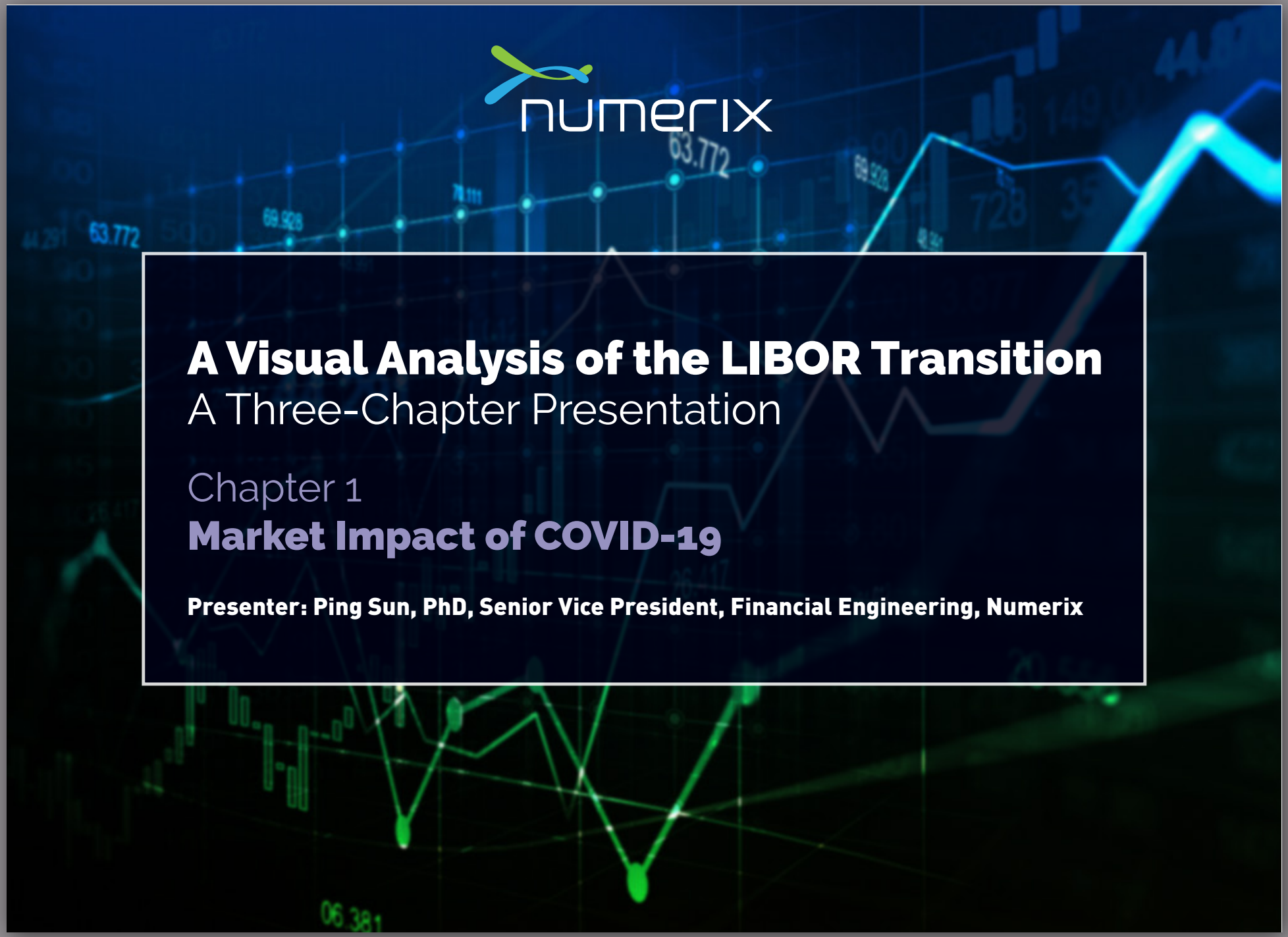


A Visual Analysis of the LIBOR Transition

A Three-Chapter Presentation

Chapter 1

Market Impact of COVID-19

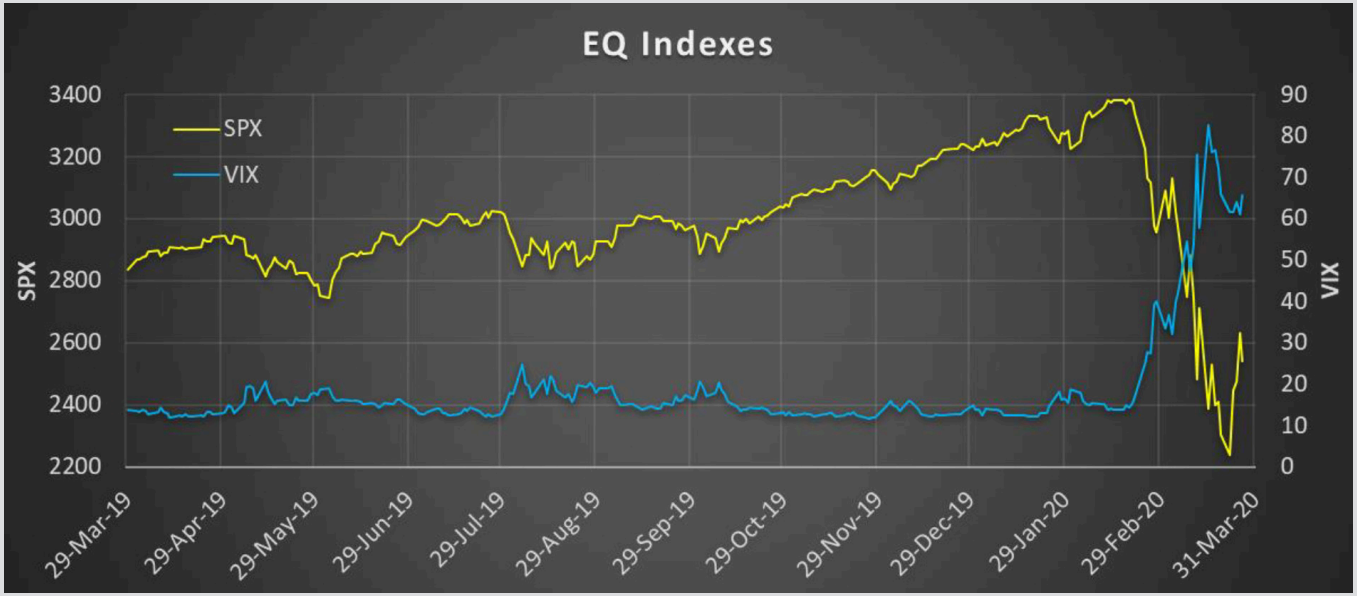
Presenter: Ping Sun, PhD, Senior Vice President, Financial Engineering, Numerix

In April 2020, I presented a webinar titled, The LIBOR Transition: Impact of SOFR Switch on Swaptions, which discussed LIBOR transition headwinds linked to COVID-19. Leveraging an analysis of historical data for SOFR and LIBOR fixings and volatility, in my presentation I also examined the impact of the Fed Funds/SOFR switch on value transfers for swaptions, as well as impact on swaptions of LIBOR fallback.

With this ebook, *A Visual Analysis of the LIBOR Transition*, I decided to create a visual analysis of my findings, consisting of three chapters. In Chapter 1, I analyze the impact of COVID-19 on the financial markets and, consequently, on LIBOR and SOFR rates leading up to March/April 2020. I also explore how transition milestones continued despite the pandemic, and do so by highlighting SOFR derivatives trade volume.

