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The post-Libor world: a global view from the BIS derivatives statistics[1]

The transition from Libor to "nearly risk-free" rates (RFRs) has led to structural changes that have reshaped the trading and hedging behaviour of participants in fixed income markets. Using the BIS Triennial Survey statistics, we document four major changes in the instrument mix and geographical distribution of the global turnover of OTC interest rate derivatives between 2019 and 2022. First, forward rate agreements (FRAs) became largely obsolete because of reduced fixing risk. This led to a decline in FRA trading, which dragged down overall turnover. Second, trading in swaps referencing RFRs increased. Third, the UK and US shares in global turnover dropped, whereas the share of the euro area rose. Finally, new instruments emerged to manage morphing basis risks in the post-Libor world.

JEL classification: E43, G12, G21, G23.

The latest BIS Triennial Central Bank Survey revealed four key changes between April 2019 and April 2022. First, the global turnover of over-the-counter (OTC) interest rate derivatives fell 19% to $5.2 trillion. This decline reflected a 74% drop in trading of forward rate agreements (FRAs), a type of OTC contract that allows investors to fix interest rates in advance. Second, overnight index swaps (OIS) – contracts that swap a fixed rate for an overnight rate – gained share in the turnover of interest rate swaps (IRS) for the Swiss franc, the Japanese yen and the pound sterling. Third, the United Kingdom and the United States remained the largest trading locations for OTC interest rate derivatives, but their shares in global turnover declined, whereas that of the euro area increased. Fourth, new types of basis swap (ie IRS contracts that swap different floating rates) emerged, while existing types gradually disappeared.

The transition from the London interbank offered rate (Libor) to "nearly risk-free rates" (RFRs; FSB (2014)) – henceforth the "benchmark rate reform" – is arguably the main driver of these structural changes for four reasons. First, the phase-out of Libor-based IRS limited the use cases for FRAs, thus reducing their turnover. Second, as publications of Libor in CHF, JPY and GBP ceased at end-2021, an increasing amount of IRS denominated in these currencies had to switch to the new RFRs. Since RFRs are based on overnight rates, the share of OIS in IRS turnover rose.

[1] The authors thank Sirio Aramonte, Chris Barnes, Luis Bengoechea, Claudio Borio, Stijn Claessens, Branimir Gruić, Bryan Hardy, Simonetta Iannotti, Patrick McGuire, Elena Nemykina, Andreas Schrimpf, Hyun Song Shin, Vladyslav Sushko, Nikola Tarashev, Toby Williams and Philip Woodridge for helpful comments and discussion, as well as Anamaria Illes, Alessandro Barbera, Ann Neale and Nicolas Lemercier for excellent research assistance. The views expressed in this article are those of the authors and do not necessarily reflect those of the Bank for International Settlements.

Key takeaways

- The benchmark rate reform led to structural changes in OTC interest rate derivatives markets, driving up the share of instruments referencing overnight rates in overall turnover.
- The reform reduced hedging needs for Libor-related risks, which led to a material drop in FRA trading and a shift in the geographical distribution of OTC turnover.
- The benchmark reform reduced some basis risks but gave rise to new ones, stemming from the variety of reference rates in the post-Libor world and driving the rise in new types of basis swap.

Third, the different effects of the benchmark rate reform across jurisdictions led to a shift in trading locations.[2] Lastly, since the reform gave rise to multiple reference rates, it created the need for new swaps that help manage new "basis risks" – ie the risks of loss when assets and liabilities reference different floating rates.

This special feature studies these main implications of the Libor transition on fixed income markets, with a special focus on OTC derivatives. The rest of the feature is organised as follows. The first section briefly describes the benchmark reform and explains the main differences between Libor and RFRs. The second examines how the Libor transition changed risks in interest rate markets. The third uses Triennial Surveys and additional data sources to analyse four major implications of the reform for derivatives markets. The final section concludes.

Fixed income markets transition from Libor to RFRs

RFRs have started replacing Libor as key interest rate benchmarks in major currencies. Libor in GBP, EUR, CHF and JPY ceased as of end-2021, and USD Libor is scheduled to be discontinued in June 2023. The main reason for the Libor cessation is that the rate is based on surveys and is therefore prone to manipulation (CFTC (2012), FSA (2012)). The same problem was common among other interbank offered rates (IBORs) (IOSCO (2013)). To address it, authorities, together with the private sector, developed new benchmark rates – called RFRs by market convention – based on transactions in active and liquid overnight lending markets (FSB (2014)). In addition, some existing IBORs (eg Euribor) were reformed with more robust methodologies and have remained in use (EMMI (2019)). Depending on the availability of the reformed IBORs for trading, some jurisdictions (eg the United Kingdom) adopted RFRs faster than others (eg the euro area).

The transition from Libor to RFRs became evident in fixed income instruments. New issuance of Libor-based bonds nearly stopped in 2022 (Graph 1.A, dark red bars), whereas issuance of RFR-based bonds increased substantially (dark blue bars). Similarly, new loans referencing Libor dropped materially in 2022 (light red bars), as they were replaced by RFR-based loans (light blue bars).[3] Turning to derivatives, the

[2] Other factors may also play a role. For example, Brexit and the attendant regulatory restrictions on trading venues probably also contributed to the shift away from the United Kingdom.

