

Thoughts on the Methodologies in the ISDA Consultation

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These comment reflect my own thoughts and should not be taken as reflecting the views of the Federal Reserve Board.

It is important that market participants engage with ISDA in its consultation. These thoughts are meant to raise some points that market participants may want to consider as they review the various methodologies that ISDA is consulting on.

Triggers

- ISDA could consider other tools to help market participants move their legacy swap positions at an earlier trigger, for example, a finding by FCA that LIBOR was not representative.
- If supervised EU entities were prohibited from trading new LIBOR products, it could diminish LIBOR's liquidity and usefulness substantially – people should think about whether they want tools to trigger earlier and work with ISDA if so.

Fallback Rates

- ISDA's proposal that the fallback rates be directly based on the overnight risk-free rates such as SOFR is in line with the FSB's position. The FSB has issued a note supporting the use of the overnight RFRs for derivatives and in the ISDA protocol. However that does not preclude the possibility that some cash products could choose to fallback to a forward-looking term rate.
- Because the type of forward-looking term rate proposed by the ARRC and under consideration in other currency areas would be based on SOFR futures or OIS data, it is possible to hedge any term-rate exposures using SOFR derivatives.

Spread Adjustment

- No matter what the fallback rate is, a spread adjustment is needed in order to minimize valuation effects.
- There is no perfect spread adjustment, and while each can seek to minimize valuation changes, it is not possible for any of the potential contractual fallbacks to guarantee that there will be no valuation change.
- This is true for all LIBOR products, but particularly true for derivatives.
- If you want to guarantee that there are no valuation changes, you should seriously consider closing out at a price and terms that you are comfortable with before any LIBOR stop.

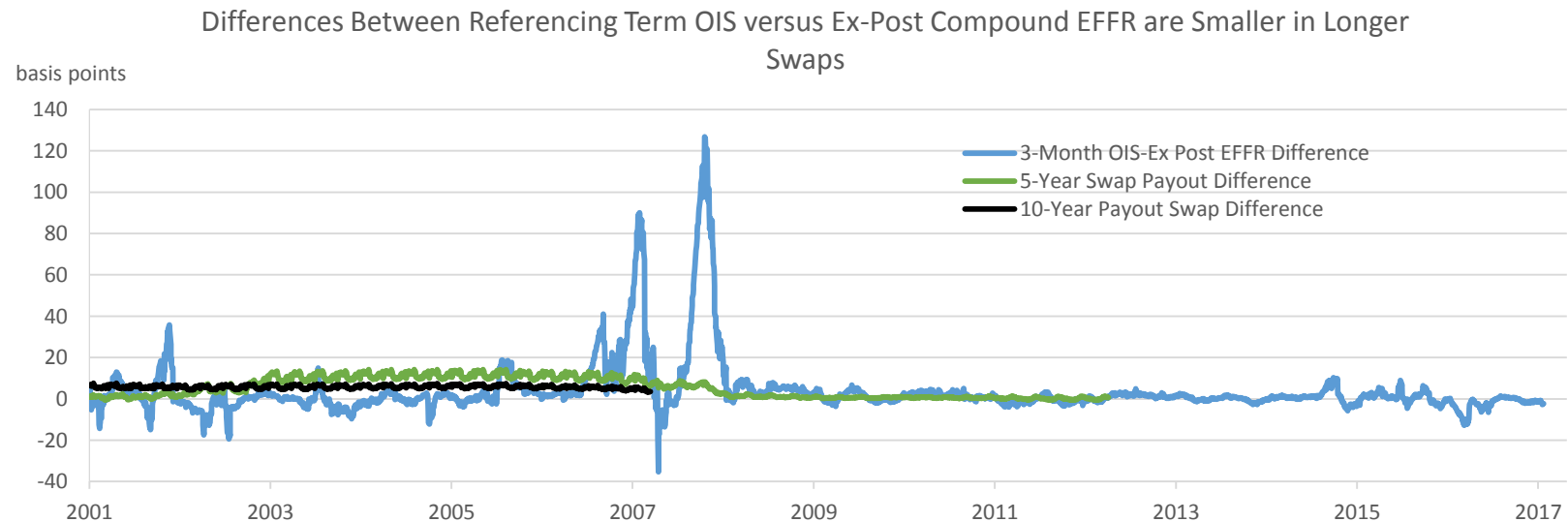
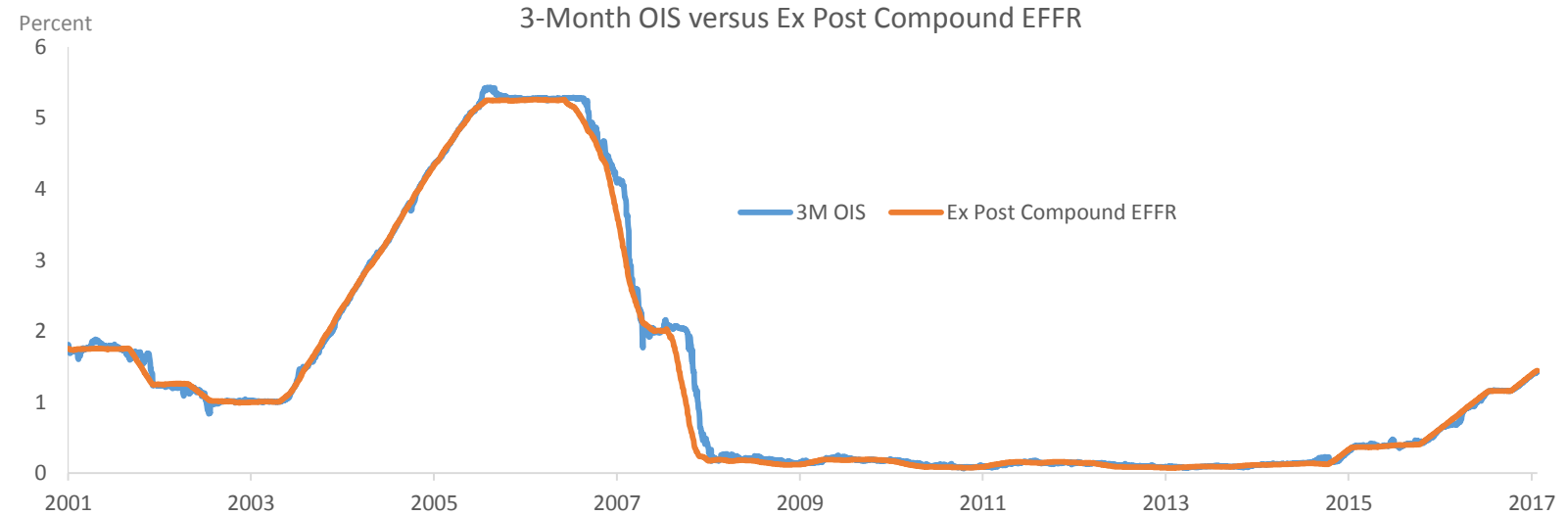
The examples in the next slides are based on EFRR, since SOFR has just begun production and trading, and are meant to be indicative of various considerations participants may want to keep in mind.

