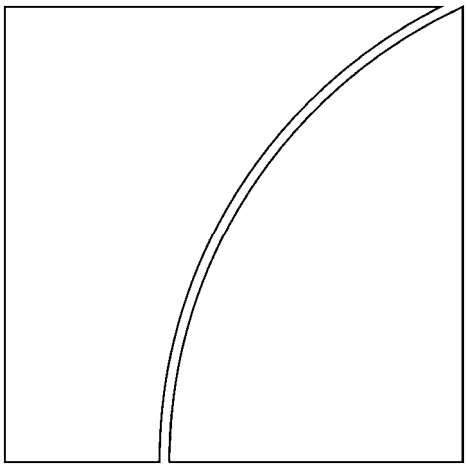
BANK FOR INTERNATIONAL SETTLEMENTS



BIS Working Papers

No 343

Market structures and systemic risks of exchange-traded funds

by Srichander Ramaswamy

Monetary and Economic Department

April 2011

JEL classification: G24, G28, G32

Keywords: Mutual funds, total return swaps, securities lending, systemic risk

BIS Working Papers are written by members of the Monetary and Economic Department of the Bank for International Settlements, and from time to time by other economists, and are published by the Bank. The views expressed in them are those of their authors and not necessarily the views of the BIS.

Copies of publications are available from:

Bank for International Settlements
Communications
CH-4002 Basel, Switzerland

E-mail: publications@bis.org

Fax: +41 61 280 9100 and +41 61 280 8100

This publication is available on the BIS website (www.bis.org).

ISSN 1020-0959 (print)

ISBN 1682-7678 (online)

Market structures and systemic risks of exchange-traded funds

Srichander Ramaswamy[†]

Abstract

Crisis experience has shown that as the financial intermediation chain lengthens, it becomes complicated to assess the risks of financial products due to a lack of transparency as to how risks are managed at different levels of the intermediation chain. Exchange-traded funds, which have become popular among investors seeking exposure to a diversified portfolio of assets, share this characteristic, especially when their returns are replicated using derivative products. As the volume of such products grows, such replication strategies can lead to a build-up of systemic risks in the financial system. This article examines the operational frameworks of exchange-traded funds and identifies potential channels through which risks to financial stability can materialise.

JEL classification: G24, G28, G32.

Key words: Mutual funds, total return swaps, securities lending, systemic risk.

[†] The author thanks Stephen Cecchetti, Matthew Eichner, Ingo Fender, Giuseppe Grande, Philippe Mongars, Dietrich Domanski and Jingchun Zhang for helpful comments. The views expressed are those of the author and not necessarily those of the BIS.

1. Introduction

Financial institutions are constantly designing and marketing innovative financial products that promise to meet investors' return expectations as market conditions and global risk appetite change. For example, in the low global interest rate environment in 2002–03, structured credit products were marketed to gear up investment returns for institutional investors as the value of their liabilities increased; banks were also willing buyers as they offered higher returns to comparably rated plain vanilla assets. Rising investor demand for these products subsequently helped banks to fund the rapid growth in credit demand in 2004–06 through the securitisation structures that these products supported.

The financial crisis experience,[1] however, dampened investors' appetite for structured credit products. Yet the low global interest rates that supported growth in structured credit products have returned, with institutional investors facing similar problems to those back in 2002–03. This time, financial intermediaries have responded by adding some innovative features to existing plain vanilla investment funds. These investment funds, marketed under the name of exchange-traded funds (ETFs), have existed since the early 1990s as a cost- and tax-efficient alternative to mutual funds. The structuring of these funds initially shared common characteristics with that of mutual funds. In particular, the underlying index exposure that the ETF replicated was gained by buying the physical stocks or securities in the index.

In recent years, investors looking for alternative investment vehicles to structured products have turned to ETFs being marketed as plain vanilla-type flexible and transparent investment products that can be traded like stocks on an exchange. Investors' desire to seek higher returns by taking exposure to less liquid emerging market equities and other assets through ETFs that guarantee market liquidity has, however, demanded more innovative product structuring from financial intermediaries. Some of the product innovation might also be driven by dealer incentives to seek alternative funding sources to comply with the liquidity coverage ratio (LCR) standard under Basel III.[2] For example, certain product structures might facilitate run-off rates on liabilities to be reduced despite keeping the maturity of liabilities short. As a result, ETFs have moved away from being a plain vanilla cost- and tax-efficient alternative to mutual funds to being a much more complex and diverse array of products and replication schemes (Russell Investments (2009)).

This paper examines recent market developments in ETFs and their potential implications for financial market stability as growth of ETF assets under management gathers pace. It is organised as follows. First, the plain vanilla structures and their legal framework are presented and put in the context of how the ETF industry has evolved over the last several years. Second, the synthetic structures and, subsequently, the more exotic structures are discussed, and some parallels to the structured finance market developments in the last decade are drawn. Next, the underlying motivation for index replication using synthetic

[1] See BIS (2009) for a review of the global financial crisis.

[2] For a discussion of the LCR standard, see BCBS (2010).

structures is examined from the perspective of financial intermediaries. Finally, the key channels through which risks to financial stability might materialise are explored.

