Global Fixed Income Strategy Special

HSBC Global Research

Real Topics

Finding optimal value

- **We provide two powerful methods to gauge relative value on a real yield curve**
- **Then we present the strengths and limitations of linker carry**
- **Last, we assess seasonal trends to pinpoint the optimal time to buy inflation-linked bonds**

Delving into the idiosyncrasies of linkers

The inflation-linked market has witnessed a remarkable boom in the past five years as more investors have become concerned with fluctuations in inflation and look for fixed-income products that offer real returns. An important question for investors is to find the optimal inflation-linked bonds that meet their needs, in terms of maturity, credit and volatility exposure. And after finding such linkers, the main question becomes whether they offer better value than other similar inflation-linked securities.

We provide two methods that deal with this problem and allow investors to quantify relative value. The first algorithm conducts a regression analysis on real yields and identifies bonds that trade off fair value relative to surrounding securities of similar duration. The second algorithm is more complicated and identifies inflation prints implied by different linkers. The model was implemented for the UK but can be applied to other countries, to the extent that the deflation floors can be priced accurately.

And when investors have established a position, they should be able to estimate how a trade looks both in the spot and forward space. In other words, they have to take into account carry to estimate the yield changes that correspond to actual market moves and those which are driven from carry or formula effects. Last but not least, investors need to be aware that linkers are not equally attractive during the entire year as inflation exhibits a seasonal pattern. We analyse the seasonality of a few countries and highlight the optimal timing to buy linkers.

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Assessing relative value

- Logarithmic regressions coupled with Z-scores help identify rich and cheap bonds on a real yield curve
- Implied RPI rates show that the 30-year sector trades at a premium relative to other parts of the UK real yield curve

There are several ways to look at relative value of IL debt and a few have already been presented in our previous Special *Is your IL bond fairly priced?* Now, we are improving our relative value (RV) arsenal with the introduction of two more models.

The first model operates on the real yield curve and regresses real yields with duration. It provides a way to estimate real yield pick-up for an increase in duration exposure. The inclusion of carry is particularly crucial for the model as it may otherwise lead to wrong conclusions.

The second model identifies RPI prints implied in UK linkers. We have used the UK market for simplicity as other linker markets tend to include a deflation floor, which can distort our calculations. Should somebody intend to apply the model in a market with floors, then they have to calculate the floor-less price of linkers and follow the same steps.

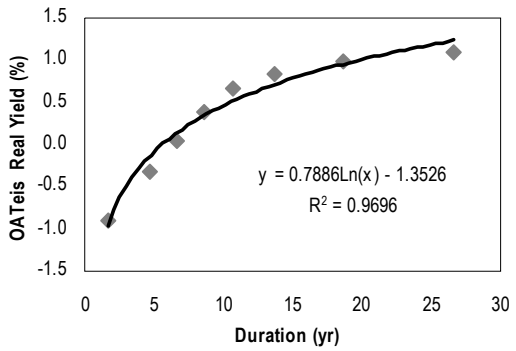
Regression models

Inflation-linked bonds can sometimes trade off fair value due to idiosyncratic reasons. We aim to quantify the amount of richness/cheapness through a model that regresses real yields and duration.

Step 1

We use a logarithmic function (see Figure 1) as it exhibits a degree of curvature, without however causing problems such as overfitting, which is the norm with higher order splines. Those with a preference for cubic splines can do so, but should use a monotonic cubic spline. In the case of a logarithmic function, the obtained R-squared tends to be above 90%, indicating that the model works well.

Figure 1. Finding cheap or rich bonds

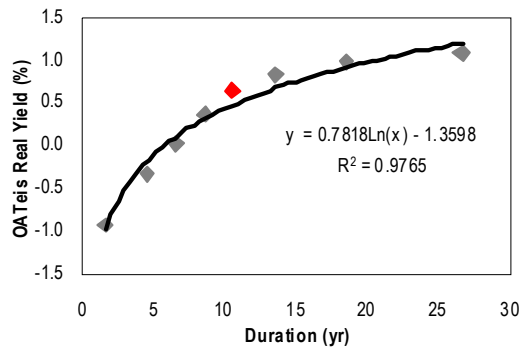


Source: HSBC

Step 2

We run the same regression without the recognised rich/cheap bond (see Figure 2). Then we estimate the real yield of the bond, based on the regression. In this way, we can gauge the cheapness of a bond relative to others, which can be used as a signal for switches or butterfly trades.

