



Passive Insights

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Annex II)

Over the Currency Hedge

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“The idea that you can actually predict what’s going to happen contradicts my way of looking at the market.” - George Soros

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Executive Summary

Ultimately, investing is about risk and return. While predicting returns is often more an art than a science, risk mitigation through asset diversification may be implemented more systematically. In this context, **investing in non-domestic assets can represent a key source of diversification**. The recent rally in international equity markets, which has been accompanied by well differentiated regional returns, seems to confirm this diversification benefit.

However, **recent volatility** in the US dollar, Japanese yen, euro and Swiss franc **has reminded investors of the potential risks associated with exposure to foreign currencies**.

For example¹:

- Between July 2012 and December 2013 the Japanese yen fell from 96.12 against the euro to 144.82, a 33.6% loss for euro-based holders of yen;
- Between March 2014 and March 2015 the euro fell from 1.377 against the US dollar to 1.0731, a 22.07% loss for US dollar-based holders of euro;
- Between January 14 and January 15 2015, the Swiss franc appreciated from 1.5518 against the pound sterling to 1.2739, a 17.9% overnight loss for Swiss-based holders of sterling.

Managing the currency risk of global equity and bond portfolios is therefore a topic of rising interest to a broad range of asset owners, in particular those who are contemplating such international diversification while wishing to mitigate the risks linked to foreign currency exposure.

The pros and cons of currency hedging have been well analysed in academic finance literature. Ultimately, the decision of whether to hedge

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¹ Source Deutsche AWM, Bloomberg LLP



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non-domestic currency exposures or not depends on several factors: notably, an investor's base currency and time horizon and the investment outlook. While academic studies have reached different conclusions regarding the costs associated with currency hedging, the published studies usually agree that hedging can provide a reduction in the risk faced by an investor.

In this paper, we review the **impact of hedging various exposures to equity or fixed income indices**. Our analysis shows that:

- While future currency movements are unknown – which is often the base argument for leaving long-term investments in non-domestic markets unhedged – **currency hedging would often have led to a significant reduction in overall portfolio volatility for a global investor, especially for short- to medium-term investment holding periods**;
- In global equity markets (in particular, by reference to the MSCI World index), while the overall performance difference between hedged and unhedged indices for a euro-based investor has been small over the last 13 years, **on a year-by-year basis the currency effect has outweighed equity market returns in more than half of the calendar years (7 calendar years out of the last 13)**;
- In global fixed income markets (in particular, by reference to the Barclays Global Aggregate index), **the magnitude of currency moves is often much bigger than the underlying bond market returns**, reinforcing the case for currency hedging;
- **The carry component of the cost of currency hedging is currently relatively low for many developed market currency pairs**, meaning a low opportunity cost for investors contemplating a currency-hedged investment;
- **ETFs can offer a straightforward and transparent way to achieve exposure to global markets on a currency-hedged basis**.

1. Currencies have a significant impact on portfolio returns

Currency markets snapshot: volatility is back

The currency market is the largest and most liquid financial market in the world. Global turnover in foreign exchange markets averaged US\$5.3 trillion per day according to a recent global survey, conducted in April 2013, while exchange-based trading in equities and bonds averaged around US\$220 billion a day and US\$90 billion a day, respectively, around the same time².

The currency market brings together many participants, including governments, central banks, commercial and investment banks, insurance companies, exporters, importers and individuals. By virtue of their cross-border exposures, many portfolio investors are also actively involved in foreign exchange.

After a period of relatively low volatility in the currency market, the first quarter of 2015 has seen two major events (the abandonment of the Swiss franc's peg to the euro in January and the launch of a quantitative easing programme by the European Central Bank (ECB) in March) that have clearly signalled a rise in foreign exchange risk (see Figure 1).

² Source: Bank for International Settlements Triennial Central Bank Survey, September 2013; World Federation of Exchanges.



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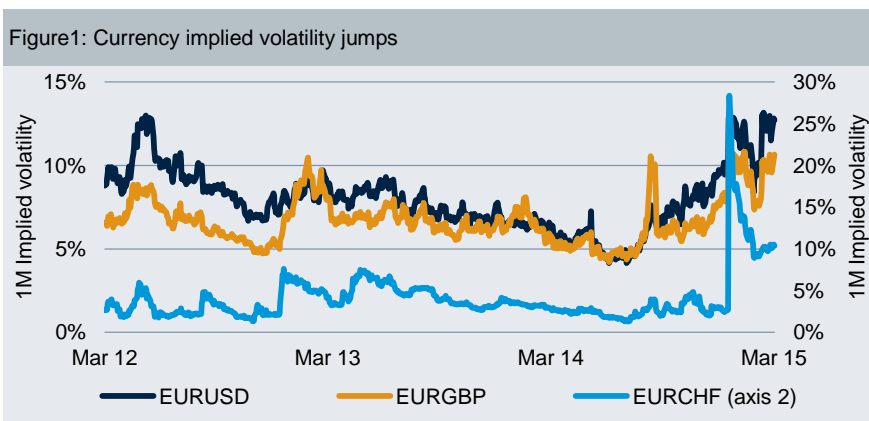


Figure 1 represents the at the money, 1 Month Maturity Implied Volatility for several currency pairs, derived from options contracts. Implied volatility is a measure of the market expected future volatility of a currency exchange rate from now until the maturity date.

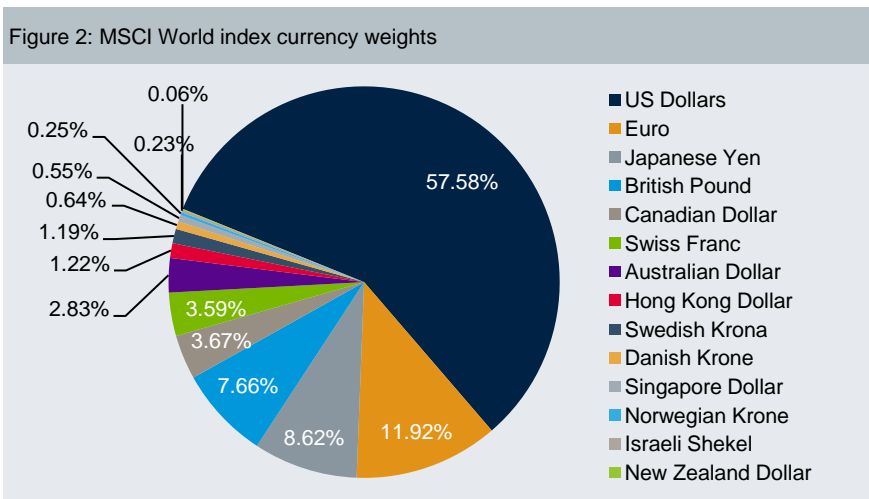
Source: Bloomberg. Deutsche Bank, from 31 March 2012 to 31 March 2015 inclusive

The performance of international indices differs dramatically, depending on an investor's base currency

Foreign currencies can be a significant driver of risk and return in a portfolio. Currency risk refers to the possibility that the price of one currency relative to another will change over an investor's holding period, affecting the returns received from stocks or bonds denominated in foreign currencies.