Dr. Ping Sun's work has appeared in a number of publications and academic journals, and he has lectured at a range of academic events and industry conferences. He was a postdoctoral fellow at Rutgers University and earned a doctorate degree in Physics from City College of New York. He also received an undergraduate degree in Physics from Fudan University in Shanghai, China.

1) Financial Markets Hit Hard Under COVID-19



Data Source: Bloomberg

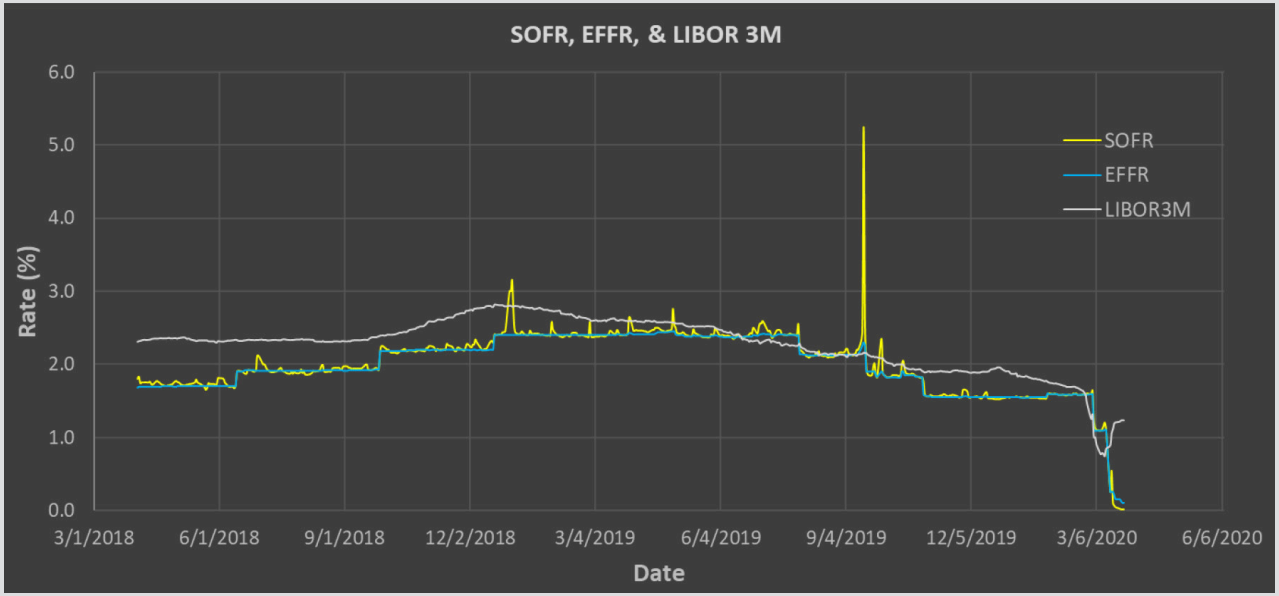
The ongoing coronavirus pandemic has hit the markets hard. If you look at the major EQ indexes, such as the S&P 500, which is what I show here in yellow, the index fell from its peak at the beginning of the year to an almost 30% drop in value within approximately one month. At the same time, the VIX index surged to more than 80%. That indicates quite a bit of market fear due to the negative impact of the pandemic.

