Executive Summary

In this report, we analyse the latest trends in the European exchange-traded fund marketplace. We cover aspects such as asset growth and product proliferation. We discuss the ongoing impact of regulation and the disruptive role that "robo-advisors" are playing in advancing the case for investing in ETFs within retail investment channels.

Additionally, this report provides some insights into the crucial issue of ETF selection. It also includes summaries of our in-depth due diligence on the eight largest European ETF providers, examining the key aspects of their portfolio management practices. For each, we detail issues such as replication techniques, performance optimisation — inclusive of the use of ancillary operations such as securities lending — and risk-management policies.

Landscape Highlights

- Assets under management in European-domiciled ETFs have doubled over the past five years to approximately EUR 550 billion at the end of December 2016. ETF AUM is now at par with the longer-established market for traditional index funds.

- Exchange-traded fund adoption across Europe is set to accelerate, spurred by favourable regulatory changes, innovation, and an increasing acknowledgement of the long-term benefits of low-cost investment solutions. Should its current growth rate persist, the sector could hit the EUR 1 trillion mark by 2020.

- European retail investors have yet to fully embrace ETFs, but distribution channels are slowly opening. Incoming regulation like MiFID II should help. In the meantime, the growing popularity of robo-advisors has advanced the case for the use of ETFs by cost-wary retail investors.

- The market share of fixed-income ETFs has increased in each of the past five years and now stands at over 24%, up from 16% in 2011. ETFs are proving a handy tool to gain exposure to fixed income in an environment where the traditional channels to access the asset class have been severely constrained by post-crisis bank regulation.

- The shift from synthetic to physical replication continues, with assets in physically replicated exchange-traded products now representing 77% of the market, up from 66% three years ago.

- For all the talk of consolidation, the number of providers and products is still rising. New entrants continue to throw their hats into the ring. On the product development front, strategic or "smart" beta; environmental, social, and governance; and thematic exposures are areas of focus.
The European ETF market has become a sweet spot for active fund managers looking to diversify their offerings, with strategic-beta ETFs the favoured avenue.

As the product menu broadens, so does complexity. This calls for renewed education efforts for investors.

Foreword
At Morningstar, we are committed to helping investors make better-informed decisions. We pride ourselves on being independent, and our research is valued and respected for that.

Morningstar has long been a proponent of low-cost funds of all stripes—including index mutual funds and ETFs—as one of the most effective tools to drive success for investors. For over eight years, we have been providing qualitative research and analyst reports on some 650 ETFs worldwide. More recently, we have incorporated ETFs into our Morningstar Analyst Rating framework for the first time. Today, approximately 350 ETFs worldwide now have an Analyst Rating, including 110 domiciled in Europe.¹

In addition to conducting due diligence on and rating individual funds, we regularly produce ad-hoc research papers like this one. We received tremendous feedback on the first edition of "A Guided Tour of the European ETF Marketplace", published in November 2014. The report was particularly well received by investment managers, wealth managers, advisors, and other fund selectors, who have used it as part of their due-diligence process. Hence the idea of providing an update, with additional commentaries.

This report is split into three parts. In the first part, we examine the latest trends in the European ETF landscape. In the second part, we provide insights into the crucial issue of ETF selection. The final section contains comprehensive profiles for each of Europe's eight largest ETF providers. The profiles detail the most important aspects of these firms' portfolio-management practices. We complement this objective due-diligence exercise with our own view on each of the providers.

Also, in the Appendix, we include an educational guide that outlines the replication methods and portfolio-management techniques used by ETF managers. Finally, we include a list of the European-domiciled ETFs that have been assigned an Analyst Rating.

¹ See full list of the European-domiciled ETFs with Morningstar Analyst Ratings in Appendix II.
The European ETF Landscape and Recent Trends

The European ETF marketplace has doubled in size over the past five years. Assets under management at the end of 2016 totalled nearly EUR 550 billion (note — this includes exchange-traded commodities and currencies), placing them at par with the long-established market for traditional index funds.

The 2014-16 period was marked by tremendous growth. Over this span, annual net inflows into European-domiciled ETFs averaged EUR 55 billion, up from an average of EUR 19 billion over the three previous years.

At the end of 2016, ETFs accounted for 7.5% of total AUM in European investment funds, up from around 5% five years earlier. European ETFs now account for 17% of total global AUM in ETFs.

Exhibit 1  Europe ETF Market Annual Net Flows and Asset Growth

European ETFs to Hit EUR 1 Trillion by 2020

The outlook for the European ETF industry is positive. Spurred by favourable regulatory changes, innovation, and an increasing acknowledgement of the long-term benefits of low-cost investment solutions, the consensus expectation is for the take-up of ETFs — and index funds in general — to continue growing at a healthy clip. By simply extrapolating the average pace of growth experienced from 2014 to 2016, European ETFs would be on track to hit the EUR 1 trillion mark by 2020.
The Rise of Fixed-Income ETFs

In the early stages of its development, the European ETF marketplace was made up almost entirely of products providing equity market exposure. The past decade has seen a steady increase in the breadth and depth of the product offering and take-up of other asset classes, most notably fixed income.

The market share of fixed-income ETFs has grown in each of the past five years and now stands at over 24%, up from 16% in 2011.

ETFs are proving a handy tool to gain exposure to fixed income in an environment where the traditional channels to access the asset class have been severely constrained by post-crisis bank regulation. Changes in the way bond benchmarks are constructed, particularly in relation to liquidity — and thus, investability — have also helped fixed income practitioners to better appreciate the virtues of the ETF wrapper to gain access to the asset class. Meanwhile, ETF providers and market-makers have strived to overcome the technical barriers of bringing an asset class that operates over the counter to a vehicle that is priced and traded continuously on-exchange, like a stock.

The fortunes of exchange-traded products (that is, ETFs and ETCs) providing exposure to commodities have been determined by the ups and downs of gold prices, which is dominant in terms of product offering. Assets in commodity ETPs picked up in 2016, but at 7.8%, their market share has more than halved from the high of 19% five years ago.

Exhibit 2  Europe ETF Market Share by Broad Asset Class

The Shift to Physical Replication Continues

The last three years have seen a further shift from synthetic to physical replication, with assets in physically replicated ETPs (including ETCs) rising to 77% of the market, from 66% at the beginning of 2014.

Exhibit 3 Europe ETP AUM by Replication Method

![Graph showing shift from synthetic to physical replication]


Former advocates of a synthetic-only model continue to expand their physical offering, whether by means of launching new products and/or switching the replication methodology of existing funds. Db Xtrackers and Lyxor, Europe’s second- and third-largest ETF providers, have long been engaged in transition efforts, while Amundi, the fifth-largest player, recently announced plans to open its almost wholly synthetic ETF lineup to physical replication.

The notion of using swaps as the optimal means of replicating the index performance of hard-to-reach markets (for example, emerging markets) or to bypass liquidity issues (for example, in fixed income) has been undermined by the arrival of new ETFs and/or the success of existing ones that employ physical replication. But perhaps more importantly, after the very public spat between the two sides of the industry in 2011-12, “synthetic” became a loaded word, one carrying negative connotations. Even now, some investors—not to mention media commentators—continue to wrongly believe that synthetic ETFs do not hold, or have a claim to, any securities.

Consequently, ETF providers are avoiding the “synthetic” term in their marketing materials. Instead, they are opting for “indirect” replication, as opposed to “direct” for physically replicated funds.

There remain instances where physical replication remains either technically or financially unfeasible. Equally, there are investors who feel at ease with the technicalities of synthetic replication. However, the way the market has evolved does not bode well for ETFs utilising synthetic—or “indirect”—replication. These funds are unlikely to disappear from the scene, but they are increasingly treated as secondary options from an ETF product development standpoint.
Consolidation Still to Come

The European ETF market remains top-heavy, with the three largest providers controlling around two thirds of total assets. BlackRock’s iShares has retained its position as the dominant player, leaving other providers scrapping for second step on the podium.

Exhibit 4  Europe ETF Providers League

<table>
<thead>
<tr>
<th>Provider</th>
<th>AUM (EUR Billion)</th>
<th>Market Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>iShares</td>
<td>253.0</td>
<td>46.4</td>
</tr>
<tr>
<td>db X-trackers</td>
<td>53.4</td>
<td>9.8</td>
</tr>
<tr>
<td>Lyxor</td>
<td>51.0</td>
<td>9.3</td>
</tr>
<tr>
<td>UBS ETFS</td>
<td>30.1</td>
<td>5.5</td>
</tr>
<tr>
<td>Amundi ETF</td>
<td>25.2</td>
<td>4.6</td>
</tr>
<tr>
<td>Vanguard</td>
<td>23.9</td>
<td>4.4</td>
</tr>
<tr>
<td>Source</td>
<td>19.9</td>
<td>3.6</td>
</tr>
<tr>
<td>SPDR ETFS</td>
<td>17.6</td>
<td>3.2</td>
</tr>
<tr>
<td>ETF Securities *</td>
<td>16.4</td>
<td>3.0</td>
</tr>
<tr>
<td>Deka ETFS</td>
<td>8.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Comstage</td>
<td>7.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Swisscanto *</td>
<td>6.6</td>
<td>1.2</td>
</tr>
<tr>
<td>BNP Paribas Easy</td>
<td>6.0</td>
<td>1.1</td>
</tr>
<tr>
<td>HSBC</td>
<td>4.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Deutsche Borse *</td>
<td>4.2</td>
<td>0.8</td>
</tr>
<tr>
<td>db-X ETC *</td>
<td>2.5</td>
<td>0.5</td>
</tr>
<tr>
<td>XACT</td>
<td>2.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Powershares</td>
<td>2.3</td>
<td>0.4</td>
</tr>
<tr>
<td>GAM *</td>
<td>1.9</td>
<td>0.4</td>
</tr>
<tr>
<td>Ossiam</td>
<td>1.9</td>
<td>0.3</td>
</tr>
<tr>
<td>Think ETFs</td>
<td>1.7</td>
<td>0.3</td>
</tr>
<tr>
<td>SG Issuer</td>
<td>1.7</td>
<td>0.3</td>
</tr>
<tr>
<td>BoostETP</td>
<td>0.6</td>
<td>0.1</td>
</tr>
<tr>
<td>Morgan Stanley</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>WisdomTree</td>
<td>0.4</td>
<td>0.1</td>
</tr>
<tr>
<td>Others</td>
<td>2.2</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>545.7</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: Morningstar Direct. Data as of 31 December 2016. * Note - These issuers specialise in the provision of ETCs.

The geographically fragmented nature of the European market has strongly influenced the structure of the European ETF industry. Becoming a truly pan-European ETF provider calls for extensive distribution networks and demands a full menu of competitive products listed across several exchanges to satisfy a geographically diverse client base. This has resulted in a market cluttered with numerous offerings of the same exposure. For example, there are 12 separate providers offering ETFs that track the Euro Stoxx 50 Index. What’s more, each of these funds is listed across one or more of 13 different European exchanges.

This, in part, explains why the European ETF offering is larger than that of the US, despite being one fifth of the size in AUM terms. Although such a market would appear ripe for streamlining, the long-predicted consolidation amongst providers and rationalisation of products has yet to materialise.

In the past few years, M&A activity has been limited to iShares acquiring Credit Suisse’s ETF business, WisdomTree buying BoostETP, and more recently China Post taking over Royal Bank of Scotland’s Market Access ETFs. ComStage—the domestically focused ETF arm of German Bank Commerzbank—
could be next. Also, Source—an ETF specialist owned by private-equity firm Warburg Pincus and a consortium of investment banks—is reported to be up for sale.