For example, investors using the MSCI World index as a benchmark are exposed to the returns of 1,635 large- and mid-capitalisation stocks across 14 currencies.

The currency weights of the MSCI World index as at the end of March 2015 are shown in Figure 2.



Source: Bloomberg. Deutsche Bank, March 2015

Currency movements can cause the returns of global markets to vary significantly from the perspective of different base currencies and over different time periods.

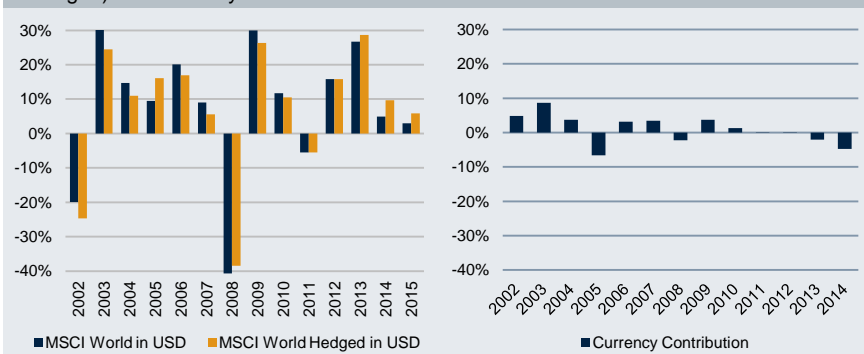


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MSCI World for an investor with a US dollar base currency

Figure 3 shows both the hedged and unhedged performance and the recent currency contribution to the returns experienced by a US dollar-based investor from the non-US stocks in the MSCI World index. The currency contribution is the absolute difference between the (unhedged) US dollar returns from the MSCI World index and the returns on a US dollar-hedged version of the index (a benchmark from which non-US dollar currency risk has been removed). An in-depth description of currency hedging is provided in Section 2.

Figure 3: MSCI World index calendar year returns 2002-2014 (in US dollars, hedged and unhedged) and currency contribution.



Source: MSCI, calendar year returns from 2002-2014, inclusive. Past performance is not a reliable indicator of future results.

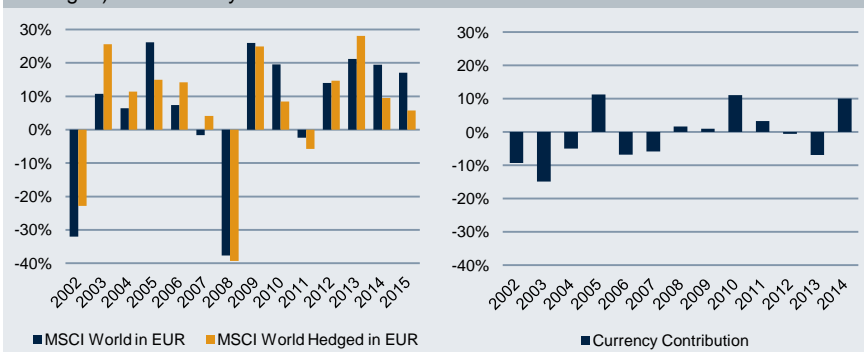
In ten of the thirteen years between 2002 and 2014, **non-domestic currency exposure contributed at least 2% to the headline returns experienced by a US dollar investor from the MSCI World index.**

MSCI World for an investor with a euro base currency

From a euro-based investor's perspective, however, both the timing and the magnitude of the currency effects produced by exposure to foreign stocks within the MSCI World index were different.

Figure 4 shows both the hedged and unhedged performance and the absolute difference between the (unhedged) euro returns on the MSCI World index and the returns on the euro-hedged version of the index.

Figure 4: MSCI World index calendar year returns 2002-2014 (in euro, hedged and unhedged) and currency contribution



Source: MSCI, calendar year returns from 2002-2014, inclusive. Past performance is not a reliable indicator of future results.



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As shown in Figure 4, from a euro-based investor's perspective, non-domestic currency exposure **has outweighed the underlying equity market return in seven years of the last thirteen.**

The effect of such currency fluctuations is indeed important. Many investors have a return target that is set in terms of their domestic currency and are therefore sensitive to the currency risk associated with non-domestic securities holdings.

As a result, even under the assumption that an individual currency's value moves in cycles around a long-term equilibrium rate, shorter-term volatility can impact the actual returns experienced by an investor.

Fundamentally, adding international assets to a portfolio makes sense both in theory and practice as international diversification typically allows investors to reduce portfolio risk and gain access to new sources of return. However, if foreign currencies fall or the domestic currency turns out to be stronger than expected, those return expectations can be disappointed.

Separating currency exposures from the other sources of return offered by international holdings and managing these exposures is therefore a topic of increasing interest to a broad range of investors. A first step in managing this risk is to understand the drivers of currency performance and their effect on a currency's short- and long-term behaviour.

What causes exchange rate fluctuations?

Several factors can contribute to deviations in a currency's exchange rate from its long-term, theoretical equilibrium value³. Such deviations can last for extended periods.

Interest rates and rate expectations

In economic theory (see theory explanation to the left), differences in interest rates between currencies should not be rewarded. An interest rate differential between two currencies should reflect the expected change in exchange rates between the two currencies (if exchange rates moved by less than expected, an investor could convert from the lower-yielding currency to the higher-yielding one, invest in a time deposit, convert back to the original currency and make a profit).

In practice, however, empirical evidence suggests that borrowing in lower-yielding and investing in higher-yielding currencies (the so-called "carry trade") can generate positive returns over time. Interest rate differentials can therefore drive return-seeking capital flows.