2) Federal Reserve's Rate Changes Since the Launch of SOFR

Date	Fed Funds Rate	Discount Rate
Mar. 15, 2020	0.00% - 0.25%	0.25%
Mar. 3, 2020	1.00% - 1.25%	2.75%
Oct. 30, 2019	1.50% - 1.75%	2.75%
Sept. 18, 2019	1.75% - 2.00%	2.75%
Jul, 31, 2019	2.00% - 2.25%	2.75%
Dec. 19, 2018	2.25% - 2.50%	3.00%
Sept. 26, 2018	2.00% - 2.25%	2.75%
Jun. 13, 2018	1.75% - 2.00%	2.50%

Besides the $2 trillion stimulus from the U.S. government, the U.S. Federal Reserve cut the benchmark interest rate twice in March by a total of 150 bps, which impacted the market immediately.

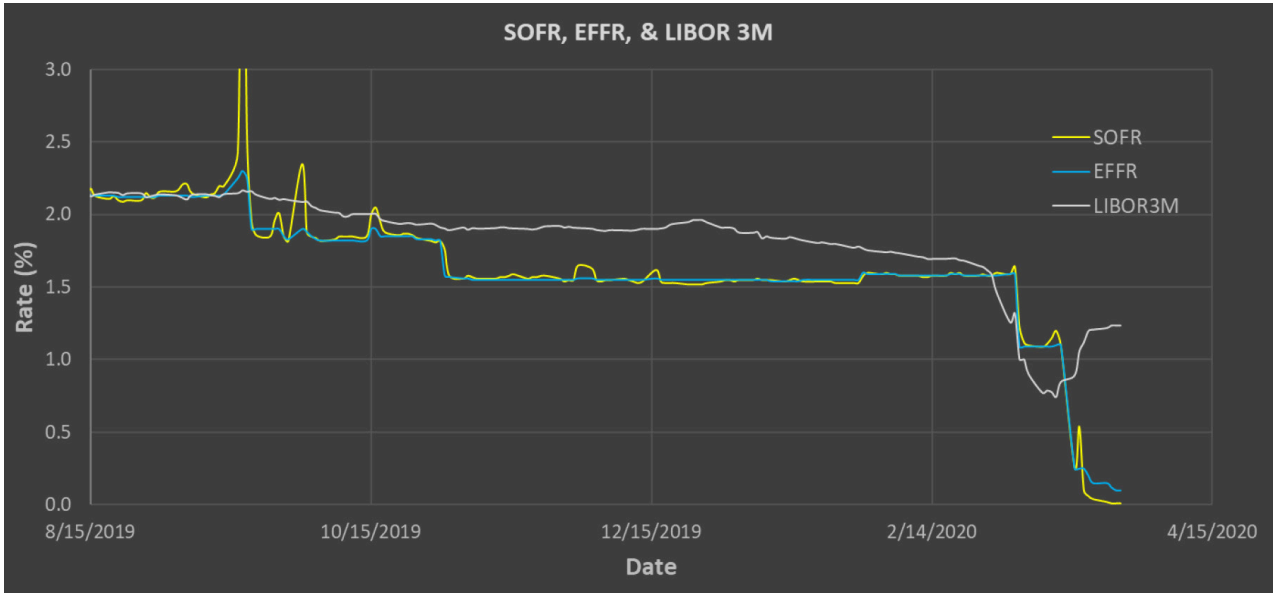
3) SOFR, EFFR, & LIBOR 3-Month



Data Source: Bloomberg

As you see from the fixings of the SOFR, the Effective Fed Funds Rate (EFFR) and LIBOR, all of them were impacted immediately by the rate cuts. At the front end, you see that the SOFR and the EFFR both dropped abruptly. Let's take a closer look at the front part.