Figure 2. Gauging the amount of relative value



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The carry challenge

The inherent challenge with the use of a spline model for real yields is that most of the time, there will be a seasonal drift on the curve. Therefore, we need to find the dates when the impact of seasonals is zero. We applied the methodology across Eurozone linkers, but something similar can be done for the UK or the US market, if we use linkers with the same seasonality, ie, linkers whose maturity differential is an integer amount of years.

The real yield of an inflation-linked bond usually includes a seasonal bias when it does not mature in an integer multiple of years from the current date. During all other days of the year there might be a residual seasonal effect.

We will show through the following example how we can identify days with zero seasonal bias. Let's assume one German linker. As it matures on 15 April, we need to find the seasonal for 15 January, which we calculated at -0.87% (for OATeis and BTPeis the two figures are 0.46% and -0.21%, respectively). Then we identify days in the year that have exactly the same seasonal with the 15 January. These are the days when the residual seasonal (see Figure 3) for Bundeis crosses the x-axis. But these are the reference days with zero residual seasonal. We need to add three months to that to obtain the actual days when the real yield curve is not affected from a seasonal bias.

But what if there is a relative value opportunity on a date with seasonal bias? This can be addressed by an examination of the real yield curve in the forward space. The spline model still can be used if the forward date is selected in such a way that the linkers have zero residual seasonals.

Enhancing the model with Z-scores

There exist structural reasons why some bonds can be rich or cheap for a prolonged period of time. For example, BTPei35 has been and probably will continue to be a rich bond (see Figure 4).

Figure 3. Dates with zero residual seasonal

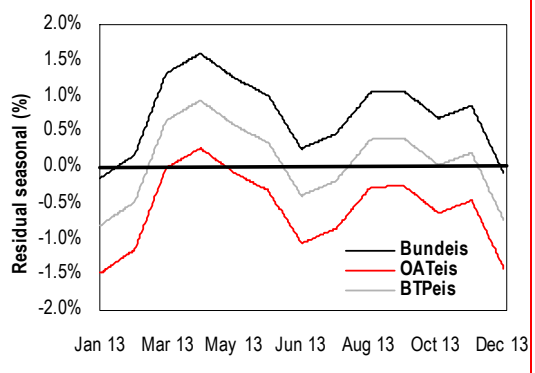

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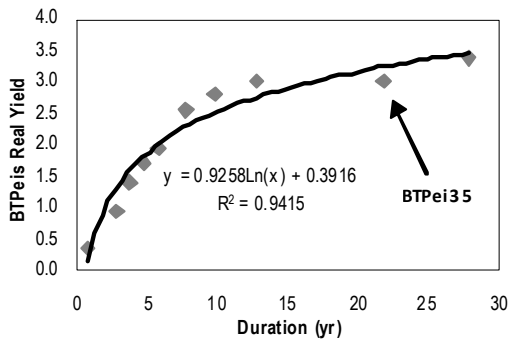
Figure 4. BTPei35 a persistently rich bond



Source: HSBC

To address this issue, we use Z-scores in our calculations. For every bond we estimate its spread from the spline. Then we analyse how this spreads evolves with the time. The Z-score of this spread (see Figure 5) provides a signal on whether a bond offers relative value.

Calculating implied RPI prints

The combination of nominal and real yields allows investors to construct a break-even curve. This might reveal average inflation expectations but does not show what level of forward RPI prints are implied by the market. So far, the only way to extract forward RPI prints was through the inflation swap market. We provide below an alternative approach that uses almost exclusively information from the bond market.

Step 1

From nominal bonds, we create a zero yield curve. This will be used for discounting purposes as we will discount linker payoffs with zero gilt rates.

Step 2

From inflation swaps and a seasonality vector we construct a path of RPI prints for each month to the maturity of the last linker. The only assumption that we make here is that the shape of an RPI path implied in the swap market is similar to that implied in the bond market.