Inflation differentials

If expected inflation in one currency is higher than in another currency and interest rates are insufficiently high in the higher-inflation country to reward investors for holding its currency, capital outflows are likely, which may lead to the depreciation of the higher-inflation currency against the other currency.

This is called the theory of "Interest Rate Parity".

Under interest parity, the forward foreign exchange rate F is derived from the spot rate S (the rate for immediate settlement) by a factor reflecting the difference in interest rates between the two currencies:

$$F = S * (1 + r_{base} / 1 + r_{foreign})$$

Where r_{base} is the wholesale interest rate in the base currency and $r_{foreign}$ is the wholesale interest rate in the foreign currency.

³ Currencies' equilibrium value is often measured via purchasing power parity "PPP". The PPP measure of a currency's value aims to equalise the prices of tradeable goods in that currency vis-à-vis other currencies.



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Public policy

Large budget deficits may raise long-term inflation expectations and contribute to a decline in government creditworthiness. Both factors increase the risk of a decline in a country's currency.

Since the 2008/09 financial crisis, governments in the US, the UK, Japan and the Eurozone have all pursued a policy of quantitative easing (QE). Achieving a depreciation in the domestic currency's value is an implicit (though often unspoken) consequence of QE. The most recent example is the quantitative easing programme announced by the ECB in January 2015 and launched in March (see Figure 5).

Figure 5: Euro/US dollar exchange rate around the announcement of Eurozone QE in January 2015



Source: Bloomberg, Deutsche Bank 21-23 January 2015

Pursuing (and then abandoning) a pegged exchange rate policy can lead to large-scale currency volatility: examples are the sterling crash of 1991 and the dramatic Swiss franc rise of 2015.

Growth forecasts

Countries with weakening relative growth prospects may see their currencies depreciate in value, whereas those with a positive growth outlook often attract inflows to their currency. For example, the US dollar index rose from 2012-2014, helped by the US economy's relative strength.

Balance of payments

A country with a balance of current account deficit (whose imports exceed its exports in value) will need to attract capital inflows to finance the deficit. Countries with large current account deficits may need to depreciate their currencies to achieve an improvement in their terms of trade (the ratio of export prices to import prices). The UK has suffered from serial currency depreciations in the past for this reason.

FX risk across market cycles: it's all about the investor's time horizon

The currency cycles resulting from the interaction of these macroeconomic forces can pose challenges for investors.

Over the long term, currency values have often fluctuated around a long-term equilibrium, with this phenomenon often referred to by academics as long-term mean reversion.

For example, over the 15-year period between the date of introduction of the euro (1 January 1999) and the end of 2014 the currency strengthened

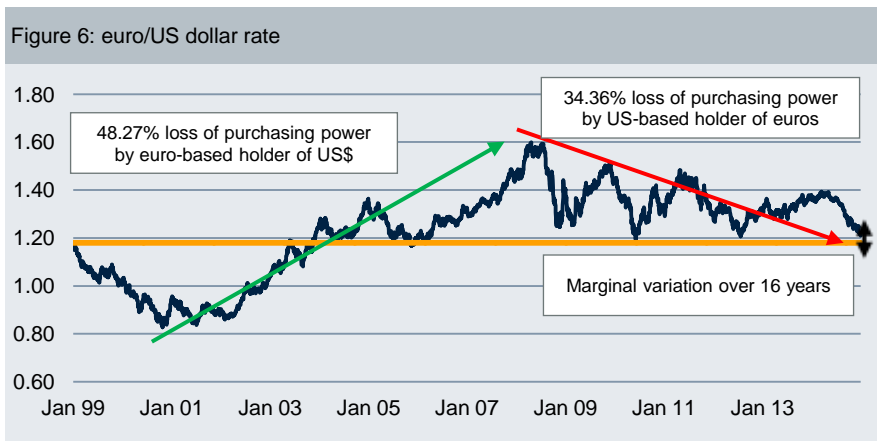


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against the US dollar only marginally, by just over 2.5% (from 1.18 to 1.2098—see Figure 6).

Over the medium- and short term, however, there were much larger cyclical changes in the value of the euro against the US dollar:

- between October 2000 and April 2008 a euro-based holder of US dollars suffered a 48.27% loss of purchasing power⁴;
- between April 2008 and March 2015 the reverse trend took effect and a US-based holder of euros suffered a 34.36% loss of purchasing power.



The potential losses faced by investors in international securities markets as a result of medium- and short-term cycles in currency values can be substantial.

In Figure 7 we show the maximum one-year loss on a 12 month rolling window experienced over the period from January 1999 to March 2015 by investors with base currencies of the US dollar, euro, Japanese yen, British pound and Swiss franc, when investing in each other's currencies.

⁴ These comparisons do not take into account differences in deposit rates between the two currencies and their effect on holding period returns.



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Figure 7: Maximum one-year cross-currency losses

	USD	EUR	JPY	GBP	CHF
USD-based investor in		-24.3%	-23.2%	-31.6%	-26.1%
EUR-based investor in	-22.4%		-28.8%	-24.6%	-14.2%
JPY-based investor in	-22.8%	-29.5%		-42.0%	-25.2%
GBP-based investor in	-16.2%	-15.3%	-22.0%		-23.5%
CHF-based investor in	-31.3%	-25.4%	-26.6%	-32.1%	

The maximum losses are calculated using daily closing foreign exchange rates. Currency losses of more than 25% are marked in red. Past performance is not a reliable indicator of future results.

Source: Bloomberg, maximum rolling one-year loss in daily closing FX rate between 1 January 1999 and 20 March 2015.

Depending on the level of underperformance an investor can accept over the short and medium term, the optimal hedging methodology is likely to vary. The optimal solutions will encompass:

- **unhedged** (for investors able to accept short- and medium-term fluctuations in currency values);
- **actively and/or partially hedged** (for example by means of a **currency overlay strategy**, where the overlay manager may add particular views on the currency markets on top of its hedging mandate);
- **fully hedged** (for investors sensitive to the potential losses that can result from currency volatility).

Full currency hedging offers a simple and transparent solution for investors unwilling to bear the fluctuations in currency values and/or to exploit specific currency views.

2. Currency hedging in practice

What is currency hedging?