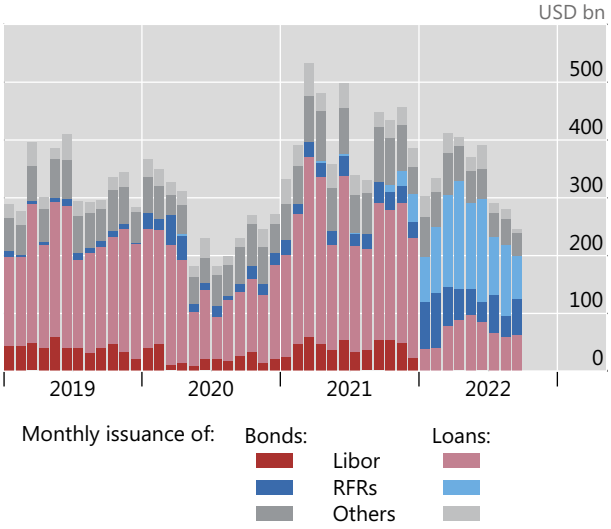
[3] New issuance of loans could be tranches from a pre-existing deal. As it is hard to modify loans' contractual terms, their switch to RFRs has been slower than for bonds.

majority of exchange-traded futures in US dollars referenced RFRs in 2022. Almost 100% of futures contracts in sterling and Swiss francs referenced RFRs (Graph 1.B).[4]

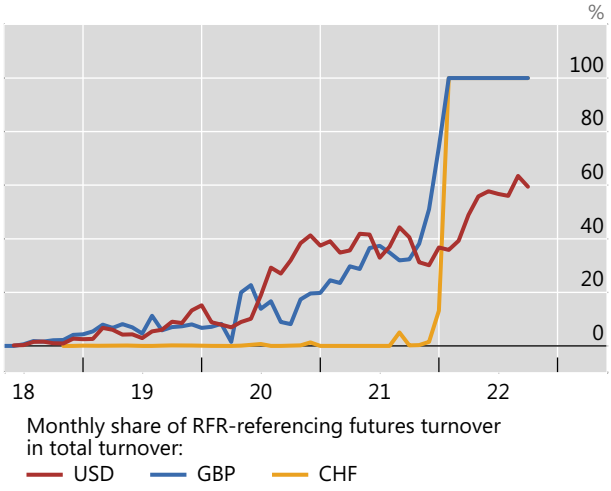
There are two key differences between Libor and RFRs. The first relates to credit risk sensitivity. Libor was initially constructed to measure banks' unsecured term funding costs. The popular tenors – three and six months – incorporated compensation for term liquidity and credit risk (Michaud and Upper (2008)).[5] By contrast, RFRs are *far less sensitive* to credit risk, as they are overnight, tightly linked to policy rates and in certain currencies – eg USD and CHF – reflect *secured* lending.[6] In sum, while Libor facilitated linking the coupon of a fixed income instrument to bank borrowing costs, overnight RFRs are not suited for this. Second, Libor is an estimation of the interest rates over a future period, whereas RFRs track the evolution of *actual* interest rates. Libor is fixed and known at the start of the contract period. Since it reflects banks' expected borrowing costs, it is called a "forward-looking" term rate. In contrast, the coupon of RFR-based instruments refers to the average of actual overnight rates, known only at the end of the relevant period.[7] This "backward-looking" approach is called compounding in arrears. Henceforth, for brevity we use RFRs to refer to both overnight RFRs and compounded RFRs. The key differences between old and new benchmark rates have major implications for fixed income markets.

Fixed income instruments switching from Libor to RFRs[1] Graph 1

A. Libor bond issuance nearly came to a halt in 2022



B. Share of RFR-based futures jumped



[1] See technical annex for details.

Sources: Clarus Financial Technology; Dealogic; authors' calculations.

[4] RFR-based futures for EUR and JPY were not developed as of September 2022.

[5] Libor has seven different maturities from overnight to one year. However, the overnight Libor was very thinly traded in derivatives markets. By contrast, the three-month tenor was deemed attractive to bank treasurers for asset-liability risk management (McCauley (2001)).

[6] Unsecured overnight rates are not entirely free from credit risk, despite the short tenor. That said, historical data reveal that these rates are almost insensitive to credit risk even in times of stress. For example, EFFR (one of the main traded USD unsecured overnight rates) did not spike during the Great Financial Crisis, in contrast to term Libor.

[7] Another averaging method is based on compounding daily values of past overnight rates. The corresponding rate is called "compounded RFR in advance" and is known at the start of the coupon period. In interest rate derivatives, such rates are used less often than compounded RFRs in arrears.

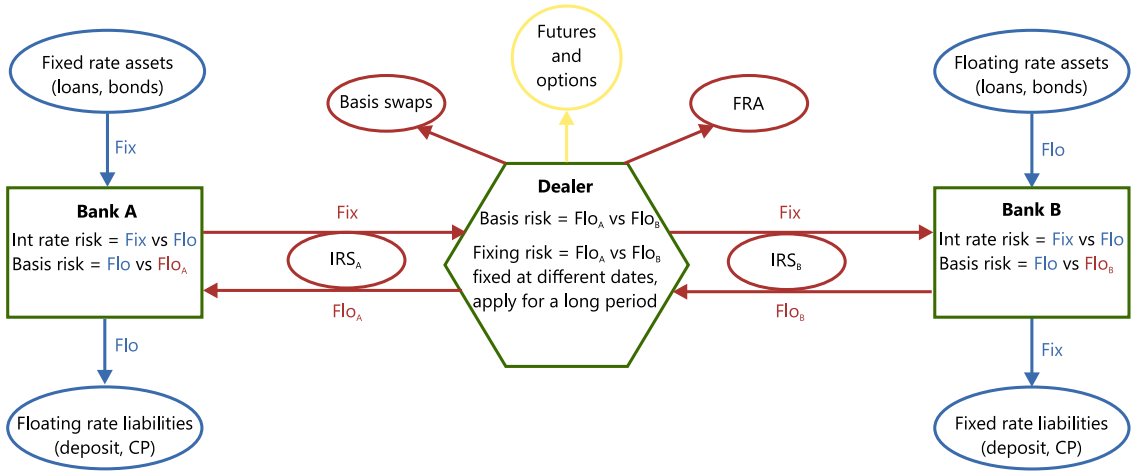
The transition changed risks in interest rate markets

The ecosystem of fixed income markets includes mainly banks, institutional investors and corporates trading in cash securities and derivatives. Typically, large global banks act as dealers in the derivatives segment and make the market for smaller banks and other agents. Cash securities (eg bonds and loans) are widely used for borrowing and lending. In turn, derivatives (eg IRS, FRAs and futures) are used mainly to transfer risk related to fluctuations in interest rates (Duffie and Stein (2015)).

