An EDHEC-Risk Institute Publication

The EDHEC European ETF Survey 2013

March 2014

with the support of

Amundi ETF & INDEXING ASSET MANAGEMENT

EDHEC-RISK Institute

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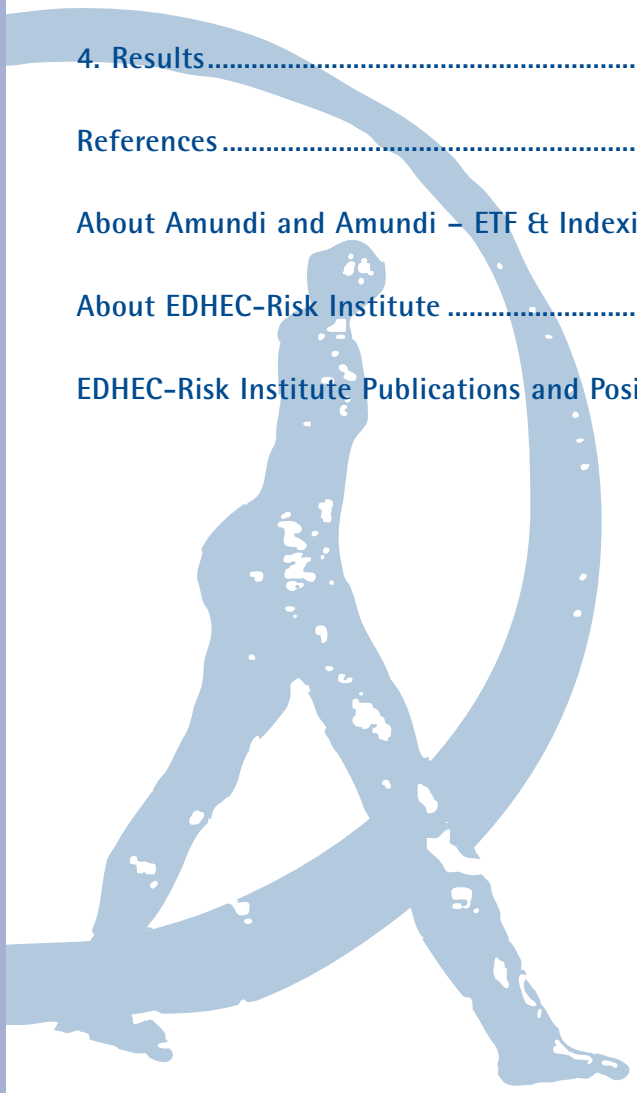

We thank Amundi ETF for its support for our research. Any remaining errors or omissions are the sole responsibility of the authors.
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Foreword

The latest edition of the European ETF Survey has been conducted as part of the Amundi ETF "Core-Satellite and ETF Investment" research chair at EDHEC-Risk Institute. This chair analyses the developments in the use of exchange-traded funds as part of the asset allocation process and looks at advanced forms of risk budgeting within the framework of a core-satellite approach.

With the survey, we aim to analyse the current practices and perceptions among ETF users in Europe and by comparing our results with those of our previous surveys, we intend to shed light on trends within the European ETF market.

This year, the survey results show that ETF investors are still looking to increase or at least to maintain their use of ETFs and have a more favourable outlook on their use of alternative indexing products. The data also shows that respondents are still overwhelmingly in favour of passive ETFs. The survey further reveals considerable interest in "smart beta" products: around 30% of respondents already use products tracking smart beta indices and more than one third of respondents are considering investing in such products in the near future. Moreover, ETFs based on smart beta indices benefit from a favourable perception as tools for improving their investment process (to outperform cap-weighted indices, to reduce risk, to gain more transparency on methodology and for risk analytics diversification). In total, 39% of investors are interested in further development in ETFs based on smart beta indices.

We would like to express our warmest thanks to our partners at Amundi ETF & Indexing for their ongoing support of our research. Special thanks also to the authors, Frédéric Ducoulombier, Felix Goltz, Véronique Le Sourd and Ashish Lodh, for the quality of the survey. I wish you an enjoyable and instructive read.

Noël Amenc
Professor of Finance
Director of EDHEC-Risk Institute

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Introduction

The aim of this study is to analyse the usage of exchange-traded funds (ETFs) in investment management and to give a detailed account of the current perceptions and practices of European investors in ETFs.

The industry has undergone rapid growth since inception. The first ETFs appeared in the United States in 1989 and they started trading in Europe in 2000. Assets under management (AUM) of ETFs and other exchange-traded index products in Europe amounted to $395bn as at the end of 2013 (ETFGI 2014). The Background Section of this document analyses how different types of ETFs are designed, which advantages they offer, and which risks they are exposed to. The second part of this document focuses on the results of a survey of 207 European ETF users, who provided us with a variety of information on their current use of ETFs, perceptions of ETFs compared to other indexation vehicles, and their opinions on risks inherent in different forms of ETFs. There are a number of studies on the ETF industry in Europe. A key advantage of employing a survey methodology is that we obtain direct information from market participants concerning not only which instruments they currently use, but also how these instruments fit into their overall investment process, and how they are evaluated. Moreover, in addition to current usage, we are able to harness information concerning future plans of investment professionals thus providing an outlook of likely future industry developments.

To summarise the main findings of the study, we will first explain key survey results on the rates of usage and satisfaction with ETFs. We then look at how ETFs are integrated in the investment process and for which purposes they are being used. To address a recent development in the industry, our survey assessed the views investors have about ETFs tracking smart beta indices, which we also summarise below. Finally, we analyse investor expectations of their future use of ETFs and their requests for further product development, which provides some hints with regard to the outlook for the ETF industry.

1. Rates of Usage and Satisfaction of ETFs

Continuing Growth in the ETF Market

While ETF usage is no longer growing at previously seen rates, product development within certain asset classes has driven increases in ETF usage. Exhibit 1 illustrates significant increases in rates of ETF usage in 2013 within the asset classes of Real Estate (5.8 % increase), Hedge Funds (14.8% increase) and Infrastructure (14.8% increase).

The increased usage of infrastructure ETFs seems likely due to an increase in the range of ETF products available to infrastructure investors. This may be due to the recent emergence of more "specialised" infrastructure ETF products.[1] For instance, investors are now able to gain infrastructure exposure to individual geographic regions through ETFs whereas previously ETFs could only provide 'global' infrastructure exposure.

Hence it would seem that continuing innovation within the industry is

1 - http://www.etftrends.com/2011/08/etf-chart-of-the-day-infrastructure-funds/

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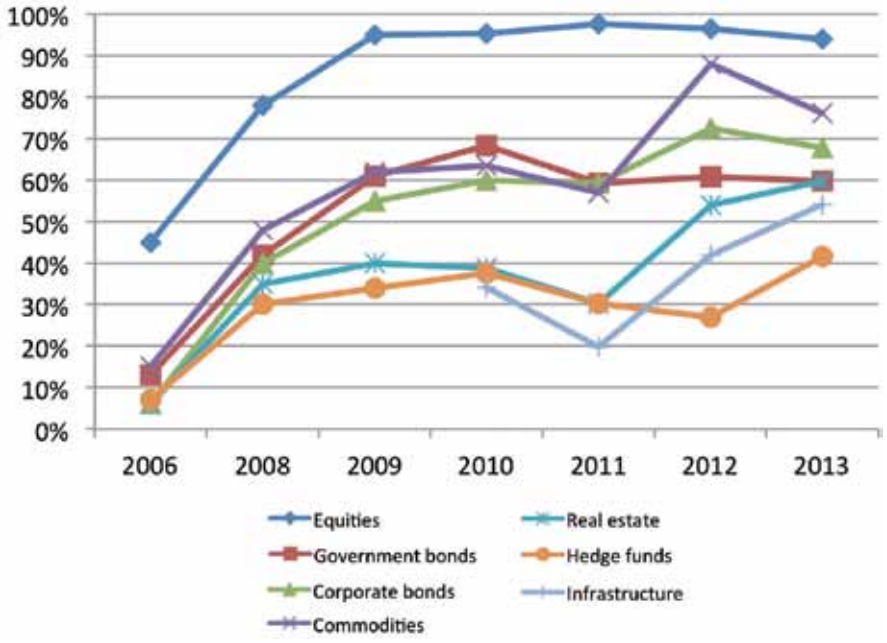
Exhibit 1. Use of ETFs or ETF-like products over time
This exhibit indicates the use of ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of EDHEC ETF survey 2006, 2008 to 2013.



perpetuating increased usage of ETFs within certain asset classes.

High Satisfaction with ETFs

Satisfaction has remained at high levels across most asset classes as shown in Exhibit 2. There have been increases in satisfaction for corporate bond, commodity, real estate and sector ETFs. This may also be linked to the fact that there has been an increase in product variety for these asset classes resulting in a product that is more likely to satisfy investor requirements.

Of all asset classes, satisfaction with equity ETFs has been the highest and the most consistent over the last 7 years. Aside from the greater variety of products, another reason for the consistently high satisfaction rates within equities may be the fact that they have the longest history hence investors are most familiar with their advantages and their drawbacks. This could also be related to the highly liquid nature of the underlying equity asset class compared to other types of ETFs.

Indeed, we can see from Exhibit 2 that satisfaction rates for ETFs based on the most liquid ETF asset classes are far more consistent compared to those based on illiquid asset classes. For instance, hedge fund and real estate ETFs have exhibited variation in satisfaction rates between 30% and 60%, and 50% and 95% respectively over the last 7 years. In contrast we can see that equity and government bond ETF satisfaction rates have been consistently in the region of 90% and 80% respectively. This may be due to the fact that two of the key attractions of ETFs are their liquidity and relatively low levels of mispricing, both of which are determined by the liquidity of the underlying assets. It is worth noting that there has been a constant increase in the satisfaction rate with corporate bond

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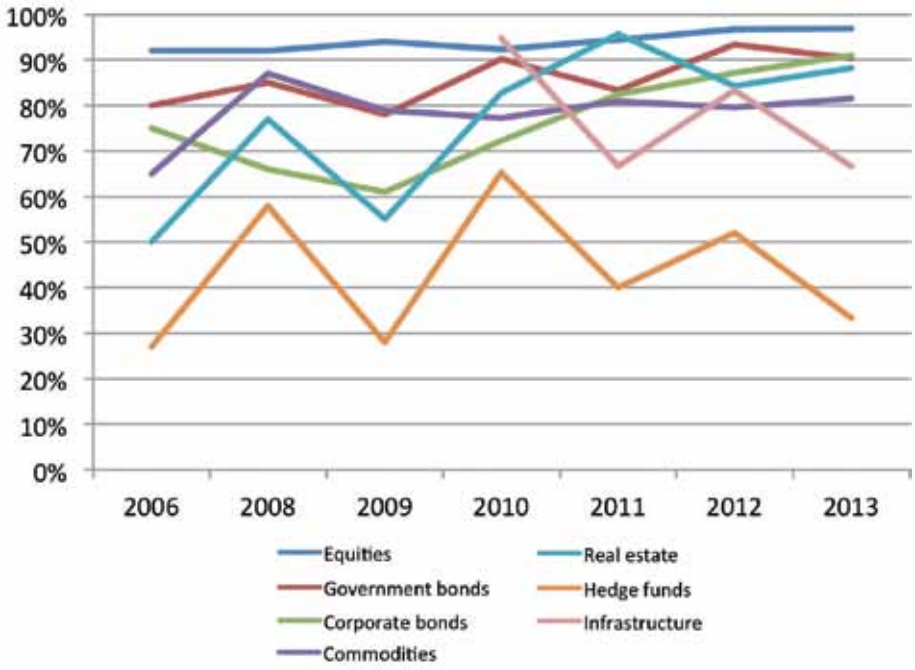
Exhibit 2. Satisfaction with ETFs or ETF-like products over time
This exhibit indicates the percentages of respondents that are satisfied with ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of EDHEC ETF survey 2006, 2008 to 2013.



ETFs, rising from about 60% in 2009 to about 90% in 2013. This increase in the satisfaction rate is observed as product variety for corporate bond ETFs has been increasing strongly over the past years and corporate bond ETFs are increasingly used by investors to diversify portfolios that are heavily exposed to sovereign debt (see Goltz, Le Sourd, Mukai and Rachidy (2013)[2]). It is likely that investors – given the increasing variety of corporate bond ETFs – are better able to select an appropriate ETF which may explain the rise in satisfaction.

2 - "Reactions to "A Review of Corporate Bond Indices: Construction Principles, Return Heterogeneity, and Fluctuations in Risk Exposures", an EDHEC-Risk Institute Publication.

2. ETFs in the Investment Process

ETFs are an important instrument in the investment process. 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, gain access to specific segments of the market through ETFs on sectors or styles. Beyond such broad categorisations of use, we also assess how often ETFs are used for specific purposes such as neutralising factor exposures or arbitraging related assets. Exhibit 3 shows the percentages of respondents that frequently use ETFs for different purposes and the trend of this usage over time, beginning in 2009.

The results show that the frequent use of ETFs by about 70% of respondents to gain a broad market exposure is a constant trend over time from 2009. If around 60%, on average, use ETFs to obtain buy-and-hold investments over the period starting in 2009, more variations are observed from one year to another than in the use for broad market exposure. Over time, the use of ETFs to obtain short-term (dynamic) investments, specific sub-segment exposure or for tactical bets is frequent for around 50% of respondents, with a slight decrease for these three uses in 2013, compared to

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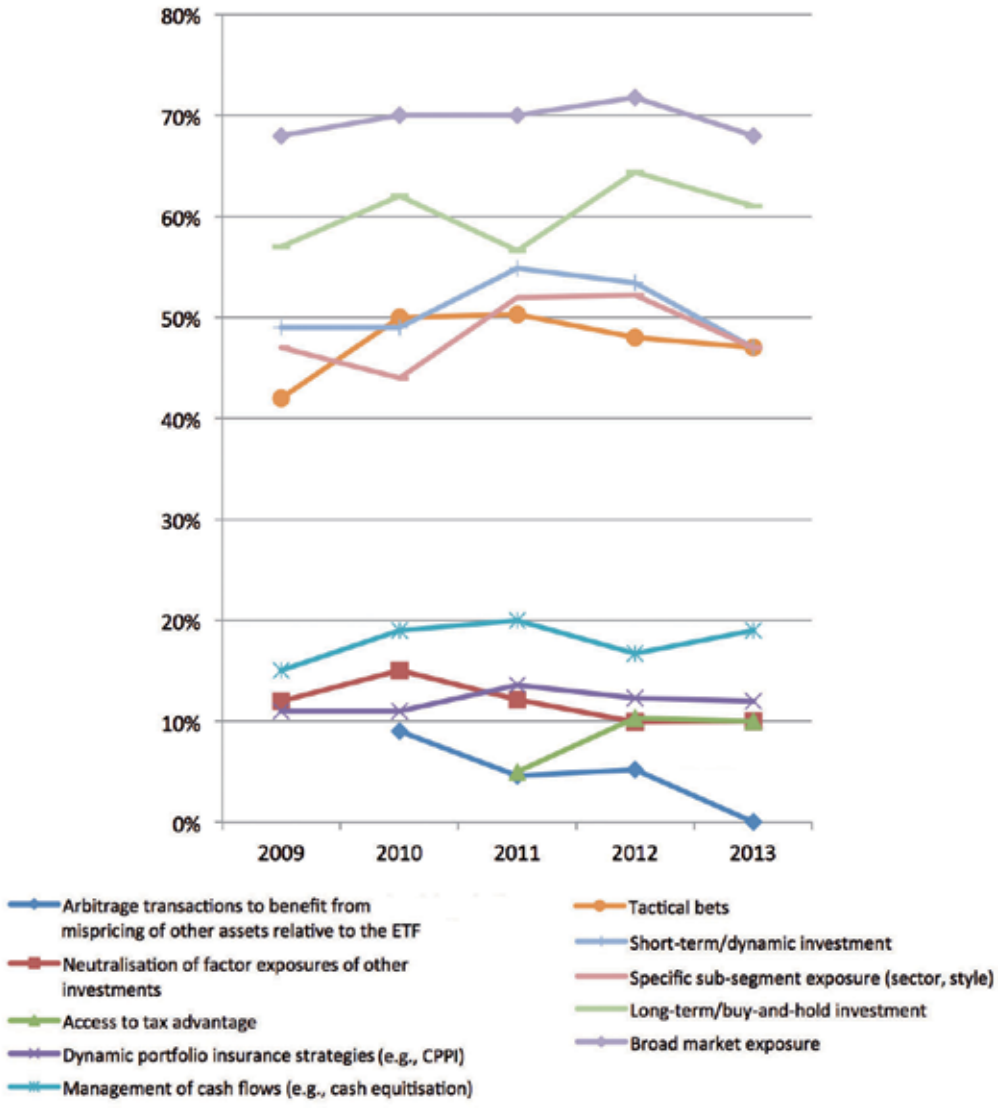
2012. Other uses of ETFs are more rare: the use of ETFs for management of cash flows is frequent for a percentage of respondents ranging from 15% to 20% over time; the use of ETFs for neutralisation of factor exposures related to other investments and dynamic portfolio insurance strategies is frequent for a percentage of respondents ranging between 10% and 15% over time; the frequent use of ETFs to access tax advantages is capped at 10% of respondents; and the use of ETFs for capturing arbitrage opportunities has shown a constant decrease since 2009.

These results show that investment in ETFs is mainly associated with a long-term exposure to broad market indices, a trend observed in successive surveys. Still, over time, frequent use of around 50% over time, of ETFs for short-term exposure and for specific market sub-segments exposure indicates that other investment purposes are also important for respondents. This is

Exhibit 3. 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. Category "frequent" would include ratings from 4 to 6. The percentages are based on the results of ETF survey 2009 to 2013.[3]



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

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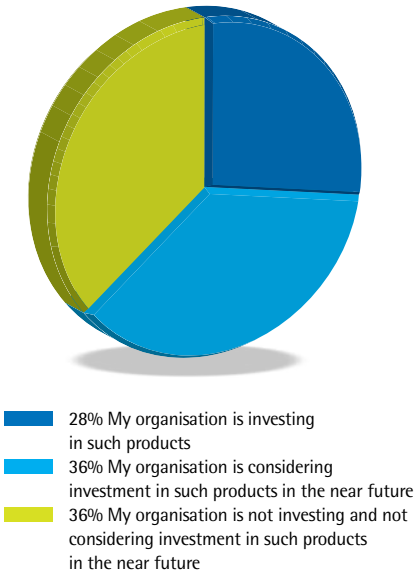
not a surprising result given the fact that the liquidity, low cost and product variety benefits of ETFs make them viable tools for such purposes.

3. Perceptions About Smart Beta ETFs

In view of the considerable development in new forms of indices, in this 2013 survey we asked investors about their use and perception of ETFs tracking smart beta indices. It appears from the results that more than a quarter (28%) of respondents already use products tracking smart beta indices and that more than an additional one-third of respondents (36%) consider investing in such products in the near future (see Exhibit 4). These results show that investors have a significant interest in these products.

Exhibit 4. Use of products tracking smart beta indices
This exhibit indicates the percentages of respondents that reported to use products tracking smart beta indices. Non-responses are excluded.



This large use of ETFs based on smart beta indices is explained by the favourable perception that respondents have of smart beta indices as tools for improving their investment process (see Exhibit 5). As shown by Exhibit 5, at least three quarter of respondents think that smart beta indices provide significant potential to outperform cap-weighted indices in the long term and that they avoid cap-weighted indices being concentrated in very few stocks or sectors. The same proportion of respondents thinks that the diversification across several weighting methodologies allows risk to be reduced and adds value, while 86% of respondents agree that smart beta indices allow factor risk premia, such as value and small-cap, to be captured. Interestingly, an even greater share of respondents (92%) agrees that smart beta indices require full transparency on methodology and risk analytics diversification across several methodologies.

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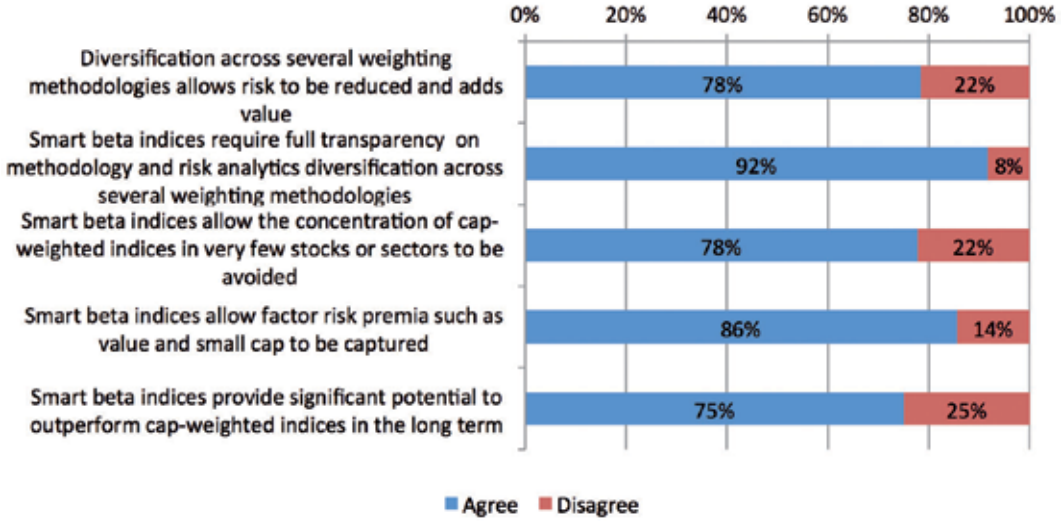
Exhibit 5. Agreement of respondents with statements about smart beta indices
This exhibit indicates the percentages of respondents that agree or strongly agree with the statements about smart beta indices. Non-responses are excluded.



4. Outlook for ETFs

Strong Outlook for ETF Usage Versus Other Indexation Products

We ask survey respondents whether they invest in alternatives to ETFs, such as futures, total return swaps, and index funds and ask them to rate ETFs and their alternatives according to various criteria. The responses are shown in Exhibit 6 below and allow for a few general conclusions. First, in terms of liquidity, transparency, and cost, ETFs are considered advantageous although on some criteria they are less well regarded than futures. Second, ETFs are ranked highest for available range of indices and asset classes. Therefore, European investors and asset managers seem to be well aware of the diversity of ETFs, which has grown dramatically in recent years. Third, futures are the most serious alternative to ETFs, but ETFs are perceived as superior with regard to minimum subscription, operational constraints, and the tax and regulatory regime. Therefore, it appears that implementation concerns with futures (such as margin calls, and applying exact allocations even for small-sized portfolios) give ETFs an advantage. Fourth, the respondents believe that ETFs generally perform much better than total return swaps (TRS).[4]

Overall, we find that ETFs and futures receive the highest scores among the four products (2.38 and 2.43, respectively), while total return swaps receive the lowest score of 1.86. For individual criteria, ETFs are rated as outstanding in terms of ease of use product range, minimum subscription and operational constraints.

Interestingly, when we examine respondents' answers with regard to their future use of each of the above indexation vehicles, we see that the results are broadly reflective of the quality scores assigned to the indexation vehicles by respondents. Hence investors' detailed analysis of each indexation vehicle is in line with their predictions of future use. For instance, Exhibit 7 shows us that most respondents (60%) are planning to increase their investments in ETFs, while only 5% of investors plan a decrease. Similarly, we can

4 - This belief seemingly conflicts with that expressed by Lhabitant, Mirlesse, and Chardon (2006), who concluded that indexation with derivatives provides better performance than exchange-traded funds and that, when considering both costs and tracking error, swaps are the most efficient mechanism for tracking an index. These conflicting beliefs may be explained, to some extent, by a lack of familiarity with total return swaps, as a considerable share of respondents do not answer this particular question. Even among those who do, however, total return swaps are not considered superior.

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Exhibit 6. Summary of the scores for ETFs, futures, total return swaps (TRS) and index funds
This table indicates the average scores which the four products received from respondents based on the eleven criteria. For each particular quality, grade 1 to 3 were given for answers of poor to very good and the average score was calculated based on the number of responses who have rated that question. The familiarity percentages were obtained by using (1- non-responses). The numbers highlighted in bold indicate the highest score.

	ETFs	Futures	TRS	Index Funds
QUALITY				
Liquidity	2.40	**2.78**	1.77	2.25
	(97.7%)	**(86.8%)**	(69.0%)	(85.1%)
Cost of liquidity	2.18	**2.68**	1. 80	2.07
	(96.6%)	**(85.6%)**	(69.5%)	(82.2%)
Other cost	2.31	**2.48**	2.36	2.30
	(97.7%)	**(85.1%)**	(69.5%)	(84.5%)
Tracking error	**2. 240**	2.62	1.80	2.07
	(97.7%)	(85.1%)	(70.1%)	(84.5%)
Product range	2.67	1.98	2.12	2.03
	(97.1%)	(84.5%)	(96.1%)	(85.1%)
Transparency	2.33	**2.65**	1.92	2.21
	(97.1%)	**(84.5%)**	(71.3%)	(83.9%)
Minimum subscription	**2.71**	2.09	1.60	2.21
	(96.6%)	(85.1%)	(71.3%)	(84.5%)
Operational constraints	2.57	2.10	1.53	2.31
	(97.1%)	(84.5%)	(71.8%)	(84.5%)
Regulatory regime	2.41	**2.49**	1.72	2.47
	(93.7%)	**(81.6%)**	(70.7%)	(82.8%)
Tax regime	**2.17**	2.25	2.14	2.17
	(89.7%)	(80.5%)	(68.4%)	(81.6%)
Control of counterparty risk	2.16	**2.59**	1.62	2.27
	(95.4%)	**(98.3%)**	(70.7%)	(84.5%)
Average score	**2.38**	**2.43**	**1.86**	**2.27**

see that 26% of respondents are planning to increase their use of futures, compared to just 7% planning to decrease their usage of the product. However, the situation is much more balanced for index funds which came in third place in terms of an overall quality score, with approximately the same number of investors planning an increase as there are planning a decrease (18 % and 15% respectively). For TRS, which came in last in terms of an overall quality score, we can see that the outlook in terms of future usage is much more negative with only 11 % of investors planning an increase in usage compared to 18% of investors planning a decrease. Thus in comparison to other indexation vehicles, we can see that ETFs have the brightest future in terms of usage.

Finally, we compare the investors' expected usage of these products over time. The results are shown in Exhibit 8. The results suggest that despite the past growth and increasing maturity of the ETF market, ETF investors are still looking to increase or at least to maintain their use of ETFs and have a more favourable outlook of their use of ETFs than of their use of alternative indexing products.

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Exhibit 7. How do you predict your future use of the following instruments?
This exhibit indicates the respondents' forecast about the future use of each of the mentioned products.

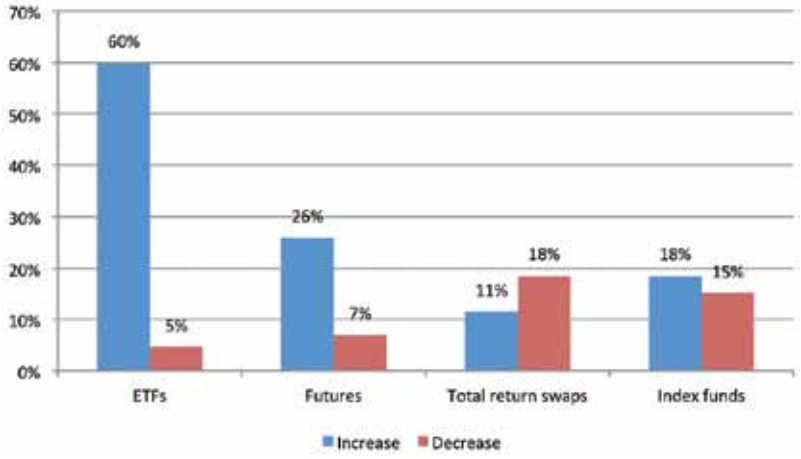
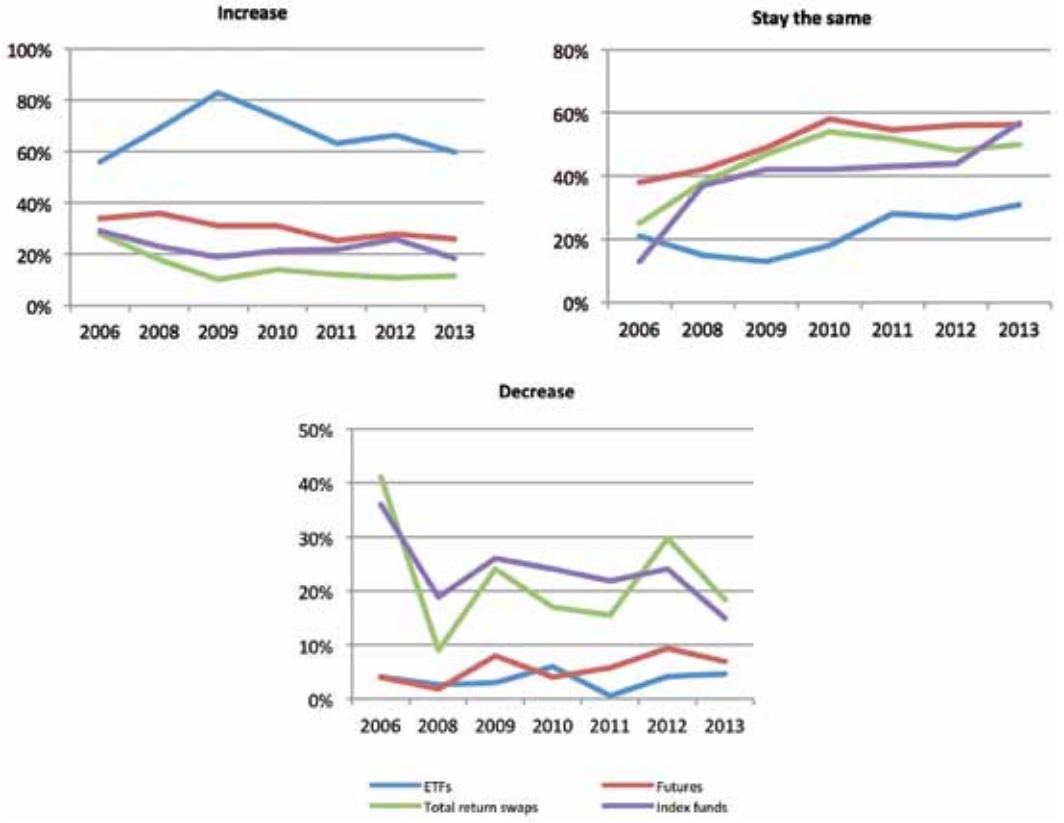


Exhibit 8. Will you increase your use of the following indexing products?
This exhibit indicates the future potential to change each of the mentioned products by investors over time. The percentages are based on the results of EDHEC ETF survey 2006, 2008 to 2013.



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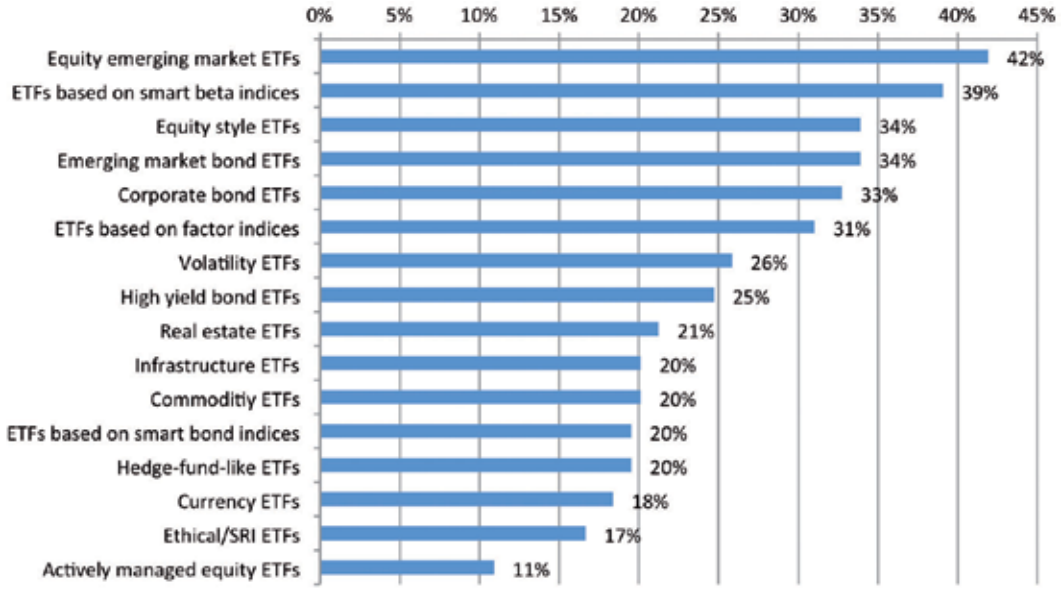
Demand for new product development

Exhibit 9 ranks the different ETF product types in order of descending demand for product development in 2013. We can see that the area of most interest to respondents is the Emerging Markets equities segment with 42% of respondents wanting to see further product development in this asset class. Emerging equity ETFs have been on the top of the investors' wish list for many of our past surveys suggesting that there is ample room for product innovation in this area. This persistent finding may be explained by the fact that emerging equity ETFs are still mainly based on broad global, regional or country emerging market indices with relatively little choice available to obtain specific sector or style exposures within the emerging market equity universe.

We can also see that there is increasing interest among investors for development of ETFs based on alternative forms of indices, with 39% of investors interested in further development in ETFs based on smart beta indices. This percentage is slightly higher than last year (37% in 2012). This result is interesting as there has been a considerable amount of product launches in the area of smart beta ETFs (see Section 2.4 on smart beta ETFs in the Background Section of this document). The fact that investors see room for further product development despite the numerous product launches 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. Given the increasing discussion on harnessing multiple factor premia from equity investing, including factors such as momentum, size, quality among others, it is perhaps not surprising that investors see room for further product development. Indeed, ETFs based on style indices or factor indices (with 34% and 31% respectively) are also among the most widely requested categories for future product development.

Exhibit 9. What type of ETF products would you like to see developed further in the future?
This exhibit indicates how many respondents would like to see further development in the future for different ETF products. Respondents are able to choose more than one product.



1. Introduction

1. Introduction

Exchange-traded funds (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 as closely as possible the performance of a financial index.

Like any other exchange-traded product, 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 realising a profit.[5]

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 $395bn as at the end of 2013 (ETFGI 2014). In little over ten 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: whereas 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 equal-weighting, minimum volatility etc., see Smart Beta insert in this document). Another focus of innovation has been to offer more varieties of equity ETFs with similar economic exposure that provide detailed choices of how to gain this exposure, such as equity ETFs with different distributing share classes[6] and ETFs on currency hedged indices. Moreover, multi-asset ETFs also come to the stage, such as ETFs replicating 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, Ferreira, Matos, and Starks 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. The broad aim of this survey is to analyse the current practices and perceptions among ETF users in Europe. By comparison of our results to those of our previous surveys, we aim to shed some light on trends within the ETF market.

The EDHEC European ETF survey 2013 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 sections covering the role

5 - The indicative NAV (iNAV) is published intraday and can be compared to the price of the ETF almost in real time.
6 - 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.

1. Introduction

played by ETFs in the survey respondents' asset allocation decisions, practical aspects of ETF investments, as well as the application of ETFs to portfolio construction. In addition, the questionnaire asks respondents to compare ETFs and other investment instruments that can be considered close substitutes: total return swaps, futures, and index funds. Finally, we invited survey respondents to express their views on regulatory issues and the future developments in the ETF market.

This survey proceeds as follows. In the next section, we review the European ETF market and explain this financial product in more detail. The methodology used to take the survey and some information about survey respondents is described in Section 3. European investors' views of ETFs, the uses of ETFs, and comparisons of ETFs and other indexing products are presented in Section 4. Section 5 draws conclusions from the survey results.

1. Introduction

2. Background

2. Background

2.1. 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 2013 3,594 ETFs worldwide were managing $ 2254bn in assets (ETFGI 2014). The assets under management (AUM) within the 1,377 exchange-traded funds constituting the European industry stood at $395bn (ETFGI 2014). Despite the large number of products available, the market is highly concentrated with only 54 of these products exceeding an AUM of €1bn (Lipper 2013). While the large number of ETF means that a large variety of indices are tracked – including indices on niche markets and innovative index methodologies on traditional asset universes – there also exists a large choice of different ETFs tracking the same or very similar indices. In Europe there are almost 40 ETFs tracking the Euro Stoxx 50 index for example (Ernst and Young 2013). ETFs and other exchange-traded products (ETP) are still heavily oriented towards equity. Equity products account for about 61% of AUM in European ETFs and ETPs, fixed-income products account for about 18% of assets and commodity products account for 18% with less than 3% of assets in ETFs and ETPs providing other types of exposures including multi-asset class exposures, currencies and alternative asset classes (Fuhr 2013).

The European ETF market is mostly institutional and industry estimates in terms of the percentage of retail AUM range from 15% to 20%[7]; The European Securities and Markets Authority (ESMA) Securities and Markets Stakeholder Group[8] 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. Two-thirds of the AUM in the European fund industry is controlled by captive distribution channels (Arzeni and Collot 2011). 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 included (Undertakings for Collective Investment in Transferable Securities).

Indeed, the management fees charged by ETFs show that they come at low cost to investors. According to Deutsche Bank (2013), the asset weighted average total expense ratio (TER) of European ETFs that offer exposure to a standard stock market index was 37 basis points, while the asset weighted TER of European ETFs that offer exposure to standard equity indices was 23 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 that are tracked and are often higher for less standard indices. For example, Europe's largest ETF provider reports a TER of 15 basis points for an ETF on US large cap stocks while it reports a TER of 74 basis points for an ETF on Emerging Markets small-cap stocks. Moreover, pronounced differences exist across providers sometimes

7 - Based on Deutsche Bank, Lipper and Lyxor estimates of 20%, 15% and 20% respectively as reported by the Financial Times http://www.ft.com/cms/s/0/dbb87eea-e539-11e1-b758-00144feab49a.html#axzz2JGpD3MAx,
8 - ESMA Policy Orientations on Guidelines for UCITS exchange-traded funds and structured UCITS (2011).