Currency hedging aims to minimise the risk associated with movements in the foreign currency or currencies in which non-domestic investments are denominated.

The mechanics of hedging

There are two principal steps involved in currency hedging:

- **at a particular point in time**, currency hedging involves the sale in the forward currency market of the currency in which international investments are denominated. This has the effect of removing the foreign currency risk over the period of the hedge for a specific investment amount;
- **from time to time**, the portfolio manager needs to re-adjust the amount of the hedge to reflect the accumulated performance of the hedged asset. This periodic rebalancing brings a dynamic component to the overall hedging cost (hedging costs are discussed below).

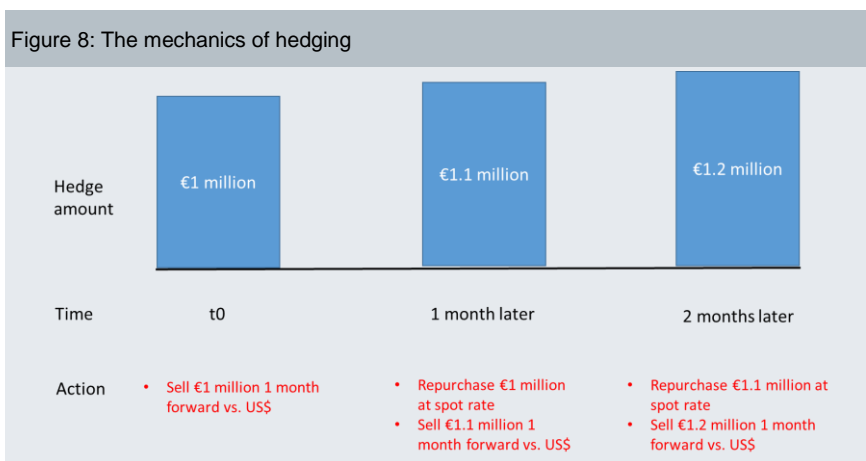
For example, a portfolio manager with a base currency of US dollars and a holding of 1 million euro of European shares or bonds can hedge the euro currency risk by selling a 1 million euro forward contract on euro against US dollar for settlement in a month's time (see Figure 8) at today's rate.



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At the end of the month, when settling this contract⁵, the portfolio manager would usually “roll” the hedge by selling forward an adjusted amount that reflects any change in the value of the underlying securities. This procedure can be repeated periodically, with the portfolio manager resetting the hedge amount each time. In Figure 8 we assume that the hedge amount rises to €1.1 million after one month and €1.2 million after two months.

During the course of a month, the portfolio may be over- or under-hedged as a result of changes in the value (in euros) of the underlying asset. The choice of the frequency at which (re-)hedging takes place therefore involves a trade-off: more frequent (e.g. daily) hedging would ensure that the portfolio is less exposed to currency risk intra-month, but this increased frequency of hedging would also involve increase transaction costs.



Source: Deutsche AWM, for illustrative purposes only.

Cost of currency hedging: forward exchange rates and the carry component

At any point in time, the cost of implementing a currency hedge has two components:

- a **transactional cost** (the bid/offer spread associated with the periodic “rolling” of the hedge);
- a cost (or in some cases a return) related to interest rates, called the **cost of carry**.

For many foreign exchange pairs, the transactional element of hedging costs is modest. Annualised bid/offer spreads in currency pairs involving developed markets can be as little as 5 basis points (hundredths of a percent), assuming monthly hedging. In emerging markets, annualised bid-offer spreads may reach 50-60 basis points or higher.

⁵ The settlement of the currency hedging contract essentially enables the portfolio manager to realize the profits/losses on the currency hedging, which will aim to offset the respective losses/profits rising from the currency effect on the underlying asset.

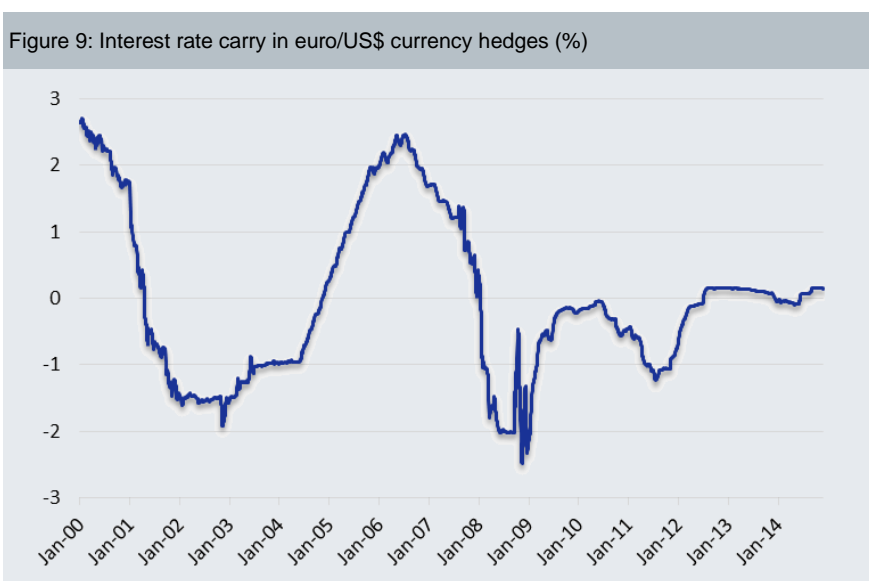


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The cost of carry reflects the interest rate differential between the two currencies in the forward foreign exchange contract. In any forward contract, an investor agrees to exchange two currencies at a future date at an agreed price. In effect, over the life of the forward contract investors earn the interest rate on the currency in which they are long and pay the interest rate on the currency in which they are short (such interest rate impact is reflected in the valuation of the forward).

In the example set out in Figure 8, an investor with a base currency of US dollars is hedging a portfolio exposure in euros. The investor is therefore short euros and long US dollars in the currency hedge. If US dollar interest rates are higher than euro interest rates the hedge will generate a net positive return (this may be referred to as “positive carry”). Conversely, if US dollar interest rates are lower than euro interest rates the hedge will incur a cost (this may be referred to as “negative carry”).

Figure 9 illustrates the historical interest rate carry in currency hedges from the euro to the US dollar, based on one month LIBOR rates. When the interest rate carry was positive (as in 2000-01 and 2005-07) hedging from euro to US dollars (the example set out in Figure 6) generated a net return. When the carry was negative (as in 2002-04 and 2008-09) hedging from euro to US dollars incurred a net cost.