IRS contracts – the most actively traded OTC interest rate derivatives – allow counterparties to swap different types of interest rate. To illustrate the mechanics of IRS, suppose bank A's asset is a bond paying a fixed coupon "Fix" (Graph 2), which is funded by a floating rate commercial paper (CP) with a coupon of size "Flo" (eg Libor). The bank then faces interest rate risk: if Flo increases above Fix, the bank suffers a loss. To hedge that risk, bank A enters into an IRS_A with a dealer and receives a floating rate Flo_A while paying Fix.

Dealers who intermediate in the IRS market face fixing risk and basis risk. In the example above, the dealer can offset the IRS_A exposure by entering into an opposite IRS_B with bank B. If the terms of the two swaps are identical, the dealer is hedged. However, when the starting dates of the two swaps are different – eg IRS_B starts later than IRS_A – the dealer could face a loss if the two floating rates are fixed at different levels: $Flo_A \neq Flo_B$ (eg Flo_A = Libor today, Flo_B = Libor tomorrow). This risk is called "fixing risk". Alternatively, if the two floating coupons are fixed on the same day but reference different rates – eg Flo_A = Libor, Flo_B = RFR – the dealer faces the risk that a wedge between these rates would generate a loss. This risk is called "basis risk". To hedge fixing risk, the dealer could enter into FRAs, which fix the values of Flo_A and Flo_B today (Box A). To hedge basis risk, the dealer could enter into a basis swap, which swaps Flo_A for Flo_B (Box B).

Stylised illustration of the ecosystem of fixed income markets — Graph 2



"Flo" and "Fix" indicate floating and fixed coupons, respectively.

Source: Authors' elaboration.

Box A

Hedging fixing risk in IRS contracts using FRAs

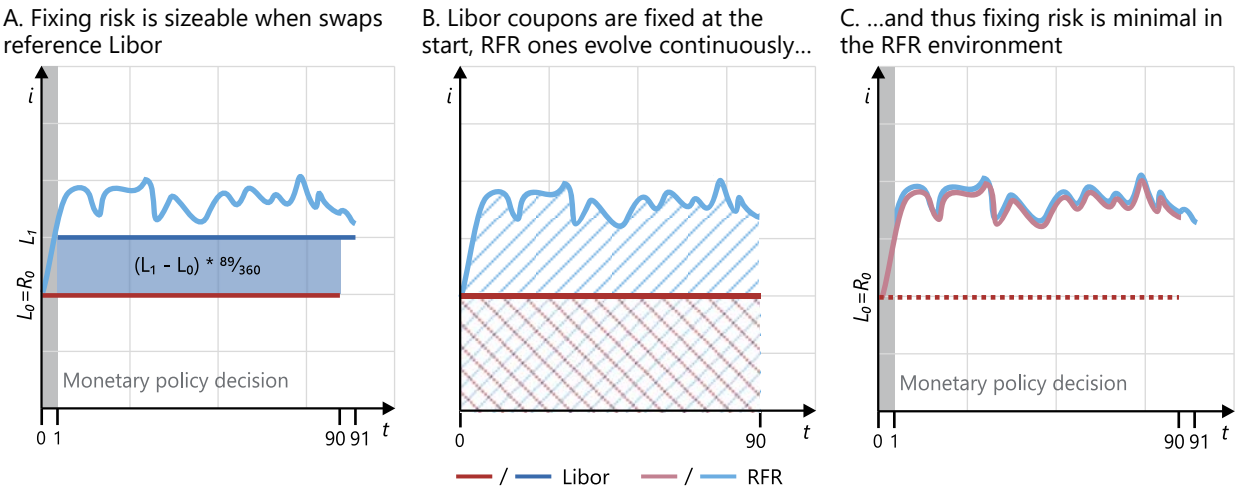
This box provides a stylised example of the fixing risk in Libor-based swaps and illustrates how swaps referencing risk-free rates (RFRs) reduce this risk.

Suppose that a dealer has two offsetting swaps, referencing three-month Libor with the same notional: one starting today (day 0), and another starting tomorrow (day 1), with coupon rates fixed for three months (90 days). In the first swap, the dealer receives three-month Libor (L), in the second she pays it. So overall, the dealer has a matched position except the one-day lag between the coupon payments. During the overlapping days of the two swaps, the difference between the dealer's coupon payments is $(L_0 - L_1) * (90 - 1)/360$ (Graph A1.A, blue shaded area). The dealer thus bears the risk that the Libor fixing today L_0 will be lower than the fixing tomorrow L_1, eg because of a monetary policy decision. To hedge this fixing risk, the dealer enters into a forward rate agreement (FRA) starting in one day, fixing L_1 on day 0 and eliminating the uncertainty.

In an RFR world, fixing risk becomes negligible since coupons are calculated by compounding the daily value of overnight rates (Graph A1.B). Consider the same two swaps in the example above but referencing RFR (R) instead of Libor. The floating coupon is now "fixed" for one day instead of 90 days, since it tracks overnight rates. Thus, the dealer faces no difference in coupons during the 89 (= 90 – 1) overlapping days of the two swaps. Since this materially reduces the fixing risk (Graph A1.C), the use case for FRA is much smaller.

