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Understanding synthetic ETFs

Vanguard research

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Executive summary. With their generally low expense ratios and ability to provide exposure to a variety of different investment exposures, exchange-traded funds (ETFs) have become popular investment vehicles for a wide range of investors. The global ETF industry reached \$1.92 trillion in assets under management (AUM) by the end of 2012, experiencing an average growth rate of 31% per year for the past ten years.¹ This surge in demand has led to significant innovation in ETF offerings, including the introduction and widespread adoption of synthetic ETFs, especially in Europe. Although there may be some benefits to investing in these vehicles, there are fundamental differences between traditional, physically based ETFs and synthetic ETFs that investors should be aware of before making any investment decisions. This paper outlines key characteristics, potential benefits and risks and costs of synthetic ETFs and discusses best practices for synthetic ETF collateral management and disclosure, so that investors might make more informed decisions.

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¹ Data – from Morningstar, Inc. – reflect all exchange-traded products (including exchange-traded notes).

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The key question in comparing physical versus synthetic ETFs is: Are investors in synthetic ETFs compensated for taking on the counterparty risk associated with a swap-based approach, through either lower total costs (and thus the potential for enhanced excess returns) or lower tracking error versus other similar ETFs?² Overall, physically based ETFs have demonstrated a strong capability to provide low-cost access with low tracking error to many broad-based indices, suggesting that investors often may not need to take on the increased counterparty risk of synthetic ETFs. For harder-to-access markets, difficult-to-implement strategies or less-liquid benchmarks where costs and tracking error may be substantially higher, synthetic ETFs may provide a competitive offering to access these markets. This paper reviews the factors that affect the costs and tracking error for synthetic and physical ETFs, assesses counterparty risk associated with synthetic ETFs and suggests some best practices for collateral management.

Growth of synthetic ETFs

First introduced in Europe in 2001, synthetic ETFs now account for more than one-third of ETF assets in Europe (see **Figures 1** and **2**), compared to only about 3% of ETF assets in North America.

Synthetic and physical ETFs in Europe generally track similar asset classes, as shown by the asset distribution in **Figure 3**. Note that although sometimes referred to as 'alternative' investments, commodity ETFs are more often classified as physical ETFs because they use physical structures to a large extent – that is, their investment holdings are metals such as gold and silver or futures contracts in cases where the underlying constituents of the index tracked by the ETF are futures contracts.

Figure 1. ETF structure market share, by region

	North America	Europe
Percentage of net assets		
Physical	97.1%	65.0%
Synthetic	2.9	35.0
Percentage of ETFs		
Physical	83.1%	31.1%
Synthetic	16.9	68.9

Note: Data include exchange-traded funds (but exclude ETNs – exchange-traded notes) existing in North America (United States, Mexico and Canada) and Europe, as at 28 February 2013.

Sources: Vanguard calculations, based on data from Morningstar, Inc.

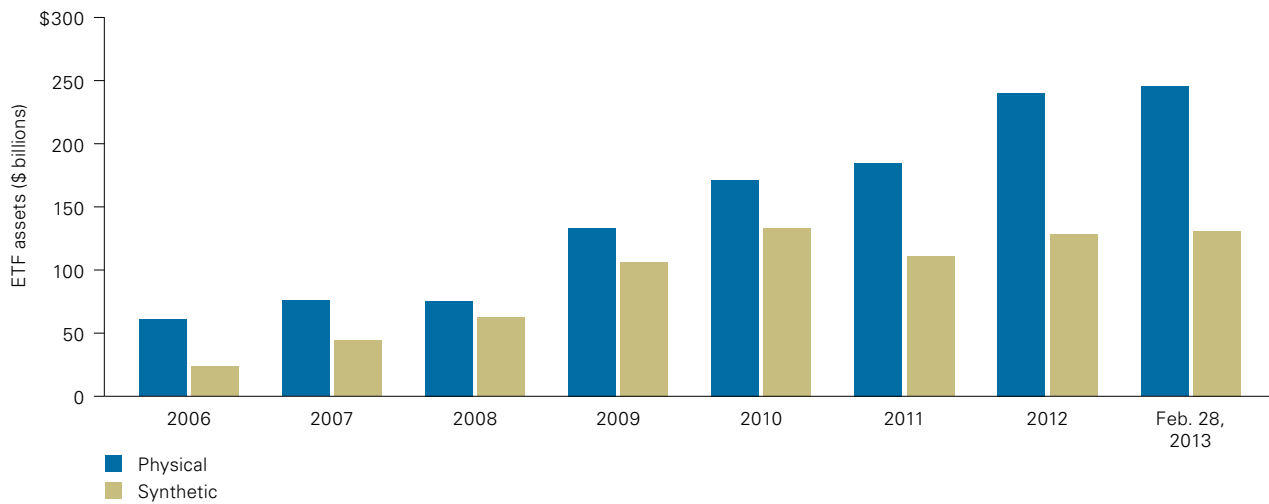
The main drivers of Europe's rapid growth in synthetic ETFs relative to other regions have been government regulation and taxation. The investment exposure obtained by a synthetic ETF is often provided in the form of a swap, with an affiliated entity such as the derivatives trading desk of the ETF sponsor's parent bank often, but not always, serving as the counterparty. Regardless of whether the swap is provided by an affiliated entity or a third party, the structure is still considered a synthetic ETF. Swaps backed by an affiliate, along with use of collateral securities (discussed more later), create synergies for the sponsor's banking and capital markets activities.³ However, such affiliated transactions are generally not permitted under US securities laws, notably the Investment Company Act of 1940 (known as the '40 Act'), the same regulatory framework under which traditional mutual funds operate, though affiliated transactions are permitted under the Securities Act of 1933. Sponsors of ETFs not registered under the 40 Act therefore can take advantage of synergies.