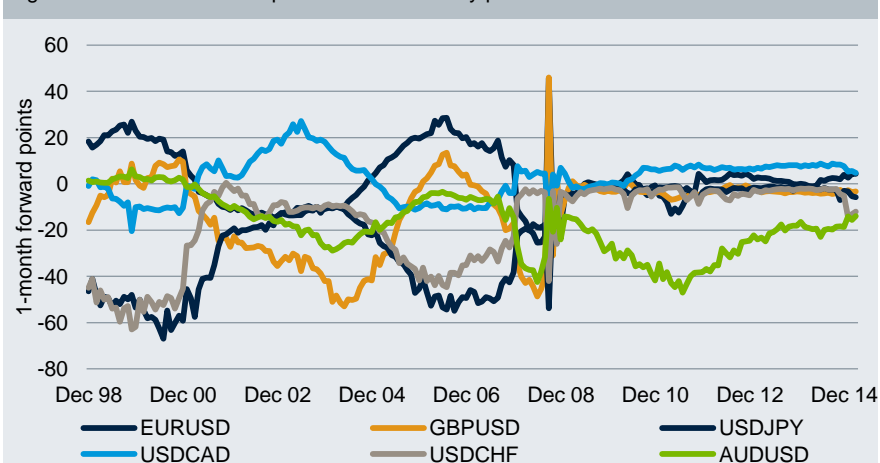
Source: Bloomberg, 1 January 2000-28 November 2014. The chart shows the difference between US\$ 1 month Libor and Euro 1 month Libor.

More recently, the interest differential between these two currencies has been close to zero, implying little net cost or return from currency hedging. Near-zero interest rates in many major economies mean that the same is currently true for a wide variety of currency pairs. This translates into historically low forward costs, as illustrated in Figure 10.



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Figure 10: 1-month forward points for six currency pairs



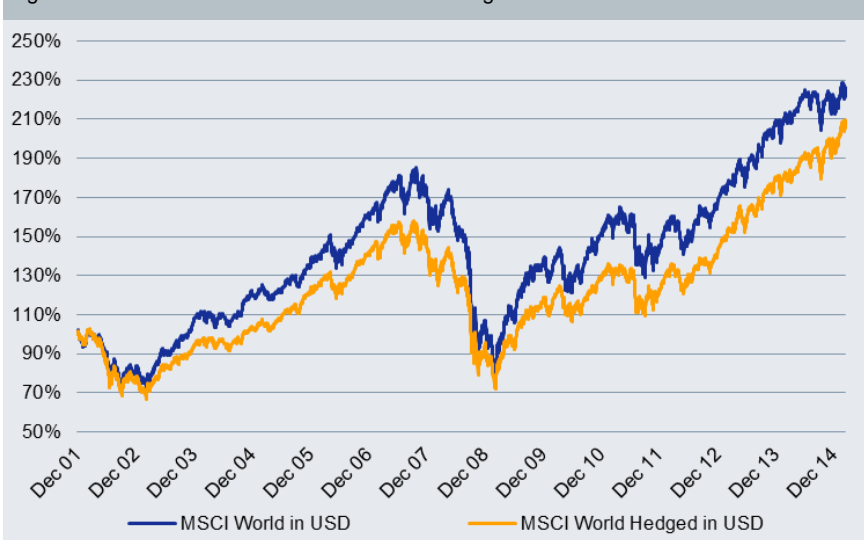
Source: Bloomberg, January 1999 to March 2015 inclusive.

Risk reduction in currency hedged indices: the equity case

The principle of currency hedging can be extended to indices of equities and bonds denominated in a variety of different currencies. Index providers calculate both unhedged (where an investor retains full exposure to the currencies of denomination of the underlying assets, irrespective of the currency in which the index return is calculated⁶) and hedged indices (in which the index's currency exposures are hedged back to the base currency, typically by means of one-month forward contracts).

Below, we show the returns of the MSCI World index in unhedged and hedged terms from both a US dollar-based (Figure 11) and euro-based investor's perspective (Figure 12).

Figure 11: MSCI World index in US dollar and hedged US dollar terms



Source: MSCI, 31 December 2001-18 March 2015. Index levels are rebased at 100 on 31 December 2001. Past performance is not a reliable indicator of future results.

⁶ Index providers calculate (unhedged) market returns in a variety of currencies, reflecting the experience of investors in different currency zones when investing in markets on an unhedged basis.



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Figure 12: MSCI World Index in euro and hedged in euro terms

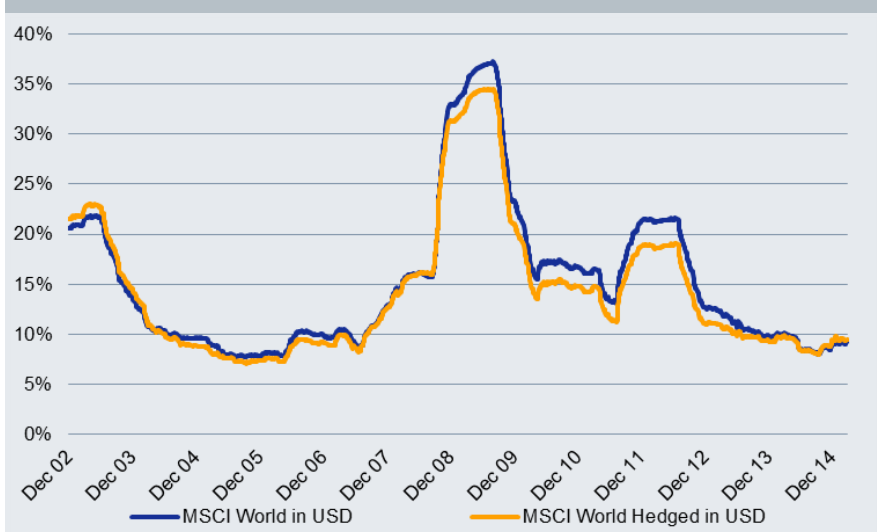


Source: MSCI, 31 December 2001-18 March 2015. Index levels are rebased at 100 on 31 December 2001. Past performance is not a reliable indicator of future results.

