



Invesco Fixed Income Investment Insights

Getting familiar with global portfolio hedging

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Executive summary

Global diversification has become an important objective when constructing fixed income portfolios. Diversifying from a portfolio's base currency can provide access to more attractive asset markets and potentially provide higher levels of risk compensation. The shift into foreign assets has demanded an increased focus on hedging strategies aimed at reducing unwanted risks. In the current environment of generally low expected returns, the costs associated with hedging have also become an important concern. In this paper, we describe various hedging methods and the costs of hedging fixed income portfolios.



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Key takeaways

- We believe proactive hedging strategies can improve the overall performance of global bond portfolios.
- A variety of hedging tools are available to offset unwanted currency and interest rate risk, including futures, forwards and swaps.
- "Basis" risk, the difference between the theoretical and market price of a forward contract, has recently become an important consideration in the cost of currency hedging.
- Volatility in the cost of hedging instruments can potentially create opportunities to switch between them when attempting to minimize costs.
- Invesco Fixed Income's research-based process helps identify both technical and macroeconomic drivers of hedging costs. We believe this dual capability is essential for effectively managing hedging strategies in global portfolios.

Breaking down global credit portfolio risk

The majority of foreign fixed income assets can generally be thought of as presenting three main risks: currency risk, interest rate risk and credit risk. Depending on an investor's objectives, some of these risks may be undesirable. Currency and interest rate risk in particular may have an outsized impact on portfolio performance. As seen in Figure 1, currency and interest rate volatility have historically been greater than credit volatility, suggesting that they could dominate returns delivered by foreign credit assets.

Figure 1:

Total global credit portfolio risk = credit risk + interest rate risk + currency risk

	Historical volatility of US dollar credit portfolio faced by euro-based investor (%)
Credit volatility	1.25
Interest rate volatility	1.43
Currency volatility	3.00

Sources: Invesco and Bloomberg Barclays US Aggregate Credit Index. US dollar based investment portfolio is represented by the Bloomberg Barclays US Aggregate Credit Index, Jan 20, 2007 to Jan 20, 2017.

Defining portfolio risks

The three main portfolio risks shown in Figure 1 are defined below. Our discussion centers on seeking protection against unwanted interest rate and currency risk. Given that the portfolio under discussion is a global credit portfolio, we assume that it is desirable to hold credit risk.

Credit risk: Credit risk is the risk that a bond issuer will default on its bond payments. The market's perception of a bond's credit risk can fluctuate, resulting in corresponding changes in the value of the bond. All else equal, bonds with more credit risk are valued less than bonds with lower credit risk.

Interest rate risk: Interest rate risk is the risk that higher long-term interest rates may reduce the value of a credit asset. As long-term interest rates rise, the value of holding a bond decreases as investors are able to seek higher yields elsewhere.

Long-term interest rates are driven by a number of factors, including investors' expectations about the path of short-term interest rates. Short-term interest rates are typically determined by central banks which are tasked with managing the balance between growth and inflation. When growth and inflation expectations rise, expectations of higher interest rates also typically rise. This can negatively impact the value of a bond portfolio.

Currency risk: Currency risk is the risk associated with receiving future cash flows in a foreign currency. Over the life of a foreign currency denominated bond, investors face the risk that their bond payments will be converted at a lower exchange rate than when the bond was originally purchased. If the foreign currency depreciates, cash flows received from the bond will be worth less in terms of domestic currency. Currency fluctuations are due to a variety of economic and market drivers, including global and country-specific factors.

Commonly used hedging tools

Investors can seek to protect against interest rate and currency risk by implementing a variety of hedging tools. Below, we describe some commonly used hedging instruments designed to offset interest rate and currency volatility.

Interest rate hedges

Interest rate futures contracts: Interest rate futures contracts are standardized contracts in which a seller agrees to deliver an interest-bearing asset (US Treasuries, for example) in the future at a previously agreed upon price. In the case of a global portfolio hedge, an investor would sell foreign interest rate futures to hedge the interest rate risk associated with his or her credit portfolio. If credit bonds lose value (due to increased yields as discussed above), the short futures positions would increase in value.