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even for ETFs tracking very similar indices. For example, TERs for European ETFs from different providers tracking similar US large cap indices range from 9 basis points to 40 basis points.

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 2009 to November 2013 the trading volume in ETFs on European exchanges amounted to 6.6% of the trading volume in cash equities and it never exceeded 9.3% of the trading volume in cash equities in any given month over this period (Deutsche Bank 2013). As of 2013 the AUM in the European ETF industry represented 3.5% of those of the overall fund management industry in Europe (Ernst and Young 2013). A notable feature of the ETP industry is that it is highly concentrated: while close to 200 providers vie for the global market, the top three players control over 69% of the AUM and the top ten players over 82% of the AUM (see BlackRock 2013). In Europe, there are close to 50 providers present and there is slightly less concentration at the very top, with the top three players controlling 71% of the AUM. The dynamics of the industry have remained fairly constant since last year in terms of the number of players.

2.2. 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.[9] 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.

Full Replication ETFs, Sampling Replication ETFs and Swap-Based ETFs

An ETF's replication mechanism is one of its defining features. Indeed, ETFs come in three flavours: full index replication 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.[10,11] 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

9 - 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 exchange. 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.

10 - In some instances (e.g. some emerging markets) access issues will make the full replication approach impossible.

11 - 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.

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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.[12]

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 (See the insert on Risks of ETFs). 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 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, and before reaching this limit of 10% 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

12 - 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 in weeks and sometimes in months.

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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 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 2013, about one-third of European ETF AUM is represented by synthetic replication ETFs and about two-thirds of AUM is invested in physical replication ETFs (see Deutsche Bank 2013).

ESMA ETF Guidelines*

On 25 July 2012 ESMA published guidelines "*aimed at strengthening investor protection and harmonising regulatory practices across the EU fund sector*" across seven different areas with key areas relating to Index-Tracking UCITS, Actively-Managed ETFs, Efficient Portfolio Management Techniques, UCITS ETF Identifiers and Financial Indices. On 27 November 2013 ESMA issued a Questions and Answers document that clarified questions regarding the practical applications of the guidelines. We provide an overview of the key issues related to the ESMA Guidelines below.

Index-Tracking UCITS

ESMA has acknowledged that the different replication mechanisms employed to track an index will have varying levels of exposure to different risks. For instance, Physical Replication of an index is more likely to lead to a higher level of tracking error risk than synthetic replication. Hence in order to ensure that "investors are always informed of the principle risks in relation to the investment policy of the UCITS" they have stipulated that among other criteria, the prospectus of an index-tracking UCITS should include details of the replication mechanism employed and the likely risks of faced by the investor in terms of underlying index and counterparty risk.[13]

In particular they have asked for specific disclosures relating to the size of the tracking error in relation to the benchmark index for the period under review and an explanation for the divergence between anticipated and realised tracking error.[14] There were calls for a universal definition of how tracking error should be calculated[15] due to differing definitions among investors, however, ESMA stopped short of defining a universal metric that should be applied.

Actively-managed ETFs

There are varying interpretations of what constitutes an actively-managed ETF. For instance, the Morningstar definition is that an ETF which does not state a benchmark index is considered actively-managed. In contrast the SEC classes a passive ETF as one that immediately reflects the changes in the stock weightings of the reference index, whereas actively-managed ETFs can wait a trading day.[16] Indeed when we asked a sample of our own survey respondents about their definition of an active ETF there were varying responses. Some respondents only classed actively-managed

13 - See guidelines 9(b) in Section V of the ESMA ETF Guidelines
14 - See Guideline 11 of the ESMA ETF Guidelines
15 - See point 4 under Q2 of the Feedback section of the ESMA ETF Guidelines
16 - http://money.usnews.com/money/personalfinance/mutual-funds/articles/2012/08/21/its-goodto-be-active-but-in-an-etf.

* - Much of the material in this section is drawn from "Ducoulombier, F. 2012. Guidelines on ETFs and other UCITS issues. Commentary. EDHEC-Risk Institute Publication (July)." Some of the observations may have been overtaken by subsequent regulatory developments.

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ETFs as those including discretion within their construction, whereas others also included alternatively weighted indices within this definition. Thus it seems the recent emergence of alternatively weighted indices has blurred the line between what constitutes an active versus a passive ETF. Hence there have been calls for ESMA to make the move of setting a limit in terms of a target level of tracking error to define, in an objective fashion, what constitutes an actively-managed ETF (Ducoulombier 2012) but they have refrained from doing so.

With regard to issue of identification of actively-managed ETFs, the ESMA Guidelines have imposed the requirement that they must clearly inform investors in their prospectuses and marketing documents of the fact that they are actively managed, and also of how they intend to meet their stated investment policy of outperforming an index, if that is the stated investment policy.[17] However, in the absence of an objective measure of what constitutes an active ETF, this may still not lead to a uniform system of classification.

However, according to ESMA these new guidelines were "overwhelmingly welcomed by stakeholders." Thus it would seem that stakeholders are very keen for clearer distinction between active and passive ETFs and more transparency from active ETF providers about their investment policies.

17 - See guidelines 19 and 20 from section VIII. relating to actively managed UCITS ETFs
18 - http://citywire.co.uk/money/stock-lendingprofits-should-go-tofund-investors-says-ima/a607303

Efficient portfolio management techniques

Securities lending, while generating additional revenues, also generates counterparty risk for the investor. The revenues received as a result of efficient portfolio management techniques such as securities lending serve as compensation for the assumption of these risks. Hence the position that has been put forward is that investors are the ones bearing this risk, so it should be investors who gain the benefit of securities lending fees and not the ETF provider.[18]

A key focal point of the ESMA Guidelines are that they require that securities lending fees should be returned, net of costs, to investors as shown in ESMA Guidelines 28 and 29 below:

> "28. The UCITS should disclose in the prospectus the policy regarding direct and indirect operational costs/fees arising from efficient portfolio management techniques that may be deducted from the revenue delivered to the UCITS. These costs and fees should not include hidden revenue. The UCITS should disclose the identity of the entity(ies) to which the direct and indirect costs and fees are paid and indicate if these are related parties to the UCITS management company or the depositary."
>
> "29. All the revenues arising from efficient portfolio management techniques, net of direct and indirect operational costs, should be returned to the UCITS."

The issue of costs arising in relation to securities lending is not necessarily a straightforward one. For instance, there will be direct costs related to the volume of securities lending payable through fee sharing arrangements to securities lending

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agents which are easily visible through the terms of the arrangement. However, as many stakeholders put forward during the consultation phase, the UCITS management company may face indirect costs related to the diligent execution of securities lending. These could include for example, investment in IT systems to allow proper counterparty credit risk assessments etc.

Hence the final ESMA Guidelines do not prohibit the deduction of both direct and indirect costs from revenues received in relation to securities lending, the payment of fees to related parties or require the disclosure of a maximum percentage of fees payable.[19] Instead, the guidelines are more focused on the disclosure of operational costs, revenues and fee sharing agreements and thus will rely on the competitive effects arising transparency to act as a controlling mechanism with regard to the levels of fees deducted from securities lending revenues. Our results suggest that investors are aware of the potential that exists for complex revenue sharing arrangements post the publication of the ESMA Guidelines and are in favour of full transparency with regard to these costs and revenues.

It has been stipulated that providers of physically replicated ETFs have been using securities lending fees as a subsidy to allow them to charge lower ETF management fees and that the new guidelines will thus decrease their competitiveness.[20] However, we believe that transparency on these costs and revenues will only serve to increase transparency with the regards to the **true cost** of following different replication strategies, and that the net result will be that investors are more aware of the risks they have had to assume for the returns they are earning. Hence we are in support of this action.

UCITS ETF Identifiers

One of the risks highlighted in the debate surrounding ETFs is the potential for confusion between ETFs and other ETPs. Hence the ESMA Guidelines state that a UCITS ETF should use an identifier which identifies it as an exchange-traded fund which *should not be used by any UCITS which is not an ETF*. ESMA decided against making a distinction between physically and synthetically replicated ETFs through the identifier because of the practical difficulties of doing so. For instance, this would avoid long fund names and the difficulty of capturing mixed situations where the replication is partially physical and partially synthetic.

However, we think that this the right decision and that the regulator should avoid promoting communication about alleged differences between instruments that is not based on relevant risk characteristics. When it comes to categorising funds the focus should be on the economic exposure achieved or the payoff generated and not on the methods or instruments used to engineer the payoff.

ETFs compared to other ETPs

There are key differences between UCITS ETFs and other ETPs in terms of investor protection. Investors in ETFs enjoy higher standards of protection in terms of

19 - The disclosure of a maximum percentage of revenues to be paid away to third parties was being considered during the consultation phase. See ESMA Consultation (January 2012) on Guidelines for UCITS ETFs and other UCITS issues.
20 - UBS AG, Dr. Thomas Bischof & Dr. Gabriele C. Holstein, in UBS response to the ESMA consultation.

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governance, custody of assets, investment and risk management policies and disclosure. In general, ETP is a generic term designating a wide array of products that are covered by different regulations and have little in common except that they are listed on exchanges. The all-encompassing ETP acronym refers to ETFs, exchange-traded notes (ETNs) and other exchange-traded vehicles (ETVs). Within ETPs, only ETFs are regulated by the UCITS Directive while other ETPs are not and are distributed in Europe via the much lighter regulatory regime of the Prospectus Directive.

An ETN is a debt obligation, typically a senior unsecured debt obligation, designed to track an asset, a portfolio or an index. Since ETNs are not funds but notes, their investment policies need not comply with the asset eligibility and diversification rules specified in UCITS and comparable legislation in other jurisdictions. Therefore, an ETN could be exposed to a single asset, which may be otherwise difficult or impossible to achieve with ETFs. However, ETNs are purely backed by the credit of the issuer, which expose ETN investors to the full credit risk of the ETN issuer; this is unlike ETFs, for which the counterparty risk exposure of UCITS ETFs is limited to 10-20%. In addition, ETNs can be either unsecured (not-collateralised) or secured (collateralised), since the collateralisation arrangement is not at the discretion of the issuer and there is no standardisation. The value of an ETN on the secondary market may be adversely impacted by negative changes in the perception of the issuer's creditworthiness and cause the ETN to trade at a discount to its redemption value. While the primary risk factors of an ETF are market risk and where relevant, tracking error risk, the primary risk factors of an ETN are market risk and credit risk. Exhibit 2.1 summarises the differences between ETFs and other ETPs – ETNs in particular.

Exhibit 2.1. Differences between ETFs (UCITS-compliant) and ETNs

Differences	UCITS ETFs	ETNs
Structure	• Open-ended funds	• Debt instruments
UCITS-compliant	• Yes	• No – distribution through the Prospectus Directive
Diversification rules	• Strict diversification requirements under UCITS Articles 52-56	• No diversification requirement • Product could be exposed to a single asset or currency
Counterparty risk	• Independent custodian / depositary holds the fund's assets • Counterparty risk arising from over-the-counter (OTC) derivatives transactions is limited by UCITS to 10% of the NAV of the fund • Counterparty risk, as a whole, including that arising from other transactions (e.g. securities lending) is limited to 20% through UCITS Issuer Concentration Limits	• Not regulated • Investor is exposed to the credit risk of the issuer • Secondary market price could be affected by perceptions about the credit quality of the issuer
Collateral rules	• All assets must respect UCITS eligibility rules • Committee of European Securities Regulators (CESR) guidelines as transposed to apply to collateral for OTC derivatives transactions	• Counterparty risk need not be mitigated • Terms of collateralisation arrangements, if any, are at the issuer's discretion

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We can see from the above discussion that ETFs and other ETPs, such as ETNs, are separated by more than just a letter, but have sometimes been marketed as one and the same thing. When ETFs are used as UCITS wrappers, investors enjoy high standards of protection in terms of governance, custody of assets, investment and risk management policies and disclosure. Other ETPs such as ETNs cannot be UCITS and do not provide investors with the protection that UCITS offer. Hence, from investors' perspectives, the essential distinction between ETFs and other ETPs to recognise under the current regulatory framework corresponds to the difference between UCITS funds and non-UCITS products. Hence, we are in full support of the decision taken by ESMA in the creation of an ETF identifier.

Transparency Requirements for Financial Indices: Comments on Regulatory Developments

While indices have long played a crucial role in investment, index provision has not traditionally been a regulated activity. When regulators have imposed restrictions on indices that could be used by retail funds, these have been relatively high level: wide recognition and acceptance; wide dissemination and availability of public information about composition and methodology; and sufficient diversification.[21] It is only recently, against the backdrop of the rapid growth and diversification of indexing products, and in the shadow cast by integrity issues with the oil price and interbank rate benchmarks, that indices have received closer scrutiny and the question of imposing higher standards of methodological quality, governance and transparency upon indices has been discussed. In this insert, we review recent regulatory developments related to indexing with particular emphasis on the issue of transparency, which has taken on critical importance with the emergence of new forms of indices.

Regulatory developments in the period 2001–2012: UCITS III and the rise and diversification of indexing

The 'Product Directive',[22] which increased the investment freedoms of European retail funds (known as Undertakings for Collective Investment in Transferable Securities, or UCITS), introduced the first reference to financial indices in UCITS regulation. The Directive relaxed risk-spreading rules to allow for the replication of (apparently poorly diversified) "well-known and recognised" indices. It also permitted outright investment in financial derivatives and, recognising financial indices as an acceptable underlying for these derivatives, created the possibility of synthetic replication. The Directive authorised replication of indices recognised by the competent authorities as being sufficiently diversified; representing adequate benchmarks for the market to which they refer; and being published in an appropriate manner. These requirements were first clarified by the "Eligible Assets Directive". [23]

21 - Index funds and the use of indices by the asset management industry, International Organisation of Securities Commissions, February 2004. www.iosco.org/library/pubdocs/pdf/IOSCOPD163.pdf.
22 - 2001/108/EC
23 - 2007/16/EC

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To be considered an adequate benchmark, an index must measure the performance of a representative group of underlying securities in a relevant and appropriate way and be revised or rebalanced periodically, according to publicly available criteria, to continue to reflect the markets to which it refers. Transparency requirements with respect to publication are described as the "wide and timely" provision of "material information" on matters such as index calculation, rebalancing methodologies or index changes.

At the same time the Directive clarified that UCITS could indirectly invest in otherwise ineligible asset classes via derivatives tracking financial indices; the CESR subsequently issued guidelines[24] detailing eligibility conditions for hedge fund indices, which notably included the requirement that these indices be systematic and that UCITS carry out appropriate due diligence on the quality of these indices. The introduction of these broader investment freedoms facilitated the rapid development of index funds; they also allowed UCITS to pursue strategies that had previously not been possible, which created concerns about the possible retailisation of complex strategies. This prompted the successor to CESR, ESMA, to review the UCITS regulatory regime.

24 - CESR/07-434.
25 - ESMA/2012/832EN

The 2012 ESMA Guidelines: a benchmark for transparency

ESMA surveyed the industry and concluded that investors were not sufficiently informed about the risks of indices and that some indices appeared to have unstable objectives, rely on discretionary strategies, or maintain opacity with respect to methodology and composition. In July 2012, following two industry consultations, ESMA established new transparency requirements for index-tracking vehicles and updated the eligibility criteria of financial for all UCITS. These rules[25] are applicable to newly created funds since 17 February 2013; other UCITS have one year to comply. With respect to transparency, ESMA clarified that each index should have a clear, single objective and that the universe of the index components and the basis on which components are selected should be clear. ESMA went further and prohibited the use of indices that do not disclose their "full calculation methodology" or fail to publish "their constituents together with their respective weightings" at least up to the period preceding the last rebalancing. The regulator also required that this information be accessible easily and on a complimentary basis to investors and prospective investors. ESMA also prohibited investment in indices whose methodologies are not based on a set of pre-determined rules and objective criteria, or which permit the so-called "backfilling" of data. These requirements go beyond what would be needed for a high-level understanding of the objective, methodology and historical performance of an index, which would suffice for investor orientation and a basic screening of indices. The regulator's intention is to restrict the choice of indices to those that are systematic and for which sufficient transparency is provided for independent historical replication on a non-commercial basis, which allows one to audit the track record, gauge the exercise of discretion and conduct

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performance and risk analyses to assess the relevance and suitability of each index with respect to investor goals. In so doing, ESMA has taken a major step and introduced transparency in an industry which, with some exceptions, has been characterised, under the pretext of protecting intellectual property, by the low level of information given to investors on index methodologies and compositions.

While such 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 strategy indices, i.e. indices that aim to achieve a given risk/return objective. Indeed, while the latter can provide investors with improved risk/reward profiles or other benefits, they bring distinct risks of their own, notably the risk of periodic underperformance vis-à-vis market indices, which to date remain the primary benchmarks. Furthermore, while there are often several providers offering indices with comparable objectives, closer inspection reveals a wide diversity of assumptions, choices and methodologies and therefore model and parameter estimation risks. Unfortunately, these indices' low level of transparency on detailed methodology, which is routinely justified by the use of proprietary models, makes the evaluation of risks difficult.

The ESMA rules provide the minimum level of transparency allowing investors to do their pre-investment due diligence and integrate indices into a modern risk and investment management framework; at the same time, they fully preserve the index industry's ability to charge, inter alia, for live replication data and services.
2012–13: A global review of indices used as benchmarks

The recently uncovered manipulations of interbank interest rate benchmarks in various jurisdictions have given regulators a fresh mandate to review the regulatory regime of indices and benchmarks. In the autumn of 2012, the European Commission consulted on a possible framework for index provision; in January 2013, ESMA and the European Banking Authority (EBA) launched a consultation on principles for benchmark-setting designed to serve as guidance in the interim before potential European Regulation. In the same month, the International Organisation of Securities Commissions (IOSCO) launched the first of two consultations on financial benchmarks. The final ESMA/EBA principles were released in June, the final IOSCO Principles in July and the draft European Regulation in September 2013. Since these regulatory reviews were prompted by egregious cases of market abuse committed by data-contributing entities that had both the capacity to influence benchmark levels and the economic incentives to do so, they were from the start biased towards risks to index integrity heightened by conflicts of interest and the specific weaknesses of submissions-based benchmarks.

As a result, these consultations primarily approached transparency as one of several tools to address the risk of conflicts of interest rather than a prerequisite for informed investment and risk management. While all processes initially included statements in line with the promotion of a degree of transparency consistent with the needs of

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historical replication, they also associated transparency with the words "adequate" or "appropriate". The European Commission and IOSCO also used vocabulary indicating that they were sympathetic to the assumption that "governance" and transparency were substitutable, i.e. that some degree of opacity was tolerable in the presence of "strong" governance mechanisms or when the extent of discretion in the methodology was limited. These premises and assumptions paved the way for a backlash against transparency and a regression relative to the high standards introduced by ESMA.

In search of the best and cheapest disinfectant

Discussions about governance typically cover various internal controls and procedures intended to minimise the likelihood that conflicts of interest will affect integrity; these include segregation of duties and information barriers, internal reviews of compliance and whistle-blowing policies. They also mention the use of external, non-market-based, mechanisms such as audits and oversight committees. EDHEC-Risk Institute considers that the recurrence of scandals affecting highly-regu-lated institutions subjected to strict governance rules should lead lawmakers to question the ability of "strong" governance mechanisms to protect investors against abuse. Such scandals have not only underlined the limits of internal controls but also exposed the weakness of the external mechanisms that are expected to further mitigate the risks of abuse. Being appointed and remunerated by the very parties whose compliance they are expected to assure, the accounting and auditing profession is inherently susceptible to conflicts of interests. This has been well documented, including by the profession's own codes of practice and ethics, as well as richly illustrated by high-profile failures to live up to the profession's fiduciary duties with respect to stakeholders. In this context, one may question the wisdom of entrusting conflict of interest mitigation to parties that have proven their fallibility and remain structurally conflicted. As for "independent" oversight bodies, it is well documented that they may not be exempt from conflicts of interest themselves and are susceptible to capture by management or other powerful interests. Altogether, non-market based compliance mechanisms, even when they impose a strong fiduciary duty on their participants, have proven incapable of preventing major scandals in the past and little should be expected from their extension or reform. As Jonathan Macey, a professor at Yale Law School, has remarked: "Indeed, one of the great ironies of the myriad new corporate governance rules passed by courts, legislatures, administrative agencies, and stock exchanges in response to the collapse of Enron is that Enron itself met or exceeded the higher standards ostensibly promulgated to prevent future 'Enrons'.[26]

In its contributions to the aforementioned consultations,[27] EDHEC-Risk Institute warned that regulation focused on such an approach could be counterproductive and lead to heightened risks of abusive conduct, especially if it were implemented in a context preserving opacity. Indeed, certification effects, in particular those involving an official sanction by the regulator, increase moral hazard and adverse selection

26 - *Corporate Governance: Promises Kept, Promises Broken*, Princeton University Press, 2010.
27 - Responses to the consultations organised by the European Commission (November 2012), IOSCO (February 2013) and the European Supervisory Authorities (February 2013).

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by promoting a false sense of confidence based on the idea that governance rules and regulatory oversight resolve conflicts of interest issues and guarantee integrity.

EDHEC-Risk Institute has thus expressed caution against any temptation to trade lower levels of transparency for "stronger" governance mechanisms. It considers that transparency is the most powerful mitigator of conflicts of interest as it allows for the independent and multilateral verification of track records and puts the exercise of discretion under public scrutiny. More importantly, full transparency of methodology and historical information is required for investors to conduct thorough quantitative due diligence to measure the risks, costs and potential benefits of indices and assess their suitability in the context of their risk and investment management needs and constraints

EDHEC-Risk Institute also underlined that governance-based approaches impose significant compliance costs, which directly and indirectly reduce the welfare of investors: directly because compliance costs and the costs associated with the liabilities for non-compliance are eventually borne by investors, indirectly because these costs – which fall disproportionately on small and less established providers – create barriers to entry and lead to further consolidation of an industry which historically has been very concentrated, which does little to promote competition, lower prices and innovation. This orientation favours an oligopolistic market structure of the sort which in the past never protected against scandals but instead guaranteed that any scandal had systemic proportions.

It should also be remarked that while index integrity can be readily verified when there is full transparency and failure to provide the latter can be sanctioned by non-eligibility before any party has been harmed, detection of abuse by other governance means is eventually subject to the reliability and integrity of costly mechanisms, may involve sanctioning that takes place long after some party has been harmed, and may entail great expense for the taxpayer and/or the defendants seeking redress. In other words, governance-based approaches are not only ineffective, but also inefficient.

The 2013 IOSCO Principles for Financial Benchmarks: the low point for transparency?

The IOSCO Principles for Financial Benchmarks encompass governance principles that notably include the need to establish a control framework and an internal oversight function; Benchmark and Methodology Quality principles that seek to promote quality, integrity and continuity; and Accountability principles that introduce complaints procedures and audits of compliance. While these principles introduce positive advances with respect to quality of benchmark and methodology, their emphasis is on governance to protect integrity and address conflicts of interest, and on accountability to document compliance. Transparency is approached as one dimension of methodology quality and is limited to the provision of minimal disclosures, on a par with current index industry practices. This is in stark contrast

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with the progress that could have been expected from IOSCO's initial report,[28] which contained unambiguous language about the lack of transparency in the index provision industry as well as ambitious investor-protection targets: "Transparency should be sufficient to allow interested parties to understand how a benchmark is derived (including the ability to replicate a published benchmark level to assess its plausibility and detect inaccuracies or potential manipulation), what it measures and therefore understand the suitability of the benchmark for their purposes and any limitations or risks of the methodology."

After its first consultation, IOSCO noted the lack of consensus among respondents with respect to transparency, with some expressing concerns that it would undermine index providers' intellectual property and others supporting full transparency to allow for independent replication. In spite of this reported support for a high level of transparency, the notion of replicability disappeared from the draft IOSCO Principles[29] and the transparency objective was lowered: "The published methodology should provide sufficient detail to allow stakeholders to understand how the benchmark is derived and to assess its representativeness, its relevance to particular stakeholders, and its appropriateness as a reference for financial instruments." The final IOSCO Principles conserved this wording but clarified that the adequate level of transparency it was requiring did not equate full disclosure of methodology or historical data and that the disclosure of "summary information and key features" would be sufficient for compliance (provided indices were produced with data sourced from regulated markets or exchanges with mandatory post-trade transparency requirements). This evolution reflects IOSCO's acceptance of the index providers' contentions that they have "strong market incentive to provide the best transparency to stakeholders" and that full transparency would be detrimental to stakeholders.

28 - CR01/2013.
29 - CR04/2013
30 - ESMA/2013/SMSG/03

Europe at a crossroads

In the elaboration of their principles, ESMA and EBA rejected the ESMA Securities and Markets Stakeholder Group's suggestion[30] that the governance and transparency approaches were substitutable and that index providers should be allowed to choose with which to comply with the expectation that less established providers would opt for transparency to avoid being priced out by the disproportionate costs of the governance-based approach. The ESMA-EBA Principles for Benchmark-Setting Processes in the European Union cover methodology, governance structure, supervision and oversight, and transparency. They promote a version of transparency that is consistent with that provided under the UCITS framework but is undermined by references to intellectual property rights as an acceptable basis for restricting access to information: "A benchmark should be transparent and accessible to the public, with fair and open access to the rules governing its establishment and operation, calculation, and publication ... A high degree of transparency on the process determining a benchmark, or any modification thereof, will enhance confidence in its integrity, which would also help foster understanding of the benchmark in the market place. Transparency may be limited in exceptional circumstances only, based

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on contractual provisions safeguarding confidentiality and intellectual property rights. The full methodology along with historical records should be disclosed to the public wherever possible in order to make it fully replicable."

The draft European Regulation on indices used as benchmarks in financial instruments and financial contracts[31] makes benchmark provision a regulated activity subject to initial authorisation and substantial ongoing requirements supported by credible administrative measures and sanctions for non-compliance. Its requirements cover governance and control; data and methodology; and transparency and consumer protection. While broadly consistent with the IOSCO Principles, the proposal shows a stronger concern for the ability to assess the accuracy, reliability and suitability of benchmarks, which would justify higher transparency requirements.

Indeed, the impact study[32] accompanying the proposal unambiguously recognised the importance of index replicability and endorsed full transparency as a preferred policy option: "With access to both the data and the methodology, investors and regulators would be able to replicate or back-test the benchmark in order to assess its accuracy. Full transparency about what the benchmark measures, how it should be used and its shortcomings would enable regulators and the public to be fully informed about the economic reality a benchmark is intended to measure and of any shortcomings it may have in tracking this." However, EDHEC-Risk Institute is of the view that this ambition does not appear as clearly in the proposal: replicability is mentioned only in relation to the records that a provider needs to keep in the event the index were audited, and the imprecise wording of transparency provisions does not guarantee that a high level of transparency on methodology will be provided to investors. That such an organisation as IOSCO could be sold on the idea that the level of transparency should be left to the discretion of index providers illustrates how much the full transparency objective identified by the European Commission will be at risk of dilution in the course of the legislative procedure. European lawmakers should thus exert the utmost caution in respect to the wording of the proposal, lest transparency and the ability to back-test benchmarks be irremediably compromised, with significant adverse impact for investor welfare.

31 - COM(2013) 641 final
32 - SWD(2013) 337/2

EDHEC-Risk Institute's recommendations

EDHEC-Risk Institute advises lawmakers to balance the benefits of governance and control requirements with their direct and indirect costs for investors and to be wary of promoting a misplaced sense of confidence in benchmarks on the basis of governance-based regulation. To promote fair competition and a high level of investor protection in the indexing industry without creating barriers to innovation, EDHEC-Risk Institute considers it key to focus regulation on the responsibility of professional investors and intermediaries to conduct due diligence on the integrity, quality and suitability of benchmarks and to ensure that the necessary transparency be provided for the discharge of these duties. This calls for the provision of both historical data (index levels, components and weightings) and methodology with

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a level of precision allowing for independent replication of the index track record. EDHEC-Risk Institute also suggests that lawmakers ensure that all interested parties enjoy the right to use this data freely, including for the purposes of research, index evaluation and performance comparisons. This would not only allow third-party asset managers and end-investors to perform their due diligence at minimal cost, but also foster public debate on the strengths, weaknesses, benefits, costs and risks of indices, which in turn would create the conditions for a genuinely efficient index market. Providing the public with the information required to independently replicate an index for such purposes should not be misrepresented as denying index providers the right to protect and enforce their intellectual property rights or as threatening the economic viability of the index provision industry. There are legal (for example, patents) as well as contractual tools (for example, licenses) to defend index providers against the unauthorised use of their methodologies and data. Beyond these, there is also the strong "natural protections" afforded by the added value, for example the brand or services, that index providers provide to the lawful users of their products. EDHEC-Risk Institute also notes that the transparency required for historical replication of indices can accommodate important time lags in the release of the underlying data, thus greatly reducing opportunities for free-riding or for front-running by parties that have not subscribed to the index feed. Opacity typically increases the scope for conflicts of interest to play out as abuse and, worse, practically denies the public the ability to assess the relevance and suitability of indices and to manage their risks properly. Opacity should therefore not be tolerated by regulators as a blanket protection against intellectual property infringements or, in the context of indexing, presented as a way of protecting the interests of investors.

Overview of Risks Associated with European ETFs

In this insert, we will summarise the potential risks associated with different ETF replication methods (see Exhibit 2.2), with a focus on counterparty risk and the liquidity risk.

Section 1: Counterparty risk

Initially, counterparty risk concerned only swap-based ETFs. Since the swap-based ETFs do not hold the exact underlying portfolio (unfunded swap-based ETFs hold a substitute basket of securities which do not necessarily match the underlying portfolio; funded-swap-based ETFs have the claim for the collateral posted by the swap counterparty in a segregated account with a custodian in the event of counterparty default) but deliver the return of the underlying through an OTC swap contract, investors are exposed to counterparty credit risk (i.e. the risk that the counterparty defaults or fails to deliver the index return), in particular, the outperformance of the index over the collateral basket.

2. Background

In Europe, all ETFs except those based in Switzerland are structured as UCITS. Hence, the counterparty risk arising from OTC derivatives transactions is strictly limited by the UCITS regulation, which explicitly states that exposure to a counterparty should not exceed 10% of the net assets of the fund. To avoid violating this rule, synthetic ETF providers typically start by fully collateralising or over-collateralising the swap exposure via a diversified pool of securities, monitoring the counterparty risk exposure on a daily basis, and generally imposing safety margins for resetting swaps (posting additional collateral) to stay well below the UCITS limit on counterparty exposure. A survey of European ETF providers conducted by Johnson *et al.* (2011) concludes that unfunded structures tend to have counterparty risk between zero and 10% of the ETF's NAV and that counterparty risk is usually negative in funded structures due to over-collateralisation.

In the event of a default by the swap counterparty, what really matters is the level of collateralisation and the marketability of the collateral or the assets in the substitute basket. The substitute basket or the collateral held by a third-party is marked-to-market on a daily basis. The collateral composition and management follow the relevant CESR rules if transposed and/or additional or alternative Member State requirements. CESR rules concern liquidity, daily valuation, issuer credit quality, correlation with OTC counterparty, diversification, operational and legal risks, third-party custodian, full enforceability, and investment limits.[33] While CESR rules are high-level principles, they may be complemented by precise Member State standards, further mitigating risk. In the case of an unfunded swap, the assets in the substitute basket do not need to follow CESR rules on collateral but still need to comply with the provisions of UCITS, notably on asset eligibility.

In response to the recent discussion on counterparty risk, Johnson *et al.* (2011) note that great progress has been made with respect to disclosure of information about the composition of substitute/collateral baskets. There are many synthetic ETF providers publishing the composition of their collaterals and daily counterparty risk exposure on their websites (Bioy 2011). Therefore, ETFs, in fact, are offering higher standards of transparency compared to other UCITS funds that also employ OTC derivatives.

On the other hand, financial regulators and international organisations have noticed that synthetic replication is not the only source of counterparty risk. Securities lending, in which physical replication ETFs[34] engage to boost their returns, is a bilateral collateralised operation that creates counterparty risks similar to OTC swap transactions, as observed by the FSB (2011).[35] The Johnson *et al.* study (2011) finds that, with one exception,[36] none of the synthetic ETF providers in Europe engage in any securities lending. The follow up survey by Bioy (2011) finds the mirror image for physical replication ETF providers: only one provider reports not engaging in securities lending.[37] Thus in general, issues associated with securities lending will concern the physical replication ETFs, but not the swap-based ETFs. In securities

33 - Non-cash collateral cannot be sold, re-invested or pledged and cash collateral can only be invested in risk-free assets.
34 - UCITS and non UCITS funds, end-investors such as pension funds and insurance companies, and other professional investors also engage in this practice. Among other things, securities lending is required for short-selling activities, which have been found to improve market quality, see for example Boehmer *et al.* (2010). Securities lending does not appear to impact security prices, see Kaplan, Moskowitz and Sensoy (2011).
35 - Note that leaving aside OTC transactions, securities lending and repurchase agreement activities (all of which are secured transactions), counterparty risks also arises from purchases of fixed income securities, certificates, warrants, exchange-traded notes, and contracts for differences (all of which are typically unsecured transactions). See Deutsche Bank (2011).
36 - ComStage ETF announces it may lend out up to 100% of the securities held by its ETFs against collateral equivalent to 100% of the loan value.
37 - A small provider named Think Capital.

2. Background

lending, portfolio owners (in this case ETF providers) initiate a loan with the broker/dealer (borrower) to lend out part (or all) of the securities underlying the index they track in return for a fee and (cash, or typically non-cash) collateral.[38] The purpose of the transaction is to collect a fee that will be used to partially (or fully) offset the fund's fees and expenses and reduce its tracking error.[39] Bioy (2011) also reports that the level of securities lending varies significantly from provider to provider and from fund to fund – in general up to 100% of the funds' assets.

Therefore, physical ETFs, which have lent out their shares, are also exposed to the counterparty risk, just like synthetic ETFs. However, the amount of counterparty risk assumed through securities lending operations is not subject to specific limits under UCITS. Despite this, CESR has clarified[40] that net exposure to a counterparty generated through a stock lending or a repurchase agreement must be included when calculating the issuer concentration limit of 20%.

Here again, what matters is the level of collateralisation and the marketability of the collateral provided. However, the collateral for securities lending does not need to comply with the CESR principles as the funded swap-based ETFs do because CESR Guidelines are only applicable to OTC derivative transactions. Bioy (2011) notes that the level of investor protection[41] against the counterparty risk resulting from securities lending varies across providers of physical replication ETFs and explains that, with one exception,[42] not enough information is provided on a timely basis to allow investors to assess the counterparty risk assumed. However, the ETF provider will normally require haircuts (margins) on the collateral received and mark the securities on loan and the collateral to market to ensure that the value of the collateral exceeds that of the loaned securities (Amenc *et al.* 2012a).

In summary, the counterparty risk is not specific to synthetic ETFs – physical ETFs which engage in securities lending are also exposed to a similar level of counterparty risk. However, such risks are well limited by the current UCITS regulation (either the 10% limits for OTC transactions or 20% for the maximum exposure to a single issuer) in Europe. Moreover, all UCITS can engage in OTC derivatives and securities lending transactions within the same limits. Therefore, the recent criticisms of counterparty risk will promote higher levels of transparency; but this might also mislead investors into focusing on the risk issues alone, (which are well regulated) and forgetting the benefits of such structures – synthetic ETFs offer access to markets which are difficult for physical replication and physical ETFs with securities lending operations could reduce the TER of the funds and play an important role on the liquidity and price efficiency.[43] Now we move the discussion to the liquidity risk.

Section 2: Liquidity Risk

ETFs are often presented as combining the diversification benefits of mutual funds and the transparency, liquidity and regulatory oversight afforded to instruments listed on public markets. The liquidity of an ETF stems not only from the exchange's order book and market making activity,[44] but also from direct creation and redemption

38 - Dive *et al.* (2011) have shown that in Europe only about 20% of securities on loan receive cash collateral, while about 90% of securities on loan use cash collateral in the US.
39 - Deutsche Bank (2011) estimates that security lending may account for up to one third of physical ETF providers' revenue
40 - CESR 10/788, Box 27.
41 - E.g. nature of collateral, level of over-collateralisation applied, selection of borrowers, marking of collateral, and borrower default indemnification.
42 - BlackRock started disclosing the details of its securities lending activities on a quarterly basis in 2011 and on a daily basis in October 2011.
43 - Many academic papers have shown, both theoretically and empirically, that when securities lending becomes difficult this reduces the market quality. Theoretically, restrictions on short-selling negatively impact the underlying market either by restricting the participation of optimists (see inter alia Miller 1977) or decreasing the informational content in stock prices (see Diamond and Verrecchia 1987; Chen *et al.* 2002; Bai *et al.* 2006). Depending on further hypotheses, this can translate into overpricing followed by reversals (see Miller 1977; Chen *et al.* 2002; Chen and Stein, 2003; Bai *et al.* 2006). Empirically, short selling is found to improve price efficiency (Bris *et al.* 2007; Boehmer *et al.* 2008; Boehmer and Wu, 2010b) and constraints are found to negatively impact market quality (see Chen *et al.* 2002; Jones and Lamont, 2002; Boehmer *et al.* 2009; Lioui, 2011; Saffi and Sigurdsson 2011).
44 - Official market making or liquidity provision takes place in the context of contractual agreements with the exchange. Each market venue determines the obligations of the market maker; typically, a market maker will be required to quote bid and ask prices for a minimum amount and keep the bid-ask spread between a set limit.

2. Background

of ETF shares by so-called authorised participants (see following text on "Primary and secondary markets" for the description of in-kind creation and redemption process). 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. 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 (Mussavian and Hirsch 2002; Kalaycioglu 2004; Engle and Sarker 2006).

A number of recent reports have mentioned potential liquidity issues with ETFs. The FSB seems to be concerned with the possibility that massive cash redemptions of ETF shares could cause liquidity problems at ETFs and swap counterparties when the underlying assets being tracked are "less liquid" than the ETF. The BIS (2011a) has described a scenario that sees concerns about counterparty risk trigger massive redemptions, which in turn causes liquidity problems that heighten counterparty risk and starts a feedback loop.

