J.P.Morgan

A long-term cross-market macro perspective on swap spreads

Favour US Treasury and Gilt widener vs. Bunds

- We present a long-term framework for a fundamental analysis of swap spreads across various currencies and find that global swap spreads are driven by liquidity conditions, proxied by front end OIS rates and risk aversion, measured by swaption implied volatility (or more recently peripheral spreads)
- Over the past five years some of these long-term relationships of swap spreads to fundamental variables have been challenged by central banks remaining firmly on hold and limited volatility of policy rates. This has reduced the sensitivity of swap spreads to macro variables while increasing the relevance of flight-to-quality and risk-aversion
- With the prospect of Fed and BoE starting to hike rates sometime in 2015 (4Q15 and 1Q15, respectively), we believe macro considerations will once again become relevant driving swap spreads both outright and cross market
- We present a summary of our bottom-up swap spreads model in USD, EUR, GBP, JPY, AUD, and SEK. We typically use these models for RV analysis and strategic recommendations
- Using this long-term analysis, **we build a common simplified framework to model single currency USD, EUR and GBP swap spreads by using domestic front end rates, swaption implied volatility and the BTP/Bund spread**. This framework can be extended to cross market analysis
- Cross market, **we believe that swap spreads will be driven by relative macro conditions; the relative flattening in the USD and the GBP curve on market pricing tighter monetary policy over the medium term will support a relative widening of USD and GBP swap spreads vs. EUR**
- **We do not anticipate a strong directional bias on outright and/or cross market swap spread differential, from the upcoming regulatory changes**. With peripheral spreads narrowing and volatility staying low, we believe fundamental macro variables will become more relevant in driving swap spreads

Rates Strategy

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See page 15 for analyst certification and important disclosures.

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Introduction and outline

The scope of this publication is to present a long-term, cross-market macro perspective on swap spreads. The first section presents a top-down empirical PCA model for global swap spreads, highlighting the global macro and country specific idiosyncratic factors. In the second section we summarize each country specific J.P.Morgan models on swap spreads. The third section focuses on cross market correlation and highlights macro and RV opportunities in cross market swap spreads. The final section discusses the most recent outstanding and upcoming regulatory issues and their implication on swap spreads.

Long term PCA model

Fundamental and macro drivers

Over the past few years the modeling of swap spreads in various G10 markets has been challenged by the instability of drivers, change in directionality vs. yield levels and the prevalence of short term technical factors over medium term macro variables. Over the long run swap spreads in EUR, USD and GBP exhibit similar behaviour, on the back of common global macro factors (**Exhibit 1**), resulting in a strong positive correlation among 10Y benchmark swap spreads across different currencies (**Exhibit 2**). These correlations have, however, declined significantly over the past 3-5 years as idiosyncratic factors have prevailed. For example over the past 5Y the correlation between 10Y GBP and 10Y USD swap spreads declined to 50% from over 90% over a 15Y horizon.

In order to develop a unified framework on the drivers of swap spreads we run a long term (15 years) Principal Component Analysis on 2Y, 5Y, 10Y and 30Y swap spreads in EUR, GBP, USD and JPY (where we use 20Y instead of 30Y), and then find market variables which are correlated to the first and the second principal component.

The analysis of the evolution of the principal components helps in identifying the long term drivers of swap spreads across the various currencies. The capability of the first few factors to explain the overall variability of swap spreads over the past 5Y has declined significantly, as idiosyncratic factors, such as the peripheral crisis in EUR, have prevailed more recently. Indeed, over the past 15Y the first and the second factors explain about 80% of the overall variability of swap spreads, whereas over the past 5Y only about 2/3rd of the overall variability has been explained by the first and the second factors of our PCA analysis (**Exhibit 3**).

Overall, on the back of our cross market PCA analysis, **we believe that swap spreads are mostly driven in the long run by front end liquidity conditions**, which we

Exhibit 1: Since Euro inception, swap spreads in EUR, USD and GBP have shown similar patterns, on the back of common global macro factors...

German, UK and US 10Y benchmark swap spreads; since Jan 1999; bp;

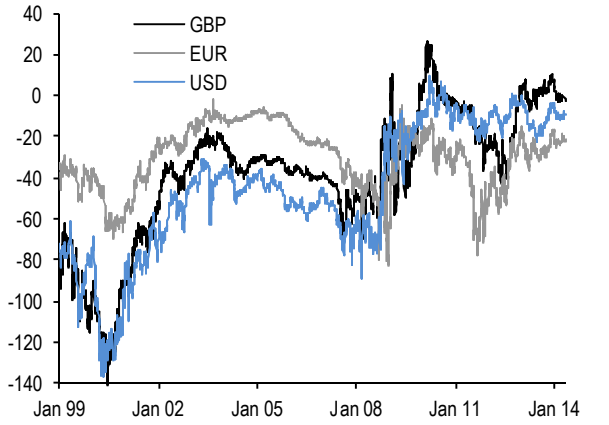


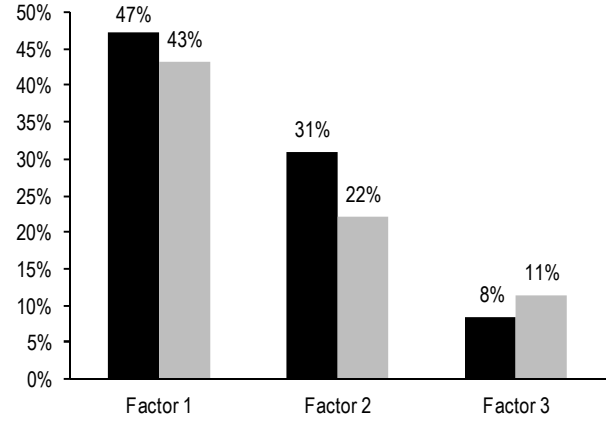
Exhibit 2: ...resulting in strong positive correlation among 10Y benchmark swap spreads in different currencies

15Y correlation of 10Y benchmark swap spreads across various currencies (since Jan 1999); %

Last 15Y	USD 10Y	EUR 10Y	GBP 10Y	JPY 10Y
USD 10Y	100%	37%	93%	53%
EUR 10Y	37%	100%	49%	32%
GBP 10Y	93%	49%	100%	56%
JPY 10Y	53%	32%	56%	100%

Exhibit 3: The first two factors of our PCA analysis across global swap spreads explains about 80% of the overall variability of the past 15 years but only about 2/3rd of the overall variability over the past 5Y

Variability of global swap spreads explained by first, second and third PCA factor in a 15Y (black) and 5Y (grey) PCA analysis; %



measure by front-end OIS rates, as an expression of monetary policy and/or excess liquidity conditions. In addition, **swap spreads are also driven by risk aversion**, given the tendency of investors to increase demand for safe government bonds during period of turmoil in the markets. The relationship between swap spreads and government bond issuance (or budget deficit) has been strong for long but it has become patchy over the last few years. Finally, **there are also various technical drivers of swap spreads** coming from the hedging activity on the swap curve (MBS in US or swapped issuance activity in EUR and USD).

Since Euro inception the first PCA factor has been strongly correlated with liquidity conditions, proxied by front end rates in EUR and USD (**Exhibit 4**), and the second PCA factor has been correlated with the level of 30Y implied volatility in USD and EUR, as a reflection of the impact coming from risk aversion (**Exhibit 5**)[1].