Compound Setting in Arrears

The differences between term OIS rates and the ex-post compound average of the overnight rate (ISDA's Compound Setting in Arrears Rate) are generally quite small

The only instances where we've seen sizeable differences were the two episodes during the financial crisis when the FOMC unexpectedly cut its policy targets by 200 and 250 basis points over very short periods of time (blue line in bottom panel). That's hopefully something not very likely to happen in the future.

Taken over the life of a longer-term swap, any differences are averaged out further. Even the misses during the financial crisis would not have amounted to a large difference in payments over the life time of a 5- or 10-year swap (grey and black lines in bottom panel).



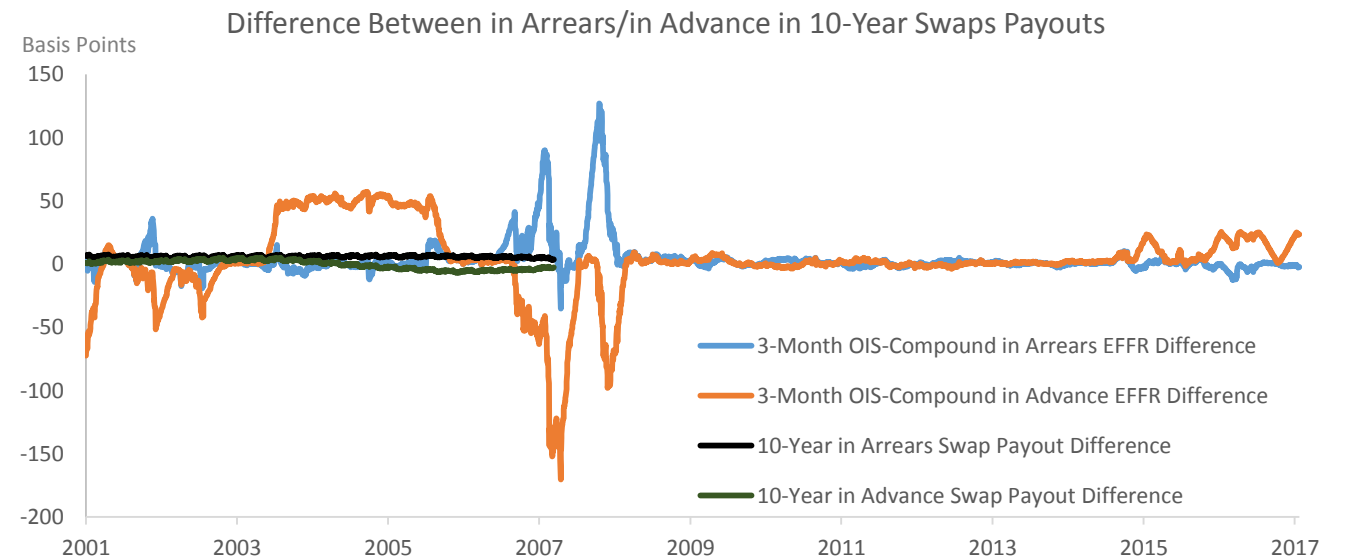
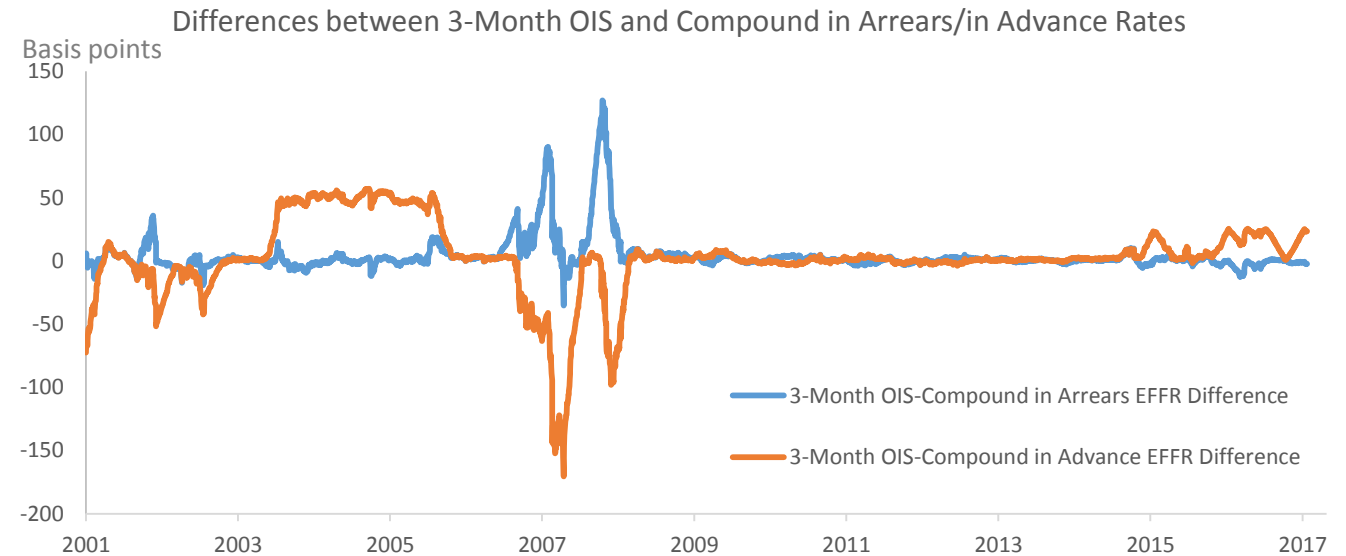
Source: Bloomberg and Federal Reserve staff calculations

Compound Setting in Advance

The compound setting in advance approach is just a lagged version of the compound setting in arrears.

The difference between and OIS rate and this alternative are larger than with the in advance and changes the economics from forward-looking to backward

But the payout structure remains the same as in OIS contracts and so the forward payments can be hedged by OIS contracts