Notes on risk: All investing is subject to risk, including the possible loss of the money you invest.

² See also 'Understanding Excess Return and Tracking Error' (2012), at vanguard.com (see this paper's References), for a discussion of the two terms.

³ See 'Motives for Synthetic Replication', in Bank for International Settlements (2011: 8).

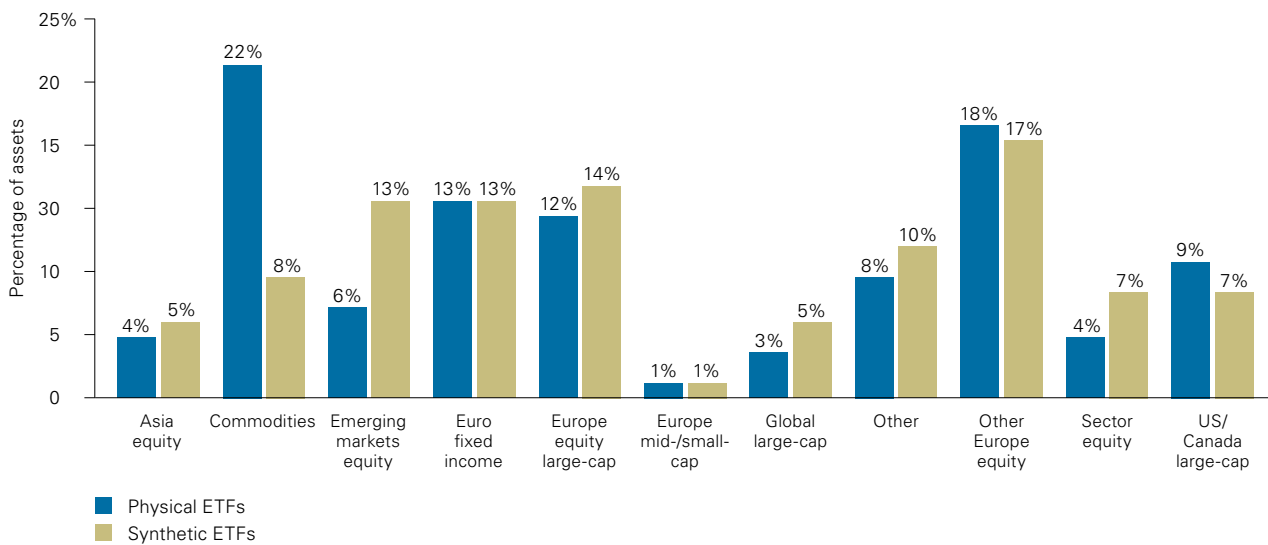
Figure 2. Growth of ETFs in Europe, by ETF structure (\$ billions)



Note: Data include all exchange-traded funds (but exclude ETNs) existing in Europe from 2006 through 28 February 2013.

Sources: Vanguard calculations, based on data from Morningstar, Inc.

Figure 3. Share of ETF assets in Europe, by structure and investment focus



Notes: Data include all exchange-traded funds (but exclude ETNs) existing in Europe as at 28 February 2013. 'Other' category consists of allocation and alternative funds.

Source: Vanguard calculations, based on data from Morningstar, Inc.