2. The market for ETFs and legal structures

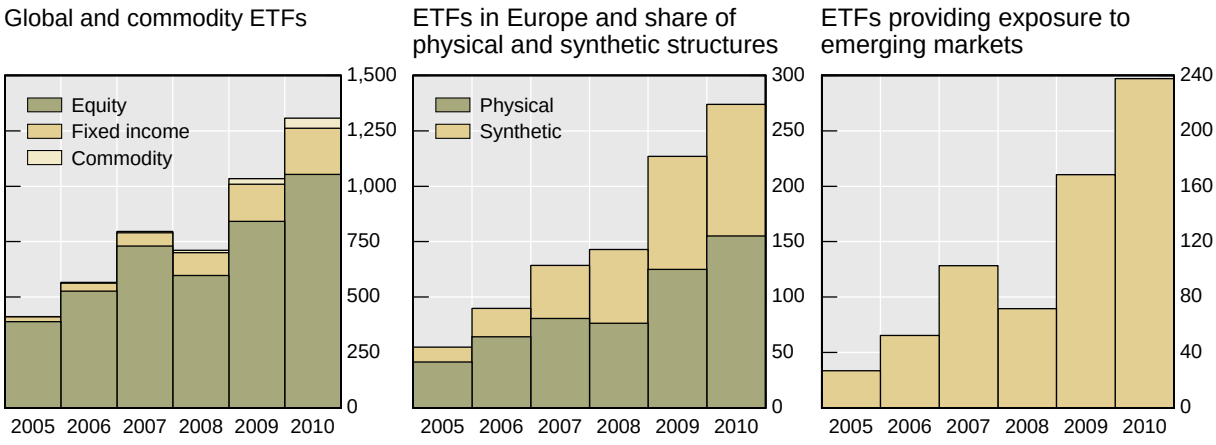
ETFs are structured as open-ended mutual funds that allow investors to gain diversified exposure to financial assets across geographical regions, sectors or asset classes. They are traded on exchanges through brokers on a commission basis like stocks, which means that long and short positions can be taken; market, limit or stop orders can be executed; and they can also be purchased on margin. As of end-2010, there were close to 2,500 ETFs offered by around 130 sponsors and traded on more than 40 exchanges around the world (BlackRock (2011)). Data compiled by BlackRock suggest that six sponsors – iShares, State Street Global Advisors, Vanguard, Lyxor Asset Management, db x-trackers and Power Shares – control more than 80% of the ETF market share.

Global ETF assets under management rose from $410 billion in 2005 to $1,310 billion in 2010 (Graph 1, left-hand panel). Even so, ETF assets under management remain a small fraction of the global mutual fund industry, which had close to $23 trillion in assets under management in 2010. About 80% of ETF assets in Europe are held by institutional investors, whereas in the United States their share is only 50%, with the remainder held by retail investors. Hedge funds are large users of ETFs in the United States, but they trade less frequently in the ETFs originated in Europe. This is because hedge fund strategies often involve shorting, and the market for lending and borrowing ETFs that is needed to take short positions is less well developed in Europe. This makes implementation of short positions in ETFs traded in Europe expensive.

Graph 1

ETF asset growth in different markets

In billions of US dollars



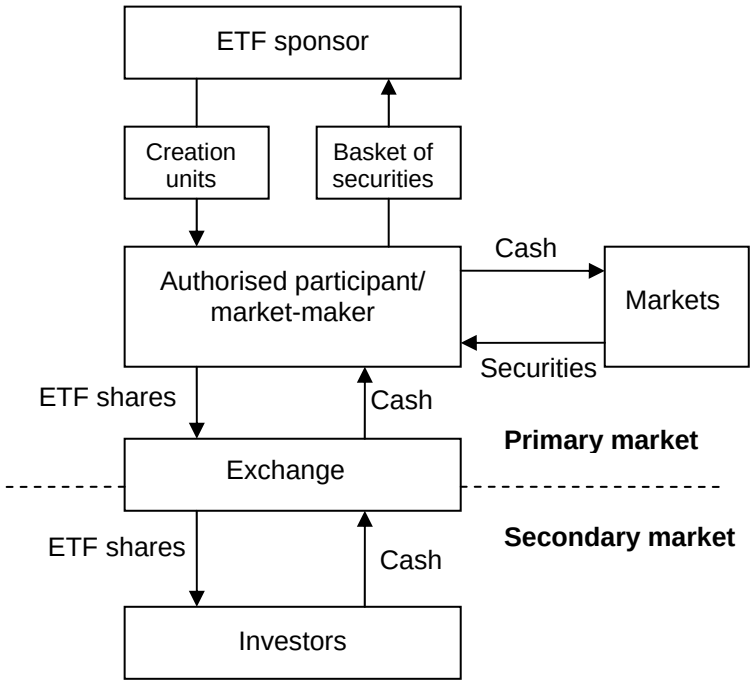
Source: BlackRock (2011).