The first argument itself is in fact confusing because the liquidity of an ETF is determined by the liquidity of the underlying securities. If the underlying securities are illiquid, it is to be expected that the ETF will be illiquid. ETFs are designed to track an underlying portfolio rather than to improve the liquidity of its individual constituents. Besides, the possibility of a liquidity problem arising from maturity transformation as mentioned by the FSB is not specific to ETFs, but is common to all open-ended funds invested in assets with low liquidity when they are faced with large redemptions.[45]

As for the concern that synthetic replication or securities lending by ETFs would lead to higher liquidity risk, it is first of all, it is worth noting that the effective liquidity of an ETF does not depend on the replication methodology, but rather on the liquidity of the underlying assets; other things equal, the more illiquid the underlying, the larger the bid-ask spread should be. Secondly, we shall look into the potential implications in the case of redemption for synthetic ETFs and physical ETFs with securities lending operations.

When redemption is required for a swap-based ETF, it has to unwind the swap. The counterparty bank then loses its short position on the tracked underlying and its long position on the substitute/collateral basket; to keep its market position unchanged it will purchase the substitute/collateral basket from the fund and sell the tracked portfolio to the fund – the liquidity of the bank is impacted only at the level of the difference in values (i.e. the counterparty risk) and it will typically be hedged against market risk. Besides, the bank will generally have borrowed the assets in the substitute/collateral basket from a third-party, in which case it will simply return them and will not be directly affected by their possible relative lack of liquidity (Dubois 2011; Lomholt and Juul 2011).

Assuming that an ETF has engaged in securities lending, it will have to call back the loaned components of its portfolio and return the collateral received. For the

45 - UCITS cannot be directly invested in property. The German open-end real estate funds that offered daily liquidity for close to 50 years (see Ducoulombier 2007) but have been affected by multiple liquidity crises leading to suspensions of redemptions and liquidations over the past six years were not UCITS.

2. Background

ETF provider, returning the physical collateral will be straightforward if it is not encumbered and returning the cash collateral will not be a cause for concern if it has been invested in liquid and low-risk assets; if the physical collateral is itself on loan, then it will have to be called back. For ETFs engaged in securities lending, as previously mentioned in the counterparty risk section, collateral does not necessarily comply with the CESR Guidelines – prescriptions on liquidity, credit quality and prohibition on rehypothecation[46] and restrictions on reinvestment. Therefore, the possible rehypothecation and reinvestment in high-risk assets would lead to potential liquidity risk when calling back the collateral. However, some Member States have imposed strict restrictions on the use of collateral from securities lending.[47] In addition, UCITS asset eligibility rules still apply to the ETF, limiting liquidity risk. The position of the asset borrower with respect to returning the securities is similar.

In the worst case scenario (i.e. when a swap or securities lending counterparty defaults) the liquidity of the ETF is indeed affected by the extent of collateralisation and the marketability of the substitute/collateral portfolio, which goes back to our previous discussion on the counterparty risk for relevant UCITS regulations.

Therefore, ETFs should not be blamed for reflecting the liquidity of the indices they track or the underlying assets to which they are exposed. Furthermore, the possibility that large redemptions will create stress on the underlying markets is not at all specific to ETFs, but is common to any open-ended investment fund.

To summarise, the various risk exposures (not only the counterparty and liquidity risk) for ETFs with different replication methods, we include the Exhibit 2.2 in the text, which focuses on three types of structures: full replication with securities lending, sampling replication with securities lending and synthetic replication without securities lending. We choose these three categories as we believe that they cover the most common practices in the industry. As physical replication includes both full replication and sampling replication (i.e. optimisation), and each results in different levels of risk exposure, we separate these two cases. Note that the fact that physical replication without securities lending is not reviewed here should not be seen as an indication that it is devoid of the risks that have been discussed heretofore; for example, a physical replication ETF would be exposed to (typically uncollateralised) counterparty risk if it invested in a bank-issued certificate representing ownership of stock.[48]

46 - It refers to that pledging the collaterals received for a loan into another loan.
47 - For example: Ireland makes it clear that non-cash collateral cannot be sold, pledged or re-invested and that restricts reinvestment of cash collateral to what is traditionally viewed as low-risk assets.
48 - UCITS limits on counterparty risk would also apply.

2. Background

Exhibit 2.2 Summary of risk sources for different types of replications – UCITS ETFs

Risk sources	Full replication with securities lending	Sampling replication with securities lending	Synthetic replication without securities lending
Tracking error risk	• Depends on transaction costs, ease of access to and liquidity of underlying, tax treatment and ease of reinvestment of dividends. • Can be low for the most liquid market and high for less-liquid markets thus making sampling or synthetic replication more attractive.	• Reduced transaction costs relative to full replication and possibly tracking error. However, the sampling approach can cause significant tracking error, particularly in stressed periods.	• Lowest but not necessarily zero, the index performance served needs to be defined to correspond exactly to the performance of the index tracked, and the issue of dividend taxation does not completely disappear.
Counterparty risk	• Main source : securities lending counterparty / counterparties		• Main source: swap counterparty / counterparties
	• Counterparty risk arising from OTC derivatives transactions is limited to 10% of the fund's NAV by UCITS. • Counterparty risk arising from other transactions (e.g. securities lending) is not addressed explicitly but is limited by issuer concentration limit of 20% (CESR has clarified that net exposure to a counterparty generated through a stock-lending or repurchase agreement must be considered from the point of view of issuer concentration limit).		
Collateral risk	• Limited by standard UCITS asset eligibility rules.		• Funded swap: Limited by CESR guidelines as transposed (prescriptions on liquidity, credit quality and prohibitions on rehypothecation and reinvestment).
			• Unfunded swap: the assets in the substitute basket are not technically collateral; they need to comply with UCITS asset eligibility, liquidity and diversification rules.
Liquidity risk	• Potential direct or indirect liquidity risk when large redemptions occur and the underlying is relatively illiquid.		
	• The fund will call the on-loan securities back – while a squeeze is unlikely, its consequences would be primarily felt by the borrower of the securities, not the ETF.		• The fund will unwind the swap, sell the substitute/collateral basket to the swap counterparty and buy the index – while a squeeze is unlikely, its consequences would be felt by the bank delivering the securities or the party from which they were borrowed by the bank, not the ETF. Typically, the bank will be hedged.
	• Should the counterparty default, the fund would have to sell the collateral to meet redemptions; if the collateral is relatively illiquid (see collateral risk above), there is a risk. Over-collateralisation is recommended.		
Legal risk (in case of counterparty default)	• Securities lending collateral recourse may be hampered by existence of multiple competent jurisdictions across Member Countries. Use of a master agreement is recommended.		• For funded swaps, differences exist between title transfer and pledge agreements (although in theory collateral should be available without recourse to the counterparty).

The remaining risk source to cover is the tracking error risk. Assuming proper collateralisation of securities lending operations, which takes place in practice, Exhibit 2.2 shows broadly similar levels of risk exposure across replication structures, except for tracking error risk. For physical replication, tracking error depends on transaction costs, ease of access to and liquidity of the underlying assets, as well as dividend taxation and reinvestment issues – costs, delays, dividend payments

2. Background

and associated taxes, index turnover creating tracking error – all of which can be substantial. Physical replication typically leads to higher TERs and higher tracking error than synthetic replication. Sampling or optimisation allows physical replicators to reduce their trading costs (e.g. by shunning the least liquid subsets of the index being tracked) but relies on the stability of the correlation between the portfolio that is held (which incidentally may contain assets that do not belong to the index but improve correlation and/or performance) and the index. If the correlation deteriorates, the tracking error can suffer and end up being higher than with full replication (assuming it is feasible). Sampling is particularly popular with ETFs tracking broad indices and emerging markets. A synthetic ETF will enter into an OTC swap with a counterparty that will guarantee that the ETF receives the index return – the effective quality of the tracking will depend on the costs of the swap and any difference between the index being tracked and the index being used as a reference (e.g. arising from differences in the treatment of dividends).

Exhibit 2.2 shows that although ETFs may be constructed in different ways, their risk exposures with respect to counterparty risk, collateral risk and liquidity risk are comparable within the UCITS framework. As far as counterparty risk is concerned, it makes more sense to address the issue through clear guidelines on counterparty risk mitigation up to the quality, marketability and diversification of assets performing the economic role of collateral rather than making distinctions between the different structures of ETFs. In addition, transparency should not be restricted to the problems posed by counterparty risk and its mitigation, but should include disclosure of the revenues and costs from ancillary activities such as securities lending.

Section 3: How UCITS ETFs compare to other UCITS funds

In Europe, almost all ETFs are structured as UCITS, except those listed in Switzerland. The market share of UCITS ETFs is less than 5% of the total AUM of the UCITS funds at the end of September 2012.[49] However, in our discussion on the rising concerns regarding the counterparty risk and liquidity risk exposed by synthetic ETFs and physical ETFs which engage in securities lending (see Section 1 and 2), it seems that only ETFs are exposed to such risks but not with other UCITS funds. It is useful to take a close look at the differences between the UCITS ETFs and other UCITS funds.

Investors should clearly understand that ETFs are not special entities that are distinct from other UCITS, but that they are wrappers for UCITS funds that need to comply with additional listing rules set by exchanges (see the summary in Exhibit 2.4). When UCITS regulated funds (including ETFs) use derivatives, they do so within a precise regulatory framework and comply with clear rules which have been approved by market regulators. While securities lending operations do not enjoy the same level of scrutiny, this is not specific to UCITS.

Exhibit 2.4 summarises the relevant rules on the potential risk exposure. As for the use of derivatives, counterparty risk, collateral rules and diversification rules, they are applicable for all UCITS funds, including ETFs. For instance, UCITS requires

49 - Computed from the BlackRock (2012b) and EAFMA statistics. European ETFs AUM of $308bn and Total UCITS AUM of $6223bn as at September 2012.

2. Background

that the exposure to any individual counterparty for an OTC derivative contract be limited to 10% if the counterparty is a credit institution. In addition, the collateral backing OTC derivative contracts is subject to liquidity and credit risk criteria defined by CESR Guidelines, when transposed into Member State law. To respect these rules at all times, UCITS managers (including ETF providers) usually implement stricter requirements.

Furthermore, funds that seek an exchange listing need to comply with the rules set by the exchange, which can go beyond the minimum requirements of UCITS (e.g. to comply with additional Member State level rules). For instance, the leading venue for listing ETFs, NYSE Euronext, requires that at least one liquidity provision agreement exists. The liquidity provider undertakes to quote two-way bid and offer prices with a minimum volume size or capital amount and within a minimum price range or spread. The ETF issuer is also required to calculate and disseminate the indicative NAV of each of its ETFs to global data vendors.

Exhibit 2.3 Comparison of rules applied to UCITS ETFs and other UCITS funds

	UCITS Exchange-traded funds	Other UCITS funds
Applicable UCITS rules: these rules apply to ETFs but also to all other UCITS funds		
Derivatives	• Financial derivative instruments dealt on a regulated market or over-the-counter (subject to asset and counterparty eligibility, daily valuation and liquidity).	
Counterparty risk	• The risk exposure to a counterparty of the UCITS in an OTC derivative transaction should not exceed either 10% of its assets when the counterparty is a credit institution or 5% of its assets, in other cases. • Overall counterparty risk, including that arising from other transactions (e.g. securities lending) is limited to 20% via UCITS issuer concentration limits and may be further restricted at the Member State level.	
Collateral rules	• The collateral used to reduce counterparty risk exposure in the context of an OTC derivative transaction must satisfy a set of high-level principles defined by CESR Guidelines as transposed in Member State level. • Among the CESR guidelines for collateral, one can highlight the following rules: - Liquidity of collateral: The collateral "must be sufficiently liquid" and "valued on a daily basis"; - Credit quality of collateral: If there is a less than 'very high grade' credit rating, haircuts may be used. Haircuts can also be used to deal with volatility of collateral; - Use of collateral: Non-cash collateral cannot be sold, pledged or re-invested; cash collateral can only be invested in risk-free assets.	
Diversification rules	• Individual limits: A UCITS shall invest no more than 5 % of its assets in transferable securities or money market instruments issued by the same body with the same issuer, or 20% in the case of deposits. • Issuer limits: A UCITS shall not investment more than 20 % of its assets in a single body via transferable securities, money market instruments, deposits or exposures arising from OTC derivative transactions undertaken with that body. • Exceptions to the above apply in the context of master-feeder agreements.	
Disclosure requirements	• For each UCITS, the management company shall publish a prospectus, an annual report for each financial year and a half-year report to cover the first six months of the year. • Member States can require the UCITS to publish a self-contained short document containing key information for investors, including: - UCITS identification; - Description of investment objectives and policy, past-performance or performance scenarios; - Costs and associated charges; - Risk/reward profile, including appropriate guidance and warnings in relation to the risks associated with the investment.	

2. Background

Applicable listing rules to be listed on exchange (e.g. NYSE Euronext)		
Market maker	• For the listing of ETFs there must be at least one liquidity provider. • The market maker must display continuous bid and ask prices for a minimum quantity and a maximum spread defined by the exchange.	• Not applicable for UCITS funds that are not traded on an exchange.
Size of issue	• At the time of admission, the expected market capitalisation of the ETF must amount to at least EUR5 million, and at least 25% of the issued capital must be distributed to the public.	• Not applicable for UCITS funds that are not traded on an exchange.
Disclosure requirements	• In the case of ETFs, the disclosure conditions set for admission to listing have to be met on a continuous basis. • ETFs must be able to compute and need to publish an indicative Net Asset Value throughout the day.	• Not applicable for UCITS funds that are not traded on an exchange.

Based on Exhibit 2.4, we can conclude that the rules applied to UCITS ETFs are not less stringent, but much stricter than those applied to other UCITS funds. It is somewhat surprising that there is more concern about the possible issues associated with these highly-regulated funds, instead of general concern about UCITS regulated funds on the whole. Hence, if further improvement of regulation is required, it is more reasonable to target UCITS funds and not ETFs alone.

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.

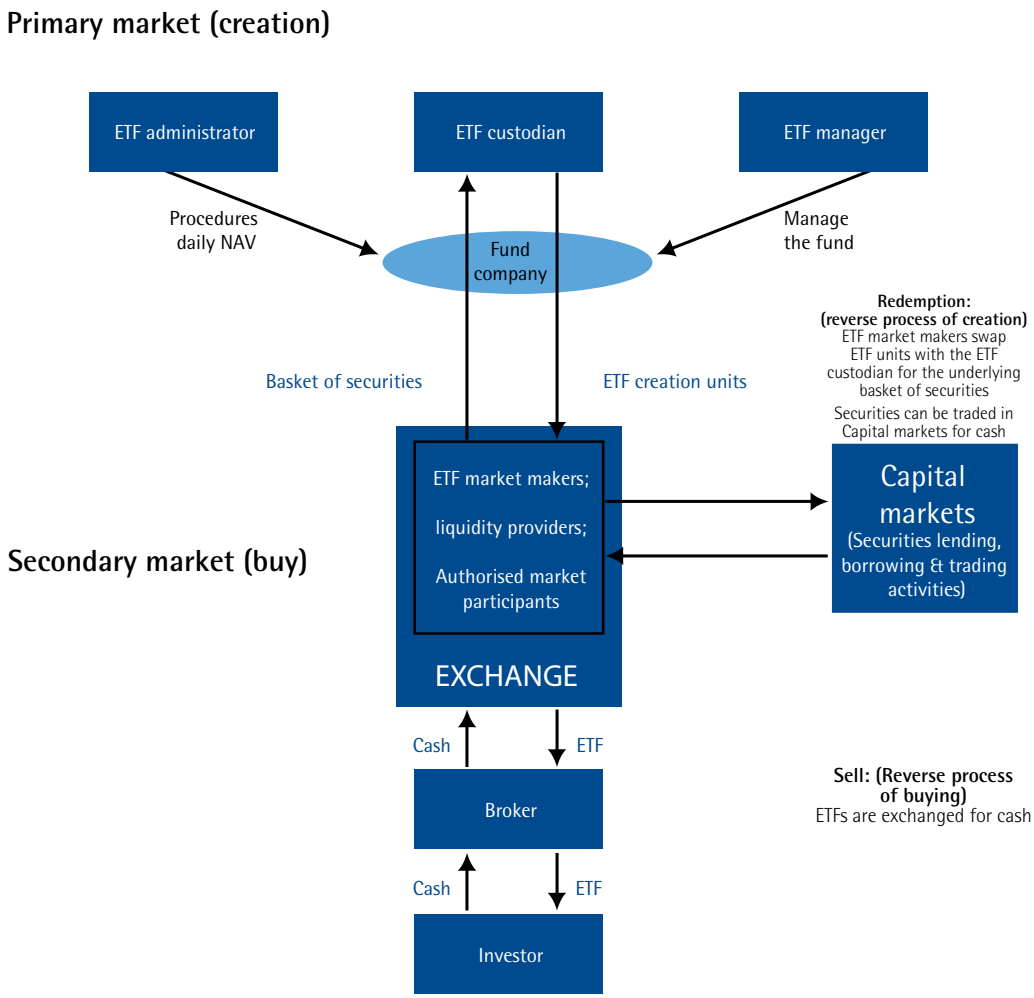
Primary and Secondary Markets

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 2.4 and 2.5 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

2. Background

Exhibit 2.4. 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.



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 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

2. Background

Exhibit 2.5: Typical activities during an ETF transaction in primary and secondary markets

1	Liquidity providers 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 of 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 numer of ETF units with the ETF custodian for the underlying basket of securities, which can then be sold for cash in the secondary market.

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 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.

2.3. 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

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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.[50] 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 first on the market and are still the most important type.[51] Broad market ETFs attempt to replicate the returns of the entire stock market as reflected by a 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 *et al.* 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 subject of some discussion. Drenovak *et al.* (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

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

51 - 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.

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have started to launch local currency emerging market bond ETFs.[52]

ETFs do 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 represents 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).

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.[53] 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).

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 in 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

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

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

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(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 – 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 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).

2.4. Smart Beta ETFs

Recently, the standard practice of using a capitalisation-weighting scheme for the construction of indices has been the target of harsh criticism. Nowadays, a growing demand for indices as investment vehicles has led to innovations including new weighting schemes and alternative definitions of sub-segments. There are many recent initiatives for non-cap-weighted ETFs as well. 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-

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cap-weighted indices,[54] including equal-weighted ETFs, minimum variance ETFs, characteristics-weighted ETFs, etc.[55] 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 CNBC,[56] about 7% of ETF assets are linked to smart beta indices and such ETFs have seen a 43% growth over 2013 compared to a 16% growth of the overall ETF market. Moreover, a study from Cogent Research reveals that about half of institutional investors will increase their investment in smart beta ETFs over the next years. [57]

Performance of Smart Beta Indices

Modern Portfolio Theory (MPT) states that investors should allocate their wealth between a tangency portfolio, or a maximum Sharpe ratio (MSR) portfolio, and a riskless asset. Therefore, the only portfolio of risky assets that should be of interest to a rational investor is the MSR portfolio. Implementing this objective of Sharpe ratio maximisation, however, is a complex task because of the presence of estimation risk for the required expected return and risk parameters. Therefore some methodologies for constructing diversification strategy indices do not explicitly aim to obtain a portfolio with an optimal risk/reward ratio, but instead adopt heuristic approaches to diversification by trying to have fewer parameters to estimate or parameters whose estimation would be easier.

Heuristic or *ad-hoc* strategies, which have objectives different from Sharpe ratio maximisation, can be further categorised into *deconcentration and decorrelation*-based approaches. *Deconcentration*-based strategies simply focus on reducing the weight and risk concentration of portfolios by spreading out the constituents' weights or their risk contributions equally.[58] *Decorrelation* strategies focus on risk reduction that stems from the fact that assets are imperfectly correlated. In contrast to these heuristic approaches, scientific or *efficient diversification* methodologies are based on the theoretical framework of MPT and aim at obtaining efficient frontier portfolios, i.e. portfolios that obtain the lowest level of volatility for a given level of expected return (and thus the highest risk-adjusted return). All smart beta strategies can be seen as a response to shortcomings of cap-weighted equity indices like high concentration or risk-return inefficiency (Malevergne, Santa-Clara and Sornette (2009) and Goltz and Le Sourd (2011)). We will provide an analysis of the performance of three heuristic diversification weighting schemes (Maximum Deconcentration, Diversified Risk Parity and Maximum Decorrelation) and then two *efficient diversification* strategies, namely Efficient Minimum Volatility and Efficient Maximum Sharpe by drawing on indices published by ERI Scientific Beta for these five weighting schemes (detailed description of methodologies can be found in Gonzalez and Thabault (2013)).

Most smart beta indices are marketed on the basis of outperformance, but usually their back-tests are conducted over a limited time period. Critics of smart beta often

54 - For instance, PowerShare adopted fundamental index methodology and launched PowerShares FTSE RAFI ETFs cover both the US and global markets since 2005. Wisetom 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.

55 - Rydex introduced the first equal-weighted ETF in 2003. It tracks S&P Equal Weight Index. iShares and Ossiam also launched equal-weighted ETFs in 2011. Most recently, in May 2011, PowerShare launched the first beta and the first volatility weighted ETFs.

56 - "Smart beta: Beating the market with an index fund", CNBC, 7 November 2013, <http://www.cnbc.com/id/101149598>

57 - See <http://www.marketwired.com/press-release/smart-beta-etfs-poised-for-growth-among-institutional-asset-managers-nasdaq-qqq-1861354.htm>

58 - The risk contribution of a constituent is defined as the product of the constituent's weight with the marginal contribution of this constituent to the total portfolio volatility.

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question the robustness of these strategies over the long term. Exhibit 2.6 shows that in the long term (40 years),[59] all the diversification strategies deliver higher returns than the cap-weighted reference index with annualised outperformance of more than 2.3%. Moreover, all of the diversification strategy indices exhibit better risk-adjusted performance, with Sharpe ratios ranging from 0.38 to 0.45 (compared to 0.24 for the cap-weighted reference index). The Efficient Minimum Volatility index delivers a volatility of 14.73% compared to 17.47% for the cap-weighted benchmark. The Efficient MSR index results in a Sharpe ratio of 0.43, which is well above that of the cap-weighted index (0.24). Similarly, Maximum Deconcentration fulfils its deconcentration objective with an effective number of stocks equal to 485.[60] The Maximum Decorrelation objective can be accessed by computing the GLR measure, which can be viewed as the contribution of average pair-wise correlations to the volatility of the portfolio compared to that of a portfolio composed of uncorrelated stocks.[61] High turnover and limited investment capacity are two of the most cited problems with smart beta indices. Our results show that 1-way annual turnover of all diversification strategies is close to 30%, showing the effectiveness of turnover rules. All strategies are adequately liquid as their weighted average market capitalisation is about 1/4th of that of the cap-weighted index, which is itself highly liquid by construction.[62]

Exhibit 2.6. Overview of Diversification Strategies - The analysis is based on daily total returns from 31/12/1972 to 31/12/2012 (40 years) obtained from www.scientificbeta.com. The regression coefficients statistically significant at the 95% level are highlighted in bold. The Market factor is the daily return of the cap-weighted index of all stocks that constitute the index portfolio in excess of the risk-free rate. The Small Size factor is the daily return series of a cap-weighted portfolio that is long CRSP cap-weighted market portfolios 6-8 (NYSE, Nasdaq, AMEX) and short the largest 30% of stocks in the CRSP S&P 500 universe. The Value (momentum) factor is the daily return series of a cap-weighted portfolio that is long the highest 30% and short the lowest 30% of B/M ratio (past 1 year return) stocks in the CRSP S&P 500 universe. Secondary Market US Treasury Bills (3M) is the risk-free rate in US Dollars. Turnover is mean annual 1-way. All statistics are annualised.

	Cap-Weighted	Max Deconc	Max Decorr	Min Vol	Max Sharpe	Div Risk Parity	Div Multistrategy
Ann Returns	9.74%	12.13%	12.16%	12.20%	12.43%	12.19%	12.24%
Ann Volatility	17.47%	17.49%	16.67%	14.73%	15.99%	16.78%	16.28%
Sharpe Ratio	0.24	0.38	0.40	0.45	0.43	0.40	0.41
ENS	113	485	305	247	296	457	399
GLR	26.51%	19.75%	18.29%	18.99%	18.42%	20.23%	18.95%
Max DD	54.53%	58.70%	54.16%	50.03%	53.22%	56.36%	54.55%
AnnAlpha	0.00%	**1.24%**	**1.23%**	**1.87%**	**1.58%**	**1.49%**	**1.49%**
Market Beta	**1.00**	**0.99**	**0.95**	**0.82**	**0.91**	**0.95**	**0.93**
SMB Beta	-	**0.21**	**0.20**	**0.11**	**0.16**	**0.17**	**0.17**
HML Beta	-	**0.11**	**0.09**	**0.10**	**0.11**	**0.11**	**0.11**
MOM Beta	-	**-0.05**	**0.01**	**0.01**	**0.01**	**-0.04**	**-0.01**
Capacity Average ($m)	45 171	10 786	10 799	12 802	11 549	11 573	11 502
1-Way TO	2.66%	20.52%	29.56%	30.56%	28.13%	22.35%	20.45%

59 - All portfolios are constructed on the CRSP S&P 500 universe and are rebalanced quarterly.

60 - Effective number of stocks (ENS) is the inverse of the Herfindahl Index, $ENS = 1/\sum_{k=1}^{N} W_k^2$

61 - $GLR = \frac{Var(R_P)}{\sum_{i=1}^{N} W_i Var(R_i)}$ where N is the number of stocks in the portfolio, R_P is the return of the portfolio, W_i is the weight of stock i and R_i is the return of stock i. The GLR measure (Goetzmann, Li and Rouwenhorst, 2005) is the ratio of the portfolio variance to the weighted variance of its constituents and a low GLR measure indicates that correlations have been well exploited and in this sense the portfolio is well diversified.

62 - *Weighted Average Market Cap of index* $i = \sum_{k=1}^{N} W_{k,i}$ *Market Cap*$_k$ where $W_{k,i}$ is the weight of stock k in index i, N is the total number of stocks in the index, and *Market Cap*$_k$ is the float-adjusted market cap of stock k.

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Every smart beta strategy carries risks, which can be divided into two categories: systematic risks and specific (or non-rewarded) risks. Systematic risks come from the fact that strategy indices can be more or less exposed to dynamically rewarding systematic risk factors (such as value and size risk). Specific risks are the risks that are not desired by investors as they are not rewarded and can be reduced by diversification. They are composed of i) strategy-specific risk, which comes from the portfolio construction methodology, and ii) sample-specific risk, which comes from the data used for parameter estimation. The combination of different strategies allows the risks that are specific to each strategy to be diversified away by exploiting the imperfect correlation between the different strategies' parameter estimation errors and the differences in their underlying optimality assumptions (Tu and Zhou (2010), Kan and Zhou (2007) and Martellini, Milhau and Tarelli (2013)). Moreover, as the single strategies' performance will show different profiles of dependence on market conditions, a multi-strategy approach can help investors smooth the overall performance across market conditions (Badaoui and Lodh (2013), Amenc *et al.* (2012b)).

Exhibit 2.7 shows that the Diversified Multi-Strategy index has about average outperformance across its constituents with a tracking error of 4.28%, which is below the average tracking error. Consequently, the strategy achieves a very high Information Ratio of 0.58. Also, its outperformance in bull and bear markets is quite similar, while most other strategies are favoured in either bull or bear markets. Overall, Diversified Multi-Strategy exhibits attractive probability of outperformance (> 80%) for the 40-year period. It is a good starting point for investors who are agnostic about either their capacity to identify the model with superior assumptions or their capacity to take the risk of choosing a particular model in the wrong market conditions.

Exhibit 2.7. Diversification across Weighting Schemes - The analysis is based on daily total returns from 31/12/1972 to 31/12/2012 (40 years) obtained from www.scientificbeta.com. The benchmark is the cap-weighted index on the CRSP S&P 500 universe. Probability of outperformance is the historical empirical probability of outperforming the benchmark. It is computed using a rolling window analysis with 3/5 years window length and one week step size. Maximum relative drawdown is the maximum drawdown of the long-short index, whose return is given by the fractional change in the ratio of strategy index to the benchmark index. Calendar quarters with positive market index returns comprise bull markets and the rest constitute bear markets. All statistics are annualised.

	Max Deconcentration	Max Decorrelation	Efficient Min Vol	Efficient Max Sharpe	Diversified Risk Parity	Diversified Multi-Strategy
Ann Rel Returns	2.39%	2.42%	2.46%	2.69%	2.45%	2.50%
Tracking Error	4.32%	4.36%	5.29%	4.54%	4.23%	4.28%
Information Ratio	0.55	0.55	0.46	0.59	0.58	0.58
Outperf Prob (3Y)	72.3%	79.0%	79.6%	79.9%	76.3%	78.6%
Outperf Prob (5Y)	78.3%	82.1%	79.9%	83.5%	80.6%	81.4%
Max Rel DD	30.07%	30.00%	40.10%	30.66%	34.10%	32.89%
Excess Ret (Bull)	4.3%	3.3%	-0.1%	2.3%	3.2%	2.6%
Excess Ret (Bear)	-0.1%	1.2%	5.4%	2.9%	1.4%	2.1%
TE (Bull)	3.8%	3.9%	4.5%	3.9%	3.7%	3.7%
TE (Bear)	5.1%	5.2%	6.6%	5.7%	5.2%	5.3%

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It is understood that any deviation from cap-weighting will induce systematic risks (as shown in Exhibit 2.6), but it is misleading to assume that the outperformance of a strategy can simply be explained by these factor premia alone. In fact, one can still benefit from diversification without taking a particular risk exposure and/or while taking a desired risk exposure. A clear distinction between the stock selection phase and the weighting phase allows management of implicit factor tilts that may arise from the weighting scheme through an explicit choice of the universe in which the strategy invests (Amenc *et al.* (2012c)).

Exhibit 2.8 shows the performance of the Diversified Multi-Strategy index on half universes characterised by high and low market cap, volatility, dividend yield, B/M ratio (value), and liquidity. Since each stock selection corresponds to a factor tilt, these indices can be considered long-only investable proxies of 'smart factor indices'. All smart factor indices outperform the cap-weighted benchmark in terms of annual returns and Sharpe ratio. The outperformance for well-known risk factors such as high value and low size is more than 4%. Investors with capacity constraints can select the indices like 'high liquidity' and 'large cap' Diversified Multi-Strategy to outperform the benchmark. The turnover of smart factor indices is a bit higher than the 'no-selection' index but they stay within the limit of 30%.

Exhibit 2.8. Factor-Tilted Indices - The analysis is based on daily total returns from 31/12/1972 to 31/12/2012 (40 years) obtained from www.scientificbeta.com. The benchmark is the cap-weighted index on the CRSP S&P 500 universe. The regression coefficients statistically significant at the 95% level are highlighted in bold. Secondary Market US Treasury Bills (3M) is the risk-free rate in US Dollars. Turnover is mean annual 1-way. All statistics are annualised.

	Diversified Multi-Strategy									
	Large Cap	Mid Cap	High Vol	Low Vol	High Yield	Low Yield	Value	Growth	High Liq	Mid Liq
Ann Rel Returns	1.50%	4.45%	2.35%	2.90%	3.85%	1.09%	4.70%	0.81%	1.46%	4.25%
Ann Volatility	16.25%	16.73%	19.54%	14.39%	15.10%	18.12%	16.55%	16.45%	17.23%	15.60%
Sharpe Ratio	0.35	0.52	0.34	0.50	0.54	0.29	0.54	0.31	0.33	0.54
Tracking Error	3.31%	6.80%	6.10%	6.17%	6.24%	4.84%	5.82%	4.09%	2.99%	7.03%
Information Ratio	0.45	0.66	0.39	0.47	0.62	0.23	0.81	0.20	0.49	0.61
AnnAlpha	**1.05%**	**2.59%**	**0.56%**	**2.52%**	**2.56%**	**0.43%**	**2.26%**	**0.94%**	**0.92%**	**2.64%**
Market Beta	**0.92**	**0.93**	**1.12**	**0.78**	**0.81**	**1.04**	**0.91**	**0.94**	**0.98**	**0.85**
SMB Beta	**0.05**	**0.32**	**0.35**	**0.02**	**0.07**	**0.28**	**0.16**	**0.18**	**0.11**	**0.24**
HML Beta	**0.08**	**0.16**	**0.07**	**0.14**	**0.25**	**-0.05**	**0.31**	**-0.07**	**0.05**	**0.18**
MOM Beta	**-0.01**	**0.00**	**0.00**	**0.00**	**-0.01**	**0.00**	**0.03**	**-0.02**	**-0.02**	**0.01**
Capacity Average ($m)	18 931	2 750	8 783	13 738	12 903	10 220	8 373	14 602	19 092	3 355
1-Way TO	23.03%	23.79%	26.64%	25.80%	21.98%	25.04%	23.93%	25.68%	23.12%	23.04%

The diversification strategy indices address the limitations of cap-weighted indices, such as their high concentration levels (in weight or risk contributions) or inefficient return-to-risk profiles. The achievement of the respective objectives is robust over the long term i.e. across different market conditions. The 3-year probability of outperformance is around 80% for 'no-selection' indices in the long term. Although

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each strategy has its own benefits, it also has certain limitations that stem from its specific risks. Investors can diversify the strategy-specific risk by allocating across strategies in the form of a Diversified Multi-Strategy index. Finally, one can always add value through diversification even for a restricted characteristics-based stock selection.

Smart Beta 2.0: A Powerful Concept for Multi-Smart Factor Investing

Recently there has been a significant increase in the number of alternative forms of equity indices. Given that there is so much choice, a natural question that arises for investors is which index to select. The answer lies in the investment objective and more importantly in the risk preference of the investor. Therefore, a more relevant question that needs to be asked is how best to reward investors for the risk choices they wish to make? A good smart beta index is one that diversifies away the specific risks and manages the exposure to equity risk factors. This article shows how to construct smart (well-diversified) factor indices and the benefits gained from diversifying across them – the multi-smart factor approach.

From Multi-Strategy Investing...

It is useful to recall that each diversification-based weighting scheme comes with systematic (or rewarded) risks, specific risks, and more generally, non-rewarded risks.

Systematic or rewarded risks are well-known to researchers and investment practitioners. Today, they are the subject of numerous commercial propositions, notably from index providers who, arguing that traditional cap-weighted indices have exposures to the wrong factors, offer solutions with more favourable factor biases, such as value or size for example.

By mixing weighting schemes with factor exposures that can be different (for example, an equal-weighted or Maximum Deconcentration weighting scheme will have a more pronounced exposure to the size factor than a minimum volatility scheme, which in turn will be more exposed to low volatility stocks), the multi-strategy approaches diversify the systematic risk factors and as such smooth the performance and the risks relative to cap-weighted.

However, this factor "message" often leaves little room for the seminal idea since the work of Harry Markowitz (1952), which is the diversification of specific risks. The category of specific risks corresponds to all the risks that are non-rewarded in the long run, and therefore not ultimately desired by the investor, but that can have a strong influence on the volatility or the maximum drawdown of the index (in absolute terms) or the tracking error or maximum relative drawdown of the index (in relative terms). Specific risks can correspond to important financial risk factors that do not explain, over the long term, the value of the risk premium associated with the index. There are many of these non-rewarded financial risk factors. The academic

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literature considers for example that commodity, currency or sector risks do not have a positive long-term premium. These risks can have a strong influence on the volatility, tracking error, maximum drawdown or maximum relative drawdown over a particular period, which might sometimes be greater than that of systematically rewarded risk factors (e.g. exposure to the financial sector during the 2008 crisis or to sovereign risk in 2011). In line with portfolio theory, among the non-rewarded financial risks we also find specific financial risks (also called idiosyncratic stock risks) which correspond to the risks that are specific to the company itself (its management, the risk of the poor quality of its products, the failure of its sales team, the relevance of its R&D and innovation, etc.). It is this type of risk that asset managers are supposed to be the best at recognising, evaluating and choosing in order to create alpha, but portfolio theory considers it to be neither predictable nor rewarded, so it is better to avoid it by investing in a well-diversified portfolio. A globally effective diversification weighing scheme reduces the quantity of non-rewarded risk, whether it involves non-rewarded risk factors or non-rewarded specific financial risks. However, like any model, it is imperfect and can itself lead to non-negligible residual exposures to certain non-rewarded risks. For example, minimum volatility portfolios, which are robust proxies for efficient portfolios, and therefore well-diversified, are often exposed to significant sector biases. One should always try to implement diversification models that are the least exposed possible to these non-rewarded risks. For example, the use of norm constraints is a good compromise between the desire to fully utilise the potential to reduce the volatility in an efficient way procured by a minimum-volatility-type weighting scheme, while avoiding overconcentration in a small number of low volatility stocks.

Specific or non-rewarded risks can also correspond to operational or non-financial risks that are specific to the implementation of the diversification model. We call these risks "strategy" or "operational-specific" risks, which we usually analyse using the concept of parameter estimation error. As such, for example, a maximum decorrelation scheme depends on a good estimation of the correlation matrix for the robustness of the diversification proposed. Every investor should attach a high price to the technical quality of the models used and their implementation to reduce this type of specific risk (for example, the quality of the estimation of correlation matrices is a crucial element for the majority of diversification weighting schemes and has been the subject of much econometric, economic and statistical effort in recent years).

In spite of all the attention paid to the quality of model selection and the implementation methods for these models, this specific operational risk, like the non-rewarded financial risks described above, remains present, and it therefore seems interesting to be able to reduce even further the exposures that each weighting scheme, even it is smart, is not able to diversify. This is also the objective of our multi-strategy approach, which ultimately enables not only the systematic risks, but also the specific or non-rewarded risks, to be diversified.

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This double effect is illustrated in Exhibit 2.9 below.

Exhibit 2.9. Diversified Multi-Strategy - The table shows conditional relative returns and conditional tracking error of five diversification-based indices and the Diversified Multi-Strategy index – an equal-weighted combination of the five indices. All statistics are annualised, all portfolios are rebalanced quarterly and the analysis is based on daily total returns (with dividends reinvested) from 12/31/1972 to 12/31/2012. The total number of stocks in the USA universe is 500. Calendar quarters with positive market index returns comprise bull markets and the rest constitute bear markets. Source: www.scientificbeta.com and CRSP.