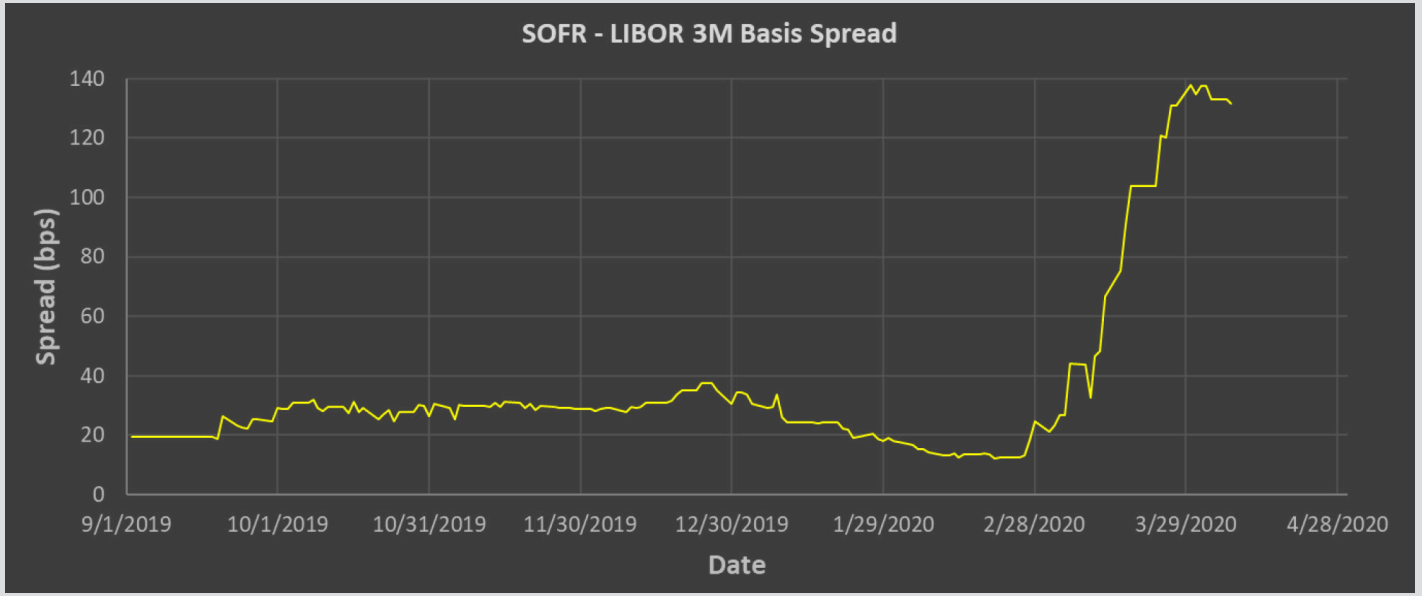
4) SOFR, EFFR, & LIBOR 3-Month II



Data Source: Bloomberg

As of now, the SOFR is around 1 bp, and the EFFR is around 5 bps. Actually, there are reports that the SOFR is already being traded at a negative rate, meaning if you borrow money, you earn interest, which is not a bad deal. In the meantime, people are concerned about the behavior of LIBOR. As you may see from this plot, the 3-month LIBOR rate is now more than 100 bps above the EFFR and the SOFR. People are worried because similar behavior happened more than 10 years ago during the last global financial crisis. During that time, the spread was even larger, being close to 350 bps. Such behavior is due to LIBOR carrying risk components, so that in stressed market conditions, the spread becomes significant.

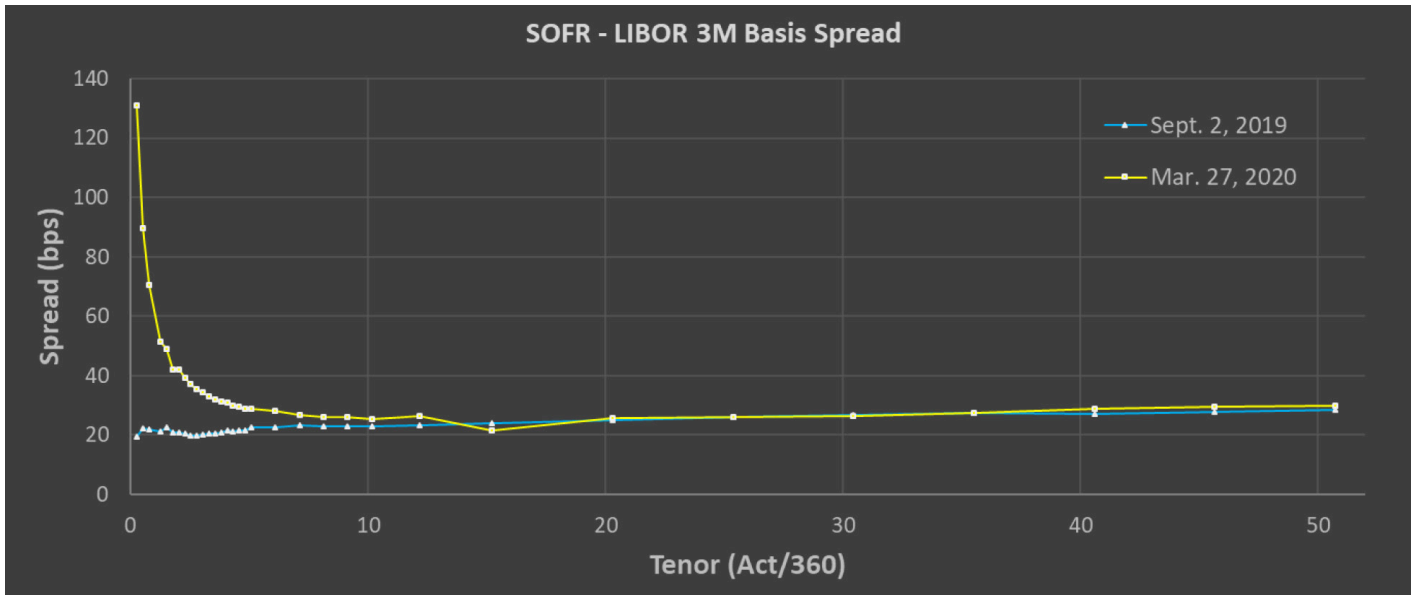
5) SOFR-LIBOR Basis Spread



Data Source: Bloomberg

We can look at the same spread using SOFR-LIBOR basis swaps. What you see here is the 3-month basis spread between SOFR and LIBOR. When it started in 2019, it was in the 20-40 bps range and as March approaches, the spread grows very sharply and shoots up to near 140 bps. This is a significantly larger basis spread compared to what it used to be.