The operational structure of ETFs that use physical replication schemes to gain index exposure is shown in Figure 1. In this structure, authorised participants, who are also market-makers, purchase the basket of securities in the markets that replicate the ETF index and

deliver them to the ETF sponsor. For example, the constituents of the S&P 500 Index would be delivered if the ETF is benchmarked against this index. In exchange for this, each market-maker receives ETF creation units, typically 50,000 or multiples thereof. The transaction between the market-maker and ETF sponsor takes places in the primary market. Investors who buy and sell the ETF then trade in the secondary market through brokers on exchanges. The market value of the basket of securities held by the ETF sponsor forms the basis for determining the NAV of the ETF held by investors.

Figure 1

Operational structure of ETFs



In the United States, ETFs are registered under the Investment Company Act of 1940 and are classified as open-ended funds or as unit investment trusts (UITs). But ETFs differ in some respects from traditional open-ended funds. For example, unlike open-ended funds, which can be bought or sold at the end of the trading day for their net asset value (NAV), ETFs can be traded throughout the day much like a closed-end fund. Moreover, ETFs do not sell shares directly to investors but only issue them in large blocks called creation units to authorised participants who effectively act as market-makers (Kosev and Williams (2011)). Investors then buy or sell individual shares in the secondary market on an exchange based on the NAV of the fund without attracting subscription or redemption charges. In the primary market, ETFs redeem creation units to authorised participants through securities that comprise the ETF rather than through cash. Because of the limited redeemability of ETF shares, ETFs are not considered to be mutual funds in the United States. In Europe, this distinction is not made and ETFs can be established under the Undertakings for Collective Investments in Transferable Securities (UCITS) similar to those for mutual funds.

In the early phase of the development of the ETF industry, index replication was done through plain vanilla structures that involved buying all the underlying securities comprising the index as in Figure 1. Subsequent modifications involved replicating the index by holding an optimised[3] basket of the underlying securities in the index and generating additional income by lending the securities out. In the United States, this involved organising ETFs as open-ended funds rather than as UITs because UITs do not permit securities lending. Almost all of the ETFs that are benchmarked against fixed income or equity indices in the United States are plain vanilla structures that involve physical replication of the underlying index. In Europe, roughly 50% of the ETFs are plain vanilla types, and the rest are replicated using synthetic structures (Graph 1, centre panel).

Regulatory rules that stipulate how ETF assets are managed encourage the adoption of plain vanilla structures in the United States. One is the requirement that investment companies registered under the Investment Company Act of 1940, which include ETFs, hold at least 80% of their assets in securities matching the fund's name. This came into force in July 2002. The other is the notification by the US Securities and Exchange Commission in March 2010 to review the use of derivatives by ETFs and mutual funds to assess risks associated with the use of derivatives to achieve their investment objectives (US SEC (2010)). The UCITS regulations that apply in Europe, on the other hand, permit exchange-traded as well as over-the-counter derivatives to be held in the fund to meet the investment objectives. The UCITS framework has also been adopted in Asia and other emerging markets, with more than 70% of authorised investment funds in Hong Kong and Singapore now being UCITS-compliant. But a significant share of ETFs benchmarked to emerging market assets are domiciled in Luxembourg or Dublin. This may be related to greater European institutional demand for exposure to these asset classes. ETFs benchmarked to emerging market assets now total $230 billion (Graph 1, right-hand panel).

3. Synthetic and exotic structures

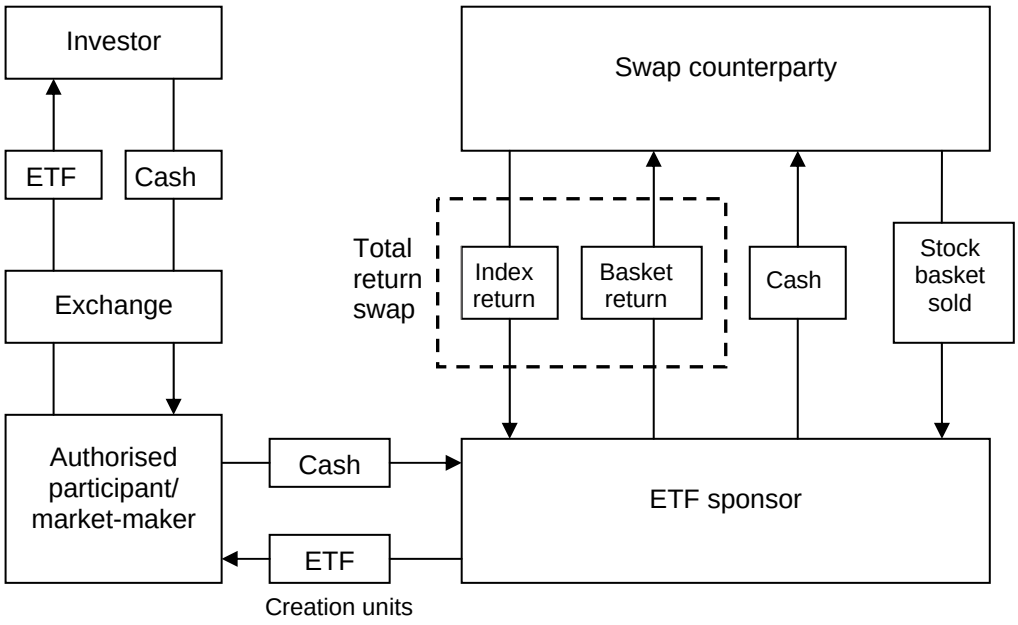
Synthetic ETFs allow replication of the index using derivatives as opposed to owning the physical assets. One motivation for using synthetic structures to replicate the index could be to reduce costs. If the index has a narrow regional or sector focus and is widely traded, replicating the ETF benchmark by owning the underlying securities can be cost-efficient. However, physical replication can be an expensive method for tracking broad market indices such as emerging market equity or fixed income indices, or other less liquid market indices. Including only a subset of the underlying index securities for physical replication can lead to significant deviation in returns between the ETF and the index in volatile market conditions. Furthermore, in less liquid markets the wider bid-ask spreads increase replication costs, particularly when the fund has high turnover.