USA Long-Term	Scientific Beta Long-Term USA Track Records					
	Maximum Deconc.	Maximum Decorr.	Efficient Min Volatility	Efficient Max Sharpe	Diversified Risk Parity	Diversified Multi-strategy
Ann Relative Returns						
Full Period	2.39%	2.42%	2.46%	2.69%	2.45%	2.50%
Bull Market	4.34%	3.33%	-0.07%	2.33%	3.17%	2.63%
Bear Market	-0.08%	1.16%	5.38%	2.91%	1.41%	2.15%
Ann Tracking Error						
Full Period	4.32%	4.36%	5.29%	4.54%	4.23%	4.28%
Bull Market	3.85%	3.87%	4.51%	3.86%	3.69%	3.72%
Bear Market	5.15%	5.23%	6.61%	5.69%	5.17%	5.25%

...to Multi-Smart Factor Investing

Any deviation from the standard cap-weighting approach will potentially lead to exposures to equity risk factors (betas) which are different from the cap-weighted references. Investors should have the choice of explicitly selecting the risk factors they want to be exposed to. With betas being the key ingredients of active management, asset managers have become aware of the importance of managing betas and their diversity. Indices or building blocks replicating microeconomic factors (like size, momentum, value, liquidity or volatility) and macro-economic factors (like geographical region or industry sector) can be found in abundance on the market.

Going beyond pure factor replication, one needs to address the issue of harvesting the risk premium of these betas. Plenty of empirical evidence shows that cap-weighted indices are not well-diversified, efficient benchmarks, i.e. they do not provide "fair compensation" for the amount of risk taken (Haugen and Baker (1991), Grinold (1992)). We propose a solution for this in the form of ***smart factor investing***. The idea of *smart factor investing* is to construct a factor-tilted portfolio to extract the factor premia most efficiently and is based on two pillars: 1) selecting appropriate stocks for the desired beta and 2) using a diversification-based weighting scheme.

A clear distinction between the stock selection phase and the weighting phase enables investors to choose the risks to which they do or do not wish to be exposed. This choice of risk can be expressed through an explicit choice of the universe in which the strategy invests.[63] When 'stock selection' is based on a particular stock-based characteristic, such as size, it allows this factor exposure to be shifted, regardless of the weights that are applied to individual portfolio components. Once chosen, the use of one or more smart weighting schemes provides a well-diversified portfolio corresponding to a smart proxy for the factor exposure. We

63 - A distinction between stock universe selection and the selection of a diversification-based weighting scheme recognises that, in principle, methodological choices can be made independently in these two steps, which are used in the construction of advanced beta equity strategies. This is the flexibility offered in the Smart Beta 2.0 approach.

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call this proxy "smart" because, unlike investable factor proxies constructed with maximum factor loading or cap-weighted-type schemes, the Scientific Beta factor-tilted indices are diversified, and as such reduce the exposure to non-rewarded risks, providing in this sense more efficient access to the return associated with the factor.

For the next illustration, we construct ***smart factor indices*** – building blocks which use Diversified Multi-Strategy weighting on characteristics-based half universes.[64] Stock selection choices are made to gain exposure to three well-known equity risk factors – size, value, and momentum along with the low volatility factor, which is commonly accepted to have a positive risk premium (an anomaly). Then we construct a Multi-Beta Multi-Strategy index which combines the four factor-tilted indices so as to achieve an equal contribution of each component to the overall portfolio tracking error with respect to the cap-weighted reference index. Exhibit 2.10 shows that the Multi-Beta Multi-Strategy Equal Risk Contribution (ERC) benchmark results in tracking error which is below the average tracking error of the constituting indices. Since its performance is close to the average performance of the constituents, its Information Ratio shows a significant improvement. Results also show that diversification across factors also helps in controlling extreme relative risks.

64 - Diversified Multi-Strategy has been chosen as the weighting scheme following the 'diversification across weighting schemes' argument present in the first part of this article. In theory, one can choose any diversification-based (non-cap-weighted) weighting scheme to construct smart factor indices.

Exhibit 2.10: Multi-Smart Factor Diversification - The table presents absolute and relative risk/return analysis of factor-tilted Diversified Multi-Strategy indices. 95% tracking error is the 95th percentile of the tracking error computed using a rolling window of one year and step size of one week. The yield on Secondary Market US Treasury Bills (3M) is a proxy for the risk-free rate. All statistics are annualised, all portfolios are rebalanced quarterly and the analysis is based on daily total returns (with dividends reinvested) from 12/31/1972 to 12/31/2012 for the long term. The total number of stocks in the USA universe is 500. Factor-tilted track records contain 50% stocks sorted by the characteristics (size, volatility, B/M ratio (for value), and past year's returns omitting the last month (for momentum)). Source: www.scientificbeta.com and CRSP.

	Factor-Tilted Diversified Multi-strategy Portfolios					
	Low Vol	Mid Cap	Value	Momentum	Avg of 4 Factor Indices	Multi-Strategy Multi-Beta ERC Benchmark
Ann Returns	12.65%	14.20%	14.44%	13.30%	13.65%	13.60%
Ann Volatility	14.39%	16.73%	16.56%	16.30%	15.99%	15.79%
Sharpe Ratio	0.50	0.52	0.54	0.48	0.51	0.51
Max Drawdown	50.13%	58.11%	58.41%	49.00%	53.91%	54.10%
Relative to Broad CW						
Ann Relative Returns	2.90%	4.45%	4.70%	3.56%	3.90%	3.86%
Tracking Error	6.17%	6.80%	5.82%	4.88%	5.92%	4.96%
Information Ratio	0.47	0.66	0.81	0.73	0.67	0.78
95% Trk Error	11.53%	11.55%	10.14%	8.57%	10.45%	8.21%
Outperf Prob (3Y)	76.44%	74.68%	78.82%	84.52%	78.61%	80.53%
Max Rel Drawdown	43.46%	42.06%	32.68%	17.28%	33.87%	29.57%

Conclusion

The objective of Smart Beta 2.0 is the management of both specific risk, or non-rewarded risk, and systematic risks, or rewarded risks. The strategy-specific risk can be optimally diversified by combining different weighting schemes. Investors, and not smart beta providers, should have the freedom to select the systematic risks

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they want to be exposed to and to manage them. Multi-beta benchmarks, which allow for a flexible choice and combination of smart factor indices, present new opportunities for passive investors or for active managers and multi-managers to enhance their performance at very low marginal cost.

2.5. 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. Svetina (2010) gathered information of 584 ETFs available in the US in 2007 and studied their prospectus. She finds out that only 102 of the 584 ETFs track the same indices as index funds. So she concludes that ETFs and index funds are not competing in the same market. Agapova (2010) also argues that ETFs are not the substitute of the index fund but the complements of the index funds. She adopted the methodology proposed by Sirri and Tufano (1998) and examined the flow of Vanguard Index funds and ETFs. The results show that Vanguard's ETFs and index funds are complements. Moreover, Agapova (2010) discovers a positive spillover effects which could help explain the synergy between ETFs and index funds. This reinforces findings in Agapova (2011) that the asset inflows to ETFs do not reflect asset outflows from conventional index funds. In terms of performance, Blitz *et al.* (2010) show that both European index funds and ETFs underperform their benchmarks. Such observations could not be explained by the expense ratios but the dividend taxes. Guedj and Huang (2008), on the other hand, show that ETFs can be substitutes for index funds tracking large, broad, well-diversified and liquid indices because both of them offer investors a fairly identical investment vehicle. Thus, there is some debate in the academic literature as to whether the growth of ETFs is coming at the expense of index funds.

Investors can also opt for derivative instruments (futures and TRS) to trade large baskets of assets. Futures are standardised forward contracts that make it possible to trade baskets of assets (bonds, equities, or commodities) at a certain date in the future. Since these derivatives are traded on-exchange, they are highly liquid. TRS by contrast, are not traded on-exchange; they are OTC contracts. 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), not cash flows

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alone, is swapped. As with any swap, the parties do not transfer actual ownership of the assets. TRSs expose investors to counterparty credit risk because they are traded OTC, whereas futures are exchange-traded instruments and thus benefit from clearing-house mechanisms that mitigate counterparty credit risk.

2.6. Benefits and Uses of ETFs

Because 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. And a single ETF trade can provide much broader exposure than a single stock trade. They are also tax efficient.

65 - http://www.investopedia.com/terms/i/indexfund.asp#axzz1hEuSp6IJ

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[65] 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. As reported by Euronext (2010), total expense ratios for many standard European equity and government bond indices are between 15 and 40 basis points. More exotic ETFs in emerging markets, short ETFs, or ETFs in specific strategies, with expense ratios ranging from 50 to 100 basis points, are more expensive. These costs are significantly lower than those of

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traditional equity index funds, which usually have expense ratios of around 100 basis points, even when they are simply tracking standard indices. In 2009, Fuhr and Kelly reported that the average TER for equity ETFs in Europe was 37 basis points a year.

Secondly, ETF shares must be bought by investors, either on or off exchange, and 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 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 tracking similar segments or even the same index may differ.[66]

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 tracking 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

66 - For example, ISHARES FTSE 100 and AMUNDI ETF FTSE 100 track the same FTSE 100 index. The TER for iShares is 0.40% but 0.25% for PowerShares (Euronext 2010).

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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 *et al.* 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 in the S&P500) 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).[67]

67 - 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.

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.

Inverse ETFs

Inverse ETFs, also called short ETFs, are supposed to provide investors with the inverse of the performance of an index, which is achieved through short-selling. In addition, these ETFs provide investors with the money market interest on the amount invested and interest earned on the short position.

Leveraged ETFs

Leveraged ETFs provide investors more aggressive exposure to the underlying index, without the operational hassles of making leveraged investments themselves. Leveraged ETFs usually attempt to provide constant leverage in such a way that the excess returns of the index are magnified by, say, a factor of two for the holder of a leveraged ETF. There are also leveraged versions of inverse ETFs, so investors can magnify their inverse exposure in a simple trade.

Options on ETFs

Options on ETFs began trading on derivatives exchanges shortly after the introduction of ETFs. These instruments are limited to a relatively narrow range of the most successful ETFs. The possible advantages of these options include precise exposure to the underlying fund, minimum investments lower than those required by index options, as well as physical delivery of the underlying asset if the option is exercised (index options, by contrast, are settled in cash). The main difference between ETF options and index options is that ETF options are American style which means early exercise is possible, whereas index options are typically European style which does not allow early exercise

ETFs Following Option-Based Strategy

A "buy-write" strategy, also called covered call, is a commonly used approach to generate income. Such a strategy can be implemented by buying the underlying and writing call options on the underlying. In the long run, the covered call will reduce the volatility of the portfolio compared to the naked position of holding the underlying alone by giving up some return in the bull market (Benjamin

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and Moran 2008). The introduction of ETFs[68] on such strategy could facilitate investors to build up the portfolio without facing the implementational hassles of implementing such a strategy themselves.

Shorting ETFs

Unlike traditional index funds, ETFs may be sold short. Since ETFs can be borrowed and sold short, long/short strategies are possible. With these strategies, long/short exposure to different style or sector indices can be used to capitalise on return differentials between categories while maintaining low or zero exposure to market risk. As a temporary way to become defensive without incurring transaction costs and undesirable capital gains, this mechanism can be used in various ways, including more sophisticated trading strategies involving shorting some combination of several indices. In addition, ETFs can be sold short, as part of a purely speculative trade, to take advantage of market downturns.

Lending ETF Units

ETF units held by an investor may be lent out to generate additional income for the portfolio. Interest paid by the borrower of the ETF may compensate for management fees and generate income above the management fees in the ETF.

68 - For instance, Lyxor has offered ETF EURO STOXX 50 BuyWrite since January 2007.
69 - See Guideline 13(a) in section VI of the ESMA ETF Guidelines
70 - These figures are taken from, or computed from data available in the last half-yearly report on ETPs provided by BlackRock (2011a).

Leveraged and Inverse ETFs

Leveraged and inverse ETFs have received a considerable amount of attention from regulators since their launch in 2005. The FSB reignited the debate on these products with its April 2011 note, in which it described leveraged and inverse ETF as "archetypes" of product innovation extending the ETF "asset class (sic) beyond its initial plain-vanilla standardised nature" and it called for closer scrutiny because: "The complexity and opacity characterising these innovations may leave investors exposed to risks they have not anticipated". Thus one of the requirements of Index-Tracking UCITS ETFs in the ESMA Guidelines on ETFs is that they include within their prospectuses a description of the leverage policy, how it is achieved, the costs of the leverage and the risks associated with this policy.[69]

Such ETFs are pre-packaged products which make use of short-selling, derivatives, and/or other techniques together to try and deliver levered (e.g. 2x), inverse (-1x) or inverse levered (e.g. -2x) return of the underlying index on a short-term basis (usually daily, but also weekly or monthly returns). With these ETFs, investors can easily magnify returns, hedge portfolios, and manage risk without any operational hassles about margin accounts or margin calls. By mid 2011, there were 577 leveraged and inverse exchange-traded products in the world with an AUM of $50bn (to be compared with a global ETP market with 3,987 vehicles and $1,626bn at the same time) – the 261 (231) such products calling Europe (the United States) home totalled AUM of $11bn ($36bn), thus representing 3% (3.3%) of the regional ETP market.[70]

Despite the popularity of these instruments, the mechanics of leveraged and inverse ETFs, which must be rebalanced on a daily basis to keep their returns on a multiple

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of the returns of the underlying index, may increase the volatility of the underlying around the close. The underlying mechanics suggest that the size of the potential impact of rebalancing activity by these funds is proportional to their AUM,[71] the leverage factor applied, and the daily fluctuation of the underlying. The idea that rebalancing could put pressure on the underlying markets was given a theoretical basis by Cheng and Madhavan (2009), whose model we present below.

If A_{t_n} is the fund's NAV at time t_n, the exposure of the ETF needs to be adjusted on day t_{n+1}. This adjustment, denoted by Δ_{tn+1}, is given as follows:

$$\Delta_{t_{n+1}} = A_{t_n}(x^2 - x)r_{t_n, t_{n+1}}$$

where x is the multiple of the performance and $r_{tn,\ tn+1}$ the return of the underlying index from calendar time t_n to time t_{n+1}.

The above shows that the adjustment factor is non-linear and asymmetric, which means the more highly leveraged the ETF is, the greater the amount it needs to adjust at the end of the day. Furthermore, the adjustment for inverse ETFs would be even larger than that for long leveraged ETFs. For example, if comparing the value of (x^2-x) at and x=-2, it is apparent that the double inversed ETF will have much higher adjustment than a double leveraged ETF. Cheng and Madhavan (2009) conduct a simulation of the impact of a change in the underlying index on hedging demand from the US equity leveraged and inverse ETF segment. They find that a 1% uniform move across all segments of the US equity market would lead to a 16.8% change in the aggregate hedging demand from these trackers, whereas a 5% move would cause 50% more aggregate hedging demand. It is assumed all the rebalancing activity takes place towards close on the underlying markets to minimise the tracker's uncertainty.

It has also been shown that the returns of leveraged ETFs are path dependent. Cheng and Madhavan (2009) and Avellaneda and Zhang (2009) both find that the change in asset values over time depends on the volatility of the underlying index. In general, the lower the volatility of the underlying index, the smaller the change in the asset value of the ETF.

Furthermore, empirical results imply that the long-term performance of leveraged and inverse ETFs would deviate from the promised returns (Lu, Wang and Zhang 2009).[72] This suggests that leveraged and inverse ETFs are suitable for short holding periods rather than for long-term buy-and-hold strategies. Little (2010) conceptually explains how underperformance is due to infrequent rebalancing. Guedj *et al.* (2010) have followed the argument and shown the lost caused by the extended holding period of more than a day. Hill and Teller (2010) reach the same conclusion in two case studies. Murphy and Wright (2010) analyse the returns from commodity-based leveraged ETFs and conclude that such ETFs are effective ways to gain expected exposure to the corresponding commodities and indices on a daily basis but not on

71 - Counter-intuitively, the re-balancing activity is in the same direction as the change in the underlying index, whether the fund is levered or inverse or inverse levered, which means that hedging demand from inverse and inverse levered funds adds to the hedging demand from levered funds. See Cheng and Madhavan (2009) for a proof.

72 - Lu, Wang, and Zhang (2009) have compared the returns of four double ETFs and four inverse double ETFs with the returns of their underlying indices. They find that, when the holding period is longer than one quarter, the returns on ETFs could deviate from those promised.

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a buy-and-hold investment program. Rompotis (2011a) also suggests that leveraged and inverse ETFs deliver multiples that are close to the promised multiples when used as intended.

Since leveraged and inverse ETFs have gained popularity among investors, but they use more complex structure than conventional ETFs and their inability to deliver their target multiple in the long run, in March 2009, the US-based Financial Industry Regulatory Authority (FINRA) reminded financial advisors of their obligations in connection with these products, in particular to ensure that recommendations be suitable and based on a full understanding of the terms and features of the product recommended. In an August 2009 alert issued with the US Securities and Exchange Commission, FINRA underlined that (daily) inverse and leveraged ETFs were typically "designed to achieve their stated performance objectives on a daily basis" and that investors should not expect them to deliver this performance over the long term as well. In addition, effective December 2009, FINRA also put in place an increased maintenance margin[73] for leveraged ETFs.[74]

Indeed, ETF providers make it clear in their prospectuses and marketing collateral that such funds seek to deliver a multiple return of the underlying index over a specified holding horizon, and that these funds are more appropriate for sophisticated investors who understand their mechanics and structure. Empirical studies also suggest that these ETFs need to rebalance at a frequency directly linked to their normal holding period to maintain their properties. These products are not meant to be long-term buy-and-hold investments and by construction, their long-term performance will diverge from the long term performance of their reference index times their short multiple.[75] Also note that, to the extent that they are UCITS products in Europe, these leveraged and inverse ETFs are highly-regulated: this also means that UCITS leveraged and inverse ETFs cannot leverage beyond 100% of the NAV, which is why multiples over two are not available to such funds under UCITS (Bollon 2011). Interestingly, BIS (2011a) remarks that while leveraged and inverse ETFs hold only about 3% of ETF assets, they account for nearly 20% of the turnover in ETF assets; this is consistent with shorter holding periods for these instruments relative to other ETFs.[76]

In short, the liquidity advantage of leveraged and inverse ETFs, which have attracted growing attention in recent years, makes them suitable for short-term trading. Indeed, both academic research and regulatory investigations have suggested that these ETFs are more suitable for short-term investment than for long-term buy-and-hold strategies.

73 - Leveraged and inverse ETFs are pre-packaged margin products. When they are first designed the margin requirements for going long on and shorting ETFs must be taken into account.
74 - Under the old rules, the maintenance margin for any long ETF was 25% of its market value and the margin for any short ETF was 30% of its market value. These requirements were thus unrelated to the target multiple. Under the new rules, the margin requirements have increased by a percentage commensurate with the leverage of the ETF (e.g. a leveraged ETF which promises a return three times that of the underlying index must maintain a margin equal to 75% of the market value).
75 - If an investor wants to use these products to achieve a multiple of the reference index over the long term, then frequent rebalancing of the allocation to these products will be required. Such a sophisticated investor will probably find that replicating the targeted exposure directly through derivatives, margin trading and short selling may be more cost effective.
76 - While ETFs can be excellent buy-and-hold instruments, they can also be used for short-term exposure and hedging and there is heavy trading in ETFs relative to the number of outstanding shares, which results in short average holding periods – literally few days for the most popular ETFs.

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2.7 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.

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 number of studies dedicated to investigating the differences in tracking error across various types of indices.

Rompotis (2011b) 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.

Rompotis (2009) also finds that ETFs tracking 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 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

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which tracked the S&P 500. In addition, Maister *et al.* (2010) show that ETFs tracking emerging market indices exhibit higher tracking error than those which 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 *et al.* (2010) investigate the driving factors for sovereign ETFs tracking 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.

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. One recently advocated measure, as proposed by Amihud (2002) and Acharya and Pedersen (2005), is explained in more detail in an insert in this section.

Measuring Illiquidity: The ILLIQ Measure of Amihud (2002) and Acharya and Pedersen (2005)

Amihud (2002) and Acharya and Pedersen (2005) define the following illiquidity measure. The illiquidity for a given stock i in the month t is computed as

$$ILLIQ_t^i = \frac{1}{Days_t^i} \sum_{d=1}^{Days_t^i} \frac{\left|R_{td}^i\right|}{V_{td}^i}$$

where $\left|R_{td}^i\right|$ is the absolute return of the *i*-the stock on day *d* of month *t*, and V_{td}^i is the volume of the stock. The illiquidity measure reflects the idea that the price of an illiquid stock will display large movements in response to a given volume of trading.

This liquidity measure has been constructed to evaluate the liquidity of stocks and it may be a means of measuring the liquidity of underlying securities comprising the basket of an ETF.

Acharya and Pedersen (2002) use this measure for empirical tests of the influence of illiquidity on expected stock returns. In particular, they test a so-called liquidity-adjusted CAPM. This is a multifactor model for expected excess stock returns of the following form:

$$E[r_t^i - r_t^f] = E[c_t^i] + \lambda\beta^{1i} + \lambda\beta^{2i} - \lambda\beta^{3i} - \lambda\beta^{4i}$$

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The expected excess return over the risk-free rate of asset *i* is equal to the expected illiquidity cost (expressed as percentage of the stock's price), $E[c_t^i]$ plus the reward for the risk born by the asset. This reward is proportional to the various beta terms in the regression multiplied by the corresponding risk premia (the lambda terms). β^{1i} is the traditional CAPM beta (covariance of the stock return and market return). The three additional betas correspond to different types of liquidity risks. β^{2i} is the covariance of the stock's illiquidity and market illiquidity (i.e. the commonality of the stock's illiquidity and the market illiquidity), β^{3i} is the covariance of stock returns and market illiquidity (i.e. the stock's return sensitivity to market illiquidity), and β^{4i} is the covariance of stock illiquidity and the market return (the stock's illiquidity sensitivity to market returns).

In their empirical tests of the model, the authors find that the level of illiquidity of a stock and its three types illiquidity risks carry a positive risk premium.

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 of 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 be often affected by the location of the underlying market, the number of constituents, the trading hours as well as 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

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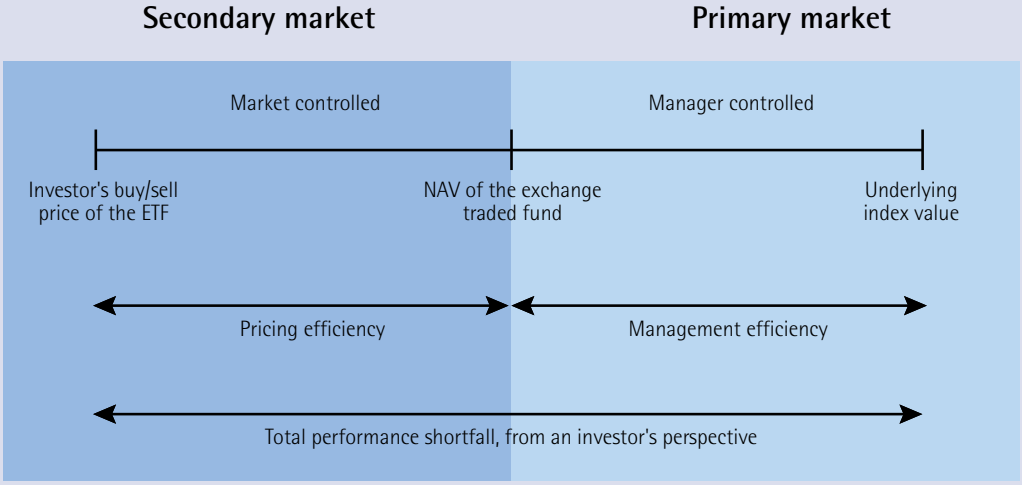
volume traded), the replication method, as well as market fragmentation influence the bid-ask spread (also see Stoll (2000), Rompotis (2010b), or Agrrawal and Clark (2009) for analyses of determinants of bid-ask spreads). Thirumalai (2004) shows that there is a positive relationship between the bid-ask 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.

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 2.11 provides a description of the sources of deviation that ETFs may encounter.

Exhibit 2.11: 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. The

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latter are beyond the control of the ETF company, since they depend on the market makers, supply and demand, and transaction costs.

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 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 *et al.* (2010) show that ETF mispricing has a reasonably frequent occurrence. 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. Patejisto (2010) 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 the price deviation can lead to arbitrage opportunities. Shum (2010) analyses the international ETFs and shows that Asian ETFs are trading at 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.

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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 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.

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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.

The Impact of ETFs on Price Efficiency, Liquidity and Systemic Risk

Before the introduction of ETFs, index futures were one of the major means of replicating index performance. Futures markets may show slight deviations of the futures price from the fair price reflected by the underlying index value, and these deviations may be caused by transaction costs or market illiquidity. This price discrepancy results in arbitrage opportunities. As arbitrageurs observe such opportunities and execute the orders immediately, the mispricing will disappear quickly if the market is liquid (Roll *et al.* 2007). Empirical studies have observed that significant price discrepancies exist in index futures markets (Modest and Sundaresan 1983; Figlewski 1984; MacKinlay and Ramaswamy 1988; Yadav and Pope 1994). Neal (1996) also argues that mispricing could lead to arbitrage trades. On the other hand, studies have shown that it is precisely this arbitrage trading activity that constitutes one of the factors resulting in reversions to the theoretical value (Garrett and Taylor 2001; Tse 2000; Alphonse 2007).

The difficulties of tracking an index were greatly reduced by the introduction of ETFs. These new instruments are traded on-exchange like stocks, all while replicating indices in cost and tax efficient ways. With the in-kind creation and redemption process, arbitraging trades are much easier to execute and, as a result, the price discrepancy in ETF markets is short-lived. As ETFs offer another means of index-tracking, a vast body of academic research has looked at the influence of ETFs on the price efficiency in the index spot-futures market. Hasbrouck (2003) and Tse *et al.* (2006) show a clear price leadership of the ETF market over the spot market, a demonstration that suggests that ETFs process information faster than the spot market.

Evidence from the Diamonds and the QQQ funds (Hegde and McDermott 2004; Madura and Richie 2007) suggests that the liquidity of the underlying index market increases after ETFs were introduced. This increased liquidity stems largely from the lower cost of trading. In a recent paper, Winne, Gresse and Platen (2012) find higher

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levels of liquidity among index versus non-index stocks post the introduction of an ETF on the index. They attribute this to lower order processing and order imbalance costs. Furthermore, Ackert and Tian (2001), Deville (2005), and Deville and Riva (2007) show that the introduction of ETFs significantly improved price efficiency in the index spot-futures market. Market responses to observed price deviations are also swifter in periods during which there is an ETF on an index than they are in periods before the existence of the EFT (Kurov and Lasser 2002). Deville, Gresse, and de Séverac (2009), find a strong two-way causality between futures price efficiency and index stock liquidity appears after the introduction of the ETF.

Following events such as the Flash Crash on 6 May 2010 and recent scrutiny by financial stability groups, there has been much research into the systemic risks posed by ETFs. David, Franzoni and Moussawi (2012) find that arbitrage trading in ETFs can propagate liquidity shocks from the ETF market to the underlying securities. They also find that ETF ownership of stocks is associated with increased volatility. Sullivan and Xiongi (2011), find that increased use of ETFs has led to an increase in stock correlations and convergence of stock betas and that stocks start to move in "lock step". However, Mazzai (2012) finds that increased correlations and volatility have always increased during periods of macro-economic stress. They find that this is independent of the proliferation of ETFs and that ETFs offer investors an effective method of risk diversification during shocks.

In summary, the empirical literature largely finds that the introduction of ETFs offers better opportunities to perform arbitrage. Moreover, it improves the liquidity of the underlying index and reduces price discrepancies in the index spot-futures market.

2.8. Core-Satellite Investing with ETFs

ETFs are particularly suited to core-satellite investing. The wide product range and transparency of construction in terms of an absence of stock picking (in general) makes them very suited for use within a "building block approach" to portfolio construction. Hence investors can use ETFs in combination to create transparent portfolios, reflective of their individual investment preferences. Their high liquidity and relatively low cost of trading also makes them particularly suited to dynamic trading strategies which we expand on later in this section.

The objective of this section is present the static and extended dynamic core-satellite management techniques.

The core-satellite approach divides the portfolio into a core component, which is passively managed and fully replicates the investor's specifically designated benchmark, and an outperformance-seeking component, made up of one or more satellites, that is allowed higher tracking error. This satellite can be active or passive, depending on the preferences of the investor. Satellites are often actively managed and usually invested in markets that require more specialised managers. However, outperformance of the benchmark may stem not only from active management but also from passive investment products that track asset classes or sub-segments whose longer-term performance is significantly better than those in the benchmark.

2. Background

The separation of funds into a core and a satellite is not done for practical reasons alone; indeed, this separation is grounded on economic theory. It is optimal for investors who benchmark to a specific external benchmark.[77]

Core-satellite management has become the standard means of designing portfolios. A detailed analytical derivation of the core-satellite portfolio design is presented below.

The Arithmetic of Core-Satellite Investing

We first take a core-satellite construction with a single satellite. The mathematics is then straightforward. The overall portfolio P, a combination of the core portfolio and the satellite portfolio, can be expressed as follows:

$$P = wS + (1-w)C$$

where w is the fraction invested in the satellite S, and 1-w is the fraction invested in the core C. The difference between the portfolio and its benchmark B is computed as follows:

$$P - B = wS + (1-w)C - B = w(S-B) + (1-w)(C-B)$$

Assuming for the sake of simplicity that the core replicates the benchmark perfectly, we get C = B; we then have:

$$P - B = w(S-B).$$

Using this formulation, we can now calculate the tracking error of the portfolio TE(P) with respect to its benchmark B. It is given as a function of the tracking error of the satellite TE(S):

$$TE(P) = \sqrt{\text{var}(P-B)} = w\sqrt{\text{var}(S-B)} = wTE(S).$$

This formulation makes it possible to assess the efficiency of a core-satellite portfolio with respect to tracking error management. Consider, for example, an active investor who is allowed a 2.5% tracking error budget. The investor either hires one manager with a tracking error equal to 2.5% for the entire portfolio or forms a passive core, consisting of 80% of his overall portfolio, and leaves 20% in an aggressively managed satellite with a tracking error chosen so that the overall portfolio tracking error does not break his risk budget; here, the satellite is permitted a 12.5% tracking error, as given by the following computation:

$$TE(S) = \frac{TE(P)}{w} = \frac{2.5\%}{20\%} = 12.5\%$$

77 - For an analytical derivation of this separation in asset/liability management context, see Martellini (2008) or Martellini and Milhau (2009).

The core-satellite approach has many advantages over conventional portfolio management, especially when relying on actively-managed satellites. First, it makes it possible to control the portfolio's overall tracking error. The core portfolio simply tracks the long-term benchmark; it does not deviate from that benchmark and therefore has no tracking error. The performance-seeking satellite, by contrast, is allowed significant tracking error. But as the satellite is only a fraction of the total investment, overall tracking error is of course much lower.

2. Background

Since the satellite allows substantial deviation from the benchmark, the fund manager is freer to use his personal skills and thus perhaps to outperform the benchmark; he need not be fixated on maintaining low tracking error. Let us consider an active manager with a 5% tracking error constraint. In fact, such a manager is 95% passive, and the active portfolio choices he can make are thus relatively few. At the same time, the restriction of the weight attributed to the satellite in the overall portfolio keep risks under control. In short, the skills of asset and fund managers can be exploited much more efficiently and in a risk-controlled manner.

Finally, if the investor uses active managers, the separation into a core and a satellite may help reduce fees: high management fees will be paid only for this actively-managed satellite; the passively managed core usually involves much lower fees.[78]

78 - In fact, the origins of core-satellite portfolio management are linked to an attempt to optimise the costs of active portfolio management.

The core-satellite investment concept can also be extended to a dynamic context, in which the proportion invested in the performance-seeking portfolio (i.e. the satellite) can vary as a function of the current cumulative outperformance of the overall portfolio.

The dynamic core-satellite concept builds on the principle of constant proportion portfolio insurance (CPPI). This principle, described by Black and Jones (1987) and Black and Perold (1992), allows the production of option-like positions through systematic trading rules. CPPI dynamically allocates total assets to a risky asset in proportion to a multiple of a cushion defined as the difference between current portfolio value and a desired protective floor. The result is an effect similar to that of owning a put option. In such a strategy, the portfolio's exposure tends to zero as the cushion approaches zero; when the cushion is zero, the portfolio is completely invested in cash. Thus, in theory, the guarantee is perfect: the strategy of exposure ensures that the portfolio never descends below the floor; in the event that it touches the floor, the fund is "dead", (i.e. it can deliver no performance beyond the guarantee).

This CPPI procedure can be transferred to a relative return context. Amenc, Malaise, and Martellini (2004) show that an approach similar to standard CPPI can be taken to offer the investor a relative-performance guarantee (underperformance of the benchmark is capped). Conventional CPPI techniques still apply, as long as the risky asset is re-interpreted as the satellite portfolio, which contains risk with respect to the benchmark, and the risk-free asset is re-interpreted as the core portfolio, which contains no risk with respect to the benchmark. The key difference from CPPI is that the core or benchmark portfolio can itself be risky. In a relative risk context, the dynamic core-satellite investment can be used to improve the performance of a broad equity portfolio by adding riskier asset classes to the satellite. Dynamic core-satellite investing may also be of interest to pension funds, which must manage their liabilities: the core then is made up of a liability-hedging portfolio, and the satellite is expected to deliver outperformance.

2. Background

Exhibit 2.12. This table compares the traditional CPPI and the relative CPPI approaches

Traditional CPPI	Relative CPPI approach
Risky asset	Satellite portfolio
Risk-free asset	Core portfolio

Core-satellite portfolios are usually constructed by putting assets that are supposed to outperform the core in the satellite. But if economic conditions become temporarily unfavourable the satellite may in fact underperform the core. The dynamic core-satellite approach makes it possible to reduce a satellite's impact on performance during a period of relative underperformance, while maximising the benefits of the periods of outperformance.

From an absolute-return perspective, it is possible to propose a trade-off between the performance of the core and satellite. This trade-off is not symmetric, as it involves maximising the investment in the satellite when it is outperforming the core and, conversely, minimising it when it is underperforming. The aim of this dynamic allocation is to produce greater risk-adjusted returns than those produced by static core-satellite management. Like standard CPPI, this dynamic allocation first requires the imposition of a lower limit on underperformance of the benchmark at the terminal date. This so-called floor is usually a fraction of the benchmark portfolio, say 90%. Investment in the satellite then provides access to potential outperformance of the benchmark.

At this point, it may be useful to summarise the various possibilities (see Exhibit 2.13). The investor must first choose his long-term benchmark, the core portfolio. He must then identify attractive sources of outperformance for the satellite. Using these components, the investor may manage his tracking error by defining, statically or dynamically, the allocations to the two.

Static core-satellite management makes it easy to manage overall tracking error. If the investor has a particular tracking error budget, fixing the proportions invested in the core and in the satellite ensures that he will stay within this budget. Dynamic management of tracking error, on the other hand, offers investors full access to good tracking error, while keeping bad tracking error to an acceptable minimum, and it does so by dynamically adjusting the fractions invested in the core and the satellite.

Exhibit 2.13. Allocation to the core and satellite keeps tracking error under control

Static core-satellite approach
Symmetric management of tracking error by fixing allocation to the core and satellite

Dynamic core-satellite approach
Asymmetric management of tracking error by using a strategy to limit the underperformance of the core while benefiting from the upside potential of the satellite

Core	**Satellite**
Defines the investor's long-term choices in terms of risk/return profile through: - Exposure to standard commercial indices - Improved allocation to sub-segments (such as sectors, styles, and so on) or asset classes - Improved allocation to constituents of commercial indices (new forms of indexing)	Seeks to outperform the core while inducing tracking error through: - Exposure to additional risk premia - Abnormal returns (alpha) obtained by an active strategy

2. Background

Setting the floor is the key to dynamic core-satellite management, since it ensures asymmetric risk management of the overall portfolio. If the difference between the floor and the total portfolio value increases, that is, if the cushion becomes larger, more of the assets are allocated to the risky satellite. By contrast, if the cushion becomes smaller, the fraction of investments in the satellite decreases.

As seen in previous sections, ETFs are visible, transparent, liquid and cheap investment vehicles. Thus, they are particularly adapted to the implementation of core-satellite strategies, especially if they require dynamically changing the allocations.

We proceed now to the presentation of the survey methodology and data. The main results of the survey—European investors' views of ETFs, the use of ETFs, and their comparative advantages and disadvantages—are found in Section 4.

3. Methodology and Data

3. Methodology and Data

3.1. Methodology

The EDHEC European ETF survey 2013 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, including institutional investors, asset management companies and private wealth managers.

The questionnaire consisted of three sections. In the first part, the survey participants are asked about the role ETFs play in their asset allocation decisions. The next set of questions turned to some practical aspects of ETF investment, such as the satisfaction with different ETF products, as well as different applications of ETFs for the portfolio optimisation. In this section, we also ask our respondents' opinions on the ESMA ETF Guidelines published in 2012 which focus on the mitigation of counterparty risk, the disclosure of revenue sharing arrangements regarding securities lending and increasing protection for investors in UCITS ETFs. We then asked respondents about smart beta ETFs to assess their practices and use on this specific product category which has received increasing attention in the media recently. In the last set of questions, the questionnaire finally asks the participants to compare ETFs with other investment instruments that can be considered as close substitutes: index funds, futures, and total return swaps. We also invited the survey participants to express their views on future developments in the ETF market. Finally, relating to the recent considerable development in smart beta indices, we asked respondents to provide their opinions on products that track smart beta indices.

3.2. Data

The email containing a link to the questionnaire was sent out in November 2013. The first response was received on 6 November and the last on 20 December. In total, we received 207 answers to our survey. However, 16% of them declared that they have never invested in ETFs. Since our aim is to include only experienced ETF investors in this survey, we excluded these participants from the study.