Fixing risk in Libor and RFR environments

Graph A1



Source: Authors' elaboration.

The Libor transition fundamentally changed both fixing risk and basis risk. First, the use of RFRs as benchmark rates reduced fixing risk significantly. As the floating coupons in RFR-based swaps capture the daily realisation of overnight rates, they are "fixed" every day. This is structurally different from Libor-based swaps, in which the floating coupons are fixed typically for three or six months. Thus, the fixing risk in RFR-based swaps is an order of magnitude smaller than that in Libor-based swaps. Box A provides a simple example to illustrate the underlying mechanics. It also shows how FRAs can be used to hedge fixing risk in the Libor environment and why that hedging need is reduced in the new RFR environment.

Second, the transition to RFRs gave rise to a coexistence of multiple reference rates, which created new basis risks. In addition to the RFRs discussed above, other

Summary of different reference rates Table 1

Rate	Based on	When known	Backward- or forward-looking	Examples
Libor	Quotes	At the start	Forward-looking	*Unsecured:* USD/EUR/GBP/JPY/CHF Libor
O/N RFR	Transactions			*Unsecured:* ESTR, SONIA, TONA *Secured:* SOFR, SARON
Compounded RFR in arrears	Transactions	At the end	Backward-looking	
Compounded RFR in advance	Transactions	At the start	Backward-looking	
Term RFR[1]	Quotes and transactions	At the start	Forward-looking	*Secured:* CME Term SOFR
Other term rates	Quotes and transactions	At the start	Forward-looking	*Unsecured:* Euribor, Tibor, BSBY, Ameribor
Other O/N reference rate	Quotes and transactions			*Unsecured:* EFFR, EONIA

O/N = overnight.

[1] By market convention, only forward-looking term RFRs based on derivatives are referred to as "term RFRs".

Source: Authors' elaboration.

types of reference rate have been emerging to fulfil different market needs (Schrimpf and Sushko (2019)). For one, "term RFRs" are based on RFR derivatives and capture expectations of future rate moves. For another, credit-sensitive term rates – such as reformed IBORs – are based on *unsecured* short-term borrowing markets and arguably better reflect the term borrowing costs of banks (Table 1). The new basis risks that arise in the RFR environment are especially important for financial intermediaries like banks which are both lenders and borrowers. Box B reviews basis risks in the Libor and the RFR worlds.

Libor reform footprint in the data

Given the structural changes outlined above, we expect to see four main implications of the Libor transition for OTC interest rate derivatives. First, given the reduced fixing risk in the RFR environment, the turnover of FRAs should decrease. Second, as benchmark rates shift from term Libor to RFRs based on overnight rates, an increasing share of IRS should be OIS. Third, to the extent that the reform affects jurisdictions differently, the geographical distribution of OTC derivatives turnover, as well as the attendant currency composition, would change. Finally, the emergence of new basis risks should increase the turnover of corresponding basis swaps.

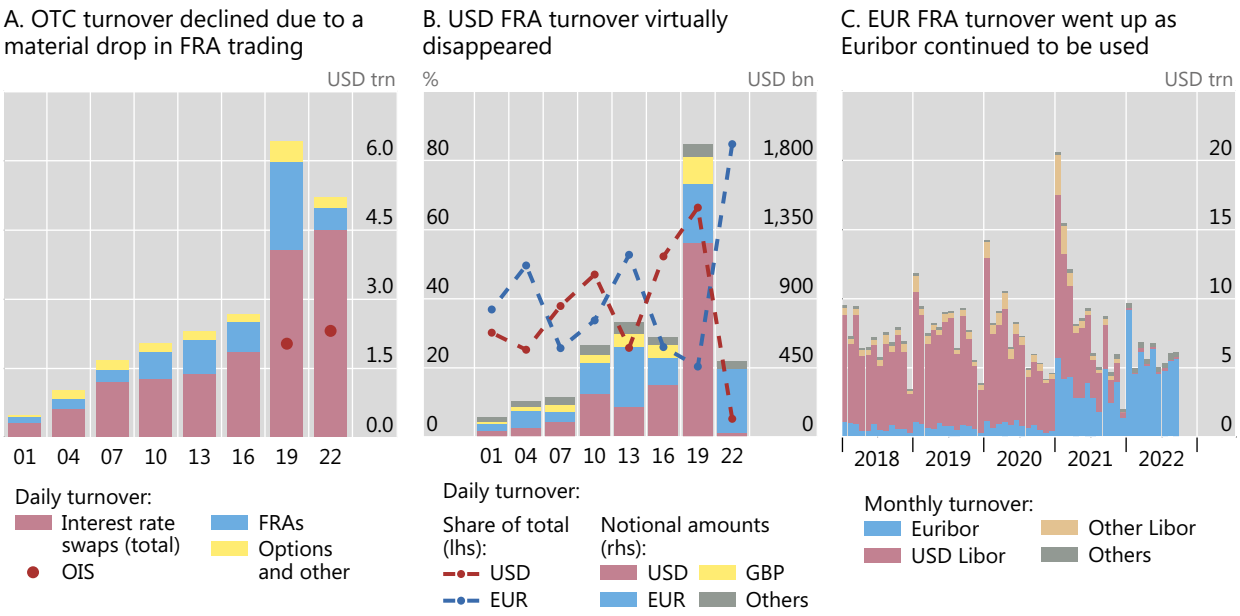
FRA turnover slumped

The material decline in FRA trading is a clear hallmark of the Libor transition. On the one hand, the need to use FRAs to hedge fixing risk in IRS positions became negligible in the RFR environment. On the other hand, the scope for speculation with FRAs became limited. Since these contracts need to reference a forward-looking term rate

that is known at the start of the period, they are incompatible with RFRs.[8] As a result, the daily turnover of FRAs dropped significantly, from $1.9 trillion (30% of global turnover) in 2019 to only $0.5 trillion (10%) in 2022, leading to a 19% decline in total OTC derivatives turnover (Graph 3.A). The turnover of USD-denominated FRAs had the most sizeable decline: from $1.3 trillion in 2019 to just $0.03 trillion in 2022 (Graph 3.B). This decline reflected the shrinking activity in FRAs referencing USD Libor, as shown by data reported to the Depository Trust & Clearing Corporation (DTCC) (Graph 3.C). FRAs denominated in GBP, JPY and CHF also virtually ceased trading, declining by more than 90% each.