[3] Providers of index funds use a variety of techniques to replicate the benchmark. Where full replication of the index is either difficult to implement or is deliberately not employed, techniques such as stratified sampling or other dynamic index tracking strategies are used to minimise the tracking error of the portfolio versus the index. See Rey and Seiler (2001) for a discussion on indexation techniques and their tracking errors.

The above considerations have led to the use of synthetic structures to replicate the ETF benchmark.[4] One popular synthetic structure involves the use of total return swaps,[5] which the ETF sponsors refer to as the unfunded swap structure (Figure 2). Under the synthetic replication scheme, the authorised participant receives the creation units from the ETF sponsor against cash rather than a basket of the index securities as in the physical replication scheme. The ETF sponsor separately enters into a total return swap with a financial intermediary, often its parent bank, to receive the total return of the ETF index for a given nominal exposure. This constitutes the first leg of the swap. Cash is then transferred to the swap counterparty equal to the notional exposure. In return, the swap counterparty transfers a basket of collateral assets to the ETF sponsor. The assets in the collateral basket could be completely different from those in the benchmark index that the ETF tries to replicate. The total return on this collateral basket is then transferred to the swap counterparty, which constitutes the second leg of the total return swap.

Figure 2

Unfunded swap ETF structure



The nature of the swap transaction discussed above suggests that this structure exploits synergies between banks' collateral management practices and the funding of their warehoused securities. This could provide another motivation for employing synthetic replication schemes, with the ETFs' parent financial institution using them as a funding vehicle for its warehoused securities. This is explored further in the next section.

[4] Effectively, synthetic structures transform tracking error risk into counterparty risk for investors. This is discussed in Section 4.

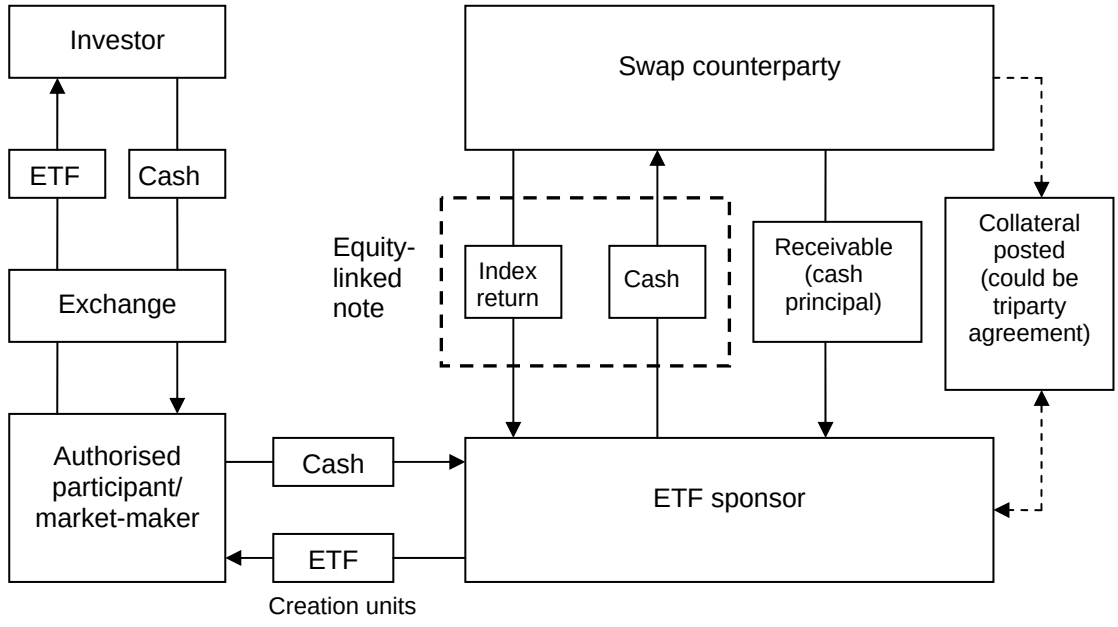
[5] A total return swap is a bilateral financial transaction where the counterparties swap the total return of a single asset or basket of assets for periodic cash flows, typically a floating rate such as Libor.

