

# **Options for Using SOFR in Adjustable Rate Mortgages**

The Alternative Reference Rates Committee  
July 2019

## *Executive Summary*

This paper is intended to help illustrate a model of how market participants could use the Secured Overnight Financing Rate (SOFR) in consumer closed-end, residential adjustable rate mortgage (ARM) products.<sup>1</sup> At the request of the Alternative Reference Rates Committee (ARRC), convened and sponsored by the Federal Reserve Board and Federal Reserve Bank of New York, the ARRC's Consumer Products Working Group (the Working Group) developed this paper to identify the key considerations relevant to developing new ARM products based on the "overnight" SOFR rate.<sup>2</sup> Nothing in this paper is intended to limit the range of possible new product development based on SOFR, or the terms and conditions under which market participants transact in any ARM products based on SOFR (or any other rate); and it is not intended to address or be inconsistent in any way with alternative product development based on other rates in the future, e.g., on forward-looking term (SOFR) rates, to the extent that those rates are established and meet the criteria set forth by the ARRC. While those types of forward-looking rates may offer some attractive features to investors, the ARRC has emphasized that it is important not to wait for those rates and the U.S. official sector has emphasized that market participants should seek to transition away from LIBOR as soon as possible. Given the risks to LIBOR and the length of time that it can take to build new product systems, there are persuasive arguments for using the robust, IOSCO-compliant rates that already exist.

This paper identifies a number of considerations that have been contemplated by the members of the Consumer Products Working Group, as they relate to consumers (borrowers), originators, servicers, and investors (together, "users"), who together comprise the market ecosystem for ARMs in the marketplace. They have identified several foundational considerations for use of SOFR in consumer ARMs:

- Financial products should either explicitly or implicitly use some kind of *average* of SOFR, not a single reading of the overnight rate, in determining payments on floating-rate instruments. An average of SOFR will accurately reflect movements in interest rates over a given period of time and smooth out any idiosyncratic, day-to-day fluctuations in market rates. For the purposes of the model described in this paper, the Working Group recommended considering either 30- or 90-day averages of SOFR.
- Investors and originators will face a technical choice between using a *simple* or a *compound* average of SOFR as they seek to use SOFR in cash products. Compounded interest would more accurately reflect the time value of money, which becomes a more important consideration as interest rates rise, and it can allow for more accurate hedging and better

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<sup>1</sup> The Secured Overnight Financing Rate (SOFR) is a broad measure of the cost of borrowing cash overnight collateralized by Treasury securities. <https://apps.newyorkfed.org/markets/autorates/SOFR>

<sup>2</sup> The ARRC is a group of public and private sector entities, convened and sponsored by the Federal Reserve with a mandate to develop recommendations for a successful transition from USD LIBOR. <https://www.newyorkfed.org/arrc/about>. The ARRC's members include private-market buy-side, sell-side, and intermediary participants in a broad range of interest rate products and transactions, and ex-officio members of the official sector, including the Federal Reserve and other market regulators. To help meet its mandate, the ARRC has established numerous working groups with additional public and private sector market participants to study market transition issues potentially affecting various products currently based on USD LIBOR. The Consumer Products Working Group is one such working group and it includes, among others, representatives from the Federal Reserve, the Federal Housing Financing Agency, government-sponsored entities Fannie Mae and Freddie Mac, consumer advocacy and other trade groups, and originators, servicers, and investors in ARM products.

market functioning.<sup>3</sup> For consumer products, the Working Group believed that the choice of which type of average to use was less important than that the averages be published by a trusted, publicly available source, such as the Federal Reserve Bank of New York, which has stated that it expects to publish averages of SOFR in the first half of next year.

- Although other products such as derivatives and floating-rate debt are gravitating toward use of SOFR *in arrears* (that is, basing their floating-rate payments on averages of SOFR that occur over the current interest period) the Working Group did not view this as appropriate for consumer products or consistent with consumer regulations because it would give consumers very short notice of payment changes. An *in advance* structure would reference an average of SOFR observed before the current interest period begins and was noted by the Working Group as the only practicable mechanism to provide *ex ante* certainty of payment amount while allowing servicers to provide required notice to the borrower ahead of the payment due date.
- In order to foster liquidity, any new ARM product based on SOFR would need to be structured to both fit the needs of consumers and be capable of being offered at rates and terms consistent with, and as determined by, the competitive markets in which ARM products are currently transacted. Because the model product described in this paper would be based on SOFR in advance, which tends to be less attractive to investors than in arrears, the Working Group believed that the frequency of rate changes in a SOFR-based ARM could be increased to twice a year from the once-a-year regime currently observed in most LIBOR-based ARMs. At the same time, the Working Group believed that the rate cap structure could be adjusted for a SOFR-based ARM to make sure that potential rate increases were appropriately controlled. The Working Group felt that these changes offered the best opportunity to make sure that new SOFR-based products could be offered at rates consistent with, and as determined by competitive markets, while meeting consumer needs and complying with regulatory considerations..
- This note also explains the considerations identified by the Working Group related to specific ARM product attributes.<sup>4</sup> An adjustable-rate mortgage differs from a fixed-rate mortgage in many ways. Most importantly, with a fixed-rate mortgage, the interest rate and the monthly payment of principal and interest stay the same during the life of the loan. With an ARM, the interest rate changes periodically, usually in relation to an *index* and payments may go up or down accordingly. Most ARM products offered today are “hybrid ARMs” which have a three- to ten-year fixed rate period followed by an adjustable rate for the remainder of the term. These products are popularly connoted as “3/1,” “5/1,” “7/1,” “10/1,” where the first number relates to the length of the fixed interest rate period, and the second number relates to the frequency of the adjustment period after the fixed rate period ends, in this case one year. This paper explores the features of ARMs that may change as a result of using SOFR as a new floating rate *index*. The Working Group, however, noted that the floating rate only becomes relevant after the fixed rate period has ended and that in a majority of cases hybrid ARMs are refinanced or repaid before the floating-rate period ever begins. This paper explores

