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LIBOR: ITS INCEPTION, GOLDEN ERA AND DOWNFALL

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INTRODUCTION

LIBOR, the reference interest rate of the London interbank market, served for decades as a cornerstone of the global financial system. As a benchmark rate, it influenced financial contracts worth trillions of dollars worldwide. In this study, we trace the history of LIBOR in detail, investigate the underlying causes and repercussions of the LIBOR scandal, and identify the specific factors that culminated in its complete discontinuation. It should be noted at the outset that although the 2012 scandal accelerated LIBOR's termination, its true demise was driven chiefly by the arguably excessive dominance of this benchmark and by profound changes in banks' funding structures – changes partly prompted by tighter capital requirements.

JEL codes: E43, F33, G15

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1 THE EVOLUTION OF LIBOR

In Hungary, LIBOR became well-known during the foreign currency lending of the early 2000s, when most mortgage and car loans were indexed to the Swiss franc LIBOR reference rate. The phasing out of LIBOR a few years ago, however, no longer generated public interest, since by then foreign currency loans had essentially disappeared and the problems they had caused were not due to LIBOR but to the appreciation of the Swiss franc and the depreciation of the forint. Therefore, even most of those affected are unaware that for just over four years the official reference rate for loans denominated in Swiss francs has been SARON[2] rather than LIBOR. Although the use of LIBOR has now completely disappeared

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2 SARON stands for Swiss Average Rate Overnight, the overnight reference rate for the Swiss franc (CHF) based on repurchase transactions since 2017.

worldwide, its heyday and fall can nevertheless offer many lessons that are still valid today. Our paper summarises these lessons.

But before we get into the origins of LIBOR – the London Interbank Offered Rate, perhaps the best-known financial benchmark to date –, we briefly describe the role of financial benchmarks. The pricing and comparison of the value, price and performance of financial assets – deposits, loans, securities portfolios – over a given period is carried out worldwide using different standardised *benchmarks* to improve transparency and comparability. In order for benchmark indices to play this role, two conditions must be met. Firstly, clear rules are needed even for their definition; secondly, their values must be available on a daily basis.

From LIBOR through the British FTSE 100, the American S&P 500 and Dow Jones Industrial Average (Dow) stock indices to the Brent crude oil price index, there are three fundamental reasons for the widespread use of benchmarks:

1. They reduce trading costs by providing a unified basis for settling transactions both among financial institutions and between individual institutions and their clients.
2. The use of benchmarks stimulates competition, while also increasing market depth by focusing trading on a well-defined asset or indicator. Although fierce competition may narrow trading profits, the greater transparency achieved by using benchmarks boosts trading volume, which generally more than compensates for the reduced profit margin.
3. Pricing tied to benchmarks also creates an opportunity to assess and manage risks, thereby strengthening the resilience of the financial system (Duffie–Stein, 2015).

The inception of LIBOR is commonly dated to 1986, when the British Bankers' Association (BBA) introduced the indicator as the standardised benchmark for interest rates. However, the roots of LIBOR actually go back even further, to the late 1960s, when the total amount of interest-bearing term US dollar deposits placed with banks outside the United States (or at foreign subsidiaries of American banks) had grown significantly. This pool of deposits was referred to as the Eurodollar market.[3] The banking regulations of the United States did not apply to these deposits. At that time, starting in the early 1950s, financial institutions accepting such deposits enjoyed offshore status in their home countries. This was because, in countries outside the United States, a restrictive foreignexchange control regime was still in place until 1959, which – among other require-

3 From the mid-1950s, American dollars deposited in bank accounts administered by banks outside the United States were designated as Eurodollars. The cumulative sum of these deposits constituted the Eurodollar market.

ments – mandated the conversion of currency claims into the national currency. By granting offshore status, banks holding dollar deposits were exempted from the domestic foreign exchange regulations.[4] In this way, the Eurodollar market created an opportunity for regulatory arbitrage, allowing depositors to benefit from higher deposit interest rates (for example, due to the absence of deposit insurance costs), while borrowers enjoyed lower loan rates than those available in the United States. The Eurodollar market developed in several countries, with London emerging as the largest centre. In 1985, London accounted for 30 percent of the world's Eurodollar market, while Paris, the second most important centre, held only an 8 percent share. (International banking in London, 1975-85). Sixty-three countries' investors had offshore subsidiary banks or branches in London, including the National Bank of Hungary from 1973 onward.[5] In terms of sheer numbers, most London banks or branches were owned by US financial institutions, but in terms of market share, the Japanese banks' London subsidiaries and branches formed the most significant group (Bank of England, 1986).

On the Eurodollar market, beginning in 1959 with the achievement of convertibility, not only the American dollar but also other convertible currencies – including the Dutch guilder, the German mark, the Swiss franc and the Japanese yen – appeared. In just under two decades, by 1973, the size of the Eurodollar market had grown to approximately 300 billion dollars, and the market share of non-dollar currencies had increased to 28 percent compared to 17 percent in 1969.

In the Eurodollar markets, transactions were typically conducted with short-term funds. However, for a long time the Eurodollar market was hampered by the fact that, despite its rapidly expanding funding base, its short maturities prevented it from serving as an alternative to the tightly regulated bond markets for large borrowers seeking substantial financing. Large borrowers – principally governments and international corporations – typically sought loans of such considerable magnitude and extended maturities that no single bank could, or was willing to, underwrite independently (Árva et al., 2020). The gap between demand and supply was bridged through a financial innovation known as **syndicated lending**. Under this lending technique, banks interested in financing a largescale loan formed a consortium, known as a syndicate, to share the loan amount and the associated risks among themselves. The first syndicated loan, amounting to USD 80 million,

4 The granting of offshore status was not unprecedented in Hungary; indeed, Hungary employed this approach in 1979 with the establishment of Central European International Bank Ltd. (CIB).

5 In 1973, the National Bank of Hungary, together with MKB and OTP, established Hungarian International Bank Ltd. with its headquarters in London. HIB played a significant role in arranging syndicated loans taken by Hungary and in financing Hungarian foreign trade conducted on a convertible settlement basis. The bank was liquidated in 1995.

was arranged in 1969 by the London branch of the New York–based Manufacturers Hanover Corporation for the Iranian government (Hou–Skeie, 2014).

Under the syndication framework, the participating banks provided the borrower with loans on identical terms and by utilizing uniform documentation, under the aegis of a lead bank or banking group. In this lending arrangement, it was not requisite for each participating bank's contribution to be equal; rather, banks participated in financing in proportion to their capacity and risk preferences. Naturally, the organising banks, as well as those assuming a larger share, typically received a proportionally greater portion of the fees and commissions from the loan transaction. The discrepancy between the term of the loan and the maturity of the underlying funds was mitigated by the syndicate through the rolling over of the deposit base assigned to the loan. The technique of syndicated lending was adopted by numerous banks, and consequently, in just over a decade, by 1982 the syndicated loan market had expanded to a magnitude of approximately 46 billion dollars. This breathtaking growth was temporarily curtailed by the Latin American debt crisis that erupted in Mexico during the summer of 1982 (1982–83), when, within a brief span, several dozen countries in Latin America and Africa declared insolvency.