All the while, new players have entered the market. Some have chosen to strike strategic partnership deals with existing providers like Source and ETF Securities, both of which boast having an open architecture platform. This path has already been trod by active managers like Goldman Sachs and PIMCO, the rationale being that it allows them to leverage their brand and expertise without having to invest in their own ETF management capabilities.

Others have entered the fray as standalone entities, including Canada’s BMO. Some US heavyweights such as J.P. Morgan, Fidelity, and Franklin Templeton are thought to be preparing an imminent entrance.

So, despite all the talk of consolidation, the number of providers and products is likely to increase, with more asset managers, banks, and independents wanting a piece of the action.

**Regulation Continues to Shape the European ETF Landscape**

The regulatory drive towards greater transparency is widely expected to strengthen the case for low-cost funds of all types, and ETFs and index mutual funds in particular.

More than any other, the legislation with the power to sculpt the future of the European ETF market is the wide-ranging EU Markets in Financial Instruments Directive (known as MiFID II). Set to come into force in January 2018 at the earliest, MiFID II promises to increase the disclosure surrounding trade reporting. It is estimated that 50% to 80% of ETF trading volume in Europe takes place over the counter—most of which goes unreported. Assessing liquidity remains a primary concern for market participants, so any move to improve transparency regarding the true level of ETF liquidity would be welcomed. The introduction of a consolidated tape would allow investors to gauge the depth of the market and obtain a more complete picture of ETF liquidity and pricing, which should—in theory—make ETFs more attractive to a larger investor base.

On a broader note, MiFID II is primed to tackle the commission-based advisory model across the European Union, which intends to level the investment playing field by making the ‘true cost’ of active funds more visible. While any move towards greater fee transparency would be welcomed by investors and the ETF industry alike, the legislation may fall short of expectations. Many view the current proposal as a watered-down version of the UK’s Retail Distribution Review, as it would only apply to independent advisors.

At the time of writing, it is unclear what impact Brexit will have on the European fund industry. In the specific case of ETFs, national fragmentation has always been at odds with the pan-European nature of the ETF wrapper, so the last thing one would wish is for new barriers to be erected.

The UK is not a domicile of choice for European ETFs. However, the City of London plays a key role in the provision of capital and remains the primary hub for many investment management firms servicing the European market. Besides, the London Stock Exchange is the leading venue for ETF trading in Europe. Given this backdrop, it is perhaps encouraging to note the UK has been a strong advocate of MiFID II, and that the UK financial sector seems to be actively lobbying for the maintenance of equivalent regulatory regimes and for the widest possible access to the EU single market.
Retail Distribution Channels Are Slowly Opening

The growth of the European ETF market remains driven by demand from institutional investors. That said, over recent years, ETF providers have started to turn their attention towards the retail community. This is even though some key obstacles have impeded European retail investors from embracing ETFs to the extent that their US counterparts have.

Fund distribution channels, particularly in Continental Europe, remain dominated by commercial banks, which have traditionally favoured the placement of high-margin products. Likewise, many of the large fund platforms serving financial advisors—particularly in the UK—have been reluctant to undertake the necessary investment in technology that is required to facilitate the distribution of funds that trade on an intraday basis like ETFs.

Short of the pending regulatory changes, the status quo is being challenged by the growing popularity of robo-advisors. These online platforms offer low-fee automated investment management services to increasingly cost-wary retail investors.

Popular robo-advisors in Europe, such as Nutmeg and Money Farm, primarily use ETFs. This has led some ETF providers to ponder the potential benefits of setting up their own D2C platforms to reach retail clients.

The appeal of the robo-advising proposition has not gone unnoticed by the dominant forces of investment fund distribution in Europe. Many commercial banks, including UBS, Barclays, and Banco Santander are now working on their own online D2C platforms, which has opened the door to commercial agreements for the distribution of ETFs (for example, iShares with Commerzbank). All the while, bowing to the pressure to adapt in face of growing demand, an increasing number of platforms serving financial advisors have plans to upgrade their capabilities to allow for the inclusion of ETFs.

As it stands, European retail investors have yet to fully embrace ETFs. However, it is encouraging to see that distribution channels are evolving to facilitate access.

The Product Menu Broadens

Competition between providers has driven down fees, particularly for highly commoditised offerings such as funds tracking the S&P 500 or Euro Stoxx 50 indexes. With prices likely to continue their race to the bottom, providers have shifted their focus on other ways to stand out in a crowded market.

By and large, this has meant launching increasingly complex—not to mention higher-margin—products. This has been most evident in the proliferation of strategic or smart beta ETFs. Assets under management in strategic-beta ETFs have quadrupled in four years, landing at EUR 43 billion as of the end of 2016.

By now, the more common equity factor exposures, like value and minimum volatility, have become commoditised and crowded. The natural evolution is for providers to turn their attention to multifactor ETFs, which blend varying combinations of existing factor exposures.
One area of the strategic-beta universe which remains undercultivated is fixed income. To date, most launches in the bond space have focused on quality-oriented or equal-weighted strategies, leaving plenty of room for innovation going forward.

Elsewhere, providers have strived to differentiate themselves in other ways. One such tactic has been to add currency-hedged share classes to existing funds, which provides them with a relatively inexpensive avenue via which to broaden their product offering. Others have ventured into niche investment areas, including ESG and thematic exposures (for example, mega-trends, such as aging populations, or the rise of robotics). ESG ETFs have yet to attract serious AUM. However, rising social awareness, particularly amongst millennials, and regulatory moves to enforce ESG disclosure, suggest that this will be a space to watch.

Last but not least, active ETFs have long been talked about in hushed tones as ‘the next big thing’. While they may yet flourish, there remain a number of issues—mainly around holdings disclosure—that require attention before we are likely to see any appreciable growth in this area.

Exhibit 5 European ETP Market: Launches vs. Closures

<table>
<thead>
<tr>
<th>Year</th>
<th>Launches</th>
<th>Closures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
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<td>2009</td>
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<td>2013</td>
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<tr>
<td>2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td></td>
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</tr>
</tbody>
</table>


The overall number of ETF launches in Europe has been declining since 2010. Meanwhile, the number of fund closures and delistings has risen, reaching a level broadly in line with new launches in 2016. This can be viewed as a healthy sign of market maturation. It appears that providers are becoming more willing to shut the doors on funds that fail to capture assets.
ETF Selection

With over 2,400 ETFs available for sale in Europe and the range of products continuing to expand, the challenge for investors and their advisors is how to select the best ETF for their investment objectives.

Exchange-traded fund selection is no easy task, but since an ETF is designed to track an index, a good starting point is to understand whether the index that an ETF tracks truly reflects the market exposure that one seeks. This involves scrutinising the index’s construction methodology.

The proliferation of ETFs has gone hand in hand with that of indexes, with more and more ETFs tracking new, differentiated, and increasingly complex indexes. This, ultimately, calls for investors to step up their due diligence.

Meanwhile, there remain many ETFs in Europe that track the same or very similar indexes. When selecting between these, investors are often tempted to choose the fund with the lowest management fees. Management fees are a major contributor to the total cost of ETF ownership and are therefore a useful—and in most cases readily available—criteria of selection. However, they certainly don’t tell the full story.

The least-expensive ETFs are not always the best-performing ones. As illustrated in Exhibit 6, over a given period there are examples of ETFs that outperform cheaper rivals tracking the same or a similar benchmark. This may be so for several reasons, including the performance boost from securities-lending revenue or tax-optimisation practices.

**Exhibit 6** Popular equity ETFs: Ongoing Charge (OC) and 2016 Tracking Difference (TD) (%)

<table>
<thead>
<tr>
<th>S&amp;P 500</th>
<th>Euro Stoxx 50</th>
<th>FTSE 100</th>
<th>MSCI World</th>
<th>MSCI Emerging Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OC</td>
<td>TD</td>
<td>OC</td>
<td>TD</td>
</tr>
<tr>
<td>Amundi</td>
<td>0.15</td>
<td>0.22</td>
<td>0.15</td>
<td>0.51</td>
</tr>
<tr>
<td>db X-trackers</td>
<td>0.20</td>
<td>0.55</td>
<td>0.09</td>
<td>0.63</td>
</tr>
<tr>
<td>iShares</td>
<td>0.07</td>
<td>0.31</td>
<td>0.10</td>
<td>0.69</td>
</tr>
<tr>
<td>Lyxor</td>
<td>0.15</td>
<td>0.57</td>
<td>0.20</td>
<td>0.50</td>
</tr>
<tr>
<td>Source</td>
<td>0.05</td>
<td>0.28</td>
<td>0.05</td>
<td>0.50</td>
</tr>
<tr>
<td>SPDR ETFs</td>
<td>0.09</td>
<td>0.29</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>iShares</td>
<td>0.12</td>
<td>0.18</td>
<td>0.15</td>
<td>0.57</td>
</tr>
<tr>
<td>Vanguard</td>
<td>0.07</td>
<td>0.28</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

Source: Providers’ websites. Tracking Difference = Fund Return - Index Return.
Vanguard uses FTSE All-World and FTSE Emerging Markets as underlying indices instead of MSCI World and MSCI Emerging Markets, respectively.
Exhibit 6 serves to illustrate that examining management fees in isolation will not necessarily lead investors to pick the ETF delivering the highest-fidelity tracking performance. And yet, it is difficult to understate the impact of management fees on long-term performance, thus their guiding value in the ETF selection process.

Tracking difference, which is the under- or outperformance of a fund relative to its benchmark index, may stand as a more useful metric. It measures the annualised cost of holding a fund and, in addition to the management fees, it factors in the effects of ancillary operations undertaken as part of the fund-management process. However, it isn’t a foolproof measure either, as it is backward-looking, can vary across different time horizons, and cannot account for the impact of future fee cuts or other improvements to the portfolio-management process.

Tracking error is another metric used to evaluate ETF performance. It measures the variability of a fund's deviations relative to the benchmark index. This volatility indicator may be useful for tactical investors who buy and sell frequently, but it has limited use for buy-and-hold strategic investors.

On top of essential factors such as the makeup of the fund's benchmark index, fees, and tracking performance, investors may also consider liquidity, the strength of the parent company behind the ETFs, as well as an array of individual preferences for or against specific aspects of the fund-management process. All these can influence the decision-making process. As such, any assessment should be conducted on a case-by-case basis to suit the specific requirements of the individual investor.

Despite these challenges, Morningstar believes that a generic guidance framework for fund selection is not only feasible, but can be of great value to investors with a long-term view. This is why we recently incorporated ETFs into our Analyst Rating framework. The Analyst Rating is designed to help investors home in on the best strategies within a Morningstar Category, which include ETFs as well as other index-tracking funds and actively managed mutual funds. This is a holistic approach, which, in the context of ETFs, goes beyond the sole analysis of cost and tracking performance. Within this framework, we take a view on which strategies—as defined by the underlying index—are likely to deliver the best outcomes for investors over the long term. See Appendix II for a list of the European-domiciled ETFs that have been assigned an Analyst Rating (see the Morningstar Analyst Rating methodology document).
Provider Profiles

Please note that the information provided in these profiles was either supplied to us directly by the relevant providers or taken from public sources. As such, we cannot guarantee that it is complete, accurate, or timely. Please refer to ETF prospectuses and providers’ websites for the latest information.