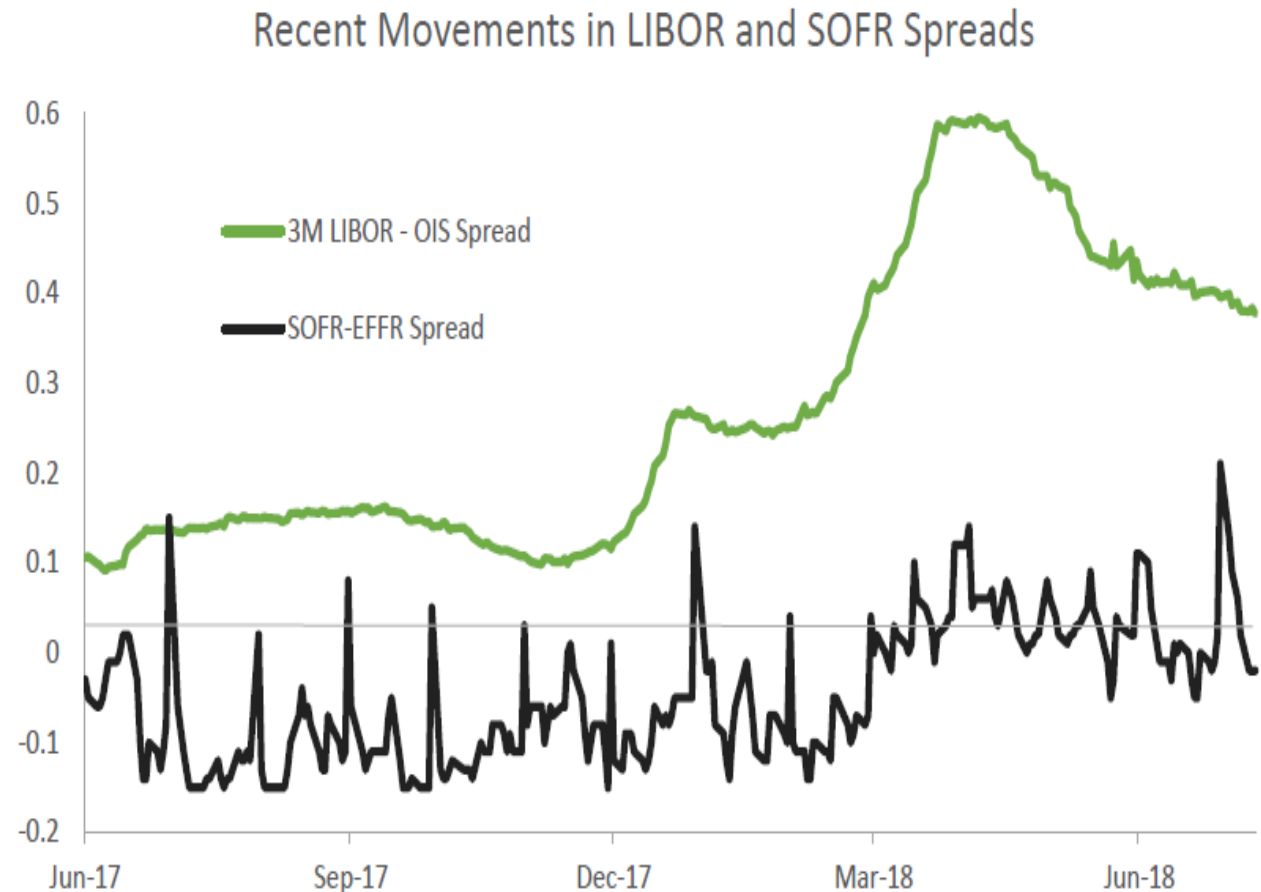
Spot Overnight Rate and Convexity-adjusted Overnight

Spot rates are more variable than either of the compound-averages. These choices would build that added volatility in to the lifetime of payments

It also would not match the payment structure in an OIS contract, so legacy and new swaps books would not match. Market participants would need bespoke products to hedge the difference.

These choices also would not work well with the forward spread approach.

On the other hand, they are easy to understand and some might prefer them to the Compound in Arrears option, which might be operationally difficult to implement for some, and the Compound in Advance, which is backward-looking.



Source: Bloomberg and Federal Reserve staff calculations

The spot spread approach might work reasonably if a LIBOR stop occurred during a stable period – generally, far-term spreads are relatively close to the spot LIBOR-OIS spread, but in times where near-term spreads are temporarily high, this approach would lock in that high spread for even very long-term swaps