Over the past few years some of these long term relationship of swap spreads to fundamental variables have been challenged by central banks staying firmly on hold and limited volatility of policy rates, which has reduced the sensitivity of swap spreads to macro variable while increasing the relevance of flight to quality and risk aversion (peripheral crisis).

Specific risk aversion factors

The increasing sensitivity to risk aversion can be easily proved by running a similar PCA analysis on the shorter time horizon of the past 5Y. **Over this period, risk aversion has been the main driver of global swap spreads with the first PCA factor correlated with 30Y implied swaption volatility** (average of EUR and USD) **and the second factor strongly correlated with the 10Y weighted peripheral spreads**. Although at the peak of the peripheral crisis these two variables may appear strongly correlated, over the past five years they are almost orthogonal to each other[2]. The decline in volatility and the narrowing in peripheral spreads have been the main drivers behind the narrowing of swap spreads of the past 18 months.

Exhibit 4: Global swap spreads, in the long run, have been mostly driven by liquidity conditions, measured as the average of EUR and USD 1Y swap rates

1st Principal Component of 15Y global swap spreads regressed against average of 1Y swap rate in EUR and USD; past 15Y; unitless

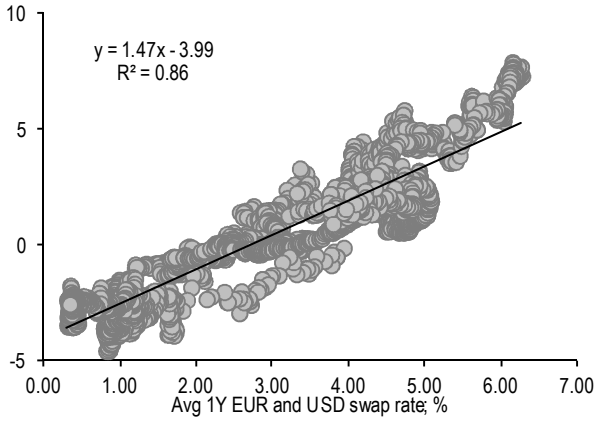
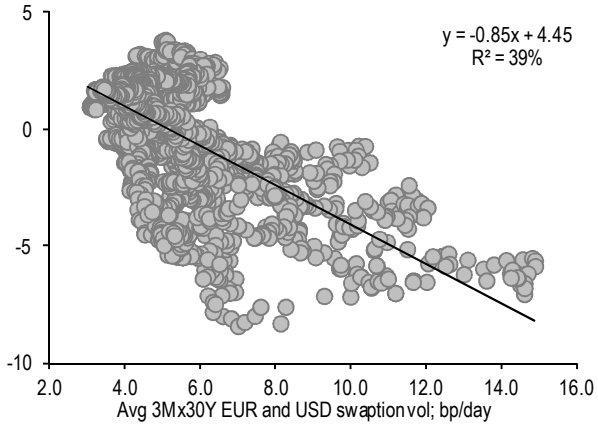


Exhibit 5: The second PCA factor exhibits strong relationship to risk aversion, measured as the average of EUR and USD 3Mx30Y swaption implied volatility

2nd Principal Component of 15Y global swap spreads regressed against average of 3Mx30Y swaption implied volatility in EUR and USD; past 15Y; unitless



Ideally, we would like to build a model of swap spreads on fundamental business cycle variables, on which we tend to have forward looking views. However, with limited volatility in front end rates on a spot and forward looking basis (especially in the Euro area where the ECB is expected to be on hold until 3Q18), we also include financial market variables such as swaption volatility to assess the relative value of swap spreads vs. other measures of risk.

Budget deficit as proxy for economic cycle

[1] In our EUR swap spreads model, for example, we incorporate the sensitivity to these factors by running a high-frequency long term model of swap spreads vs. money market rates and then regress the residual of our high-frequency model and regress against swaption implied volatility, 10Y govie yields and swapped issuance activity (see below for further details).

[2] The 30Y implied vol richened significantly relative to historical standard in early 2009 reflecting the risk aversion just after the Lehman crisis (1st factor), while the weighted peripheral spreads became a systemic driver of swap spreads only in the summer of 2011, when the peripheral crisis extended to Italy, and broadly remained so until August/September 2012. The retracement since then contributed to a global narrowing of swap spreads on declining risk aversion.

One variable commonly used in the analysis of swap spreads is the issuance of government bonds, with the idea that lower issuance tends to drive swap spreads wider, given the increase in the scarcity premium attached to bonds. We discussed extensively in our *2014 Outlook* the relationship between swap spreads and issuance, proxied by forward looking budget deficit Consensus Forecast expectations and we found that the link with swap spreads was mostly due to the forward looking budget deficit being a good proxy of the economic cycle, widening as growth declines and vice versa. The implication of this analysis was that there was not significant additional information in modeling swap spreads with budget deficit info instead of using front end rates, which were better proxy for monetary and liquidity conditions.

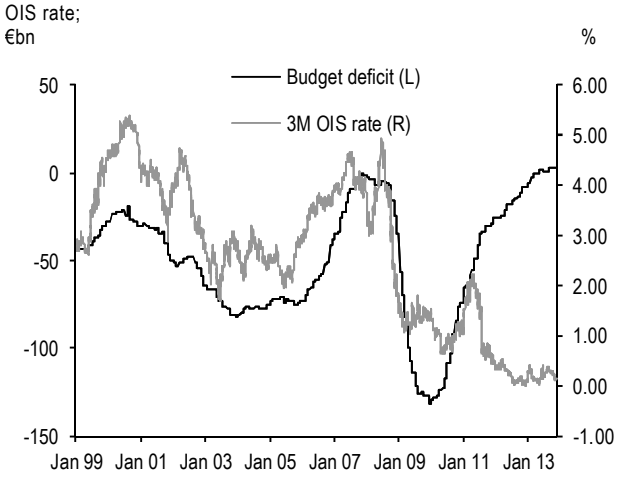
Additionally, it appears that the improvement in the German budget deficit had little correlation with the level of OIS rates, justifying the weak beta of swap spreads to budget deficit improving, when liquidity conditions remain ample, and front end rates remain low (**Exhibit 6**). In countries, like UK and US, where the link between macro variables, budget deficit dynamic and policy rates is closer, swap spreads will likely be driven wider by lower budget deficit and therefore lower issuance. However, **we prefer modeling the budget deficit dynamic through the long-term macro relation of swap spreads to short end rates**.

Impact of technical factors

As explained in details in the section below, hedging activities on the swap curve tends to have an impact on the dynamic of swap spreads. These hedging activities range from pension fund and insurance companies hedging long-term liabilities (variable annuity hedging), to dealers hedging exposure to structured products with payout linked directly or indirectly to the swap curve (PRDC or non-inversion notes) or simply to issuers converting their fixed rate liabilities into short term floating rate liabilities. In Europe, we typically track the swapped issuance activity by monitoring the evolution of fixed rate issuance coming from covered bonds, supra nationals, financials and corporate. These factors are typically short term technical drivers, whose analysis goes beyond the scope of this note, which focus on global long-term cross-market drivers. The section below summarizes our model on swap spreads for various currencies presenting more details on the sensitivity to these technical factors.