From a risk management perspective, theory and empirical evidence suggest that currency hedging in a global equity portfolio can make a contribution to reducing portfolio volatility, particularly if the returns on foreign currencies are positively correlated with local equity market returns⁷.

Figure 13 shows the historic rolling 12-month volatility of the unhedged and US dollar-hedged MSCI World index.

Figure 13: Rolling 12-month volatility of unhedged and hedged MSCI World index



Source: MSCI, 31 December 2001-18 March 2015. Annualised volatility of daily index returns, based on a notional 252-day year.

⁷ See, for example, "Global Currency Hedging", Campbell, Serfaty-de Medeiros, Viceira, 2008.



Over the Currency Hedge

Risk Reduction in currency hedged indices: the fixed income case

By comparison with a global equity portfolio (in which equity risk dominates currency risk), the contribution of currencies to the risk and return of a global bond portfolio is proportionately larger. As a result, the risk reduction achieved by currency-hedging a global bond index is noticeably greater in relative terms.

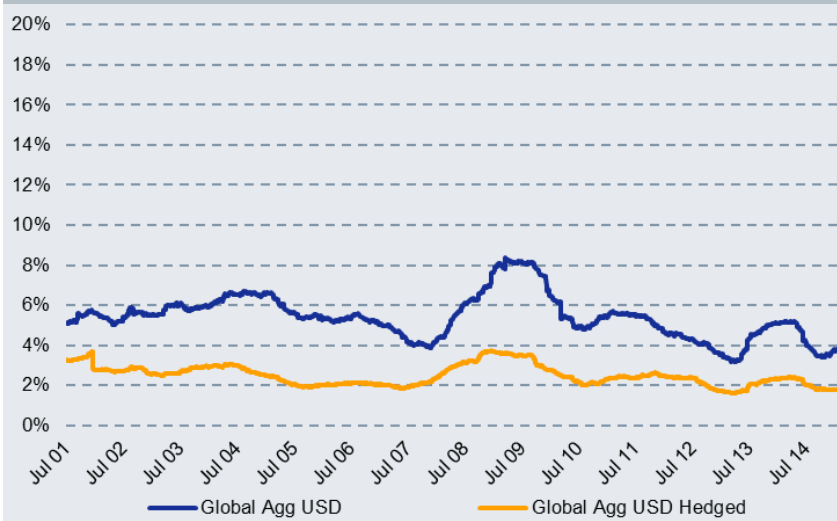
This is evident from Figures 14 and 15, which show the historic returns and rolling 12 month volatility Barclays Global Aggregate index both in unhedged and hedged US dollar terms. The index contains investment grade government, government-related, corporate and securitised bonds from twenty-four different local currency markets⁸.

Figure 14: Barclays global aggregate index in US dollar and hedged US dollar terms



Source: Barclays, 07 July 2000-27 February 2015. Index levels are rebased at 100 on 07 July 2000. Past performance is not a reliable indicator of future results.

Figure 15: Rolling 12-month volatility of unhedged and hedged Barclays Global Aggregate index



Source: Barclays, 07 July 2000-27 February 2015. Annualised volatility of daily index returns, based on a notional 252-day year. Past performance is not a reliable indicator of future results.

⁸ Source: Barclays, 5 March 2014.



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Putting it all together: the volatility reduction factor, and its main components

Figure 16, below, shows that the amount of risk reduction that is achieved through hedging depends primarily on two factors: the correlation between the currency being hedged and the underlying asset; and the volatility of the asset and the currency.

In the case of assets displaying relatively low historical volatility (such as global fixed income), currency risk may represent a majority of the overall risk and hedging can therefore offer a strong reduction in volatility. However, even in the case of relatively high volatility assets (such as emerging market equities), the emerging market currency risk represents a significant portion of the overall risk.

We define the Volatility Reduction Factor as the ratio between the volatility of the hedged index in a particular currency and the unhedged index in the same currency. Such ratio between the asset and the currency is therefore likely to be a significant factor in the decision over whether or not to hedge currency risk.

Figure 16: Five-year volatility and volatility reduction factor for hedged and unhedged indices across asset classes and in different base currencies

5Y Volatility	Base Currency	Unhedged in EUR	Hedged in EUR	Unhedged in USD	Hedged in USD	Unhedged in GBP	Hedged in GBP
MSCI World	USD	12.42%	13.26%	14.45%	13.07%	12.96%	13.22%
MSCI EM	USD			18.08%	11.95%		
MSCI EMU	EUR			24.88%	19.54%	24.88%	19.77%
S&P 500	USD	15.68%	16.21%			15.92%	16.14%
MSCI Japan	JPY	19.47%	19.55%	18.88%	19.59%	19.09%	19.68%
Barclays Global Agg	USD	6.87%	2.19%	4.58%	2.17%	6.55%	2.18%

Volatility Reduction Factor	EUR	USD	GBP
MSCI World	107%	90%	102%
MSCI EM		66%	
MSCI EMU		79%	79%
S&P 500	103%		101%
MSCI Japan	100%	104%	103%
Barclays Global Agg	32%	47%	33%

Source: Bloomberg, Deutsche Bank, 31 March 2010-31 March 2015. Annualised volatility of daily index returns, based on a notional 252-day year. Past performance is no guarantee of future results.

Comparative performance of hedged and unhedged indices: time does matter

Figure 17 shows that the longer the investment time horizon, the greater the likelihood that the performance of hedged and unhedged indices converges. Over one year, the difference in performance between the unhedged and hedged versions of the same index regularly reaches double figures in percentage terms, whereas over five years the annual performance differential is smaller. The period over which an investor's performance is assessed is therefore also a significant contributing factor to the decision over whether or not to hedge currency exposure.