Exhibit 7 Eight Largest Providers of UCITS ETFs*

<table>
<thead>
<tr>
<th>Physical Replication</th>
<th>Synthetic Replication</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETFs</td>
<td>AUM (EUR Billion)</td>
</tr>
<tr>
<td>Amundi</td>
<td>8</td>
</tr>
<tr>
<td>db X-trackers</td>
<td>92</td>
</tr>
<tr>
<td>iShares</td>
<td>288</td>
</tr>
<tr>
<td>Lyxor</td>
<td>40</td>
</tr>
<tr>
<td>Source</td>
<td>12</td>
</tr>
<tr>
<td>SPDR</td>
<td>99</td>
</tr>
<tr>
<td>UBS</td>
<td>92</td>
</tr>
<tr>
<td>Vanguard</td>
<td>22</td>
</tr>
</tbody>
</table>


*Note: All calculations refer exclusively to ETF range (i.e. they exclude ETCs).

Amundi ETF

Amundi ETF is part of a dedicated business line within Amundi Group. Resulting from the merger of Crédit Agricole AM and Société Générale AM, Amundi became a publicly listed company in December 2015. Crédit Agricole Group remains the main shareholder, with a 75% stake.

Amundi ETF is currently the fifth-largest ETF provider in Europe, as measured by AUM.

The first Amundi ETFs were launched in 2001, but it wasn’t until 2008 that Amundi Group placed the ETF activity at the centre of its strategic development.

Morningstar View

Amundi can rightly lay claim to be being one of the trailblazers of the European ETF market, having launched its first ETF back in 2001.

Formerly a staunch advocate of synthetic replication, Amundi has now embraced a more pragmatic approach in its replication strategy, with the choice of methodology determined on a fund-by-fund basis.
We hold the portfolio management team in high regard. We value its strong commitment to the delivery of tight tracking. We also are satisfied that appropriate measures have been taken to mitigate any counterparty risks.

With no borrower indemnification and a potential conflict of interest with the lending agent, the securities-lending programme could certainly be improved. This said, given the tiny number of ETFs currently engaged in the practice (three as of writing), this may be more of an issue for the future.

**ETF Offering**

Amundi ETF offers a range of more than 100 ETFs covering a broad range of equity and fixed-income exposures.

Formerly an advocate of synthetic replication, in September 2016 the firm announced an expansion of its range of physically replicated funds. Since then, the number of physical ETFs has grown from three to 15, representing 13% of the ETF range (by number), and one fifth of AUM. All Amundi ETFs are UCITS-compliant.

**People**

Amundi manages all of its ETFs in-house through a dedicated ETF team within the Amundi ETF, Indexing & Smart Beta business line. Sixteen professionals are engaged directly in the management of the ETF portfolios. The Paris equity management team, headed by Lionel Brafman, is composed of nine portfolio managers. The Tokyo equity management team, responsible for Asian Equity ETFs, is headed by Thomas Gilotte and is composed of three portfolio managers. The fixed-income management team, headed by Sylvain Brouillard, consists of four portfolio managers, all based in Paris.

**Portfolio-Management Process: Synthetic ETFs**

All of Amundi’s synthetic ETFs use the unfunded swap model. Under this model, each ETF buys and holds a basket of securities and simultaneously enters into a swap agreement with a counterparty that commits to pay the index performance in exchange for the performance of the fund holdings.

**Swap Counterparties**

Each Amundi ETF enters into a swap agreement with a single counterparty. BNP Paribas is used as swap provider for equity ETFs, while Société Générale is used for fixed-income ETFs.

Counterparties are selected following an auction process implemented every five years, with competitiveness monitored and changes negotiated on an ongoing basis.

**Substitute Baskets**

Substitute baskets for equity ETFs consist mainly of stocks in the MSCI Europe Index and/or stocks from the underlying index and, to a lesser extent, stocks in the S&P 500 and/or the Nikkei 225. Additionally, the UCITS diversification rule applies.

For fixed-income ETFs, portfolio managers buy investment-grade bonds issued by OECD countries and/or securities from the underlying index and, to a lesser extent, investment-grade corporate or covered.
As an additional protection measure, BNP Paribas, Société Générale, Crédit Agricole, and Amundi Securities are excluded from the funds' assets.

No securities lending is carried out within the substitute baskets.

**How is Counterparty Risk Managed?**
For its synthetic ETF range, Amundi aims to maintain zero daily counterparty exposure. To achieve this, the portfolio manager resets the swap daily regardless of exposure.

In the event of a swap-counterparty default, Amundi may appoint another swap counterparty, switch to physical replication, or return money to investors by liquidating the ETF.

**Disclosure**
The composition of the substitute basket, the mark-to-market swap value, and the swap counterparty name are disclosed and updated daily on the company website.

**Portfolio-Management Process: Physical ETFs**
All physical equity Amundi ETFs are fully replicated, that is, the manager buys all the securities in the weights stipulated by the tracked index.

The upcoming physical fixed-income ETF range will be using a sampling methodology.

**Trading**
All trading is done in-house via Amundi Intermediation, a 100%-owned subsidiary of Amundi. By aggregating trades from other parts of the group, Amundi Intermediation can take advantage of economies of scale and ensure that transactions costs are minimised.

Cross-buying, the act of transacting internally with other business groups in order to reduce transaction fees, is not used within the firm.

**Index-Related Events**
Amundi does attempt to pre-empt market events (for example, corporate actions, index rebalances) in select circumstances where it is determined that the risk/reward trade-off is favourable.

**Cash and Dividend Management**
Portfolio managers use futures for cash management purposes, including for the reinvestment of dividends to minimise tracking error. In the case of scrip dividend, portfolio managers decide between receiving the dividend in stock or cash.

**Securities Lending**
Amundi uses Amundi Intermediation, a 100% subsidiary of Amundi Group, as an agent for its lending programme for all its physically replicated ETFs. A list of 20-plus counterparties is selected by Amundi’s Risk Committee and reviewed continuously after an annual due-diligence process.

A team within Amundi’s Risk Department is dedicated to monitoring counterparty risk.
Acceptable collateral includes equities, bonds, and cash. Amundi takes equities from well-known large-cap indexes. Accepted bonds include euro cash; G5, G7, and G10 bonds; and minimum AA-rated corporate bonds. The following haircuts are applied: 110.5% for equities, 103% for cash, and 105% for bonds. The mark-to-market collateral is held in a segregated account in the name of the fund by CACEIS, which also acts as the custodian of the ETF. The collateral received cannot be re-lent. The cash is remunerated at EONIA.

Although non-PEA (Plan d’Epargne en Actions) eligible funds are legally permitted to lend up to 100% of their assets, Amundi has set a cap of 45% of the net asset value of a fund on securities lending. The cap for PEA-eligible funds is 23%. These caps apply to each business day when NAV is calculated. In practice the average amounts lent have historically been even lower than the maximum percentage allowed.

The proceeds from gross lending revenue that are returned to the ETF have recently been improved. The ETF now receives 65% of gross lending revenue, increased from 60%. The remaining 35% goes to Amundi Intermediation and Amundi ETF, with the latter covering all associated operational costs.

Investors are not offered indemnification in the event of borrower default.

Amundi’s securities-lending policy is published on the company website. Detailed information per fund is available in the fund’s annual report.

db X-trackers

Db X-trackers is part of Deutsche Asset Management (Deutsche AM), the asset-management division of Deutsche Bank. When the ETF business was launched in 2007, it was part of Deutsche Bank’s Corporate Banking and Securities division. It became a part of Deutsche AM’s passive business in 2012.

Db X-trackers is currently the second-largest ETF provider in Europe by AUM.

Morningstar View

The growth of db X-trackers since its inception 10 years ago has been impressive. From a small team within Deutsche Bank’s Investment Banking group, it has developed into the second-largest ETF provider in Europe, offering a broad menu of funds spanning all major asset classes. Along the way, db X-trackers has led its peers in terms of transparency and pragmatism.

Db X-trackers is currently in the midst of important changes to its business model to better align it to a standalone asset-management culture. As part of this move, the team has begun a transition away from a wholly synthetic platform to a more balanced synthetic - physical offering. As it pertains to its synthetic products, db X-trackers is transitioning from a single-counterparty model with Deutsche Bank as the sole swap counterparty, towards a multiple swap-counterparty model. Fund-management duties, which were previously farmed out to State Street Global Advisors, are also being brought in-house.
These changes call for substantial investment in human and technical resources, and while we applaud these moves, we think it is too early to judge the success of the new teams and systems being put in place.

Db X-trackers is the only major European provider to offer synthetic ETFs using the ‘fully funded’ swap model. While these funds account for a small portion of its AUM, we think that the firm could be more proactive in switching them to the widely preferred unfunded swap model.

The securities-lending programme appears to be efficient and tightly controlled for risk. However, the decision to use DB Agency Securities Lending as the lending agent may lead to a conflict of interest.

**ETF Offering**

The db X-trackers ETF offering covers all main asset classes.

Db X-trackers are available to investors via three platforms. Two — db X-trackers and db X-trackers II — are domiciled in Luxembourg, while the Concept Fund Solutions PLC platform is domiciled in Ireland. All three platforms offer a mixture of physical and synthetic replication ETFs.

Db X-trackers started as a wholly synthetic ETF provider, but in 2012, the decision was taken to introduce physically replicated ETFs. In 2014, db X-trackers started to switch ETFs from synthetic to physical replication. As of the end of December 2016, 60% of AUM were physically replicated, according to Morningstar data. In terms of number of ETFs, this represents just under half of db X-trackers’ total offering of around 190. The choice of replication method will continue to be made on a case-by-case basis, depending on what is deemed more efficient.

All db X-trackers ETFs are UCITS-compliant.

**People**

In the second half of 2013, db X-trackers began the process of in-housing fund management for its range of ETFs. While most ETFs are now managed internally, the management of approximately 18% of Luxembourg-domiciled ETFs (by AUM) is still outsourced to State Street Global Advisors in London. The db X-trackers Harvest range is managed by Harvest Global Investments in Hong Kong. In all cases, the management company, Deutsche Asset Management S.A., provides oversight in Luxembourg.

Db X-trackers’ in-house portfolio management team is led by Julien Boulihat and consists of 11 portfolio managers, supported by seven assistant portfolio managers. They focus on both synthetic and physical offerings and are based in London and Birmingham.

**Portfolio-Management Process: Synthetic ETFs**

Db X-trackers refers to synthetic replication as ‘indirect replication’ and uses both the unfunded and the fully funded swap models.

Db X-trackers uses the unfunded swap model for all of its fixed-income ETFs and for most of the entire equity ETF range. Under the unfunded swap model, each ETF buys and holds a basket of securities, and simultaneously enters into a swap agreement with a counterparty that commits to pay the index performance in exchange for the performance of the fund holdings.
The fully funded swap model is used for around 18% of equity ETFs (by number), primarily sector, single emerging markets, and leveraged and inverse funds. It is also used for db X-trackers’ currency and commodity ETFs. Under the fully funded swap model, each ETF transfers investors’ cash to a swap counterparty in exchange for the index performance plus the principal at a future date. The counterparty posts collateral assets with a third-party custodian.

Db X-trackers has transitioned approximately 40 ETFs from the fully funded to the unfunded swap structure since June 2013, a move prompted by client demand and regulatory preference.

Swap Counterparties
For almost its entire range of synthetic ETFs, db X-trackers uses its parent company, Deutsche Bank AG, as the sole swap counterparty. In 2016, the decision was taken to introduce a multi-swap counterparty model to allow for a better diversification of risks. A handful of equity ETFs currently have several swap counterparties, with more to follow. In addition to Deutsche Bank AG, approved swap counterparties include Barclays, HSBC, Goldman Sachs International, Société Générale, and Morgan Stanley Capital Services LLC.