2 THE FUNCTIONING AND OPERATION OF THE LIBOR

Since the funding for the syndicated loans was comprised of mainly short-term deposits placed with the participating banks, the banks devised a solution to enable maturity transformation in the pricing of syndicated loans. This solution permitted the interest on the loan to be regularly aligned with the prevailing deposit rates throughout the entire term of the loan. Accordingly, the lending banks charged the borrowers the current market rate applicable to a brief interval of the loan's term – typically corresponding to an interest period ranging from one to six months. This variable interest rate was then augmented by the fixed interest margin and other fees stipulated in the loan agreement. The determination of the interest rates applicable to the different interest periods was executed by having the members of the syndicate report their financing costs directly to the lead organiser shortly before the rate-fixing date of each period, that is, the rate at which they could refinance their portion of the loan on the interbank market. The lead organiser then rounded the weighted average of these reported financing costs to the nearest one-eighth of a percentage point. This figure was termed LIBOR, to which the fixed interest margin was subsequently added. At the end of each interest period, the syndicate members received, in proportion to their participation, their share of the interest calculated in this manner. From 1970 onwards, LIBOR

was generally employed in the calculation of the interest charged over the term of most syndicated loans. This interest rate was soon utilised not only in the market for syndicated loans but also in the pricing of various other financial instruments. For instance, the interest rate on certain bonds was linked to LIBOR – and thus the floating-rate bond was born.

It is pertinent here to briefly clarify why the London interbank rate became the foremost benchmark in money markets worldwide – including in the United States – even though, in the aftermath of the Second World War, the pound sterling was unable to re-establish itself as the leading reserve currency, and the London money market could no longer reclaim its erstwhile dominant position. This was primarily due to the emergence of the American dollar as the key currency within the Bretton Woods financial system, with New York subsequently assuming the role of the largest domestic money market. That London managed to remain an important financial centre despite the global economic crisis of the 1930s and the severe burdens imposed by the Second World War can be attributed to several complementary factors.

On the one hand, following the financial crisis of the 1930s, American banking regulations became increasingly stringent, and, among other measures, imposed restrictions on the maximum interest payable on dollar deposits and introduced a mandatory insurance scheme – against a fee – for retail deposits held at American banks. Due to these constraints, during the 1950s, dollars flowed from the United States into the European offshore – i.e. extraterritorial – dollar markets, initially as a consequence of the outflow of dollars associated with aid and corporate takeovers, and subsequently from dollar revenues derived from the growing US-bound export activities of European countries. As previously noted, the funds accumulated in these offshore markets were not subject either to the monetary regulations governing the respective national currencies, or to the constraints of restrictive foreignexchange regimes, nor to the aforementioned US banking regulations or its sanctioning powers. In short, in the Eurodollar market, the absence of these restrictions enabled more favourable returns than those obtainable in the United States.

In the aftermath of the Second World War, economies were characterised by what several authors have termed "financial repression" (Masciandaro–Quintyn, 2013). The objective of financial repression was to reconstruct war-ravaged economies and to foster economic growth and development through the oversight of the financial system. The most salient features of this strategy included the predominance of state-owned banks, the utilisation of monetary instruments such as credit ceilings, directed lending, interest rate regulation and high reserve requirements for commercial banks, as well as the monetary financing of fiscal deficits by central banks. This characterised the United Kingdom as well; however, in

order to reinforce the role of the London money market, the Bank of England adopted a liberal stance towards offshore banking transactions. As stated by Sir Leslie O'Brien, then Governor of the Bank of England, at the Scottish Bankers' Institute in 1973: "The supremacy of London as an international banking centre (...) is founded on a freedom from vexatious banking legislation equalled in few countries in the world" (Pigott, 1994). Indeed, in the United Kingdom – unlike in most developed countries – until 1979 there was no statute or other form of legislation governing the establishment of a bank or, more generally, banking operations. The Bank of England performed its supervisory functions in an informal manner. When it sought to enforce a rule uniformly throughout the banking community, it did so via a circular in which banks were urged to conform to the new practice outlined therein. Although these circulars did not possess legal force, the central bank nonetheless expected both the spirit and the letter of its directives to be adhered to. This practice, however, had to be modified shortly thereafter, firstly owing to the crisis precipitated by so-called "secondary" or "marginal" banks operating outside the scope of supervision, and secondly following the collapse of the German Herstatt Bank in the summer of 1974, an event that sent shockwaves throughout the global money markets. Subsequent to the United Kingdom's accession to the European Economic Community, the British Government published a white paper in 1976 entitled "The Licensing and Supervision of DepositTaking Institutions". The regulations proposed in the white paper were implemented in practice by means of the Banking Act of 1979. This Act complied with the requirement stipulated in the first banking directive issued by the European Commission in 1977, which mandated that banks and other financial institutions obtain a licence before commencing operations. Thus, in 1979, banks in the United Kingdom were subject to statutory regulation for the first time.

Besides the attractive features of British banking regulation, the widespread use of the English language[6] worldwide, the similarity of the English and US legal systems based on case law, the availability of highly skilled British financial, legal and accounting experts, and the accession of most of the former British colonies to the Commonwealth, have made London an ideal bridgehead for US and other foreign banks. Naturally, one must not overlook the cosmopolitan openness of the city, its historical significance, and its prestige, all of which have contributed to the sustained role of London as a global financial centre. Owing to these factors, numerous banks established subsidiaries or branches in London, where they could conduct their international financial transactions unimpeded within the

6 According to the latest estimates, out of the world's eight billion inhabitants, approximately 1.5 billion people speak English, whether as a first or a second language. This figure also includes native English speakers (around 375 million).

offshore market. Moreover, political considerations – or concerns that funds deposited in American banks might be frozen or otherwise restricted – led the Soviet Union, China, and several Middle Eastern states to locate their dollar assets in the United Kingdom (Pásztor, 2014). London's standing was further enhanced by its close links with the two key Asian commercial and economic centres that emerged after the Second World War – Hong Kong and Singapore – which maintained strong ties with the United Kingdom, and particularly with London in financial matters.

Consequently, these factors enabled London to retain its preeminent position and become the foremost global hub for syndicated lending. This, in turn, ensured that LIBOR emerged as the world's leading benchmark interest rate.

As LIBOR acquired growing importance within the international financial system, so too did the demand for a standardised method for determining its value – previously, this had been done on a case-by-case basis by the banks involved in syndicated transactions, as set out in the loan agreements. In October 1984, the British Bankers' Association initiated consultations with the Bank of England and other parties regarding the establishment of a standardised benchmark interest rate. By 1986, the BBA had developed its "BBA LIBOR" methodology, according to which the benchmark interest rate was calculated initially based on the offshore interbank rates for the British pound, the US dollar, and the Japanese yen. This methodology comprised three innovations.