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<sup>3</sup> These considerations are highlighted by ISDA’s decision, after its initial consultation, to use a compound average, calculated in arrears, for its proposed fallback language to be applied to new and existing derivative contracts.

<sup>4</sup> For more information on adjustable-rate mortgages, see the Consumer Handbook on Adjustable-Rate Mortgages, which is maintained by the Consumer Financial Protection Bureau (CFPB) and is available at: [https://files.consumerfinance.gov/f/201401\\_cfpb\\_booklet\\_charm.pdf](https://files.consumerfinance.gov/f/201401_cfpb_booklet_charm.pdf). The CFPB is in the process of revising this handbook.

each of these features in the next few sections, including the adjustment period, interest rate cap structure, and margin.

## ***Background***

In 2014, the Federal Reserve convened the Alternative Reference Rates Committee (ARRC) and tasked that group with identifying an alternative to U.S. dollar LIBOR that was a robust, IOSCO-compliant, transaction-based rate derived from a deep and liquid market and to develop plans to promote its use on a voluntary basis. In order to meet its mandate to serve as a forum for coordinating voluntary transition, the ARRC engaged in a several-year process to evaluate a range of potential alternatives to U.S. dollar LIBOR and conducted a robust and transparent process of market-wide consultation and deliberation before selecting its recommended alternative. The ARRC considered a variety of factors, including the depth of the underlying market and its likely robustness over time; the rate's usefulness to market participants; and whether the rate's construction, governance, and accountability would be consistent with the IOSCO Principles for Financial Benchmarks. The ARRC considered the input of a wide range of market participants, including feedback from its Advisory Group of end users, in making its recommendation.

To meet its mandate to act as forum for coordinating voluntary transition, the ARRC formed a number of working groups and, as part of that process, formed a Consumer Products Working Group this year. The ARRC has established a set of [guiding principles](#) that it believes are uniquely applicable for consumer loan products:

- To ensure an orderly, fair, and transparent outcome for adjustable-rate US residential mortgages as well as other consumer products with loans indexed to LIBOR, transition planning should actively engage with stakeholders (including, lenders, servicers, investors, regulators, and consumer groups) and comply with all applicable consumer protection laws and regulations.
- While ensuring fair and transparent outcomes for consumers, stakeholders should seek to maintain alignment in outcomes for investors in order to minimize basis risk between their consumer loan products and any related loans and securities, securitizations, or hedges associated with them, bearing in mind operational, tax, accounting and similar issues.
- In determining proposed fallbacks for LIBOR in consumer products, the choice of the replacement benchmark, spread adjustment to the replacement benchmark, succession timing, and mechanics should be easily comprehensible and capable of being effectively communicated to all stakeholders in advance of the transition away from LIBOR, and should seek to minimize any potential value transfer based on observable, objective rules determined in advance.
- Where flexibility or discretion are incorporated in fallback recommendations, it should be carefully considered and limited to the extent possible to ensure ease of application and minimize any potential disputes arising from a transition to an alternative rate.

Amongst its mandates, the Working Group was charged with seeking active engagement from stakeholders and recommending models for using SOFR in consumer products that meet consumer needs and offer terms consistent with, and as determined by, competitive markets. In order to meet this mandate, a diverse array of lenders, consumer groups, investors, and servicers were invited to form the Working Group and participate in its discussions of potential new ARM products based on SOFR. This paper is intended to help explain the Working Group's considerations as it explored the ways in which SOFR could be used in consumer ARM products and its conclusions as to some of the characteristics that such a product would need to satisfy in order to meet the principles set forth by the ARRC. As noted, this paper is not intended in any way to preclude alternative product development based on SOFR or any other rate and recognizes that there may be a range of specification choices for SOFR-based ARM products that can be consistent with the ARRC's principles and the new product considerations addressed herein.