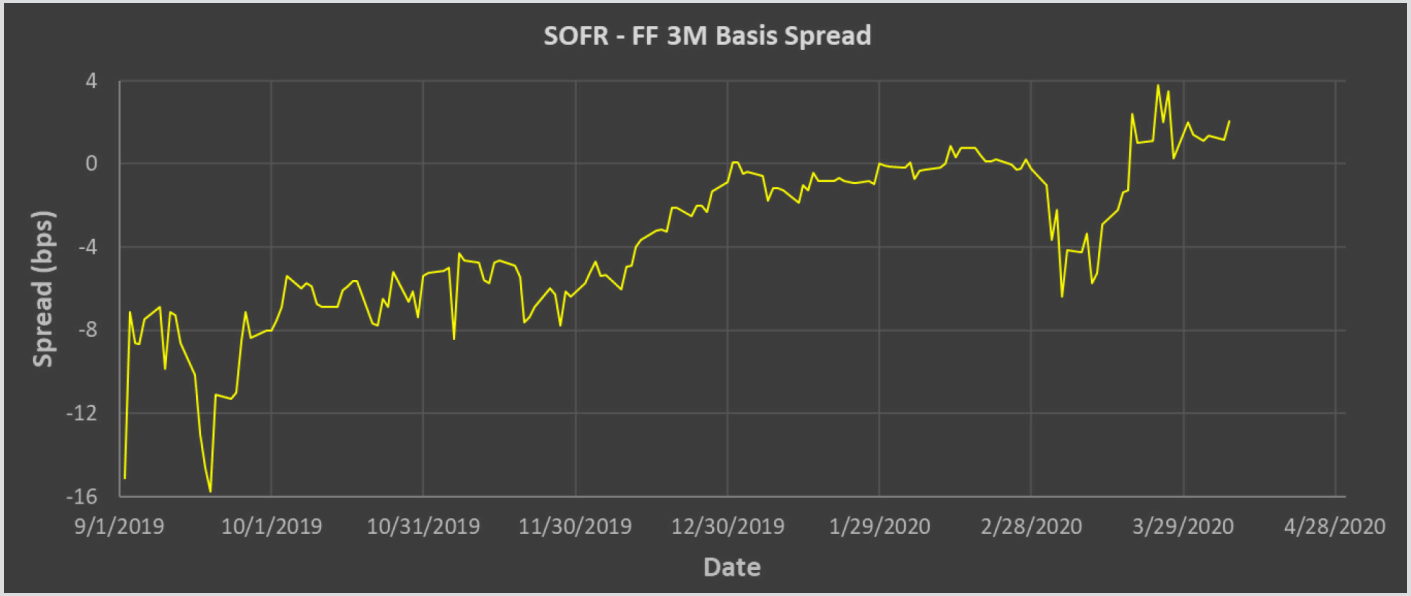
6) SOFR-LIBOR Basis Spread II



Data Source: Bloomberg

We can look at the same basis spread from a different angle. I plotted the spread on two dates, September 2 of last year and March 27 of this year. Across the tenor range between 3 months and 50 years, the SOFR-LIBOR basis was quite flat last year, between 20 and 40 bps across the board. Now in the front, the basis develops a sharp peak, reflecting the market stress. At around 10 years, it returns to the previous value. This can be due to the market liquidity being low at longer tenors or because of the market having a vision on the basis spread, which is no longer impacted after around 10 years in tenor. We will still need to wait and see how it evolves. By the way, the data I am showing you here is from Bloomberg, and I believe most of the contributions to this data come from brokers, such as Tradition.

