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FX Risk Management Considerations for Investors

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Overview

- The broad aim of this presentation is to discuss techniques and instruments that investors in foreign-denominated bonds can use to manage embedded economic FX risk. The content in this presentation can be applied to European insurers, pension funds and other credit investors. The presentation covers the following areas:

1. UK Insurance – Foreign denominated Investments

- Historical behaviour. How much have insurers been investing in foreign bonds and why?
- Potential future behaviour. What are the factors that we think will influence the quantum of insurers' future investment in foreign bonds?

2. FX Hedging techniques – There are multiple different instruments that can be used to manage FX risk associated with foreign bonds – which do we think is most suitable?

- Instrument behaviour. How does the instrument react to market movements? Does it do more than just hedge the FX risk?
- Economic efficiency. Is the instrument effective at managing cash-flow and mark-to-market risk?
- Market drivers. Who are the players in each market and how liquid is the market?

- **Note that we do not cover regulatory, accounting and legal considerations in this presentation.**



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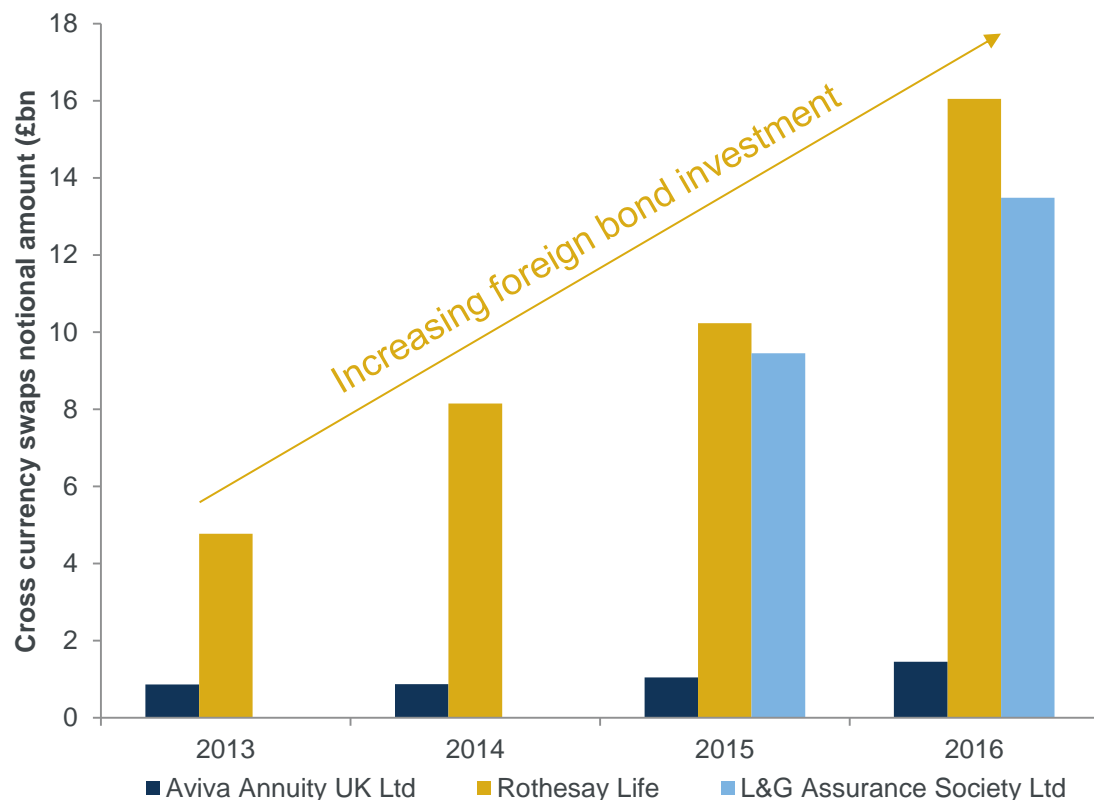


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1. UK Insurance – Foreign Denominated Investments: Past Behaviour and Potential Future Behaviour

UK insurers have been investing more in foreign denominated assets.

Cross-Currency Swap notional amounts (in £bn)



- FX derivatives may be used by UK insurers for multiple reasons, including:
 1. Transforming cash-flows on a fixed income asset back to the liability currency;
 2. Hedging the dividend cash-flow stream from a foreign subsidiary;
 3. Hedging cash-flows on a debt issuance obligation when the cash-flows are in a different currency to that where the underlying P&L is generated; and
 4. Overlay hedge to manage group balance sheet volatility on a SII / EV / IFRS / SI basis
- We assume that the derivative notional amounts shown on the left of this page are used mainly to hedge currency risk associated with fixed income investments held in the MA fund
- Disclosure detail of foreign bond holdings varies significantly between insurers. We estimate that total holdings in the UK make up c.10-20% of total annuity fund assets



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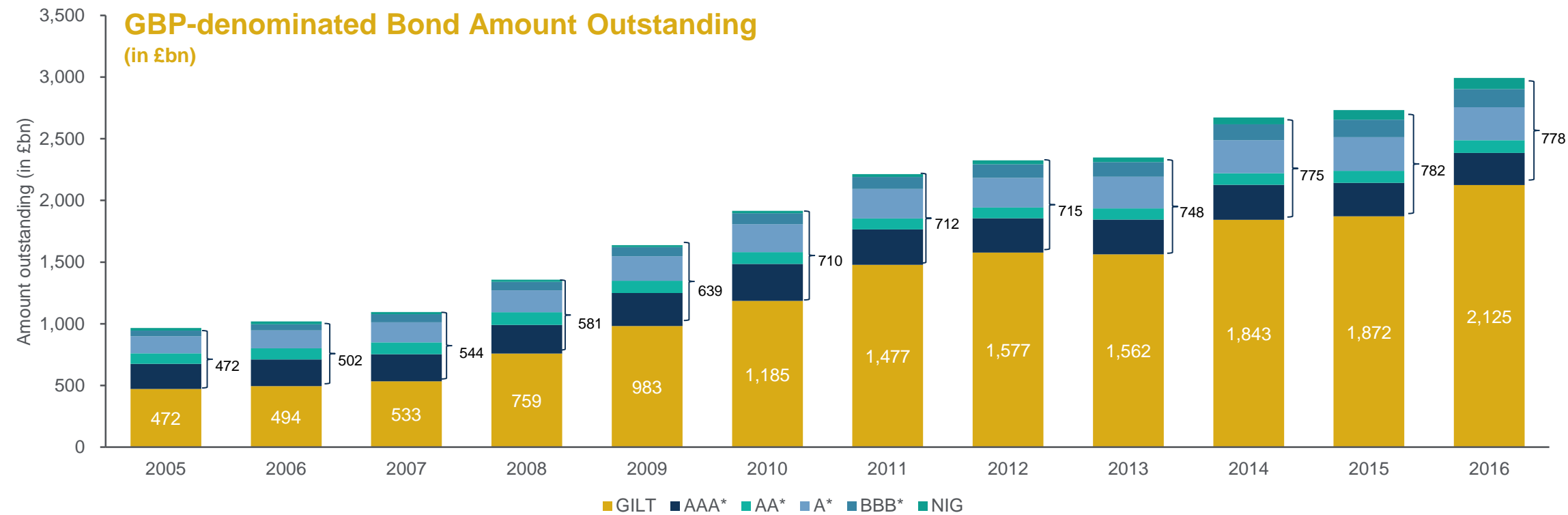
Why have UK Insurers been more investing in non-GBP denominated bonds?