### ***How Can ARM Products Use SOFR?***

In 2017, the ARRC fulfilled this mandate to identify a recommended alternative to U.S. dollar LIBOR by selecting SOFR. SOFR is based on overnight transactions in the U.S. dollar Treasury repo market, the largest rates market at a given maturity in the world. National working groups in other jurisdictions have similarly identified overnight nearly risk-free rates (RFRs) like SOFR as their preferred alternatives.

Some of SOFR's benefits include:

- It is a rate produced by the Federal Reserve Bank of New York for the public good;
- It is based on an active and well-defined market with sufficient depth to make it extraordinarily difficult to ever manipulate or influence;
- It is produced in a transparent, direct manner and is based on observable transactions, rather than being dependent on estimates, like LIBOR, or derived through models; and
- It is based on transactions in a market that was able to weather the global financial crisis and that the ARRC believes will remain sufficiently active to be able to be reliably produced in a wide range of market conditions.

However, as an overnight rate, SOFR is different from the 1-year LIBOR rates that are predominantly offered in US residential ARMs at this time. But although many market participants have become accustomed to using these types of term LIBOR rates, LIBOR is a relatively new phenomenon. Overnight rates have long been used in financial instruments, including futures, overnight index swaps (OIS), loans (for example, loans based on overnight LIBOR or the Prime Rate), and floating rate notes. In addition, other countries, such as Canada, have floating rate mortgage products based on overnight rates. Nevertheless, the use of SOFR is new in US markets. Therefore, below we review some of the considerations relevant to originating a new SOFR-based ARM product.

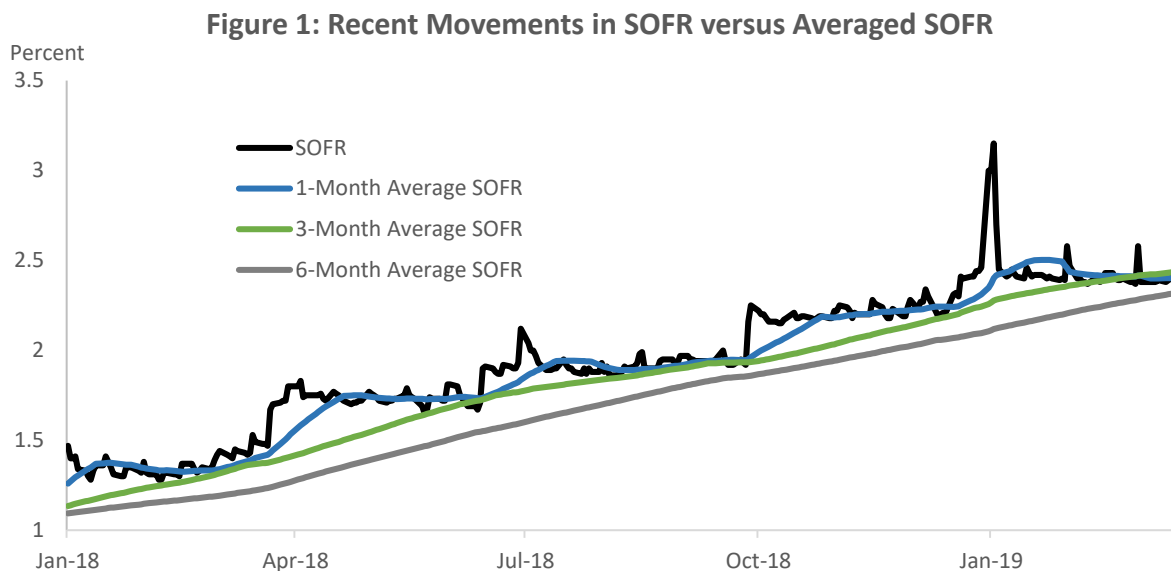
#### ***A. Index Averaging***

Many financial products have used market-based overnight rates like SOFR as benchmarks, but these financial products either explicitly or implicitly use some kind of *average* of the overnight rate, not a single reading of the overnight rate, in determining the floating-rate payments.

There are two essential reasons why financial products use an average of overnight rates:

- First, an average of daily overnight rates will accurately reflect movements in interest rates over a given period of time. For example, SOFR futures and swaps contracts are constructed to allow users to hedge future interest rate movements over a fixed period of time, and an average of the daily overnight rates that occur over the period accomplishes this.
- Second, an average overnight rate smooths out idiosyncratic, day-to-day fluctuations in market rates, making it more appropriate for use.

This second point can be seen in Figure 1. On a daily basis, SOFR can exhibit some amount of idiosyncratic volatility, reflecting market conditions on any given day, and a number of news articles pointed to the jump in SOFR over the end of the year as highlighting this point. However, although people often focus on the type of day-to-day movements in overnight rates shown by the black line in the figure, it is important to keep in mind that the type of averages of SOFR that are referenced in financial contracts are much smoother than the movements in overnight SOFR. It is relevant to note that even ARMs based on LIBOR may use averaging for many of the same reasons. For example, most ARMs based on 6-month LIBOR refer to a 30-day average of the LIBOR rate rather than a single-day's value.