Exhibit 6: Budget deficit has been historically correlated to the economic cycle, proxied by short term OIS rate; however, more recently rates in Euro area are too low vs. the German budget deficit, limiting the use of the German budget deficit as the variable to forecast the evolution of EUR swap spreads

1Y-ahead Consensus Forecast of German budget deficit and 3M EUR OIS rate;



Source: Consensus forecasts by Consensus Economics Inc.

Country specific swap spreads model

We present below a summary of J.P.Morgan swap spreads model in different currencies. These models are used as bottom-up approach to make our recommendations in the various markets. The nature of these models is very tactical and we typically refer to them in our strategy publications such as *Global Fixed Income Markets Weekly* or *US Fixed Income Markets Weekly*.

USD swap spread model

10Y USD swap spreads are currently around 10bp and have moved in a 0 – 20bp range over the last two years. We use the following variables to model 10Y swap spreads:

1. **Current coupon mortgage basis** – a widening of the mortgage basis leads to a widening of swap spreads; a widening of the mortgage basis causes the holders of mortgage assets to pay in swaps for hedging purposes and results in wider swap spreads; beta of 10Y USD swap spreads is around 1.8bp for every 10bp widening in the CC mortgage basis;

2. **Investment grade credit spread** – we proxy this using J.P.Morgan JULI index spread; a wider credit spread is an indication of financial stress and leads to wider swap spreads. 10Y

USD swap spreads has widened about 1bp for every 10bp widening in the JULI spread.

3. **5s/10s UST curve** – this curve has significant explanatory power. We believe this is due to a pattern of investment flows in Treasuries that have focused on the belly. Each 10bp of flattening of the 5s/10s UST curve tends to widen 10Y swap spreads by 2bp.

4. **Budget surplus** – this is a proxy for net Treasury duration supply; lower supply (higher surplus) is expected to widen swap spreads by impacting govie yields directly. A surplus of $100bn (supply reduced by $100bn) has widened 10Y swap spreads by 4bp.

All the above variables are statistically significant and together they explain about 80% of the total variance of the data (**Exhibit 7**).

For 5Y swap spreads, we use *1)* current coupon mortgage basis, *2)* investment grade credit spread, and *3)* 3M FRA/OIS basis as the fundamental drivers. We include the FRA/OIS basis as the 5Y point is still sufficiently "front-end" enough that FRA/OIS spreads explain a great deal of movement in this spread (Exhibit 7).

At the front-end of the curve, we model 2Y USD swap spreads via *1)* 3M FRA/OIS basis, *2)* 3M change in front Treasury stock, and *3)* 1M GC repo rate. **Exhibit 8** shows that all the variables are significant and have correct signs.

EUR swap spread model

Front-end rates/liquidity conditions, which we proxy by the fifth IMM EONIA (3M OIS 1Y forward) rate have historically been the most important **long-term driver of swap spreads**. During the period 2000 – 2007, this variable alone explained about 75% of the total variance in 10Y swap spreads, capturing the sensitivity of swap spreads to fundamental factors related to the economic cycle. However, its impact has been overshadowed by several high-frequency factors since credit crisis of 2008 (**Exhibit 9**). To get around this, we employ a two-stage model to model EUR 10Y swap spreads. In the first stage, we regress 10Y EUR swap spreads by 1Yx3M OIS rate during the period 2000 – 2007.

In the second stage, we regress the adjusted swap spreads (adjusted for front-end rates) to several high-frequency factors. We include the following variables:

Exhibit 7: Both 5Y and 10Y USD swap spreads are driven by the mortgage basis and IG spread. In addition, the 10Y swap spread is also impacted by the 5s/10s UST curve and budget surplus

5Y and 10Y USD maturity matched swap spread fair value models*; bp

5-year swap spread model	2-year model		Current	Forecast		
	Coefficient	T-stat	Level	2Q14	3Q14	4Q14
Intercept	-25.4	-23.1				
IG (JULI) spread; bp	0.11	11.6	126	130	130	130
3M FRA OIS; bp	0.3	7.9	12	15.0	20.0	20.0
CC MBS-TSY basis; bp	0.12	14.3	106	120	130	140
R^2	88%					
Std Error	2.2					
5Y Swap spread; bp			8			
Fair value; bp			5	8	11	12

10-year swap spread model	2-year model		Current	Forecast		
	Coefficient	T-stat	Level	2Q14	3Q14	4Q14
Intercept	4.3	2.4				
IG (JULI) sread; bp	0.07	6.7	126	120	120	120
Budget Surplus 1Y ahead	0.02	18.8	-530	-520	-510	-500
5s/10s Treasury curve; %	-12.93	-11.5	0.98	1.05	1.05	1.05
CC MBS-TSY basis; bp	0.21	17.7	106	120	130	140
R^2	80%					
Std Error	2.4					
10Y Swap spread; bp			8			
Fair value; bp			10	12	15	17

* 5Y model based on a 2-year regression of 5-year matched maturity swap spreads (bp) on current coupon mortgage basis (CC yield – 7-year Treasury yield in bp), 3-month ahead FRA-OIS (bp), and JULI spread to Treasuries (bp).
10Y Model based on a 2-year regression of 10-year matched maturity swap spreads (bp) on current coupon mortgage basis (CC yield – 7-year Treasury yield in bp), JULI spread to Treasuries (bp), 1-year ahead budget surplus ($bn), and 5s/10s Treasury curve (%).

Exhibit 8: On the other hand, USD front-end swap spreads are driven by front-end Treasuries

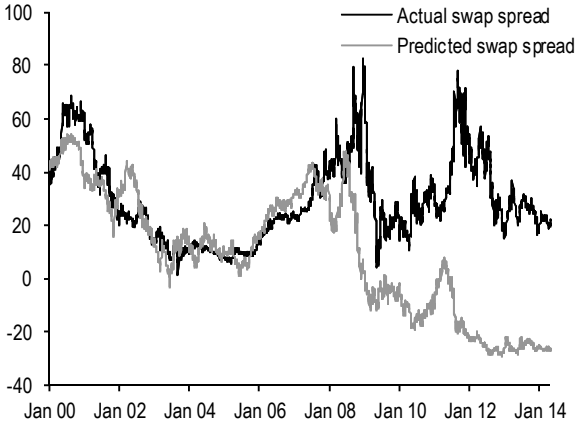
2Y maturity matched swap spread fair value model*

2-year swap spread model	2-year model		Current	Forecast		
	Coefficient	T-stat	Level	2Q14	3Q14	4Q14
Intercept	-1.9	-6.5				
1M GC repo; bp	-0.13	-7.8	6	6	8	9
3M FRA OIS; bp	1.0	60.0	12	15.0	20.0	20.0
3M chg in front Tsy stock;	-8.44	-8.6	0.01	-0.23	0.09	0.09
R^2	91%					
Std Error	1.8					
2Y Swap spread; bp			13			
Fair value; bp			9	14	16	16

* Based on a 2-year regression of 2-year matched maturity swap spreads (bp) on 3-month ahead FRA-OIS (bp), 3-month change in marketable Treasury debt outstanding with maturities less than or equal to 2 years ($tn), and 1-month GC repo rate (bp).

Exhibit 9: Front-end rates were a dominant driver of 10Y swap spread prior to the credit crisis. Although they remain a significant long term driver, their impact over the near term has been overshadowed by other factors...

Actual 10Y German b/m swap spread versus that predicted via its long term driver*; since Jan 2000; bp



* Y = 15.46*(1MM5 EONIA rate) – 28.91; equation fitted using data from Jan 2000 - Jan 2008; R^2 = 75%; SE = 8bp.