The first innovation was to set up a group of several banks – so-called panels – to fix LIBOR for each currency, that is to set the reference rate. Over the following two decades, the number of currencies whose LIBOR was published daily increased from three to ten, and so did the number of panels. However, following the introduction of the euro, the publication of LIBOR for the currencies superseded by the euro – namely the German mark, the French franc, the Dutch guilder, and the Belgian franc – was discontinued. Instead, the Euro Interbank Offered Rate, Euribor[7], was introduced; this rate represents the daily average of the euro-denominated interbank lending rates offered by European banks to each other, as determined by the Brussels-based European Money Markets Institute (EMMI), which was established by the national banking associations of the EU member states, on the basis of the supply of credit between prime banks in the European Union. Although the method for determining Euribor's daily rate was

7 Euribor stands for **Eur**o **I**nter**b**ank **O**ffered **R**ate.

similar in many respects, but differed from that of LIBOR in several important details – including the substance of the question posed each day[8].

The establishment of panels was necessary because each interbank market worldwide – including the London market – is organised on a bilateral basis, whereby only the two parties involved in a particular transaction know its precise terms, which are not subsequently disclosed publicly. Instead, banks participating in the panels were required each day at 11:00 to respond to a standard question: namely, at what interest rate, in a given currency, on the given day and at the given time, they could procure funds on the offshore interbank market for fifteen distinct maturities within a year. Participation in these panels was voluntary and undertaken at the request of the BBA; in the early days, such participation conferred considerable prestige.

Table 1
Composition of LIBOR panels in London

LIBOR panel membership (22 May 2008)							
Number	**Bank**	**Country**	**currency**				**Number of panel members**
			GBP	**CHF**	**JPY**	**USD**	
1	Abbey National plc	UK	×				1
2	Bank of America	US	×		×	×	3
3	Bank of Tokyo-Mitsubishi UFJ	JP	×	×	×	×	4
4	BNP Paribas	FR	×				1
5	Barclays Bank plc	UK	×	×	×	×	4
6	Citibank NA	US	×	×	×	×	4
7	Credit Suisse	CH		×		×	2
8	Deutsche Bank AG	DE	×	×	×	×	4
9	HBOS	UK	×			×	2
10	HSBC	UK	×	×	×	×	4
11	JP Morgan Chase	US	×	×	×	×	4
12	Lloyds TSB Bank plc	UK	×	×	×	×	4
13	Mizuho Corporate Bank	JP			×		1
14	Rabobank	NL	×		×	×	3
15	Royal Bank of Canada	CA	×			×	2

8 The panel members were asked to state the interest rate at which they would be prepared to extend unsecured interbank loans to prime banks.

LIBOR panel membership (22 May 2008)							
Number	**Bank**	**Country**	**currency**				**Number of panel members**
			GBP	**CHF**	**JPY**	**USD**	
16	Société Générale	FR		×	×		2
17	Sumitomo Mitsui Banking Corporation Europe Ltd (SMBCE)	JP			×		1
18	The Norinchukin Bank	JP			×	×	2
19	The Royal Bank of Scotland Group	UK	×	×	×	×	4
20	UBS AG	CH	×	×	×	×	4
21	West LB AG	DE	×	×	×	×	4
		9	16	12	16	16	

Source: Select Committee on Treasury Written Evidence, House of Commons, 1 July 2008.

As can be seen, the London subsidiaries or branches of banks from twenty different banks operating in nine countries participated in the four panels. The US dollar had the largest panel and the Swiss franc the smallest.

The second innovation was BBA's adoption of a trimmed-mean calculation, rather than a simple arithmetic average, to determine the daily LIBOR rate. This trimming was executed by the BBA by disregarding the lowest and highest quarters of the data submitted by the banks in each panel, with the intention of minimising the possibilities of manipulation and fraud. Consequently, each panel had to consist of at least eight banks so that, after trimming, the average could be calculated from a minimum of four values. Due to the number of banks and their respective market shares in each panel, LIBOR reliably and accurately reflected the actual interest rate conditions in the interbank market even though its calculation was based on hypothetical rather than actual interbank transactions. An additional important characteristic of the chosen method was that the calculated LIBOR average – unlike the benchmarks used hitherto – captured not only the prevailing interest conditions but also the expectations of the contributing banks regarding various maturities. This is particularly significant, as modern economics has long recognised that in economic activity and decision-making, expectations establish a link between the present and the uncertain future – a factor of considerable importance in finance (Farkas Beáta, 2016). The forward-looking nature of LIBOR has greatly contributed to its popularity and widespread use.

The third innovation – and perhaps the most crucial in terms of the widespread adoption of LIBOR – concerned the communication of its daily values. For this purpose, the BBA engaged the services of the British news agency Reuters. Following the calculation of the daily LIBOR value, Reuters transmitted it immediately to professional traders and financial analysts, as well as to all British and international media subscribing to its services, via its extensive global telecommunications network and widely used electronic trading platforms. In this manner, the daily LIBOR value became available in real time throughout the world, which decisively contributed to its widespread adoption. The methodology and process for calculating and publishing LIBOR were so refined that, in the ensuing years, changes were made solely due to the digitalisation of data collection, processing, and dissemination.

In the major international offshore money markets – including those in Tokyo, Hong Kong, and Singapore – the methodology developed by the BBA was adopted, with minor modifications, for setting the benchmark interest rate. Moreover, many national markets developed their own benchmarks calculated by similar means. As shown in *Figure 1*, there were 40 benchmarks in 2014, including BUBOR (**Bu**dapest Inter**b**ank **O**ffered **R**ate). Since August 1996, under the joint auspices of the Hungarian Forex Association (MFT) and the National Bank of Hungary, BUBOR had been published daily for one and threemonth maturities, with the sixmonth tenor added in 1997.

Figure 1
Global interbank rates in 2014

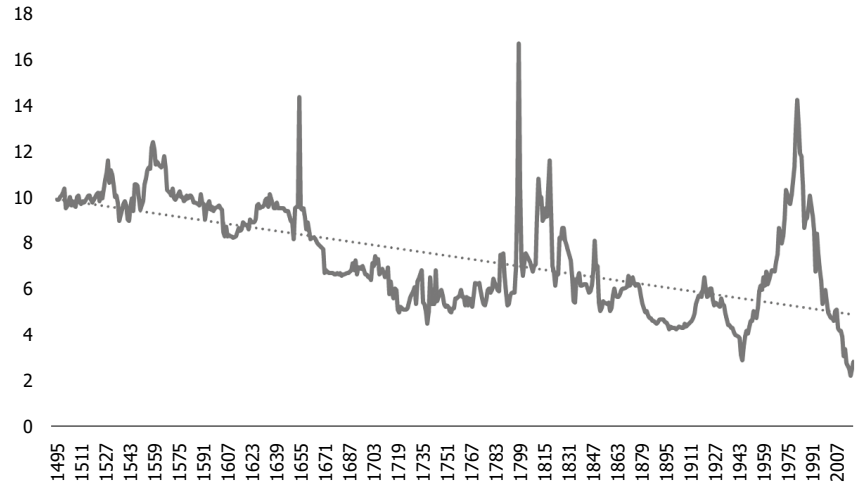
Source: Innovation Business Vision, 2020

The introduction of BBA LIBOR coincided with the British Prime Minister Margaret Thatcher's 1986 financialderegulation programme, commonly referred to as the "Big Bang". Overnight, this reform opened the door for retail banks to engage in investmentbanking activities: they were henceforth free to trade with one another and with their clients, to provide investment advice, and to offer assetmanagement services to their customers (Takács, 2010). Moreover, the programme removed barriers preventing foreign banks from acquiring and integrating UK-based financial institutions, a development that precipitated the establishment in London of numerous large American and international banks. The "lighttouch" supervisory approach, which afforded extensive scope for market participants' selfregulation or actively encouraged the development of selfregulatory mechanisms through state instruments (coregulation), rendered London an even more attractive market, thereby further contributing to the increasingly widespread adoption of LIBOR.