In practice, futures contracts are typically opened and closed in short-term increments over the life of the underlying investment due to liquidity considerations. For example, US Treasury futures contracts are closed and re-opened quarterly. This process (known as rolling) is repeated over the life of the investment.

Interest rate swaps: In a swap agreement, an investor receives/pays a fixed interest rate to pay/receive a floating interest rate. The fixed interest rate remains unchanged over the life of the swap while the floating rate adjusts periodically. If the investor pays a fixed interest rate and receives a floating rate, the value of the swap increases if market interest rates rise - as opposed to the underlying fixed rate credit asset, which loses value. In the case of a global portfolio hedge, the investor would pay a fixed foreign interest rate to receive a floating foreign interest rate.

Currency hedges

Currency forward contracts: The most common way to manage currency risk is with short-term currency forward contracts. Currency forwards are agreements between two parties to buy and sell a currency pair at an agreed upon price on an agreed upon date in the future. Investors can manage currency risk by selling foreign currency and buying their home currency. The currency forward increases in value when the foreign currency depreciates.

Currency futures contracts: Unlike currency forward contracts, currency futures contracts are standardized, exchange-listed and exchange-traded instruments. As such, currency futures have pre-defined maturity dates and contract sizes. If an investor sells foreign currency and buys domestic currency and the foreign currency depreciates, the value of the futures position will increase the investor's return.

Like interest rate futures, currency futures and forwards are often purchased in shorter-term increments, such as three-month contracts, and "rolled" over the life of the underlying investment. Because forward contracts are not standardized, they could be written to lock in an exchange rate and long-term date to match the life of the bond. However, liquidity favors entering into short-term contracts.

Cross-currency asset swaps: Cross currency asset swaps allow investors to simultaneously hedge currency and interest rate risk. Two parties agree to exchange principal and interest payments. The parties also agree to exchange those payments in two different currencies, setting a pre-determined exchange rate at the opening of the swap. By matching the timing and amount of swapped cash flows to those of the bond portfolio, an investor can pay foreign currency bond payments and receive domestic currency bond payments at a pre-determined exchange rate.

Cost of interest rate hedging

Interest rate hedging converts a long-term, fixed interest rate into a short-term, floating interest rate. In a swap, a bond investor typically makes fixed payments to receive floating payments based on short-term interest rates which correspond in timing and amount to the coupon of the credit bond. This, however, leaves the investor exposed to short-term interest rates via the floating rate on the interest rate swap. Interest rate hedging is profitable if the value of the floating payments received over the life of the bond is higher than the value of the fixed payments made by the investor. This would occur if short-term interest rates are ultimately higher than those implied in the price of the swap at its inception.

Cost of currency hedging

Two factors account for most of the cost of a currency hedge: the interest rate differential between the foreign and domestic currencies and the so-called "basis." Other factors also affect the total cost, such as transactions costs, but they are relatively small. The main components of currency hedging costs are described below.

Interest rate differential

The price of a currency forward is theoretically based on the difference between the short-term foreign and domestic interest rates. If the price of a forward agreement were not based on this differential, investors would be able to earn a riskless profit by borrowing in the lower interest rate currency and investing in the higher rate currency. This "arbitrage" would ultimately eliminate the interest rate differential. In practice, imbalances in the supply

and demand for currencies have caused the price of currency forwards to deviate from their theoretical levels.

Basis

“Basis risk” arises because hedges may not be perfect - prices of investments in a hedging strategy may not perfectly offset price changes of the underlying investment, causing potential excess gains or losses. Although the theoretical price of a currency forward is determined by the interest rate differential, prices traded in the market can differ significantly from theoretical values. The difference between the theoretical price and the actual traded price of a currency forward is called the “basis.” This differential arises when the supply and demand for currency forwards become unbalanced and there is a lack of capital to arbitrage the basis back to its theoretical level (i.e. zero difference between the theoretical and market prices of the forward contract). Changes in the basis have been larger and more frequent since the global financial crisis, which we discuss further below. Taking basis risk into account is important because increases in the basis can increase currency hedging costs, which can adversely affect cross-border fixed income investors.