- We believe that there are multiple factors driving UK insurance companies to acquire increasingly large holdings of foreign denominated fixed income assets:
 1. Allows access to relative value credit opportunities across a broad range of markets (i.e. credit spread on foreign bond + cross-currency basis > credit spread on local bond);
 2. Allows access to longer tenor assets with a broader range of credit spreads;
 3. Opens up the potential to increase sector diversification (i.e. via access to the technology sector in the US);
 4. Illiquid asset supply / demand dynamics. There is a general lack of supply of 'illiquid' assets. This can be partially offset by broadening out the potential illiquid asset universe;
 5. Greater depth and liquidity in the USD and EUR markets;
 6. Asset sourcing speed. BPA & M&A situations sometimes require insurers to source assets quickly to achieve the spread priced in on the deal. Some markets outside of GBP can have more consistent liquidity.



GBP fixed income market – An Overview

- There is c.£300bn - £400bn of annuity fund liabilities & capital in the UK, predominantly backed by gilts & corporate credit. As more pension fund liabilities flow onto insurance companies balance sheets (through BPAs), UK insurers may need to increasingly look outside of the UK

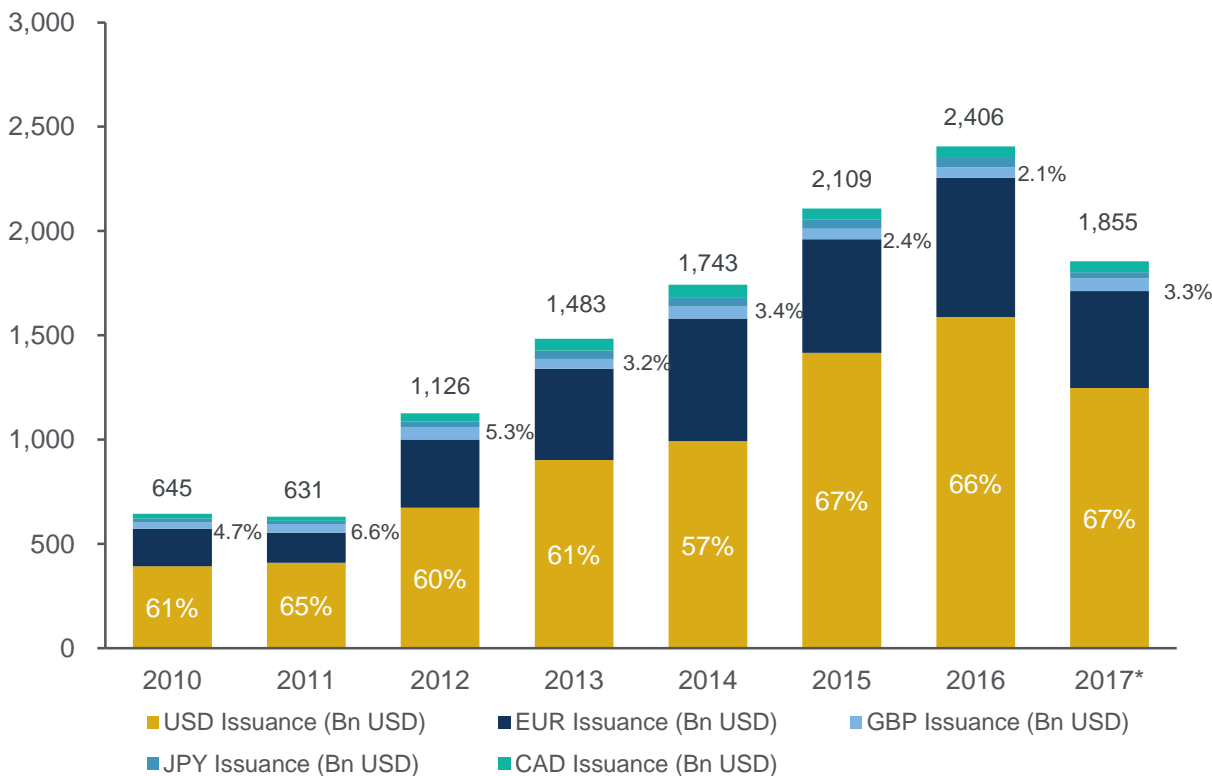


- Gilt amounts outstanding have increased from £472bn to £2,125bn (350% increase) in 11 years
- Corporate credit has increased from £472bn to £778bn in 11 years

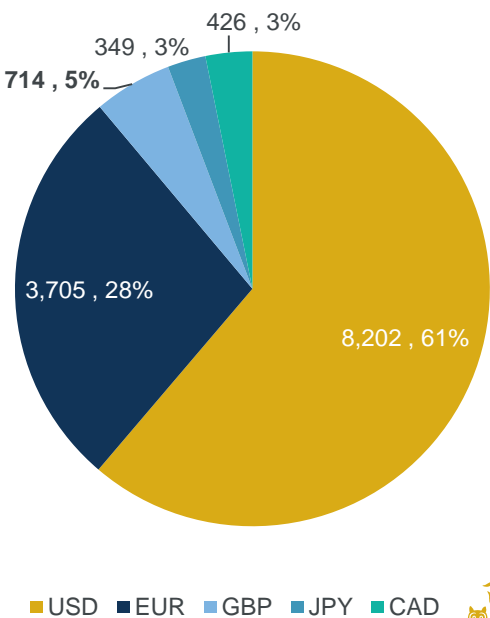
Global credit markets – How does GBP compare?

- The GBP corporate credit market is relatively small in terms of outstanding size and annual issuance amounts compared to others – especially the USD and EUR market.