Our survey is aimed at European investment professionals. Thus, the 207 respondents to the survey are based in Europe, a large part of which are from the UK, Switzerland and France (more than half of the respondents). The exact breakdown of the respondents' country can be seen on Exhibit 3.1. We can see from these numbers that our sample gives a fair representation of the European investment market by geography.

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 72% out 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 17% of respondents belong to the private wealth management industry. Finally, the remaining 2% is made up of other professionals within the financial

3. Methodology and Data

services industry, such as investment bankers or industry representatives.

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 207 replies to the survey.

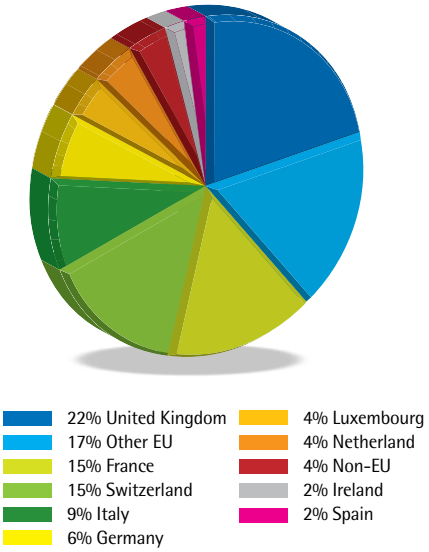
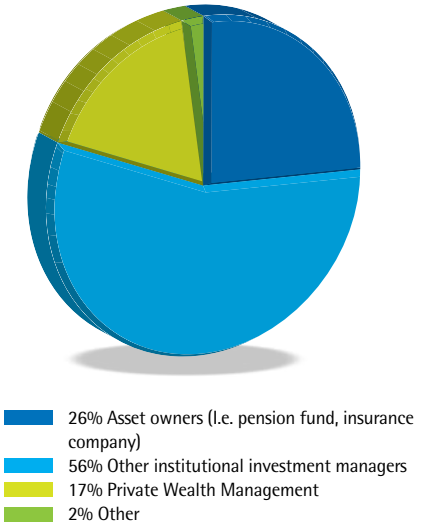


Exhibit 3.2. Main activity of respondents
This exhibit indicates the distribution of respondents according to their professional activities. Percentages are based on the 207 replies to the survey.



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: 14% are board members and CEOs, and 29% are directly responsible for the overall investments of their company (such as CIOs, CROs, or Heads of Portfolio Management). Another small third (28%) of the survey participants are portfolio or fund managers (see Exhibit 3.3).

We also ask the respondents about the nature of their activity. From Exhibit 3.4, we can see that about half of the respondents (48%) are asset managers.

Finally, Exhibit 3.5 shows the AUM of the companies for which the survey respondents work. More than one-third (37%) of the firms in the group of respondents are large firms that have over €10bn in AUM. Another 47% (i.e. almost half of the respondents) are from medium-sized companies, with AUM of between €100m and €10bn. We also capture the opinions of small firms, with 16% having AUM of less than €100m. This feature on the size breakdown implies that the European ETF Survey 2013 mainly reflects the views from medium to large sized companies, with 84% 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 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 this group of survey participants.

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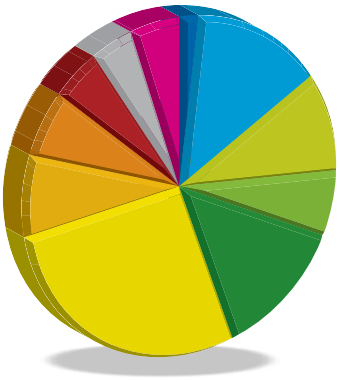
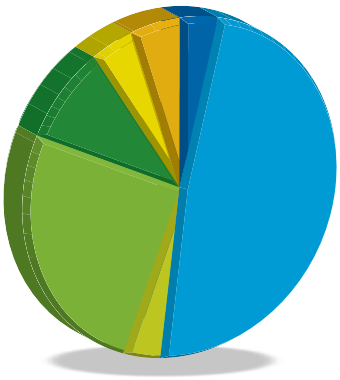
Exhibit 3.3. Function of survey respondents
This exhibit indicates the distribution of respondents based on their positions held in the company. Percentages are based on the 207 replies to the survey. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



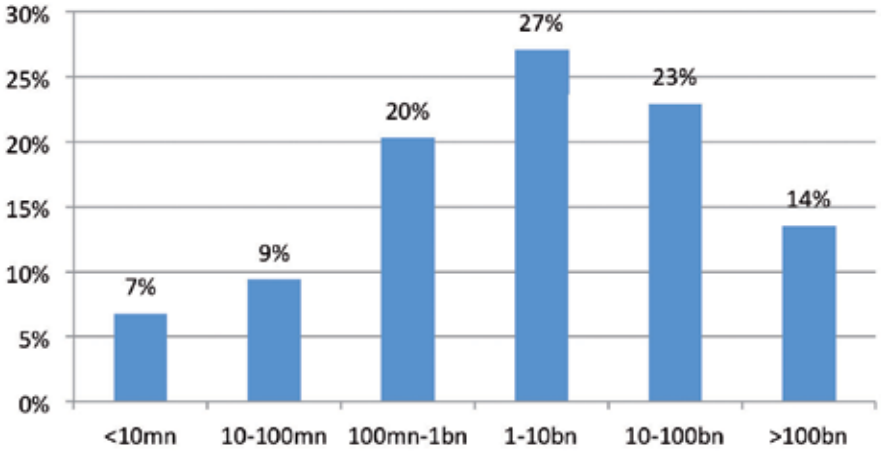
- 2% Supervisory Board Member
- 14% CEO/Managing Director/President
- 10% CIO/CFO Treasurer
- 6% CRO/Head of Risk Management
- 13% Head of Asset Allocation/Head of Portfolio Management
- 28% Portfolio Manager/Fund Manager
- 8% Vice President
- 6% Associate/Analyst
- 5% Marketing Position
- 4% Independent/Private Client
- 5% Non response

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 207 replies to the survey. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



- 4% Non response
- 48% Asset Management
- 4% Capital Markets
- 26% Institutional Investors
- 9% Wealth Management
- 4% Consultants
- 5% Others

Exhibit 3.5. Asset under management
This exhibit indicates the distribution of respondents based on the AUM which they reported.



4. Results

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In this section, we present the main results of this survey and discuss possible explanations for the respondents' answers. In the first part, we take a close look on the use and satisfaction of ETFs in practice. In this part, we also ask our respondents their opinions on the current issues related to the ESMA ETF Guidelines issued in 2012 which are aimed at increasing investor protection for ETF investors and discussed in more detail in the Background Section. In addition we also invite survey participants to express their views on future developments in the ETF market, as well as to give their opinion about products tracking smart beta indices, in relation to the recent considerable development in this type of indices. We then compare the practitioners' view on ETFs with those on investment instruments that can be considered as close substitutes: index funds, futures and total return swaps. We also investigate the role ETFs play in asset allocation decisions which includes the reasons for investing in ETFs and the uses of ETFs within a core-satellite investing approach. In the last section, we compare the results of this year's survey to previous ETF surveys in order to get further insight into trends over time.

4.1. Use of and Satisfaction with ETFs

As ETF products have been gaining more attention in recent years, it would be useful to highlight perspectives from investors. We begin by analysing the use of ETFs in different asset classes; we then look at satisfaction with ETFs. We also look at the investment strategies used in the industry as well as the advanced uses of ETF products. We subsequently compare respondents' views on different ETF replication methods, before moving on to Section 4.1.6, which illustrates how respondents assess the qualities of ETFs in terms of liquidity, tracking error and cost. Section 4.1.8 assesses the respondents' views on the key aspects of the ESMA ETF Guidelines including synthetic replication, securities lending and differences between ETPs and ETFs. Finally, we invite survey participants to express their views on the future developments in the ETF markets and give their opinion on products tracking smart beta indices.

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 4.1 summarises the use of ETFs or ETF-like products among those investors who invest in the relevant asset classes. For instance, 94% and 78% of respondents have used ETFs or ETF-like products for their equity or sector investments respectively. 60% and 68% of respondents use ETFs to invest in government and corporate bonds respectively. Within alternative asset classes, more than three-quarters (76%) of investors who invest in commodities actually employ ETFs. Volatility ETFs are used by two third (67%) of investors who hold such assets, while real estate ETFs are used by 60% of investors. In addition, more than half of respondents (54%) who invest in infrastructure use ETFs, and ETFs are used by 42% of respondents that invest in hedge funds. However, SRI (20%) and currencies (13%) are the two asset classes in which the fewest investors have employed ETFs for their portfolios. Hence we can see

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that – while ETFs are used across a wide spectrum of asset classes – the main use is in the area of equities and commodities. This is likely to be linked to the popularity of indexing in these asset classes as well as to the fact that both equity 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.

For each asset class, Exhibit 4.2 shows the percentages of the amounts invested that are accounted for by ETFs or ETF-like products. Exhibit 4.2 is different from the questions asked in Exhibit 4.1, which shows the rate of ETF usage for those respondents who invest in the respective asset class/investment category, whereas the Exhibit 4.2 reflects the intensity of usage for those investors who do use ETFs. It shows that ETFs are a sizeable share of overall assets across different asset classes.

Exhibit 4.1. Use of ETFs and ETF-like products
This exhibit indicates the percentage of respondents that reported to use ETFs or ETF-like products for asset classes/investment styles that they have already invested in/used. The percentages have been normalised by excluding the non-responses.

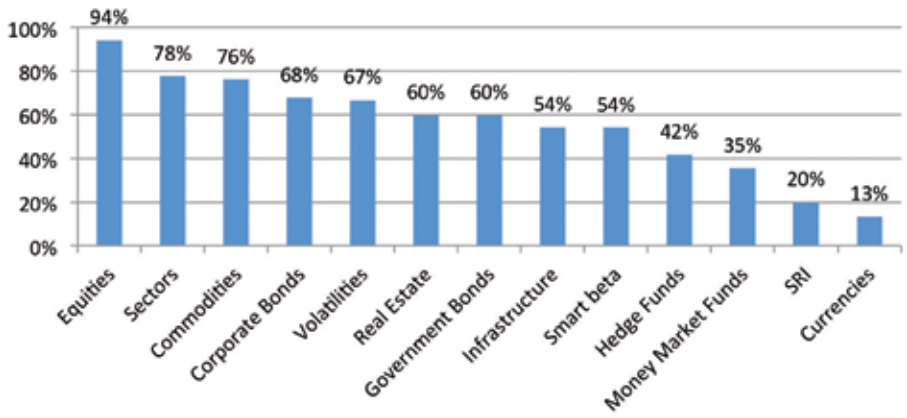
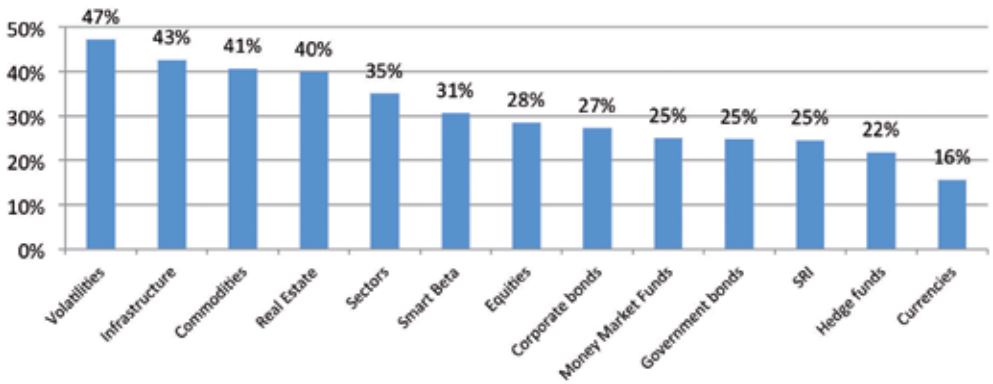


Exhibit 4.2. The percentage of total investment accounted for by ETFs or ETF-like products
This exhibit indicates the average percentage of total investment accounted for by ETFs or ETF-like products for each asset class. We only consider respondents that do use ETFs for the given asset class. Thus the percentage indicates the volume invested in ETFs compared to all investments in the asset class, for those respondents who do use ETFs. The percentages have been normalised by excluding the non-responses.



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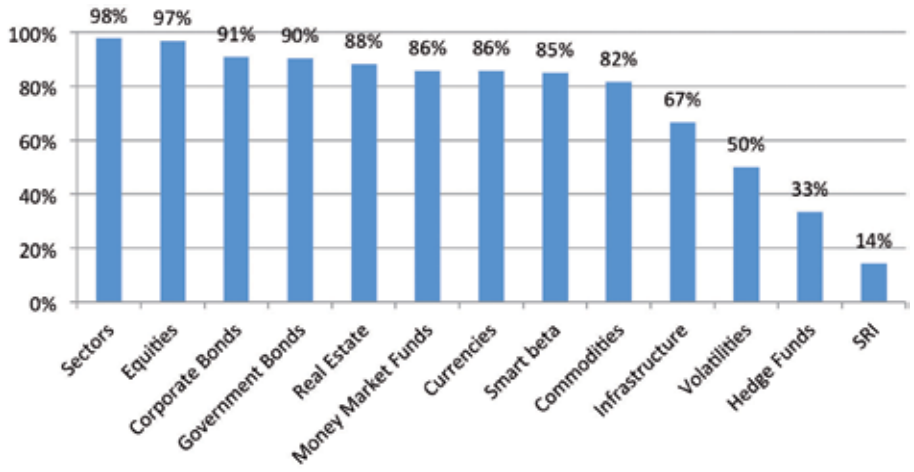
Indeed, for the average respondent to this question, they account for 47% of total volatility investment, 43% of infrastructure investment, 41% of commodity investment, 40% of real estate investment and 35% of sector investment. Smart beta indices and Equities represent 31% and 28% respectively of investment via ETFs or ETF-like products. Corporate bond ETFS accounted for 27% of average investment in this asset class. Money market fund ETFs, government bond ETFs and SRI ETFs each have 25% invested via ETFs in their respective universes. Hedge fund ETFs and currency ETFs accounted for 22% and 16% of average investment in these asset classes respectively. 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.

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 4.3 shows that, across all asset classes, except hedge funds and SRI, the large majority of users are satisfied with their ETFs. Except for infrastructure and volatility ETFs, satisfaction is remarkably high (more than 80%). This is particularly so for sectors, equities, corporate bonds and government bonds (each with satisfaction rates in excess of 90%). In addition, for real estate, money market funds, currency, smart beta and commodity, more than 80% of ETF users are satisfied. Infrastructure and volatility ETFs have lower satisfaction levels although these are still in the 50% to 70% bracket. On the contrary, the level of satisfaction is especially low among hedge fund and SRI ETFs users, with only one-third and 14% of users satisfied, respectively.

It should be noted that the sample for SRI ETF users was especially narrow, with only 7 respondents using ETFs in SRI

Exhibit 4.3. 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.



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asset class. 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 with regard to constructing a representative index is that there is a lack of informational disclosure with regard to performance by a large no. 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, 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 4.4. It is interesting to note that volatility indexes have scored the third lowest in terms of satisfaction rates. 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.)

4.1.3. Trading ETFs

One of the great advantages of ETFs is that they can be easily traded on conventional stock exchanges. So we asked respondents how much of their ETF trading is done OTC rather than on an exchange. Although 55% of the respondents do not trade a significant share of their ETF investments over-the-counter, around a quarter of respondents execute more than half of their ETF trading on OTC markets (see Exhibit 4.4). It is not surprising that a large proportion of ETF trading takes place OTC (see Background Section) as this allows for a saving on costs. For instance, by doing so investors can avoid paying transaction costs and only need to pay the creation fees from the ETF provider. There is also the fact that trading OTC allows more flexibility with regard to negotiating specific elements of the trade such as country of settlement or specific settlement dates to more precisely match the investor's requirements.[79] The percentage of respondents who have reported trading more than 90% of their ETF investments on OTC markets has stabilised since 2011, as it is constant (9% [80]) since this year.

79 - http://etf-radar.com/magazine/?portfolio=trading-etfs
80 - The percentage is taken from EDHEC-Risk European ETFs Survey 2011 and from EDHEC-Risk European ETFs Survey 2012.

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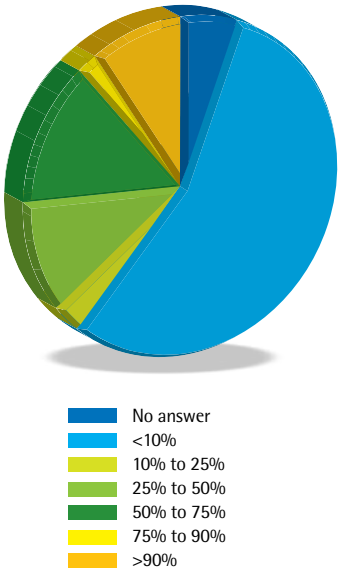
Exhibit 4.4. How much of your ETF trading is done OTC rather than on-exchange
This exhibit indicates the distribution of respondents according to the percentage of total trading volume done OTC. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



4.1.4. Advanced ETF Products and Advanced Uses of ETFs

As mentioned in the Background Section, ETFs stand out for a number of advanced features. Exhibit 4.5 summarises how these features are used by European investors and asset managers. We ask in particular about the use of inverse and leveraged ETFs, options written on ETFs, short-selling of ETFs and the use of ETF shares in securities lending.

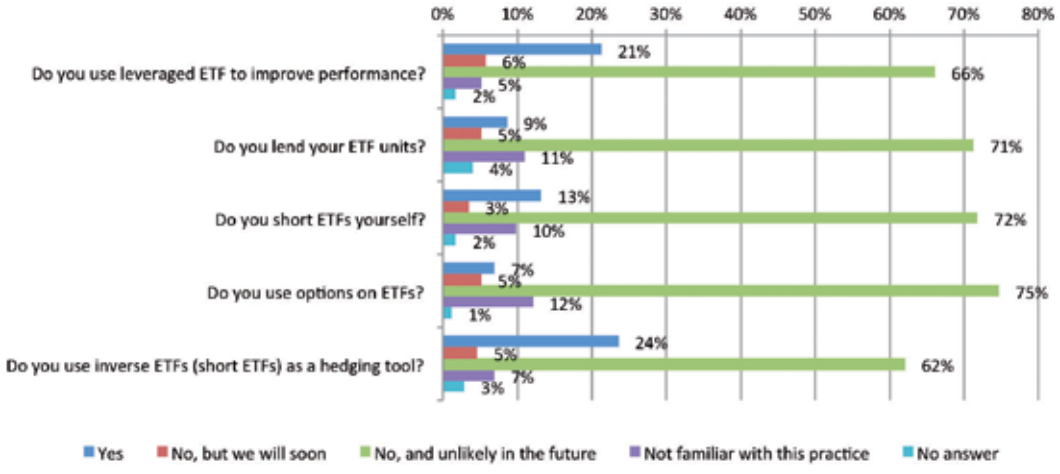
We can see from this chart that ETFs packaged with advanced trading strategies (inverse or leveraged ETFs) are still widely used (by about one-quarter and one-fifth of respondents, respectively), despite the recent appearance of such instruments. We also ask whether those respondents who currently do not employ these advanced uses of ETFs, intend to do so in the future. We can see that we should expect the percentage of respondents using ETFs in advanced ways to increase going forward. In addition to this, we could also expect increases in usage as investors who answer that they are "not familiar with the practice" become educated about advanced forms of trading ETFs.

4.1.5. Replication methods for ETFs

Most ETFs are passively managed and replicate indices. More recently, actively-managed ETFs have been launched as well.[81] Exhibit 4.6 shows that the majority of respondents (70%) prefer passive ETFs,

81 - Pimco launched the Total Return Active ETF on the 1 March and by November 2012 it had become the largest actively managed ETF with $3.4bn in assets under management.

Exhibit 4.5. Advanced use of ETFs
This exhibit indicates the adoption of advanced use of ETFs. Non-responses are reported as "no answer" so that the percentages for all categories in each advanced use of ETFs add up to 100%.



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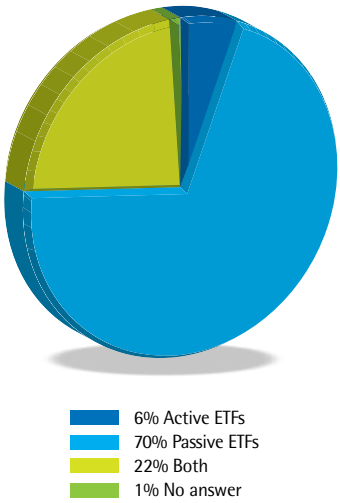
while active ETFs are preferred by about 6% of respondents. 22% of respondents indicate that they are indifferent between both types of ETFs.

Exhibit 4.6. Which type of ETF do you prefer?
This exhibit indicates the distribution of respondents based on their preferred type of ETFs. Non-responses are reported as "no answer" so that the percentages for all categories added up to 100%.



Active ETFs fly in the face of the investment philosophy that would have the manager eschew stock picking and concentrate on asset allocation. Active ETFs allow immediate trading in actively-managed funds. Therefore, the logical application of such funds would be short-term manager selection, not asset allocation. A dilemma exists in active ETFs that may reduce their attractiveness to investors. Active ETFs 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 other 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.

Many ETF providers in the U.S. have made applications to the SEC to launch actively-managed ETFs which do not disclose their holdings on a daily basis[82] without success. This may illustrate the conflict between the product providers' desire to keep their investment strategies private when it comes to active management and the regulators efforts to maintain the key property of transparency within ETFs.

The data clearly shows that respondents prefer passive ETFs. The total percentage of respondents who prefer active ETFs (6%) or both active and passive ETFs (22%) has stayed the same compared to the previous year.

The data shows that respondents are still overwhelmingly in favour of passive ETFs. Hence we analyse which types of passive ETFs they prefer in terms of the replication mechanism employed. Among those who favour passive ETFs or are indifferent, we ask them a general question, asking them to rate the "quality" of each of the different ETF replication mechanisms. Exhibit 4.7 shows that all three replication mechanisms are viewed positively by our respondents – there are less than one-third of respondents expressing negative views on any one of the replication mechanisms.

However, we can also see clearly that a large majority of respondents (66%) express a very positive view on the general quality of conventional full replication ETFs and almost nobody sees them as poor. On the other hand, there are more

82 - http://www.indexuniverse.com/sections/features/9817-blackrock-plans-nontransparent-active-etfs.html

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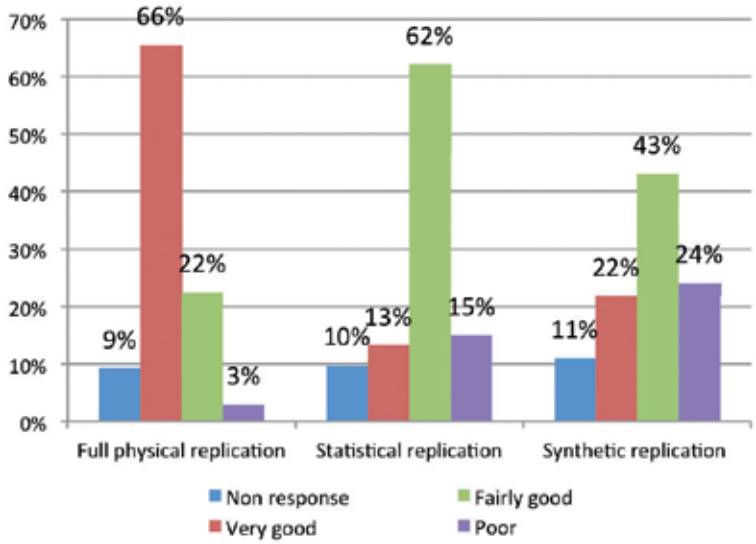
Exhibit 4.7. How do you rate the quality of the following passive ETFs?
This exhibit indicates the distribution of respondents based on their preferred replication method of ETFs. The percentages in this exhibit are for respondents who prefer passive ETFs only.



negative views on sampling and synthetic replications (15% and 24%, respectively), and there are less respondents who rate them as very good (13% and 22%, respectively).

An interesting part of our study emerges when we ask more detailed questions on the relative merits of different replication methods, and we find that respondents do not uniquely favour any of the possible replication techniques. When taking into account aspects including cost of replication, access to broad indices and tracking error considerations, full physical replication, sampling-based physical replication and synthetic replication actually receive similar ratings by respondents, as shown by the results in Exhibit 4.9 So it appears that debates about synthetic replication and, in particular, the communication on supposed advantages of physical replication has had an impact on respondents' overall perception as illustrated by Exhibit 4.7.

As different methods may be more or less appropriate for different asset classes or investment objectives, we developed our questions to respondents regarding their opinions on a variety of qualities for each of the three replication methods. For instance, full replication would be very suitable for indices with liquid and small number of constituents. However, for more broad indices or those innovative indices based on asset classes with low liquidity, full replication may not be feasible, but synthetic or sampling replication could help investors overcome this issue. As an example, one can cite the launch of the ETP on volatility indices that have been made possible by the nascent market for volatility derivatives[83] or ETFs that use credit derivatives to obtain credit exposure.

Exhibit 4.9 summarises the respondents' views on the various qualities for these three replication methods. In the 2012 survey, similarly to results observed in the 2011 survey, we reported the rather

83 - Two exchange-traded products on S&P500 volatility index futures were launched in January 2009.

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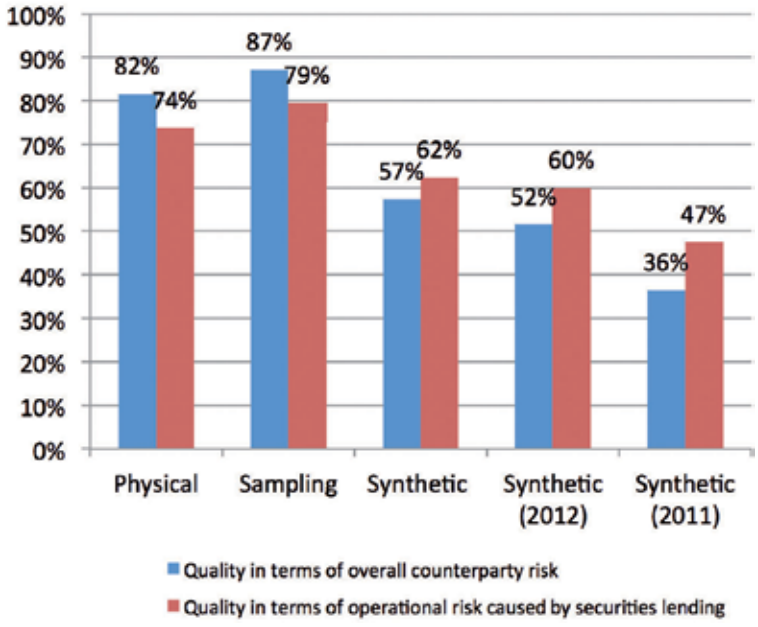
surprising result that synthetically-replicated ETFs scored the least strongly out of the three replication mechanisms with regard to both counterparty risk and operational risk (with positive response rates of 51.5% and 60% respectively, higher than in 2011, compared to about 80% for similar criteria for the other two replication mechanisms).

Hence, synthetic replication was perceived to have the highest risk exposures for both counterparty risk and operational risk and full replication and sampling replication were seen to be less exposed to such risks. These results are rather surprising, particularly in terms of counterparty risk exposure, because as discussed in Amenc *et al.* (2011), ETFs replicated by all three methods are exposed to counterparty risks, though from different sources (securities lending counterparty for full and sampling replications and swap counterparty for synthetic replication). Since in the event of a counterparty defaulting, collateral will be received, an ETF's level of risk exposure depends more on the characteristics of the collateral than on the type of replication.

Exhibit 4.7a illustrates respondent's perceptions with regard to the exposure of each of these replication mechanisms to these two risks in 2013. We have included the 2011 and 2012 results to serve as a comparison for synthetic replication. We can see that the situation has improved both from 2011 to 2012, and from 2012 to 2013, though the latest improvement was smaller. Synthetically replicated ETFs have scored more strongly with regard to both overall counterparty risk (57%) and securities lending risk (62%), to be compared to 2012 figures (52% and 60%, respectively) and 2011 figures (36% and 47%, respectively). However, the situation is still quite similar, confirming that there is confusion about how these products

Exhibit 4.7a. Comparison of Replication methods in terms of perception of Counterparty and Operational risks.
Respondents were asked to score each replication mechanism with regard to quality with regard to counterparty risk and operational risk by assigning 3 to very good, 2 to fairly good, and 1 to poor. The percentages plotted on the graph show the respondents who answered very good and fairly good excluding non-responses.



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are constructed. The stronger indicator of this misunderstanding is related to the operational risk caused by securities lending. As shown in Johnson *et al.* (2011), synthetic ETFs in general do not engage in such activities. But our result shows the lowest quality score among the three types of replication for synthetic ETFs. On the other hand, full and sampling replications which generally engage in securities lending obtain a higher quality score on risk associated with securities lending which does not make sense.

As for the coverage[84] and cost properties, synthetic replication is regarded as being more effective than the other two replication methods. For example, 88% of respondents rate the ability of synthetic replication to provide access to alternative asset classes as good or very good, compared to the ability of physical and sampling replication, which are rated as good or very good by 63% and 77.5% of respondents, respectively. Similar results are obtained for cost, as 93% of respondents rate synthetic replication as good or very good, both for replicating illiquid underlying securities and replicating a large number of constituents, when only 36.5% and 53% of respondents consider full replication as good or very god for replicating illiquid underlying securities and large number of constituents, respectively. Thus, full replication receives the lowest rating, both for coverage and cost of replication, which is consistent with the explanation that it is difficult and costly to use full replication to track large or illiquid indices. Lastly on the reliability of replication (i.e. low tracking error), interestingly, full replication attains the highest positive response rate (95%), which is much higher than synthetic replication (84%) or statistical replication (81%). This is in line with the fact that low tracking error character is often cited as a justification for full replication by ETF providers (Cheng 2009; Kaminska 2011; St Anne 2011). In addition, full replication also obtains the best score for the ability to track narrow indices, with 95% of respondents rating it as good or very good.

To this question, overall, the three methods receive similar scores though synthetic replication is slightly higher than the rest (2.20, versus 2.02 and 1.98, for full replication and statistical replication, respectively). However, this is inconsistent with the findings in the previous question, where full replication receives exceptionally high feedback when compared to the other two replication approaches: statistical and synthetic (see Exhibit 4.7). Thus there seem to be misperceptions with regard to the superiority of physically replicated ETFs.

We also show the average score received for each criterion (see the last column in Exhibit 4.8). This score shows the merits of ETFs in the eyes of our respondents with regard to each of the qualities assessed and the higher the score the better the perception of the replication mechanism with regard to the assessed qualities. On average, the ETFs score more strongly with regard to reliability in terms of low tracking error and the coverage of ETFs and least strongly with regard to the risks associated with ETFs.

84 - The coverage refers to capability to replicate different types of indices.

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Exhibit 4.8. Comparison in the qualities of different replication methods
The scores indicated in the table are obtained by assigning 3 to very good, 2 to fairly good, 1 to poor and calculated based on the number of respondents for each question excluding the non-responses. The percentages shown in the next row indicate the percentages of respondents who answered very good and fairly good excluding non-responses.[85]

	Full replication	Sampling replication	Synthetic replication	Average
QUALITY SCORES				
Reliability				
Quality of reliability of replication (i.e. low tracking error)	**2.55**	1.9	2.25	2.23
	95.2%	81.0%	83.7%	
Coverage				
Ability to provide access to alternative asset classes	1.79	1.91	**2.37**	2.02
	63.1%	77.5%	**88.1%**	
Ability to track broad indices with large number (>1000)	2.03	2.18	**2.47**	2.23
	76.3%	88.8%	**93.1%**	
Ability to track narrow indices with small number (<100) constituents	**2.63**	2.04	2. 421	2.37
	94.9%	82.2%	91.8%	
Cost				
Cost of replication for illiquid underlyings	1.44	1.90	**2.30**	1.88
	36.5%	82.1%	**92.9%**	
Cost of replication for a large number (>1000) of constituents	1.55	1.99	**2.36**	2.00
	53.2%	87.7%	**92.9%**	
Risk				
Quality in terms of overall counterparty risk	**2.11**	2.05	1.66	1.94
	81.5%	87.1%	57.3%	
Quality in terms of operational risk caused by securities lending	**1.92**	1.87	1.79	1.86
	81.5%	79.5%	62.3%	
Overall Quality Scores	**2.02**	**1.98**	**2.20**	

85 - We are showing both scores and percentages because sometimes if the answers are very extreme (e.g. half very good half poor), the score may just show an average of importance which does not properly represent the views of respondents. With the percentages shown in the results, we show a more detailed picture of respondents' answers.

4.1.6. Evaluating ETFs

We have seen opposite views from our respondents regarding the most favoured replicating methodology when answering a broad or a detailed question. This implies that respondents perhaps perceive some criteria as more important than others. So when they are asked by a general question about preference, the most critical factor will dominate their opinions. In this section, we ask our respondents to give some insight on the important criteria when selecting an ETF and we then focus on three qualities: tracking error, liquidity and cost.

The criteria we have in the first question are commonly found information from an ETF's factsheet. As ETF providers choose to report such information, we would like to investigate whether our respondents see them as important while making investment decisions. Overall, Exhibit 4.9 shows that respondents are most concerned about the total expense ratio (it receives a score of 1.68), the underlying index which the ETF tracks (1.55), bid/ask spread (1.63), tracking error (1.49) and counterparty risk (1.43). The rest of criteria, such as house reputation, AUM, depth of range etc., are not as important. The lack of importance assigned to criteria that do not have a direct impact on the

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financial characteristics of the ETF, but are more closely related to "branding" is probably indicative of the increasing levels of commoditisation within the industry.

Cost is another critical factor which affects the portfolio performance. It is a general quality for all types of investment, and under more pressure as the industry become more competitive. Whenever an investor considers a product, how much it costs is always an important question which may determine the choice of investments. Carhart (1997) shows that common factors in stock returns and differences in mutual fund expenses and transactions costs explain almost all of the persistence in mutual fund returns. Hence aside from the underlying index being tracked by the ETF (which will determine exposure to common factors) 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 in average annual returns by 67 basis points. This is reflected in the high importance assigned to the total expense ratio by our survey respondents. This shows that respondents are strongly scrutinising costs within ETFs, even though they are already a comparatively low cost vehicle. This may be as a result of the recent focus that has been placed on the 'hidden costs' that are being charged to investors relating to securities lending fees by the regulators (See Background Section).

The bid / offer spreads receives the second highest score (65%), with a notable increase in importance compared to the results of 2012 survey (65%, versus 59%). Bid/ask spread is a measure of liquidity. As noted in the Background Section, liquidity is one of the most essential criteria to evaluate the quality of ETFs and other indexing vehicles. The most attractive advantage that ETFs bring to investors is that ETFs could be traded in the exchange market like stocks; hence ETF products are very liquid. As a result, liquidity is an important factor when evaluating an ETF.

The underlying index receives the third highest score (63%), which implies that the selection of ETFs very much depends on the investment objectives and less so on the other qualities (aside from TER and liquidity) of an ETF. In other words, even if an ETF replicates an index perfectly and is free of risk or tracking error, as long as the underlying index is not the desired one, investors will not choose this ETF. The importance of the underlying index would seem to make perfect sense as the reason for investing is to gain a specific type of investment exposure.

The fact that investors think that the underlying index is a key factor supports the recent increased scrutiny being placed on financial indices in general and specifically those acting as benchmarks for UCITS by the European Commission and by ESMA respectively. We provide a detailed discussion of the issues being investigated in the Background Section and refer the reader to the respective consultation documents.[86]

86 - http://ec.europa.eu/internal_market/consultations/docs/2012/benchmarks/consultation-document_en.pdf

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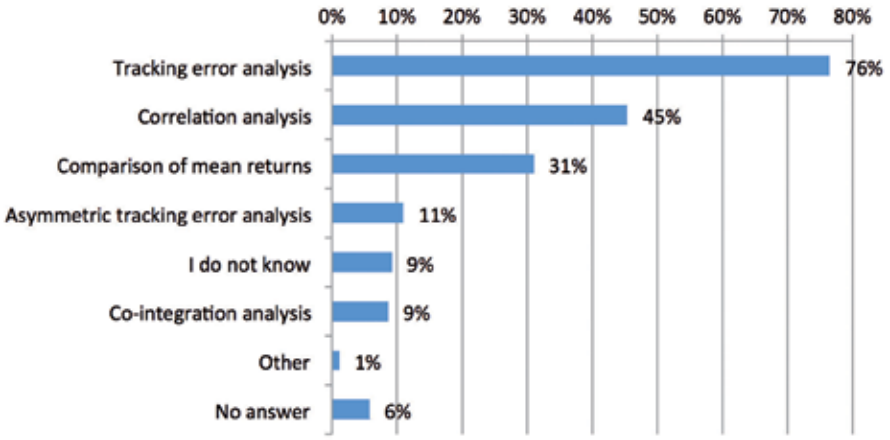
The fourth highest score is for tracking error. The primary goal of an ETF is to track the performance of an underlying index. Thus, tracking error is a straightforward indicator for assessing the quality of an ETF. Exhibit 4.10 indicates the various methods used by respondents to assess the tracking quality. It appears that more than three-quarters of them (76%) rely on the simplest method, i.e. tracking error measurement, while less than half of them (45%) also look at more sophisticated methods, such as correlation analysis, and less than a third of them (31%) use comparison of mean returns. Other more sophisticated methods are only marginally used, with 11% of respondents using asymmetric tracking error analysis, and 9% of them using co-integration analysis. Besides the tracking quality and the

Exhibit 4.9. How do you rate the importance of the following criteria when selecting an ETF?
The scores indicated in the table are obtained by assigning 2 to critical, 1 to important but not critical, -1 to not important at all and calculated based on the number of respondents for each question excluding the non-responses. The percentages shown indicate the percentages of respondents who answered critical excluding non-responses.