Currency hedging in action: an example

Assume a UK investor invests in the Bloomberg Barclays US Aggregate Credit Index, yielding 3.20%. If the differential between three-month British pound Libor (UK interest rate) and three-month US dollar Libor (US interest rate) is 70 basis points (annualized), and the currency basis is 18 basis points, the total annualized hedging cost would be 88 basis points (interest rate differential + currency basis). The total yield on the UK investor’s investment would, therefore, be 2.32%.

In this example, we reference the 3-month forward contract, a commonly used tenor to hedge currency risk. As each contract expires, a new one would be created, providing continuous protection against currency risk over the life of the investment. This process, however, leaves the investor exposed to changes in short-term interest rates. This means that the annualized cost of hedging (Line 4, Fig. 2) depends on the cost of each renewed contract, which changes as interest rates change. Basis risk exists regardless of the tenor of the forward contract.

Figure 2: Hedging in action: US dollar (USD) credit portfolio hedged into British pounds (GBP)

		Bloomberg Barclays US Aggregate Credit Index hedged into GBP	(%)
		3-month UK LIBOR	0.35
1	minus	3-month US LIBOR	1.05
2	equals	Interest rate differential	-0.70
3	plus	Basis	-0.18
4	equals	GBP USD hedging annualized effect (using a 3 month forward)	-0.88
5	plus	US credit yield	3.20
6	equals	Net hedged yield	2.32

Source: Bloomberg L.P., as of Feb. 24, 2017.

Comparing hedging strategies

In the chart below, we compare alternative hedging strategies to an unhedged strategy. Where marked, the corresponding risk remains unhedged.

Figure 3: Comparing hedging strategies

	Currency risk	Basis risk	Foreign interest rate risk	Credit risk
Unhedged foreign credit portfolio	■	■	■	■
Hedged with currency forwards		■	■	■
Hedged with interest rate swaps	■	■		■
Hedged with swaps and currency forwards		■		■
Hedged with cross currency basis swaps				■

For illustrative purposes only.

As shown in Figure 3, the simplest hedging strategies, currency forward contracts and interest rate swaps, seek to protect against currency and interest rate risk, but leave a number of other risks unhedged. Currency forwards, for example, do not hedge against foreign interest rate volatility. They also leave the investor exposed to future movements in the basis. Coupling currency forward contracts with interest rate swaps or interest rate futures contracts can potentially protect against currency and foreign interest rate movements. However, the investor would still be exposed to changes in the basis.

Hedging with fixed-floating cross-currency swaps is a more comprehensive strategy and is designed to manage all three risks mentioned above. The investor pays a fixed foreign interest rate and a foreign currency payment to receive a domestic floating interest rate and domestic currency payment in return. The spot exchange rate and spread over the domestic short-term interest rate are determined at the inception of the swap and remain fixed over the life of the swap. The timing of the cash flows provided by the swap can be matched to the cash flows of the underlying bond portfolio.

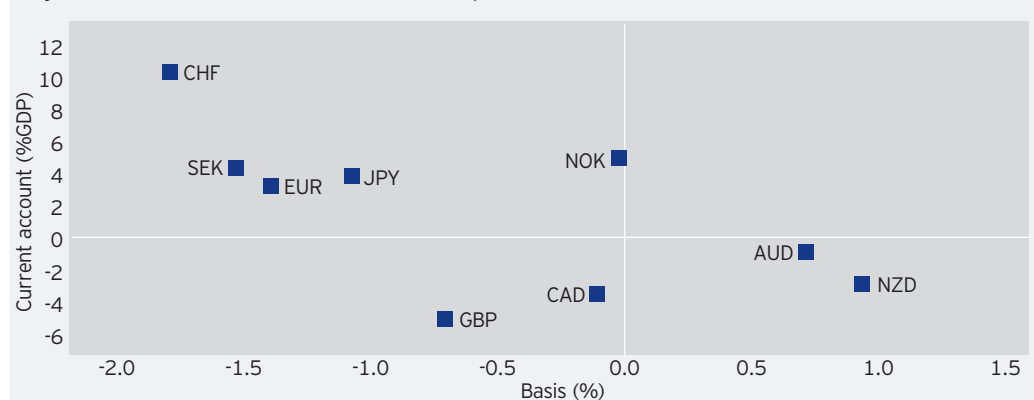
For investors who wish to minimize unwanted foreign interest rate and currency risk, cross currency basis swaps often represent the lowest risk option. However, this option typically involves bilateral derivative documentation, which can be onerous in terms of time and resources.