IG Corporate Bond Issuance by currency (2010-2017)
(in \$bn)



Current Outstanding IG Corporate Bonds
(in \$bn, %, as of 18th Sept 2017)



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Potential drivers of UK Insurers' future holdings in non-GBP denominated bonds

1. Increased BPA activity? New GBP corporate bond issuance may not keep up with the quantum of assets required to back new BPA liabilities?
2. Banking & insurance regulation may impact liquidity of GBP bonds
 - Matching adjustment broadly requires a “buy and maintain” strategy – this may reduce trading activity of certain bonds
 - Broker-dealers generally have smaller bond inventories for the following reasons:
 - Higher market risk RWAs; and
 - Lower economic risk appetite (as a whole)
3. Quantitative Easing – Bank of England has the potential to hold certain bonds on its balance sheet for long periods of time
4. Potential disruption / risk aversion resulting from volatility caused around Brexit





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2. FX Hedging Techniques Overview

FX Hedging Techniques – A Comparison

The table below compares the majority of FX hedging strategies in terms of economics

	FX Forward	Non-resettable Cross-Currency Swaps	Resettable Cross-Currency Swaps	SPV Solution
Liquidity / Pricing Drivers	<ul style="list-style-type: none"> Levels quoted on ICAP / Bloomberg Pricing based on Spot FX / USD rates / GBP rates 	<ul style="list-style-type: none"> Generally lower than resettable cross-currency swaps Pricing driven by market risk, balance sheet usage (SLR) and funding risk 	<ul style="list-style-type: none"> Mid levels quoted on ICAP, and less exposure to CSA collateral Pricing driven by market risk and less by balance sheet usage and funding risk 	<ul style="list-style-type: none"> Pricing driven by market risk on x-currency swap, CVA, balance sheet usage and funding cost priced in structure
Format Flexibility	Higher – terms can be structured	Higher – can be fixed or floating	Lower – USD leg typically needs to be 3m Libor flat	Flexibility available on the terms
Collateral Exposure	Dependant on the tenor	Higher – as mark-to-market exposure to multiple market factors	Lower – as notional reset on a quarterly basis	No exposure – Collateral is managed between Dealer and SPV
Cash-Liquidity requirement	Higher – A rolling FX strategy requires liquidity depending on market moves	Lower – assuming a bond CSA, so less on-going cash liquidity required relative to rolling FX hedges.	Higher – as FX exposure is cash settled every quarter. So similar to a rolling FX strategy	No requirement – Collateral is managed between Dealer and SPV
Central Clearing	Not currently eligible	Not currently eligible	Not currently eligible	N/A



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2. FX Hedging Techniques Overview

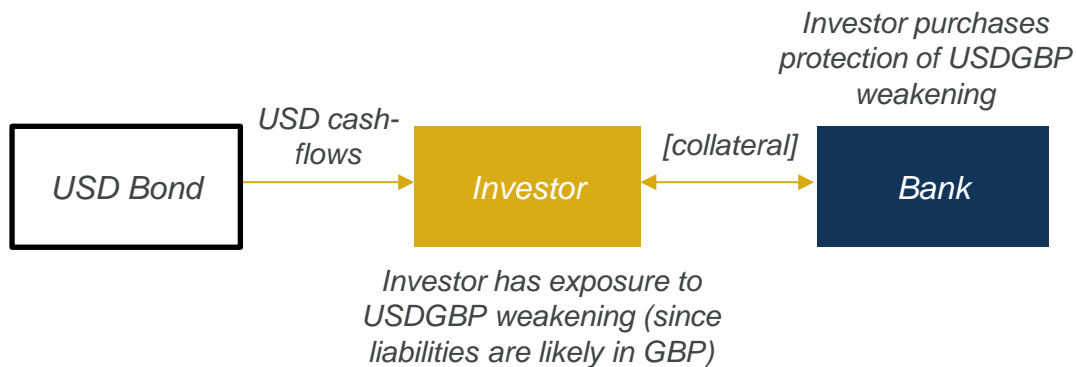
a. FX Forwards

FX Forwards - An Overview

Definition

- An FX forward contract is an agreement to purchase/sell a set amount of a foreign currency at a specified price for settlement at a predetermined time in the future

Payoff Diagram



Potential Advantages

- ✓ Generally liquid product that's widely traded by many different broker / dealers
- ✓ Relatively low transaction costs vs. other potential FX hedging products
- ✓ Relatively straight-forward to value and mark
- ✓ Can be structured to manage mark-to-market (rather than cash-flow) risk
- ✓ Historically has been widely used by investors to manage FX risk

Potential Disadvantages

- ✗ Structured to be efficient at 'day 1', but can become less effective over time as factors impact the (hedged) bond's value (and associated FX exposure) such as rates & credit spread movements
- ✗ Cash-flow required to settle – in order to be self-financing, the underlying bond would need to be rebalanced (this introduces contingent exposures)
- ✗ Collateral – if traded under ISDA / CSA, collateral will be required