Another reason for the disparity in growth in synthetic versus physical ETFs in Europe stems from tax treatment. In the United States, a swap-based ETF is more likely to have less favourable tax treatment than a traditional ETF because swap income may have higher and more accelerated tax liability than the capital gains incurred by transacting in a physical ETF's underlying securities. Other countries, however, may offer advantages to using swap-based ETFs. For example, physically based ETFs holding UK shares are subject to a 0.50% stamp duty on the value of physical underlying securities when creating new units, while swap-based ETFs are not, though this difference may actually be embedded in the transactions costs associated with the swap. However, the recently proposed financial transactions tax (FTT) in Europe could increase the relative amount of taxes for synthetic ETFs versus physical ETFs. While physical ETFs would, similar to their treatment in the UK, face a tax on the transactions in underlying portfolio securities, synthetic ETFs would face a tax on swap transactions and perhaps also on transfer of collateral.⁴

Overview of ETF structures

Regardless of whether they are physically based or synthetic, ETFs are generally organised under shared legal frameworks such as the 40 Act in the United States and the Undertakings for Collective Investment in Transferable Securities ('UCITS') in Europe. They typically seek to replicate the returns of a benchmark index as closely as possible.

Physical ETFs

Traditional, or physical, index ETFs attempt to replicate the results of a benchmark index by physically holding all, or a representative sample, of the underlying index's constituents (see **Figure 4**).⁵ The accompanying box, 'Creation and redemption of ETF shares', describes the ETF investment process in more detail. The ETF's portfolio manager is responsible for managing cash flows from interest and dividend payments as well as from investor transactions.

Key terms in this paper

Collateral refers to assets pledged to an ETF by a counterparty (see definition here); the assets are retained by the ETF for the benefit of its shareholders, if the counterparty does not meet its payment obligations.

Counterparty is an entity – typically a bank, securities dealer or other financial institution – that is responsible for paying the promised return based on a predetermined market measure as part of a swap arrangement.

Physical ETFs predominantly rely on individual securities such as stocks or bonds to execute an investment strategy.

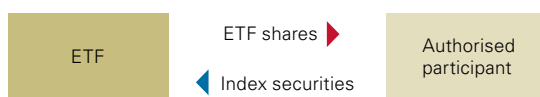
Synthetic ETFs predominantly rely on derivatives such as swaps (see definition here) to execute an investment strategy.

Swap is an agreement between parties to exchange periodic cash flows over an agreed-upon time horizon. The cash flows are typically determined by financial market measures such as interest rates and stock market indices.

4 Source: Bank of America Merrill Lynch (2013). Minimum additional estimated amounts are 0.84% for synthetic ETFs and 0.60% for physical ETFs, respectively.

5 ETFs whose managers implement what is essentially an actively managed strategy by investing in more or less of an index's underlying constituents would also be considered 'physical' ETFs.

Figure 4. Physical ETF structure



Note: In some jurisdictions, the authorised participant is referred to as the *designated broker*. In this paper, the term *authorised participant* refers to either entity.

Source: Vanguard.

Synthetic ETFs

Conversely, synthetic ETFs invest – or may be directed to invest by the swap counterparty – in securities (the ‘substitute basket’ or ‘collateral basket’) that may be unrelated to the benchmark index⁶ and also enter into a swap agreement with one or more counterparties who agree to pay the return on the benchmark to the fund. Thus, a synthetic ETF’s return is guaranteed by the counterparty. More specifically, even though there are two synthetic ETF structures (an unfunded and a funded swap structure, as detailed next), in both cases the swap counterparties are responsible for providing the index’s return to the ETF investors. Note, too, that in the United States many leveraged ETFs, which seek to double or triple the positive or negative return of their benchmark index, also use swaps in their strategy because achieving leverage in physical-based strategies is limited by regulation. As a result, leveraged ETFs would be considered synthetic ETFs.

Unfunded swap structure. One common synthetic ETF structure – the unfunded swap structure – makes use of total-return swaps (see **Figure 5**, on page 6). In an unfunded swap-based ETF, the ETF issues newly created shares to an authorised participant in exchange for cash, as opposed to the earlier-described, in-kind process that is typical of physical ETFs. With the cash, the ETF acquires the substitute basket of securities