1. **10Y German b/m yields** – captures the directionality of swap spreads to yields; swap spreads have tended to widen in a rally and vice-versa. 10Y swap spreads have widened 1.5bp for every 10bp rally in 10Y German b/m yields.

2. **Swaption implied volatility** – an indicator of market stress and captures risk aversion; swap spreads tend to widen during volatile markets. 10Y swap spreads have widened 5bp for every 1bp/day increase in 3Mx10Y swaption implied volatility

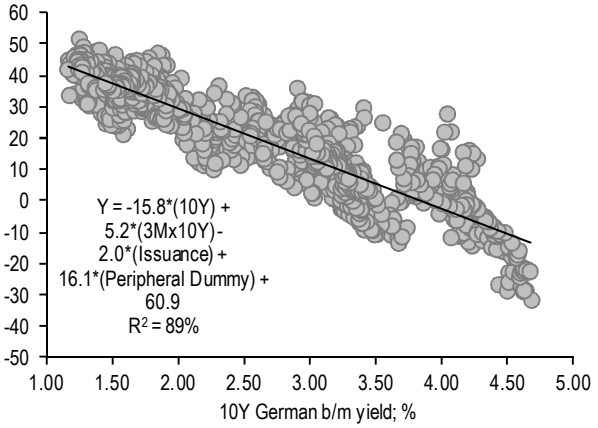
3. **Swapped issuance activity** – captures the impact of issuance swapping of corporates; corporate typically swap their fixed rate liabilities into floating rate liabilities by receiving in swaps which in turn puts narrower pressure on swap spreads. 10Y swap spreads have narrowed 2bp for every €1bn/day increase in swapped issuance activity (on a 20D MA measure)

4. **Peripheral spreads** (used as an indicator variable – we assume this variable to be 1 during August 2011[3] – August 2012[4] and 0 otherwise) – captures the sharp swap spread widening experienced during the peak of the peripheral crisis on the back of large flight-to-quality flows and increased volatility. This dummy variable can explain about 16bp of widening of the 10Y swap spreads during this period.

Together, these variables explain 90% of the remaining variance (**Exhibit 10**).

Exhibit 10: ...such as bond yield, swaption volatility, swapped issuance, and peripheral spreads. Together, these variables can explain 90% of the total variance of 10Y German b/m swap spread

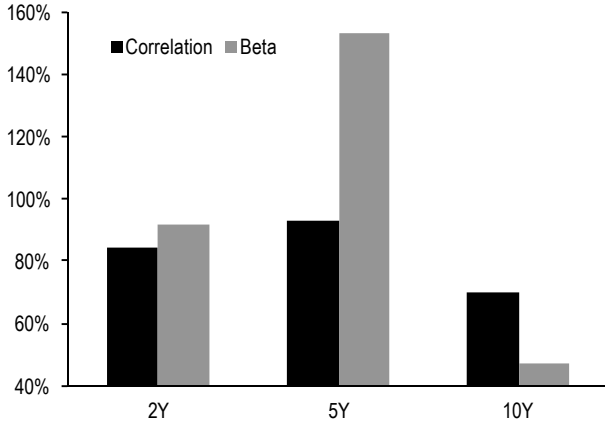
10Y *adjusted** swap spreads regressed against *1)* 10Y German benchmark yields, *2)* 3Mx10Y swaption implied volatility, *3)* swapped issuance activity**, and *4)* peripheral spread dummy***; since Jan 2008; bp



* J.P. Morgan's low-frequency model regresses 10Y swap spreads against the fifth IMM date EONIA over the 8Y period ending 1 January 2008. Residual from this low frequency regression is computed over the period between 1 January 2008 and the present, and regressed against the four high-frequency factors.
** We use fixed-rate, euro-denominated issuance by financial institutions (including covered bonds) and supras/agencies, plus one-half of corporate bond issuance, as an indicator of potential swapped issuance.
*** Peripheral dummy is equal to 1 between August 2011 and August 2012 and 0 otherwise.

Exhibit 11: 2Y, 5Y, and 30Y EUR swap spreads exhibit a strong correlation to 10Y spreads. We use this relationship to estimate fair value for these swap spreads

1Y correlation and regression beta from regressing 10Y German b/m swap spread versus various points on the curve; %



[3] The peripheral crisis spread to Italy/Spain.
[4] ECB announced its OMT program.

2Y, 5Y, and 30Y German b/m swap spreads have exhibited good correlation to 10Y German b/m swap spreads over the past year (**Exhibit 11**). We use our fair value estimate of the 10Y swap spread in conjunction with the regression beta to obtain fair value estimate for these points on the curve.

GBP swap spread model

10Y benchmark GBP swap spread have moved in a 15bp range (-10 to 5bp) over the last year. We focus on a high frequency model for GBP swap spreads to reduce the impact of idiosyncratic factors such as QE. The following three variables together explain about 60% of the total variance in 10Y swap spreads (**Exhibit 12**):

1. **3M SONIA rate 1Y forward** – captures the impact of monetary policy that gets priced into the SONIA curve. 10Y swap spread has widened around 2bp per 10bp increase in 1Yx3M SONIA rate.

2. **10Y GBP benchmark yield** – captures the directionality of swap spreads to intermediate yields. Over the last year, swap spreads have narrowed 1.3bp for every 10bp increase in yields.

3. **10Y swaption implied volatility** – captures risk aversion. According to our model, a 1bp/day increase in 3Mx10Y GBP swaption implied volatility widens the swap spreads by about 2bp.

We model 5Y GBP swap spreads along the same lines as its 10Y counterpart namely using: *1)* 3Mx1Y SONIA rate (to capture front-end liquidity conditions), *2)* 5Y GBP b/m yields (to capture yield directionality) and *3)* 3Mx5Y GBP swaption implied volatility (to capture risk aversion). All the variables are statistically significant and have correct signs. This model explains about 50% of the total variance over the last year (**Exhibit 13**).

Long end spreads (30Y) exhibit a strong and stable directionality to yields. However, implied volatility and the 10s/30s yield curve (a proxy for ALM/technical flows) also tend to impact long-end swap spreads. We model 30Y GBP swap spreads using *1)* 30Y GBP bond yield, *2)* 3Mx30Y GBP swaption implied volatility, and *3)* 10s/30s gilt curve (**Exhibit 14**). All the variables have correct and intuitive signs: swap spreads are counter-directional to yields, show a positive beta to risk aversion (proxied by the volatility) and widen as 10s/30s curve steepens. We note that the 10s/30s curve has tended to steepen in a rally which leads to wider swap spreads.