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Figure 17: One-year and five-year annualised performance of hedged and unhedged indices across asset classes and in different base currencies

1Y Returns	Unhedged in EUR	Hedged in EUR	Unhedged in USD	Hedged in USD	Unhedged in GBP	Hedged in GBP
MSCI World	36.06%	13.50%	6.03%	13.81%	19.07%	14.00%
MSCI EM			0.44%	7.38%		
MSCI EMU			-6.13%	19.88%	-6.13%	20.61%
S&P 500	43.78%	11.55%			25.83%	12.04%
MSCI Japan	43.80%	30.04%	12.06%	29.51%	25.84%	30.24%
Barclays Global Agg	23.63%	7.39%	-3.66%	7.39%	8.19%	7.83%

5Y Returns	Unhedged in EUR	Hedged in EUR	Unhedged in USD	Hedged in USD	Unhedged in GBP	Hedged in GBP
MSCI World	15.20%	10.44%	10.00%	11.32%	10.48%	11.07%
MSCI EM			1.75%	2.98%		
MSCI EMU			4.54%	10.27%	4.54%	10.00%
S&P 500	19.11%	12.68%			14.23%	13.36%
MSCI Japan	12.52%	15.17%	5.87%	10.42%	6.33%	10.33%
Barclays Global Agg	7.14%	4.69%	2.30%	4.63%	2.75%	4.92%

Source: Bloomberg, Deutsche Bank, 31 March 2010-31 March 2015. Past performance is no guarantee of future results.

Should an investor hedge or not?

During the last thirty years academics have been involved in an active discussion on the appropriate level of hedging for global portfolio investors in equities and bonds. Among others :

- Fischer Black (1985-1994) proposed a universal hedging formula and suggested an optimal hedge ratio for investors in foreign share markets, based upon expectations of foreign markets' excess returns and the volatility of those returns. Black argued that 100% of overseas bond holdings should be hedged.
- Schmittman (2010) argued that currency hedging for risk reduction purposes should be considered by global equity and bond investors over holding periods of up to five years.
- De Roon, Eiling, Gerard and Hillion (2012) argued that that currency hedging reduces both portfolio risk and mean expected returns.

Currency hedging essentially removes a specific factor contributing to a portfolio's overall volatility, namely the foreign currency risk. Hedging may create an opportunity cost, that of missing a potential appreciation of foreign currencies.

For any individual investor, the choice of whether or not to hedge currencies will depend on a number of factors, including:

- the base currency of the investor;
- the investment time horizon;
- the nature of the hedging strategy being performed;
- the performance characteristics of the underlying securities and, in particular, the levels of relative risk between the asset and the currencies;
- the cost of the hedging strategy.



Over the Currency Hedge

3. Currency hedged ETFs

How do currency hedged ETFs work?

An ETF's portfolio manager starts by buying and holding the shares, bonds or other assets needed to meet the fund's objectives. For most ETFs, this objective is track the performance of a reference index, before fees and costs.

For example, the managers of the db x-trackers Japan Index UCITS ETF (DR) attempt to replicate the reference index (the net total return version of the MSCI Japan index) by buying all or most of the constituents of the index and in proportions similar to those of the index.

Through typical unhedged share classes in euro, an investor would be able to get exposure to the MSCI Japan index (in yen) but valued in euro, hence keeping the risk of yen against euro.

In addition to two unhedged share classes of the db x-trackers Japan Index UCITS ETF (DR), Deutsche AWM also offers three currency-hedged share classes. These provide exposure to different currency-hedged versions of the reference index (i.e., the index returns, hedged into different currencies):

- MSCI Japan monthly USD hedged (share class 2D)
- MSCI Japan monthly Euro hedged (share class 4C)
- MSCI Japan monthly GBP hedged (share class 6C)

In order to track the performance of each currency-hedged version of the index, the investment manager hedges the currency exposure of the fund's underlying holdings (in this case, in Japanese yen) into the currency of the relevant hedged share class.

The currency hedge is performed by one-month forward foreign exchange or other currency derivative contracts, replicating the hedging frequency embedded in the index. As illustrated in Figure 6, the ETF portfolio manager renews the forward currency contracts each month, adjusting the size of the currency hedge to take into account any changes in value of the holdings in the relevant share class of the ETF

These currency contracts serve to minimize the ETF's exposure to fluctuations in the yen, the currency in which the Japanese shares held by the fund are denominated.

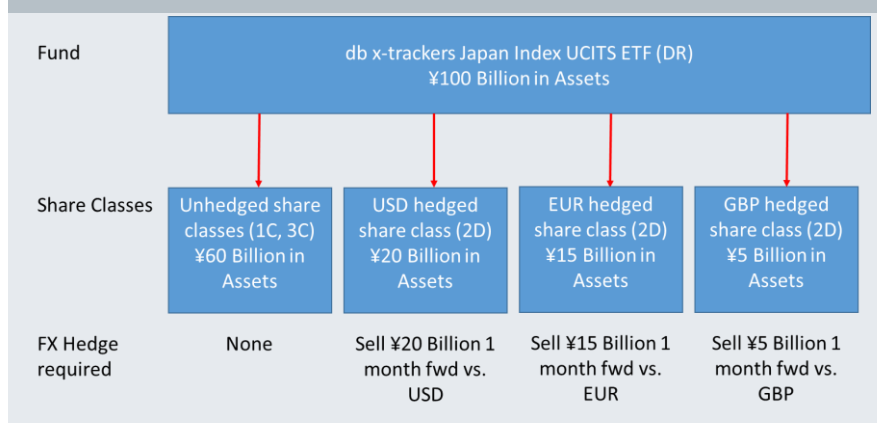
For example, if the yen falls by 2% over the course of a month against the US dollar, the forward currency contract owned by the USD hedged share class of the ETF should generate a gain that fully or partially offsets that currency loss.

The structure of a typical ETF, its share classes and the accompanying currency hedges is set out in Figure 18. All the asset figures are notional and for purposes of illustration only.



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Figure 18: An equity ETF with unhedged and hedged share classes



Source: Deutsche AWM, for illustrative purposes only.

Currency hedged ETFs, ETF currency share classes, currency ETCs and depositary receipts

It's easy to become confused by the different tracker products and securities that reference currencies in different ways. These are the principal differences between them.