Substitute Baskets/Collateral
For db X-trackers ETFs that use the unfunded swap model, the substitute basket consists of OECD equities (for equity ETFs) and typically government and corporate bonds (for fixed-income ETFs). Assets within the substitute basket are held in a ring-fenced segregated account by the custodian in the name of the ETF. State Street Custodial Services (Ireland) Limited serves as custodian of the funds on the Concept Fund Solutions platform, while State Street Bank Luxembourg is the custodian of the db X-trackers and db X-trackers II platforms.

Db X-trackers ETFs that use the fully funded swap model receive collateral consisting of OECD equities, bonds with a minimum of investment-grade (government and corporate) bonds, and/or cash. Haircuts of 20% are applied for equity collateral, 10% for corporate bond collateral, and 5% for government bond collateral. Collateral is pledged in favour of the fund.

No securities lending is carried out within the substitute baskets/collateral.

How is Counterparty Risk Managed?
Db X-trackers has a policy of resetting swaps to zero when exposure to the counterparty reaches 5% of NAV and/or whenever there is significant creation or redemption of ETF units in such a way that the exposure remains within acceptable limits. In practice, however, db X-trackers often achieve zero or negative net swap counterparty exposure at the end of each day, meaning that the ETFs are either fully collateralised or overcollateralised.

The investment management team at Deutsche International Corporate Services (Ireland) Limited is responsible for overseeing risk functions for the Irish-domiciled ETFs. SSGA and Deutsche Asset Management S.A. handle risk functions for the Luxembourg-domiciled ETFs. Both management teams rely on a number of checks as part of the investment decision-making process, trade execution, and post-trade process, and use various external risk management systems. The risk-management tools are tailored to each fund’s risk profile. Deutsche Bank also conducts internal audits.
For db X-trackers ETFs with Deutsche Bank AG as the single swap counterparty employing the unfunded swap structure, in the event of counterparty default, the assets would either be sold and the cash returned to investors, or be kept within the custodian bank while another swap counterparty was found to meet the fund's investment objectives. For ETFs with multiple swap counterparties, the fund's operators would likely enter into a replacement swap transaction with another approved counterparty. The ETF's management company/board of directors (as applicable) would decide on which approach to take.

For those db X-trackers ETFs employing the fully funded swap structure, in the case of swap-counterparty default, the custodian and the fund can take automatic ownership of the assets pledged as collateral without requiring the approval of Deutsche Bank.

Disclosure
The composition of substitute baskets/collateral, swap-counterparty name, swap-counterparty exposure, swap costs/swap enhancements, as well as estimated tracking differences are available on the db X-trackers website, updated daily.

Portfolio-Management Process: Physical ETFs
Db X-trackers refers to physical replication as 'direct replication' and all its physically replicated ETFs are explicitly identified by the acronym 'DR' at the end of the fund's name.

For physical ETFs, portfolio managers use either full replication or optimised sampling. Exchange-traded funds with optimised sampling use a risk model to minimise tracking error based on the stock's size, valuation characteristics, historical momentum, and historical volatility.

Trading
Trading is performed in-house by a centralised dealing desk within Deutsche AM for all Irish- and some Luxembourg-domiciled ETFs. It is managed by SSGA for the remaining Luxembourg-domiciled ETFs.

Index-Related Events
Portfolio managers use multiple sources to forecast and monitor upcoming index changes. To a limited extent, they may engage in some pre- or post-trading related to index changes to minimise market impact and/or capture extra value that can offset portfolio-management costs.

Cash and Dividend/Coupon Management
Dividends received from the underlying stocks (and coupons received from underlying bonds) are reinvested in line with the index methodology to minimise tracking error.

Portfolio managers may also use futures to minimise tracking error resulting from dividend receivables and other cash items. Futures typically do not exceed 0.5% of the portfolio's value, although this is a function of the dividend structure of the index. For certain funds, it could be as much as 1% due to a long gap between ex-date and pay date of the dividend. In order to manage distributions, the fund manager can use existing cash accounts and rebalance as required.
Securities Lending
Most physically replicated db X-trackers ETFs engage in securities lending, with DB Agency Securities Lending acting as lending agent. The maximum a fund can lend out is 50% of its portfolio at any given time, while lower limits can also apply for certain specific sub-funds.

Lending transactions are fully collateralised by taking eligible high-quality collateral. The level of overcollateralisation varies depending on the asset class received as collateral, whereby the margins applied are 110% for equity and corporate bond collateral, 105% for government/supranational bonds, and 100% for cash.

Deutsche Bank’s Credit Risk Management department proposes and monitors the list of counterparties. In the event of borrower insolvency, Deutsche Bank AG will indemnify the ETF for any shortfall between the market value of the on-loan security and the proceeds of collateral liquidation.

For the Irish- and Luxembourg-domiciled physically replicated db X-trackers ETFs, 70% of gross securities-lending revenue is passed on to the fund, while 15% is retained by the management company (to cover operational costs) and 15% by the lending agent. For the db x-trackers DAX UCITS ETF (DR) and db x-trackers DAX UCITS ETF (DR)—Income, 90% of gross securities-lending revenue is passed on to the fund.

Securities-lending information such as lending revenue, amounts on loan, collateral levels, and borrower information, is available on the db X-trackers website, updated daily.

iShares
iShares, a division of BlackRock since 2009, began operations in Europe in 2000 and has grown to become the largest ETF provider in Europe. In 2013, BlackRock bought Credit Suisse’s ETF operations and merged them with iShares.

BlackRock, the world’s largest asset manager, was founded in 1988 and is headquartered in the US. It specialises in the provision of investment-management services across all main asset classes and via a wide variety of vehicles, including actively managed, structured investments and indexing solutions such as traditional index funds and iShares ETFs.

Morningstar View
As the largest ETF provider in a ‘scale business’, iShares holds a commanding position within the European ETF marketplace. This dominance has been built upon several factors. In managing funds, iShares draws upon a wealth of industry experience. The seasoned portfolio-management team leverages market-leading technology and the vast economies of scale generated by the BlackRock group.

Tracking performance is boosted by a well-oiled and widely implemented securities-lending programme. We think that the process is tightly controlled for risk. However, the decision to use the in-house, profit-generating lending agent does introduce a conflict of interest. iShares is also the only large provider to allow funds to lend up to 100% of holdings, a practice that has left some investors unnerved. Finally,
while iShares has increased the portion of lending revenue it passes back to the investor, it remains less generous than other providers.

With the largest product range in Europe, iShares can offer investors a ‘one-stop shop’ solution. It is particularly dominant within the fixed-income space, where it currently controls two thirds of market AUM.

In terms of fees, beyond its "core" ETF range, many iShares ETFs, including some with large asset bases, are amongst the most expensive on the market. With all the benefits that stem from such an advantageous market position, we think that the spoils could be better shared with investors in the form of lower fees.

**ETF Offering**

iShares' large ETF offering covers all main asset classes. iShares ETFs are incorporated into a variety of legal structures depending on domicile, namely open-ended investment companies in Ireland (76% of funds), Germany (20% of funds), and Switzerland (4% of funds, resulting from the acquisition of Credit Suisse's ETF business).

All iShares ETFs, except those domiciled in Switzerland, are UCITS-compliant.

iShares can be described as the key exponent of physical replication in the universe of ETF providers in Europe. Its 2011 foray into the development and subsequent launch of a small suite of swap-replicated ETFs — for exposures difficult or impossible to replicate in a physical ETF format — proved short-lived. As of this review, bar the single exception of a swap-based German-domiciled commodity ETF, the entire suite of iShares products is physically replicated.

**People**

iShares’ equity and commodity ETFs in Europe are managed by the EMEA Portfolio Management group, headed by Debbie Jelilian and sitting within BlackRock’s ETF and Index Investments business. Supported by 15 portfolio managers, this group focuses exclusively on the management of index products. The suite of iShares fixed-income ETFs is managed by EMEA Portfolio Solutions within BlackRock’s Model-Based Fixed Income Portfolio Management Group, headed by Michael Harper. This group, supported by around 20 portfolio managers, is responsible for the day-to-day management of both index-based and actively managed fixed-income funds and investment solutions.

**Portfolio-Management Process**

The stated aim of the portfolio-management group in charge of iShares’ equity ETFs is to pursue full replication whenever feasible and use an optimisation approach for ETFs tracking market indexes subject to a fair degree of illiquidity and/or high transaction costs. In practice, some 63% of iShares' equity ETFs are fully replicated, while the remaining 37% use optimisation. iShares ETFs' factsheets define the methodology as 'replicated' for full replication or 'optimised' to indicate the use of an optimiser.

In the case of fixed-income ETFs, the default replication methodology is stratified sampling, identified as 'sampled' in the ETFs' factsheets. Stratified sampling is the method of index construction when full replication is not possible or not appropriate. Stratified sampling will usually result in some degree of
sampling error, and hence the expected tracking error versus the index will increase compared with that of a fully replicated portfolio. On the other hand, there will be a benefit to the investor in a reduction in transaction costs due to fewer holdings and not searching out illiquid assets, which could be very expensive.

Portfolio managers rely on proprietary analytical and risk-control systems to meet all aspects of management. The risk-monitoring system is integrated with the portfolio-building solution, issuing daily reports to managers.

Trading
All trading is done in-house, with all orders channelled through to BlackRock’s Trading and Liquidity Strategy Group. This group has a global presence, with staff in Europe, the US, and Asia, and has the ability to route orders from one region to another for local execution.

Cost-savings in the trading of securities are seen as key to ensuring efficient management of iShares ETFs. This effectively means that any opportunity to cross-trade internally amongst the various BlackRock divisions will be actively pursued. Once the internal cross-trading avenue is exhausted, the trading desk will explore available external crossing opportunities with other institutional investors before engaging in direct market execution.

Index-Related Events
In the event of index changes—driven by either rebalancings or corporate actions—portfolio managers carry out a series of analyses, mostly focusing on liquidity and pricing conditions. In an effort to minimise potential market impact, managers may trade ahead of or after the actual index event.

Portfolio managers benefit from their close collaboration with the trading desk. The portfolio-management role includes analysis into the impact of upcoming index events and corporate actions on portfolios, and then taking the appropriate action to balance risk, cost, and return.

Cash and Dividend/Coupon Management
Cash dividends for iShares equity ETFs, with the exception of Sharia-compliant ETFs, are routinely equitised from the ex-date using index futures, either like-for-like or best available proxy to the benchmark tracked by the ETF. The dividends accrue in a cash account until it reaches a certain threshold, when they are reinvested in the ETF. Simultaneously, the long positions in equity index futures are reduced so that the portfolio remains unleveraged. In the case of scrip dividends, the portfolio management team carries out an analysis to ascertain the most financially favourable course of action (for example, taking cash or stock).

Bond-coupon payments to fixed-income ETFs accrue in a cash account until reinvestment in the ETF according to benchmark rules, typically at month-end.

Securities Lending
Securities lending is a common practice across the entire range of European-domiciled iShares ETFs, with BlackRock acting as the lending agent. Each fund can lend up to 100% of its NAV (prior to June 2015, the amount of securities that could be lent was capped at 50% of AUM per ETF).
Lending operations are protected by taking UCITS-approved high-quality collateral—normally stocks and bonds, although cash and even ETFs can also be accepted—in excess of the loan value. The level of overcollateralization varies in relation to the asset class lent out and the asset class accepted as collateral. However, it typically ranges between 105% and 112% for equity collateral, 102.5%-105% for government bonds, and 102.5%-108% for cash (in US dollars, euros, and British pounds).

Both loan and collateral values are marked-to-market daily. The collateral is held in a ring-fenced account in the name of the ETF separate from BlackRock’s balance sheet. The lending agent routinely monitors the quality of accepted borrowers and provides full indemnification to the ETF. Should a borrower default, BlackRock promises to replace all the unreturned securities.