The only exception from the overall decline in FRA trading was EUR-denominated FRAs. The turnover of these contracts expanded from $387 billion (20% of total FRA turnover) in 2019 to $421 billion (85%) in 2022. This expansion reflected the increasing trading activity of FRAs referencing Euribor, which is a reformed IBOR that will continue to be used (ECB (2020)). Since Euribor is a forward-looking term rate like Libor, swaps referencing Euribor give rise to fixing risk and the need to use FRAs to hedge this risk.[9] In addition, the expansion of Euribor FRAs could also stem from hedging or speculating on future Euribor values.

FRA trading ground to a halt except for euro-denominated contracts[1] Graph 3



[1] See technical annex for details.

Sources: BIS Triennial Central Bank Survey; DTCC, *Swap Data Repository*; authors' calculations.

[8] To speculate on future interest rate movements in the new RFR world, investors can use a one-period OIS that takes effect on a future date (ie a forward-starting OIS) as a replacement for an FRA. Alternatively, investors could resort to exchange-traded futures but only to the extent that the standardised maturity dates fit their purpose.

[9] Swaps referencing term RFRs or other credit-sensitive term rates can also give rise to fixing risk, similar to Libor. However, these instruments are thinly traded, probably due to regulation. For example, inter-dealer trading of term SOFR is currently prohibited in the United States to promote adoption of SOFR in derivatives (ARRC (2021), Bartholomew (2022)).

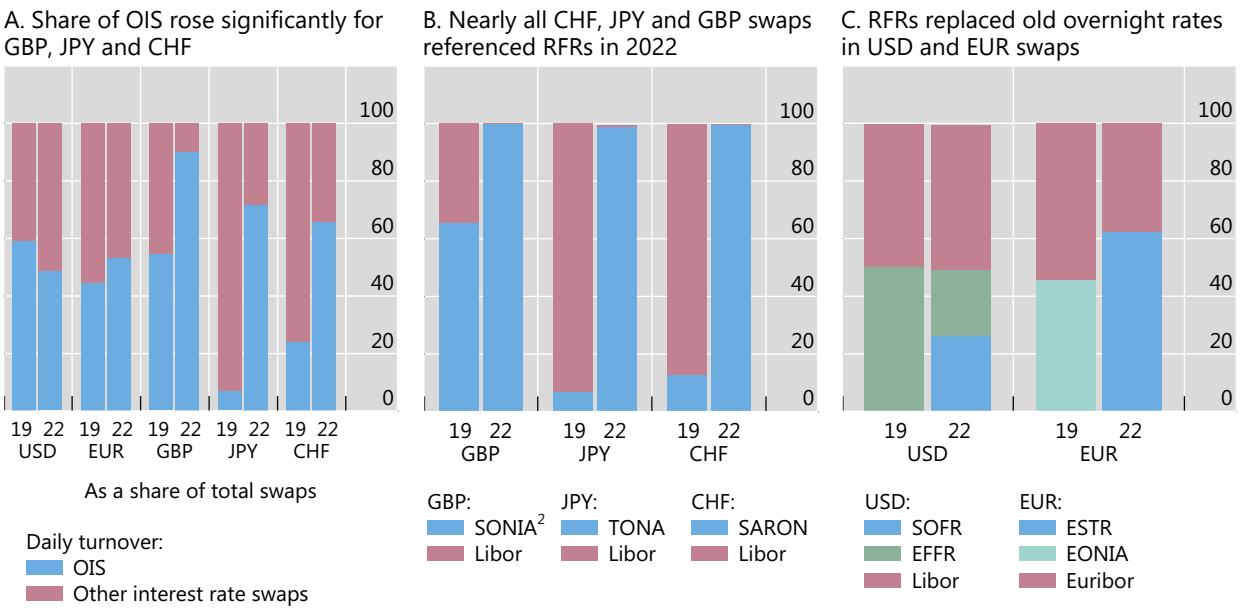
Turnover of OIS gained traction

Given the increasing adoption of RFRs, which are based on overnight rates, the share of OIS in total IRS turnover increased in 2022 for the currencies most affected by the benchmark reform, such as the Swiss franc, the yen and sterling. This share increased to above 90% for GBP, and above 60% for JPY and CHF contracts (Graph 4.A). The increase was mainly driven by the nearly full adoption of RFRs for swaps in these currencies, as revealed by DTCC data (Graph 4.B). This is a significant change compared with 2019, when the share of RFR-based contracts was less than 15% for the Swiss franc and yen, and less than 70% for sterling.[10]

In the case of USD and EUR contracts, the share of OIS in IRS turnover remained relatively stable (Graph 4.A). Despite the increasing adoption of RFRs in these currencies (Graph 4.C, blue bars), they mainly replaced existing overnight rates – ESTR took over EONIA for EUR contracts and SOFR partially replaced EFFR for USD ones.[11] The share of IRS referencing credit-sensitive term rates remained sizeable. More than 50% of USD swaps referenced Libor in 2022, and roughly 40% of EUR swaps referenced Euribor. USD Libor swaps were probably used to run down legacy positions given the planned cessation of Libor in June 2023.[12] The sizable turnover

Share of OIS went up significantly for currencies most affected by the reform[1]

As a percentage of total notional by currency/year pair — Graph 4



[1] See technical annex for details. [2] GBP share includes old SONIA contracts.