	Score	% of Critical
Total expense ratio (all-in fees)	1.68	68.0%
Bid/offer spreads	1.63	64.9%
Underlying index	1.55	63.4%
Tracking error	1.49	54.7%
Counterparty risk	1.43	53.8%
House reputation	1.22	38.0%
Asset under management	1.20	35.5%
ETF domicile/regulatory regime	1.16	40.1%
UCITS compliancy	1.14	47.1%
Tax regime	1.12	32.6%
Dividend policy	0.92	25.7%
Market makers interactions	0.79	18.7%
Depth of the range	0.66	16.4%
Over performance	0.63	17.5%

Exhibit 4.10. Which method do you use to assess the tracking quality?
This exhibit indicates the percentages of respondents that reported to use particular method to assess the tracking quality. Respondents are able to select more than one method. Non-responses to this question are reported as "no answer" to show the response rate.



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liquidity, indicated by our respondents as important qualities when comparing ETFs that replicate the same desired index, counterparty risk, which is usually linked to synthetic replication, but in fact associated with all kinds of ETFs, also draws significant attention from our respondents. ETF providers often launch parallel products on the same index with different dividend distribution policies,[87] however, our results show relatively low importance of the dividend policy for investors. Hence this is an interesting signal of the increasing maturity of the market, where product differentiation is occurring even on issues of relatively low importance.

A key issue with indexing instruments is liquidity. Although practitioners are highly familiar with liquidity measures, the finance literature has yet to come to a consensus on theory and on empirical methodology. In the following exhibit, we list four methods for liquidity measures. The bid-ask spread is the most common used measure for liquidity. The smaller the market spread, the more liquid the product is. The AUM mentioned in the exhibit is the asset under management of the ETF, which shows the size of the ETF and may proxy for the liquidity of the product. The turnover rate is an indicator for trading volume. The last method about the co-movement of liquidity and returns represents the Acharya and Pedersen (2005) model which is explained in the Background Section.

Survey respondents rely largely on market spreads (75%), turnover and AUM (53% each) as measures of liquidity (see Exhibit 4.11). However, a significant percentage of respondents (17%) rely on the co-movement of liquidity in the instrument and the returns on the index, as proposed by Acharya and Pedersen (2005).[88]

From the Exhibit 4.11, we understand that there are number of indicators which could be used to measure the level of liquidity. In the following question, we ask our respondents on how they perceive the different measures of liquidity (see Exhibit 4.12). Overall, the results show that as a general impression, trading ETFs

87 - See for example the dividend capitalising and dividend distributing ETFs managed by DB X Trackers both benchmarked against the Euro Stoxx 50 Index.
88 - Please refer to textbox in Section 2 for more discussion.

Exhibit 4.11. Which method do you use to assess the liquidity?
This exhibit indicates the percentages of respondents that reported to use particular method to assess liquidity. Respondents are able to select more than one method. Non-responses to this question are reported as "no answer" to show the response rate.

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is more flexible in terms of liquidity than other type of funds (86% of respondents agree with this statement). In addition, most respondents consider that many indicators could only explain part of the ETF liquidity: 85% of respondents consider that on-exchange traded volumes display partly the current volume traded on ETFs; 77% think that the liquidity of its underlying index also determine part of the liquidity of an ETF. Bid/ask spread, the most commonly used indicator for liquidity, only receive the support from 68% of respondents. This implies that bid/ask spread alone is not enough to enable the liquidity measure of an ETF, especially when the market is extremely volatile, market makers may stop providing the price for the trading.[89] This could also be the reason that only 64% of respondents believe that liquidity could be ensured by market makers in the OTC market. In the end, 63% of respondents agree that the AUM could partly measure the ETF liquidity, a little more than the 53% of respondents that use AUM to measure liquidity (see Exhibit 4.11).

89 - See example on 6 May 2010, also called "flash crash". When the market has a sudden drop, many automatic trade orders are executed, causing a scarcity in market liquidity; Market makers are not able to provide instant accurate spread so many of them stop providing prices (SEC report).

The next question we ask our respondents is about how they assess the ETFs in terms of their costs. Overall, Exhibit 4.13 shows that the TER and the spread are the most critical factors when assessing an ETF. They receive scores of 1.59 and 1.44 respectively, and more than half of respondents see them critical (60% and 50%, respectively). As for creation & redemption fees and brokerage fees, they are less important. About 40% and 30% of respondents, respectively, consider them critical.

The results of this question are related to how investors use ETFs. For instance, 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 in aggregate will be related to the volume of trading that takes place. From the results of this question, we would expect that our respondents are more likely to be using ETFs for long-term buy-and-hold purposes rather than short-term high frequency trading which is confirmed in Section 4.3.1 of the Results section.

Exhibit 4.12. How would you rate the following statements regarding or when assessing the liquidity of an ETF?

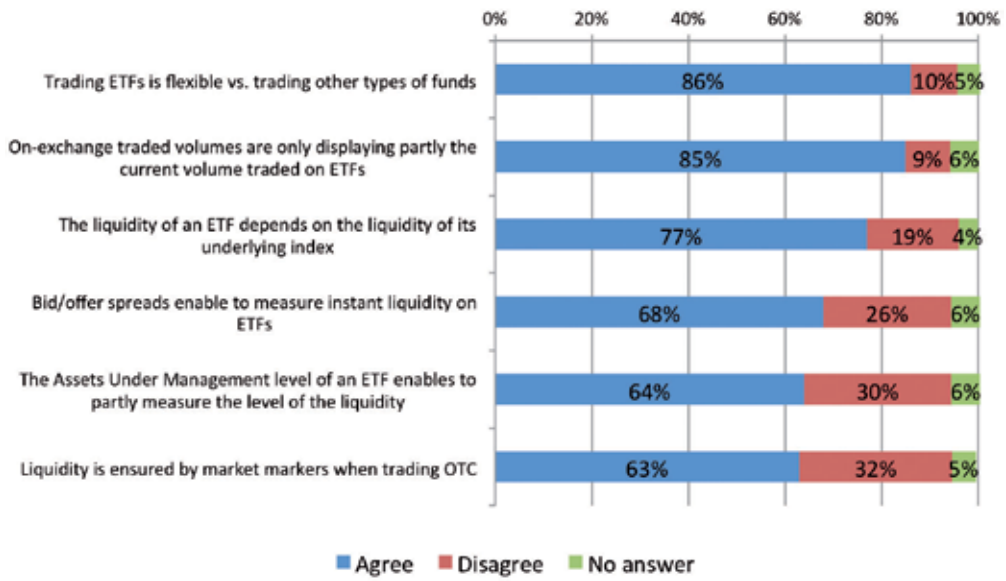

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Exhibit 4.13. How do you rate the importance of the following criteria when selecting an ETF?
The scores indicated in the table are obtained by assigning 2 to critical, 1 to important but not critical, -1 to not important at all and calculated based on the number of respondents for each question excluding the non-responses. The percentages shown indicate the percentages of respondents who answered critical excluding non-responses.

	Score	% of Critical
Total expense ratio (all-in fees)	1.59	59.9%
Cost of liquidity (spreads)	1.44	50.3%
Creation & redemption fees when trading at Net Asset Value	1.19	39.8%
Brokerage fees	1.11	29.3%

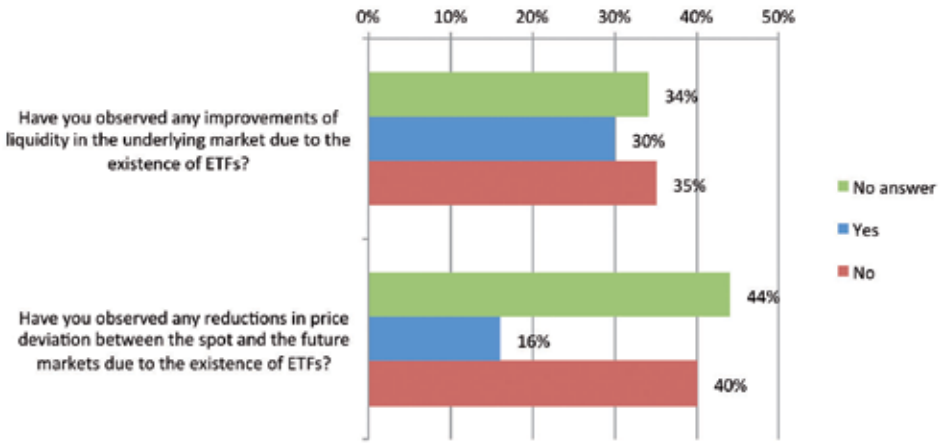
4.1.7. The Impact of ETFs on Price Efficiency

So far we have asked about evaluating ETFs directly. As ETF markets become more mature, it is rational to evaluate the impact that ETFs have on the broader market especially in the light of concerns raised by regulators about the market wide impact of ETFs. The academic literature described in the Background Section, has found evidence of a positive impact of ETFs on the related futures markets or on underlying securities. Therefore we move on to ask the opinions of respondents regarding to the price efficiency in the spot-future market after the insertion of ETFs.

Exhibit 4.14 shows that 16% of respondents have themselves observed that ETFs have improved the price efficiency between spot and futures markets. This finding is similar to last year's result ; and the results to the second question with regard to an improvement in liquidity in the underlying market (30%) show a slightly decrease compared to last year's result (33%).

The results are important as they show that many practitioners seem to share the same views as academia – that there is a significant improvement in the liquidity of underlying markets as well as in the price efficiency of the futures market after the introduction of ETFs (Hegde and McDermott 2004, Madura and Richie 2007, Ackert and Tian 2001, Deville 2005, Deville and Riva 2007, and Winne *et al.* 2012). The high non-response rate (44%

Exhibit 4.14. Concerning price efficiency have you observed...
This exhibit indicates the percentages of respondents that expressed their opinions on the two arguments about the price efficiency. Non-responses to this question are reported as "no answer" so that the percentages for all categories in each argument add up to 100%.



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and 34%, respectively) indicates that many investors have not started to be aware of the impact of ETFs on spot and futures markets and thus have no opinion on this topic.

Exhibit 4.15 indirectly examines the efficiency of the ETF market against the underlying markets and the results show that slightly more than half of respondents (51%) watch information on ETFs frequently instead of doing that directly on the underlying market (as indicated by the sum of the "Very Often", "Often" and "Sometimes" responses.) This is lower than the 2012 results (59%) and higher than the 2011 results (43%). The figure for respondents who answered this question as "Never" is 17% – higher than the ones of 2012 (13%), but lower than the ones of 2011 (22%). The decline we observe in 2013 in the number of respondents that rely on ETFs to gain information about the underlying securities, may be explained by the considerable increase observed in the figures the previous year. However, it should be noted that the figures are still higher than in 2011. Thus it seems that ETFs are having an increasingly positive impact on price efficiency of the underlying markets over time. This is in line with Hasbrouck (2003) and Tse *et al.* (2006) who show a clear price leadership of the ETF market over the spot market which suggests that ETFs process information faster than the spot market. Overall, both the observations of practitioners as reflected in the responses to our survey and the empirical academic literature suggest that ETFs are having an increasingly positive impact on price efficiency of financial markets.

Before investigating the views on investors about ESMA Guidelines, we ask them if they prefer of the index on which an ETF is based is not constructed by the ETF provider. From Exhibit 4.15a, we can see that about three-quarters of respondents (72%) indicate that they would prefer the index on which an ETF is based is not constructed by ETF provider.

Exhibit 4.15. Do you watch information on ETFs to gain access to information about the underlying securities?
This exhibit indicates how frequently respondents watch information on ETFs to gain access to information about the underlying securities. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.

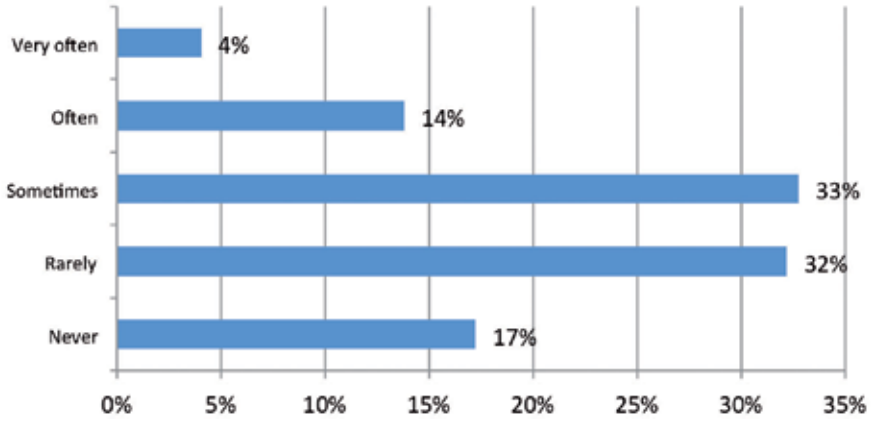

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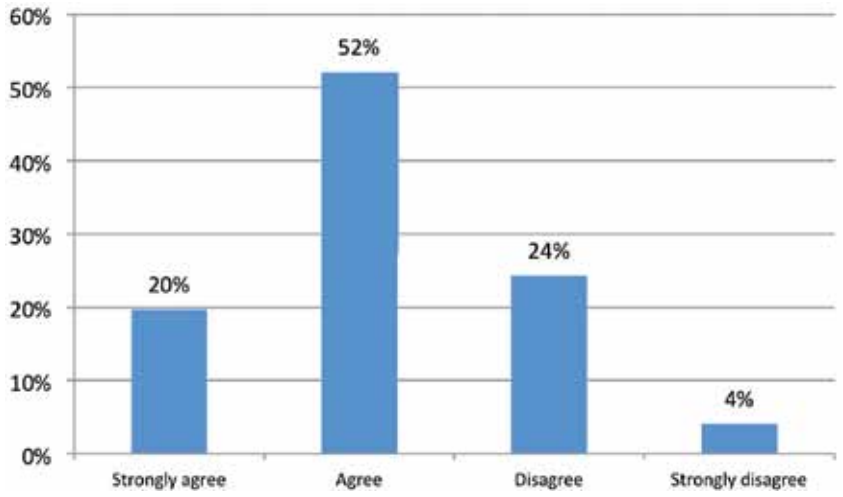
Exhibit 4.15a. Do you prefer of the index on which an ETF is based is not constructed by the ETF provider? This exhibit indicates the agreement of respondents with this statement. Non-responses are excluded.



4.1.8. Investor Views on the ESMA Guidelines and Recent Debates on ETFs

On 25 July 2012 ESMA published guidelines aimed at increasing investor protection for investors in UCITS ETFs. We provide a detailed discussion of the Key guidelines in the Background Section. However, we now present the views of our respondents with regard to the effectiveness of the guidelines and their views on some key issues.

One of the key considerations of the ESMA Guidelines has been the mitigation of counterparty risk associated with the use of efficient portfolio management techniques such as securities lending, and OTC swap transactions. The risks from both of these transactions are discussed in detail in Amenc *et al.* (2011.) For synthetic replication, a substitute basket of stocks plus the return on the index to be tracked is provided to the ETF provider in exchange for the cash assets of investors in the ETF through an OTC swap transaction. The counterparty risk is that, in the event of a default of the swap counterparty, the assets in the substitute basket are not liquid or are not similar to the underlying securities of the index which the ETF is supposed to track. Within physical replication, securities lending also results in counterparty risk. This is because the shares held by the ETF are lent out in exchange for a securities lending fee and collateral on the shares. Hence risk is induced if the borrower defaults and the value of the collateral is less than the value of the shares that have been borrowed (Amenc *et al.* 2011.)

Counterparty Risk Mitigation

But as asserted by practitioners and detailed by Amenc *et al.* (2011) the risk from both these types of transactions can be controlled through different regulations. With regard to OTC derivative transactions, the counterparty risk (in terms of excess value of the ETF NAV compared to the value of the substitute basket of stocks) should not exceed 10% of the fund's NAV as outlined by UCITS. In the event of a larger than 10%

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imbalance between the substitute basket and the fund NAV, there will be a 'reset' where collateral is added to the substitute basket. In actuality many synthetic ETF providers employ a daily reset so as not to carry any counterparty risk overnight to provide protection in excess of that required by regulation. With regard to securities lending, these transactions are subject to a maximum of 20% exposure to a single counterparty through the Issuer Concentration Limits as laid out by the CESR.

In addition to the regulation outlined above, the newly formulated ESMA Guidelines have imposed specific criteria for the collateral for OTC financial derivative transactions and efficient portfolio management techniques (securities lending).

These are covered in Guideline 40 within Section XII of the ESMA Guidelines and include:

- Liquidity – any collateral received other than cash should be highly liquid with transparent pricing;
- Valuation – collateral received should be valued on at least a daily basis;
- Issuer credit quality – collateral received should be of high quality.

In our survey, we cover respondents' views with regard to the importance of such measures with regard to managing risk. In addition to this, we also consider other ways of mitigating counterparty risk which are used in practice such as over-collateralisation, diversifying trading activity across multiple counterparties and the importance that the composition of the substitute basket be published.

We divide this section into two parts and begin with the risk exposures caused by synthetic replication before moving onto physical replication. As shown by Exhibit 4.16, with regard to the approaches to reduce counterparty risk, respondents value the daily monitoring of counterparty exposure levels, over- collateralisation of the underlying and the 10% UCITS limitation on exposure levels the most (66%, 63% and 58%, respectively). As for the adoption of multiple counterparties, 44% of respondents consider this as important. However, a single counterparty is not appreciated among our respondents even if the name is identified (only 28% of respondents rate it as critical). This results of these last two findings seems to be consistent with our findings that there is a growing trend in the increased number of counterparties used in practice as investors look for approaches to diversify away their risk exposure. We discuss this in more detail in the time trends section of our analysis in Section 4.3.

With regard to the composition of the substitute basket, all three of the approaches outlined above from the ESMA ETF Guidelines receive very high attention from respondents (over 60% for the three of them). Whether the assets in the basket are high quality is considered the most critical factor for respondents to reduce the risk (The score is 1.73 and 75.0% see it critical). But whether the assets in the baskets have similar or even higher liquidity than the constituents of the index that the ETF tracks is seen less important than the basic requirement on high quality (The score is 1.56 and 62.5% think is critical). In addition, transparency on the composition of the

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Exhibit 4.16. How do you rate the importance of the following approaches to reduce risk exposures caused by synthetic replication? The scores indicated in the table are obtained by assigning 2 to critical, 1 to important but not critical, -1 to not important at all and calculated based on the number of respondents for each question excluding the non-responses. The percentages shown indicate the percentages of respondents who answered critical excluding non-responses.

	Score	% of Critical
Approaches to reduce counterparty risk		
The exposure level to swap counterparty is monitored daily	1.58	65.6%
The underlying being over collateralised	1.45	62.9%
The exposure level to swap counterparty is limited to 10% (UCITS III)	1.48	57.9%
Multiple counterparties are used	1.22	43.7%
A sole counterpart is indentified	0.72	27.8%
Composition of the substitute basket		
The assets in the substitute basket are high quality	1.73	75.0%
The composition of the substitute basket is published	1.59	66.9%
The assets held in the substitute basket have similar or higher liquidity than the constituents of the index that the ETF tracks	1.56	62.5%

substitute basket is also helpful to reduce the risk exposure. About two-thirds of respondents (67%) consider it critical.

The outstanding importance of high quality assets in the substitute basket may be because "high quality" could imply the assets are both liquid and similar to the constituents of tracked index. Overall the opinions of the respondents with regard to collateral management seem to be consistent with the ESMA ETF Guidelines.

Following the discussion on risk caused by synthetic replication, we move to the next issue: risk caused by securities lending. As previously mentioned, securities lending is the common approach in the mutual fund industry to reduce cost and earn income. However, since both ETF shares and the underlying securities could be lent out, there are potential risks associated to this approach. Similar to synthetic replication, counterparty risk may be induced if the borrower could not return the shares. In this case, investors would incur a loss. Hence, we investigate how our respondents consider the importance of common approaches use to reduce such risks.

First of all, respondents are asked if they see securities lending an important advantage when considering ETFs. The results show that about one-quarter of respondents (24%) see it an advantage. On the contrary, about three-quarters of respondents (74%) do not think so (see Exhibit 4.17.) One possible explanation would be that securities lending is common for mutual funds so it is not unique feature to be considered a specific advantage for ETFs. Another implication from this result is that respondents may perceive securities lending a risky choice as it would involve potential risk exposure, such as counterparty risk and investment risk. The fact that percentage of respondents who do not think it is an advantage has increased significantly over the last year (67% in 2012) would lend support to the latter argument. Hence it seems that the recent focus on the risk associated with securities lending has negatively influenced opinions of this activity among survey respondents.

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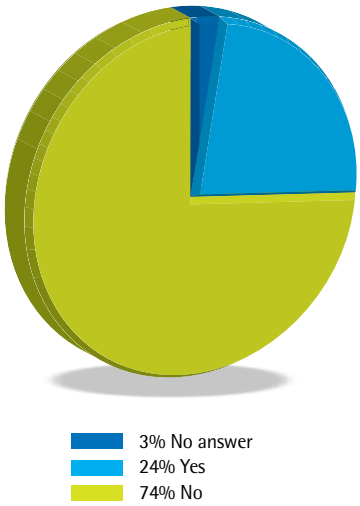
Exhibit 4.17. Is securities lending an important advantage when considering ETFs?
This exhibit indicates the distribution of respondents who see securities lending an advantage for ETFs. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



Then respondents are asked about the opinions on the approaches to reduce potential risk caused by securities lending. Exhibit 4.18 summarises the results of this question. Similar to the findings for approaches to reduce counterparty risk, respondents see the known collateral level (73.3%), followed by regulated exposure level (67.7%) most critical. This is followed by daily monitored exposure level (66.7%). The identified counterparts as well as multiple counterparties are also important considerations for our respondents (60% and 54.1%, respectively) to reduce the risk caused by securities lending.

When respondents are asked about the critical considerations for judging securities lending employed by ETF providers, the quality of the instruments used for cash investments as well as exposure level are the most important factors (score of 1.56 and 1.54 respectively). The amount of income generated seems to be the less critical to our respondents, as only 43% of them see it as critical. Therefore, our results suggest that respondents see securities lending a risky choice in light of the payoffs that are generated from this activity. They are far more concerned with the careful mitigation of risk than procurement of additional income in the form of securities lending fees.

Securities lending fees and costs.

As the limelight has been firmly placed on the counterparty risks associated with securities lending transactions, it

Exhibit 4.18. How do you rate the importance of the following approaches to reduce risk exposures caused by securities lending? The scores indicated in the table are obtained by assigning 2 to critical, 1 to important but not critical, -1 to not important at all and calculated based on the number of respondents for each question excluding the non-responses. The percentages shown indicate the percentages of respondents who answered critical excluding non-responses.

	Score	% of Critical
Approach to reduce risk exposure caused by securities lending		
The collateral level is known	1.73	73.3%
The exposure level to lending/borrowing are regulated	1.64	67.7%
The exposure level to lending/borrowing is monitored daily	1.63	66.7%
The lending/borrowing counterparts are indentified	1.54	60.0%
Multiple counterparties are used	1.45	54.1%
Critical considerations for judging securities lending		
The quality of the instruments used	1.56	65.2%
The exposure level to securities lending/borrowing operations	1.54	59.9%
The names of counterparties to securities lending/borrowing operations	1.41	51.3%
The amount of income generated through lending/borrowing	1.27	43.0%

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is perhaps fitting that a corresponding amount of attention is placed on the fees generated through the assumption of these risks. The position that has been put forward that since it is the ***investor who is exposed to counterparty risk***, it is only natural that it is the investor who is compensated for taking on the risk and not the ETF provider. The Investment Management Association (IMA) has compared the income from stock lending to the dividends paid on shares or the coupons on bonds and asserted that "The stocks being lent are the fund's assets. There is a risk to that lending and there should be a return to the fund's investors. These assets don't belong to the fund manager."[90]

90 - http://citywire.co.uk/money/stock-lending-profits-should-go-to-fund-investors-says-ima/a607303

Hence one of the key outcomes of the ESMA review is the fact that securities lending fees should be returned, net of costs, to investors as shown in a reproduction of guidelines 28 and 29 below:

"28. The UCITS should disclose in the prospectus the policy regarding direct and indirect operational costs/fees arising from efficient portfolio management techniques that may be deducted from the revenue delivered to the UCITS. These costs and fees should not include hidden revenue. The UCITS should disclose the identity of the entity(ies) to which the direct and indirect costs and fees are paid and indicate if these are related parties to the UCITS management company or the depositary."

"29. All the revenues arising from efficient portfolio management techniques, net of direct and indirect operational costs, should be returned to the UCITS."

Up to now, there has been no formal regulation with regard to transparency of securities lending costs and revenues hence the common practice has been for providers of physically replicated ETFs to use such revenues to "subsidise" their management fees and provide more competitive fee structures. This situation is summarised by Bischof and Holstein's (2012) response to the ESMA consultation who fear that the result of the guidelines will be an increased competitive advantage for providers of synthetically replicated ETFs.

> *"Securities lending generates extra income for the fund and allows investors to benefit from a better fund performance. If fees which are currently paid to parties connected with stock lending activities are in the future paid to the fund, such parties may no longer be in a position to undertake the duties connected to stock lending.* ***Where management fees are increased to cover for associated costs this could lead to an unfair competitive advantage for swap-based funds.****"*

In contrast to their sentiment we believe that the ESMA Guidelines which require more transparency on the costs and revenues arising from securities lending coupled with the requirement to return net profits to the investors will only serve to increase transparency with the regards to the true cost of following different replication strategies. The result will be that investors are more aware of the risks they have had to assume for the returns they are earning.

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Points made by ETF providers during the consultation were that securities lending is a costly operation for the provider which occurs indirect and direct costs for the ETF provider such as IT infrastructure and counterparty credit risk assessments, that the ETF providers should be compensated for in order to allow them to continue securities lending. The newly formulated guidelines hence do not prevent the ETF provider deducting costs from securities lending revenues, but do impose greater levels of transparency with regard to the costs and revenues associated with securities lending activity and the disclosure of any beneficiaries of said revenue who are related to the UCITS management company. Hence the investor is able to gain a much clearer picture of the true cost of each service that is being provided with (i.e. ETF management, securities lending services etc.).

Exhibit 4.18a. Is it important to have regulatory guidelines requiring Net Profits from securities lending to be returned to investors?
This exhibit shows the percentage of respondents who agreed to this question through the selection of the "agree" or "strongly agree" responses compared to the percentage who disagreed to the question through selection of the "disagree" or "strongly disagree" responses.

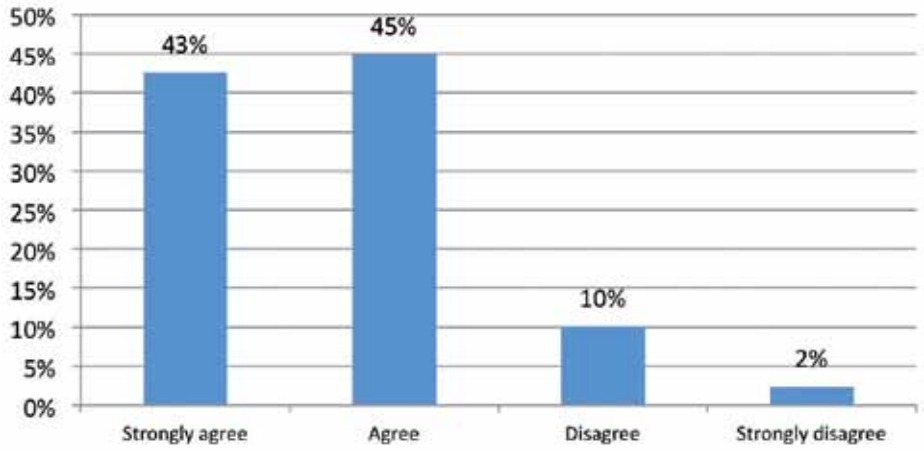
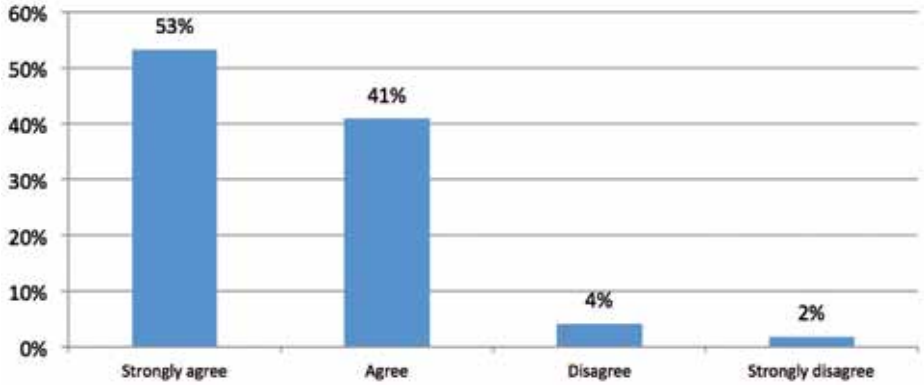


Exhibit 4.18b. Is it important to have regulatory guidelines requiring Costs and Revenues in relation to securities lending be disclosed to investors?
This exhibit shows the percentage of respondents who agreed to this question through the selection of the "agree" or "strongly agree" responses compared to the percentage who disagreed to the question through selection of the "disagree" or "strongly disagree" responses.



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To ascertain the views of respondents with regard to these guidelines we posed two new questions related to each of the new ETF guidelines in the 2013 ETF Survey.

We can see from the results of the first question that investors are overwhelmingly in favour of the requirement to return securities lending revenue net of costs to the ETF investor with 88% of respondents agreeing with the question and thus the ESMA Guidelines in this respect. We can see from an analysis of the responses that the level of support was quite strong by the fact that 43% of respondents selected the "strongly agree" response compared to 45% who just agreed.

Interestingly, we can see that the results to the second question relating to **transparency** with regard to the costs and revenues associated with securities lending was answered even more strongly than the question concerning the payment of those fees to investors. Here 94% of investors agreed with the question and 53% of those were "strongly agree" responses. This is interesting, because it suggests that investors are more concerned about transparency with regard to costs and revenues than the receipt of these revenues. This may be an indication that investors are aware of the potential that still exists for the structuring of for complex revenue sharing agreements between the ETF provider, securities lending agent and other parties related to the ETF provider, and hence are very keen on Guideline requiring full disclosure with regard to these matters.

Clear Labelling of ETFs

Another risk that exists is the potential risk caused by the confusion of ETPs and ETFs which the ESMA Guidelines have sought to reduce through clearer labelling requirements. As ETPs share similar name "exchange-traded" with ETFs, investors (even academia) are often confused by these two products. However, as previously stated (see insert on "Discussion on the possible risks associated with European ETFs" in Background Section), ETPs in fact include other non-ETF products, such as ETNs. Those products are under different regulations as ETFs. So in the next question, we ask about how important our respondents find these differences between ETFs and other ETPs. Exhibit 4.19 summarises the result of this question.

Overall, respondents are more concerned with regulatory collateral requirement (57.9% of respondents find it very important). Whether the value of the products is independent from the creditworthiness of the issuer is also a main concern for our respondents (54.3% of respondents consider it very important). In other words, to our respondents, it is critical to have the value of the products to reflect the change of NAV but not the change of creditworthiness of the issuer. 54.0% of respondents consider whether the product is UCITS-compliant/ regulated very important. The nature of the product, whether it is debt-security or fund, attracts attention from 52.9% of respondents. 41.8% of respondents find it important that ETFs could not invest more than 20% of their NAV in instruments issued by the same body but other ETPs could. In the end, the diversification requirements for ETFs do not make ETFs more special than other ETPs as only one-third of respondents find important

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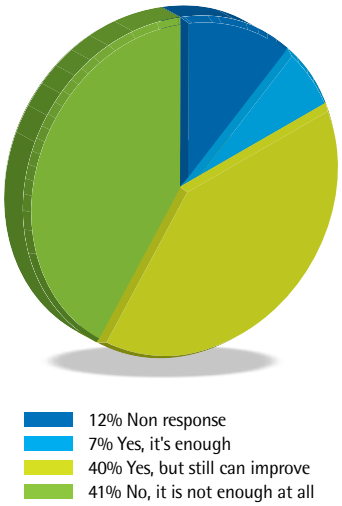
Exhibit 4.19. Do you think there are important differences between ETFs and other ETPs?
The scores indicated in the table are obtained by assigning 2 to very important, 1 to important, -1 to not important at all and calculated based on the number of respondents for each question excluding the non-responses. The percentages shown indicate the percentages of respondents who answered very important excluding non-responses.

	Score	% of Critical
Important differences between ETFs and other ETPs		
Other ETPs do not have regulatory collateral requirements but ETFs do	1.47	57.9%
The value of ETFs does not depend on the creditworthiness of the issuer but the value of other ETPs may	1.45	54.3%
Other ETPs may be off-shore funds whereas ETFs are regulated funds (UCITS)	1.37	54.0%
Other ETPs may be debt securities whereas ETFs are funds	1.39	52.9%
ETFs are UCITS-compliant but other ETPs are not	1.39	49.7%
ETFs could not invest more than 20% of their NAV in instruments issued by the same body but other ETPs could	1.21	41.8%
ETFs ensure more diversified access than other ETP	1.06	33.3%

differences in terms of diversification. In general, the result suggests that the main important differences of ETFs from other ETPs come from UCITS compliance in terms of collateral and the independence of the value from the creditworthiness of the issuer, which is consistent with the results of last year's survey.

Since there are many differences between ETFs and other ETPs, we next ask our respondents if the current product descriptions are enough to differentiate ETPs from ETFs. The result is shown in Exhibit 4.20. Only 7% of respondents consider it enough. In contrast, 41% of the respondents see it not enough at all. Another 40% think that there is still room for further improvement. Overall, in excess of 80% of respondents find the product description of ETPs does not do enough to educate investors on the differences between ETPs and ETFs. Hence, there is an urge to have appropriate ETP prospectuses to focus on the distinctions between ETPs and ETFs, besides the promotion of the attractive features of other ETPs.

Exhibit 4.20. Do you think the current product descriptions on ETPs are enough to educate investors on the differences between ETPs and ETFs?
This exhibit indicates the percentages of whether the current education is enough for investors to differentiate between ETPs and ETFs. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



This is one of the issues which the ESMA ETF Guidelines have tried to address as discussed in the Background Section. As the guidelines came into effect on 1 January 2013 so it is interesting to observe the impact of the guidelines on investor opinions in the previous ETF survey.

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Increased Investor Protection

ESMA have stated that the UCITS ETFS Guidelines were "*aimed at strengthening investor protection and harmonising regulatory practices across the EU fund sector.*" They have tackled the issue of investor protection from a number of different angles, which we discuss in detail in the Background Section.

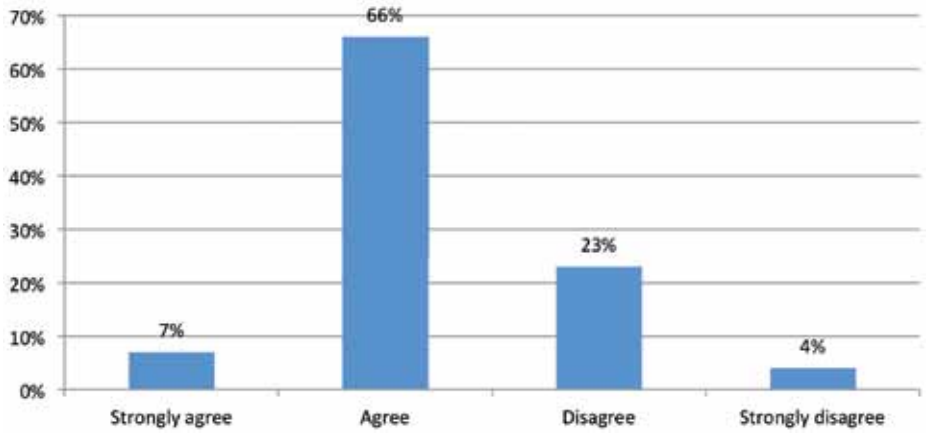
The key aspects are as follows:

1) Increased disclosure for index-tracking UCITS
2) Increased clarity with regard to use of ETF Identifiers
3) Increased disclosure for actively-managed UCITS ETFs
4) Guidelines with regard to costs and revenues from efficient portfolio management techniques
5) Management of collateral for OTC derivative transactions and efficient portfolio management techniques
6) Guidelines for the ETF benchmark indices (See separate insert in Background Section on ETF benchmark indices).

We have covered many of these issues individually within our 2013 survey. However, in order to assess the perception among investors of the effectiveness of the ESMA Guidelines as a whole, we ask them if they thought the guidelines had been effective in improving investor protection.

We can see from the distribution of responses to this question, that the reception of the ESMA ETF Guidelines has been favourable among our survey participants with 73% of investors agreeing that the guidelines have improved investor protection. However, in comparison to the questions that we asked with regard to specific securities lending guidelines we can see that the response has been weaker with only 7% of respondents selecting the "strongly agree" response. This seems like a good indication that our survey respondents are satisfied but that they feel that more could have been done to increase investor protection. We discuss areas for improvement and further guidance from regulator in the Background Section.

Exhibit 4.21. Overall, do you think that the new European regulatory guidelines have improved investor protection for ETF investors? This exhibit shows the percentage of respondents who agreed to this question through the selection of the "agree" or "strongly agree" responses compared to the percentage who disagreed to the question through selection of the "disagree" or "strongly disagree" responses.



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4.1.9. Future Development of ETFs

So far, our questions have focused mainly on the current usage and the current issues 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 realisations. In a last set of questions in this section on ETFs we ask survey participants about their views on their use of ETFs in the future, as well as products they would liked to see developed. This allows us to gain some perspective on future developments on the demand side of the ETF industry.

First, we ask those surveyed to identify the area in which they predict the greatest increase in the use of ETFs. These areas include exposure to new asset classes through ETFs, constructing optimal portfolios of ETFs, hedging and risk management with ETFs and cash equitising with ETFs. Exhibit 4.22 shows that the greatest increase (chosen by 40% of the respondents) is expected to be in the area of accessing new asset classes. It seems to justify the strategy of ETF providers to cover new asset classes such as listed real estate, listed private equity, commodities, volatility and even more specific alternative asset class segments.