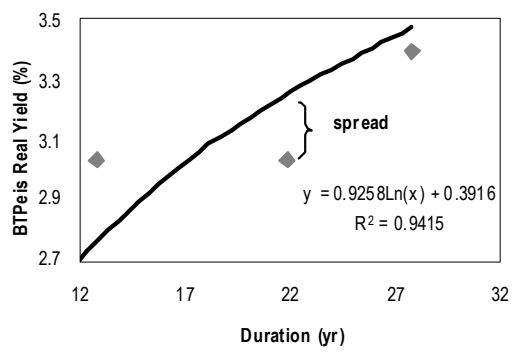
Step 3

If linkers were to be valued based on RPI prints from inflation swaps, we would obtain much higher prices than what we observe in the market. But if we scale these RPI prints by an appropriate factor, we obtain a complete RPI path, which prices accurately each linker.

Rich 30-year sector in UK linkers

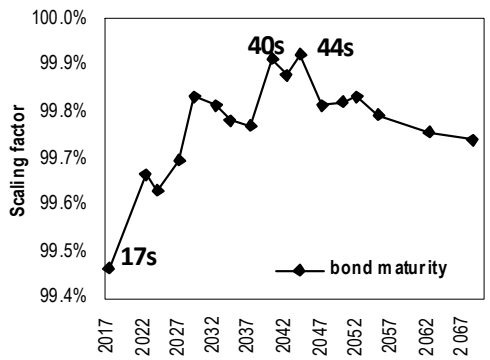
We calculated scaling factors for 3mo UK linkers and made a few interesting observations. The 30-year sector appears to be the most expensive part of the curve. From a first glance, that might appear counterintuitive as the ultra long-end of the real curve is inverted. However, it is very reasonable. At the time of the analysis, the highest yielding nominals are in the 30-year sector, making 30-year linkers appear rich as they have the highest scaling factors (see Figure 6). Of note is that not a single linker had a scaling factor greater than one, indicating that the swap market clearly implies higher RPI prints than the bond market.

Figure 5. Estimating spread against the spline



Source: HSBC

Figure 6. Scaling factors show richness of 30-year area



Source: HSBC

Cheap front-end

We identify that the scaling factor is particularly small for the front-end and UKTI1.25 11/17 looks particularly cheap. We believe this is attributed to the small number of accounts interested to buy UK linkers in the sub five-year sector. As UKTI1.25 11/17 is now not included in most linker indices, there will not likely be a rush to buy the bond, hence it may continue to trade cheap for some time.

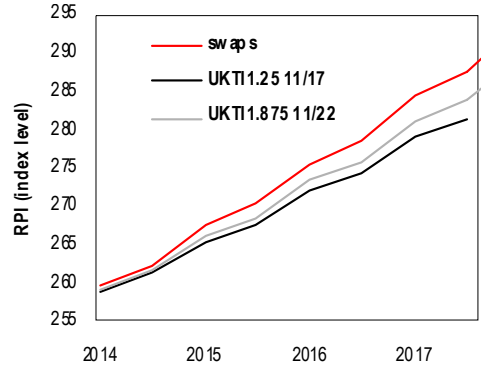
However, this cheapness of the front-end provides an attractive opportunity to investors who wish to obtain front-end inflation exposure. As shown in Figure 7, the implied by UKTI1.25 11/17 RPI path is much lower than that implied by RPI swaps and UKTI1.875 11/22.

How to use it?

The model can be used on a daily basis and does not require any seasonal adjustment. Pension fund activity and auctions can distort the curve so some linkers might appear to be priced off fair value. A Z-score approach can be applied to this model as well, and it can be done on scaling factors or on the implied RPI prints.

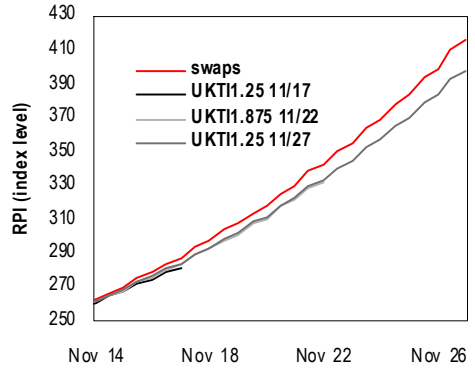
As the model allows investors to quantify the implied RPI prints, they may consider switch trades or to be overweight/underweight particular parts of the curve. The model acts as a pure relative value tool and it should be used in conjunction with other RV metrics such as break-evens, ASWs and Z-spreads. Last, another way to look at the model is by using it in order to analyse the divergence between the RPI paths implied by UK linkers and swaps (see Figure 8).