Sources: BIS Triennial Central Bank Survey; DTCC, *Swap Data Repository*; authors' calculations.

[10] The share of GBP RFR contracts includes both the reformed and the old SONIA. This explains the high share back in 2019.

[11] These trends reflect the part of the benchmark rate reform that concerned the development of robust overnight RFRs. See detailed discussions in Schrimpf and Sushko (2019).

[12] Supervisory guidance in the United States encouraged "... banks to cease entering into new contracts that use USD *LIBOR* as a reference rate as soon as practicable and in any event by December 31, 2021" (Board of Governors of the Federal Reserve System et al (2020)).

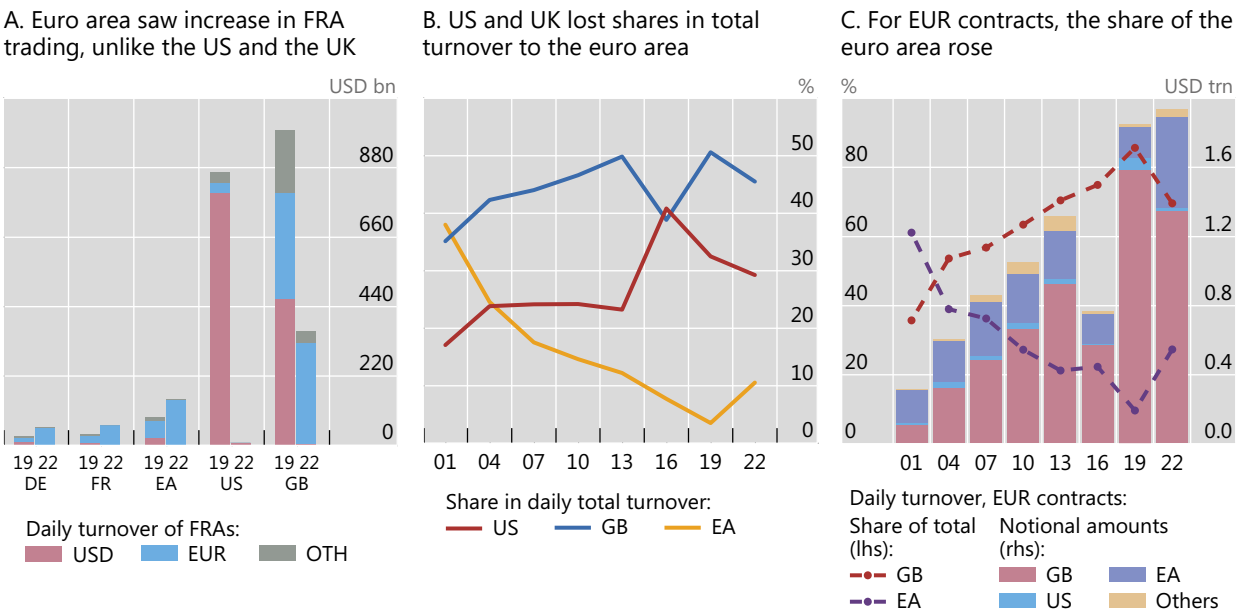
of Euribor swaps could reflect market participants' demand for credit-sensitive term rates.

The geographical distribution of turnover shifted

The different approaches to the benchmark rate reform across regions led to a shift in trading locations of FRAs. Jurisdictions without reformed IBORs are strict with the "RFR only" approach (eg the UK and the US), while others allow RFRs and reformed IBORs to coexist (eg the euro area). Consistent with the sizeable drop in USD-denominated FRAs, trading of FRAs by sales desks in the US almost disappeared, with daily turnover dropping by 99% between 2019 and 2022 (Graph 5.A). Similarly, FRA turnover in the UK declined by more than a half over the same period. In contrast, FRA turnover increased by 65% in the euro area[13] – mainly in Germany and France – reflecting the expansion of Euribor-based FRAs.

The uneven decline of FRA trading across jurisdictions contributed to changes in the geographical distribution and the currency composition of overall turnover. The share of the UK (the largest trading location for OTC derivatives) in global turnover declined from 51% in 2019 to 46% in 2022 (Graph 5.B). The share of the second largest trading location for OTC derivatives – the US – dropped from 32% in 2019 to 29% in 2022. In contrast, the share of the euro area increased. The respective currencies also saw similar trends, with the shares of the dollar in global turnover shrinking to 44% in 2022 (from 51% in 2019) and the euro expanding to 34% (from 25%) (BIS (2022)).

Libor transition led to shifts in currency composition, geographical distribution[1] Graph 5



[1] See technical annex for details.

Sources: BIS Triennial Central Bank Survey; authors' calculations.

[13] This comprises all euro area countries that reported to the BIS Triennial Surveys.

Notably, the share of the euro area in total EUR contracts bounced back to 27%, interrupting a long-term downward trend since 2004 (Ehlers and Hardy (2019)) (Graph 5.C). Apart from the uneven evolution of FRA turnover across regions, the migration of EUR contracts to the euro area could also reflect the impact of Brexit.[14]

New basis swaps emerged

The phasing-out of Libor led to a reduction in existing basis risks and a drop in the turnover of associated basis swaps. As Libor in major currencies other than the US dollar ceased as of end-2021, basis swaps referencing Libor in these currencies essentially disappeared thereafter (Graph 6.A, blue bars). In contrast, turnover of basis swaps that referenced legacy USD Libor (but not RFRs) remained sizeable in 2022 at around $500 billion per month (red bars). These swaps were probably used to hedge old basis risks like those stemming from different tenors of Libor, eg three-month and six-month Libor. This type of basis risk does not apply for RFRs as they track daily value of overnight rates continuously (Box B). In addition to Libor-only swaps, basis swaps between RFRs and Libor reached a peak at end-2021 and declined afterwards (yellow bars).