On the other hand, there are 31% of respondents that would like to increase use for optimal portfolio construction, an increment of 2% from the last year (as well as from the year before). An implication of this planned increase of using ETFs in optimal portfolio construction is that respondents see ETFs not only as purely passive tools to cover broad market segments but also want to exploit diversification benefits from optimally constructed portfolios that combine various ETFs. This may be driven by the emergence of Smart Beta products that offer exposure to a variety of alternatively weighted indices (See Smart Beta insert.) Indeed, there is recent evidence that combining optimal portfolios constructed under different assumptions results in a higher probability of outperformance (to the cap-weighted index) over market cycles than any one alternatively constructed weighting scheme. Hence it would make sense that investors in ETFs 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 MSR portfolios provide greater access to the upside of equity markets. Because 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.

The next area we examine is the use of ETFs for risk management and hedging. We can see that 16% of respondents foresee an increase in their use of ETFs in this area. These two uses suggest that ETFs can become a tool for portfolio management besides the basic application in accessing new asset classes. However, the fact the percentage of respondents anticipating the use of ETFs for hedging and risk management is lower than we would expect (though higher than last

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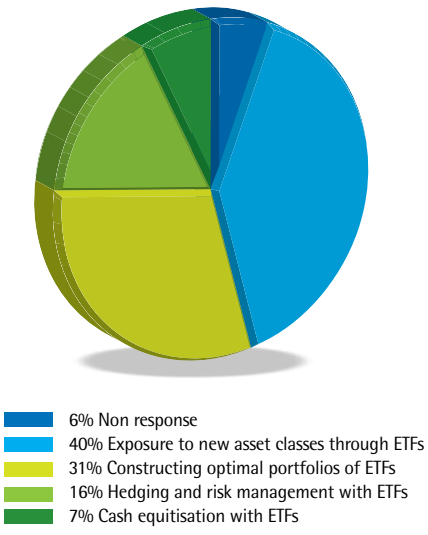
year's figure of 10%) given the inherent liquidity and low cost related qualities which would expect to make them ideal for dynamic hedging type strategies.

One of the reasons may be that there is limited disclosure with regard to information that is directly or indirectly related to the risk characteristics of the indices underlying the ETFs. For instance, Amenc *et al.* (upcoming 2013) have shown that there is very little disclosure of historic index constituents within a sample of 50 strategy and reference indices. The lack of this type of information prevents investors from understanding the risk characteristics of their ETFs which would be prohibitive to them using ETFs effectively for the purpose of risk hedging.

91 - EDHEC-Risk European Index Survey 2011.

Exhibit 4.22. In which area do you predict the greatest future increase in your use of ETFs?
This exhibit indicates the distribution of different areas which are predicted to have the greatest futures by investors. Non-responses are reported as "no answer" so that the percentages for all categories add up to 100%.



In addition, we ask our respondents about the possible directions for future innovations of ETFs. In line with the results of Exhibit 4.6 which demonstrated that respondents expressed a clear preference for passive as opposed to active ETFs, Exhibit 4.23 shows that 82% of respondents still consider that ETFs should remain beta-producing products. As ETFs are mainly used to track indices, the main objective to invest in ETFs is still to get exposure of the market (beta exposure). This is consistent with the finding in our European Indices Survey 2011[91] that 74% of investors think indices should not aim at generating alpha but generating a normal return, i.e. to reflect the market.

Actively-managed ETFs are indeed not as important to our respondents and only 18% think that ETFs should shift from passive to active. This percentage has slightly increased from last year's results (17%) which is in line with the increased interest we have seen in actively-managed ETFs elsewhere in the survey and may be at least partially due to a blurring of the line between what is considered an active and a passive ETF as we discuss in Section 4.1.5.

We can also see that 38% of respondents find it important for ETFs to track niche markets. In other words, innovations of ETFs should catch up to the innovations of indices. In the next section 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 one thousand products in the market (BlackRock 2013), hence it will be very interesting to see where the gaps in the

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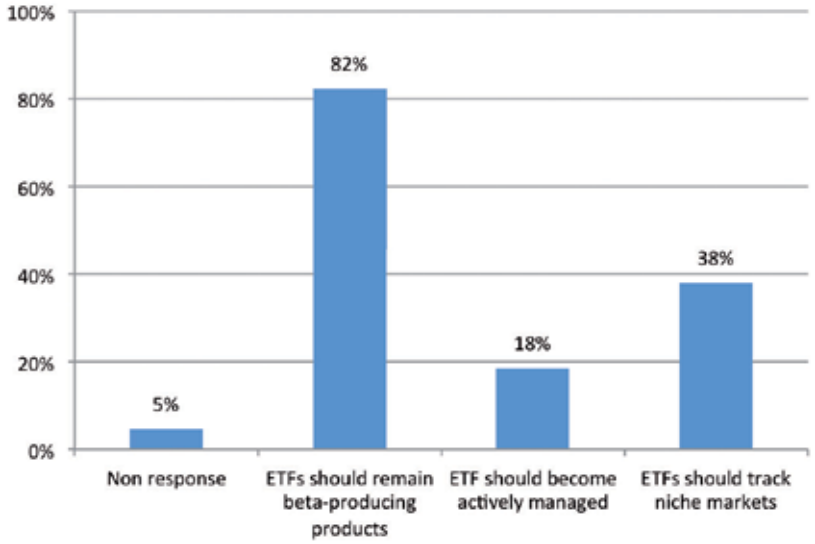
Exhibit 4.23. Do you think...?
This exhibit indicates the distribution of different areas which are the possible directions for innovations. Respondents were given the option of selecting more than one answer hence the percentages are in excess of 100%.



market are in terms of investor demand. Exhibit 4.24 illustrates the types of ETFs that respondents would like to see further developed in the future.

As shown in Exhibit 4.24, emerging markets equity ETFs (42%) are the top concerns of respondents. With 39% of respondents, ETFs based on smart beta indices are 2nd on the list, which represents an increase of 2%, if we compare to last year's results more general inquiry about new forms of indices. This indicates the still increased interest shown in alternative indices observed since. Alternative indices include those that are equally weighted or based on fundamental company characteristics (see e.g. Arnott *et al.* 2005 or Amenc *et al.* 2009b for an introduction to such weighting schemes), or on weights derived from portfolio optimisation (see e.g. Amenc *et al.* 2010b). Equity style ETFS and emerging market bond ETFs also rank quite highly with 34% of respondents choosing them.

About a third of the respondents would also like to see new products developed in the areas of corporate bond indices (33%) and on factor indices (31%), and about a quarter in volatilities (26%) and high-yield bonds (25%).

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Exhibit 4.24. What type of ETF products would you like to see developed further in the future?
This exhibit indicates how many respondents would like to see further development in the future for different ETF products. Respondents are able to choose more than one products.

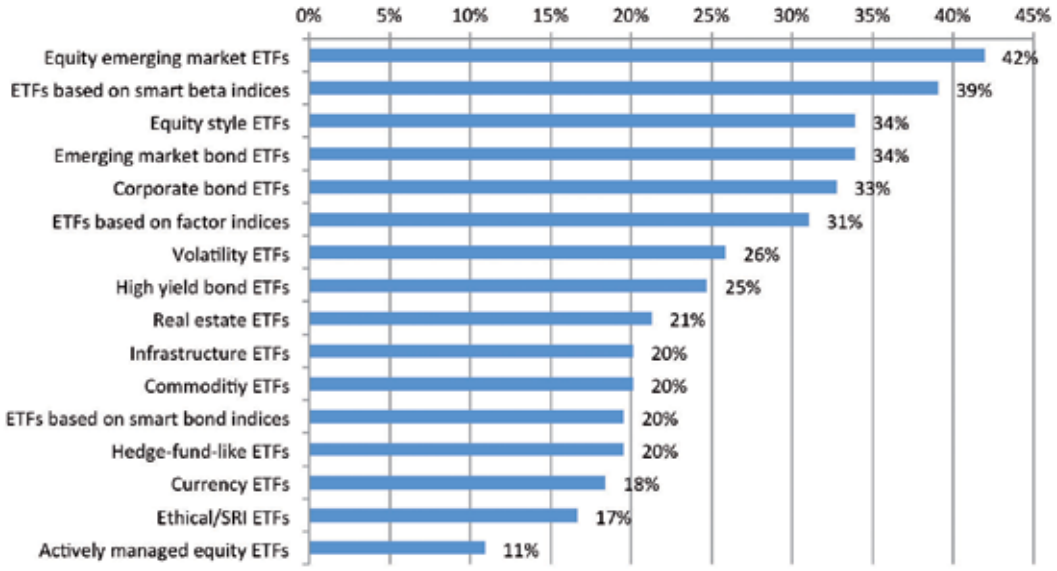

Exhibit 4.24a. Largest increases in demand for product development in 2013
This exhibit shows the types of ETFs for which there were the largest increases in terms of demand for future product development between 2012 and 2013 ranked in decreasing order of size.

What type of ETF products would you like to see developed further in the future?	2012	2013	% Increase
Equity style ETFs	29%	34%	**5%**
Smart beta indices ETFs	37%	39%	**2%**
Infrastructure ETFs	18%	20%	**2%**

Compared to last years' results, there has been an increase in the demand for product development only within three categories of ETFs, namely equity style, smart beta indices and infrastructure. The slightly decrease in demand for other categories of ETFs may be the results of a satisfying development in products within these areas over the latest years.

The area of most interest to respondents in terms of product development is the Emerging Markets equities segment. Overall, the equity asset class gathers the highest rate of demands this year with also demands on ETFs based on smart beta indices and on equity style ETFs rated on the second and third positions, respectively.

4.1.10. Use of Products Tracking Smart Beta Indices

New in the 2013 survey, and in view of the considerable development in new forms of indices, we asked respondents about their use of products tracking smart beta indices.

From Exhibit 4.24.b1, we can see than more a quarter of respondents (28%) already use product tracking smart beta indices, and that more than a third of them (36%) consider investing in such products in the near future. These results

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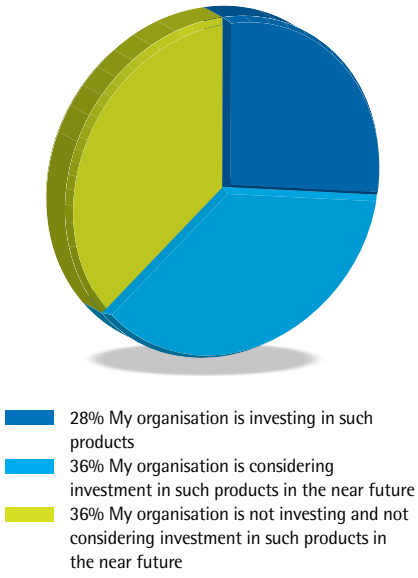
show that investors have already a large interest in such products.

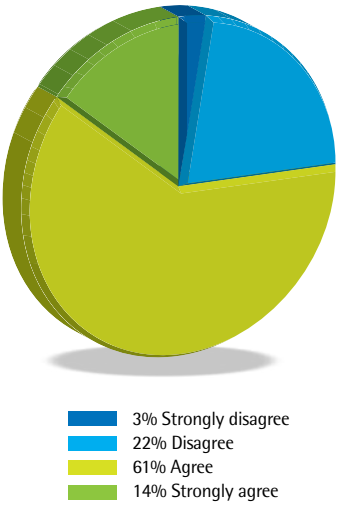
Exhibit 4.24.b1. Use of products tracking smart beta indices
This exhibit indicates the percentages of respondents that reported to use products tracking smart beta indices. Non-responses are excluded.



Investors were then asked about their agreement with different propositions. First, they were asked, if according to them, smart beta indices provide significant potential to outperform cap-weighted indices in the long term.

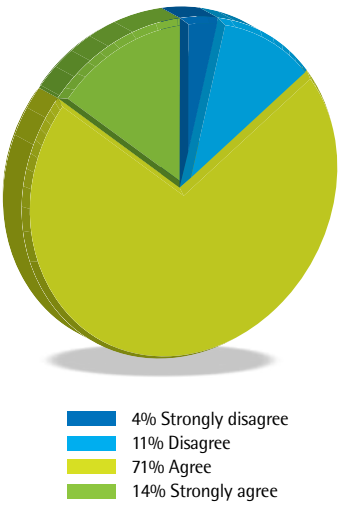
From Exhibit 4.24.b2, we can see that a vast majority of respondents agree that smart beta indices provide significant potential to outperform cap-weighted indices in the long term, as a quarter of them indicate they agree or strongly agree with this argument.

Exhibit 4.24.b2. 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.



Then, respondents were asked if they think smart beta indices allow factor risk premia such as value and small-cap to be captured. From Exhibit 4.24.b3, it appears that a vast majority of respondents (85%) agree or strongly agree that smart beta indices allow factor risk premia such as value and small-cap to be captured.

Exhibit 4.24.b3. 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.



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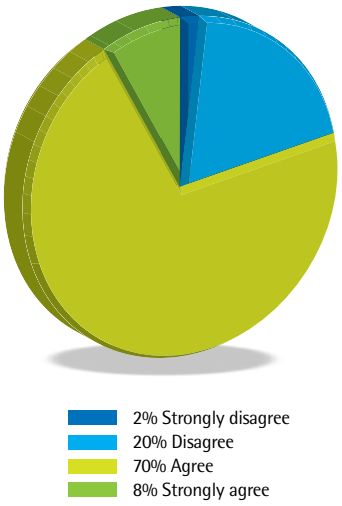
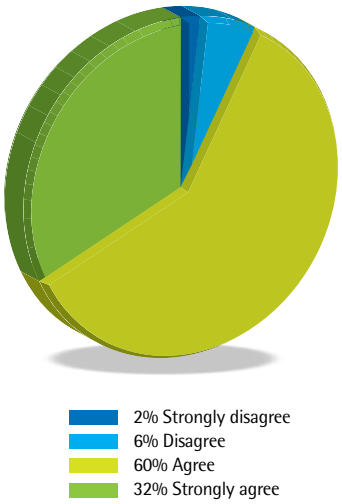
Then, respondents were asked if they think smart beta indices allow the concentration of cap-weighted indices in very few stocks or sectors to be avoided. Here again, from Exhibit 4.24.b4, we can see that a large share of respondents (78%) agree or strongly agree that smart beta indices allow the concentration of cap-weighted indices in very few stocks or sectors to be avoided.

Exhibit 4.24.b4. 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.



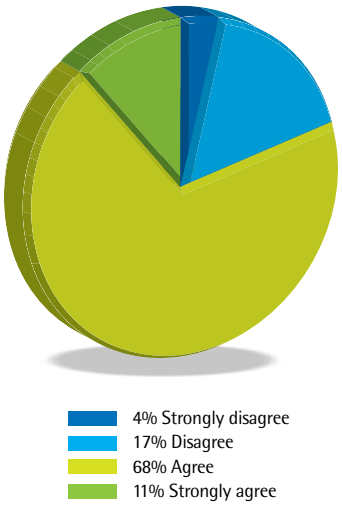
Further, respondents were asked if they think that smart beta indices require full transparency on methodology and risk analytics diversification across several weighting methodologies. From Exhibit 4.24.b5, we can see that the vast majority of respondents (92%) agree or strongly agree that smart beta require full transparency on methodology and risk analytics diversification across several weighting methodologies, with even a third of them (32%) that strongly agree with statement.

Exhibit 4.24.b5. Do you think smart beta indices require full transparency on methodology and risk analytics diversification across several weighting methodologies.
This exhibit indicates the percentages of agreement with this statement. Non-responses are excluded.



Further, respondents were asked if they think diversification across several weighting methodologies allows risk to be reduced and adds value. From Exhibit 4.24.b6, we can see that almost four out of five respondents (79%) agree or strongly agree that diversification across several weighting methodologies allows risk to be reduced and adds value.

Exhibit 4.24.b6. 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.



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In conclusion, respondents show a great interest in products based on smart beta indices, as they see them as providing potential improvement in their investment. In addition, they have major concerns in the quality of these products, as 92% of them think that smart beta indices require full transparency on methodology and risk analytics diversification across several weighting methodologies.

4.2. The Pros and Cons of ETFs, Futures, Total Return Swaps and Index Funds

In this section, we compare four investment instruments that allow the simple execution of trades in large baskets of stocks: ETFs, futures, TRS, and traditional index funds. Our criteria for evaluation are loosely based on Rubinstein's (1989) early examination of such instruments. We look at the advantages and disadvantages of each instrument and then emphasise specific issues concerning total return swaps, futures, and ETFs. In addition, we assess the future use of these instruments by European institutional investment managers and asset managers to highlight developing trends.

4.2.1. Comparing ETFs to Alternatives

We ask survey respondents whether they invest in alternatives to ETFs, such as futures, total return swaps, and index funds and ask them to rate exchange-traded funds and their alternatives according to various criteria. The responses – analysed in more detail below – allow for a few general conclusions. First, in terms of liquidity, transparency, and cost, ETFs are considered advantageous although on some criteria they are less well regarded than futures. Second, ETFs are ranked highest for available range of indices and asset classes. Therefore, European investors and asset managers seem to be well aware of the diversity of ETFs, which has grown dramatically in recent years. Third, futures are the most serious alternative to ETFs, but ETFs are perceived as superior with regard to minimum subscription, operational constraints, and the tax regime. Therefore, it appears that implementation concerns with futures (such as margin calls, and applying exact allocations even for small-sized portfolios) give ETFs an advantage. Fourth, the respondents believe that ETFs perform generally much better than total return swaps.[92]

Before going into great detail of the comparisons, we first ask our respondents which alternatives they use for ETFs. Exhibit 4.25 shows that futures is the most common used substitute for ETFs – 57% of respondents use them, closely followed by index funds with 55% of respondents using them as substitutes for ETFs. In contrast, only 24% have allocations in total return swaps. This suggests that futures and index funds are the most popular substitutes for ETFs. There are 16% of respondents who do not use any of these alternatives at all.

92 - This belief seemingly conflicts with that expressed by Lhabitant, Mirlesse, and Chardon (2006), who concluded that indexation with derivatives provides better performance than exchange-traded funds and that, when considering both costs and tracking error, swaps are the most efficient mechanism for tracking an index. These conflicting beliefs may be explained, to some extent, by a lack of familiarity with total return swaps, as a considerable share of respondents do not answer this particular question. Even among those who do, however, total return swaps are not considered superior.

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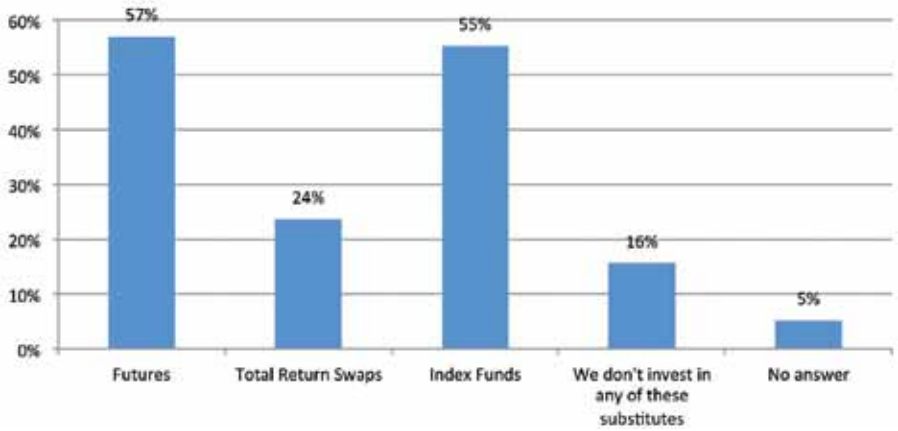
Exhibit 4.25. Use of substitutes for ETFs
This exhibit indicates the percentages of respondents that reported to use different alternatives of ETFs. Respondents are able to choose more than one alternative. Non-responses are reported as "no answer" to show the response rate.



With this result in mind, we could expect that there would be higher response rate for futures and index funds as more respondents use them, which indicates a greater familiarity rate. We summarised the finding in the Exhibit 4.26. In this table, it displays both the overall score and the percentage of respondents who think very good to fairly good for each question (excluding non-responses). For each particular question, the score is obtained by assigning grade 1 to 3 for answers of poor to very good and calculated the average score based on the number of responses who have rated that question. The row of "average score" shows the average across the eleven different evaluation criteria for each type of instrument. Now we start the discussion row by row.

As Exhibit 4.26 first row on the liquidity shows, 98% of respondents believe that futures are very good or fairly good in terms of liquidity, followed by ETFs and index funds with 96.5% and 92.6% in terms of a positive response rate, respectively. Almost no respondents state that liquidity is "poor" for these three products. In contrast, 71.7% of respondents view total return swaps, the least liquid of these instruments, as very liquid/fairly liquid. These results show that respondents appreciate the merits of futures and ETFs with regard to immediate trading, and that the positive rate concerning index funds liquidity has increased compared to previous years' results.

Now we move to the second row about the cost of liquidity. Survey respondents express opinions on the cost of liquidity that are similar to their opinions on liquidity in terms of relative rating of the different products. Futures score the highest (94.0% judging them very good or fairly good), followed by ETFs (89.9%) and index funds (81.8%). Only 67.8% view total return swaps as very good or fairly good with regard to cost of liquidity.

When it comes to other costs such as fees and expenses, most respondents think that futures are still the best instrument. 94.6% judge futures either very good or fairly good in terms of costs. ETFs come as the second, 87.1% view them very good or fairly good in terms of cost. Total

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return swaps and index funds perform less well in this category with 29.5% and 18.4% respectively ranking them as poor in terms of cost.

With respect to the reliability of tracking error, all four instruments receive very high scores with positive response rates of about 90% each. Index funds receive a slightly higher score than the rest (93.2%), followed by ETFs (92.4%).

When we move to the product range, ETFs clearly obtain the best rating among the others, with 98.2% of respondents stating that the available range is very good or fairly good. This finding is consistent with recent developments in the ETF industry offering exposure to a wide range of indices (Demaine 2002). Index funds come in second (83.8%), closely followed by total return swaps (82.1%), although having a less diversified product range; they are followed by futures and index funds. Furthermore, it should be read that there are between 16% and 21% of respondents who consider the product range to be poor for all three competitors to ETFs while close to 0% do so for ETFs.

In terms of transparency, it can be seen that few respondents (6.8%) believe that futures are poor. Index funds and ETFs have a low percentage of around 9% who rank transparency as poor. This figure has slightly decreased for ETFs when compared to the 2012 survey (10%) proving that the actions of the regulators (ESMA) in terms of the formulation of guidelines aimed at investor protection and increased transparency continue to be effective at improving the reputation of ETFs in this regard. The slight increase in the percentage of respondents who think ETFs are fairly good or very good with regard to transparency (91% versus 90%) also confirms this. Total return swaps are considered poor with regard to transparency by 27% of respondents.

ETFs are clearly the preferred instrument when it comes to the minimum subscription requirement. 97.6% of respondents consider ETFs as very good or fairly good, while only 2.4% consider them poor. The positive views of ETFs are to be compared with the views of index funds, which are considered very good or fairly good by only 88.4% of respondents with regard to minimum subscription requirement. Futures come after with about 80% of respondents thinking they are good. The highest percentage of respondents (48%) to express the greatest degree of dissatisfaction (poor) with the minimum subscription was with regard to total return swaps.

Next, ETFs are viewed less susceptible to operational constraints than the other three instruments. Indeed, 96.4% of our respondents believe that ETFs are very good or fairly good in terms of such constraints. Traditional index funds and futures are ranked behind ETFs, with 91.8% and 79.6% of respondents seeing them as very good or fairly good, respectively. Hence, in this discipline index funds are again preferred to futures. Total return swaps are clearly perceived as the instrument most susceptible to operational constraints, with more than half of respondents (53.6%) viewing them as poor. Hence, the answer to this question confirms a pronounced difference between exchange-traded (futures) and OTC derivatives (swaps).

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When it comes to the regulatory regime, respondents prefer index funds to ETFs, 99.3% versus 96.3% of respondents seeing them as very good to fairly good, closely followed by futures with 94.4% of respondents seeing them as very good or fairly good. Thus, the lowest percentage of respondents that regard these three instruments very good or fairly good in terms of regulatory regime is just below 95%. On the contrary, only 62.6% of respondents view total return swaps positively. But different figures are observed in terms of tax regime. Though index funds, futures, and ETFs are highly regarded still (90.8%, 90.0% and 89.7%, respectively), only 16% of respondents see total return swaps as poor.

Lastly, as for the control of counterparty risk, futures and index funds are viewed as very good or fairly good by 95.2% and 89.1% of respondents, while a slightly lower percentage of respondents (84.9%) thought the same about ETFs and 15% of respondents think they are poor in terms of control of counterparty risk. Index funds are the worst performers with 45.5% of respondents viewing them poorly. On one hand, this finding

Exhibit 4.26. Summary of the scores for ETFs, futures, TRS and index funds
This table indicates the average scores which the four products received from respondents based on the eleven criteria. For each particular quality, grade 1 to 3 were given for answers of poor to very good and the average score was calculated based on the number of responses who have rated that question. The percentages indicate the respondents who answered "very good" or "fairly good" for each question, excluding non-responses. The numbers highlighted in bold indicate the highest score.

	ETFs	Futures	TRS	Index Funds
QUALITY				
Liquidity	2.40	**2.78**	1.77	2.25
	(96.5%)	**(98.0%)**	(71.7%)	(92.6%)
Cost of liquidity	2.18	**2.68**	1. 80	2.07
	(89.9%)	**(94.0%)**	(67.8%)	(81.8%)
Other cost	2. 40	**2.62**	1.80	2.07
	(87.1%)	**(94.6%)**	(70.5%)	(81.6%)
Tracking error	2.31	**2.48**	2.36	2.30
	(92.4%)	**(89.2%)**	(88.4%)	(93.2%)
Product range	**2.67**	1.98	2.12	2.03
	(98.2%)	(78.9%)	(82.1%)	(83.8%)
Transparency	2.33	**2.65**	1.92	2.21
	(91.1%)	**(93.2%)**	(72.6%)	(91.1%)
Minimum subscription	**2.71**	2.09	1.60	2.21
	(97.6%)	(80.4%)	(51.6%)	(88.4%)
Operational constraints	**2.57**	2.10	1.53	2.31
	(96.4%)	(79.6%)	(46.4%)	(91.8%)
Regulatory regime	2.41	2.49	1.72	**2.47**
	(96.3%)	(94.4%)	(62.6%)	**(99.3%)**
Tax regime	2.17	2.25	2.14	**2.17**
	(89.7%)	(90.0%)	(84.0%)	**(90.8%)**
Control of counterparty risk	2.16	**2.59**	1.62	2.27
	(84.9%)	**(95.2%)**	(54.5%)	(89.1%)
Average score	**2.38**	**2.43**	**1.86**	**2.27**

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is expected as ETFs are highly-regulated in Europe by the UCITS rule,[93] which is not applicable to total return swaps. On the other hand, the finding is also a little surprising as counterparty risk which is due to the securities lending activities could also be found in index funds.

Overall, we find that ETFs and futures receive the highest scores among the four products (2.38 and 2.43, respectively), while total return swaps receive the lowest score of 1.86 that is even below the fairly good level of 2. For individual criteria, futures show very good quality in terms of liquidity, cost, tracking error and transparency, and are the strongest competitor to ETFs. ETFs are rated as outstanding in terms of ease of use (minimum subscription and operational constraints) and range of products. Interestingly, ETFs also dominate traditional index funds, as overall index funds receive a score of 2.27 as compared to 2.38 for ETFs. Total return swaps receive the second highest rating among the four products for the tracking error (2.36) and product range (2.12). However, the product has received the lowest rating among the four index-tracking vehicles on all the rest of criteria. The ratings suggest that TRS are particularly poor in the sense that they are less liquid, more costly and difficult to use compared to the three other types of products.

4.2.2. Specific Issues Related to Investment in Total Return Swaps, Futures and ETFs

Total Return Swaps

Considering responses across all criteria, we find, broadly, that total return swaps (TRS) are viewed more poorly than the other three instruments. In addition, the least number of respondents indicate that they invest in TRS, suggesting that respondents are relatively unfamiliar with them. Our survey addresses two specific issues with TRS: the requirement for OTC trading and the associated counterparty credit risk.

As shown in Exhibit 4.27, trading OTC is problematic for the majority of respondents (61%). Counterparty risk is even considered to be a more severe problem for investors (72%). This is in line with the finding in the Exhibit 4.26 that 45% of respondents consider total return swaps poor in terms of control of the counterparty risk. This is reflective of the fact that TRS investors are exposed to the full credit risk of the counterparty as opposed to ETFs where counterparty risk is limited by UCITS regulation.[94] However, these percentages have slightly decreased from the last year – (63% and 79% respectively).

Interestingly, the responding rate (around 90%) to these specific questions is significantly higher than the percentage of respondents who report that they have invested in TRS. These exhibits suggest that these reasons have contributed to the respondents' decision not to use total return swaps.

93 - http://europa.eu/legislation_summaries/internal_market/single_market_services/financial_services_banking/mi0037_en.html

94 - See Amenc *et al.* (2012a) for a detailed exposition of the counterparty risks of ETFs.

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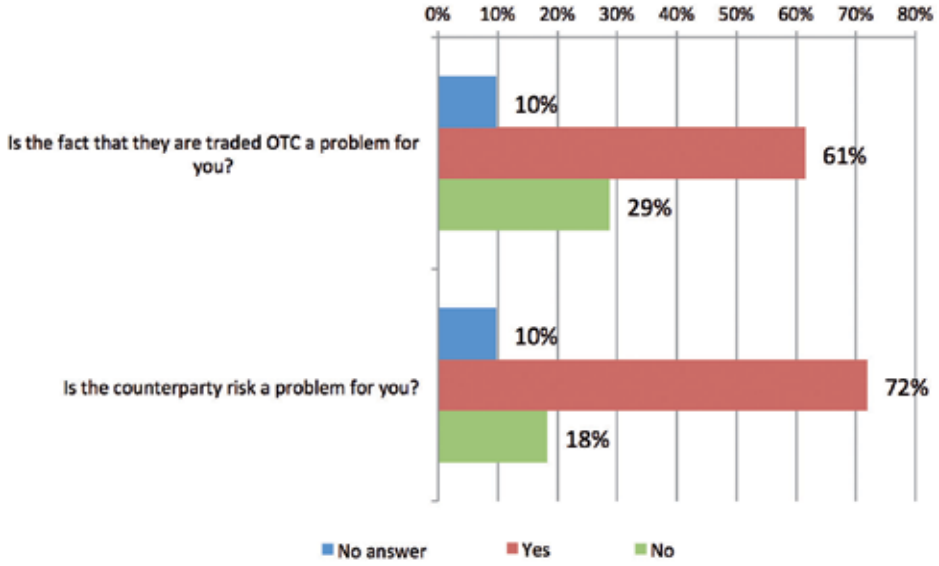
Exhibit 4.27. Concerning total return swaps...
This exhibit indicates the respondents' opinions about the two arguments concerning total return swaps. Non-responses to this question are reported as "no answer" so that the percentages for all categories in each argument add up to 100%.



Futures

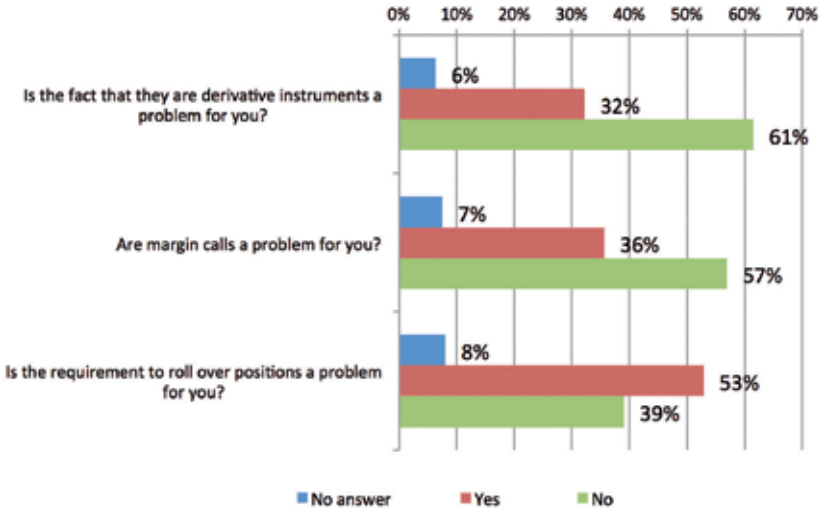
In direct comparison of all four instruments, futures fared remarkably well and can be viewed as the greatest rival of ETFs when implementing indexing strategies. When comparing futures and ETFs, a drawback of futures is that they are derivative instruments, require roll-over transactions, and involve margin calls. What is more, futures fall behind ETFs in the evaluation of the operational constraints linked to each instrument, as seen from Exhibit 4.26. Exhibit 4.28 shows that a third of respondents (32%) indicate that the fact that futures are derivative instruments is a problem for them.

When asked directly, 36% of respondents report that margin calls are problematic for them (see Exhibit 4.28). However, this has decreased from 38% in 2012. The results to those answering that margin calls are not a problem has slightly decreased from 58% to 57% in 2013. Hence we can see that in 2013 concerns over making margin calls have remained quite the same, compared to 2012. At the same time we can see that the requirement to roll futures positions has also remained quite the same in terms of being an investor concern (53% of respondents state this is a problem compared to 54% in 2012) and is the second concern, just behind margin calls.

Overall, there is still a significant percentage of respondents seeing margin calls and the requirement to roll positions as problems with futures, which corresponds to the comparatively low score obtained by futures in terms of operational constraints. Still, it is interesting that in 2013 investors have about the same concerns about margin calls and the requirement to roll-over positions than they have in 2012.

4. Results

Exhibit 4.28. Concerning futures...
This exhibit indicates the respondents' opinions about the three arguments concerning futures. Non-responses to this question are reported as "no answer" so that the percentages for all categories in each argument add up to 100%.

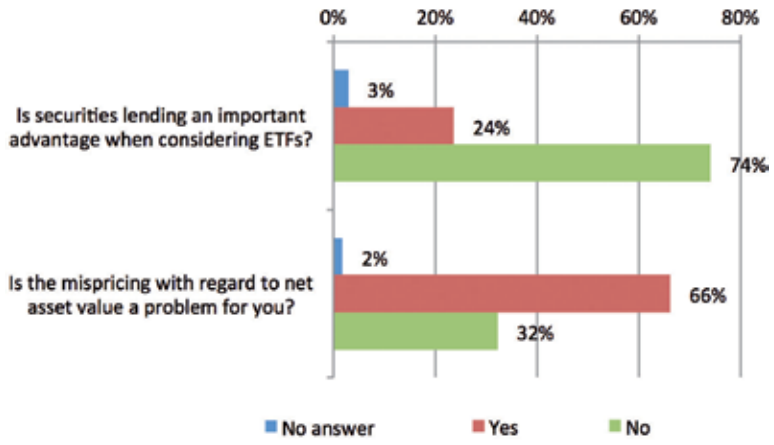


ETFs

Turning to ETFs, we ask questionnaire respondents for their opinions on pricing errors with respect to the NAV of the ETF, and on their perceived advantage of securities lending.

Possible mispricing with respect to the NAV was of concern to 66% of respondents (see Exhibit 4.29.) This finding is somewhat surprising as Engle and Sarkar (2006) find that the premia or discounts on fund NAVs are typically small and disappear very quickly (see Background, Section 2.) It may be that the respondents to our survey associate the problem of non-synchronous observations between fund prices and fund NAVs with the problem of mispricing, which is in fact another problem altogether. Concerning securities lending, only 24% of respondents evaluate it as an important advantage when considering ETFs.

Exhibit 4.29. Concerning ETFs...
This exhibit indicates the respondents' opinions about the two arguments concerning ETFs. Non-responses to this question are reported as "no answer" so that the percentages for all categories in each argument add up to 100%.



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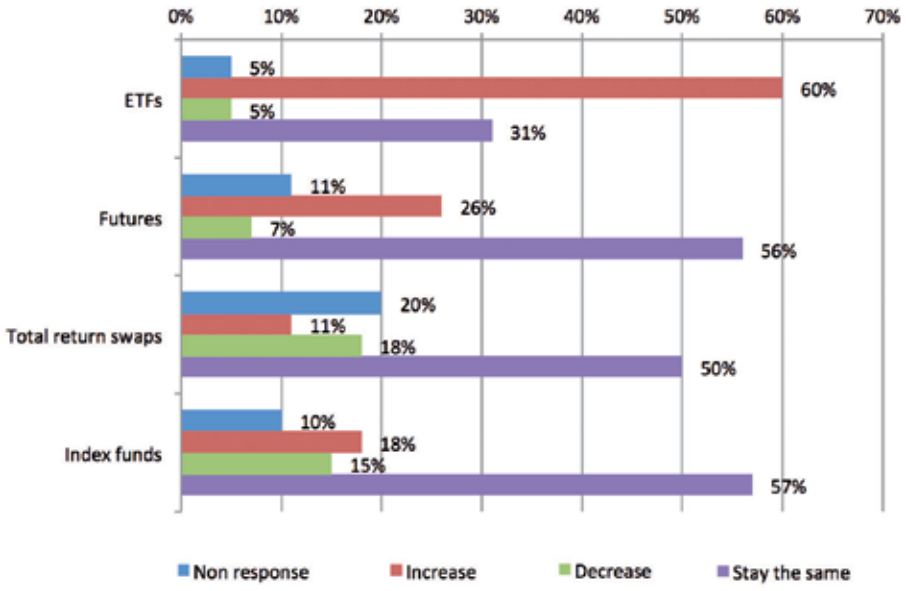
4.2.3. Looking Ahead

Finally, we venture a glimpse into the future by asking survey participants about their views on their use of ETF and other financial instruments in the future. In Section 4.1.9, we have already established some plans for future use of ETFs and priorities for new product development. In this section of the survey, we ask respondents to comment on how they plan to develop the future use of all four indexing vehicles. As a complement to the evaluation of these instruments on the various quality criteria above, this question allows to assess the likely development of the market share of such instruments in the future.

From Exhibit 4.30 we can see that respondents report that they expect to increase their use of ETFs over time. This positive outlook is especially striking for ETFs. 60% of respondents plan to increase their use of ETFs, while only 5% plan to decrease it. About one-quarter of respondents (26%) plan to increase their use of futures, While 18% of respondents plan to do it with index funds. Only 7% plan to reduce the use in futures while 15% plan to decrease in index funds. Against the backdrop that this survey only covers respondents that are already ETF investors, this increase in expected usage is even more remarkable.