3 THE BROADENING USE OF LIBOR

By the 1990s, LIBOR had become the cornerstone of the financial system, from pricing mortgages, student loans and variable rate bonds to pricing the most diverse derivatives transactions worth hundreds of billions of dollars. The most significant of the derivatives linked to LIBOR was the interest rate swap, which allowed companies to mitigate the risk of interest rate fluctuations. Interest rate swaps were invented during the extreme volatility of global interest rates in the 1970s and early 1980s. *Figure 2* illustrates that, over the period from the fifteenth century to the present day, few episodes have witnessed as pronounced a deviation in nominal interest rates as those spanning the collapse of the Bretton Woods financial system, the surge in oil prices and ensuing inflation, and the later emergence of negative interestrate environments.

Figure 2
The Fluctuations of global weighted nominal interest rates (percent per annum)



Source: Paul Schmelzing (2020): Eight centuries of global real interest rates, R-G, and the »suprasecular« decline, 1311-2018, Bank of England, swp 845.

Table 2
LIBOR-based retail and corporate financial instruments

Some financial instruments priced based on LIBOR	
Retail	**Corporate**
Mortgage loans Home loans Car loans Student loans Credit card debt Bank loans	Money market funds Short-term bond funds Floating-rate bonds Municipal bonds Mortgage-backed securities Asset-backed securities Interest rate swaps Forward-rate agreements Forward foreign exchange transactions

Source: Bates Group LLC, 2012

The basic mechanism of an interest rate swap is straightforward: the contracting parties exchange fixed-rate cash flows for floating-rate ones, or vice versa – and may even swap floating-rate cash flows from different markets. In its most fundamental and prevalent form, one party pays a fixed interest rate in the hope that interest rates will rise, whereas the other pays a floating rate, trusting that rates will fall. At the time of execution, the swap's value is essentially zero, meaning that the net present values of the two streams of cash flows are nearly identical, which renders the transaction rational for both parties. Naturally, swap pricing may deviate from this ideal situation based on supply and demand factors. Moreover, because the interest rate – and thus the yield curve – can change over the term of the swap, its value will also fluctuate. Consequently, the value of a given swap at any moment can be expressed as the difference between the prices of two bonds, with the "floating" leg of the contract most often linked to the movements in LIBOR. Furthermore, since swap transactions do not require significant "initial" capital, they have offered a more cost-effective means of hedging against interest rate fluctuations than using government bonds denominated in different currencies.

During the 1980s, LIBOR supplanted discount treasury bills as the dominant short-term reference rate for the dollar. A further significant milestone in the proliferation of LIBOR occurred in January 1997, when the Chicago Mercantile Exchange (CME) replaced the previously used interest rate benchmark with LIBOR on its Eurodollar futures market, which had been operational since 1981. At the time of this change, the average daily trading volume was approximately 400,000 contracts – a figure that had increased sevenfold by March 2014.

What was the secret behind LIBOR's rapid adoption in the United States? Firstly, LIBOR more accurately reflected banks' funding costs than the other indicators employed as reference rates. Secondly, the range and volume of LIBOR-based lending and derivative products continued to expand. Thirdly, intermittent periods of uncertainty in financial markets drove investors *en-masse* towards quality assets – a phenomenon known as "flight-to-quality". During such periods, while yields on discount treasury bills generally remained unchanged or declined, the rates on LIBOR-based instruments tended to increase, thereby more closely mirroring market expectations.

4 THE RISKS OF LIBOR

The remarkable success and widespread proliferation of LIBOR ultimately paved the way for fraudulent practices that marked the beginning of its downfall. Market experts first began to recognise the potential threat of fraud with the move of CME to LIBOR. At the end of 1996, the legal counsel of an American investment bank alerted the United States derivatives regulator, the Commodity Futures Trading Commission (CFTC), that individual panel banks and their staff might be highly tempted to influence the LIBOR fixing process – close to the time of settlement of larger derivative transactions – in order to benefit their own trading positions. The other "Cassandra", a New York-based investment banker, warned the CFTC that some panel banks, seeking to conceal their financing difficulties during periods of stress, might be tempted to cosmetically adjust their daily rate submissions. However, neither warning dissuaded the CFTC from approving the use of LIBOR. At that time, the dominant view among regulatory experts was that LIBOR could not be manipulated, reasoning that since panel banks' submissions were subject to upper and lower quartile trimming, it would be virtually impossible to influence the reference rate without coordinated collusion. Furthermore, they believed that panel banks were also discouraged from manipulation by the fact that their individual disclosures were subsequently made public for transparency, and consequently the bank that submitted manipulated data would soon be exposed anyway.

As was later revealed in 2012, both suspicions were well-founded, and real-world events ultimately disproved the regulators' stance. Mathematical and statistical analyses following the exposure of the manipulations confirmed that influencing LIBOR was considerably easier than had been assumed. The findings demonstrated that, by deliberately under- or overpricing their submissions, even a single bank could affect the value of the benchmark – especially in panels comprising only a few banks. Moreover, through informal personal contacts, manipulation could span several banks, although such collusion could only be detected retrospectively by analysing the digital "footprint" over an extended period. In a portfolio of interest rate swap transactions amounting to one hundred billion dollars, even a onebasispoint shift can generate gains of several million dollars for a bank. Consequently, traders holding large derivatives positions needed only to nudge LIBOR by a few basis points to realise substantial profits; such minimal manipulation fell within the detection error margin and thus went unnoticed. Moreover, the potential for manipulation was amplified during the 2007–2008 financial crisis, as, amid market turbulence, the credit and funding risk of individual panel banks could shift significantly even over the course of a few days (Avdijev et al., 2012).

LIBOR was already referred to by many as a "convenient fiction" even before the fraud was discovered, because the tight relationship that existed in the early 1970s between the daily published LIBOR fixings and the actual interbank loans executed on the London market had, over time, significantly weakened. For example, the Euro Money Market Survey conducted by the European Central Bank (ECB, 2007) demonstrated that, by the early 2000s, nearly 70 percent of interbank transactions were overnight deals, and almost 95 percent were transactions with a maturity of one month or less. Consequently, the values of LIBOR rates with a longer maturity were most often determined on the basis of the expert estimates provided by the panel banks. Moreover, given that available statistics indicate that the majority of US Dollar LIBOR-referenced transactions – from interest rate derivatives to student loans and even home loans – were indexed to the three-month (or longer) LIBOR, pricing inevitably became more reliant on estimations rather than actual interbank lending transactions.