- Currency hedged ETFs offer exposure to portfolios of global equities, bonds and other asset classes on a currency hedged basis. Such ETFs reduce the currency risks associated with non-domestic assets while maintaining exposure to the other components of equities' and bonds' returns (potential capital growth, dividends, credit, interest income, etc.). These ETFs are the focus of this guide.
- ETF Currency Share Classes enable investors to buy and sell a single fund using different currencies. The investor retains unhedged exposure to the currencies of denomination of the fund holdings. For example, the db x-trackers Euro Stoxx 50 UCITS ETF (DR) can be traded on the Deutsche Boerse, the Mercado Continuo Espana, the Borsa Italiana and the Stuttgart Stock exchange in euros, on the London Stock Exchange in British pounds and on the SIX Swiss Exchange in Swiss francs.
- Currency ETCs are debt instruments offering exposure to movements in a particular exchange rate or basket of currencies, sometimes on a short or leveraged basis.
- Depositary receipts such as American and Global Depositary Receipts (ADRs, GDRs) are certificates issued by a depositary bank to represent ownership of an underlying number of shares of a foreign company. ADRs and GDRs are frequently used by share issuers in emerging markets who wish to access investors in other capital markets. The return on an ADR, for example, reflects both movements in the foreign company's domestic share price and in its domestic currency vis-à-vis the US dollar. In other words, an ADR buyer receives a return equivalent to an unhedged investment in the foreign company's domestic share; there is no hedging of currency exposures.



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Conclusion

Foreign currencies can be a significant driver of risk and return in a portfolio. As a result of macroeconomic trends and self-reinforcing capital flows, currency rates often move in cycles, with frequent over- and undershoot in their values. The periodic drawdowns experienced by an unhedged investor can be severe, even when holding a notionally strong currency.

Currency hedging enables investors to separate the currency risk associated with investing in an international market from the other drivers of the market's return, and to offset the currency risk by means of forward foreign exchange contracts. From a portfolio perspective, hedging can also reduce volatility, particularly in fixed income.

For an investor, the decision on whether to hedge exposure to overseas markets will depend on a number of factors, including:

- the base currency of the investor;
- the investment time horizon;
- the nature of the hedging strategy being performed;
- the performance characteristics of the underlying securities and, in particular, the levels of relative risk between the asset and the currencies;
- the cost of the hedging strategy.

For investors wishing to hedge their overseas holdings of equities and bonds, currency hedged ETFs offer a transparent way of accessing international markets with reduced exposure to foreign exchange market volatility.



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References

Black, Fischer: "Universal Hedging", Financial Analysts Journal, January-February 1995

De Roon, Eiling, Gerard, Hillion: "Currency Risk Hedging: No Free Lunch", September 2012

Schmittman, Jochen: "Currency Hedging for International Portfolios", IMF Working Paper 10/151, June 2010.

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Risk Factors – db X-trackers UCITS ETFs

- Investors should note that the db X-trackers UCITS ETFs are not capital protected or guaranteed and investors in each db X-trackers UCITS ETF should be prepared and able to sustain losses of the capital invested up to a total loss.
- The value of an investment in a db X-trackers UCITS ETF may go down as well as up and past performance is not a guide to the future.
- Investment in db X-trackers UCITS ETFs involve numerous risks including among others, general market risks relating to the relevant index, credit risks on the provider of index swaps utilised in the db X-trackers UCITS ETFs, exchange rate risks, interest rate risks, inflationary risks, liquidity risks and legal and regulatory risks.
- Not all db X-trackers UCITS ETFs may be suitable for all investors so please consult your financial advisor before you invest in a db X-trackers UCITS ETF
- db X-trackers UCITS ETFs following a direct replication investment policy, may engage in securities lending. In these instances the db X-trackers UCITS ETFs face the risk of the borrower not returning the securities lent by the db X-trackers UCITS ETF due to e.g. a default situation and the risk that collateral received by the db X-trackers UCITS ETFs may be liquidated at a value lower than the value of the securities lent out by the db X-trackers UCITS ETFs.
- db X-trackers UCITS ETFs employing an indirect investment policy will use OTC derivative transactions. There are appropriate arrangements in place to reduce the exposure of the db X-trackers UCITS ETF to the counterparty, in some cases up to 100%, but there is no guarantee that such arrangements will be perfect and the counterparty may lose up to 100% of its investment if the counterparty defaults.
- db X-trackers UCITS ETFs may be unable to replicate precisely the performance of an index.
- An investment in a db X-trackers UCITS ETFs is dependent on the performance of the underlying index less costs, but an investment is not expected to match that performance precisely. There may be a tracking difference between the performance of the db X-trackers UCITS ETFs and the underlying index e.g. due to the impact of fund management fees and administrative costs among other things. The returns on the db X-trackers UCITS ETFs may not be directly comparable to the returns achieved by direct investment in the underlying assets of the db X-trackers UCITS ETFs or the underlying index. Investors' income is not fixed and may fluctuate.
- db X-trackers UCITS ETFs shares may be denominated in a currency different to that of the traded currency on the stock exchange in which case exchange rate fluctuations may have a negative effect on the returns of the fund.
- The value of any investment involving exposure to foreign currencies can be affected by exchange rate movements.
- Tax treatment of the db X-trackers UCITS ETFs depends on the individual circumstances of each investor. The levels and bases of, and any applicable relief from, taxation can change.
- DB Affiliates significant holdings: Investors should be aware that Deutsche Bank or its affiliates ("DB Affiliates") may from time to time own interests in any individual db X-trackers UCITS ETF which may represent a significant amount or proportion of the overall investor holdings in the relevant db X-trackers UCITS ETF. Investors should consider what possible impact such holdings by DB Affiliates may have on them. For example, DB Affiliates may like any other Shareholder ask for the redemption of all or part of their Shares of any Class of the relevant db X-trackers UCITS ETF in accordance with the provisions of this Prospectus which could result in (a) a reduction in the Net Asset Value of the relevant db X-trackers UCITS ETF to below the Minimum Net Asset Value which might result in the Board of Directors deciding to close the db X-trackers UCITS ETF and compulsorily redeem all the Shares relating to the db X-trackers UCITS ETF or (b) an increase in the holding proportion of the other Shareholders in the db X-trackers UCITS ETF beyond those allowed by laws or internal guidelines applicable to such Shareholder.
- db X-trackers shares purchased on the secondary market cannot usually be sold directly back to the db X-trackers ETFs. Investors must buy and sell shares on a secondary market with the assistance of an intermediary (e.g. a stockbroker) and may incur fees for doing so. In addition, investors may pay more than the current net asset value when buying shares and may receive less than the current net asset value when selling them.
- Full disclosure on the composition of the db X-trackers UCITS ETF's portfolio and information on the Index constituents, as well as the indicative Net Asset Value, is available free of charge at www.etf.deutscheawm.com. For further information regarding risk factors, please refer to the risk factors section of the prospectus, or the Key Investor Information Document.



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