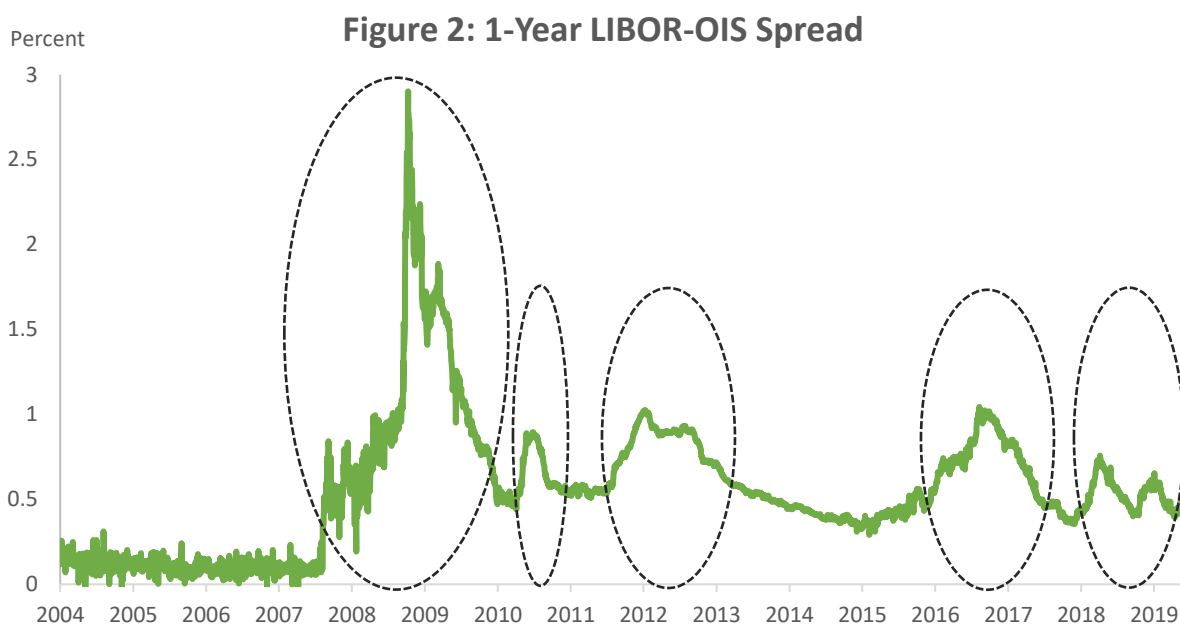


Source: Federal Reserve Bank of New York; Federal Reserve Board staff calculations

The Federal Reserve Bank of New York has indicated that it will solicit public feedback on its plans to begin publishing averages of SOFR by the first half of 2020, which may further help market participants understand and use averages of SOFR in ARM products.<sup>5</sup> Working Group members believe that these types of averages of SOFR would be appropriate for use in consumer products such

<sup>5</sup> See reference to these plans in the [January 2019 FOMC minutes](#).

as an ARM. Note, however, that while longer averages are less volatile, there is a potential tradeoff in that they may be less representative of current rates and therefore could be less attractive to investors which, in turn, could result in higher initial rates for ARM products. Most Working Group members felt that a 30-day average of SOFR would be sufficient to smooth most of the day-to-day volatility while still reflecting current rate movements, but recognized that a 90-day or longer average might also be viable. Regardless of that choice, as was emphasized in the ARRC’s [Second Report](#), averages of SOFR are generally less volatile than LIBOR. As shown in Figure 2, in recent years LIBOR has experienced several fairly large upward fluctuations relative to risk-free rates (proxied in the Figure by 1-Year OIS rates) in recent years, and an average of SOFR should not be subject to these kinds of fluctuations.



Source: Bloomberg and Ice Benchmark Administration.

### *Compound versus Simple Averaging*

While many financial products use an averaged overnight rate, they may exhibit some technical differences in how these averages are calculated. As described in the ARRC’s document [A User’s Guide to SOFR](#), investors and originators will face a technical choice between using a *simple* or a *compound* average as they seek to use SOFR in ARM products. However, it is important to emphasize that the technical choice of a particular averaging convention need not affect the overall rate paid by the borrower, because the differences between those conventions are generally small and other terms can be adjusted to equate the overall cost to the borrower. For ARMs, which tend to have relatively high margins (which would not be compounded) given the long-dated nature and other characteristics of the product, the choice between simple and compound averaging of the index rate matters less as it is likely to be a particularly small component.