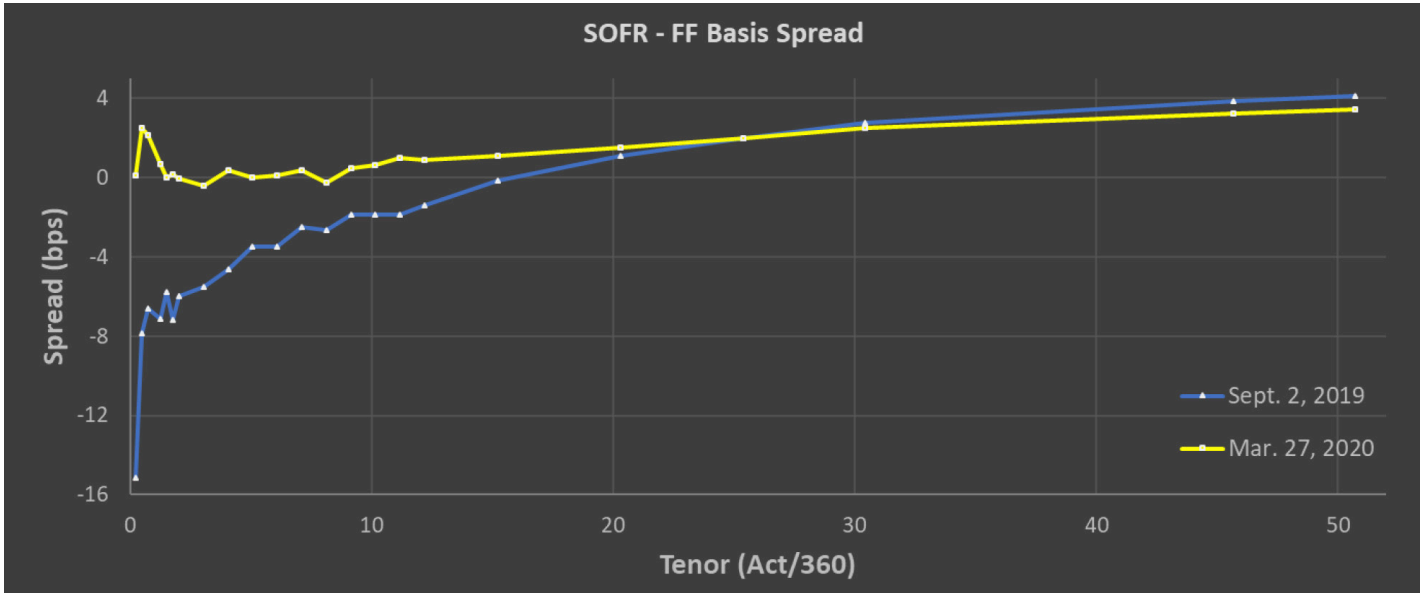
7) SOFR-FF Basis Spread



Data Source: Bloomberg

The same 3-month basis spread can be plotted between SOFR and the Fed funds rate, again for the time horizon from September of last year up until now. It used to be that this SOFR versus Fed funds basis was negative, meaning that at the 3-month tenor the Fed funds rate was traded lower than the SOFR. It is believed that this was mainly due to the liquidity in the overnight REPO market; otherwise, as a secured rate, the SOFR should be lower. During this period of time, you may observe that the basis has increased by around 20 bps. While it is not as big as that between LIBOR and SOFR, the change still has visible effects and the SOFR-EFFR basis is now in the positive range.

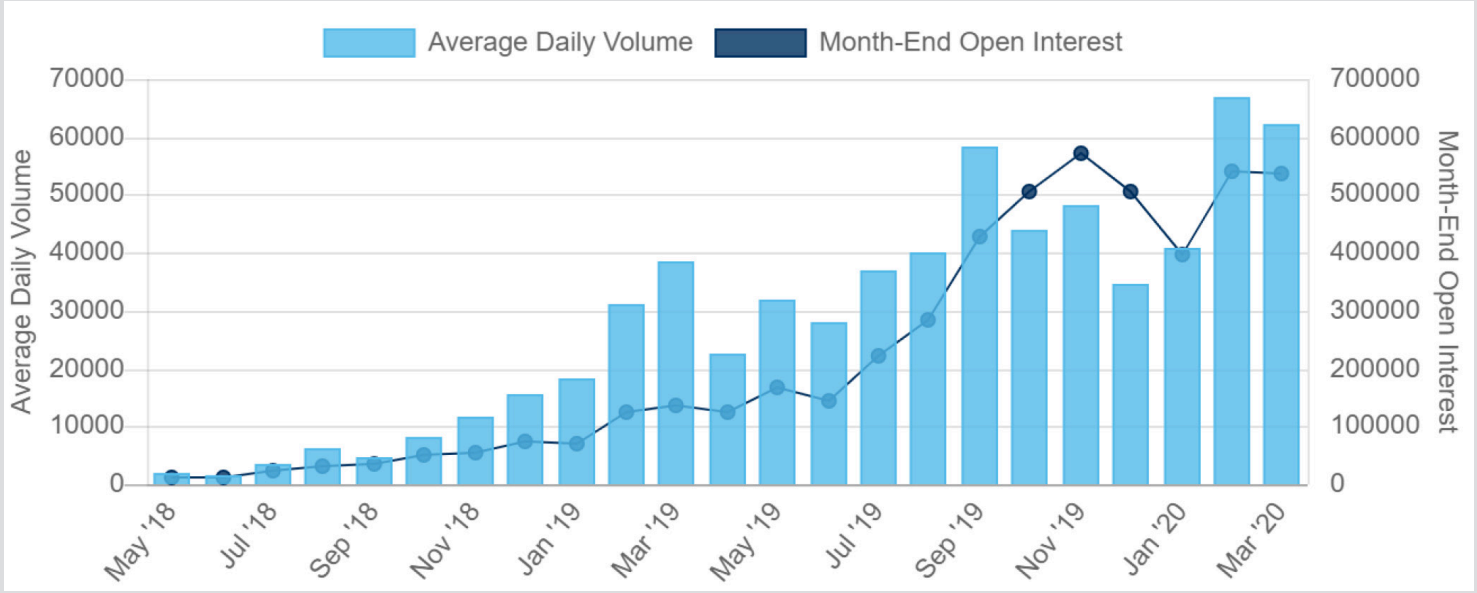
8) SOFR-FF Basis Spread II



Data Source: Bloomberg

Let's again look at the SOFR-EFFR basis spread on the two dates of September 2 of last year and March 27 of this year. From the tenor range of 3 months up to 50 years, you can observe that in the last year it used to be that there was a big dip in the front, and now the basis spread becomes quite flat in the range of 0 to 4 bps. This is a new behavior in the current market. It will be interesting to see how it further evolves.

