor Indices (July).
- Martellini, L., and V. Milhau. Factor Investing: A Welfare Improving New Investment Paradigm or Yet Another Marketing Fad? (July).
- Goltz, F., and V. Le Sourd. Investor Interest in and Requirements for Smart Beta ETFs (April).
- Amenc, N., F. Goltz, V. Le Sourd and A. Lodh. Alternative Equity Beta Investing: A Survey (March).
- Amenc, N., K. Gautam, F. Goltz, N. Gonzalez, and J.P Schade. Accounting for Geographic Exposure in Performance and Risk Reporting for Equity Portfolios (March).
- Amenc, N., F. Ducoulombier, F. Goltz, V. Le Sourd, A. Lodh and E. Shirbini. The EDHEC European Survey 2014 (March).
- Deguest, R., L. Martellini, V. Milhau, A. Suri and H. Wang. Introducing a Comprehensive Risk Allocation Framework for Goals-Based Wealth Management (March).
- Blanc-Brude, F., and M. Hasan. The Valuation of Privately-Held Infrastructure Equity Investments (January).

2014

- Coqueret, G., R. Deguest, L. Martellini, and V. Milhau. Equity Portfolios with Improved Liability-Hedging Benefits (December).

EDHEC-Risk Institute Publications (2014-2017)

- Blanc-Brude, F., and D. Makovsek. How Much Construction Risk do Sponsors take in Project Finance. (August).
- Loh, L., and S. Stoyanov. The Impact of Risk Controls and Strategy-Specific Risk Diversification on Extreme Risk (August).
- Blanc-Brude, F., and F. Ducoulombier. Superannuation v2.0 (July).
- Loh, L., and S. Stoyanov. Tail Risk of Smart Beta Portfolios: An Extreme Value Theory Approach (July).
- Foulquier, P. M. Arouri and A. Le Maistre. P. A Proposal for an Interest Rate Dampener for Solvency II to Manage Pro-Cyclical Effects and Improve Asset-Liability Management (June).
- Amenc, N., R. Deguest, F. Goltz, A. Lodh, L. Martellini and E.Schirbini. Risk Allocation, Factor Investing and Smart Beta: Reconciling Innovations in Equity Portfolio Construction (June).
- Martellini, L., V. Milhau and A. Tarelli. Towards Conditional Risk Parity – Improving Risk Budgeting Techniques in Changing Economic Environments (April).
- Amenc, N., and F. Ducoulombier. Index Transparency – A Survey of European Investors Perceptions, Needs and Expectations (March).
- Ducoulombier, F., F. Goltz, V. Le Sourd, and A. Lodh. The EDHEC European ETF Survey 2013 (March).
- Badaoui, S., Deguest, R., L. Martellini and V. Milhau. Dynamic Liability-Driven Investing Strategies: The Emergence of a New Investment Paradigm for Pension Funds? (February).
- Deguest, R., and L. Martellini. Improved Risk Reporting with Factor-Based Diversification Measures (February).
- Loh, L., and S. Stoyanov. Tail Risk of Equity Market Indices: An Extreme Value Theory Approach (February).

EDHEC-Risk Institute Publications (2014-2017)

EDHEC-Risk Institute Position Papers (2014-2017)

2016

- Amenc, N., F. Ducoulombier, F. Goltz and J. Ulahel. Ten Misconceptions about Smart Beta (June).
- O'Kane, D. Initial Margin for Non-Centrally Cleared OTC Derivatives (June).

2014

- Blanc-Brude, F. Benchmarking Long-Term Investment in Infrastructure: Objectives, Roadmap and Recent Progress (June).

For more information, please contact:
Carolyn Essid on +33 493 187 824
or by e-mail to: carolyn.essid@edhec-risk.com

EDHEC-Risk Institute
393 promenade des Anglais
BP 3116 - 06202 Nice Cedex 3
France
Tel: +33 (0)4 93 18 78 24

EDHEC Risk Institute—Europe
10 Fleet Place, Ludgate
London EC4M 7RB
United Kingdom
Tel: +44 (0)20 7332 5600

EDHEC Risk Institute—France
16-18 rue du 4 septembre
75002 Paris
France
Tel: +33 (0)1 53 32 76 30

www.edhec-risk.com