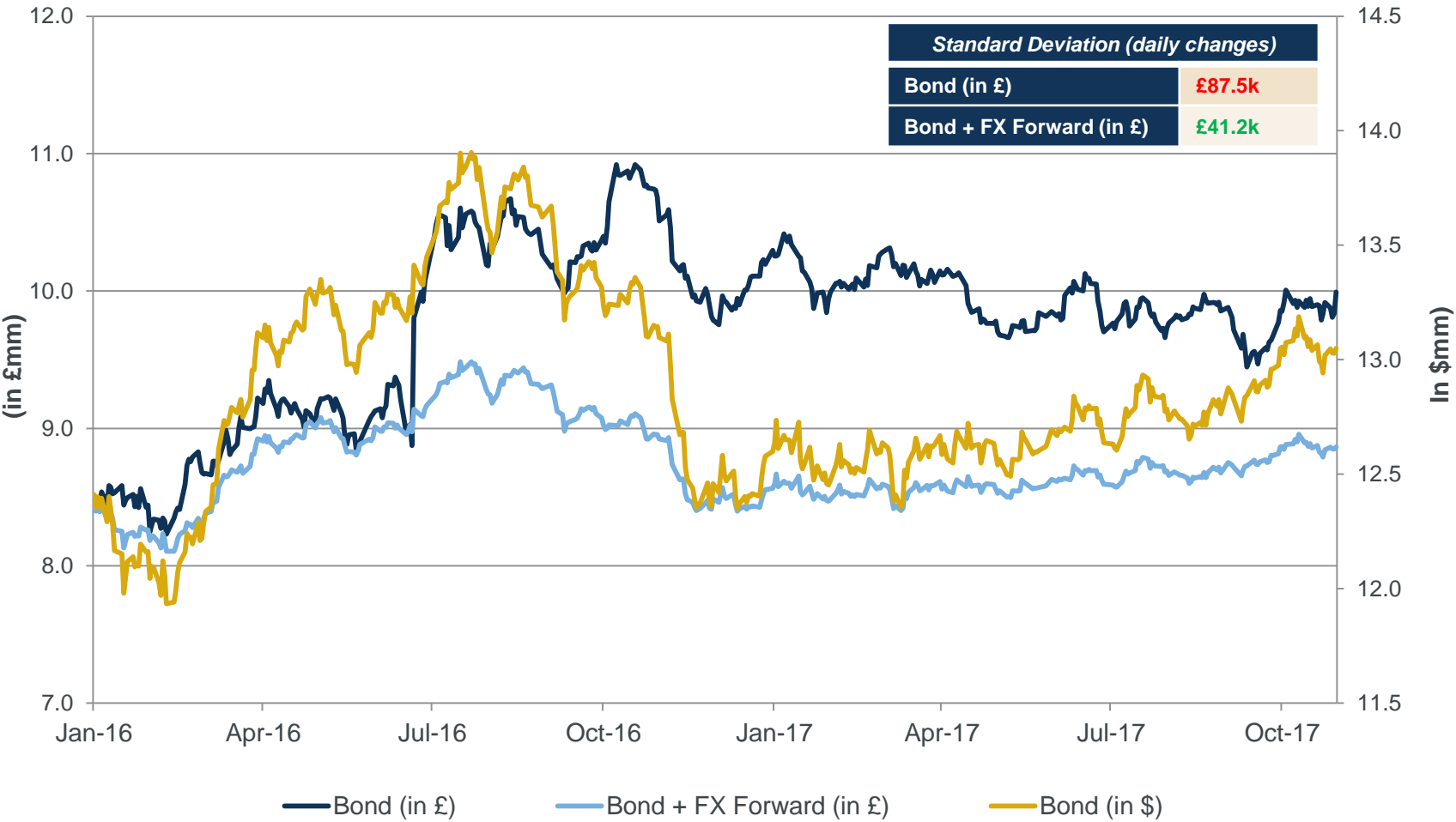
Potential Hedge Calibration Parameters

- Roll frequency.** 3m roll tends to be most common. Less liquidity on longer tenor trades. Frequent rolling can be operationally challenging
- Sizing.** Could be sized based on current mark-to-market of the bond or expected average size over the lifetime of the FX forward (before roll)
- Re-hedging.** If the hedge becomes less effective over time (i.e. FX hedge delta and bond FX delta diverge, under what parameters should the transaction be rolled again?)



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Mark-to-Market Stability Comparison (USD bond vs. USD bond + Rolling FX Forward)



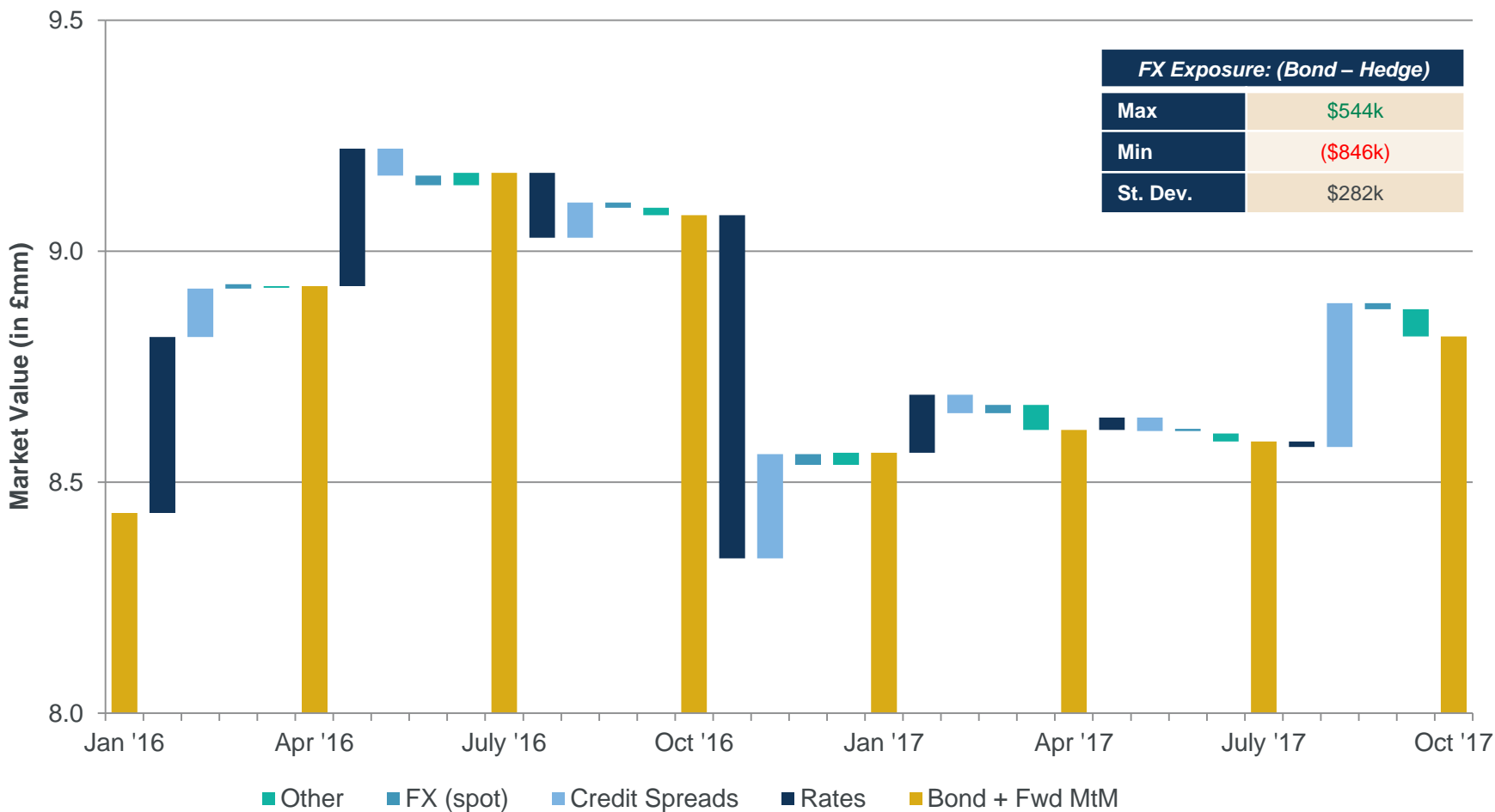
Bond Details	
Bond	FORD 7.45 16/07/2031
ISIN	US345370CA64
Notional	\$10mm
Coupon	7.45%
Maturity	16/07/2031
Rating	BBB
Spread	~221bps (vs bmrk)

- From an economic point of view, we should consider why an investor should hedge the FX risk at all. Is it a rewarded risk?
- Based on our bond example, day to day volatility is expected to be lower with an FX hedge (which may not be the case if for example USD weakening was correlated with rates falling and credit narrowing)
- In some cases, an unhedged FX position may outperform in a global stress scenario as investors flock to purchase USD assets (in some cases)



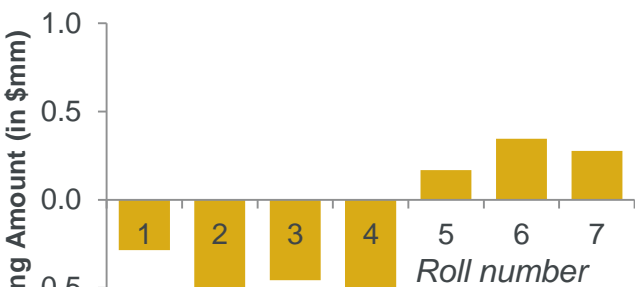
P&L Attribution - USD Bond and 3M Rolling FX Forward

- The rolling FX forward strategy hedges spot FX day 1, but needs to be regularly rebalanced otherwise a ‘basis’ may develop between the bond and FX forward due to differences in market risk exposures between both instruments.