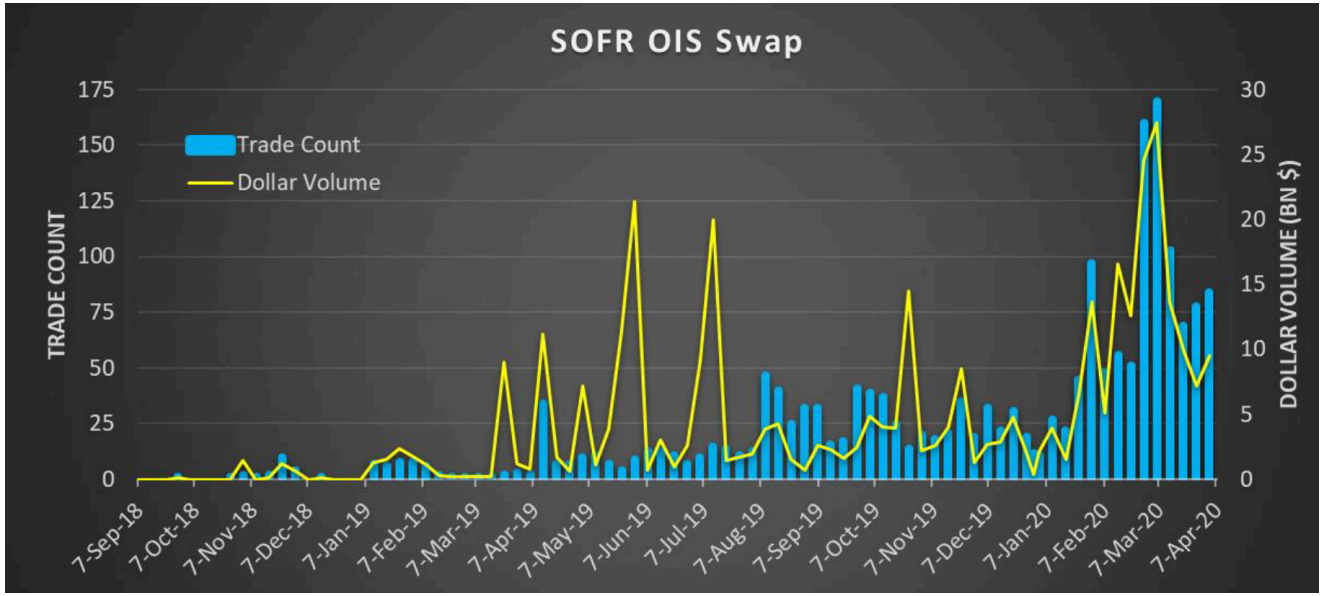
9) LIBOR Transition in Progress: CME SOFR Futures



Data Source: CME

While the market is very volatile due to the coronavirus pandemic, the LIBOR transition is still making progress. This is the SOFR futures trading volume and open interest published by CME. You may see that the trend of increasing trading activity of the futures is quite obvious, although there are fluctuations that are due to reasons such as it being year-end. The impact of COVID-19 on trading is not so obvious, at least not yet. You see that the March data is not too much different from that of February.