Gross lending revenue is split as follows: 62.5% to the ETF and 37.5% to the lending agent, with the latter covering all associated operational costs. This 62.5/37.5 split was improved in May 2014 from 60/40 previously.

For each ETF that takes part in the securities-lending programme, iShares discloses quarterly on its website a summary of key statistics for the previous 12 months, including average and maximum on loan values, collateral value (percentage of loan), and list of holdings, including weights, plus lending return to the fund over the period.

Lyxor

Lyxor Asset Management Group, a wholly owned subsidiary of the Société Générale Group, was founded in 1998. Lyxor specialises in the provision of investment products and solutions in four major areas: ETFs and indexing, structured investments; alternative investments, and quantitative investments. Lyxor is currently Europe’s third-largest ETF provider, as measured by AUM.

Morningstar View

Lyxor can be considered one of the pioneers of the European ETF market, having been the first to launch synthetically replicated ETFs.

Following a period of volatility in 2012-14, during which time several senior personnel departed and the firm relinquished its position as the second-largest provider in Europe, Lyxor’s ETF business has gotten back on its feet.

Once one of the strongest advocates of synthetic replication in the early years, shifting market sentiment has seen Lyxor soften its stance and migrate some of its more popular offerings onto a physical platform. This pragmatic approach allows for a decision to be made on replication method on a fund-by-fund basis. We are satisfied that it has carefully managed this potentially tricky migration with minimal disruption to the tracking record of the ETFs involved. We also value the fact that Lyxor has beefed up the portfolio management team with professionals who have expertise in the management of physical funds.
Lyxor has developed a broad menu of products ranging from core plain-vanilla equity exposures through to strategic beta offerings. Recent launches and fee cuts on the existing range have bolstered the fixed-income offering and helped redressed a bias towards equity exposures.

ETF Offering
Lyxor's ETF offering covers all main asset classes. Lyxor ETFs are incorporated in two types of structure, namely FCP (Fonds Commun de Placement), and SICAV (Societe d'Investissement a Capital Variable), with legal domiciles in France and Luxembourg. The FCP structure is a historical legacy. As of now, Lyxor gives priority to Luxembourg SICAV, or French SICAV when it is more favourable from a tax-treatment perspective for investors.

All Lyxor ETFs are UCITS-compliant.

Lyxor started off as a wholly synthetic ETF provider. Since late 2012, it operates on a mixed synthetic-physical replication model. As of this writing, around 20% of the ETFs offered (by number) are physically replicated, representing around half of AUM.

As a rule, physical replication is now used for all market exposures where the use of synthetic replication does not result in superior tracking efficiency. Further growth in Lyxor's offering of physically replicated ETFs, whether by means of switching existing swap-based products or by new launches, will be determined on the same principles.

People
Lyxor's ETF and Index Fund Management team is headed by Raphael Dieterlen. As of this review, the team was made up of 13 people, including eight portfolio managers. Since 2013, Lyxor has invested heavily in beefing up its portfolio management team with a view to bring in professionals with expertise in the management of physical funds.

Portfolio-Management Process: Synthetic ETFs
For its entire range of synthetic ETFs, Lyxor uses the unfunded swap model. Under this model, each ETF buys and holds a basket of securities and simultaneously enters into a swap agreement with a counterparty that commits to pay the index performance in exchange for the performance of the fund holdings.

It must be noted that Lyxor denotes the replication methodology for its suite of synthetic ETFs as 'indirect (swap based)' on its website as well as on ETF factsheets.

Swap Counterparties
For the majority of its synthetic ETFs, Lyxor uses Société Générale as the sole direct swap counterparty for the purposes of operational efficiency. Société Générale works back-to-back with counterparties selected by Lyxor in the frame of a request for pricing process to obtain the best swap price. Swap counterparties are selected and regularly monitored on a set of creditworthiness criteria. Any counterparty risk arising from these back-to-back operations lies exclusively with Société Générale.

For its current range of seven JPMorgan single and multi-factor ETFs, J.P. Morgan acts as the sole and direct swap counterparty.
Portfolio managers are responsible for issuing RFPs for swap contracts. Portfolio managers launch an RFP for any ETF with AUM over EUR 250 million. The goal is to secure the best possible price for swap contracts, which would be agreed upon for one year. Exchange-traded funds with AUM below EUR 250 million are not necessarily subject to the RPF process. Nonetheless, swap prices for these ETFs are monitored for competitiveness and, if required, challenged.

Substitute Baskets
For all substitute baskets, Lyxor seeks a high degree of consistency between the eligible securities and the nature of the ETF’s benchmark index.

Substitute baskets for equity and commodity ETFs are generally made up of liquid stocks belonging to major indexes and maintain a minimum average trading volume and market capitalisation.

Meanwhile, for fixed-income ETFs, they consist of bonds selected on three key criteria limits: maximum duration, minimum size, and minimum rating.

All substitute baskets comply with UCITS diversification rules and exclusions/limits on eligibility of Société Générale bonds and stock.

All assets in the substitute basket are the property of the ETF and are kept segregated on a separate account in its name with the custodian bank; Société Générale for French-domiciled ETFs and Société Générale Bank & Trust SA for Luxembourg-domiciled ETFs.

For its suite of synthetic ETFs, Lyxor does not engage in securities lending with the constituents of substitute baskets.

How is Counterparty Risk Managed?
Lyxor targets to have no counterparty risk through the swap value. The ETF manager resets the swap value to below zero whenever its level becomes positive (that is, when the fund owes the swap counterparty). In practice, the swap value could be negative, meaning that the fund would be overcollateralised (that is, the substitute basket value is above the NAV of the ETF).

Lyxor’s ETF portfolio management team is responsible for the daily monitoring of the swap value, along with a dedicated team who is responsible for the second level of control on D+1. Lyxor’s Internal Control acts as the third and final level of control.

In the case of swap counterparty default, Lyxor would give first priority to selecting a new counterparty and arrange a new swap contract. If this were not possible, a change from synthetic to physical replication would be pursued. As a last resort, Lyxor would consider selling the basket of assets and fully redeem the fund, subject to regulatory approval.

Disclosure
Lyxor fully discloses each ETF substitute basket contents and the relevant swap mark-to-market values daily on its website.
**Portfolio-Management Process: Physical ETFs**

Lyxor uses the expression ‘direct’ to refer to physical replication techniques. All physically replicated Lyxor ETFs are explicitly identified by the acronym ‘DR’ at the end of the ETF’s name. In addition, factsheets for Lyxor physically replicated ETFs define the replication method as ‘direct (physical)’. Full replication is the default replication choice for Lyxor’s range of physical ETFs. However, in some cases the portfolio managers use sampling techniques.

In the case of some equity ETFs, the managers may use sampling in a bid to minimise the cost of trading full baskets of stocks when the fund faces large creations or redemptions. However, Lyxor states that in those circumstances, the ETFs would usually hold a perfect basket for over 90% of the assets and only the remainder would be managed using sampling techniques.

In the case of fixed-income ETFs for which the underlying market displays special liquidity conditions and the purchase of all benchmark bonds is deemed financially unfeasible, portfolio managers opt to follow a stratified sampling approach.

**Trading**

All trading is done in-house, with trades directly routed to Lyxor’s execution desk. Internal cross-trading is allowed, but happens rarely and only for limited sizes.

**Index-Related Events**

In the event of index rebalancing, portfolio managers carry out an analysis of potential market impact. If the market impact is deemed high, the managers will generally smooth it through volume-weighted average price execution. In cases where market impact is limited, trading requirements would be met via standard brokerage channels.

**Cash and Dividend/Coupon Management**

Routine cash stock dividends are reinvested according to index rules. Portfolio managers may use futures for cash equitisation purposes. The use of derivatives rarely exceeds 1% of ETFs’ NAV, other than during the dividend period, when it can go up to 3%.

In the case of scrip dividends, portfolio managers follow a quantitative-driven approach to ascertain the most financially favourable course of action (for example, taking cash or stock).

Bond coupon payments to fixed-income ETFs are reinvested to the fund directly in bonds in accordance with benchmark rules.

**Securities Lending**

Securities lending is used for equity ETFs only, with Société Générale Securities Services acting as the lending agent. The amount of securities that can be lent is capped at 25% of AUM per ETF. Lending operations are hedged by taking UCITS-approved high-quality collateral (for example, blue-chip stocks and G7 government bonds) in excess of the value of the loan. The level of overcollateralisation is set at 105% for bonds and 110% for stocks. Cash is not accepted as collateral.
Both loan and collateral values are marked-to-market daily. The lending agent routinely monitors the quality of accepted borrowers and provides full indemnification to the ETF in case of a borrower failure to return the securities.

Gross lending revenue is split as follows: Minimum 65% to the ETF, maximum 20% to Lyxor, and 15% to the lending agent. This split enables Lyxor to cover its operational costs. Lyxor does not make any profit from securities-lending activities.

Lyxor discloses daily on its website all key information pertaining to its securities-lending programme, including current loan levels (expressed as a percentage of NAV) per ETF; one-year rolling average and maximum on-loan values; collateral value (expressed as a percentage of loan); and list of holdings, including weights, plus returns since inception.

**Source**


The company was founded in 2008, and the first Source ETF was launched in 2009.

Source is currently the seventh-largest ETF provider in Europe, as measured by AUM.

**Morningstar View**

Source differs from all other major providers in that it outsources all fund-management responsibilities. The firm actively pursues strategic partnerships with asset managers and strategy providers in relation to the development and subsequent management of ETFs. As such, Source is best described as an ETF distributor.

This unorthodox structure forms the basis of both Source's strengths and weaknesses. It allows the flexibility to select and collaborate with high-profile partners, such as J.P. Morgan and PIMCO, on a fund-by-fund basis. As a result, Source has developed a fairly idiosyncratic product range. However, owing to the varying management techniques, its ETFs should be evaluated case-by-case rather than at a broad firm level.

Assenagon, the asset manager responsible for the management of the majority of Source's ETFs, has shown itself to be proficient, particularly in terms of tracking accuracy. We also look favourably upon the indexing experience brought by LGIM, which manages Source's recently established physical equity ETF platform.

The lack of stability in ownership and management in recent times is a concern. Following the acquisition by Warburg Pincus in 2014, Source suffered a tumultuous period, which was punctuated by high-profile departures, including that of its founder and CEO. Since then, the firm seems to have
stabilised, although the involvement of a private equity firm ensures that rumours of a sale continue to swirl.

**ETF Offering**

Source's ETF range covers all major asset classes and is predominantly synthetically replicated.

Following the announcement of Legal & General Investment Management as physical management partner in 2015, Source has added three funds to its range of physically replicated funds, with more expected to follow.

Source's modus operandi differs from other large ETF providers in that it outsources the management of all its ETFs. The firm pursues strategic partnerships with asset managers and strategy providers in relation to the development and subsequent management of ETFs, while oversight is maintained by Source. Examples include partnerships with LGIM, Goldman Sachs, and PIMCO.

Source also offers a handful of actively managed ETFs, all providing exposure to fixed income.

All Source ETFs are UCITS-compliant and domiciled in Ireland.

**People**

Most Source employees in Europe are engaged in investor-facing, marketing, and finance roles. The day-to-day investment management of all Source's synthetic ETFs has been outsourced to Assenagon Asset Management, a third-party financial asset and risk manager specialising in passive and structured investment solutions. Assenagon, which currently has a team of six investment professionals working on Source ETF projects in Munich and Luxembourg, implements the processes developed by Source. In late 2015, Source announced a strategic alliance with LGIM, which has become the manager of a newly launched physical platform.

The PIMCO fixed-income ETFs are managed by PIMCO from Europe and the US depending on the underlying exposure.