Figure 7. Low RPI prints implied by UKTI1.25 11/17



Source: HSBC

Figure 8. Bonds and swaps imply very different RPI rates



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Dealing with carry

- Real yields, repo and seasonality drive carry across inflation-linked bonds
- Misinterpretation of carry can lead to wrong conclusions due to illusions related to price/yield formulae
- The optimal timing to conduct carry trades is heavily dependent on the estimated seasonal pattern of inflation

The drivers

Carry in both nominal and inflation-linked bonds is defined as the proceeds from holding a position in a bond, reduced by financing cost over a specific investment horizon. The quantity is often measured in basis points as the differential between forward and spot yields, and provides a proxy of return, if spot yields remain unchanged.

Whilst carry of nominal bonds is a relatively stable figure, that of linkers is highly volatile making it a significant factor in the PnL of linker trades. The main reason for the increased volatility of linker carry is that it does not depend only on the level of yields and repo rates but also on seasonality. For carry estimations, investors can use the following formula:

(*real yield – repo + inflation accretion)/ PV01/ T*

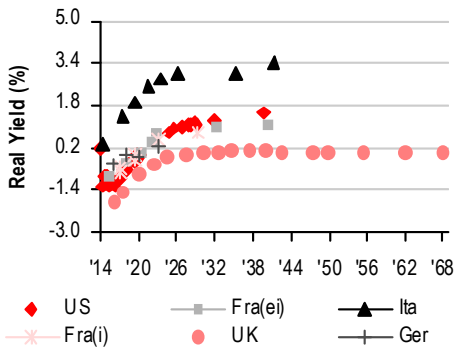
From the sum in the brackets, the first two factors are relatively stable whilst the last factor accounts for almost the entire volatility of carry. Below, we will analyse the three drivers of carry:

Level of real yields

Almost everyone has encountered at some point the concept of a "carry trade" in conjunction with high-yielding assets. Indeed, in these occasions carry tends to be high as investors are able to finance themselves at a low rate and can hold an instrument that provides them with a higher return.

Generally, the level of real yields is a function of nominal rates, inflation expectations, liquidity discount and risk sentiment. But there are also idiosyncratic factors that determine real yields in each market. In the Eurozone, the dominant driver of real yields is the different credit quality of issuers (see Figure 9). In the UK, a key factor is the equity market. Real yields are strongly correlated with equities due to pension funds conducting de-risking, ie, switching out of equities into UK linkers. In the US, real yields taxation and seasonality are two big elements, impacting real yields.

Figure 9. Real yield curves



Source: HSBC

Repo

Usually, investors have a limited amount of cash available as most of their wealth is allocated to securities rather than plain cash. Therefore, long positions in bonds have to be financed through the repo market. The repo market allows potential bond buyers to obtain financing for a given period at a pre-defined rate.

The main rationale behind the impact of carry is the following: The higher the rate of financing, the lower the carry and vice versa. If we ignore the inflation component for a moment, then we can express carry as the annualised difference between yield and the financing rate, divided with PV01. For linkers, we can use the same equation, with the only difference that we need to add a component of inflation accretion. For carry to be positive, the following inequality needs to hold:

inflation accretion + real yield > repo

Some bonds are hard to be found and trade special. Therefore, even though there might be visible distortions in the spot real yield curve, they tend to disappear when repo it taken into account and the curve is examined in the forward space. Even though this phenomenon is much more pronounced in the nominal word, it does also hold for linkers. Overall, repo for linkers trades at a spread to GC with the spread ranging between 3bp and 10bp depending on the country and term.

Seasonality

Inflation does not rise in a steady way but tends to accelerate/decelerate more in particular months of the year. This pattern is the dominant driver of volatility on linker carry and makes it an important topic for issuers and investors.

There are periods of the year when the index rises more than others. To achieve high carry over a holding period, the index ratio should be small at the initiation and large at the termination date. For example, holding Eurozone linkers from April to July means that someone is gaining exposure to CPI changes during the January – April period, which tends to be the time of the year when Eurozone inflation rises at its most rapid pace (for more, see the section on optimal timing).

The caveats

Assumption of no change

The strong assumption implied in the calculation of carry is that yields remain unchanged. In practice, spot yields have the tendency to move towards forwards with the actual yield move wiping off the favourable carry. Therefore, we should treat positive carry as a cushion to a trade, and not a quasi-arbitrage opportunity.