From an economic perspective, a compound average may more accurately reflect the cost to the lender, as it represents what the lender could earn if he/she invested the money elsewhere. For example, if someone holds a bank account or money market fund paying overnight interest, then they

receive compounded interest. Derivatives markets also tend to use compound averages, and thus instruments that use compound interest will be easier for investors to hedge. On the other hand, simple averaging is easier to calculate.

For purposes of an averaging mechanism to be applied to SOFR for consumer ARMs, although it was observed that simple averages may be easier to understand and calculate, the Working Group noted that if the Federal Reserve, or another trusted administrator were to publish compound averages of SOFR, then such rate would be observable by consumers and may be readily processed by existing servicing infrastructure. In that case, the use of a compound average would be both feasible and have a smaller basis differential with derivatives when compared to simple averaging.<sup>6</sup>

## **B. *Payment Determination***

Most of the contracts that reference LIBOR, including ARMs, set the floating rate based on the value of LIBOR at the *beginning of the interest period*. This convention is termed *in advance* because the floating-rate payment due is set in advance of the start of the interest period. But not all LIBOR contracts take this form; some LIBOR derivatives reference the value of LIBOR at the *end of the interest period*. This convention is termed *in arrears*. These conventions are used with overnight rates also. An *in advance* payment structure based on an overnight rate would reference an average of the overnight rates observed before the current interest period began, while an *in arrears* structure would reference an average of the rate over the current interest period.

Although other products such as derivatives and floating-rate debt are gravitating toward the use of SOFR *in arrears*, the Working Group did not view this as appropriate for consumer products or consistent with consumer regulations because it would give consumers very short notice of payment changes and challenge servicers in meeting notice requirements for the notice of payment to be applied to consumer ARMs. Instead, the Working Group considered *in advance* as the most appropriate mechanism, given that: advance certainty of payment due from borrower to (lender) investor is critical for consumers, current regulations stipulate that a “change of interest rate” be furnished to borrower in advance of such change, and it is simpler to implement across the existing systems infrastructure for consumer ARMs.<sup>7</sup>

The Working Group also considered the lookback structure (also referred to as a backward-shifted rate observation period or “lag”), which specifies the amount of advance notice that borrowers receive before any change in the floating rate. In current market practice and in accord with consumer regulations, the new index rate on which payments are to be based during the floating-rate period on

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<sup>6</sup> Apart from the choice between simple and compound interest, there are a number of other conventions that need to be set in calculating an average rate, though they generally should have no appreciable economic impact on the amount of interest payments. Amongst others, these include the choice of day count convention (which determines how annualized rates are quoted) and how the rate is applied over weekends and holidays (whether to use the rate on transactions taking place before the weekend or holiday, which mirrors how repo markets operate, or the rate after). The Appendix of the ARRC’s User’s Guide to SOFR provides the formulation ISDA uses in its conventions and provides an example of the calculations behind simple and compounded interest. These factors would also be made easier to handle and communicate by relying on a published average rate that already embedded them.

<sup>7</sup> The ARRC’s User’s Guide to SOFR also discusses “hybrid” models that could give borrowers advance notice of payment changes while allowing investors to receive a stream of payments that are close to an *in arrears* structure. However, Working Group members considered that the added complexity for servicers and the potential difficulties in explaining the hybrid approaches to borrowers made an *in advance* ARM product more easily implementable and that other features of the ARM could be more readily adapted to provide investors an attractive investment.



a hybrid ARM is typically determined 45 days in advance of the date of the interest rate change. The payment based on that new interest rate would take effect the month after the interest rate change date. Working Group members discussed whether potential modifications to that current practice for purposes of SOFR-based ARMs should be considered, but concluded that maintaining the 45-day standard for purposes of the model described in this paper was consistent with current market practice and consumer expectations, satisfies operational considerations for billing cycles, and is within regulatory stipulations for advance notice of interest rate changes to borrowers.<sup>8</sup>

### ***C. The Adjustment Period***

Most hybrid ARMs use 1-year LIBOR as the floating rate index. In these products, at the conclusion of the “fixed rate period,” the interest rate and monthly payment will change every year until the maturity of the mortgage, or until the balance is paid off in entirety. The period of time between rate changes is called the “adjustment period.” However, while a one-year adjustment period is the current prevailing market practice, some hybrid ARMs have historically used other adjustment periods. For example, ARMs based on 6-month LIBOR have an adjustment period of six months rather than a year.

The Working Group considered that in many cases borrowers may prefer a longer adjustment period. However, given the change of the underlying index from a forward-looking term rate, 12-month LIBOR to an average of SOFR *in advance*, a lender or investor may prefer that frequency of reset be increased. Increased reset frequency would mitigate the potential mismatch between the loan rate for the ensuing accrual period, and changes in market interest rates related to expectations of future changes to the outlook for inflation, interest rates, and other macroeconomic considerations.