Creation and redemption of ETF shares

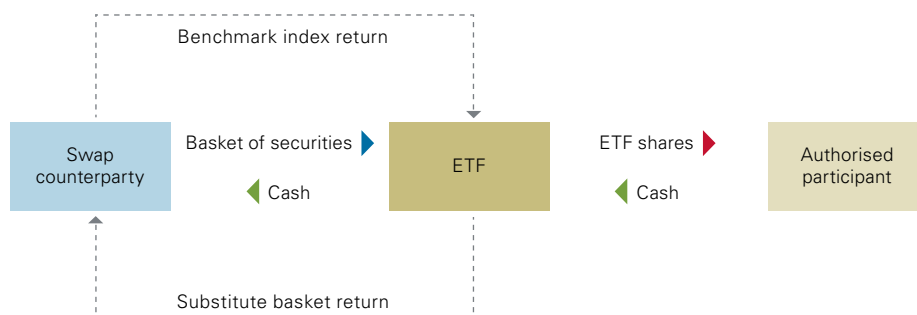
ETF shares are created and redeemed by an entity known as an ‘authorised participant’ or ‘AP’, typically a large broker-dealer. Each business day, the ETF publishes a ‘creation basket’ – a list of names and quantities of securities or other assets. To create ETF shares, an AP delivers the creation basket to the ETF and receives in return a ‘creation unit’, a large block (typically 50,000) of ETF shares. Under certain circumstances, the AP may provide cash in lieu of some or all of the securities, along with a transaction fee to offset the cost to the ETF of acquiring them. Upon receiving the ETF shares, the AP may sell some or all of them in the secondary market.

A creation unit is liquidated when an AP returns the specified number of shares to the ETF in exchange for the daily ‘redemption basket’ (which is generally the same as the creation basket). If the AP receives cash in lieu of securities, it will typically pay a transaction fee to offset the cost to the ETF of liquidating the securities.

The creation and redemption mechanisms help ETF shares trade at a price close to the market value of their underlying assets. When the shares begin to trade at a higher price (i.e. at a premium), the AP may find it profitable to create shares by buying the underlying securities, exchanging them for ETF shares and then selling those shares into the market. Similarly, when ETF shares begin to trade at a lower price (i.e. at a discount), an AP may buy shares in the secondary market and redeem them to the ETF in exchange for the underlying securities. These actions by APs, commonly described as ‘arbitrage activities’, help keep the market-determined price of an ETF’s shares close to the market value of the underlying assets.

⁶ A benchmark index that is used to determine payments due under a swap can also be referred to as a *reference* index.

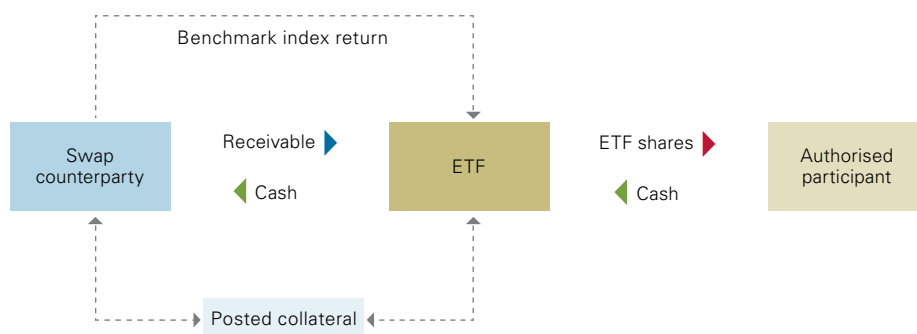
Figure 5. Unfunded-swap ETF structure



Note: Some swap ETFs use multiple counterparties and possibly more than one basket of securities.

Source: Vanguard.

Figure 6. Funded-swap ETF structure



Note: Some swap ETFs use multiple counterparties and possibly more than one basket of securities.

Source: Vanguard.

from the swap counterparty while also entering into a total-return swap with the swap counterparty. In the swap, the return generated by the substitute basket is paid to the counterparty, while the counterparty pays the ETF the return of the benchmark index (minus a swap fee, when applicable). In this structure, the fund owns the assets in the substitute basket.

Funded swap model. A second common synthetic ETF structure is the funded swap model (see **Figure 6**). Although the creation mechanism is similar to that of the unfunded model, use of the term *swap* in relation to this structure could be a

slight misnomer, since a swap-type payment is technically made in only one direction. Here, the ETF delivers the cash to the counterparty, who posts a collateral basket into a segregated account with an independent custodian. In exchange for receipt of the cash, the counterparty is then responsible for paying the return on the benchmark index to the ETF. The Bank for International Settlements, which as part of its mission conducts research on policy issues confronting financial supervisory authorities, likens this to ‘the purchase of a structured note by the ETF that is secured by collateral’ (Source: BIS, 2011; available at www.bis.org).⁷

⁷ For additional information, see Bank for International Settlements (2011).