Sensitivity to forecasts

Linker carry of Canadian-style is usually known with accuracy for a period of two- to six-weeks, depending on timing of the inflation prints. This happens because the inflation print for the previous month is released around the 15th of each month and most linkers use a three-month indexation lag.

The period of known carry can become less if inflation prints are published later than scheduled. For example, this was the case for TIPS in autumn 2013 when the US government and the BLS temporarily shut down.

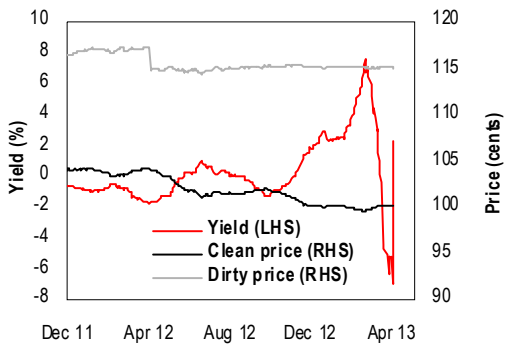
For longer periods of carry, investors have to use forecasts from economists. We agree with this approach as it provides an indication of the magnitude of likely carry. However, as already described in the *Special – 'Is your IL bond fairly priced?'*, 4 April 2012, we need to know the sensitivity of carry to the forecasts. Short-dated linkers have a particularly high sensitivity to the actual CPI prints, hence, small surprises in the underlying CPI index can cause major surprises in the level of carry.

Illusions on one curve

After a glance at the approximate formula for carry we realise that we divide with PV01 and the holding period T. This explains the fact that as linkers approach maturity, the effect of carry becomes gradually more pronounced. Moreover, if the holding period becomes very small, then the absolute value of carry shoots rapidly up.

Also, we see very little significance of carry when the maturity of the bond is less than one year. Spot and forward yields of the bond might experience strong oscillations as the maturity date approaches, but this is nothing more than a computational aspect. Carry indeed might be largely positive or negative, but that information is of little value to investors as the effect in price terms is small (see Figure 10).

Figure 10. Boblei13 real yields and full price



Source: Bloomberg

Another illusion is observed in forward real yield curves. The seasonality bias is fully removed when we examine forwards curves for a date that is an integer multiple in years of the linker maturity date. For example, this would be 15 April for Bundeis or 25 July for OATeis (see Table 1). Carry other termination dates usually includes a seasonal bias. At the same time, carry needs definitely to be factored in calculations when monitoring already existing trades.

Table 1. Main features of liquid Canadian-style linkers

Country	Name	Maturity	Cpn frequency
US	TIPS	15-Jan	Semi
US	TIPS	15-Feb	Semi
US	TIPS	15-Apr	Semi
US	TIPS	15-Jul	Semi
UK	UKTI	22-May	Semi
UK	UKTI	22-Nov	Semi
Germany	Bundei	15-Apr	Annual
Germany	Boblei	15-Apr	Annual
France	OATei	25-Jul	Annual
France	OATi	25-Jul	Annual
Italy	BTPei	15-Sep	Semi

Source: HSBC

Illusions due to different seasonality

We have observed that as time passes by, German inflation-linked securities appear to be getting cheaper versus their French equivalents. For very short maturities (less than two years), we have witnessed OATei real yields trading through Bundeis. Does this mean that investors appreciate less German and more French linkers as they approach maturity?

No. This is nothing but a mere illusion. The seasonal of Bundeis is lower than that of OATeis. Even though this spread remains almost constant in price terms, it increases rapidly in real yield terms (see Figure 11), resulting in a sharp widening of the two. Investors who calculate carry will see that the spread widening is just an expression of carry.

But this effect also can apply for one issuer alone. On the TIPS curve, for example, the different seasonals cause an oscillatory pattern (see Figure 12). As TIPS of different seasonality approach maturity, they exhibit a similar effect as OATeis and Bundeis, ie, the seasonal component is magnified due to low duration. This in essence allows TIPS of close maturity to offer very different carry, if this is expressed in basis points.