The investment manager for the physically replicated CSOP Source FTSE China A50 UCITS ETF is CSOP Asset Management, based in Hong Kong.

**Portfolio-Management Process: Synthetic ETFs**

Source's synthetic ETFs that track equity, alternative, and commodity indexes use the unfunded swap model. Source refers to this model as a 'swap-enhanced ETF structure' on fund factsheets and as 'physical with swap overlay' on its website.

Under this model, each ETF buys and holds a basket of securities and simultaneously enters into swap agreements with one or multiple counterparties that commit to pay the index performance in exchange for the performance of the fund holdings.
Swap Counterparties
Where possible, the ETF, via the investment manager Assenagon, deals with multiple swap counterparties. The currently approved and active swap providers are: Bank of America Merrill Lynch, Goldman Sachs, J.P. Morgan, Morgan Stanley, UBS, Citigroup, Barclays Capital, and Deutsche Bank.
When selecting a swap counterparty, Source's board of directors and credit committee consider several areas, including legal capacity, credit quality, and operational capabilities. For equity, alternative, and commodity ETFs the minimum short-term credit rating for swap providers is Moody's P-2, S&P A-2. Source periodically reviews the terms of the swap agreements. There are no fixed renegotiation timelines.

Substitute Baskets
Source only accepts equity within the substitute basket (T-Bills or cash in the case of the Source LGIM, commodity ETF). The eligible securities are subject to pre- and post-trade screening. Equities must be listed on a market deemed acceptable by Source and each individual basket must comply with liquidity and UCITS diversification requirements. There is an average correlation of the basket with the index of around 80%.

Assenagon does not engage in securities lending with the constituents of the substitute basket.

How is Counterparty Risk Managed?
For equity ETFs, the investment managers at Assenagon reset swaps under several different circumstances: when the end-of-day exposure to a single counterparty rises above 0.20% of the fund's NAV and EUR 100,000; or when the mark-to-market value of the swap notional is greater than 4.5% (and the previous two conditions have not been met, for example due to a small fund size); or in the case of a redemption or creation; or monthly, irrespective of value.

For single broad-basket commodity ETFs, managers reset swaps weekly. Between resets, should the counterparty exceed the threshold of USD 100,000 at the end of a given day, the exposure will be fully collateralised with cash, US T-bills, UK Gilts, or German Bunds.

Should it become necessary to reduce or eliminate exposure to a specific counterparty, their swap notional would be expected to be taken over by another swap provider.

It should be noted that for ETFs that track proprietary indexes (for example, Goldman Sachs Equity Factor indexes), only a single swap counterparty may be available, meaning investors may bear single counterparty risk.

Disclosure
The composition of the substitute basket is disclosed on the company website and the information is updated daily. Additionally, the website discloses swap fees and graphs the daily swap mark-to-market value.

Portfolio-Management Process: Physical ETFs
Depending upon the fund in question, the investment manager employs full or sampled replication. Currently, only the three FTSE RAFI Income funds and the CSOP Source FTSE China A50 UCITS ETF are
fully replicated, while all the passive PIMCO fixed-income ETFs use risk-factor matching, a form of sampling, to track their benchmarks.

The use of derivatives is permitted for certain funds for hedging purposes. These contracts usually take the form of OTC forwards, and are used primarily to hedge for currency and interest-rate risk.

Trading
All trading for Source physical ETFs is undertaken by the appropriate external investment manager. The trading functions are covered by CSOP for the CSOP Source FTSE China A50 UCITS ETF, PIMCO for its fixed-income ETFs, and LGIM for the remaining physical equity funds.

Index-Related Events
Portfolio managers do not pre-emptively trade on potential index events (that is, additions and deletions).

Cash and Coupon/Dividend Management
Coupons and dividends are treated according to index rules. Investment managers for some physical funds will invest income into futures to manage cash flows and pending ETF distribution payments.

Securities Lending
Currently, only the Source FTSE RAFI US Equity Income and FTSE RAFI Euro Equity Income ETFs are engaged in securities lending, for which Northern Trust acts as the lending agent.

The amount of securities that can be lent is capped at 50% of AUM per ETF. The maximum amount of any fund that can be lent to a single borrower is capped at 10% to further help reduce single counterparty risk. All lending counterparties must have a minimum credit rating of A1/P1 or F1 for Fitch short term, and must be approved by the LGIM Credit Committee.

Lending operations are backed by taking high-quality collateral in the form of G7 government bonds (excluding Italy) and AAA-rated supranational bonds, both of which must be over-collateralised to at least 105% of the loan amount. Both loan and collateral values are marked-to-market daily. The collateral is held in a ring-fenced account in the name of the ETF.

The lending agent regularly monitors the quality of accepted borrowers. It also provides full indemnification to the ETF. As is common practice, in the event of borrower default, Northern Trust promises to replace all the unreturned securities.

Gross lending revenue is split as follows: 85% to the ETF and 15% to Northern Trust, with the latter covering all associated operational costs.

Detailed securities-lending information is compiled and uploaded to Source’s website on a quarterly basis.
SPDR ETFs

SPDR ETFs, the ETF business of US-based asset manager SSGA, has been offering ETFs since 1993 in the US and since 2001 in Europe. After several years of limited growth, SSGA “relaunched” its EMEA ETF business in 2011. Since then, it has launched 99 ETFs and seen its AUM rise dramatically, albeit from a low base.

SPDR is currently the eighth-largest ETF provider in Europe, as measured by AUM.

Morningstar View

SSGA has a thoroughbred pedigree when it comes to indexing, having launched the first-ever U.S.-listed ETF, the SPDR S&P 500, in 1993. Despite its age, the European business has taken a considerable time to take off.

Improvements have been notable over the past two years and the firm now appears fully committed to developing its European ETF range.

The recently announced relocation of Paris-based passive-management activities to London should help create operational efficiencies.

As of now, despite having a handful of highly popular products, it remains a relatively small player in the European ETF arena. However, we are encouraged by what we now perceive to be a clearer corporate strategy to foster the European range.

The real strength of SPDR’s business lays in the economies of scale gained from its relationship with the parent State Street Corporation, one of the largest custodians in the world. The firm’s trading systems allow a large percentage of trades to be settled internally with other business areas globally, which allows for a reduction in trading costs. This close relationship also allows SPDR to leverage State Street’s global technology expertise and risk-management systems.

The securities-lending programme appears to be efficient and tightly controlled for risk. However, the decision to use State Street Securities Finance as the lending agent may lead to a conflict of interest.

ETF Offering

The European SPDR range is entirely physically replicated and gives exposure to the two main asset classes, equity and fixed income.

All European SPDR ETFs are domiciled in Ireland and UCITS-compliant.

People

The SPDR ETF portfolios are managed by SSGA’s global equity and fixed-income portfolio-management teams, leveraging the global investment platform, trading capabilities and asset-class specialties from within SSGA. Equity portfolios are run from London, Boston, and Dublin with fixed-income being managed predominantly in London but with support from Singapore and Boston for particular products.
Portfolio-Management Process
SPDR ETFs employ full, sampled, or optimised physical replication. When considering which methodology to use, portfolio managers consider several factors, including the asset class, size of the portfolio, liquidity of the benchmark, custody costs, tracking error tolerance, availability of data, and the maturity of the portfolio in question.

Trading
All trading is done in-house via an internal 24-hour trading desk, and only SSGA's traders are authorised to trade. By aggregating trades from other parts of the group, SSGA can take advantage of economies of scale to minimise transaction costs.

Index-Related Events
Index-related events, be they rebalances or corporate actions, are managed by SSGA's portfolio managers and the teams that support them. Portfolio managers may engage in some pre- or post-event trading in connection with particularly large or complex index events, based on internal forecasts on a case-by-case basis. But for most simple and/or more liquid exposures, portfolio managers prefer to trade in line with the index change itself, so as not to incur unnecessary tracking error if the change doesn't materialise.

Cash and Dividend/Coupon Management
To remain fully invested in the equity market and achieve close tracking, portfolio managers may use index futures contracts to equitise dividend receivables and other cash items while accommodating cash flows into and out of the portfolio where possible. Futures exposure represents typically less than 2% of the portfolio's value.

In line with the index methodology, the cash from coupon payments is left uninvested until the end of the month, at which time the portfolio managers invest across the portfolios.

Securities Lending
At the time of writing, only 22 formerly French-domiciled equity funds engage in securities lending. SSSF acts as the lending agent.

Acceptable collateral is limited to government debt whose long-term debt ratings are at or above A- or equivalent by two or more internationally recognised rating agencies, and global equities listed on an exchange. Minimum additional margin requirements are between 2% and 5% depending on the assets being lent and the collateral type and quality. SSGA does not re-lend collateral. Cash collateral is not accepted.

Lending agent SSSF offers indemnification against collateral insufficiency in the event of a borrower default, meaning SSSF will cover any shortfall between the value of the collateral and the replacement cost of the securities.

Gross securities-lending revenue is split, with the ETF receiving 70% of the income and the lending agent receiving 30%. The lending agent is responsible for all the operational costs associated with the practice. The cost of the borrower default indemnification is also covered out of SSGA's fee split.
The amount of securities that can be lent is capped internally by the risk team at 70% of AUM per ETF. All information relating to securities lending can be found on the SPDR ETFs website.

**UBS ETFs**

UBS ETFs, founded in 2001 and domiciled in Switzerland, is a business of UBS Global Asset Management, which is part of UBS AG. UBS ETFs solely provides ETFs. All other exchange-traded products (for example, exchange-traded notes) are sold through UBS Investment Bank.

UBS is currently the fourth-largest ETF provider in Europe, as measured by AUM.

**Morningstar View**

We hold a favourable view of the portfolio management team, which presides over a mixed physical/synthetic product lineup. The team is run by a stable group of experienced professionals who constantly seek operational efficiencies by means of innovative fund management solutions.

Examples include the move to a model where both currency-hedged and unhedged share classes lay claim to portions of a common portfolio rather than existing as separate funds, or, solely for its synthetic ETF range, the migration from a fully funded swap to a 'combined' swap model back in 2011.

These developments have allowed the firm to create efficiencies, and, in the case of synthetic ETFs, further mitigate counterparty risk.

Socially conscious investing has also been an area of development, and UBS now offers the most comprehensive range of ESG ETFs on the market. A strong bias toward equity exposures means that fixed-income investors should be prepared to look elsewhere.

**ETF Offering**

The UBS ETF offering is predominantly physical and covers all main asset classes.

UBS ETFs are built over four platforms, which are domiciled in Luxembourg, Ireland, and Switzerland. All are UCITS-compliant, except those domiciled in Switzerland.

**People**

Portfolio management of ETFs is undertaken by two separate teams within UBS Asset Management. The Indexed Equities & Alternatives team is made up of 15 investment professionals and is headed by Ian Ashment, while the seven-strong Indexed Fixed Income team is led by Matthias Dettwiler. These teams, which also manage discretionary mandates and a range of other passive investment products, operate out of London, Zurich, and Sydney.

**Portfolio-Management Process: Physical ETFs**

UBS physical ETFs employ either full replication, full replication with some substitutes, or stratified sampling methods.
Trading
Trading of the underlying constituents of UBS ETFs is done in-house. Equity and currency trades are handled by separate trading desks. Trades for UBS fixed-income ETFs are carried out by the portfolio managers. Cross-trading is not authorised.

Index-Related Events
Portfolio managers can decide to trade after announcements of index rebalances but ahead of effective changes in an attempt to add value, a practice which can boost fund performance.