In contrast, total return swaps are likely to play a minor role in the future: more asset managers expect to employ these financial instruments less in the future compared to those who assume to increase their use. Only 11% plan to increase their use of total return swaps, but 18% plan to decrease it to be compared with 30% in 2012. Overall, it seems that the anticipated growth in ETF use will come at the expense other indexing vehicles, such as total return swaps and index funds.

Exhibit 4.30. How do you predict your future use of the following instruments?
This exhibit indicates the respondents' forecast about the future use of each of the mentioned products. Non-responses to this question are reported as "no answer" so that the percentages for all categories in each product add up to 100%.



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4.3. The Role of ETFs in the Asset Allocation Process

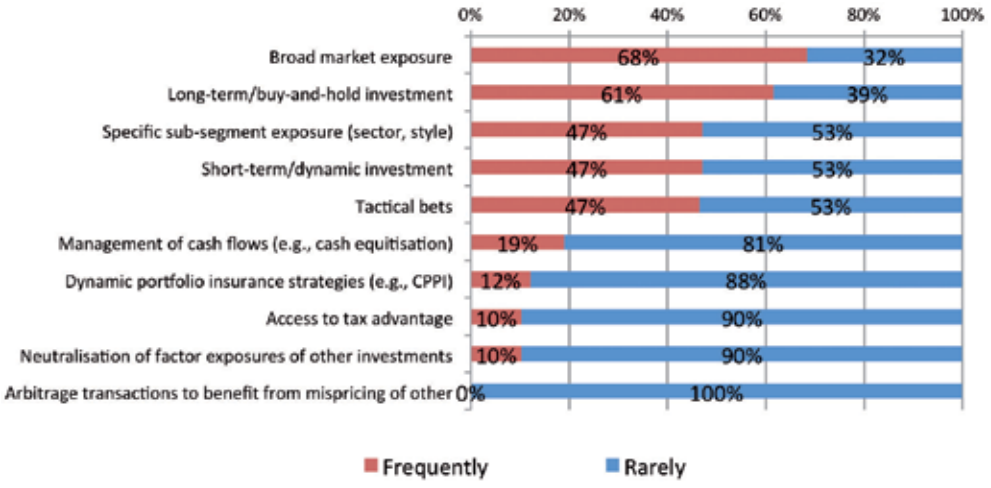
As ETFs offer investors attractive benefits like liquidity, cost efficiency and product variety, they have become an important instrument for asset allocation strategies. In this section we analyse the purpose of ETF investments and the role of ETFs within the core-satellite concept of investing. In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

4.3.1. Purpose of ETF Investments

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 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 for different investment purposes on a scale from never (score 0) to always (score 6 on the scale). Exhibit 4.31 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 in frequent users.

The results show that 68% of respondents use ETFs frequently for achieving a broad market exposure. 61% of respondents use ETFs to obtain buy-and-hold investments, while 47% of respondents use them to obtain short-term (dynamic) investments, specific sub-segment exposure or for tactical bets. ETFs are more rarely used for management of cash flows (19%), dynamic portfolio insurance strategies (12%), neutralisation of factor exposures related to other investments (10%), tax advantage (10%) or capturing arbitrage opportunities (0%).

Exhibit 4.31. 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. Category "frequent" would include ratings from 4 to 6 and "Rarely" would take into account ratings from 1 to 3 and non-responses.



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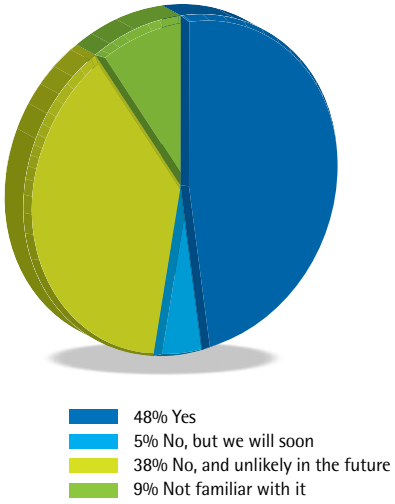
These results show that investment in ETFs is mainly associated with a long-term exposure to broad market indices. Still, frequent use of about 47% in uses of ETFs for short-term exposure and for specific market sub-segments exposure in this year's finding indicates that other investment purposes are important as well. This is not a surprising result given the fact that the liquidity, low cost and product variety benefits of ETFs should make them viable tools for such purposes.

4.3.2. ETFs in the Core-Satellite Allocation

In this section, our survey addresses the application of ETFs in core-satellite methods of asset allocation. The core-satellite strategy, whose key principle is to separate strategic benchmark choice decisions from decisions of how to generate outperformance over that benchmark (as discussed in the Background Section), is widely regarded as an effective means of organising asset allocation. First, we investigate the popularity of this investment approach. Despite its advantages, only 48.0% of ETF investors have taken a core-satellite approach to portfolio construction, which represents a 5% decrease on the year before. About 9% of respondents in this survey report that they are not familiar with this approach which is a similar level compared to the previous year (8%).

Exhibit 4.32. Have you implemented a "core-satellite" type allocation?
This exhibit indicates the percentages of respondents using core-satellite type allocation. The percentages are based on 174 responses.



Among those who have not implemented a core-satellite style investment approach, we separate the respondents claiming they intend to implement a core-satellite type allocation in the near future, from those who are unlikely to do so in the future. The vast majority of the 43% that do not use core-satellite type allocation do not intend to do it in the future (38%, versus 5% claiming they will do it soon), i.e. only 12% of respondents that do not use core-satellite type allocation claim they will implement it in the near future. This result has to be compared with the 26% figures obtain in 2012, which may be surprising as the percentage of respondents already using core-satellite type allocation is also lower this year (48% versus 53% in 2012).

ETFs are convenient instruments to implement a core-satellite type of allocation. Although indexing is sometimes perceived to be restricted to the core portfolio only (for strategic allocation purposes), traditionally 'passive'

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ETFs can also be beneficial in the satellite (for tactical bets) if they are used as return enhancers relative to the strategic benchmark. In the next questions hence, we assess the role of ETFs in different asset classes as a component of either the core or the satellite portfolio.

We ask survey participants to identify the ETFs products they use within each asset class, i.e. what types of ETFs they prefer for their asset allocation in equity, fixed-income, and alternative asset classes in both core and/or satellite portfolio. Note that responses are non-exclusive, as a given type of ETF may be used in both the core and the satellite portfolio. We then present results for a given type of ETF in order to separate responses into exclusive categories, i.e. we report the percentages of respondents using a given type of ETF (e.g. broad market ETFs) either only in the core, only in the satellite or in both core and satellite. Moreover, different types of ETFs may be used simultaneously,[95] (i.e. a user of broad market ETFs may also use style ETFs). Therefore, the results merely indicate the importance of a given type of ETF in the different parts of the portfolio, i.e. in the core versus in the satellite. They do not allow to conclude on the overall use of ETFs for a given asset class. In fact, this question has already been dealt with in earlier in Section 4.1.1.

95 - The percentages shown refer to the users of particular ETFs out of all users of ETFs for the given asset class. For example, the percentage of users of style ETFs in the satellite must be interpreted as their fraction among all equity ETF users. This presentation assures that we assess the relative importance of the types of ETFs within the asset class, as opposed to the overall importance of the asset class itself.

Equities

When evaluating the usefulness of different types of equity ETFs, core-satellite investors express a preference for broad-based ETFs. Exhibit 4.33 shows that 70% of equity ETF users use these vehicles in the core portfolio, while only 15% use them in the satellite. Another 15% use broad market ETFs for both core and satellite investments. Style and sector ETFs are clearly less popular than broad-based ETFs, especially for use in the core portfolio (13% and 11%, respectively). In the satellite portfolio, however, style ETFs are used by 56% of respondents, while sector ETFs are used by even greater 61%. These figures have increased on the prior year (by 1% and 3 % respectively) even though the percentage of investors who have responded that they use ETFs for sub-segment investment (style or sector)

Exhibit 4.33. Summary of the use of different instruments in the core-satellite allocation
This table shows the summary of the use of different instruments in the core-satellite allocation. The sum of percentages in each row is the response rate which is less than 100%.

Equity ETFs	In the Core	In the Satellite	In Both
Broad market ETFs	69.5%	14.6%	14.6%
Style ETFs	13.4%	56.1%	4.9%
Sector ETFs	11.0%	61.0%	2.4%
Government bond ETFs			
Broad market ETFs	61.1%	22.2%	7.4%
Maturity-segment ETFs	16.7%	53.7%	9.3%
Inflation-protected bond ETFs	29.6%	40.7%	1.9%
Corporate bond ETFs			
Broad market ETFs	59.6%	23.1%	13.4%
Maturity-segment ETFs	32.7%	40.4%	5.8%
ETFs by credit rating segment	17.3%	59.6%	9.6%
Sector ETFs	7.7%	57.7%	5.8%

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investing has decreased (47% See Exhibit 4.31, to be compared to 53% in 2012).

Given that the academic literature has insisted on the importance of style factors, this finding is surprising. As investment styles are not highly correlated, and as this correlation is remarkably stable across market states, equity style diversification is in fact one of the most promising ways of building a diversified core portfolio.

Government Bonds

For government bond investments, our respondents again prefer broad-based ETFs in the core portfolio, with 61% of using broad market ETFs in the core portfolio (see Exhibit 4.33). Maturity-segment ETFs and inflation-protected bond ETFs are less popular (17% and 30% are used in the core, respectively). They are also relatively likely to be added to the satellite portfolio (54% and 41%) of the average respondent who invests in bonds. This is interesting, since different maturity segments are natural media for tactical timing strategies in the satellite. Very few investors (2% to 9%) use government bond ETFs for both their core and satellite.

Corporate Bonds

The responses for corporate bond investments confirm the dominance of broad market indices in the core portfolio that was obtained for government bond ETFs. Exhibit 4.33 shows that, in the core portfolio, broad market ETFs are the most widely used. ETFs on indices that subdivide corporate bonds into finer categories, such as sectors, maturity, or rating segments are used less frequently in the core. However, compared to government bonds, corporate bonds are generally more widely used and investors make wider use of specific sub-segment ETFs in the satellite when it comes to bonds of corporate issuers. In the satellite portfolio, the most popular ETFs are credit rating segment and sector ETFs (60% and 58% of corporate bond ETF users), followed by maturity-segment ETFs (40%). These results show that practitioners seem to agree with academic research that points to the significant benefits of active allocation to such finer categories of the bond market as maturity segments. Example of papers on tactical asset allocation decision involving bond markets include Shiller (1979), Fama (1981), Ilmanen (1995, 1997), and Ilmanen and Sayood (2002).

Overall, the results suggest that different types of ETFs are used for each part of the portfolio. While ETFs on finer segments of the respective markets are relatively widely used as satellite vehicles, the dominance of broad market ETFs when it comes to investments in the core portfolio is striking. This dominance of broad market ETFs is not confined to equities alone, as these ETFs also account for the prevailing share, though to a somewhat lesser degree, of the demand for government bond ETFs and corporate bond ETFs. Perhaps the most important result of our analysis is that, instead of actively managing their long-term beta exposure to obtain the most efficient risk-return trade-off in their core portfolio, European investment managers mainly focus on using broad market indices in their core portfolios.

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4.4. Trends: Use and Satisfaction of 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 also more advanced products and sophisticated ways of using them. In this section, we compare the results of the ETF 2013 Survey with the answers we obtained in previous studies taken in 2006, 2008 to 2013. 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.

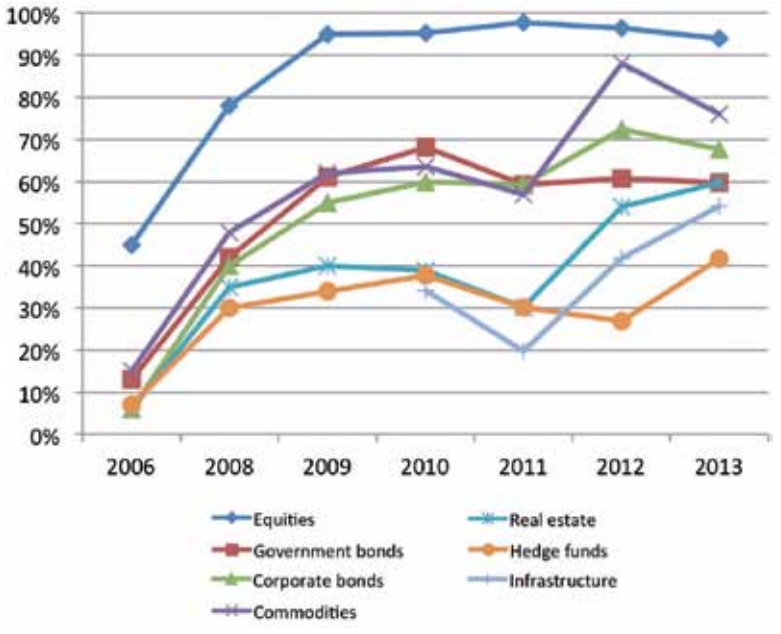
4.4.1. Use and satisfaction

When comparing the usage of ETF and ETF-like products over time, we observe a sign of increasing propagation of their adoption. The usage of ETF and ETF-like in Exhibit 4.34 refers to number of respondents who use ETFs among all respondents who invest in particular asset class. In another word, it is the frequency of the usage. It is interesting to note the large increases in the use of real estate, hedge fund and infrastructure ETFs.

Infrastructure ETFs have seen significant increases in popularity in terms of frequency of usage. This could be due to the fact that they are newer products[96] and that their usage is experiencing strong rates of growth previously enjoyed by now more established ETFs. The first infrastructure ETF appeared in 2007 and the last two years have seen an increase in the number of infrastructure ETFs and the emergence of more specialised infrastructure ETF products. It is likely that this increase in product variety has made ETFs a more viable vehicle more closely matched to investor preferences. For instance, investors are now able to

96 - http://www.oecd.org/sti/futures/infrastructureto2030/48634596.pdf

Exhibit 4.34. 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 EDHEC ETF survey 2006, 2008 to 2013.



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gain infrastructure exposure to individual geographic regions through ETFs whereas as previously only a 'global' exposure was possible.[97]

Exhibit 4.35 compares the fraction of our respondents' portfolios that is invested in ETFs.[98] Hence, in Exhibit 4.35, the usage of ETF or ETF-like products refers to the density of usage in each asset class. To the except of real estate asset class, where ETFs have gained market share (4% increase), all other asset classes have seen a decrease in their ETFs market share, the notable decreases being for infrastructure (-12%), government bonds (-8%) and equities (-6%). Those asset classes were the ones for each a significant increase has been observed the previous year.

Satisfaction with standard ETFs has generally remained at high levels as shown in Exhibit 4.36. There have been increases in satisfaction with government bond (4% increase), real estate (4% increase) and commodity (2% increase) ETFs. The satisfaction rate for equity ETFs is stable at the high level of 97% since last year. The stability of the high equity ETF satisfaction may be due to the greater consensus for equity indices. Equity indices have the longest history of development and the most number of innovations, so as to equity ETFs. Hence, investors are more familiar with equity indices as well as their drawbacks. With a number of varieties in the alternative weighting schemes for equity indices, investors could choose whatever they believe to invest.

Another trend that we can observe is the fact that the less liquid and less mature ETF markets experience the most varying levels of satisfaction. For instance, hedge fund ETFs have the most volatile satisfaction rates. 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 benefits and drawback of ETFs based on those asset classes.

Next, we turn to the number of counterparties used when trading ETFs. On average, respondents use about four counterparties, with their mean at 3.73 and their median at 3. Exhibit 4.37 presents the exact distribution. 34% of the participants have up to 2

97 - http://www.etftrends.com/2011/08/etf-chart-of-the-day-infrastructure-funds/

98 - Since this question was not asked in the EDHEC European ETF Survey 2006, we can only provide a comparison with answers from 2008 to 2013.

Exhibit 4.35. 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 EDHEC ETF survey 2008 to 2013.

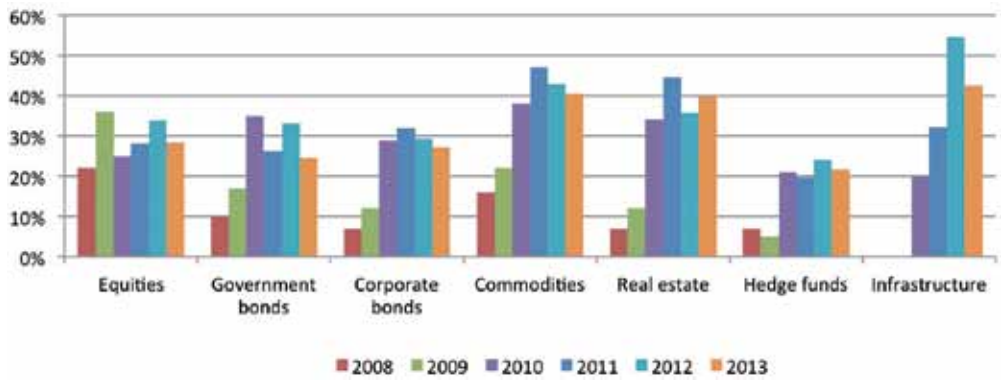

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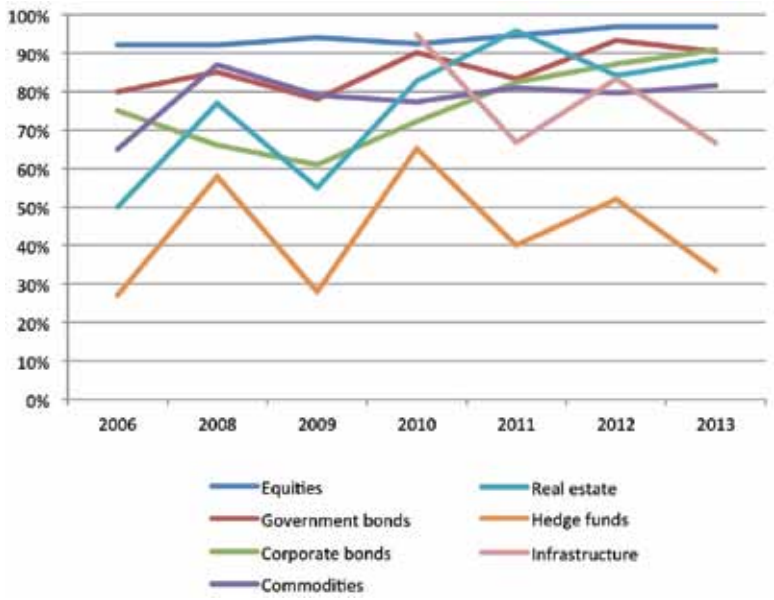
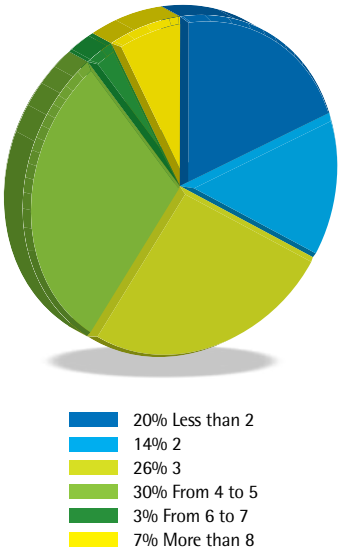
Exhibit 4.36. Satisfaction with ETFs or ETF-like products over time
This exhibit indicates the percentages of respondents that are satisfied with ETFs or ETF-like products for different asset classes over time. The percentages are based on the results of EDHEC ETF survey 2006, 2008 to 2013.



counterparties, and another 56% use 3 to 5 counterparties. 10% rely on more than 5 counterparties.

Exhibit 4.37. How many counterparties do you have when trading ETFs?
This exhibit indicates the distribution of respondents that deal with different number of counterparties. The percentages are normalised by excluding the non-responses.



When comparing the investors' preferences between actively and passively managed ETFs over time, Exhibit 4.38 clearly indicates that – for the time being – passive ETFs are likely to keep their predominance in the market. Though there is a slightly decrease in popularity since 2010. This might be due to the change of questions since the 2011 survey.[99] As noted in Section 4.1.5, the increased interest in actively-managed ETFs is at least partially due to investor interest in ETFs based on the alternatively weighted indices. The emergence of more innovative index construction schemes has led to a blurring of the line between what respondents consider to be active and passive ETFs. For instance, alternatively weighted indices can be considered active in that there risk exposures and compositions are divergent to those of their cap-weighted counterparts, however they are still passive in the sense that they do not involve discretion in the construction

99 - We have added one option to that year's question (since 2011) so that investors are able to choose passive, active and both. When we construct Exhibit 4.37, we count respondents who answered both to be 0.5 to the passive and 0.5 to the active. In this case, our results may be a little bit downward biased for passive replications since if investors might prefer passive to active if there is only one option.

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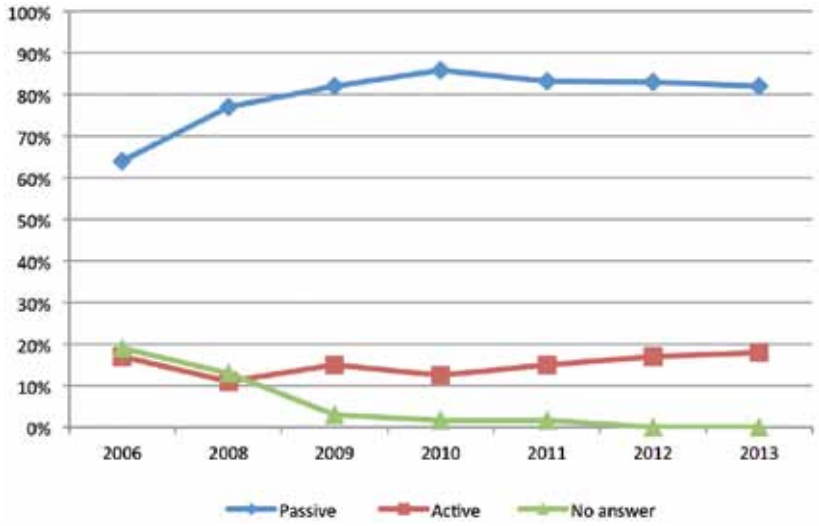
Exhibit 4.38. Preferred ETF type - active or passive?
This exhibit indicates the preferred ETF types over time. The percentages are based on the results of EDHEC ETF survey 2006, 2008 to 2013.



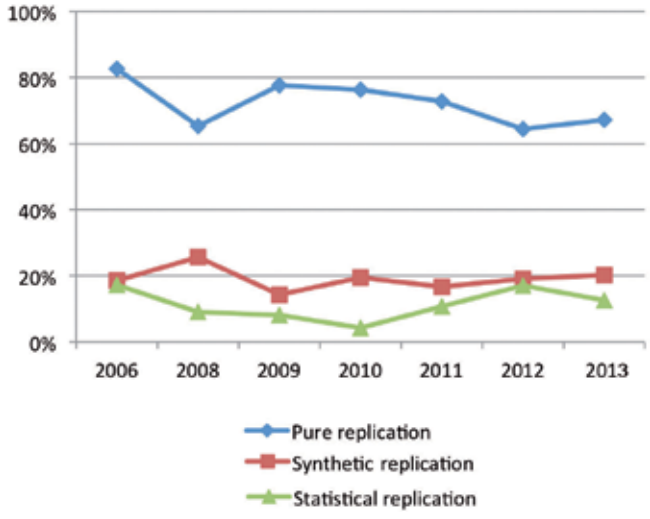
process and instead rely on a pre-defined set of systematic construction rules.

Exhibit 4.39 shows that within passive replication, investors favour full replication the most as in previous years.[100] After a decrease from 2009 to 2012, we observe again a slight increase this year in the popularity of full replication. There is a slight decrease in the sampling replication.

The popularity of synthetic replication has also increased slightly since the 2012 survey which may be sign of a slight correction in investor perceptions with regard to the relative risks faced by synthetic and physically replicated ETFs. However, this improvement is relatively minimal and misperceptions still do exist (as discussed in Section 4.1.5) which may be a contributing factor to the subdued popularity of synthetic replication.

100 - Since the 2012 questionnaire, we have adopted a slightly different approach by directly asking respondents which replication method they prefer. We ask them to express their opinions of each replication method in terms of "very good", "good", and "poor". In order to compare with past years' results, the percentages shown in 2011 are computed in the following way: we assign a score of 1 for the approach which a respondent have the highest preference – either very good or fairly good; if a respondent choose two approaches, we assign score of 0.5 to both approaches; if all three are considered good, we assign score of 0.33 to all approaches. Then the percentages are calculated by dividing the total score obtained by each approach by the overall score of three methods.

Exhibit 4.39. Investors' preferred replication methods
This exhibit indicates the preferred replication methods by passive ETF investors over time. The percentages are based on the results of EDHEC ETF survey 2006, 2008 to 2013 excluding the non-response.



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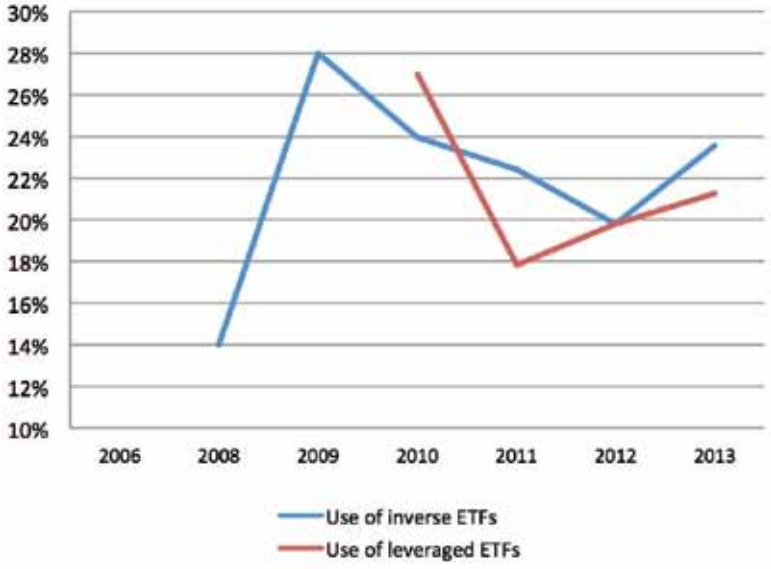
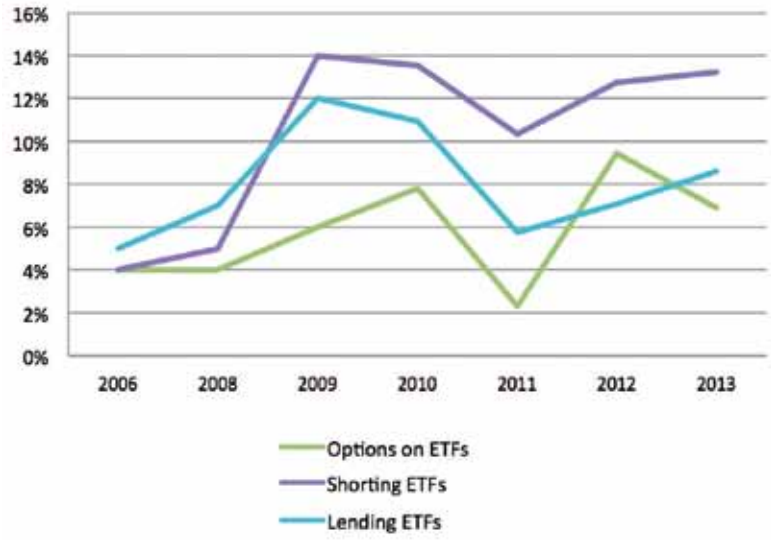
4.4.2. Developments in Advanced Uses of ETFs, Challenges for Total Return Swaps, and Outlook on Indexing Products

Exhibit 4.40 shows the use of advanced forms of ETFs and advanced use of ETFs. We can see that there has been a recovery to 2010 levels with regard to advanced forms of trading ETFs following criticisms on the complex structure of ETFs or ETF-like products in 2011 (see insert "Leveraged and inverse ETFs").

After the financial crisis in 2008/2009, we see the concerns regarding to the trading in OTC and counterparty risk have been eased in 2010 with the recovery of financial markets. However, as the European debt crisis continues in 2011, these issues become more important to investors after

Exhibit 4.40. Use of advanced forms of ETFs and advanced use of ETFs
This exhibit indicates the use of advanced forms of ETFs (the graph on top) and advanced use of ETFs (the graph below) over time. The percentages are based on the results of EDHEC ETF survey 2006, 2008 to 2013. The use of inverse ETFs is not available for the year 2006 as these products were launched only after 2006. And the question for use of leveraged ETF is only available since 2010.





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2011. They are still considered as obstacles for investment in total return swaps. There is a steep increase in the concern with regard to counterparty risk which may be a by product of the general increase in awareness of counterparty risk among ETF investors (due to the recent focus on this issue), as shown in Exhibit 4.41.

Finally, we also look at the expected developments of all four indexing products analysed in this survey, and compare the investors' expected usage of these products over time. The results are shown in Exhibit 4.42. The results suggest that despite the past growth and increasing maturity of the ETF market, ETF investors are still looking to increase or at least to maintain their use of ETFs and have a more favourable outlook of their use of alternative indexing products.

Exhibit 4.41. Regarding total return swaps...
This exhibit indicates the respondents' opinions about the two arguments concerning total return swaps over time. The percentages are based on the results of EDHEC ETF survey 2006, 2008 to 2013.

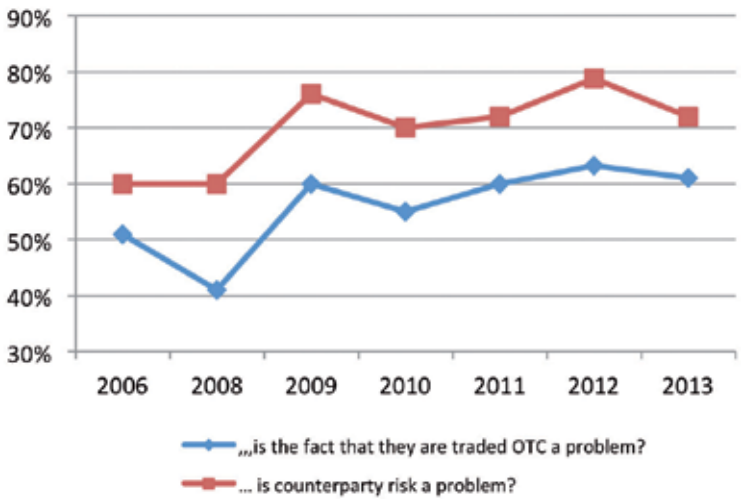

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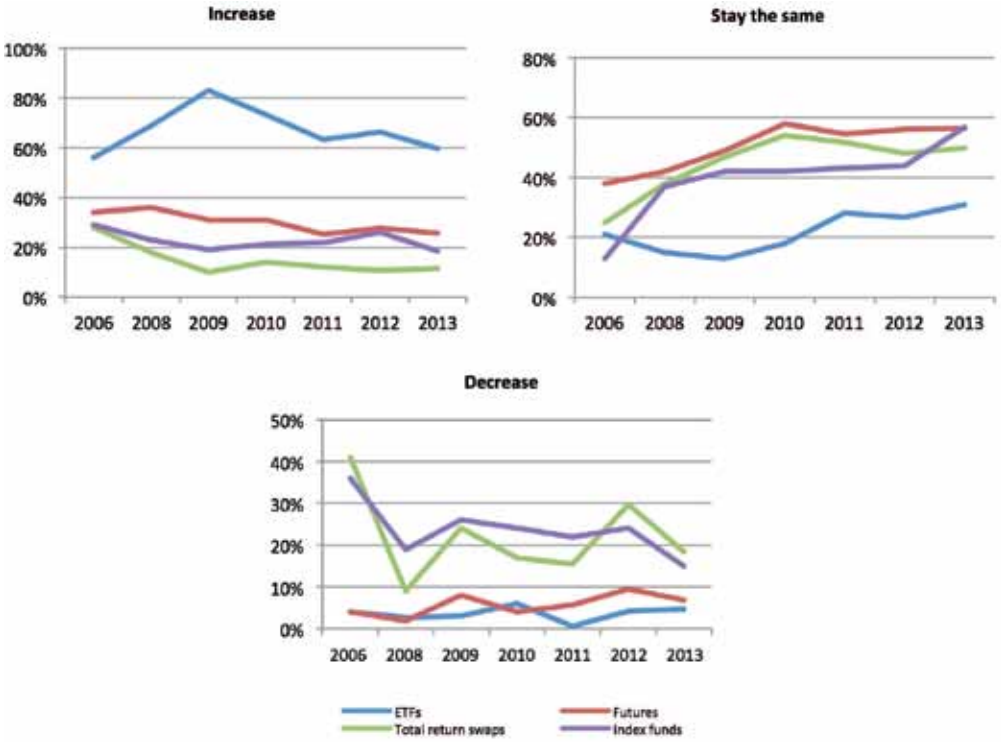
Exhibit 4.42. Will you increase your use of the following indexing products?
This exhibit indicates the future potential to change each of the mentioned products by investors over time. The percentages are based on the results of EDHEC ETF survey 2006, 2008 to 2013.



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About Amundi and Amundi – ETF & Indexing

About Amundi and Amundi – ETF & Indexing

About Amundi

Amundi ranks first in Europe1 and ninth worldwide[1] in the asset management industry with AUM of more than €750 billion[2].

Located at the heart of the main investment regions in almost 30 countries, Amundi offers a comprehensive range of products covering all asset classes and major currencies.

Amundi has developed savings solutions to meet the needs of more than 100 million retail clients worldwide and designs innovative, high-performing products for institutional clients which are tailored specifically to their requirements and risk profile.

It contributes to funding the economy by orienting savings toward company development.

Amundi has become a leading European player in asset management, recognised for:

- Product performance and transparency;
- Quality of client relationships based on a long-term advisory approach;
- Efficiency in its organisation and team engagement to serve its clients;
- Commitment to sustainable development and socially responsible investment policies.

1. Source IPE « Top 400 asset managers active in the European marketplace » published in June 2013, based on figures as at December 2012. Interviews of asset management companies on their assets as at end-December 2012 (open-end funds, dedicated funds, mandates).
2. Amundi Group figures as at 30 September 2013.

Amundi – ETF & Indexing

With a long-standing experience combined with a strong pricing power, Amundi ETF & Indexing offers first-class replication on more than 100 indices to internationally renowned institutions.

The Indexing expertise is built on the search for value-added sources within strict risk framework. It comprises a wide range of open-ended funds as well as having the capacity to implement customised mandates, including SRI and smart beta approaches.

In the ETF segment, Amundi has also successfully become a major player thanks to its strategy of competitive prices, innovation and quality tracking. Our ETF business has been growing consistently in recent years to reach the Top 5 in Europe[1] by assets under management.

Amundi ETF & Indexing business line is built around an experienced team of dedicated fund managers based in Europe and in Japan, with a recognized track record, and benefiting from Amundi dealing capabilities and research teams' excellence.

1. Source Amundi ETF/Bloomberg as at 31 December 2013

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 90 permanent professors, engineers and support staff, as well as 48 research associates from the financial industry and affiliate professors..

The Choice of Asset Allocation and Risk Management

EDHEC-Risk structures 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.

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
- Style and performance analysis
- Indices and benchmarking
- Operational risks and performance
- Asset allocation and derivative instruments
- ALM and asset management

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; and New York in the United States.

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

- Core-Satellite and ETF Investment, *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*
- Risk and Regulation in the European Fund Management Industry, *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 in Private Wealth Management, *in partnership with Coutts & Co.*
- 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)*
- Asset Allocation Solutions, *in partnership with Lyxor Asset Management*
- Infrastructure Equity Investment Management and Benchmarking, *in partnership with Meridiam and Campbell Lutyens*
- Investment and Governance Characteristics of Infrastructure Debt Investments, *in partnership with Natixis*
- Advanced Modelling for Alternative Investments, *in partnership with Newedge Prime Brokerage*
- Advanced Investment Solutions for Liability Hedging for Inflation Risk, *in partnership with Ontario Teachers' Pension Plan*
- The Case for Inflation-Linked Corporate Bonds: Issuers' and Investors' Perspectives, *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 conferences.

Each year, EDHEC-Risk organises three conferences for professionals in order to present the results of its research, one in London (EDHEC-Risk Days Europe), one in Singapore (EDHEC-Risk Days Asia), and one in New York (EDHEC-Risk Days North America) attracting more than 2,500 professional delegates.

EDHEC also provides professionals with access to its website, www.edhec-risk.com, which is entirely devoted to international asset management research. The website, which has more than 58,000 regular visitors, is aimed at professionals who wish to benefit from EDHEC's analysis and expertise in the area of applied portfolio management research. Its monthly newsletter is distributed to more than 1.5 million readers.

EDHEC-Risk Institute: Key Figures, 2011-2012

Nbr of permanent staff	90
Nbr of research associates	20
Nbr of affiliate professors	28
Overall budget	€13,000,000
External financing	€5,250,000
Nbr of conference delegates	1,860
Nbr of participants at research seminars	640
Nbr of participants at EDHEC-Risk Institute Executive Education seminars	182

About EDHEC-Risk Institute

The EDHEC-Risk Institute PhD in Finance

The EDHEC-Risk Institute PhD in Finance is designed for professionals who aspire to higher intellectual levels and aim to redefine the investment banking and asset management industries. It is offered in two tracks: a residential track for high-potential graduate students, who hold part-time positions at EDHEC, and an executive track for practitioners who keep their full-time jobs. Drawing its faculty from the world's best universities, such as Princeton, Wharton, Oxford, Chicago and CalTech, and enjoying the support of the research centre with the greatest impact on the financial industry, the EDHEC-Risk Institute PhD in Finance creates an extraordinary platform for professional development and industry innovation.

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 risk and investment management, and with Yale School of Management to set up joint certified executive training courses in North America and Europe in the area of investment management.

As part of its policy of transferring know-how to the industry, EDHEC-Risk Institute has 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.

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EDHEC-Risk Institute Publications (2011-2014)

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Notes

Notes

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