Figure 7. Comparing physical and synthetic ETF structures

	Physical ETFs	Synthetic ETFs
Underlying holdings	Index-constituent securities.	Collateral and swaps.
Transparency of holdings	Yes.	Historically limited; recently improving.
Counterparty risk	Limited.	Yes.
Sources of costs	Management fee. Transactions costs.	Management fee. Swap costs.
Sources of tracking error	Level of portfolio optimisation. Dividend treatment.	Resetting of swap contract terms.

Note: In 'Sources of costs', securities lending by the ETF investment adviser may be used to enhance returns of physical ETFs and synthetic ETFs.

Source: Vanguard.

The funded model is also characterised by the two different ways by which the collateral is treated. In most cases, the ETF has a transfer of title in place, meaning that the collateral assets are in the name of the ETF and treated as its property. If the counterparty were to default, the fund would instruct the collateral agent to transfer the assets from the segregated account to the fund's custody account. Some issuers, however, use a pledge structure, in which the collateral is posted to a pledged account in the name of the counterparty for the benefit of the fund. In a default scenario, the fund would not have direct access to the assets, but would first need to have the pledge enforced. Complications could arise if the bankruptcy administrator decided to freeze the assets. It is thus essential for investors in swap-based ETFs to understand how a fund would proceed following a counterparty default.

Figure 7 provides a summary comparison of physical versus synthetic ETF structures.

A note on ETNs

In addition to physical and synthetic ETFs, there are exchange-traded notes (ETNs), which are senior, unsecured, debt instruments that seek to track the performance of a market index or strategy. ETN investors generally do not have recourse to any specific counterparty assets if the note issuer fails, and thus are at risk of losing their entire investment. As such, the value of the note may be affected by any deterioration in the issuer's financial condition. Counterparty exposure in swap-based ETFs is less significant, because it is usually limited to a small percentage of net asset value, specifically, the difference between the value of the collateral or substitute basket and the value promised under the swap.

Figure 8. ETF data for Europe

Structure	Median prospectus expense ratio	Median 1-year excess return	Median 3-year annualised excess return
Physical	0.40%	−0.38%	−0.36%
Synthetic	0.30	−0.25	−0.22

Notes: Data include all exchange-traded funds existing in Europe as at 28 February 2013, except allocation, alternative and commodity funds. Exchange-traded notes (ETNs) are also excluded.

Sources: Vanguard calculations, based on data from Morningstar, Inc.

Potential compensating factors in synthetic ETFs

Although the counterparty risk is limited in synthetic ETFs, investors should still be compensated for it to the extent the exposure is greater than that of physically based ETFs. Investors in synthetic ETFs can be compensated in two main ways: through lower costs (and thus higher relative excess returns) and through lower tracking error.⁸ The following subsections outline key cost and tracking-error considerations for investors and discuss how funds can limit counterparty risk.

Costs

Costs have an immediate, inverse impact on a fund's performance, typically causing an index fund's excess returns to be negative.⁹ Some costs, such as total expense ratio (TER), are stated in public documents. Others, such as transactions costs, are not stated 'up front', but their effects are nonetheless reflected in fund performance. Both types of costs are fairly consistent month to month, so even though they might not affect tracking error, they can negatively affect excess returns.

As highlighted in **Figure 8**, the TERs of synthetic ETFs are often lower than those of physical ETFs. In many instances, however, transaction costs are

associated with swaps that are not apparent in the TER. One such cost is the swap spread, which is the negotiated amount that the ETF must pay to the swap provider when engaging in a total-return swap. This fee could be paid directly from the ETF to the swap counterparty, or it could be incurred indirectly in the form of an amount that is withheld from the index's total return. For example, a swap contract might provide a return of the FTSE 100 Index minus 25 basis points,¹⁰ with the 25 basis points reflecting the swap spread cost. Since swap contracts are negotiated over the counter and are not standardised, some of these features can vary considerably by fund.

A source of transaction costs for physical ETFs is portfolio rebalancing due to changes in the benchmark index. Although this practice helps a fund better match an index's return, it can involve trading costs that erode the ETF's return. To the extent the ETF uses an in-kind process for creations, redemptions and/or index rebalancing, these costs can be reduced and sometimes even eliminated. The need to rebalance is eliminated in synthetic ETFs, since they do not physically track the index, in the sense that they do not trade the actual securities underlying an index. However, some trading costs may be incurred if the collateral basket needs to be altered for any reason.