Some structures may employ multiple swap counterparties for the transaction. The composition of the assets in the collateral basket can change daily as the swap counterparty recycles its inventory. Being the beneficial owner of the collateral basket, the ETF sponsor can sell the collateral assets if the swap counterparty defaults and repay the investors. Under UCITS regulations, the daily NAV of the collateral basket, which can include cash or equities and bonds of OECD countries, should cover at least 90% of the ETF's NAV, limiting the swap counterparty risk to a maximum of 10% of the ETF's market value. Assets in the collateral basket are eligible for securities lending, and secured lending is usually done through a custodian.

An alternative replication scheme used by ETF sponsors is to employ the so-called funded swap structure (Figure 3). Under this, the ETF sponsor transfers cash to the swap counterparty, who then provides the total return of the ETF index replicated. This transaction is collateralised, with the swap counterparty posting the eligible collateral into a ring-fenced custodian account to which the ETF sponsor has legal claims. But unlike in the unfunded swap structure, the sponsor is not the beneficial owner of the collateral assets. This can potentially lead to delays in realising the value of collateral assets if the swap counterparty fails. The collateral composition and the extent of minimum collateralisation will have to comply with the UCITS regulation. Usually this transaction is overcollateralised by 10−20%. Securities lending is permitted. This structure is less commonly used by sponsors for synthetic replication of ETF indices.

Figure 3

Funded swap ETF structure



The use of the term "swap" by ETF sponsors to describe the financial structure shown in Figure 3 can be misleading for anyone seeking to understand the nature of the transaction. The structure involves only one leg of regular cash flows from the swap counterparty to the ETF sponsor, with the principal being due when the transaction is terminated. From a financial engineering point of view, the transaction can be broken down into the purchase of a credit- or equity-linked note from a financial intermediary, and then mitigating the

counterparty risk by requesting the posting of collateral that is UCITS-compliant. In other words, the ETF sponsor buys a structured note that is secured by a collateral pledge. Table 1 summarises the key similarities and differences between the two synthetic replication structures.

One special case of ETFs that use synthetic replication schemes is those that provide exposure to commodity markets. But in these markets, a lack of sufficient diversification of assets in the index prohibits the use of the mutual fund structure. As a result, exchange-traded products that provide exposure to commodities use other trust structures and are marketed as exchange-traded commodities (ETCs). While physical replication of some commodity indices, such as gold and copper indices, is used by sponsors, synthetic replication using futures or forward contracts is more common.

Table 1

Comparison of the two ETF synthetic replication schemes

Attribute	Unfunded swap structure	Funded swap structure
Type of transaction	Total return swap	Credit- or equity-linked note
Counterparty risk	Mitigated through ownership of collateral assets effected through true sale	Mitigated through the pledge of collateral assets through triparty agreement
Overcollateralisation	Typically small, if any	Typically up to 120% of the ETF's net asset value
Haircuts on collateral assets	Usually none, but under UCITS some jurisdictions can impose haircuts for certain assets	Usually none, but under UCITS some jurisdictions can impose haircuts for certain assets
Composition of collateral assets	Can change daily	Can change daily
Balance sheet implication for swap counterparty	True sale of collateral assets can alter risk-weighted capital charges	Pledge of collateral assets unlikely to alter risk-weighted capital charges

As the demand for ETF assets has grown, so have product complexity and investor risk appetite for the product. More exotic products that provide leverage under the ETF umbrella are now being marketed to cater to the investor demand. These products go by the name of leverage ETFs and deliver returns that are multiples of the daily performance of the index or benchmark they track. Another comparable product, the leverage inverse ETF, seeks to deliver a return that is a multiple of the inverse performance of the underlying index.

The swap-based replication schemes discussed earlier are usually employed by the ETF sponsors to deliver the investment performance on such products. Because these ETFs provide a leveraged positive or negative return of the daily performance of the index being tracked, the holding period return on a leveraged ETF is path-dependent. In other words, the

investors' exposure is more similar to buying or selling an Asian option rather than a European option on the underlying index.[6] While the assets under management of leverage or inverse ETFs amount to only around $40 billion globally, which is about 3% of ETF assets, they account for nearly 20% of the turnover in ETF assets, suggesting that they are very actively traded.

The market for options on ETFs is another product growing in popularity, particularly in the US market among hedge funds and institutional investors. Average daily option volumes on US ETFs now exceed those of all US stock options combined (JPMorgan (2011)). Options on ETFs have an American-style exercise feature and follow the same expiration schedule of exchange-traded options. Most of the activity in ETF options tend to be concentrated in ETFs that provide exposure to certain indices, such as the S&P 500 and Russell 2000. The market for ETF options in Europe and Asia is relatively small.

4. Motives for synthetic replication

Synthetic replication schemes transfer the risk of any deviation in the ETF's return from its benchmark to the swap provider, which is effected by entering into a derivatives contract to receive the total return of the benchmark. This protects investors from the tracking error risk which physical replication schemes would otherwise expose them to. However, there is a trade-off: the lower tracking error risk comes at the cost of increased counterparty risk to the swap provider. ETF sponsors tend to emphasise the lower tracking error and downplay the counterparty risk to support the case for synthetic replication schemes, which are also marketed as being cheaper than the alternative method of replicating the index in the cash market. In reality, the increased popularity of ETF products among investors has led to greater competition between ETF sponsors, forcing them to seek alternative replication techniques to optimise their fee structures.