Exhibit 12: 10Y GBP swap spreads can be well explained by three variables: *1)* front-end rates, *2)* 10Y yield, and *3)* volatility

10Y GBP swap spread regressed against *1)* 1Yx3M SONIA, *2)* 10Y gilt yield, and *3)* 3Mx10Y swaption implied volatility; past 1Y; bp

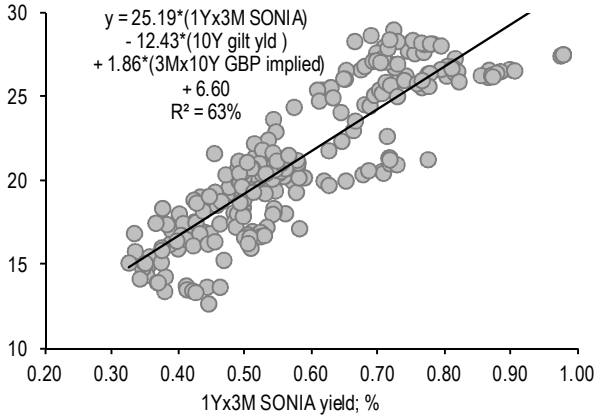


Exhibit 13: 5Y GBP swap spreads are also driven by *1)* front-end rates, *2)* 5Y yield, and *3)* volatility

5Y GBP swap spread regressed against *1)* 1Yx3M SONIA, *2)* 5Y gilt yield, and *3)* 3Mx5Y swaption implied volatility; past 1Y; bp

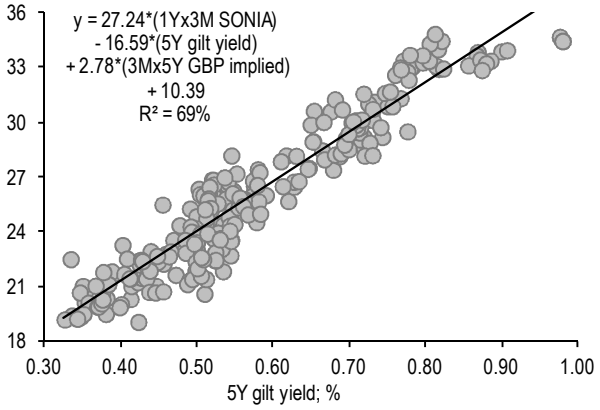


Exhibit 14: 30Y GBP swap spread exhibit strong and stable relationship with 30Y yields. Swaption volatility further increase the explanatory power of the model

30Y GBP swap spread regressed against *1)* 30Y gilt yield and *2)* 3Mx30Y swaption implied volatility; past 2Y; bp

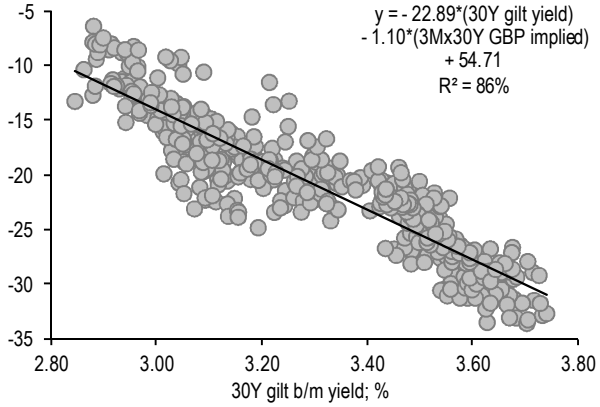


Exhibit 15: JPY swap spreads in the super-long sector are mainly driven by USDJPY Fx rate (or Nikkei 225)
30Y JPY benchmark swap spread regressed against USDJPY spot FX rate; Apr 2011—Dec 2012 (light dots) and Jan 2013 – May 2014 (dark dots); bp

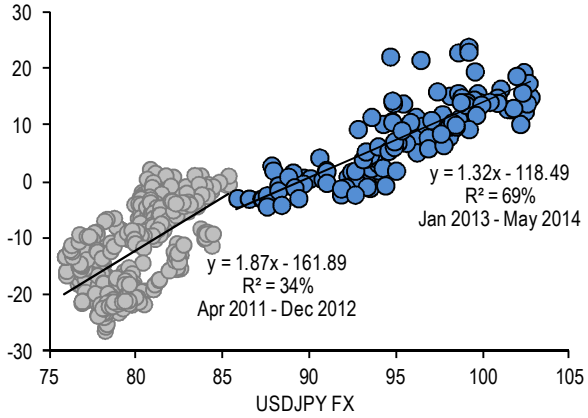
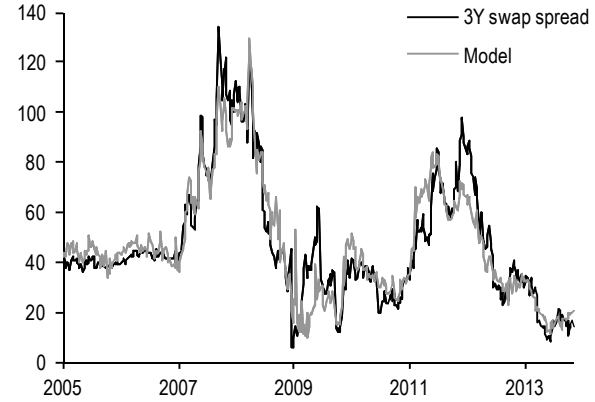
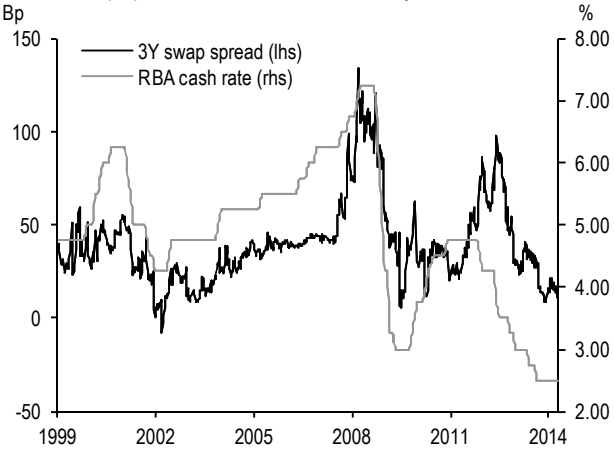


Exhibit 16: Model tracks well the evolution of 3Y swap spreads in Australia – main drivers are financial variables
3Y AUD swap spread and Model*; weekly data since July 2005
bp



Reg equation: Y = 1.86(3Y futures implied) + 0.34*(2Y USD swap spread) - 0.20*(3Y vs. 3M OIS spread) + 1.25*(3Y xccy basis ZScore) + 0.68*(6x9 FRA/OIS) +7.66, R^2=86%, SE=9.6bp.

Exhibit 17: The biggest macro driver of 3Y swap spreads generally in Australia is biased to be the RBA policy cycle – rate hikes encourage a switch from floating to fixed rate mortgages (3Y is the usual tenor), and the banks hedge these flows by paying 3Y swap (and vice versa)
3Y AUD swap spread and RBA cash rate; weekly data since Jan 1999



JPY swap spread model

JPY swap spreads in the super-long sector are mainly driven by USDJPY Fx rate (or Nikkei 225) (**Exhibit 15**). This relationship can be explained via cross gamma hedging flows impacting this sector; as the currency weakens (due to the appreciation of the equity markets), investors tend to shed duration typically via paying in swaps leading to wider swap spreads. However, the sensitivity of this sector has changed as the USDJPY has appreciated (JPY depreciating vs. USD) and Nikkei has rallied. One reason for the change in beta is that part of structured notes may have been redeemed early due to issuer's call or knockout around these levels. From a model point of view, we use a simple single factor model of 30Y swap spreads vs. USDJPY to estimate fair value of super long swap spreads, given our estimate for spot USDJPY Fx rate.

Swap spread in the intermediate parts are driven by flows and swap spreads on the wings. For example, the long term level of 5Y ASW is driven by 2Y ASW but it also tends to have short term volatility when seasonal loan hedging activity of the banks picks up. 10Y ASW was once driven by relative values but since Nikkei 225 and USDJPY started rallying in late 2012, 10Y ASW has just followed the movement of longer ASW such as 20Y and 30Y via overall curve dynamics.