The practice of securities lending can provide additional income for a fund that may help reduce the negative total return impact of the fund's expense ratio.¹¹ Providers of physically based ETFs often generate income by lending out the underlying securities held by a fund to other market participants in exchange for collateral, a process that does introduce counterparty risk.¹² These providers will generally pass on some, if not all, of the proceeds from securities lending to the fund. Although synthetic ETFs typically are able to engage in securities lending, in practice, few do. Because of transaction costs, it is not uncommon for a

⁸ A third way to compensate investors is through improved liquidity and thus lower transactions costs. However, we found no evidence of systematic liquidity differences between physical and synthetic ETFs.

⁹ See Philips (2012), for a discussion of the importance of costs.

¹⁰ One basis point equals 1/100 of a percentage point.

¹¹ This is also the case with respect to the overall cost of conventional mutual funds.

¹² See LaBarge (2011) for a discussion on the risks and rewards associated with securities lending.

physical ETF's return to trail that of its index by more than the ETF expense ratio. However, as shown in Figure 8, physical ETFs' historical excess returns for Europe have been higher (in this case, somewhat less negative) than what might have been expected as a result of expense ratio. This is perhaps attributable to the income generated through securities lending.

Tracking error

Another potential advantage of synthetic ETFs over physical ETFs is that of relatively lower tracking error, as defined as the annualised standard deviation of monthly excess returns versus the benchmark index. The median one-year tracking error for European synthetic ETFs was lower than that of European physical ETFs – 0.06% versus 0.53%, respectively.¹³ A major source of tracking error for physical ETFs is the extent of a portfolio's index replication; the more a portfolio is 'optimised', the less likely it is to consistently track an index.¹⁴ On the other hand, the more a portfolio leans toward full replication, the more likely that it will minimise the variability of its periodic excess returns.

Because a synthetic ETF's return is guaranteed by the counterparty, errors caused by inexact replication are not an issue. However, the terms of a swap contract are subject to change. The renewed terms could include different counterparties and different costs. Changing of either swap terms or costs over time is likely to increase the relative amount of tracking error. Turnover ratios in synthetic ETFs tend to be much higher than those of physical ETFs, reflecting resets of the swap agreements as well as more turnover in the substitute/collateral baskets.¹⁵

Synthetic ETFs can also produce lower tracking error than that of a physical ETF because of two nuances related to dividends. First, many total-return indices assume that dividends are paid and reinvested as soon as the stock goes ex-dividend. However, in

Figure 9. Physical versus synthetic ETFs: Median one-year tracking error

Structure	Euro Stoxx 50 Index	DAX Index	FTSE 100 Index	Standard & Poor's 500 Index
Physical	0.36%	0.62%	0.04%	0.04%
Synthetic	0.26	0.03	0.01	0.05

Notes: Past performance is no guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index. Data include all exchange-traded funds (but exclude ETNs and leveraged and inverse ETFs) domiciled in Europe that track the indices specified in the table. Data as at 28 February 2013.

Sources: Vanguard calculations, based on data from Morningstar, Inc., and Bloomberg.

reality there is a time lag between the ex-dividend date and the payment date. With a swap-based ETF, accounting for the timing of dividend payments is the responsibility of the counterparty and does not affect the fund's performance, assuming the swap provides the index's total return. Although this gives swap-based ETFs some advantage, it should be noted that many physical ETFs often use futures contracts to mitigate the dividend timing factor. The second nuance that can lead to tracking error is the tax treatment of dividends. While dividends benefit investors in both fund types, some physical ETFs may have dividend tax withholdings at the fund level, while synthetic ETFs in the same country may not. All else equal, this would mean physical ETFs realise a lower after-tax return relative to synthetic ETFs. Investors should be cognisant of tax implications for both fund types before investing.

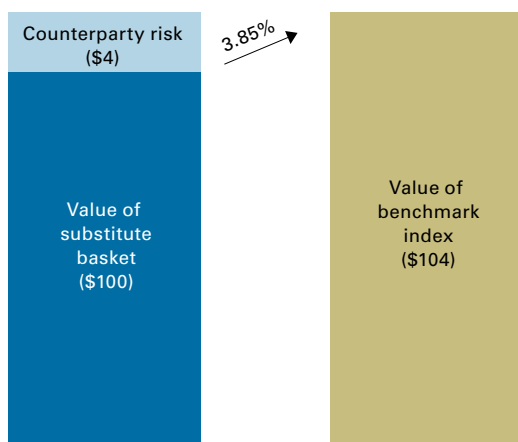
However, investors should not automatically assume that the tracking error of a swap-based ETF will always be lower. **Figure 9** indicates that often there is no significant advantage between established physical and synthetic ETF structures tracking large, liquid indices. Research from Elia (2012), however,

13 Based on data from Morningstar, Inc. (as at 28 February 2013), excluding allocation and alternative funds; commodity funds that were considered exchange-traded commodities; and exchange-traded notes.