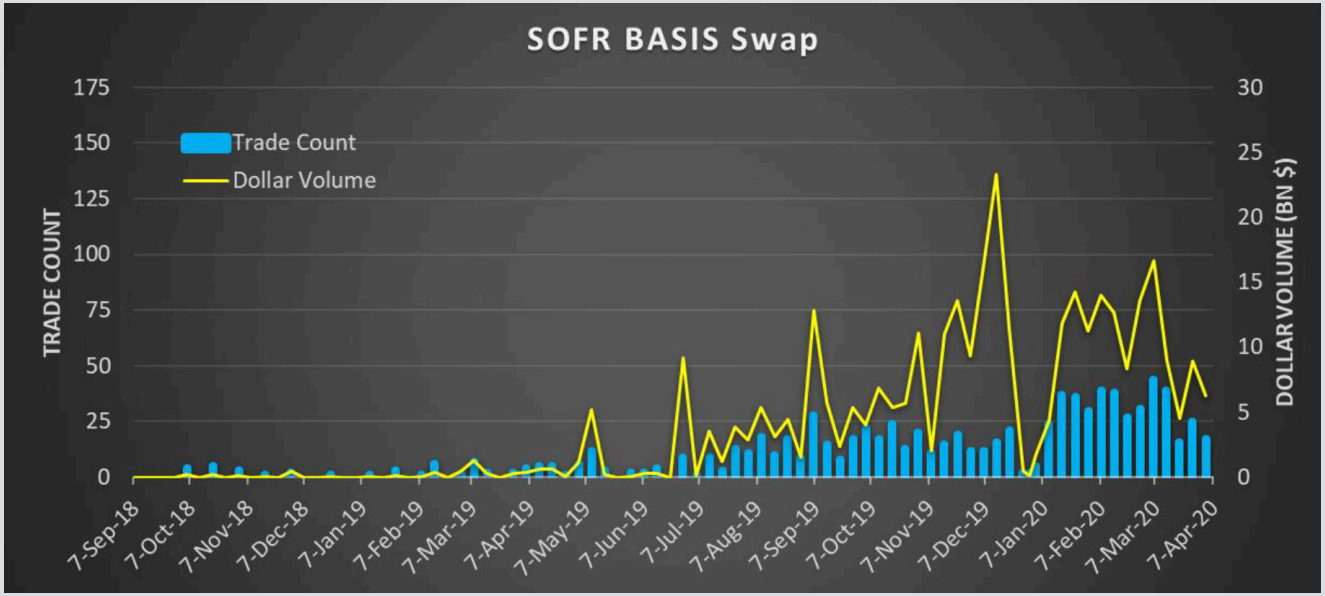
10) Swap Trading Volume



Data Source: ISDA

On the swap side, these are the trading data from ISDA. The SOFR OIS swap trading in February and March of this year was much more active than earlier. In late March and early April of 2020, you see a drop due to the market situation. But on the other hand, these numbers are still much larger than those of last year.

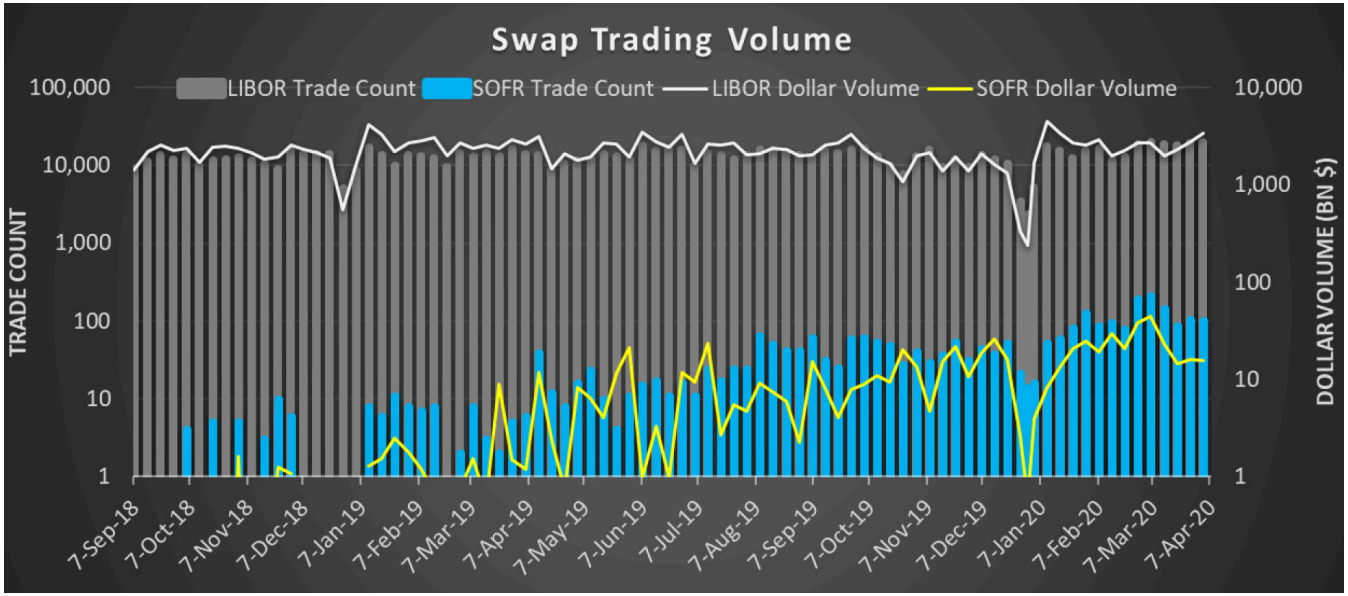
11) Swap Trading Volume II



Data Source: ISDA

On the same scale I plotted the SOFR basis swap trading volume. It is slightly less than that of the SOFR OIS swap, as compared to the previous slide. Yet, the trend is similar. The trading volume is increasing in most cases, although in March and April a certain amount of decrease is observed.

12) Swap Trading Volume III



Data Source: ISDA

Of course, the SOFR swap market is still under development. Here, I plotted the trading volume of U.S. dollar LIBOR swaps versus that of the SOFR swaps, which combines the SOFR OIS swaps and the SOFR basis swaps. In order to visualize the difference, I had to use a logarithmic scale. From both the trade count, which is the left axis, and the dollar volume, which is the right axis, you may see clearly that the LIBOR swap trading volume is about two orders of magnitude higher than that of the SOFR swaps. To this regard, the activity in the SOFR derivatives market is still quite low comparing to that of the LIBOR swaps.


END
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