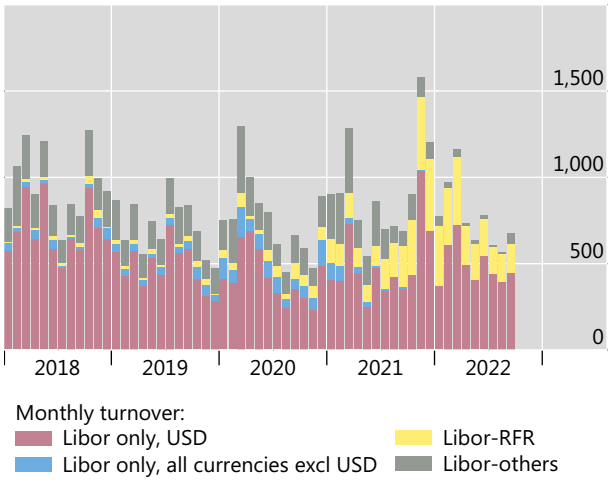
New basis swaps emerged as a tool for hedging basis risks stemming from the new reference rates. Turnover of basis swaps referencing RFRs and rates other than Libor expanded significantly in 2022 (Graph 6.B, purple bars), reaching above $300 billion per month in late 2022. This expansion reflects the hedging of new basis risks stemming from the coexistence of multiple benchmark rates (Box B).

New basis swaps have been emerging[1]

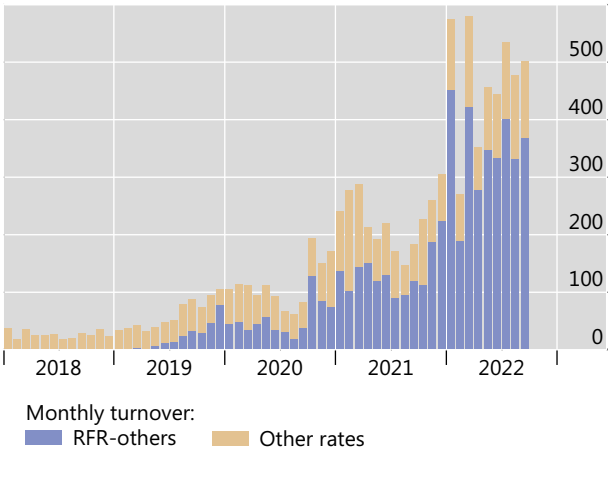
In billions of US dollars

Graph 6

A. Basis swaps referencing Libor were mainly USD contracts



B. Basis swaps referencing RFRs picked up



[1] See technical annex for details.

Sources: DTCC, *Swap Data Repository*; authors' calculations.

[14] The attendant regulatory changes after Brexit prohibited trading of some contracts on UK trading venues. See Article 28 of the EU Markets in Financial Instruments Regulation (MiFIR).

Interest rate basis risks in the Libor and RFR worlds

Wenqian Huang and Karamfil Todorov

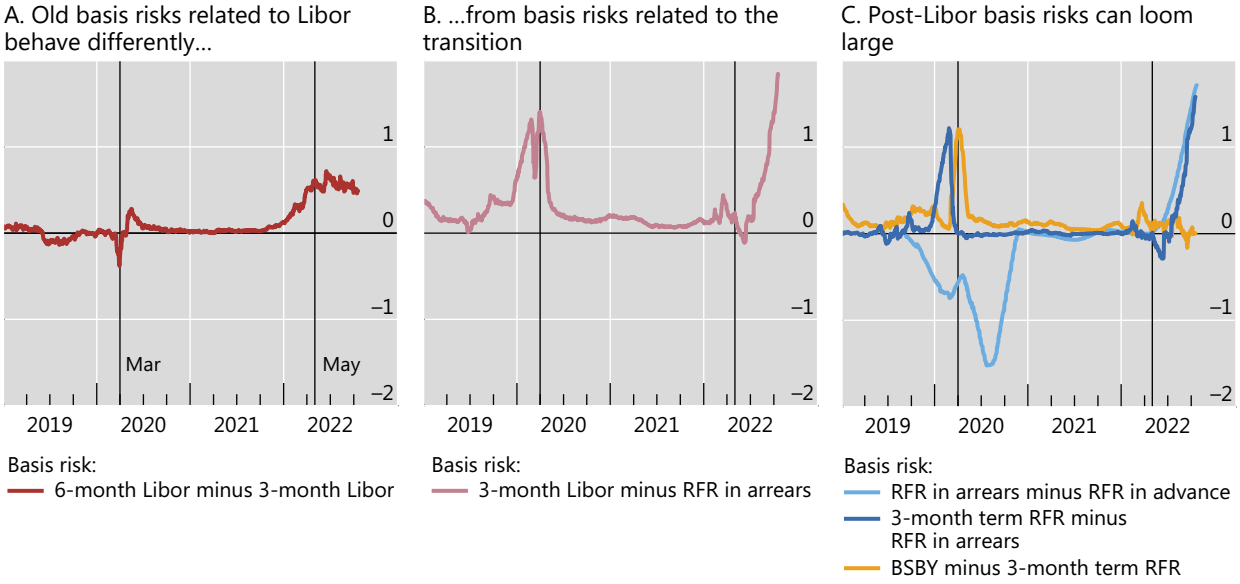
Basis risk arises when investors' assets and liabilities reference different floating rates. In this box, we first describe how the transition from Libor to the new risk-free rates (RFRs) changed Libor-related basis risks. We then explain how the differences between various reference rates in the RFR world give rise to new basis risks.