14 Optimisation is generally done for ETFs that are difficult to replicate because of fund size or illiquidity of the underlying securities.

15 The median turnover ratios for physical and synthetic European ETFs are 23% and 357%, respectively, based on data from Morningstar, Inc. (as at 28 February 2013).

Figure 10. Counterparty risk example



Source: Vanguard.

has indicated that, in general, synthetic ETFs have lower tracking error than that of physical ETFs and, in particular, that synthetic *emerging market* ETFs have exhibited markedly lower tracking error than have physical emerging market ETFs.

Counterparty risk: Role of swap resets

In addition to comparing costs and tracking error, investors should also consider the counterparty risks involved with swap-based ETFs. Because the portfolio securities of physical ETFs are held in a segregated custody account, the investor has direct recourse to those assets in the event the fund sponsor fails. Similarly, synthetic ETF investors have access to the collateral or substitute basket of securities in the event of a failure. However, if the benchmark index's return is higher than the return of the substitute basket over a specific time period covered by the swap, investors are exposed to counterparty risk for that difference should the counterparty not honor its commitment to the fund.

For example, assume an initial investment in an ETF with a \$100 net asset value (NAV) and the benchmark index starting level also at \$100. The ETF manager uses the \$100 investment to purchase a substitute basket and enter into a swap agreement with a counterparty, who guarantees the return of the benchmark index (or particular strategy). At this point, the counterparty exposure is zero. If the benchmark index rises by 4% to \$104 while the value of the collateral remains the same, the investor's counterparty exposure will be $(\$104 - \$100) / \$104$, or 3.85% (see **Figure 10**). Conversely, if the value of the collateral rises above the benchmark portfolio's NAV, there is no significant counterparty risk.

Exposure to a third-party failure can be limited and will vary by fund. There are also regulations restricting the amount of counterparty risk to which a fund can be exposed. Under Europe's UCITS rules, for instance, a fund's exposure to counterparties may not exceed a *total* of 10% of the fund's net asset value.

To comply with regulations, ETF portfolio managers generally enter into swap agreements that 'reset' when counterparty exposure reaches some stated limit. In the event of a reset, the counterparty pays the fund the amount by which the benchmark-index value exceeds the substitute-basket value. The gains are reinvested in the substitute basket, and the current counterparty exposure instantly reverts to zero. Conversely, if the value of the benchmark-index basket exceeds that of the benchmark, the fund is required to pay the swap counterparty the difference. It is important to note that swap-contract terms are not necessarily standardised, are subject to negotiation and may differ across funds. Furthermore, some providers reset swaps at exposure levels other than zero (see **Figure 11**).

Some issuers choose to implement resets on time-based intervals. Generally, swaps reset monthly or quarterly, even if the counterparty exposure fails to reach a stated notional-based threshold (that is, one based on dollar values). To reduce counterparty risk, best practice for ETF portfolio managers would be to reset swaps daily, as a few managers have already done. Managers may also reduce counterparty risk by overcollateralising the swap agreements. All things equal, the higher the level of collateralisation and the more frequent the swap resets, the more investors would be protected from losses following a counterparty default (though usually at the cost of a modestly higher swap spread).

Even with collateral and a relatively higher frequency of swap resets, possible risks related to swap counterparties can still exist beyond that of default. In some circumstances, the counterparty can terminate the swap agreements early or seek to pass along to the ETF any additional costs relating to hedging of its risk exposure under the swap, which could negatively affect the fund's performance. Also, as previously mentioned, the ETF issuer could face a jump in the cost to enter into a similar swap agreement with additional counterparties.

Counterparty risk: Role of collateral

Collateral is a swap-based ETF's key risk mitigator in the event of a counterparty default. The amount by which the collateral lowers the overall structure risk is a function of several factors, including the level of disclosure related to the collateral, the quality of the collateral, the methodology and frequency of calculating the collateral's value and the independence of the calculation agent.

The swap's ISDA agreement¹⁶ generally covers what can be used for collateral, but because the swap is negotiated over the counter, the contents of the substitute basket, like the terms of the swap itself,

Figure 11. Counterparty exposure and swap reset example

Day	Index value	Collateral basket value	ETF gain/loss	Counterparty exposure (%)
1	\$100	\$100	\$0	0.0
2	104	100	4	3.8
3	107	104	3	2.8
4	103	104	-1	-1.0
5 (end)	111	101	10	9.0
6 (start)	111	111	0	0.0

Note: This hypothetical example does not represent the return on any particular investment. It assumes swap reset at 9% counterparty exposure.