One outcome of this fee structure review has been to explore the scope for possible synergies that might exist between the investment banking activities of the parent bank and its asset management subsidiary or the unit within the parent bank that acts as the ETF sponsor. These synergies arise from the market-making activities of investment banking, which usually require maintaining a large inventory of stocks and bonds that has to be funded. When these stocks and bonds are less liquid, they will have to be funded either in the unsecured markets or in repo markets with deep haircuts. By transferring these stocks and bonds as collateral assets to the ETF provider sponsored by the parent bank, the investment banking activities may benefit from reduced warehousing costs for these assets. Part of this cost savings may then be passed on to the ETF investors through a lower total expense ratio for the fund holdings.

The cost savings accruing to the investment banking activities can be directly linked to the quality of the collateral assets transferred to the ETF sponsor. For example, there could be

[6] For Asian options, the payoff is determined by the average underlying price over some preset period of time. This is different from the case of European and American options, where the payoff of the option contract depends on the price of the underlying instrument at maturity.

incentives to post illiquid securities as collateral assets. Typically, such securities will have to be funded by the investment bank at unsecured borrowing rates. By posting them as collateral assets to the ETF sponsor in a swap transaction, the investment bank division can effectively fund these assets at zero cost for its market-making activities. In addition, the bank providing the total return swap through the unfunded swap ETF structure may benefit from a reduction in regulatory capital charges. This would be the case if lower credit quality and less liquid assets are included in the collateral basket sold to the ETF sponsor compared with those acquired for replicating the ETF index.

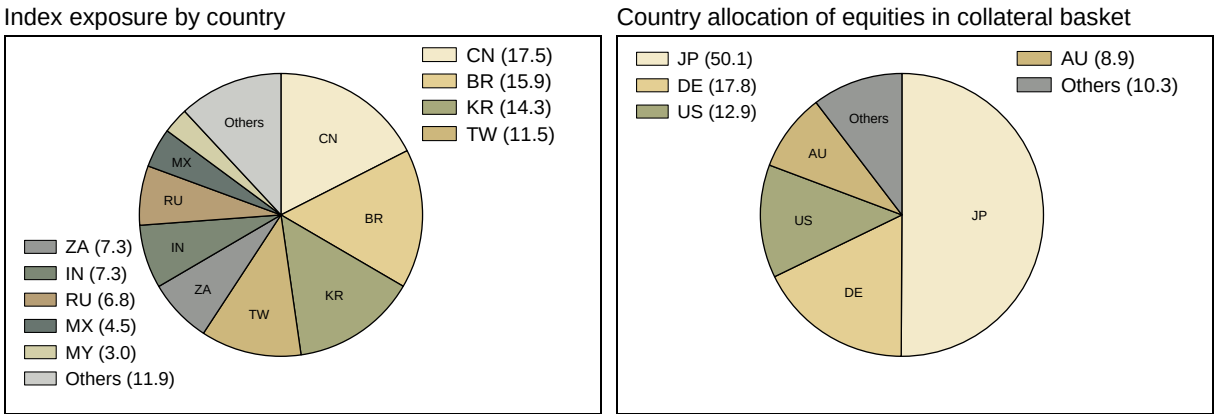
The extent of the cost savings can be influenced by the applicable haircuts for the collateral assets under UCITS, and rules on haircuts vary across jurisdictions. In Ireland, for example, equities posted as collateral are subject to a 20% haircut, whereas in Luxembourg it is up to the fund custodian and the fund management company to negotiate the haircut. As a consequence, UCITS-compliant ETFs that are synthetically replicated tend to be registered in Luxembourg to reduce haircuts on collateral assets posted.

To provide a sense of the nature of collateral assets posted, a widely traded ETF offered by db x-trackers that uses the "funded swap" synthetic replication method to track the MSCI Emerging Markets total return equity index is presented here as an example (Graph 2, left-hand panel). The transaction is overcollateralised by almost 20% of the market value of the ETF, and comprises OECD country equities and bonds numbering more than 1,000. A large share of Japanese equities is included in the collateral basket (Graph 2, right-hand panel). The bond collateral is made up of corporates with substantial exposure to the US market dominated by unrated bonds (Graph 3). But a breakdown of the share of equities and bonds in the collateral basket is not readily available. Extracting this information using the International Security Indentifying Number (ISIN) provided for each of the collateral assets would be a cumbersome process.

Graph 2

MSCI Emerging Markets ETF index and collateral composition[1]

In per cent



[1] As of end-January 2011.

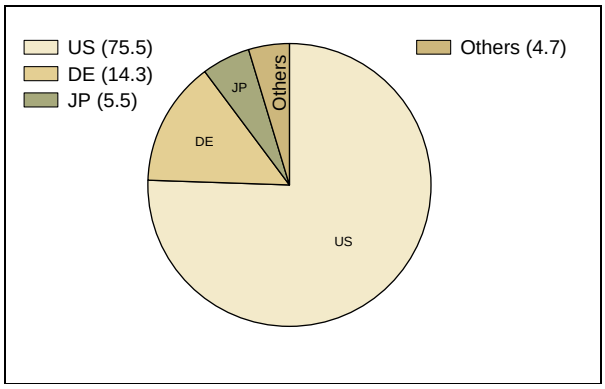
Source: Deutsche Bank.