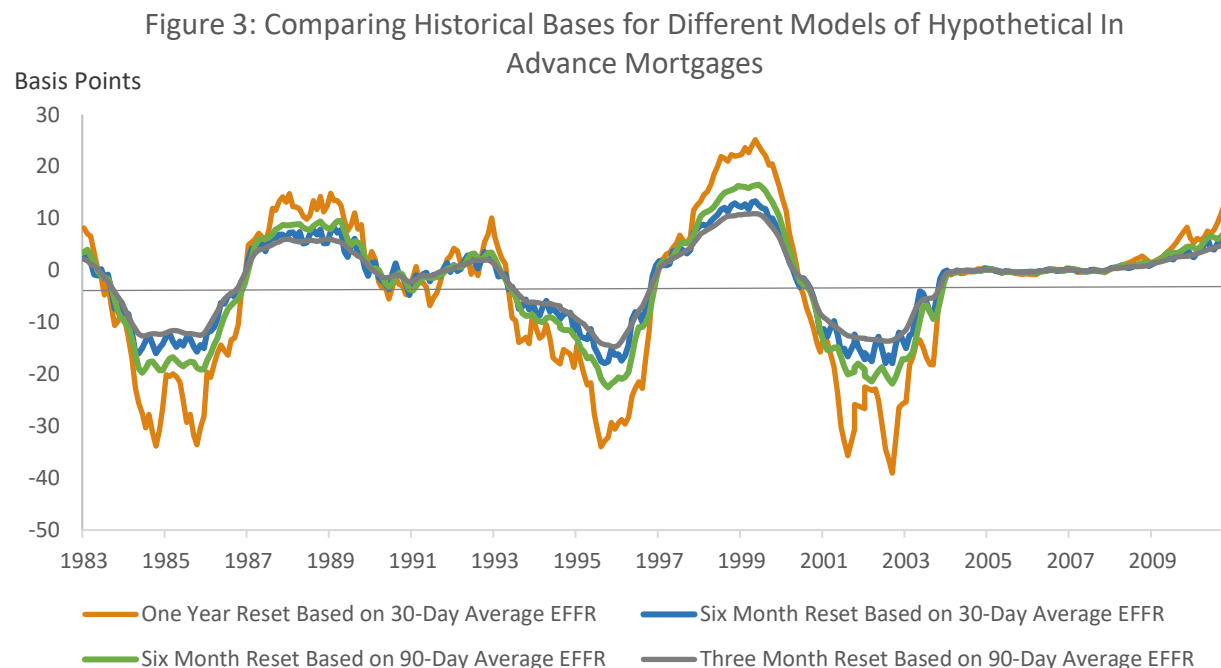
The tension in choosing an average of SOFR *in advance* is that investors will reasonably prefer returns based on rates over the interest period (i.e., in arrears) and will tend to view rates set in advance as “out of date.” This is not an entirely new consideration: As discussed in the User’s Guide to SOFR, even over the 45-day period between the date that the new floating rate on an ARM is set and the date that the first payment at the new rate is due, 1-year LIBOR can often quickly become out of date by about the same magnitude that an averaged overnight rate can. Nonetheless, as a forward-looking rate, 1-year LIBOR is potentially better correlated with future movements in interest rates, and therefore the future cost of funding, than an average of SOFR *in advance*. Comparing how well a spread-adjusted 1-year LIBOR rate predicts subsequent movements in the effective fed funds effective rate (EFFR, the monetary policy rate targeted by the Federal Reserve) compared to an average of the fed funds rate set in advance shows that historically, 1-year LIBOR has, in fact, done a slightly better job of predicting future rate movements.

Moving to a shorter adjustment period can help to offset this. An average of the overnight fed funds rate set in advance with a six-month adjustment period clearly does much better historically at matching subsequent movements in interest rates than 1-year LIBOR with an annual adjustment period. Figure 3 compares the historical performance, from an investor’s point of view, of using different adjustment periods and different averages of overnight rates. It shows the basis between the return on hypothetical ARM based on EFFR (which tends to move closely with SOFR on average

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<sup>8</sup> See also: [https://files.consumerfinance.gov/f/201503\\_cfpb\\_truth-in-lending-act.pdf](https://files.consumerfinance.gov/f/201503_cfpb_truth-in-lending-act.pdf)

and for which we have a longer history) in advance relative to the return that would have been earned on an ARM using an in arrears framework.<sup>9</sup> As can be seen in the figure, the potential basis can be reduced substantially by moving from an annual adjustment period to semiannual.



Six-month resets are not a novel concept. Such a reset frequency has been used previously in ARM products and therefore users are familiar with such a feature. On balance, the Working Group considered that, if appropriately structured, a semiannual adjustment period would be most likely to meet the needs of borrowers related to certainty of future payments, *and* to meet the needs of investors with regard to managing funding and interest rate risk. Given that balance, a semiannual adjustment period should result in a lower initial rate to borrowers.