Cash and Dividend/Coupon Management
Routine cash stock dividends are reinvested according to index rules using an ‘overdraft’ facility available from the custodians, State Street Bank and UBS. Similar to a credit line, State Street Bank lends the ETF cash to reinvest any receivable dividends on the ex-date. Once the dividend is paid to the underlying stocks, the ETF returns the borrowed cash to State Street Bank. This practice helps reduce tracking error.

Securities Lending
All physically replicated equity ETFs are eligible for securities lending, although as of this review only a selection engaged in the practice. Physically replicated fixed-income ETFs do not carry out securities lending.

The amount of securities that can be lent by an ETF at any point in time is capped at 50% of its NAV (except for UBS ETF EuroStoxx50, which is capped at 25%).

Lending operations are hedged by taking high-quality collateral (e.g. G10 government bonds and equities listed on globally recognised indexes) greater than the loan value. The level of overcollateralisation is set at 105% for bonds and stocks. Cash is not accepted as collateral. Both loan and collateral values are marked-to-marked daily.

State Street Bank, the lending agent, provides full indemnification to the ETF in case of a borrower’s failure to return the securities.

Gross lending revenue is split as follows: 60% to the ETF, 40% to UBS/State Street Bank, with the latter covering all associated operational costs.

UBS discloses daily on its website all key information pertaining to its securities-lending programme, including current loan levels (% of NAV) per ETF, one-year rolling average, minimum and maximum on-loan values, net returns to the fund, and collateral value (% of loan).

Portfolio-Management Process: Synthetic ETFs
All UBS synthetically replicated ETFs are explicitly identified by the acronym ‘SF’ in the ETF’s name. With the exception of two, all use a model that combines an unfunded swap and a fully funded swap. Two synthetic ETFs use the fully funded swap model.

Under the combination model, a target 90% of the ETF’s assets consists of a basket of securities (‘asset portfolio’) which are selected and purchased by the portfolio manager of the ETF. The remaining roughly
10% of the fund’s assets is invested via a fully funded swap. Under the unfunded swap agreement, the ETF receives the performance of the underlying index in exchange for the performance of the asset portfolio. Under the fully funded swap agreement, the ETF transfers investor cash, via the swap counterparty, to a collateral account. In turn, the swap counterparty agrees to deliver the index performance.

**Swap Counterparty**

UBS ETFs uses UBS Investment Bank as its sole swap counterparty. Swap agreements are renegotiated annually and pricing is tested via a range of panel banks. When appropriate, the portfolio manager will instruct UBS Investment Bank to source the index performance from a panel bank to ensure best execution.

**Substitute Baskets/Collateral**

The substitute basket (or ‘asset portfolio’) is identical for all ETFs and consists of liquid stocks from OECD countries. The asset portfolio complies with UCITS diversification rules.

The securities are held in a segregated account in the name of the ETF at the ETF’s custodian bank, State Street Custodial Services (Ireland) Limited.

Only high-quality collateral is accepted, including G10 government bonds and supranational debt, with a minimum AA/Aa2 rating. Collateral is held in a segregated account, with the ETF’s custodian bank, in the name of the fund (transfer of ownership).

UBS does not engage in securities lending within its synthetic ETFs.

**How is Counterparty Risk Managed?**

Swaps are reset at a minimum of every three months or when a pre-determined exposure threshold is met or exceeded. In practice, swaps are frequently reset due to subscription and redemption activity within the ETFs. Counterparty exposure under both the fully funded swap and unfunded swap is collateralised to a target 105%, after haircuts.

The portfolio manager has absolute control over the exposure and risk within the asset portfolio and collateral. UBS uses an independent risk team to further monitor the quality of the securities held by the ETF and of those posted as collateral on a monthly basis.

If the swap counterparty were to default on its obligations, a new swap counterparty would not be appointed. The substitute basket and collateral would be liquidated and the proceeds returned to investors.

**Disclosure**

UBS fully discloses the composition of the asset portfolio and collateral as well as the collateralisation level daily on its website.
**Vanguard**

Vanguard Asset Management Limited is the European asset-management arm of The Vanguard Group, Inc., which was founded in the US in 1975. Vanguard has a unique mutual ownership structure, whereby it is owned by its investors. While Vanguard has been active in the US ETF market since 2001, it only launched its ETF business in Europe in 2012.

Since then it has grown to become the sixth-largest ETF provider in Europe in terms of AUM.

**Morningstar View**

Vanguard was a late entrant to the European ETF marketplace, but backed by its strong reputation in the US, it has quickly established itself as a force to be reckoned with. This is despite offering a significantly narrower range of products than its peers.

We hold Vanguard in high regard. The source of the firm's competitive advantage and the foundation of its investor-focused culture is its distinctive mutual ownership structure. Fund shareholders own Vanguard through their funds, which compels the firm to operate at cost rather than for profit and to put investors' interests first.

It specialises in low-cost, straightforward ETFs that are well suited as core building blocks in investors' portfolios. However, by focusing on what could be described as "plain-vanilla" products, Vanguard's ETF offering may not be sufficient to cover all investor needs.

We have confidence in the well-resourced indexing team. The fund management process is efficient and tightly controlled for operational risk. We would expect the same level of diligence and end-investor focus in regards to the management of the recently established securities-lending programme.

**ETF Offering**

Vanguard's ETF offering is exclusively physical and gives access to broad equity and fixed-income market beta exposures. The range also includes actively managed ETFs.

All Vanguard ETFs are domiciled in Ireland and UCITS-compliant.

**People**

The Vanguard ETF and fund businesses are part of the same operation, with portfolio managers overseeing both ETFs and index funds.

Vanguard uses a global team approach to management and trading in which portfolio managers manage and trade assets locally. However, each portfolio manager is able to carry out other team members' responsibilities. The European and Australian teams are entirely integrated with the US team, using the same processes and systems.

**Portfolio-Management Process**

For equity index-tracking ETFs, portfolio managers use two techniques: full replication and optimisation. Due to the illiquid nature of the underlying markets, the majority of broad fixed-income ETFs use
sampling to track their index. Under the sampled model, the ETF holds a representative sample of the securities that make up the index.

For actively managed equity factor ETFs, portfolio managers implement a rules-based active approach using quantitative models.

Trading
Cross-trading, crossing security trades between funds, is allowed though used minimally in practice. Trades are geographically carried out by portfolio managers on the basis of best execution (for example, US securities are traded in the US, Asian securities are traded in Australia).

Vanguard ETFs also engage in cross-buying, crossing purchases against redemptions, which accounts for a majority of cash flow.

Index-Related Events
For equity index-tracking funds, portfolio managers analyse index events such as index rebalancing and corporate actions and, on a case-by-case basis, implement the appropriate trading strategy to implement the changes in order to limit market impact.

For fixed-income funds, as indexes rebalance on a monthly basis, at month-end, funds are also rebalanced monthly to account for changes in the index.

Cash and Dividend/Coupon Management
Dividends are reinvested into additional securities on the underlying stock's ex-dividend date, in line with the fund's index. Also, managers typically use futures contracts to reinvest dividend income until the dividend payment date, as well as to reinvest reclaimed tax. This helps reduce tracking error by allowing the ETFs to follow the index's dividend methodology more closely. Futures positions are limited to 1% of the funds' value.

Bond coupon payments to fixed-income funds are reinvested directly in bonds in accordance with benchmark rules.

Securities Lending
Vanguard added 16 equity ETFs to its securities-lending programme in November 2016.

The amount of assets that can be lent out by a fund at any given time is capped at 15% of NAV. The securities-lending programme accepts non-cash collateral in the form of five sovereign debt securities including US Treasuries, UK Gilts, German Bunds, French OATs, and Dutch Sovereign Debt securities. Vanguard requires 102% collateral for all loans, and 105% if the underlying currency of the security on loan is different from the underlying currency of the accepted collateral. To reduce operational risk, each security on loan is marked-to-market daily.

The current securities-lending revenue split is 90/10, with 90% of gross revenue returned to the fund and 10% paid to J.P. Morgan, the lending agent, which also provides full indemnification on all securities-lending transactions.
Vanguard produces a monthly report published on its website disclosing lending information such as percentage on loan, rolling 12-month average, and maximum percentage on loan.
Appendix I: A Guide to Replication Methods and Portfolio Management Techniques

Like any index fund, ETFs are designed to track the performance of an index. While this concept is easy to understand, putting it into practice is far more difficult than it seems. Indexes are theoretical portfolios that don’t reflect what is happening in the ‘real’ world as they ignore the practicalities of portfolio construction and ongoing management.

The key objective of ETF managers is to minimise tracking deviations—as commonly measured by tracking difference and tracking error—by choosing the most appropriate replication method for a fund and putting in place efficient portfolio-management techniques.

Exhibit 8 Two Measures of Tracking Performance

<table>
<thead>
<tr>
<th>Tracking Difference</th>
<th>Tracking Error</th>
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<tbody>
<tr>
<td>Tracking difference is the difference in returns between a fund and its benchmark over a period of time. A small negative tracking difference indicates the fund has done a good job matching its benchmark. A positive tracking difference indicates the fund has outperformed its benchmark.</td>
<td>Tracking error is the volatility (as measured by the annualised standard deviation) of a fund’s return differences over a period of time (return differences referring to the differences in periodic returns between the fund and its benchmark). A low tracking error indicates the fund has consistently tracked its benchmark.</td>
</tr>
</tbody>
</table>

Source: Morningstar Research.

In this section, we examine each aspect of the ETF portfolio-management process, starting with the choice of replication method.

The method employed to replicate an index is key to the success of an ETF and the choice of one over another is often made on a case-by-case basis. When deciding which methodology to use, portfolio managers consider several factors such as the size and liquidity of the index, operational efficiency, ownership restrictions, cost, tax, tracking-error tolerance, and client demand.

The various replication methods used by European ETF providers can be split into two main groupings: physical replication and synthetic replication.

Physical Replication

Physical replication, also known as direct replication, is the most straightforward way to mimic the performance of an index. Physical ETFs own the constituents of the index they track. This can be done in one of three ways: full replication, sampling, or optimisation.

Each approach has benefits and drawbacks depending on the circumstances of a particular ETF.
Full Replication
With full replication, portfolio managers build a portfolio of all the index constituents in the same weights as stipulated by the index. This approach works well for highly liquid indexes such as the Euro Stoxx 50 or the FTSE 100.

Full replication may not be possible or economically efficient when the index being tracked references a high number of securities or contains small and relatively illiquid components (for example, MSCI World with over 1,600 constituents; MSCI Emerging Markets; or Barclays Global Aggregate with over 10,000). To replicate these indexes, managers may use sampling or optimisation techniques.

Sampling
Sampling involves investing in a select basket of the largest and most liquid components of the index in an effort to minimise costs. The portfolio manager will segment the index components into sub-groups (for example, by sector, country, interest rate, credit rating, currency, or issuer) and then purchase underlying securities representative of each sub-group.

While sampling has undeniable cost advantages by virtue of excluding smaller, less liquid components of an index, it creates a potential source of tracking error as the fund strays from perfectly mirroring its benchmark.

Sampling tends to work well during normal market conditions. However, in an adverse market environment, historical statistical attributes (correlations, volatility measures, and so on) are less likely to align with the index and sampling can result in higher-than-expected tracking error.

Optimisation
Unlike sampling, optimisation uses a risk model based on the security's size, valuation characteristics, historical momentum, or historical volatility, among other predefined variables.

Optimisation has the benefit of minimising tracking error and works relatively well in a low-volatility environment. However, because it considers market access in structuring the selection and weighting of individual securities, it introduces a trade-off between greater investability and the extent to which the index adequately represents its chosen market. Optimisation techniques are not practical in fixed-income markets for this reason, as well as because of the OTC nature of bonds.