Nonetheless, for a long period the LIBOR values closely tracked those reference indicators that were linked to actual unsecured bank financing rates or with the issuance of treasury bills. The conspicuous exception was the period following the collapse of Lehman Brothers – a New York-based investment bank whose 2008 September bankruptcy triggered the global financial crisis. At that time, the three-month USD LIBOR rate diverged significantly from two other short-term reference interest rates, namely the ICAP NYFR and the three-month rate on eurodollar deposits. Although these discrepancies were noted and published by two daily newspapers at the time, it is surprising that neither the relevant British nor the corresponding American regulatory authorities reacted to these early signs. Later, in sanctioning LIBOR manipulation under competition and criminal law, regulatory authorities defended their inaction by arguing that LIBOR was a benchmark calculated and disseminated under a framework of industry self-regulation – its oversight not prescribed by any statutory mandate and hence without a legal basis for intervention.

It is probable, however, that regulatory authorities – amid the throes of the crisis – were actually disinclined to act against panel banks that quoted interest rates lower than the true market rate. After the crisis erupted, market participants lost confidence in virtually all credit ratings, and many came to regard the interbank rate as the most reliable proxy for bank-solvency and creditworthiness – on the premise that banks themselves possessed the greatest insight into each other's funding conditions. For instance, the British bank Barclays, severely weakened by the crisis, deliberately submitted low interbank rates to the British Bankers' Association – even though, at the height of the crisis, it could expect to receive no interbank funding. The earlier assumption that panel banks might be tempted to cosmetically adjust their interest rate disclosures in times of stress to hide their

funding difficulties has therefore been confirmed. In the financial profession this phenomenon is also known as "Goodhart's Law", which posits that when a metric is repurposed as a target for desirable outcomes rather than for its original intent, it loses its reliability as a measure.

Of course, Barclays Bank was not spared collapse by merely reporting a cosmetically adjusted low interest rate; however, during a period of market panic, such a practice might have somewhat alleviated its situation. Had the regulatory authorities demanded the immediate and stringent rectification of the false data, it is likely that this would have only intensified the already severe panic in the markets – and possibly caused considerably greater damage than that resulting from the manipulation of the interest rates.

5 WHAT SANCTIONS WERE IMPOSED FOR THE MANIPULATION OF LIBOR?

After the crisis subsided, in 2012 the United States Department of Justice and several European supervisory authorities initiated criminal proceedings against the banks involved in LIBOR manipulation. These proceedings were ultimately resolved through outofcourt settlements, under which the affected institutions committed to paying fines totalling over USD 9 billion. First, the American and British authorities imposed a fine of USD 435 million on the British bank Barclays; four years later, the bank agreed with forty-four American states to pay an additional USD 100 million for its role in manipulating the US Dollar LIBOR rate. In December 2012, the Swiss banking giant UBS was handed what was then the largest LIBOR-related fine – USD 1.5 billion – and in early 2013, the US and UK regulators imposed a penalty of USD 612 million on RBS. At the end of 2013, the European regulatory authorities closed their investigations against Barclays, Deutsche Bank, RBS, and Société Générale, levying fines totalling EUR 1.7 billion (i.e. in excess of USD 2 billion) against the latter three banks. Each of these institutions was found culpable of colluding to manipulate market interest rates between 2005 and 2008. In the same year, the Dutch Rabobank was sanctioned with a fine in excess of USD 1 billion. Among the American banks, JPMorgan Chase and Citigroup were also subjected to fines, albeit less severe ones. (However, in 2016 the American authorities, in connection with a separate investigation, imposed an additional fine of USD 425 million on Citigroup after establishing that its senior management was aware that its employee, Tom Hayes – who would later receive a substantial prison sentence – had been illegally manipulating the LIBOR rate.) In April 2015, the German Deutsche Bank admitted the culpability of its London branch and concluded the most severe settlement in the LIBOR matter,

paying USD 2.5 billion to the American and European authorities. This brought the total fines paid by Deutsche Bank in relation to the LIBOR case to USD 3.5 billion – an amount more than twice as high as those imposed on the other financial institutions (McBride, James, 2016).

However, by that time the authorities' stringent intervention no longer disrupted the markets. Nevertheless, the exposure and public disclosure of the manipulation profoundly undermined confidence in the LIBOR benchmark.

Following the exposure of the fraud, two conceptually distinct issues sparked intense professional debate. The first pertained to the possibility of manipulating the benchmark calculated based on LIBOR and other similar methodologies. Within this discussion, proposals were made concerning how the opportunity for manipulation might be narrowed – or even eliminated – by adopting an alternative definition of the rate, without altering the underlying method of collecting data from the panel banks. The second issue, which presented a separate substantive problem, concerned altering the nature of the underlying data. It was suggested that rather than relying on the rates submitted by panel banks, data should be gathered solely on the basis of actual transactions, thereby ensuring greater transparency and reliability in the determination of benchmark rates.

In the wake of the scandal, in July 2012 the United Kingdom's Chancellor of the Exchequer commissioned Martin Wheatley, then Chief Executive of the Financial Services Authority (FSA), to prepare a detailed report on the following matters within a short timeframe:

(a) the necessary reforms to the existing framework governing the calculation and administration of LIBOR;

(b) the appropriateness and extent of sanctions required to adequately address LIBOR manipulation; and

(c) whether the deficiencies in LIBOR's methodology had repercussions for other global benchmarks.

The final report was published in September 2012 (The Wheatley Review, 2012). The report concluded that LIBOR should be maintained as a benchmark rate, but it also stated – as had been anticipated – that comprehensive reform of LIBOR was essential.

The document outlined a ten-point reform programme. While the proposal was premised on the continued existence of LIBOR, it recommended that the management of LIBOR's calculation and the process of data reporting be made activities regulated by law. The report also proposed that, rather than being managed by the British Bankers' Association (BBA), LIBOR should henceforth be administered by a new entity selected through a competitive tender process, and it further recommended the establishment of an independent oversight committee.

Additionally, the report called for an immediate review of the LIBOR data submission process. It set forth criteria outlining the hierarchy of transactions that should be considered when submitting data for the determination of LIBOR. Looking to the longer term, it recommended that the oversight committee develop a code of conduct that would provide detailed guidance on the submission of data required for calculating LIBOR.

The report also proposed several key changes to be implemented within one year at the latest. These included ceasing the publication of LIBOR for certain currencies and tenors if there was insufficient actual trading data to support its calculation. Based on the available statistical data, the report suggested that, for certain currencies – including the Australian dollar, Danish krone, Canadian dollar, Swedish krona, and New Zealand dollar – and for certain tenors – specifically the 4-, 5-, 7-, 8-, 10-, and 11month LIBOR rates – publication should be discontinued. In order to enhance transparency and guard against manipulation, the report recommended that individual LIBOR submissions be published after a three-month delay. It likewise proposed broadening the panel of submitting banks.

The ten-point plan concluded with a recommendation that the United Kingdom's authorities work closely with European and international organisations in shaping the long-term future of LIBOR and other global benchmark rates, and how these benchmarks can be underpinned by the most effective, clear guidelines and principles.