Graph 3

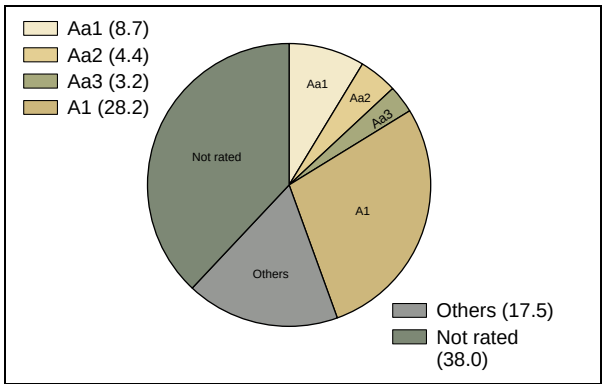
Composition of the bonds in the collateral basket[1]

In per cent

Country allocation



Credit rating breakdown



[1] As of end-January 2011.

Source: Deutsche Bank.

Liquidity regulation, such as the standards now proposed under Basel III, may also create incentives to use synthetic replication schemes. For example, under the proposed LCR standard, unsecured wholesale funding provided by many legal entity customers (banks, securities firms, insurance companies, fiduciaries, etc) as well as secured funding backed by lower credit quality collateral assets or equities maturing within 30 days will receive a 100% run-off rate in determining net cash outflows. By employing equities and lower credit quality assets to collateralise the swap transaction with the ETF sponsor that might typically have a maturity greater than one year, the bank engaging in this swap transaction will be able to reduce the run-off rate substantially on the collateral posted. Yet, the collateral substitution option allows banks to effectively keep the maturity of the funding short. The bank will still face a cash outflow run-off rate of 20% for valuation changes on the collateral posted,[7] but this is far lower than the 100% run-off rate that it might otherwise face. When significant volumes of such transactions are done, this may result in a substantial improvement in the banks' LCR, which would make compliance with the LCR standard less expensive.

5. Risks to financial stability

As the market share of assets and the number of players in the ETF industry have grown, increased competition has led to lower fund management fees for investors, and, at the same time, a wider range of financial market indices are now being replicated. ETFs also offer a number of other benefits to investors: they allow the taking of short positions to hedge existing exposures cheaply; being liquid, they allow institutional investors to use them for transition management when switching mandates across asset managers; and they are

[7] This is to meet the increased liquidity needs related to the potential for valuation changes on posted collateral securing derivative and other transactions under Basel III liquidity regulation (BCBS (2010), paragraph 90).

suitable as a vehicle for implementing tactical asset allocation decisions that might target particular market sector exposures.

But these benefits may come at a cost, the cost being increased risk to financial market stability (Bank of England (2010), FSB (2011)). To colour such concerns, it may be instructive to consult the recent history of structured finance markets. In the early 2000s, developments in these markets, which were undergoing rapid product innovation, were viewed positively by market commentators: they promised to spread the risk-bearing capacity away from banks to the broader investor community, suggesting lower borrowing costs for firms and individuals. In the early stages, plain vanilla-type structured products, which packaged physical assets in special purpose vehicles and then tranched and redistributed their cash flow proceeds to investors, were popular. Subsequently, as demand for them grew, a lack of liquidity and supply of the underlying assets that delivered the returns investors targeted, led to the structuring of synthetic products backed by credit default swaps (CGFS (2005)).

But a lack of transparency on the underlying assets backing many structured products combined with the complexity of certain structures made risk assessment of these products difficult (CGFS (2005, 2008)). Despite the overcollateralisation enforced by credit agencies when rating these products, embedded leverage and market risks were materially higher than those modelled. As the unmodelled market and liquidity risks of these products materialised, it led to fire sales that subsequently triggered a broad-based deleveraging process in the financial markets.

Drawing on this experience, there are a number of channels through which risks to financial stability could materialise from ETFs, especially when product complexity and synthetic replication schemes grow in usage. They include: (1) co-mingling tracking error risk with the trading book risk by the swap counterparty could compromise risk management; (2) collateral risk triggering a run on ETFs in periods of heightened counterparty risk; (3) materialisation of funding liquidity risk when there are sudden and large investor withdrawals; and (4) increased product complexity and options on ETFs undermining risk monitoring capacity. These risk propagation channels are examined below.

Synthetic replication schemes deliver ETF investors the index return less a fee charged by the swap counterparty for the total return swap. Replicating returns of broad market indices is, however, not the core business of investment banking. There is also little transparency on how swap counterparties replicate the index returns to meet their contractual commitment to deliver the total return on the index. It is likely that they use similar techniques to those applied by other ETF sponsors employing physical replication schemes. Such schemes generally hold an optimised subset of the securities in the index basket, and then transfer the risk that the replication basket underperforms the index to the investors.