Active Management Techniques
Managing a physically replicated ETF is not limited to choosing the most efficient replication method. Portfolio managers use ‘active’ management techniques to try to minimise costs and enhance returns. This includes techniques such as managing cash, trading around index reconstitutions, using derivatives, optimising tax, and engaging in securities lending.

When trying to minimise costs and/or enhance returns, the challenge for ETF managers is not to deviate too much from the index and to keep tracking error as low as possible. These objectives are potentially conflicting.

Index portfolio managers operate within a framework where risk is tightly monitored and controlled. Their day-to-day actions are highly automated and tightly constrained by parameters set and reviewed.
regularly in partnership with the business, under the control of the risk management department. This leaves very little room for operational error.

**Index Changes**

Index changes that occur as a result of index rebalancing and corporate actions are the most frequent source of activity for managers of physical-replication ETFs. They can be handled in a variety of ways.

**Index Rebalancing**

Most index providers carry out regular index reviews to ensure their universe remains representative of the underlying market. At these reviews, they make additions and deletions deemed necessary in accordance with the index methodology. These changes are usually announced several days in advance, which portfolio managers may take advantage of to formulate a trading strategy.

When appropriate, managers may begin buying securities prior to the day that they are added to the index, and conversely, securities may also be sold ahead of the deletion date. This is often done to minimise market impact, and may at times capture some value that can offset some other-unavoidable costs of portfolio management. With this, a small amount of market risk is introduced which may affect the tracking accuracy of the fund. However, if executed effectively, this may improve the fund’s tracking performance.

**Corporate Actions**

In the equity space, there are a number of events such as mergers and acquisitions, bankruptcy, right issues, and IPOs that can lead to noteworthy changes in the index. Examples of corporate actions that may strongly affect the value of fixed-income securities—and therefore the index they belong to—include the temporary suspension of interest payments, instances of voluntary or forced debt restructuring and, ultimately, default. All these changes, which are also usually announced in advance, are managed in a similar way as regular index rebalancings.

**Trading**

Minimising transaction costs is a key consideration for passive fund managers. Given the scale of their firm's investment operation, some managers are able to effect portfolio transactions through internal crossing. These transactions are traded off-market, without any brokerage commissions.

Where internal crossing transactions are not available or permitted, managers attempt to execute transactions in the most cost-effective manner, relying on low-cost, often automated, external trading and trade-crossing systems.

**Cash Management**

There are many instances where managers of physical-replication ETFs will be faced with cash flows which need to be managed efficiently in order to limit cash drag and ultimately minimise tracking error.

For instance, when an index changes composition, there may be a time lag between the liquidation of the index’s old constituents and the addition of its new constituents. During this span, the fund will hold cash.
Also, for those ETFs that regularly distribute income to shareholders, there can often be a lag between the time when the ETF receives dividends (or coupon payments) from its underlying holdings and the time that it ultimately distributes this income to its own investors.

In both cases, depending on the underlying index, portfolio managers can reinvest the cash through the use of futures contracts or other derivatives. For markets not covered by futures, managers may use proxy and correlation techniques.

**Dividend and Coupon Reinvestment**

When the ETF is benchmarked to a total return index that reinvests dividends, the portfolio manager must reinvest the dividends according to the index methodology.

Total return equity indexes typically add dividends on the ex-dividend date and assume they are reinvested from that point. However, funds often don’t receive the cash until sometime after this date. For example, for Japanese stocks, there can be a difference of 70 days between the ex-dividend and payment dates. To minimise tracking risk, managers may equitise accrued dividends from the ex-date using index futures. Once the account reaches a certain size (generally less than 2% of the portfolio value), futures positions are reduced and the cash is reinvested. At all times, the portfolio remains unleveraged and its beta to the benchmark remains equal to 1.

For bond ETFs, the cash from coupon payments is left uninvested until the next rebalancing date—typically the end of the month as is customary for most bond indexes—at which time the portfolio managers invest across the portfolios. When the ETFs pay out dividends, securities are sold to meet those payments.

**Scrip Dividends**

Instead of traditional cash dividends, some stocks issue optional dividends in which shareholders can choose to receive either cash or discounted stocks. Indexes usually assume that investors elect for the cash option. Managers can try to add value by opting for the discounted stock and subsequently sell it at a profit or sell the optionality to a counterpart. These solutions can be implemented at virtually no risk.

**Tax Optimisation**

Indexes make assumptions for the amount of withholding tax applied on the dividends paid by index constituents. In practice, managers can recoup either a portion of or all of this tax, depending on the fund’s country of domicile and double tax treaties. This activity, known as tax optimisation or dividend tax enhancement, can boost a fund’s return relative to its benchmark.

**Foreign Exchange Exposure Management**

Foreign exchange exposure is managed in line with the index methodology. Portfolio managers may outsource their foreign exchange transactions or execute them in-house via the trading desk. Some managers may use forwards, call options, put options, and non-deliverable forwards in order to hedge portfolios against exchange-rate fluctuations.

**American and Global Depositary Receipts**

Managers may also use American and Global Depositary Receipts to gain exposure to stocks that it would not be efficient or possible to hold directly because of local restrictions, liquidity, taxes, or quota...
limitations. American and Global Depositary Receipts are certificates issued by a custodian bank which purchases stocks of foreign companies and hold them on deposit in the companies' home country. These instruments are typically used for accessing emerging markets (for example, Russia and India).

**Securities Lending**

Securities lending is perhaps the most popular technique to enhance performance. Portfolio managers lend out a fund's assets to generate income, which in turn can help partially, or in some cases completely, offset management fees and other sources of tracking difference. However, this practice is not free of risk. Specifically, there is always a risk that the borrower of the fund's securities becomes insolvent and is unable to return them.

To mitigate counterparty risk, borrowers are carefully selected and their creditworthiness is closely monitored. Moreover, borrowers are requested to post collateral in an amount usually in excess of the value of the securities on loan. Should a borrower default, the collateral would be liquidated in compensation to the fund.

As an additional risk-mitigating measure, a majority of ETF issuers, usually through their lending agent, provide borrower default indemnification. They offer to indemnify investors for any shortfall between the proceeds from the liquidation of the collateral and the market value of the unreturned securities.

**Synthetic Replication**

Synthetic replication, also known as indirect replication, offers advantages in terms of tracking error and operational efficiency. While it tends to deliver closer tracking than physical replication, it is also often the most efficient way to track indexes made up of illiquid or difficult to access securities such as those on emerging markets.

There are two main models currently used by European ETF providers to track an index synthetically: the unfunded swap model and the funded-swap model.
**Unfunded swap Model**

The unfunded swap model is the most commonly used synthetic-replication method.

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**Exhibit 8** Simplified Unfunded-Swap ETF Structure

The ETF enters into a total return swap agreement with a counterparty (often the provider's parent bank) to receive the performance of the index. Effectively, the portfolio manager uses cash from investors to buy a basket of securities from the swap counterparty which commits to deliver the performance of the index (adjusted for a swap spread) in exchange for the performance of the securities bought by the fund.

**Substitute Baskets**

The assets bought by the ETF, which are also referred to as 'substitute basket', 'fund holdings' or 'asset portfolio', typically do not include the constituents of the reference index but can have a high degree of correlation with them. For UCITS ETFs, the substitute basket must comply with UCITS regulations on asset type, liquidity, and diversification. The securities are held in a segregated account at a custodian where they are monitored and verified daily.

It is important to note that at all times the fund remains the owner of these assets and the portfolio manager enjoys direct access to them. This means that if the swap counterparty defaults, the manager should be able to liquidate the assets swiftly should this option be chosen and in accordance with the relevant home domicile law.

**Counterparty Risk Defined**

Swap transactions expose ETFs to counterparty risk—that is, the possibility that the party providing the swap will fail to fulfil its obligation to deliver the performance of the index being tracked.

Net counterparty exposure is measured as the difference between the NAV of the ETF and the value of the substitute basket. And in accordance with UCITS regulations, this exposure should not exceed 10% of the fund's NAV. In other words, the daily NAV of the substitute basket should amount to at least 90% of the fund's NAV.
How is Counterparty Risk Managed?
Counterparty risk in ETFs that employ the unfunded swap model is actively managed by the fund managers on a daily basis. Swaps are marked-to-market daily and reset whenever the counterpart exposure approaches the 10% UCITS limit (or a lower limit set at the discretion of the firm). In the case of a swap reset, the manager asks the counterparty to pay the swap marked-to-market value by delivering additional securities to top up the substitute basket.

Some managers may engage multiple swap counterparties in an effort to minimise exposure to any one of them.

In practice, swap reset policies vary across providers, but today, the majority employing the unfunded swap structure apply much stricter reset triggers than the UCITS rule of 10%, which results in more frequent resets and generally lower counterparty risk. Some ETFs may even see their swaps reset to zero on a daily basis as a result of daily creation/redemption activity or a daily target of zero counterparty exposure.

**Funded Swap Model**
Under the funded—also known as fully funded—swap model, the portfolio manager transfers investors' cash to a swap counterparty in exchange for the index performance (adjusted for a swap spread) plus the principal at a future date. The counterparty posts collateral assets in a segregated account with a third-party custodian.

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**Exhibit 9** Simplified Unfunded-Swap ETF Structure

![Diagram of Simplified Unfunded-Swap ETF Structure](source: Morningstar Research)
Collateral Composition Access

The collateral basket posted by the counterparty complies with UCITS regulations on asset type, liquidity, and diversification.

Regulations also require that appropriate haircuts (or margins) be applied to the assets posted as collateral to account for the risk of value fluctuations and the fact that the fund doesn't hold the assets. The level of haircuts (or margins) applied typically depends on the type of securities delivered and the relevant home domicile law.

As a direct result of these rules, funds relying on the funded-swap approach are normally overcollateralised—that is, the market value of the collateral posted by the swap counterparty exceeds the NAV of the ETF.

The collateral account can be held either in the name of the fund (in the case of a transfer of title) or in the name of the counterparty and pledged in favour of the fund (in the case of a pledge arrangement).

With a transfer of title, the collateral is treated as the property of the fund. This means that if the swap counterparty defaults, the portfolio manager should be able to gain direct access to the assets and sell them. Under a pledge structure, the manager would have to claim ownership of the collateral assets before liquidating them.

As with the unfunded-swap model, providers using funded swaps may engage multiple swap counterparties in an effort to minimise exposure to any one of them.

Counterparty Risk Defined

Swap transactions expose ETFs to counterparty risk, that is, the possibility that the party providing the swap will fail to fulfil its obligation to deliver the performance of the index being tracked.

Net counterparty exposure is measured as the difference between the fund's NAV and collateral value (less haircuts or margins). Under UCITS, the net counterparty risk exposure may not exceed 10% of the fund's NAV, which means that at least 90% of the ETF must be collateralised.

How is Counterparty Risk Managed?

Counterparty risk in ETFs that employ a funded swap model is actively managed by portfolio managers on a daily basis.

Whenever the collateral value falls below the level of collateralisation agreed with the swap counterparty, the manager will ask the counterparty to post additional collateral. This is to ensure that the agreed-upon level of collateralisation is maintained at the end of each business day.
Appendix II: List of Rated European-domiciled ETFs

Exhibit 11  Europe-Listed Rated ETFs by Morningstar Category

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<th>Morningstar Analyst Rating</th>
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### Exhibit 11  Europe-Listed Rated ETFs by Morningstar Category (Continued)

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### Exhibit 11  Europe-Listed Rated ETFs by Morningstar Category (Continued)

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Source: Morningstar Direct. Data as of 14 February 2017
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