AUD swap spread model

Generally speaking, we model AUS 3Y swap spreads as a function of a number of financial variables.

1. **3Y yields** – to capture the directionality of swap spreads
2. **US 2Y yields** – as a broad measure of spread bias globally
3. **3M/3Y spread** – to capture the impact of roll down/curve shape on 3Y swap
4. **z-score of 3Y xccy basis** – the level of the xccy basis tends to be one of the main drivers of SSA issuance in our markets, which impacts swap spreads

5. **6x9 FRA/OIS** – works better than 3M FRA/OIS, a general measure of bank credit/risk aversion and a short end swap spread.

Exhibit 16 shows that since mid-2005, the model has well explained the 3Y swap spread. In terms of macro-economic drivers of 3Y swap spreads, the main driver tends to be the policy rate cycle (**Exhibit 17**). As the majority of mortgages (around 85%) tend to be floating rate and priced at a spread to the RBA cash rate, rate hikes from the RBA tend to drive a shift in borrower preference towards fixed rate mortgages. In Australia, the maturity of fixed rate residential borrowing tends to be very short, an average maturity is around 3 years. Consequently after the RBA lifts the cash rate, the domestic lenders and banks are drawn to be large payers of 3Y swap in order to hedge flows across their mortgage books. These flows are likely to infer a broad directional relationship between the RBA cash rate and 3Y swap spreads. This dynamic is also inclined to work in reverse as RBA rate cuts usually drive front end spreads narrower.

10Y SEK swap spread model

Our model to explain 10Y Swedish swap spread is along the lines of EUR and GBP, explained above. It includes the following variables:

1. **Front-end rates/liquidity conditions** – to capture the impact of monetary policy; swap spreads tend to narrow when the central bank cuts rate and front-end rates decline and vice versa. A 10 decline in 1Yx3M STINA rate tightens 10Y swap spread by 2bp

2. **10Y SGB bond yield** – to capture the directionality of swap spreads to yield. SEK swap spreads narrow 3bp for every 10bp increase in 10Y SEK bond yield

3. **10Y volatility** – to capture risk aversion. We proxy this via 3Mx10Y EUR swaption implied volatility. A 1bp/day increase in 3Mx10Y EUR swaption implied volatility pushes 10Y SEK swap spread by 1bp.

Together these variables explain about 90% of the total variance over the past two years (**Exhibit 18**). We highlight that yields remain the most significant driver of SEK swap spreads explaining about 65% of the total variance in the data series.

Exhibit 18: 10Y SEK yields are the most dominant driver of SEK swap spreads. Together with volatility and front-end rates, they can explain about 90% of the total variability of 10Y SEK swap spreads

10Y SEK b/m swap spread regressed against *1)* 10Y SGB bond yield, *2)* 1Yx3M STINA yield, and *3)* 3Mx10Y EUR swaption implied volatility; past 2Y; bp

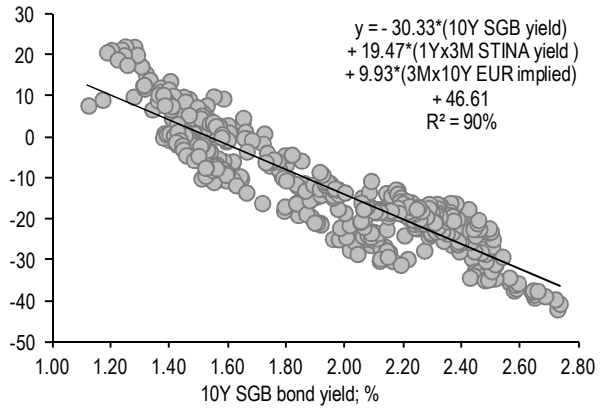


Exhibit 19: Simplified framework for global swap spreads using 2Y domestic benchmark yield, 3Mx10Y swaption implied volatility (3M historical vol for JPY) and 10Y BTP/Bund yield spread

Simplified framework for global swap spreads using 2Y domestic benchmark yield, 3Mx10Y swaption implied volatility (3M historical vol for JPY) and 10Y BTP/Bund yield spread;

	Y-variable			
X-variable	USD	EUR	GBP	JPY
2Y domestic b/m yield (bp/1%)	17	12	19	22
BTP/Bund Spread (bp/1%)	3.6	13.5	13.5	1.0
10Y swaption vol (bp/1bp/day)*	5.5	4.6	7.5	
3M historical vol (bp/1bp/day)				3.4
Residual (bp)	12	17	17	17
R^2	84%	67%	77%	47%

* Not applicable to 10YJPY swap spreads where we use 3M historical volatility instead as a proxy.

Cross market swap spreads trading

The long term PCA analysis above indicates that excluding short term technical factors swap spreads should be driven by liquidity conditions and risk aversion measures. Given the dominance of the peripheral crisis over the past few years and using the intuition from our long term PCA analysis, we **model 10Y benchmark swap spreads in EUR, GBP and USD as a function of 2Y domestic benchmark yields, as proxy for monetary and liquidity conditions, 3Mx10Y domestic swaption volatility and the 10Y BTP/Bund yield spread**.

The advantage of this approach is that it allows modeling swap spreads in various markets under a common simplified framework, which captures the long-term fundamental drivers of swap spreads.

The signs of these models are correct and intuitive, with higher front end rates, wider BTP/Bund spread and higher swaption implied volatility driving swap spreads wider, across various currencies. **Exhibit 19** shows a summary of the statistics of the model. All the variables are statistically significant with the overall R-square of these simplified models ranging from 50% to 85%. The sensitivity to front end rates is broadly similar with about 1.2-2bp of widening for every 10bp increase in 2Y benchmark yields. The sensitivity to the BTP/Bund spread is significantly higher for Bund and Gilt vs. US Treasury as the Bund became the safe haven asset during the peripheral crisis and Gilt benefited from investors reallocating investment in Europe but outside the Euro zone.

It is also possible to extend the model to JPY swap spreads, where we use historical volatility on 10Y swap instead of implieds. The results are broadly similar, with the betas keeping the same sign and an empirical sensitivity to the BTP/Bund spread about 25% of the sensitivity of USD swap spreads.

Relative value analysis on these long term models indicates that current 10Y b/m swap spreads are about 12bp, 17bp and 17bp too wide, in EUR, GBP and USD, respectively. However, given the long term nature of these models and their slow mean reverting nature, we find more value in using this framework more as the building block for cross market relative value analysis than as framework for outright positioning.

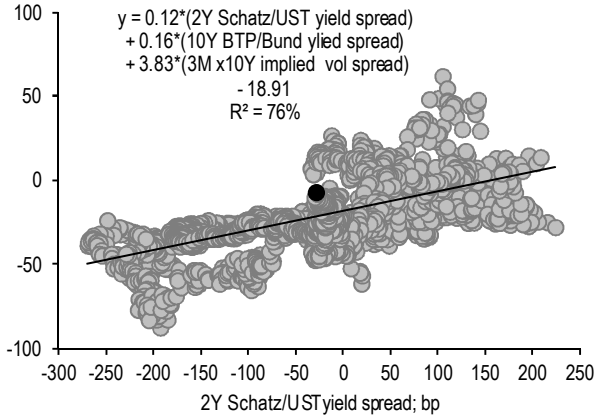
Extending the framework to cross market swap spread allows building a relative value model between EUR and USD or GBP swap spreads. We basically model swap spread differential with the spread of the underlying macro and market variables used above. Using this framework higher USD rates relative to EUR rates will likely put widening pressure on USD swap spreads vs. EUR swap spreads (**Exhibit 20a**).