Despite the identified shortcomings, LIBOR continued to remain an important element of the global financial system. However, the psychological impact of the attempted market manipulation and the falsification of LIBOR submissions was so profound that the future of LIBOR was a subject of debate even at the G20 summit in St Petersburg in September 2013. In order to restore the credibility of interest rate benchmarks, the G20 leaders endorsed the principles established by the International Organisation of Securities Commissions (IOSCO) for financial benchmarks. Based on these principles, in July 2014 the Financial Stability Board (FSB) released a report entitled "Reforming Major Interest Rate Benchmarks".

6 THE END OF THE LIBOR ERA

Following the publication of the Wheatley Report, the European Commission launched a public consultation on potential regulatory frameworks for the production and use of benchmark indices. On the basis of the consultation and the Wheatley report, and following the recommendations of the G20, the EU has adopted a regulation on benchmarks: in June 2016, Regulation (EU) 2016/1011 of the European Parliament and of the Council on indices used as benchmarks in

financial instruments and financial contracts or to measure the performance of investment funds was promulgated; it entered into force on 1 January 2018. Depending on their practical application, the Regulation established three tiers of supervisory and regulatory requirements for benchmarks: nonsignificant benchmarks; significant benchmarks (those serving as a reference for at least EUR 50 billion); critical benchmarks (those used as a reference for financial instruments, financial contracts or investment funds amounting to at least EUR 500 billion in aggregate, or which satisfy certain additional criteria). In this latter category fell LIBOR, unsurprisingly.

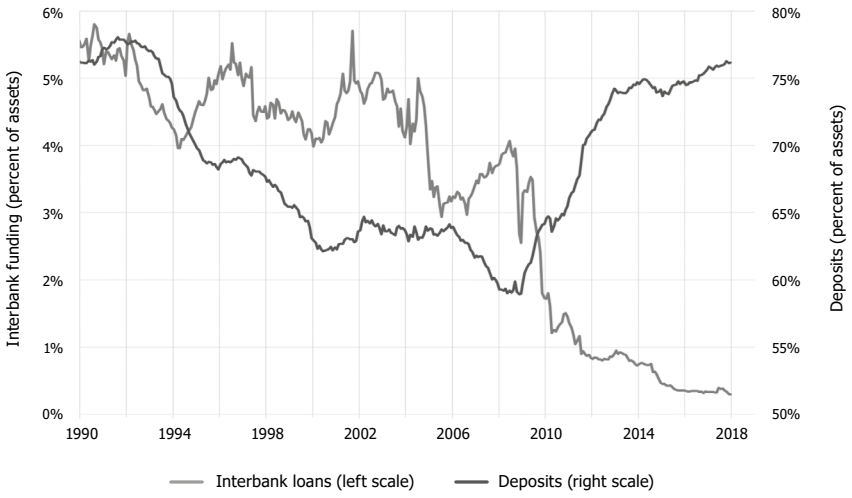
The Regulation stipulated that market participants within the Union might use benchmarks produced or administered outside the EU only if the relevant third country maintained a regulatory regime equivalent to that of the EU, or if the benchmark in question was endorsed by the European Securities and Markets Authority (ESMA), or if the benchmark was recognized by the Union. In practice, this requirement fragmented the universe of benchmarks, since no such geostrategic constraint had previously existed.

As previously noted, in the debates that have unfolded in the aftermath of the scandal, several supervisory bodies and experts proposed that LIBOR – and other similar benchmarks – should ultimately be replaced with an index determined solely on the basis of actual transactions rather than on banks' expert estimates of borrowing costs. However, immediate replacement proved unfeasible: by that time, LIBOR underlay tens of thousands of longer-term contracts whose aggregate notional value ran into the trillions of dollars and far exceeded global GDP. Unilaterally amending so vast a volume of contracts would likely have triggered a cascade of costly litigation. Instead, beginning in 2014, a series of reforms was launched under which responsibility for the fixing and publication of LIBOR was removed from the British Bankers' Association and transferred to the Intercontinental Exchange (ICE), the US derivatives-trading platform. Relying on actual usage statistics, ICE promptly reduced the number of tenors and currencies for which LIBOR was published, thereby diminishing the role of expert estimates in its determination. Nevertheless, in the second quarter of 2017, ICE reported that barely one-third of the submissions underpinning the three-month USD LIBOR – the tenor most widely used by the derivatives markets – were based on actual interbank transactions. Hence, LIBOR's tarnished reputation was not fully restored by these reforms – a circumstance attributable to factors beyond the scandal itself.

In the decades preceding the global financial crisis, most large North American and European commercial banks had relied heavily on "wholesale" funding – that is, by raising funds through interbank loans – to expand their asset base, thereby fostering a vibrant interbank market. By contrast, Japanese banks and those in most emerging market economies primarily financed their lending ac-

tivities from customer deposits, and thus the role of the interbank market was comparatively modest. Aside from these regional distinctions, however, the interbank lending market everywhere functioned as an over-the-counter market. At the time that LIBOR and other benchmarks were being established, the global financial system was still heavily bank-centric: alongside retail deposits, unsecured "wholesale" interbank operations represented banks' principal refinancing channel, whereas both bond markets and asset-management activities remained nascent – particularly in Europe.

Figure 3
Evolution of funding sources financed by interbank loans and deposits for commercial banks registered in the United States, 1990–2017 (percentage)



Source: Board of Governors of the Federal Reserve (FED), H.8.
Note: Since the beginning of 2018, the FED has ceased to separately report interbank lending

However, from the early 1970s onward, significant changes unfolded in banks' funding structures and liquiditymanagement practices. Over the subsequent three decades, a paradigmshifting revolution transformed the ecosystem of the money markets – a development illustrated in *Figure 3*. Whereas the terms "money market" and "interbank market" had long been used interchangeably, from the mid1980s the accelerated pace of financial deregulation gave rise to a marked proliferation in both the types and the number of moneymarket participants. Central banks, institutional investors, large corporations, and lightly regulated nonbank financial institutions – including hedge funds, offbalancesheet structures and "shadow banks" (Pozsár et al., 2013) – increasingly emerged as impor-

tant players. From that point onward, the term "money market" no longer exclusively denoted the "interbank market". Consequently, the use of LIBOR and other interbank rate benchmarks reached their zenith at a time when the traditional market for unsecured interbank loans – the cradle and arena for the formation of interbank interest rates – was beginning to lose its significance.

Following the collapse of the Bretton Woods system in 1971, the volatility of money markets increased, and the rising risks necessitated a tightening of banks' capital requirements. Moreover, banks themselves became more cautious in providing unsecured lending to one another, a development reflected in a notable shortening of the tenor of unsecured interbank loans. The Basel I Accord, introduced in 1988, which determined banks' capital requirements in proportion to the risks, initially assigned a risk weight of only 20 percent to interbank loans – i.e. close to the 0 percent risk weight applied to government securities – but it soon became evident that maintaining this preferential treatment was unsustainable. The increasing capital requirements, coupled with banks' growing caution, further "dried up" the interbank lending market (Brousseau, V.–Chailloux, A.–Durre, A., 2009). Over time, the traditional "wholesale" financing model – wherein banks that gathered retail savings deployed their longterm cash positions as unsecured interbank loans – was gradually supplanted by a model that prioritised collateralised financing. This shift increased the proportion of assets that borrowing banks earmarked as collateral, thereby effectively imposing an upper limit on traditional interbank lending. The process was accelerated by the global financial crisis that erupted in the summer of 2007, during which trust between banks virtually evaporated and perceived counterparty risk soared.