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Bond + FX forward - Driver of Changes in Value	
Rates	60.0%
Credit Spreads	29.4%
FX (spot)	3.5%
Other	7.1%



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FX Forwards - Conclusion

- Can be an effective instrument in order to manage the FX risk associated with the mark-to-market risk of a foreign-denominated bond
- In order to maintain an efficient FX hedge, regular rebalancing of the FX forward may be required - especially under volatile market conditions where credit spreads and rates are moving on the underlying bond
- Generally structured as a mark-to-market hedge rather than hedging the underlying bond cash-flows to term
- Relatively simple and transparent product – relative easy to transact in size compared to other products
- Different methodologies available in order to size the hedge in an appropriate manner for the investor's preferences
- Rolling strategies can be operationally challenging and will require regular dialogue between the investor and asset manager





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2. FX Hedging Techniques Overview

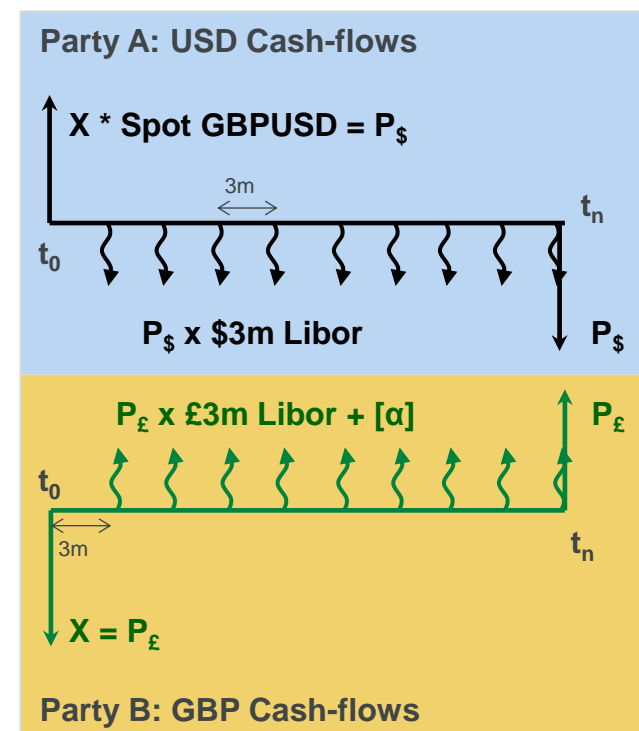
B. Cross-Currency Swaps

Non-Resetable Cross-Currency Swaps – An Overview

Original Format: **Non-Resetable** – Cross-currency swaps traditionally had pre-defined notionals until maturity

A Cross-Currency swap is an agreement between two counterparties to exchange principals and interest payments denominated in two different currencies.

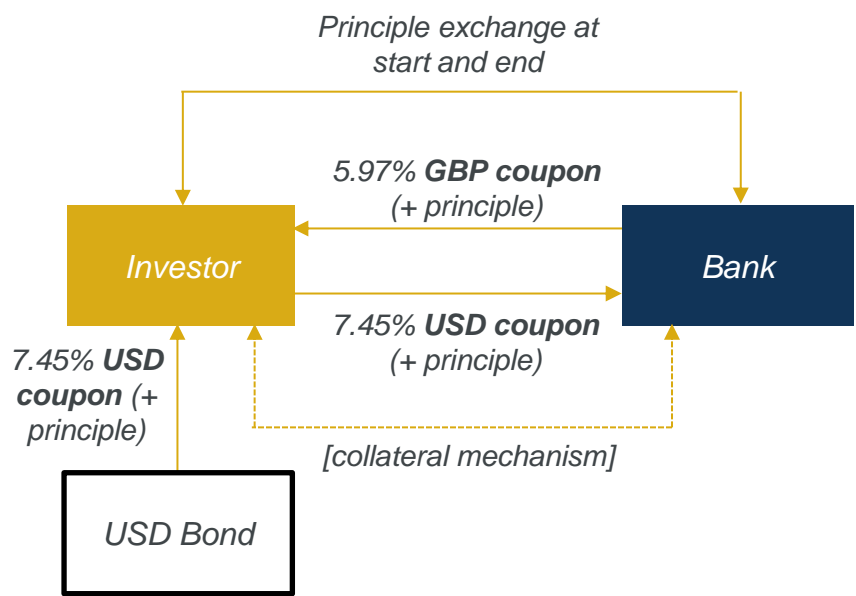
- It is traditionally a funding instrument used by corporates, insurances, banks or financial players in order to hedge interest rate differentials and have access to a non domestic markets
- Typical uses: To facilitate swapping of Bond Issuance, Loans, M&A activity, investment asset swaps
- The market standard for a cross-currency swap is against 3m Libor or 3m GBP Libor
- The basis spread is usually on the non-USD leg, vs. 3m-USD-Libor flat
- Traders dialect: Long the GBP basis = receive the basis = Rec 3m-GBP-Libor + α vs. 3m-USD Libor



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Non-Resetttable Cross-Currency Swap – A Deep(er) Dive

Structure Diagram



Bond Details	
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Sensitivity Analysis

Market Factor	Factor Direction & Quantum	Sensitivity Analysis (in \$000s) ⁽¹⁾		
		Bond	X-currency swap	Aggregate
GBPUSD FX	USD weakens 1%	(128)	+165	(37)
GBPUSD XCCY Basis	Increase 1bp	-	(16)	(16)
GBP Libor	Increase 1bp	-	(18)	(18)
USD Libor	Increase 1bp	-	+16	+16
GBP Sonia	Increase 1bp	-	+1	+1
US Treasuries (benchmark)	Increase 1bp	(12)	-	(12)
Credit spreads	Increase 1bp	(12)	-	(12)

- The non-resetttable x-currency swap has been structured as a **cash-flow hedge** in this example and not a mark-to-market hedge
- Using a non-resetttable x-currency hedge in most cases **does not hedge the mark-to-market** exposure of the package – this is due primarily to the following:
 1. The underlying discount rates on the bond (yield to maturity) and the x-currency swaps (SONIA / GBP Libor / USD Libor depending on methodology) are likely to be different
 2. The bond is likely to be priced on the underlying treasury where as the x-currency swap is priced from derivative instruments



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Non-Resetable Cross-Currency Swap – Value Analysis