Under this simplified framework cross market swap spreads trades become cross market trades on liquidity conditions/front end rates, making the argument of widener in USD and GBP vs. narrower in EUR as compelling medium term trade, as peripheral spreads and risk aversion take the back seat in terms of medium term drivers (**Exhibit 20b**).

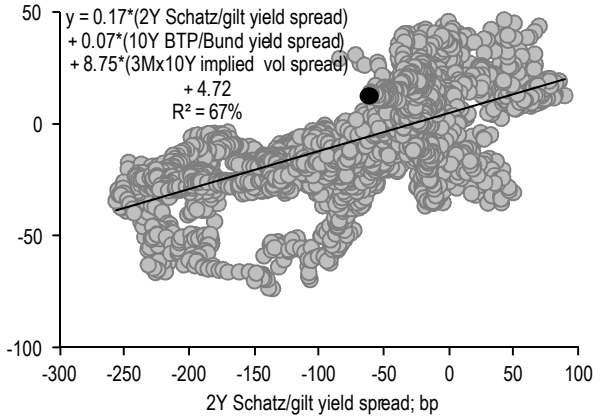
Given the historical relationship between the slope of the curve and front end rates, **a relative flattening between intermediates and long rates in USD vs. EUR would support the relative widening of USD swap spreads**

Exhibit 20: Higher USD and GBP rates (and narrower peripheral spreads) will likely put widening pressure on USD & GBP intermediate swap spreads vs. EUR swap spreads

a) EUR-USD swap spreads regressed against *1)* spread of 2Y government yields (Schatz – 2Y Treasury), *2)* 10Y BTP/Bund yield spread and *3)* spread of 3Mx10Y implied vol (EUR – USD); past 15Y; bp



b) EUR-GBP swap spreads regressed against *1)* spread of 2Y government yields (Schatz – 2Y Gilt), *2)* 10Y BTP/Bund yield spread and *3)* spread of 3Mx10Y implied vol (EUR – GBP); past 15Y; bp



vs. EUR swap spreads. In our cross market model using the 5s/30s curve we find the correct sign for the respective beta to the USD and EUR curve, with flattening in USD driving USD swap spreads wider relative to EUR swap spreads. Over the sample period the contribution to explaining the cross market swap spread from the 5s/30s German benchmark curve is very modest. Although the beta is statistically significant, the overall increase in the R-squared of the model is modest once the German curve is added to the model (**Exhibit 21a**).

In the EUR vs. GBP swap spread cross market model it is almost irrelevant to include the 10Y BTP/Bund yield spread, likely driven by the fact that both swap spreads shared a similar beta. The betas to the 5s/30s benchmark respective curves have the correct signs and

our view of relative flattening of the Gilt curve vs. the Bund curve supports a medium term widening in GBP swap spreads vs. EUR swap spreads (Exhibit 21b).

Cross market, we believe that swap spreads will be driven by relative macro conditions, with the relative flattening in the USD and the GBP curve on market pricing tighter monetary policy on the medium term will support a relative widening of USD and GBP swap spreads vs. EUR swap spreads.

Regulatory impact on swap spreads

There are numerous regulatory developments which could impact swap spreads globally going forward. **However, in general it is difficult to anticipate or position for a strong directional bias arising from regulatory changes.** This is because:

1) Many drivers work in opposite directions, limiting the overall impact.

2) Much of the impact has already likely occurred.

3) Regulatory impact is often unpredictable as it depends on the specific wording of the particular regulation. Indeed, in cases where a regulatory change looks likely to have a large impact on markets, such as the repo netting restrictions in the Supplementary Leverage Ratio (SLR) rule in the US, it is probably more prone to reversal. This creates volatility but not necessarily a clear directional bias in swap spreads.

Thus, overall we expect more traditional drivers of swap spreads, as discussed above, to continue to be the major drivers going forward. Nevertheless, below we discuss some of the more important regulatory developments affecting swap spreads, their estimated impact, and assess the outlook going forward.

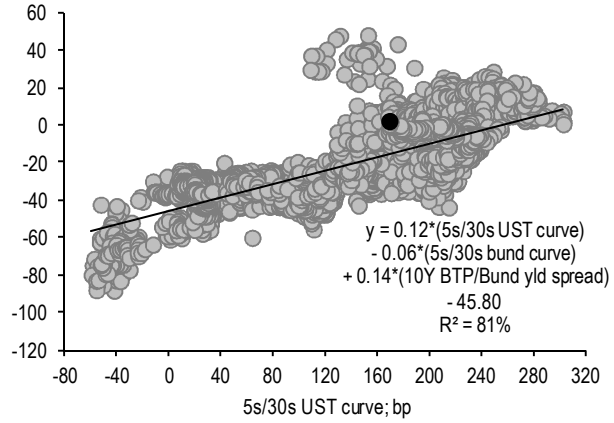
Potential regulatory drivers of swap spreads

Exhibit 22 presents a summary of some of the more important regulatory developments affecting swap spreads and their estimated impact. We discuss in brief below.

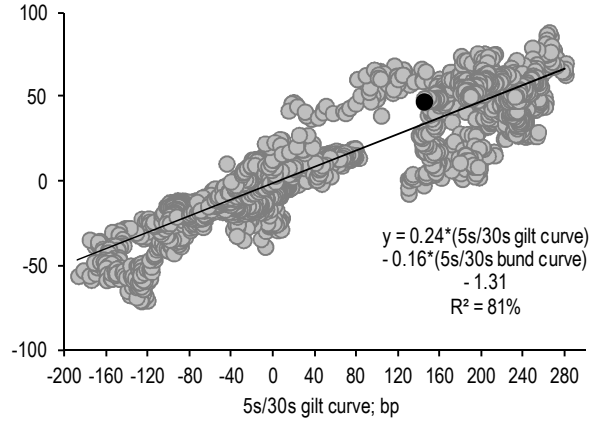
I. In general, there is a global need for more high-quality collateral, such as cash or govie bonds. This stems from an increased regulatory emphasis on central clearing of derivatives as well as the Basel III

Exhibit 21: The flattening between intermediates and long end of the USD and GPB curves is expected to put widening pressure on USD and GBP swap spreads vs. EUR swap spreads; peripheral spreads supporting widener in USD vs. EUR but not a driver of EUR vs. GBP swap spreads

a) EUR-USD 10Y swap spreads regressed against *1)* 5s/30s US Treasury curve, *2)* 5s/30s Bund curve, and *3)* 10Y BTP/Bund yield spread; since January 1999; bp



b) EUR-GBP 10Y swap spreads regressed against *1)* 5s/30s gilt curve and *2)* 5s/30s Bund curve; since January 1999; bp



Liquidity Coverage Ratio (LCR) which mandates that banks hold a certain percentage of high-quality assets to cover 30-day estimated outflows. **More demand for cash and Treasury assets should in general push swap spreads wider.** However, overall we expect the impact going forward to be minor. **First**, we estimate that only a small percentage of outstanding derivative contracts are not already margined, and in addition an end-user exemption was granted to various investors who are traditionally more short collateral. **Second**, the majority of global banks already meet the LCR requirements. For instance, a BIS survey as of end-2012 suggested that 68% of global banks already met the LCR, a figure which was fairly evenly