3-Month USD LIBOR and LIBOR Swap Spreads Over OIS

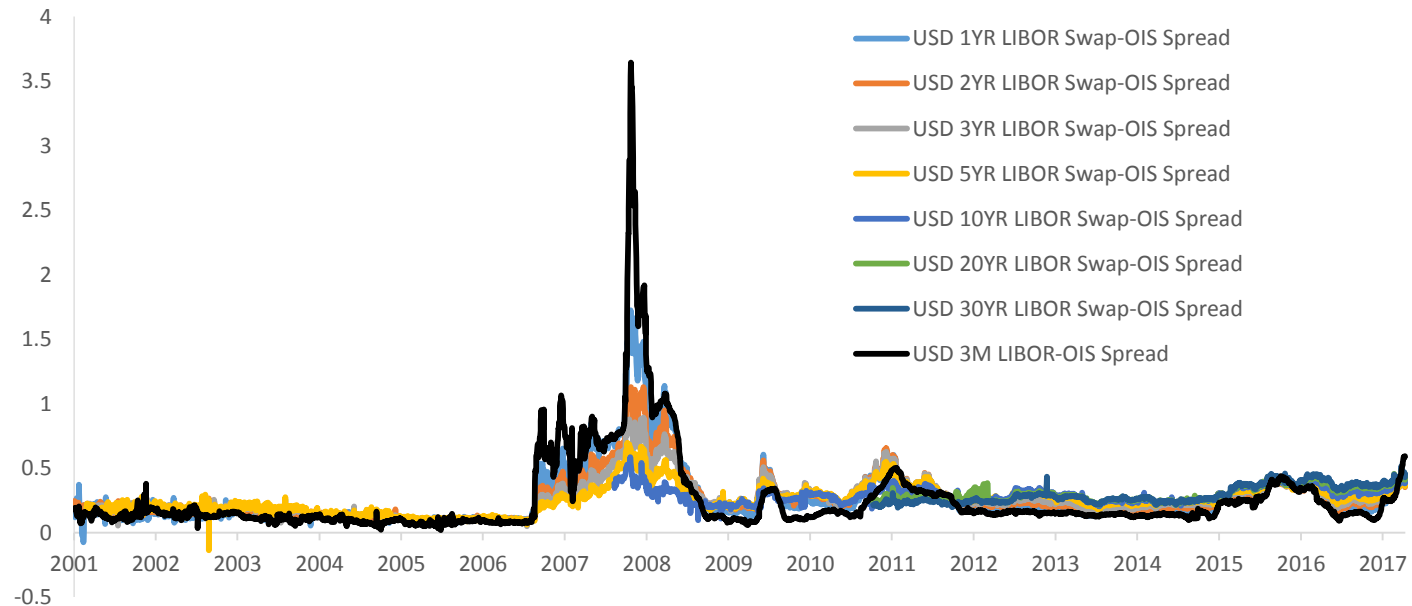


Table 1: Fit of Swap Spread Curve Based on Last Observed spot 3-Month LIBOR-OIS spread

	1 Year Swap	2 Year Swap	3 Year Swap	5 Year Swap	10 Year Swap	20 Year Swap	30 Year Swap	Average
<i>Full Sample</i>								
Average Error	0.4	0.0	-0.2	-0.9	-1.6	---	---	-0.5
Mean Absolute Error	6.0	9.4	11.5	13.4	17.5	---	---	11.5
Root Mean Squared Error	14.0	20.2	23.8	27.3	36.3	---	---	24.3
Maximum Error	194.0	251.7	282.5	304.3	312.1	---	---	268.9
<i>2010-17</i>								
Average Error	4.0	6.4	7.7	8.8	8.5	10.8	10.1	8.1
Mean Absolute Error	4.5	6.8	8.1	9.3	9.7	8.3	7.7	7.8
Root Mean Squared Error	6.3	8.5	9.5	10.4	10.8	10.6	10.4	9.5
Maximum Error	30.9	28.1	29.1	26.3	22.8	26.8	27.6	27.4