The contraction of unsecured interbank lending inevitably diminished banks' willingness to participate in the panels responsible for determining interbank lending rates. From the banks' perspective, participation in the LIBOR-fixing process – and similarly in Euribor, HIBOR, SIBOR, and other interbank rate fixing – became markedly more costly due to the tightened requirements, while also exposing them to substantial legal and reputational risks. Moreover, these risks were exacerbated by the growing reliance of rate submissions on expert estimates. At the same time, a decline in the number of banks participating in the panels would have reduced the representativeness of LIBOR and further increased the risk of manipulation. Consequently, UK regulators for a long time exercised informal pressure on banks to maintain their panel membership. Reluctance to participate is evidenced by the fact that the Euribor panel has shrunk by half from its peak of fortyfour institutions – though it began to grow again in the last two years – a pattern mirrored in Hong Kong's HIBOR and Singapore's SIBOR panels.

Crossborder interbank lending contracted even more sharply than local interbank markets. The contraction was particularly pronounced within the euro area,

where the exploitation of regulatory arbitrage – i.e. the region's comparatively low capital requirements for intraeuroarea interbank lending – enabled very large exposures that ultimately imperilled several German and French banks. These institutions had lent substantial loans to Greek, Spanish, and Irish counterparties, which in turn channelled the borrowed funds predominantly into mortgage lending that fuelled local realestate bubbles.

Last, but not least, the role of interbank lending was further diminished worldwide by the decline in the number of banks. This decline can be attributed to several factors acting concurrently. The trend in the European Union was driven by the following four principal reasons:

a) **Bank mergers and acquisitions (M&A):** since the 1960s, a significant number of mergers and acquisitions have taken place in the EU banking sector. Larger banks have absorbed smaller ones to boost their market share, expand their range of services, reduce operating costs, and improve efficiency. This trend was particularly pronounced in those countries where until recently a multitude of small savings banks and savings cooperatives operated. The resulting decline in the number of interbank market participants has inevitably reduced both the volume and liquidity of the interbank market.

b) **Economic and regulatory pressures:** in the aftermath of the 2008 financial crisis, EU regulators – most notably the European Central Bank (ECB) and the European Banking Authority (EBA) – implemented more stringent capitaladequacy standards and heightened liquidity requirements (e.g. under the Capital Requirements Directive IV). Faced with the challenge of meeting these elevated thresholds, many smaller banks opted for absorption into larger institutions. This pressure was compounded by the financial burdens associated with compliance with antimoneylaundering rules and enhanced consumerprotection mandates.

c) **Technological innovation:** the proliferation of digital banking services and fintech has transformed the European banking landscape. Many traditional banks have faced intensified competition from digital-only banks and fintech firms that can operate with lower overheads and bypass the costs of socially expected traditional payment services (e.g. operating ATM networks). Consequently, traditional banks have frequently closed branches or merged with larger entities. The automation of banking activities has had a similar effect, reducing the need for large numbers of staff and physical branches that also perform teller activities.

d) **Low-interest-rate environment:** the EU's extended period of low – or even negative – nominal interest rates, particularly following the 2008 crisis, has made it difficult for banks to maintain the profitability they need to stay

afloat. Small banks with a narrow service profile were particularly vulnerable, leading to a decline in their numbers (Pénzes et al., 2014).

As a result of these converging factors, the significance of interbank lending – and hence of the interbank lending rates – diminished markedly compared with LIBOR's early era, and it could no longer be regarded as a faithful barometer of moneymarket conditions. Consequently, most panel banks wished to discontinue their regular data submissions, particularly for those currencies and tenors for which market demand was low and, in the absence of actual transactions, submissions had to rely largely on expert estimates. Such estimates, however, carried reputational risk in the wake of the LIBOR scandal. By the summer of 2017, the situation had become so acute that Andrew Bailey, then Chief Executive of the Financial Conduct Authority (and now Governor of the Bank of England), felt compelled in a major speech to raise the possibility of LIBOR's permanent cessation by the end of 2021 (Bailey, 2017). He pointed out that under prevailing conditions LIBOR has no future, given that the weakening interbank money market transactions have made data reporting burdensome and inconvenient for panel banks. On the other hand, the sudden and spontaneous disappearance of LIBOR due to the exit of panel banks would create an unacceptable situation. Therefore, the FCA has asked panel banks to continue to submit rates until the end of 2021, in return for a commitment from the FCA, together with global regulators, to do everything possible to encourage market participants to switch from LIBOR to alternative benchmarks.

Although the announcement of the abolition of LIBOR did not directly affect the use of other reference rates – EURIBOR and other national interbank reference rates (BUBOR, TIBOR, etc.) – Chief Executive Bailey's speech, owing to LIBOR's dominant role, created a new global situation. The focus of the benchmark reform has then shifted toward establishing a new framework for benchmark interest rate indicators and preparing for a seamless transition for the postLIBOR period, which can be regarded as the second phase of the reform.

The most urgent task under the new circumstances was to determine alternative benchmarks to replace LIBOR. Without exception, these were based on real overnight transactions, thereby omitting any forwardlooking component – that is, they did not reflect the expectations of money market participants. In addition, the production of global reference rates was also discontinued, meaning that for each currency, the national indicator for that currency replaced the LIBOR indicator for that currency. Subsequently, the wording of the existing contracts referring to LIBOR had to be amended to ensure smooth transactions after the end of LIBOR. The transition was a herculean task for both market participants and supervisory authorities, not only because of the technical conditions for the

transition and their implementation, but also because of the need to inform customers in detail about the changes.

The transition process extended beyond the originally targeted deadline of 2021. However, since the LIBOR panels ceased at the end of 2021, the FCA obligated the ICE Benchmark Administration (IBA) to publish six "synthetic" LIBOR interest rates daily starting 4 January 2022, for use in contracts that, for some reason, could not be terminated. The use of synthetic LIBOR served as a work-around solution, granting financial service providers additional time to convert contracts still tied to LIBOR into alternative, riskfree reference rates or to terminate them by mutual agreement. The daily value of the synthetic USD LIBOR was calculated by increasing the daily value of the reference rate known as the Secured Overnight Financing Rate (SOFR) by the credit spread adjustment (CSA) determined by the Alternative Reference Rates Committee (ARRC) – namely, by 11 basis points for a 1month term, 26 basis points for a 3month term, and 43 basis points for a 6month term.