Exhibit 22: Regulatory drivers of global swap spreads and JPMorgan estimate of their potential impact

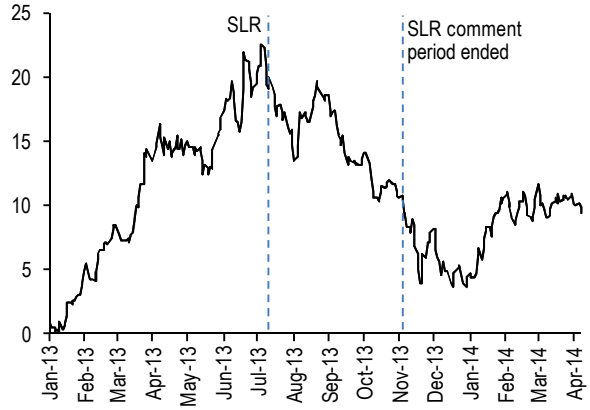
	Driver	Direction	Quantity	Region	Comment
I	More demand for high-quality cash assets as collateral, stemming from…	Wider	unclear	Global	
	…OTC deriv clearing requirements		Marginal	US (already); Europe to follow	Fairly small additional demand observed in US given 1) most OTC trades are margined and 2) end-user exemption for certain clients.
	…Onerous margin requirements for non-centrally cleared derivs		Marginal	US/Europe	Likely to include the end-user exemption, limiting impact.
	…Basel III Liquidity Coverage Ratio (LCR)		Marginal	Global	The majority of banks already meet LCR ratios. Possibly some additional and gradual impact as excess reserves are slowly drained by central banks.
II	Margining requirements for centrally-cleared products favour bond futures over swaps	Wider on the long-end	Modest: at most 5-7bp in the US (where it has already occurred)	US (already); Europe to follow	Switching from swaps to bond futures more limited than anticipated in the US.
III	Shrinkage of banks' repo businesses due to Leverage Ratio (LR) (global) and Supplementary Leverage Ratio (SLR) (US) and onerous netting restrictions	Narrower	Moderate: up to 10-15bp in the US, but partially reversed on regulation modification	Global with more impact in US due to SLR	Repo contraction implies less liquid government bond markets which implies higher yields and narrower swap spreads. A Financial Transaction Tax (FTT) in Europe, should it be enacted and applied to repo markets, could have a similar impact.
IV	More sound and well-capitalized banking systems	Narrower	Mild: perhaps 2-3bp on 2Y swap spreads going forward	Global	Previous impact on 2Y swap spreads ~25bp. FINs - Non-FINs 5Y Spread to TSY has compressed 150bp since 2012, with a 0.16 beta to 2Y USD swap spreads. R-sq >75%. (Beta and Rsq are stable over different periods).
V	Libor reform => more volatile LIBOR fixings	More volatile FRA-OIS	Limited impact until global excess liquidity is drained	Global	

distributed across regions and which should have improved subsequently.[5]

II. To date, the margining requirements for centrally-cleared products have tended to favour bond futures over swaps, particularly on the long end of the maturity curve. This was true in the US.[6] **The incentive to position in more margin-efficient bond futures over swaps suggests widening pressure on long-end swap spreads.** However, thus far, the impact has been milder than we anticipated in the US, accounting for no more than 5-7bp of widening pressure on US long-end swap spreads in 2013. Many of the end-users proved to be relatively comfortable posting the additional margin, and there was less switching than anticipated. In Europe, where the coming Solvency II framework will continue to emphasize long-end swaps as the relevant discount rate for ALM, we also foresee relatively little switching on account of margin efficiency.

Exhibit 23: The initial stringent SLR disallowed repo netting and put narrowing pressure on swap spreads which reversed when limited netting was allowed

10Y USD swap spreads around key Supplementary Leverage Ratio (SLR) announcement dates; bp



III. **Leverage ratio requirements put pressure on banks' low-margin repo businesses, suggesting smaller repo markets, less liquid government bond markets trading at higher yields, and narrower swap spreads.** The crucial determinant is whether repo transactions are allowed to be netted or not - banks often have offsetting repo trades but thus

[5] *Basel III Monitoring Report*, Basel Committee on Banking Supervision, BIS, Sep. 2013.
[6] See *2013 Outlook: Interest Rate Derivatives*, Praveen Korapaty, Nov 21 2012

far there has been a tendency for regulators to look at gross exposures. In the US, the stringent SLR disallowed netting under most circumstances and put significant narrowing pressure on swap spreads in late 2013 – perhaps on the order of 10-15bp in the 10Y sector (**Exhibit 23**). However, some of this move reversed subsequently as changes were made to allow (limited) netting. Basel III also imposes a global bank leverage ratio but precise treatment has not been finalized yet.

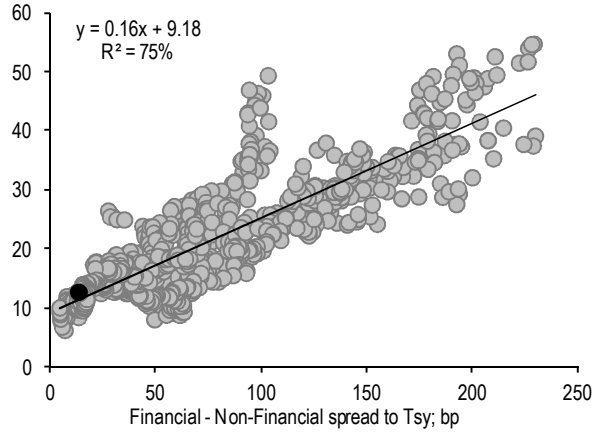
IV. Most of the regulatory changes of recent years have been aimed at strengthening the banking sector, boosting capital and liquidity. **A more sound and credit-worthy banking sector should lead to narrower swap spreads** (we judge that a more robust banking system in general outweighs the potential for increased private-sector bail-in in some regimes). Indeed, as banks have outperformed non-financial companies in recent years, front-end swap spreads have narrowed significantly (**Exhibit 24**). We estimate a 0.16 beta of 2Y US swap spread to each 1bp of bank spread outperformance.

V. Finally, **Libor reform is expected to lead to more volatile Libor fixings over time** given more regulatory emphasis on transaction data. This should not impart a directional bias to Libor but could lead to more volatile FRA-OIS. At present we think this is a minor consideration as excess central bank liquidity is high, dwarfing the impact; however we could see more volatility on the very front-end as global excess liquidity is slowly drained.

Finally, we mention the Financial Transaction Tax in Europe (FTT) although the final content and breadth of this measure remains in doubt. The exact nature of the taxes applied could impact swap spreads in either direction, particularly if there is differential impact on derivatives vs. bonds or swaps vs. futures. In addition, a tax applied to repo transactions could have a similar impact as item III above, in the sense that a high tax could impair European repo markets, producing less liquid govie bond markets trading at higher yields and hence narrowing pressure on swap spreads.

Exhibit 24: Front-end swap spreads have narrowed on outperformance of financials

USD 2Y swap spread regressed against the difference between US Financial and non-Financial corporates' spread to Treasuries, in the 5Y-7Y sector; Jan 2010-current; bp



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