Source: Bloomberg and Federal Reserve staff calculations

Forward approach

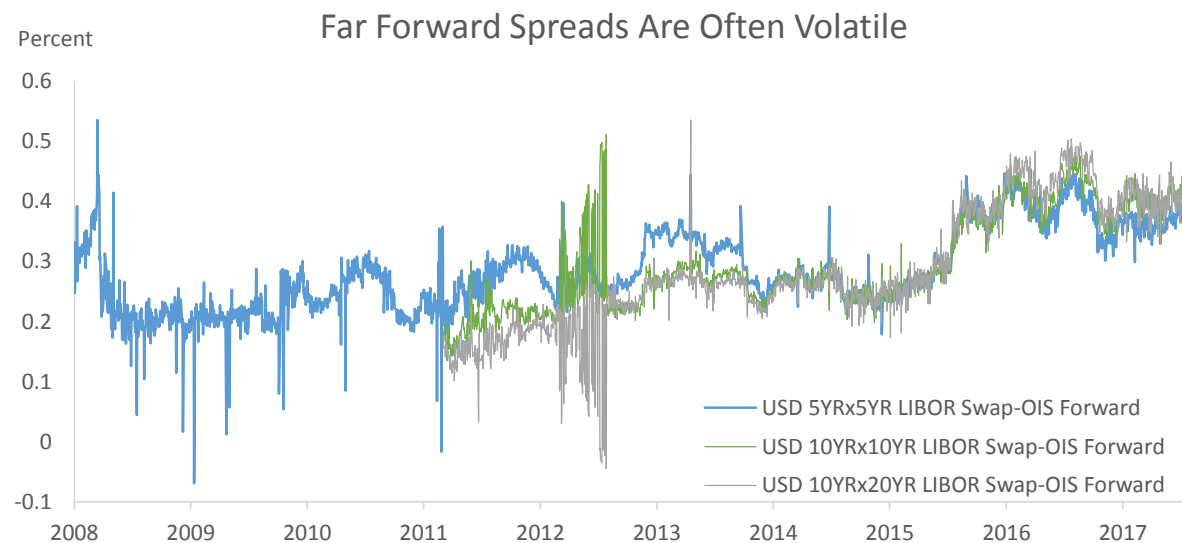
Most people are likely to assume this is the best approach for them.

If the LIBOR stop was sudden and totally unexpected, it would essentially set the value of swaps at prices the day before the end to LIBOR (or an average of prices on the days just before then). Hard to argue that from a swaps perspective.

But, you should think about several complications:

1. Which prices? The CME and LCH curves are different, so would the curve the administrator chosen by ISDA uses be closer to LCH, closer to CME, something else?
2. This is a very data-intensive method, with separate curves for each LIBOR maturity and for the risk-free rate going out 30 to 60 years. There aren't tons of transactions each day across these curves and forward rates can be noisy (see picture), so valuations will depend to at least some extent on modelling or quotes. How will they be modeled? Will there be opportunity for disputes?

3. Market participants are used to a certain level of liquidity in the LIBOR curve, but should consider that it might degrade (UK LIBOR-SONIA curves have widened recently at the long-term as some firms have sought to limit their LIBOR exposures). Would it work for cash products if they had to explain that, for example, the rate in a 30-year mortgage was going to go up because of some idiosyncrasy in the swap market?
4. How well this works will also depend on the liquidity of the SOFR curve. Post a LIBOR stop, the SOFR curve may see a jump in liquidity that is not reflected in the pre-stop curve if the announcement is unanticipated.



Source: Bloomberg and Federal Reserve staff calculations

What if the LIBOR stop is pre-announced or otherwise anticipated?

There is certainly a good chance that it would be pre-announced, perhaps up to several years in advance.

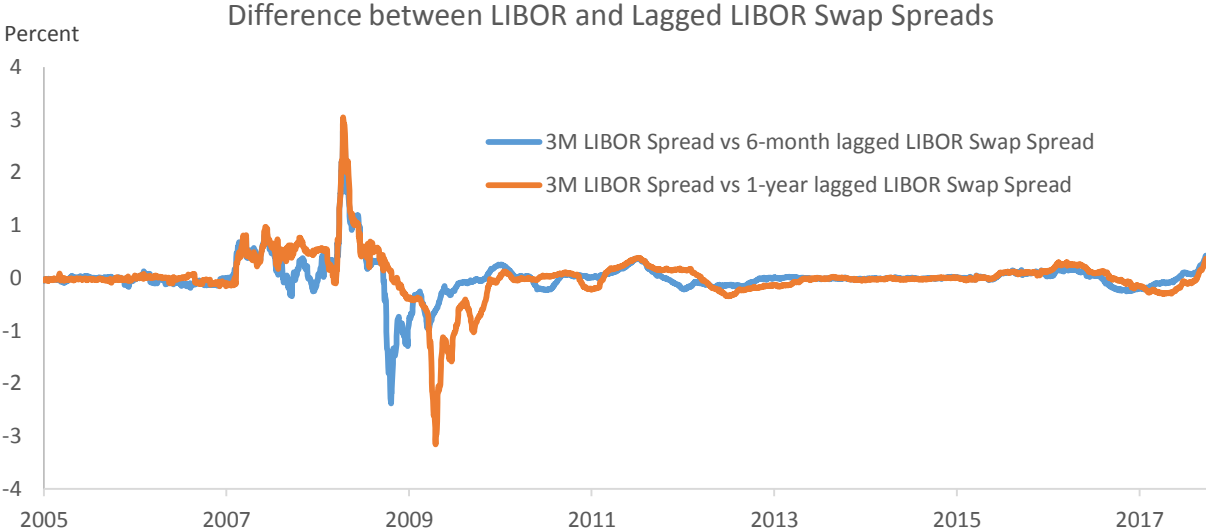
The spread would then be set at the time of announcement but would not take effect until LIBOR stopped, and in the interim economic circumstances would likely change. If the announcement were 6 months or a year in advance, the fit of the swaps curve at the time of the actual stop is on par with other methods.