Source: Vanguard.

are not necessarily publicly available. This raises questions about the transparency of swap-based ETFs. Some ETFs disclose current fund collateral holdings on an annual or semiannual basis, but the contents could change substantially between these snapshots.

Even when the collateral is completely transparent, investors must assess the benefit that the holdings might provide in the event the counterparty fails and the collateral must be liquidated. First, the collateral used by a swap-based ETF can vary significantly from the constituents of the benchmark index. This can lead to sharp differences between the fund's return and that of its benchmark index. Second, the liquidity of the collateral is paramount in the event the fund must be quickly liquidated. An ETF manager will have a more difficult time selling certain securities if they are not actively traded or if the market where they are traded is closed. Third, fixed income securities used as collateral should be of high credit quality. Finally, overcollateralisation provides a buffer if collateral must be sold quickly at 'below-market' prices.¹⁷

¹⁶ ISDA, an acronym for International Swaps and Derivatives Association, is a trade organisation that regulates over-the-counter derivative contracts.

¹⁷ For example, \$125 of collateral for \$100 of fund value implies that the collateral could suffer losses of up to 20% relative to the fund before its total value falls below that of the fund's value.

Regulator concerns about synthetic ETFs

Synthetic ETFs have come under global scrutiny in the last several years as regulators have expressed concern about the complexity and potential risks of these funds. The G20's Financial Stability Board and the International Monetary Fund (IMF) have both released statements criticising synthetic ETFs, particularly regarding affiliated transactions, counterparty risk and swap-provider 'interconnectedness' (Financial Stability Board, 2011; and IMF, 2011).

US regulators have been especially wary of synthetic ETFs. Since March 2010 and as of this writing (end of May 2013), the SEC has not reviewed new exemptive-relief applications for leveraged or inverse-leveraged ETFs that would use futures, options or swaps to achieve their objectives. However, neither previously granted exemptive-relief applications nor new applications for nonleveraged physical index ETFs have been affected. In a December 2012 speech, Norm Champ, director of the SEC's Division of Investment Management, noted that although the SEC would no longer be deferring applications related to actively managed ETFs that would use futures, options or swaps, it would still defer such applications related to leveraged ETFs (Champ, 2012).

Hong Kong's financial regulators issued rules in 2010 requiring synthetic ETFs to carry an asterisk after their name, followed by a footnote stating, 'This is a synthetic ETF' (Hong Kong Exchanges, 2010). Market participants also initiated an educational effort in the region warning investors about counterparty risks associated with synthetic ETFs.

In July 2012 the European Securities and Markets Authority (ESMA), an independent European Union entity that helps to protect the EU financial system, published guidelines on ETFs and other UCITS issues. Key stipulations include:

- The identifier 'UCITS ETF' must be used for funds – physical or synthetic – that qualify as such. Funds that do not qualify are prohibited from using that identifier or the labels 'ETF' or 'exchange-traded fund'.
- UCITS funds that enter into total-return swaps or other financial derivatives should hold collateral that complies with the investment limits applicable to all UCITS fund portfolios.
- The prospectus for a UCITS fund that uses total-return swaps or similar derivatives should extensively disclose information regarding the swap counterparty(ies), risks of counterparty default and the extent to which the counterparty has discretion over the investment portfolio.
- Collateral should be highly liquid, valued at least daily, of high credit quality and independent from the counterparty.
- All revenue from securities lending, net of operational costs, should be returned to the UCITS fund.

Do synthetic ETFs make sense for investors?

Vanguard's research and experience indicate that physically based ETF structures can provide the diversification, transparency and liquidity that ETF investors seek. However, synthetic ETFs may make sense in certain instances, such as when investors wish to gain exposure to markets that are hard to access or strategies that are not easily implemented. Still, we believe that these funds do have more counterparty risk than do physical ETFs and that investors should be compensated accordingly through lower tracking error or lower costs (the latter of which can lead to higher expected excess return). The magnitude of the risk can be evaluated based on a synthetic ETF's transparency, structuring and disclosure.

In our view, best practices for synthetic ETFs should include:

- Multiple, unaffiliated counterparties.
- Disclosure of counterparties and associated swap costs.
- A transparent, liquid collateral basket with regular updates of holdings and swap exposure.
- Minimum eligibility and diversification requirements for assets placed into the collateral basket.
- Daily collateral reconciliation.
- Overcollateralisation of amounts at risk.
- Direct access to collateral in the event of a counterparty default.

If these criteria are met, we believe that investors could be better positioned to minimise the risk associated with a counterparty default.

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