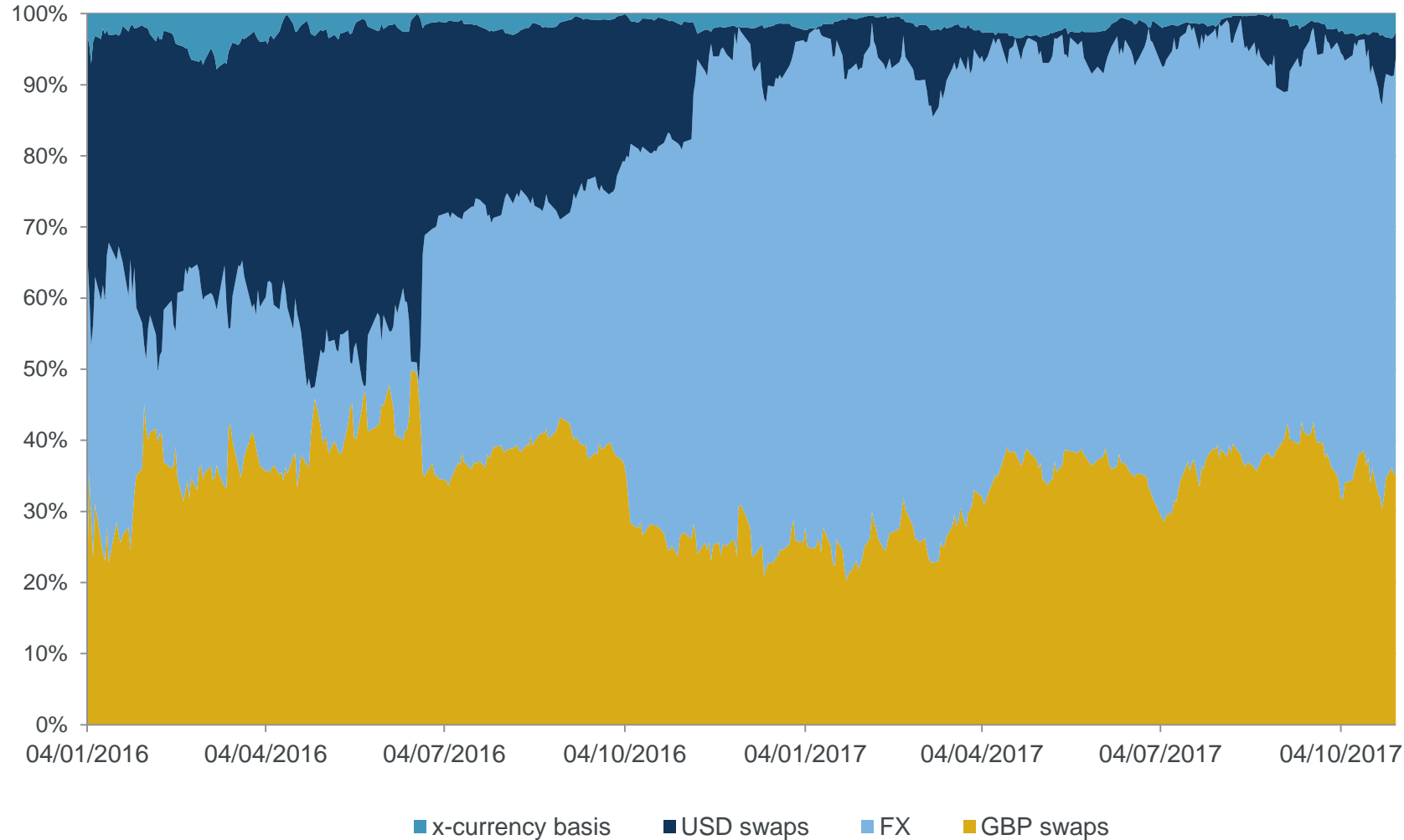
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- The non-resettable x-currency swap is structured to cash-flow match the underlying USD bond (assuming no defaults)
- The x-currency swap does not provide a MtM hedge and this can be seen from the diagram – it does seem to broadly track (inversely) the value of the bond in GBP
- Collateral requirements are a key driver of the x-currency swaps – in this example the peak collateral is c. £1.5bn, almost 15% of the underlying bond at that point in time
- The volatile MtM is also important since if the underlying bond defaults, the swap would need to be un-wound



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Non-Resettable Cross-Currency Swap – Value Attribution Analysis



- Based on the previous bond that we have considered, we've attempted to 'explain' the current MtM of the x-currency swap by breaking down its retrospectively calculated value into a combination of the following:
 1. X-currency basis risk
 2. USD swap levels
 3. FX (spot risk)
 4. GBP swap levels
- There are other variables which should be included in this analysis that drive MtM, but we have chosen to not include them in this analysis for simplicity purposes
- In this example, it shows how the mean reverting nature of the x-currency basis means that the P&L from this item does not build up to a significant amount here
- Over the period of calculation, the fall in value of GBP means that towards the end of the observation period, the built up value in the transaction is mainly driven by FX



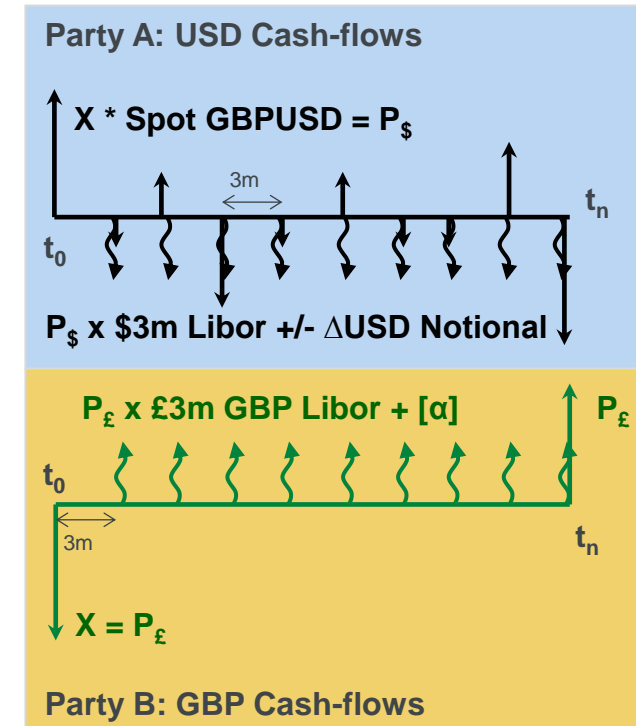
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Resettable Cross-Currency Swap – A Deep(er) Dive

Market Developments: **Resettable** – Cross-currency swaps have become the standard to reduce discounting impacts and balance sheet

After 2008, cross-currency swaps valuations became particularly exposed to changes in discount rates.

- As cross-currency swaps have a notional exchange at the maturity of the swap, the FX exposure remains until the end, which means any mark-to-market changes can last for the full maturity
- Essentially the key difference with a resettable swap is the USD notional is settled every coupon period so the notionals match at the start of each coupon period. Essentially the FX moves are cash-settled every coupon period.
- Key characteristics:
 - As the FX moves are cash-settled each period, the mark-to-market at any given time is limited.
 - This reduces exposure to discount rates, making it easier to line-up pricing, as well as reduces balance sheet usage for banks, leading to lower transaction costs.
 - However they do require more cash liquidity to settle the change in USD notionals.