More importantly, the LIBOR spread at the stop would not be the same as the forward spread, which could lead to discontinuities in payments for cash products if ISDA used this methodology and cash products sought to follow the ISDA procedure.

This would be ok for swaps, since the swap curve should converge. -- circularity

Table 3: Fit of US Dollar Swap Spreads Incorporating a 1-Year Announcement Lag

	1 Year Swap	2 Year Swap	3 Year Swap	5 Year Swap	10 Year Swap	20 Year Swap	30 Year Swap	Average
<i>Full Sample</i>								
Average Error	1.3	1.1	1.1	1.2	0.4	---	---	1.0
Mean Absolute Error	17.1	13.3	11.4	9.3	7.5	---	---	11.7
Root Mean Squared Error	30.3	21.9	17.5	13.1	9.3	---	---	18.4
Maximum Error	153.7	91.0	67.6	50.1	38.1	---	---	80.1
<i>2010-17</i>								
Average Error	-2.2	-1.4	-0.7	0.6	1.7	2.8	3.8	0.6
Mean Absolute Error	13.6	11.7	10.4	8.8	6.7	5.6	5.4	8.9
Root Mean Squared Error	21.1	16.9	14.1	10.9	7.8	7.3	7.4	12.2
Maximum Error	100.6	74.7	54.9	34.6	20.4	20.9	20.9	46.7



Source: Bloomberg and Federal Reserve staff calculations

Historical Mean/Median Approach

This approach might seem strange, but it can be thought of as a form of two-factor model of the swap curve.

(Econometricians often model yield and swaps curves based on level, slope, and curvature factors, and this method can be seen as a version of that).

Historically, it can fit the curve relatively well depending on the parameterization. Historical statistics using the ISDA methodology are shown in the top panel, while an alternative is shown in the bottom.

By construction, the approximation is at the time of the stop, so the ISDA spread would be equal to the last observed LIBOR spread, which would be useful if cash markets also sought to apply it.

Table 4: Fit of US Dollar Swap Spreads Using ISDA Linear Method and a 10-Year Moving Average for LIBOR-OIS

	1 Year Swap	2 Year Swap	3 Year Swap	5 Year Swap	10 Year Swap	20 Year Swap	30 Year Swap	Average
<i>Full Sample</i>								
Average Error	3.5	3.2	3.0	2.3	-0.6	---	---	2.3
Mean Absolute Error	12.4	9.5	8.0	6.2	5.4	---	---	8.3
Root Mean Squared Error	22.8	16.2	12.7	9.0	7.0	---	---	13.5
Maximum Error	149.9	90.0	66.6	48.7	36.1	---	---	78.2
<i>2010-17</i>								
Average Error	-5.6	-3.2	-1.9	-0.8	-1.1	-1.4	-2.2	-2.3
Mean Absolute Error	10.4	8.5	7.2	5.5	4.4	4.3	5.3	6.5
Root Mean Squared Error	11.8	10.1	8.8	6.9	5.1	5.0	5.8	7.7
Maximum Error	35.4	37.3	34.3	26.7	13.0	12.7	13.6	24.7