The Working Group discussed, however, that in a period of volatile and/or rising interest rates, a higher frequency of interest rate resets could potentially expose borrowers to a larger “payment shock” over a given 12-month period. As discussed in the next subsection, the Working Group believes that, as in existing ARM products, interest rate caps can be appropriately structured to offer adequate borrower protections against this type of adverse movement.

<sup>9</sup> In these mortgage simulations, a hypothetical 5/1 Adjustable Rate Mortgage that refinances in year 8 of the mortgage is considered, with floating rate payments based on historical values of EFFR. As described earlier, in these and following simulations, the basis is calculated as the spread (expressed as an annual rate) that would need to be added to the *in advance* instrument in order to equate the ex post net present value of payments received with the *in arrears* instrument. Net present values are calculated using the internal rate of return on the *in arrears* instrument. A positive basis implies that investors would have required added compensation to have broken even on the *in advance* instrument, while a negative basis implies that investors would have gained from the *in advance* instrument and would have had to rebate some of the interest received to have broken even relative to *in arrears*.

#### ***D. Interest rate caps***

An interest-rate cap places a limit on the amount an ARM interest rate can increase. The interest-rate caps associated with most ARMs have three components:

- An “initial cap,” which limits the amount the interest rate can adjust up or down after the conclusion of the fixed rate period. The current hybrid ARM convention for initial caps is generally 2 percent for 3/1 ARMs, and higher at 5 percent for longer fixed rate periods, e.g. 7/1 or 10/1 ARMs. For 5/1 ARMs, the convention varies and initial caps may be 2 percent or 5 percent.<sup>10</sup>
- A “periodic adjustment cap,” (sometimes called a “subsequent cap”) which limits the amount the interest rate can adjust up or down from one adjustment period to the next after the initial adjustment. The periodic adjustment cap is generally 2 percent per year across hybrid ARM products.
- A “lifetime cap,” which limits the interest-rate increase over the life of the loan. By law, virtually all ARMs must have a lifetime cap. Lifetime caps are generally 5 percent across hybrid ARM products.

The tradeoff to be considered with respect to interest rate caps is that a higher cap is more attractive to investors, which should result in a lower initial rate to the borrower; however, higher caps have a greater potential payment shock at reset. At the same time, it was noted by the Working Group that, in practice, many borrowers prepay their ARM loan prior to the first reset date. Therefore, interest rate caps are not likely material to many borrowers, beyond the economic impact the cap could have on the initial rate.

For purposes of considering ARMs based on SOFR, the Working Group saw no compelling reasons to deviate from the current prevailing market conventions for initial caps of 2 percent for shorter dated fixed periods, i.e. 3/1 and 5/1 products, 5 percent initial caps for longer dated fixed periods, i.e. 7/1, 10/1 ARMs, or the current market convention for lifetime caps of 5 percent.

However, the potential increase in the frequency of adjustment periods from one year to six months requires that the periodic adjustment cap be adjusted to a lower rate because a borrower may experience two interest rate changes in a one-year period. To safeguard against unexpected payment increases and consistent with current prevailing market practices, the model developed by the Working Group applied a 1 percent periodic adjustment cap for ARMs that reset every 6 months. As a result, for any calendar year, the borrower’s payment, even in a period of rapidly rising interest rates, would not change by more than the sum of the two periodic adjustment caps, i.e. 2 percent, in accord with the current market convention.<sup>11</sup>

Figure 4 shows that moving to a semiannual adjustment period with a 1 percent periodic adjustment rate cap actually would have historically resulted in lower volatility of payment changes to the consumer. This is because a shorter adjustment period tends to result in smaller changes in payment at any given adjustment, while the payment changes associated with an annual adjustment occur half

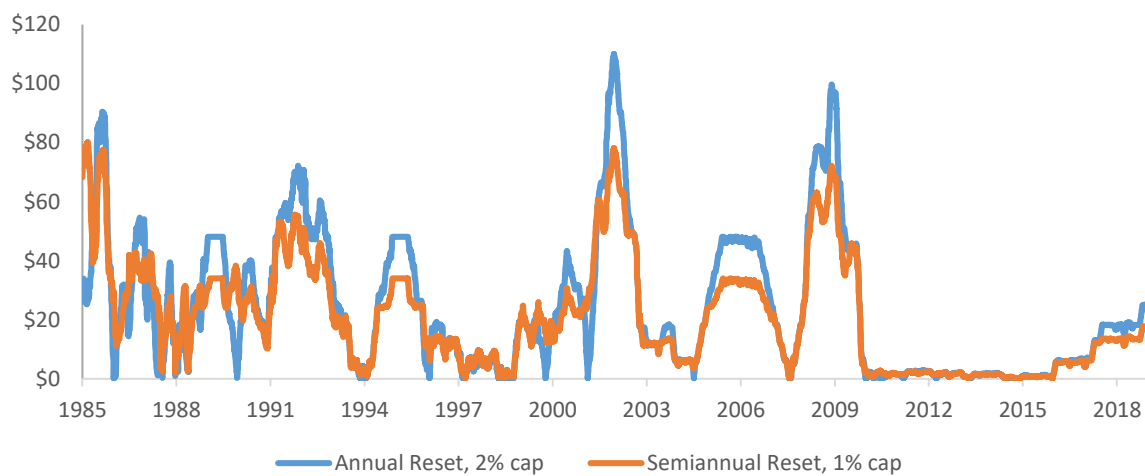
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<sup>10</sup> See also: <https://www.fanniemae.com/content/news/hybrid-arms-cap-structure-commentary.pdf>