The publication of synthetic LIBOR for the US dollar and the British pound ceased in the summer of 2023, with the last rates appearing on 30 June 2023, at 12 noon British time. For the three maturities of the US dollar, however, synthetic LIBOR continued to be calculated until 30 September 2024, although it was no longer published widely.[9]

Table 3
The last published synthetic LIBOR rate

1-month USD LIBOR	4.96%
3-month USD LIBOR	4.85%
6-month USD LIBOR	4.68213%

Source: Bank of England, 2024

9 https://www.global-rates.com/en/interest-rates/libor/

Table 4
Short-term reference interest rates in the LIBOR transition

Currency	Before transition	After transition		
		Repo	Unsecured interbank	
			overnight (1-day)	term (forward)
CHF	LIBOR	**SARON,** 2017		
EUR	~~EONIA~~, EURIBOR		**€STR,** 2019	EURIBOR
GBP	~~LIBOR~~, SONIA		SONIA	
JPY	~~LIBOR~~, TIBOR		TONAR	TIBOR
USD	Fed funds, ~~LIBOR~~	**SOFR,** 2017	Fed funds	Ameribor, 2015; BSBY, 2021; AXI, 2022

Note: The risk-free rates preferred by regulators are indicated in bold.
Abbreviations: Ameribor = American Interbank Offered Rate; AXI = AcrosstheCurve Credit Spread Index; BSBY = Bloomberg ShortTerm Yield Index; CHF = Swiss franc; EONIA = Euro Overnight Index Average; EUR = euro; Euribor = Euro Interbank Offered Rate; €STR = Euro ShortTerm Rate (also known as ESTR or ESTER); GBP = pound sterling; JPY = Japanese yen; LIBOR = London Interbank Offered Rate; SARON = Swiss Average Rate Overnight; SOFR = Secured Overnight Financing Rate; SONIA = Sterling Overnight Index Average; TIBOR = Tokyo Interbank Offered Rate; TONAR = Tokyo Overnight Average Rate (also known as TONA); USD = United States dollar.

Implementing the move from LIBOR in the financial markets has been one of the most comprehensive tasks of the decade. The cessation of LIBOR and the seamless and efficient transition to the riskfree benchmark rates that replaced it were the outcome of a joint effort by market participants and supervisory authorities – a less conspicuous yet all the more significant collaborative achievement (Bank of England, 2024).

Unlike LIBOR, EURIBOR – managed by the European Money Markets Institute (EMMI) – has endured. Its calculation methodology, however, was further refined in the wake of the LIBOR scandal and now fully complies with the European Union's Benchmark Regulation. In the European Union, the critical benchmark is determined not based on rates reflecting expectations but on the prices of real interbank market transactions, using a unified methodology with averaging and weighting for maturities of 1 week, 1, 3, 6, and 12 months. (Until 1 November 2013 – similar to LIBOR – fifteen maturities of the Euribor rate were published.) On 4 January 2022, EMMI discontinued the publication of Eonia (Euro OverNight Index Average), that is, the overnight interbank deposit rate. Its role was assumed by the shortterm euro rate, €STR (ESTER), which has been published by the European Central Bank since 2019. The €STR reflects the wholesale unse-

cured overnight borrowing costs of banks operating in the euro area, based on transactions conducted and settled in the TARGET2 payment system – which processes realtime funds transfers among EU banks – and thus provides an unbiased representation of market rates.

7 CONCLUSIONS

LIBOR was the product of a series of innovations: the emergence of the eurodollar market and the growth of syndicated lending generated the need for a representative benchmark. The London interbank interest rate – that had for long been calculated on a case-by-case basis – was refined by the British Bankers' Association into the form of LIBOR known and applied by the financial industry. The calculation and communication model devised by the BBA was, in effect, copied in almost all countries. The popularity of LIBOR (and other interbank reference rates) was greatly enhanced by the fact that – unlike the previously used benchmarks, which were predominantly government bond trading indices – its daily value was unaffected either by the budgetary considerations and issuance schedules of sovereign issuers or by the monetarypolicy interventions of central banks. Although, given its methodological design, the determination of LIBOR did not repose on concrete transactions, the substantial market shares of the panel banks ensured that it reliably reflected the prevailing supplyanddemand conditions in the interbank market for each currency. Its appeal was further increased by its "forwardlooking" nature: whereas earlier benchmarks were calculated "retrospectively" on the basis of past transactions, LIBOR panel banks' submissions incorporated not only the immediate supplyanddemand situation but also market participants' expectations of future conditions, across fifteen maturities published each day. Owing to the ease of access and the forwardlooking character of BBALIBOR, it soon came to underpin not only the pricing of syndicated loans but also a vast array of other forward derivatives. A cumulative process ensued: the more widely and diversely it was used, the more it began to be applied even in the pricing of instruments for which alternative benchmarks might have been more appropriate – for example, the markets for longterm mortgages and student loans, whose funding is by no means sourced from the interbank market.

While the use of LIBOR continued to expand, particularly in the market of derivatives products, its birthplace and principal arena of operation – the unsecured interbank lending market – underwent fundamental changes due to a number of factors. The volume and average tenor of "classic" unsecured interbank loans both began to decline, so that the pricing of the altered funding structures of

banks became less and less dependent on the supply-and-demand conditions in the interbank market.

Moreover, the explosive growth in LIBOR's role in derivatives pricing exposed it to the bonus-driven incentives of investment banks, paving the way for one type of manipulation. The other type of manipulation emerged after the financial crisis, when LIBOR began serving as a benchmark for bank ratings – a shift that activated the dynamics of Goodhart's Law.

In retrospect, Richard Robb – Professor at Columbia University and Chief Executive of Christofferson, Robb & Company – was correct when he observed that "It was constructed in a shabby way that was fine for its original purpose, but when it became so dominant, it should have been strengthened and put on firmer foundations" (Reuters, 2012). In other words, there should have been continuous analysis of the potential consequences and risks arising from uses of LIBOR beyond its original purpose, as well as of the evolution and changing role of the interbank market that underpinned it; and, on that basis, reforms should have been initiated that might have precluded the subsequent problems.

It would, of course, be irresponsible to claim that, had such analyses been undertaken thoroughly and in good time, LIBOR could have endured indefinitely. Financial products, too, have their own lifecycles, and sooner or later new alternatives may supplant them. At one time, for instance, the advent of cheques – and later travellers' cheques – represented a major advance in payment systems, yet today few young people have any familiarity with them. Likewise, the introduction of the magneticstripe debit card was revolutionary; now contactless and cardfree payments are becoming the norm. On the other hand, the demise of LIBOR does not herald the disappearance of syndicated lending, which played a key role in its inception. Indeed, the latest forecasts anticipate that the syndicated loan market will grow rapidly in the coming years, reaching USD 1.93 trillion by 2028 at a compound annual growth rate of 12.7 percent (Syndicated, 2024).

Although LIBOR has been phased out, reference rates based on interbank lending have not vanished. Worldwide reforms have succeeded in developing new methodologies for setting benchmarks that address the flaws of LIBOR. Thus, in the European Union, the total outstanding stock of financial instruments and contracts referencing the reformed EURIBOR are estimated, on reliable sources, to exceed EUR 100 trillion – albeit barely one quarter of the LIBORbased instruments at its peak.

The cessation of LIBOR has, however, removed a globally recognised, multicurrency reference rate, to be replaced by reference rates tied to individual major currencies. Although their calculation methodologies and operation are broadly

similar, navigating between them and transacting with each requires greater knowledge and deliberation.

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