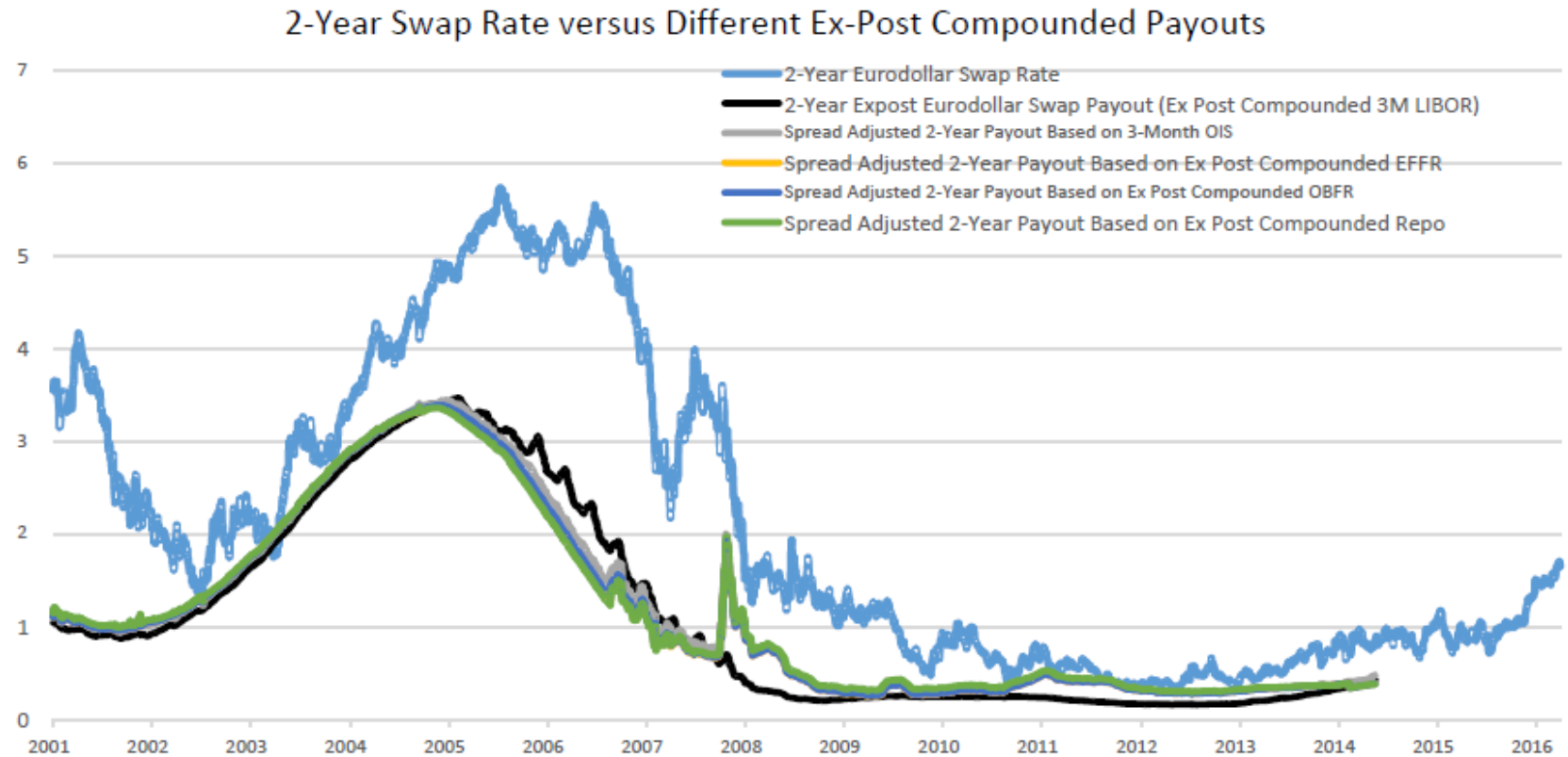
Table 5: Fit of US Dollar Swap Spreads Using AR(1) and a 10-Year Moving Average for LIBOR-OIS

	1 Year Swap	2 Year Swap	3 Year Swap	5 Year Swap	10 Year Swap	20 Year Swap	30 Year Swap	Average
<i>Full Sample</i>								
Average Error	1.7	2.2	2.3	1.9	-0.7	---	---	1.5
Mean Absolute Error	4.7	5.2	5.1	4.5	4.5	---	---	4.8
Root Mean Squared Error	7.6	8.0	7.4	6.1	5.6	---	---	6.9
Maximum Error	47.7	41.3	36.9	29.4	22.6	---	---	35.6
<i>2010-17</i>								
Average Error	-0.2	-0.1	0.2	0.5	-0.5	-1.2	-2.1	-0.5
Mean Absolute Error	4.6	5.5	5.3	4.6	3.9	4.1	5.1	4.7
Root Mean Squared Error	6.2	7.2	7.0	5.9	4.6	4.8	5.7	5.9
Maximum Error	30.3	33.3	31.7	25.1	11.7	12.4	13.6	22.6

LIBOR swaps aren't historically great predictors of future LIBOR payouts.

Reversion to a mean would be simple to understand and would historically have been much closer to actual LIBOR payouts.

That could be useful if cash products seek to mirror the ISDA fallback approach, but the tradeoff would be that at best this method can be viewed as an approximation to the swaps spread curve and would not take in to account all the factors that might affect those spreads.



Source: Bloomberg and Federal Reserve staff calculations