While mitigating Libor-related basis risks, the transition gave rise to Libor-RFR basis risks. One example of old Libor-related basis risks stems from different tenors of the reference rate: eg six-month Libor versus three-month Libor (Graph B1.A). Since RFRs track actual rates continuously, they eliminate this basis risk. However, basis risks can arise from the difference between Libor and RFRs when market participants have legacy Libor exposures. For example, suppose a bank has assets referencing Libor (eg legacy Libor loans) and liabilities referencing the standard averaged RFR, which compounds the overnight rates over the coupon period, ie "in arrears". The bank is then exposed to the basis between Libor and RFR in arrears. This basis could be substantial when the future path of interest rates is uncertain, as illustrated in the second half of 2022 (Graph B1.B).

New basis risks arise from the differences between the new reference rates and the standard RFR in arrears. The first type of new basis risk stems from the difference between RFR in arrears and in advance. RFR in arrears uses overnight rates prevailing during the *current* coupon period, whereas RFR in advance compounds *past* daily overnight rates. This difference creates a basis, which is positive when rates go up and is negative when rates go down (Guggenheim and Schrimpf (2020)). Using one of the standard market conventions for coupon calculation (three-month period), this basis reached about –150 basis points during the rate-cutting cycle in the second quarter of 2020 and +150 basis points during the rate-hiking cycle in the second half of 2022 (Graph B1.C, light blue line).

Basis risks in RFR and Libor world[1]

In percentage points — Graph B1



[1] Rates are based on USD markets. All bases take the perspective of an investor who is long the first rate and short the second.

Sources: Bloomberg; authors' calculations.

The second type of new basis risk arises from the difference between term RFR and RFR in arrears. In contrast to the backward-looking nature of RFR in arrears, term RFR is a forward-looking rate based on RFR derivatives such as futures (eg CME term SOFR). The basis between term RFR and RFR in arrears is thus related to the term premium: it is positive if expected future interest rates are higher than subsequent realisations, and negative otherwise. This basis spiked above 100 basis points when market participants expected monetary policy tightening before the Covid-19 shock in March 2020 and dipped into the negative domain when market participants temporarily foresaw a flatter policy rate path in May 2022 (Graph B.C, dark blue line).

The third type of new basis risks stems from the difference between credit-sensitive term rates and RFR in arrears. This basis is related to the evolution of banks' term funding costs. The credit risk component of the basis is typically positive and spikes in stress times, as illustrated by the Covid turmoil in March 2020 (Graph B1.C, yellow line).

① The views expressed are those of the authors and do not necessarily reflect those of the Bank for International Settlements.

Conclusion

The benchmark rate reform led to structural changes in fixed income markets, especially in the OTC derivatives segment. The direct impact of the reform was a shift from fixed income instruments referencing Libor to those referencing RFRs. The reform also had profound indirect effects due to the fundamental differences between old and new reference rates. On the one hand, the reform reduced fixing risk as the new reference rates are based on the overnight tenor. On the other hand, the reform created new basis risks stemming from the coexistence of different types of reference rate.

As a result of these effects, the Libor transition significantly changed the instrument mix and the geographical distribution of OTC interest rate derivatives. Some instruments such as FRAs became less necessary, and their turnover declined. In contrast, turnover increased for basis swaps used to hedge the plethora of new basis risks.

On the back of regulatory recommendations to promote the adoption of RFRs, OTC interest rate derivatives markets have become strongly anchored in reference rates that are overnight and largely insensitive to bank funding costs. This could potentially lead to a lack of usable benchmarks that capture term liquidity premia and credit risk. Such factors could be important to financial intermediaries active in both borrowing and lending. Fine-tuning the balance between maintaining robust benchmark rates and developing new instruments that "complete the market" is an important next step to ensure the orderly functioning of fixed income markets in the new post-Libor world.

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Technical annex

Ameribor = American interbank offered rate; BSBY = Bloomberg short-term bank yield index; CME term SOFR = Chicago mercantile exchange term secured overnight financing rate; CP = commercial paper; EFFR = effective funds rate; EONIA = euro overnight index average; ESTR = euro short-term rate; Euribor = euro interbank offered rate; FRA = forward rate agreement; IRS = interest rate swap; Libor = London interbank offered rate; OIS = overnight indexed swap; OTC = over-the-counter; RFR = risk-free rate; SOFR = secured overnight financing rate; SARON = Swiss average rate overnight; SONIA = sterling overnight index average; Tibor = Tokyo interbank offered rate; TONA = Tokyo overnight average rate.

Graph 1.A: Syndicated loans.

Graph 3.A: Notional amounts, daily averages in April. Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis. Overnight indexed swaps are included in total swap turnover. Data available only from 2019.

Graph 3.B: Notional amounts, daily averages in April. Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis.

Graph 4.A: Notional amounts, daily averages in April. Adjusted for local and cross-border inter-dealer double-counting, ie "net-net" basis.

Graph 4.B: Based on DTCC data on fixed float and OIS interest rate swaps.

Graph 4.C: Based on DTCC data on fixed float and OIS interest rate swaps.

Graph 5.A: Notional amounts, daily averages in April. Adjusted for local inter-dealer double-counting, ie "net-gross" basis. Euro area defined as total "net-gross" for euro area reporting countries.

Graph 5.B: Notional amounts, daily averages in April. Adjusted for local inter-dealer double-counting, ie "net-gross" basis.

Graph 5.C: Notional amounts, daily averages in April. Adjusted for local inter-dealer double-counting, ie "net-gross" basis. Euro area defined as total "net-gross" for euro area reporting countries. EUR contracts.

Graph 6.A: Monthly turnover of basis swaps, by reference rate.

Graph 6.B: Monthly turnover of basis swaps, by reference rate.