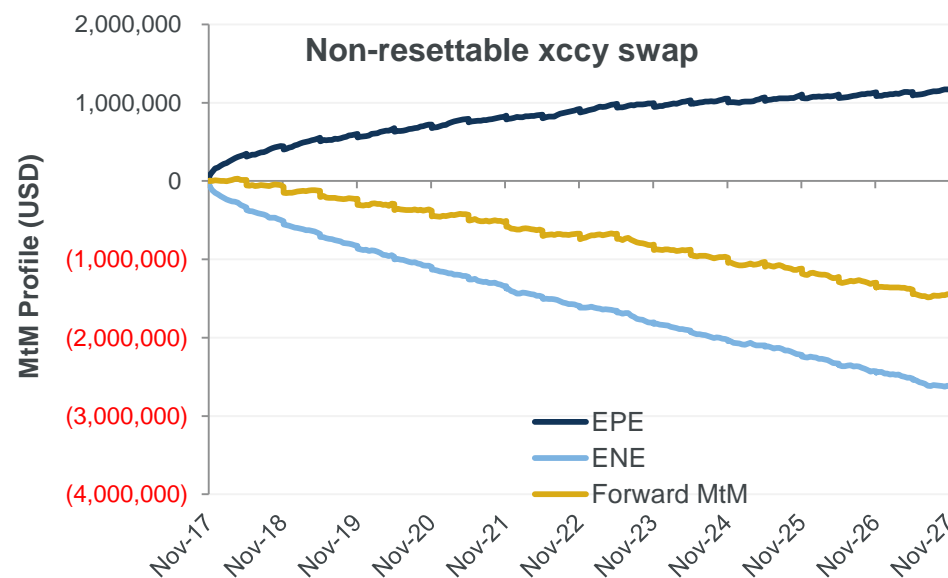
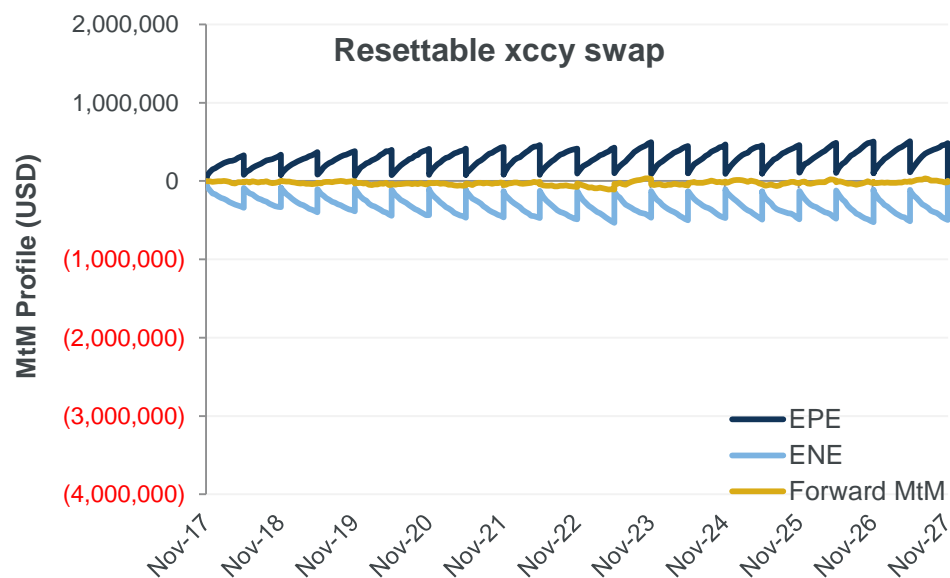
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Resettable vs. Non-resettable Swaps

Resettable cross currency swaps have a steadier expected mark-to-market profile and consequently, lower trading costs

The graphs below show the expected mark-to-market profile of a non-resettable and resettable XCCY swap with a notional of 10mm

- **EPE** is the Expected Positive Exposure of the swap to the bank at each point in time in the future i.e. client has negative Mark –to- Market (MtM)
- **ENE** is the Expected Negative Exposure of the swap to the bank at each point in time in the future i.e. client has positive MtM
- **Expected Exposure** is the expected MtM exposure of the swap, be it positive or negative (EPE + ENE)



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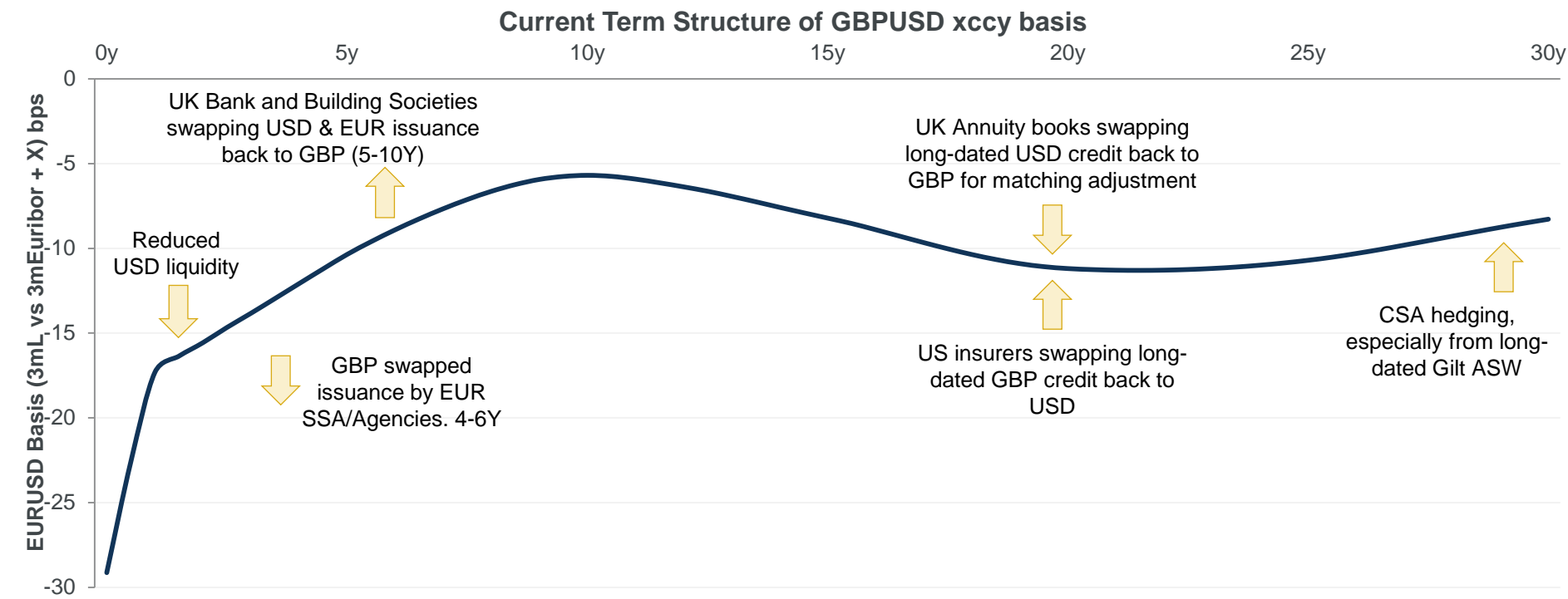
GBPUSD Market Drivers: Term Structure

The front-end basis is typically driven by funding needs

New Issue Swaps:
It is common for UK financial institutions to issue USD and EUR bonds and swap the funding back into GBP. Occasionally, EUR SSAs issue in GBP and swap back as well.