<sup>11</sup> The Working Group noted that owing to compounding, a 2 percent annual cap would likely translate to a slightly higher than 1 percent semi-annual cap, depending on the underlying volatility of the index.

as frequently but also tend to be larger. In this sense, the Working Group believed that a semiannual adjustment as described in this paper, combined with a lower rate cap, should be consistent with consumer expectations, meet consumer needs, and not result in a less favorable experience for borrowers as compared to LIBOR-based ARMs currently offered in the US. Indeed, based on historical data, the difference in average monthly payments between the two structures would be fairly small, and would more frequently result in *lower* payments from the consumer than higher payments because interest rates have tended to move down more quickly than they have tended to rise.

Figure 4: Standard Deviation of Monthly Payment Changes



### ***E. Margin***

To set the interest rate on an ARM, originators typically add a few percentage points to the index rate, called the “margin.” The amount of the margin may differ from one lender to another, but it usually stays the same over the life of any particular loan. The “fully indexed rate” is equal to the margin plus the index. For example, if the lender uses an index that currently is 2.5 percent and adds a 3 percent margin, the fully indexed rate would be 5.5 percent.<sup>12</sup>

If the index on this loan rose to 3.5 percent, the fully indexed rate at the next adjustment would be 6.5 percent (3.5 percent + 3 percent). If the index fell to 2 percent, the fully indexed rate at adjustment would be 5 percent (2 percent + 3 percent).

In practice, ARMs linked to different underlying indices often have different margins, e.g. LIBOR ARMs at 2.25 percent, versus Constant Maturity Treasury ARMs at 2.75 percent, to take in to account the different levels of the indices. The choice of margin involves some tradeoffs: higher margins should increase the value of the floating rate period, making the loans more attractive to investors which, in turn, can result in a lower initial rate offered to the borrowers; however, higher margins may also increase borrower risk due to the higher rates in the floating rate period.

<sup>12</sup> As a general statement, higher margins generally translate into lower initial rates during the fixed period of the loan; conversely, lower margins generally translate into higher initial rates during the fixed period of the loan.

Currently, originators and lenders may apply different margins in ARMs that are eligible and able to be commingled in agency mortgage-backed securities. However, for purposes of delivery to government sponsored entities, including Fannie Mae, and Freddie Mac, i.e. “conventional ARMs,” margins have historically tended to coalesce around a small range of choices in order to foster liquidity among mortgage-backed securities. For the purpose of considering how SOFR-based ARMs could be developed offering rates consistent with, and determined by, competitive markets, the Working Group applied a margin in the range of 2.75 to 3 percent. This range was identified as one that was consistent with the desired liquidity objectives in competitive markets and that could be attractive to both borrowers and investors. In particular, the inherently lower level of overnight SOFR relative to LIBOR would likely be offset in competitive markets by a higher margin. Indeed, based on historical data, a margin in the range of 2.75 to 3 percent would have resulted in SOFR-based loans resetting to a rate approximately equivalent to that of current products.

### ***Conclusion***

As noted, there may be a range of specification choices for ARM products that could be consistent with the ARRC’s principles. The Working Group actively engaged with consumer groups, lenders, investors, and servicers in discussing the many considerations laid out in this paper, and based on this engagement, the Working Group believes that the models summarized below are consistent with the ARRC’s principles, would meet consumer needs, and be attractive to both borrowers and investors at rates consistent with, and as determined by, competitive markets.

<b>Summary of the Proposed Models of SOFR ARMs</b>		
	<b>Current LIBOR ARM Model</b>	<b>Proposed Model of SOFR ARMs</b>
Fixed-Rate Period	3, 5, 7, or 10 Years	No Change to Current Structure
Floating Rate Index	1-Year LIBOR	30-Day or 90-Day Average of SOFR
Floating-Rate Adjustment Period	1 Year	6 Months
Rate/Payment Determination	New Rate Determined 45 days in Advance of Interest Rate Change Date	No Change to Current Structure
Initial Caps	2 Percent for 3/1 and 5/1 ARMs 5 percent for 7/1 and 10/1 ARMs	No Change to Current Structure
Subsequent Caps	2 Percent	1 Percent
Lifetime Cap	5 Percent	No Change to Current Structure
Margin	2.25 Percent	Likely in Range of 2.75 to 3 Percent