Synthetic replication schemes, by contrast, transfer the underperformance risk to the swap counterparty. Within investment banking, the risk of underperformance or tracking error might be co-mingled with the rest of the trading book risk. This could potentially undermine the oversight function and compromise sound risk management. Moreover, the capacity of the swap counterparty to bear the tracking error risk while providing the market liquidity needed when there is sudden and large liquidation of ETFs is untested. Hedge funds often manage the liquidity risk through techniques such as “gating”, ie by restricting investor withdrawals

when market liquidity conditions are poor. There is no such mechanism in existing ETF synthetic replication schemes to manage liquidity risk when faced with large investor redemptions.

Concerns about counterparty risk can be another channel for risk propagation. Patterns of withdrawal from money market funds during the crisis show that institutional investors are likely to be the first to run when markets question the solvency of a fund provider, which can then trigger a broader run on the industry (Baba et al (2009)). Crisis experience has also shown that the collateral assets pledged by a failed swap counterparty could be frozen by a bankruptcy administrator even when they are held in client accounts (Fender et al (2008)). Securities lending might further complicate the process of gaining access to the pledged collateral.

Even if the collateral assets can be acquired, there could be industry incentives to progressively shift collateral pools over time to include illiquid assets. This, in combination with the fact that there is very little overlap between assets in the collateral basket and the index basket, might induce institutional investors to liquidate ETFs that are replicated synthetically in periods of heightened counterparty risk. And overcollateralisation might provide little comfort, as crisis experience has shown that collateral quality tests and collateral coverage tests designed by rating agencies for structured products did not protect senior tranche holders from losses.[8] Large withdrawals from ETFs could raise correlation across asset classes sharply. For example, this could force banks to sell some of the collateral assets, including those that are illiquid, that back the swap transactions. At the same time, authorised participants might attempt to provide liquidity in ETF markets through the redemption process as market liquidity is retrenching. These actions could set in motion an adverse feedback loop that further increases counterparty risk.

Sudden and large investor withdrawals triggered by market events or counterparty risk concerns can also lead to funding liquidity risk. This risk can propagate through the investment banking function, which might take for granted the access to cheap funding through the swap arrangement with the ETF sponsor. The cheap funding is secured by marketing a tradable index portfolio through the ETF sponsor, but not charging investors adequately for the liquidity option that they have been granted. Swap providers do not take into account the effect this can have on aggregate liquidity risk, which is an externality to them. Because ETF redemptions will require cash to be delivered against collateral assets that might be illiquid, market-making activities could be severely hampered, as funding these assets might take priority. The collapse of funding for individual financial intermediaries could then reinforce funding stresses for the financial system as a whole.

Finally, by employing a variety of markets and players to replicate their benchmark indices, ETFs complicate risk assessment of the end product sold to investors. There is little transparency and no investor monitoring of the index replication process when this function is taken over by the swap counterparty. Financial innovation has added further layers of complexity through leveraged products and options on ETFs. Again, crisis experience has shown that market risk assessments tend to be closely tied to the underlying assumptions

[8] For a discussion on collateral coverage tests, see Ramaswamy (2004) page 217.

about the market liquidity of products. The notion that the market for ETFs is liquid might lead to the market risk of these products being underestimated. Under these circumstances, a reassessment of the market liquidity of ETFs by investors can have significant implications for the normal functioning of financial markets.

References

Baba, N, R N McCauley and S Ramaswamy (2009): "US dollar money market funds and non-US banks", *BIS Quarterly Review*, March.

Bank for International Settlements (2009): *79th Annual Report*, Chapter II.

Bank of England (2010): *Financial Stability Report*, Box 5: Exchange traded funds, issue no 27, June.

Basel Committee on Banking Supervision (2010): *Basel III: International framework for liquidity risk measurement, standards and monitoring*, December.

BlackRock (2011): *ETF landscape: global handbook Q1 2011*.

Committee on the Global Financial System (2005): "The role of ratings in structured finance: Issues and implications", *CGFS Papers,* no 23, January.

Committee on the Global Financial System (2008): "Ratings in structured finance: what went wrong and what can be done to address shortcomings?", *CGFS Papers*, no 32, July.

Fender, I, A Frankel and J Gyntelberg (2008): "Three market implications of the Lehman bankruptcy," *BIS Quarterly Review*, December, pp 6–7.

Financial Stability Board (2011): "Potential financial stability issues arising from recent trends in exchange traded funds (ETFs)", April.

JPMorgan (2011): *Exchange traded funds: 2011 JPMorgan global ETF handbook*.

Kosev, M and T Williams (2011): "Exchange-traded funds", *Reserve Bank of Australia Bulletin*, March.

Ramaswamy, S (2004): *Managing credit risk in corporate bond portfolios*, John Wiley.

Rey, D M and D Seiler (2001): "Indexation and tracking errors", *Working Paper* no 2/01, Basel University.

Russell Investments (2009): *ETFs, swaps and futures: trade at index close and the coevolution of financial markets*, August.

US Securities and Exchange Commission (2010): *SEC staff evaluating the use of derivatives by funds*, 2010-45, March.