Optimal timing

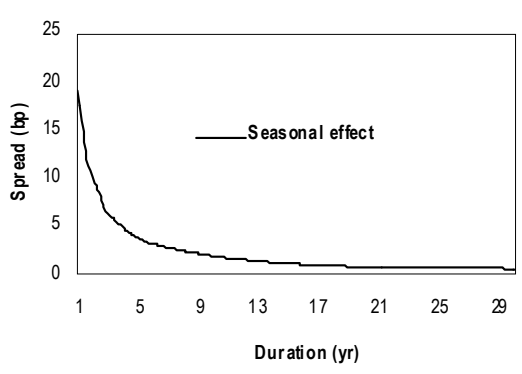
There are periods of the year when carry is much more favourable than others. Investors who aim to achieve maximum carry should obtain long linker positions at the time of the year when inflation rises the most. But given the usual three-month indexation lag, the optimal holding period is three months after the period of most quickening inflation.

For example in the Eurozone, inflation tends to dip sharply in January but to rebound strongly in March. Therefore, the optimal two-month carry is achieved between 1 April and 1 June for given levels of real yields and repo. On the flipside, the lowest carry is provided from 1 June to 1 August.

The same pattern holds also for the UK and France where seasonality is very similar to that of the Eurozone. However, in the US it is different. Investors achieve optimal two-month carry in the US if they buy TIPS in early February whilst the weakest carry occurs if they go long at the beginning of December.

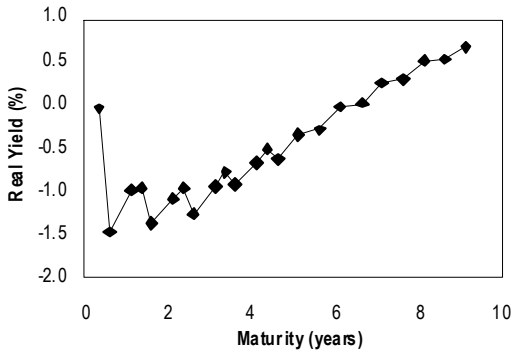
But these dates are just for two-month carry. We have found also the optimal timing for three-month carry. For Eurozone and the UK, the optimal timing to get long linkers remains unchanged. In the case of the US and France, we had some small changes as the optimal dates shift to 1 March and 3 August, respectively.

Figure 11. Drift in the spread between OATeis and Bundei



Source: HSBC

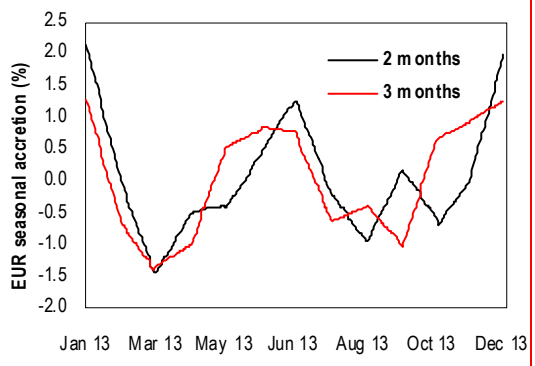
Figure 12. Carry discrepancies due to seasonality in TIPS



Source: Bloomberg

We see little value in carry calculations for longer- dated periods as they will be very sensitive on inflation forecasts of the economy. Last, one key factor that we need to emphasise is the stationary of seasonals. When we use a chart like Figure 13 to identify the optimal time to enter a carry trade, we assume that the seasonality vector of that country does not change. However in the past, we have seen large changes in the seasonal pattern of inflation, especially during periods of high inflation volatility.

Figure 13. Impact of seasonality



Source: HSBC

Table 2. Optimal timing to enter carry trades

		Date	Seasonal	Date	2m seasonal accretion	Date	3m seasonal accretion
EUR							
	Max	01 Jun	1.13%	01 Apr	2.15%	01 Apr	1.30%
	Min	01 Apr	-1.02%	01 Jun	-1.43%	01 Jun	-1.40%
UK							
	Max	01 May	0.55%	01 Apr	0.96%	01 Apr	1.30%
	Min	01 Apr	-0.84%	01 Jul	-0.94%	03 Jan	-1.12%
US							
	Max	0.61%	01 Jun	03 Feb	0.89%	01 Mar	1.03%
	Min	-0.62%	01 Feb	01 Dec	-0.89%	03 Nov	-1.02%
France							
	Max	01 Jun	0.75%	01 Apr	1.21%	03 Aug	0.73%
	Min	01 Oct	-0.55%	01 Jun	-0.89%	01 Nov	-0.82%

Source: HSBC

Notes

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