Currency hedging: recent trends and challenges

Since the global financial crisis, the major variables driving hedging costs have tended to be volatile. As mentioned above, changes in the basis have been particularly significant in the post-crisis period. Zero interest rate and other unconventional monetary policies have generated cross border capital flows as investors have searched worldwide for attractive returns. For example, non-US demand for hedged US assets has been particularly strong due to higher available yields in the US bond market.

Large capital flows and strong demand for currency hedges in recent years have distorted pricing levels of various hedging instruments, especially currency forward contracts. In the currency forward market, demand for currency hedging has widened the basis - driven it more negative - as the actual price of currency forwards has risen above the theoretical price. A larger basis has raised the cost of hedging significantly. Investors in countries with high levels of savings (i.e. large current account surpluses) and very low interest rates have been especially affected. This is because investors in countries with low interest rates and excess savings typically need to diversify their holdings. As savings have been sent abroad in search of higher returns, the demand for currency hedging has driven the basis wider, negatively impacting those investors. In Figure 4, the upper-left quartile shows that currencies of countries with low-to-negative interest rates have enjoyed large current account surpluses but have faced a negative basis.

Figure 4: Current account balance as a percent of GDP versus the basis



Source: Bloomberg L.P., data as of Feb. 24, 2017. CHF is Swiss franc; SEK is Swedish krona; EUR is euro; JPY is Japanese yen; GBP is British pound; CAD is Canadian dollar; AUD is Australian dollar; NZD is New Zealand dollar; NOK is Norwegian krone.

The cost of currency hedging has also been affected by diverging rates of global economic growth. As short-term US interest rates have risen, global interest rate differentials have widened. The increase in interest rate differentials has increased the cost of hedging US assets for non-US investors. If global macroeconomic fundamentals such as growth and inflation continue to diverge, short-term interest rates could diverge further, further raising hedging costs.

Invesco for hedging strategies

We believe proactively seeking the lowest cost hedging strategy can improve the overall performance of a portfolio. Volatility in the pricing of hedging instruments can potentially create opportunities to switch between them when attempting to minimize costs. For example, proactive hedging managers can attempt to optimize the tenor of forward hedges to seek below-average cost contracts. In addition, they can allocate to basis swaps when market conditions appear attractive. Actions such as these can reduce the drag that the cost of hedging typically places on a portfolio.

Cost efficient hedging requires managing the landscape of interest rate differentials and basis risk - an approach that requires two distinct sets of skills and capabilities. Because interest rates are driven by macroeconomic factors, such as growth, inflation and monetary policy, managers expecting to add value by proactively hedging interest rates must have a view of key macroeconomic drivers and the risk premia embedded in foreign interest rates. Invesco Fixed Income has a research-based process to help forecast short-term interest rate differentials and analyze their drivers.

While macroeconomic drivers have a large impact on currency forward pricing, the basis is driven by a different set of factors. Understanding seasonal patterns and other technical drivers of the supply and demand for currency hedging is, therefore, also essential.

Active managers may also provide value by determining the appropriate "hedge ratio" for a given portfolio. Determining how much of a portfolio to hedge is based on a number of criteria, including investment objectives. Unhedged and fully hedged portfolios are not the only options. Selecting hedge ratios between zero and 100 can often improve performance. We investigate this topic in "**Currency management: a simple roadmap.**"¹

1 Currency management a simple roadmap, Ray Uy, Head of Fixed Income Macro Research, Invesco Fixed Income, March 2017.

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