UK Insurance Impact
Long dated USD credit is attractive for UK annuity books for matching adjustment. These are often asset swapped back to GBP. 10-30Y is a common investment maturity.

US Insurance Impact
Relatively wide GBP credit spreads in 2016 led to US insurance buying long-dated GBP credit and asset swapping back to USD.



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Cross-Currency Swaps- Summary

- Can be an effective FX risk management tool in order to hedge expected cash-flows from foreign denominated bonds
- Generally used to hedge expected cash-flows rather than the mark-to-market of the bond. Depending on the exact structure, there may be residual FX and interest rate risks present after a bond has been cash-flow swapped to term
- Non-resettable cross-currency swaps are sensitive to a variety of different market factors and may have a volatile mark-to-market. Over a long period of time, the mark-to-market can build up to be a significant percentage of the underlying bond that it is held against
- In the event of a bond default, the investor may want to unwind the underlying cross-currency swap. If the swap has a negative mark-to-market (from the investor's point of view) at the point of un-wind, the investor may incur a loss in unwinding the position
- Resettable cross-currency swaps do not provide a cash-flow swap to term but are more liquid and generally less expensive to execute (due to regulatory factors that banks may be required to price in)



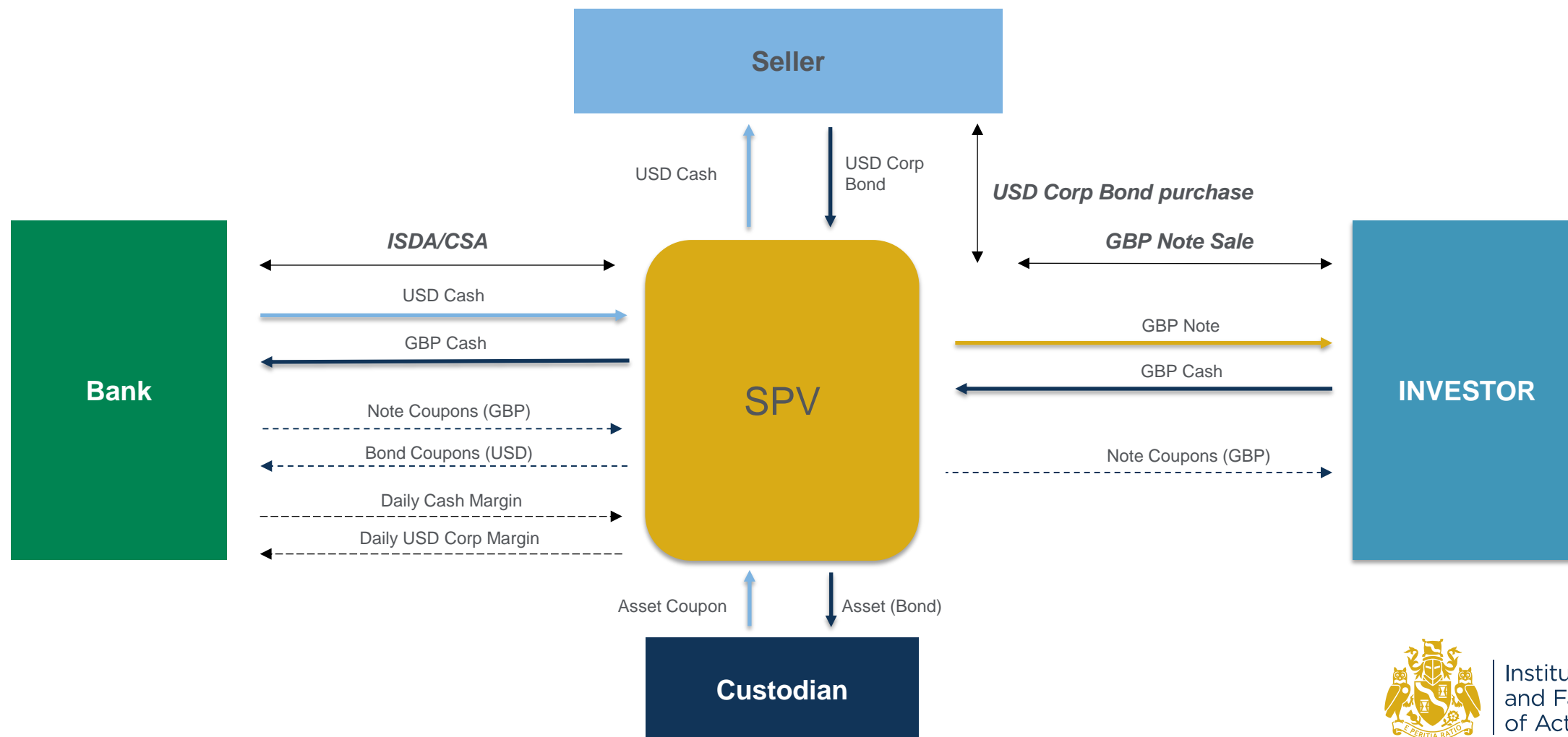


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2. FX Hedging Techniques Overview

C. SPV Solution

SPV Repack Diagram of USD Corporate Bond into GBP



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SPV Solution - Summary

- The SPV solution can be an effective FX risk management tool for hedging expected cash-flow from foreign denominated bonds
- The investor would receive a full GBP note in exchange for selling the USD bond into the SPV
- This transaction allows the investor to transfer all future collateral management risk associated with a cross-currency swap to a broker / dealer – this may make sense for an investor in one of the following positions:
 1. Holding a large proportion of illiquid assets or other assets not eligible to be posted under CSAs;
 2. Using a large proportion of derivatives and other instruments that may require collateral calls in the future under certain market scenarios
 3. Where an investor believes funding levels for collateral will increase in the future and they want to transfer this risk (whilst cheaper) to a third party
- The transaction potentially reduces the credit risk exposure of the bank to the cross-currency swap provider as the SPV would be expected to be bankruptcy remote





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3. Conclusion

Conclusions

- We expect continued investment in foreign bonds by UK insurers as a way to access attractive relative value opportunities, increase credit risk diversification and allow access to a broader set of potential investments
- From an economic point of view, each of the 4 hedging structures discussed has advantages and disadvantages. The most appropriate choice will depend on the specific aims and situation of the specific investor
- Collateral & liquidity management is a key component of assessing the overall value of a hedging strategy. Linked to this, we expect to see more interest from investors in the future in strategies where the funding risk on a transaction is transferred to a third party
- Regulatory requirements for banks is having an increased impact on the pricing of FX hedging strategies



Questions?



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