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What's in a Number?

Donald MacKenzie on the Importance of Libor

Judged by the amount of money directly dependent on it, the British Bankers' Association's London Interbank Offered Rate matters more than any other set of numbers in the world. Libor anchors contracts amounting to some $300 trillion, the equivalent of $45,000 for every human being on the planet. It's a critical part of the infrastructure of financial markets but, like plumbing, doesn't usually get noticed. Only a handful of economists, and no other academics, have ever looked in any detail at Libor, and even the financial press didn't show much interest in how Libor is calculated until this spring, when there was sharp controversy over whether these crucial numbers could be trusted.

The calculation of Libor is co-ordinated by just two people, who work in an unremarkable open-plan office in London's Docklands. I watched the process, which seemed utterly routine, a couple of years ago. Just after 11 a.m. on every weekday that's not a bank holiday, traders at leading banks send in their estimates of the interest rates at which their banks could borrow money. They do this electronically, but sometimes the co-ordinators make a phone call to a bank that hasn't sent in its estimates, and if the latter seem implausible – typos, for example, are fairly common – they're checked, also with a quick call: 'Hi there, is the Kiwi chap [provider of the estimates for borrowing New Zealand dollars] about? . . . Bit of a spread on the two month. Everyone else is coming in a good bit under that.'

A simple computer program discards the lowest quarter and highest quarter of the estimates, and calculates the average of the remainder. The result is that day's Libor. The calculation is repeated for each of ten currencies and 15 loan durations (from overnight to 12 months), so 150 Libors are published daily: overnight sterling Libor, one-week euro Libor, one-month yen Libor, three-month US dollar Libor and so on.

It's the back-up arrangements that tell you something about how much the calculation matters. The co-ordinators have dedicated phone lines laid into their

homes so they can still work if a terrorist attack or other incident stops them reaching the office. A similarly equipped building, near the office, is kept in constant readiness, and there's a permanently staffed back-up site in a small town around 150 miles from London (I won't be any more precise than that). Its employees periodically work in the London office, so that they're ready to take over if need be.

The precautions are necessary because if Libor suddenly became unavailable, large parts of the global financial system would be paralysed. The 150 numbers constitute the dominant global benchmark for interest rates. The rates on borrowing, amounting to around $10 trillion (corporate loans, adjustable-rate mortgages, private student loans and so on), are pegged to Libor. For instance, the level of Libor determines the monthly payments on around half of the adjustable-rate mortgages in the US: rates are set as Libor plus a fixed margin, and are reset periodically as Libor changes. Even in the UK, where explicit pegging of this kind is rarer, Libor is a big influence on mortgage rates.

Libor is an even more important factor in the huge market for interest-rate swaps. These are contracts in which one bank or other organisation pays a fixed rate of interest on a given amount of money to another bank, which pays a floating (that is, variable) rate – such as three-month US dollar Libor – on the same amount. The total amounts involved, added up across the globe, exceed $300 trillion. Measured that way, the swaps market is the biggest financial market of them all, and most of it depends on Libor.

Invented only at the start of the 1980s, swaps enable lenders and borrowers to eliminate the risk of interest-rate changes. Take fixed-rate mortgages, for example. Without swaps, a bank might be reluctant to offer them, because it generally pays its depositors floating rates, and also borrows from other banks at floating rates. If interest rates go up, the bank will therefore have to pay out more, while its revenue from its fixed-rate mortgages stays the same. (As rates rose sharply in the 1980s, almost all the savings and loan associations in the US – the equivalent of the UK's building societies – were caught out in this way. The resulting crisis, a precursor of today's credit crunch, pushed more than 700 savings and loans into insolvency, and the rescue operation ended up costing US taxpayers around $130 billion.) Entering into a swap in which the bank pays a fixed rate and receives a floating rate enables it to cancel out the effect of changing interest rates, and conditions in the swaps market are thus a major influence on the terms on which fixed-rate mortgages are

available. The very possibility of a large-scale swaps market depends on the availability of a measure of interest rates that is unequivocal and credible enough to form the basis for contracts denominated in billions of dollars. Libor has provided that measure.

In a financial world dominated since 1945 by the US, it's striking that the global benchmark is a set of London rates. Paradoxically, the reason for this is Britain's failure – crystallised in the 1957 sterling crisis – to re-establish the pound as a major international currency after the war. That prompted the leading British banks increasingly to lend, borrow and accept deposits in US dollars ('eurodollars', as they came to be called). The Bank of England overcame its initial anxieties and came tacitly to support the eurodollar market, and the Johnson administration inadvertently encouraged it by trying to stem the flow of dollars overseas. Eurodollar operations conducted in London allowed US banks to circumvent the new controls.

The result was that London became – and in many ways remains – the centre of the international money markets. 'Money' here does not mean cash, but short-term loans between banks and other major institutions; more than a fifth of international lending of this kind still takes place in London. Crucial to facilitating this market – and to enabling Libor to be calculated – were, and are, London's money brokers. They emerged in the 1960s as a challenge to the traditionally staid, gentlemanly, top-hatted sterling money markets, in which lending took place via designated 'discount houses' backed by the Bank of England. Money brokers put lenders and borrowers directly in touch with each other, charging a fee for doing so. The business is fast-moving, and competition fierce and sometimes not at all gentlemanly. If you listen to brokers' voices, you hear the tones of the East End and Essex more often than those of Eton or Harrow. Open-necked shirts are more common than suits and ties. While banks' dealing rooms are now often disappointingly quiet and orderly places – in reality there's far less shouting and swearing than in film portrayals – brokers' offices are more tightly packed (there's less space between desks) and more raucous.

Suppose a bank wants to borrow or lend in the interbank market. (It might want to lend because no bank likes to leave cash idle, even for the shortest period. Indeed, overnight lending is the busiest sector of the interbank market, with banks that have excess cash at the end of the working day lending to those that need it.) A bank's money-market traders could directly contact their counterparts in other

banks, but it's usually quicker and easier to work through the brokers. This can now be done on-screen, but – especially if large sums are involved or market conditions are tricky and changing rapidly – it's often better to use the 'voicebox'. This is a combination of microphone, speaker and switches that instantly connects each broker by a dedicated phone line to each of his clients in banks' dealing rooms.

If a bank wants to borrow money, a broker needs quickly to find someone who is prepared to lend at an attractive rate; if a bank wants to lend, he – it's a predominantly male profession – needs to find a borrower ready to pay a good rate. So at any given time a broker needs to know who wants to borrow, who is prepared to lend, and on what terms. As one of them said to me, a broker might 'speak to his big clients . . . maybe 25 times a day, which is 25 times as often as they speak to their wives'.

A broker needs to pass information to his clients as well as to receive it: that's a major part of what they want from him, and a good reason to use the voicebox rather than the screen. The brokers' code of conduct prohibits passing on private knowledge of what a named bank is trying to do (unless a client is about to borrow from it or lend to it), but that restriction leaves plenty of room for brokers to tell traders what has just happened and to convey the 'feel' of the market. There's a grey area in which euphemisms can be used: in context, a trader might know exactly which bank is meant when the broker tells him that 'the usual German' has just done something.

Brokers in major money-market currencies don't work as individuals, but in teams of up to a dozen or more, sitting close together in subsections of large, open-plan offices. Good eyesight is useful – trainees still sometimes called 'board boys' write unfilled bids to borrow and offers to lend on whiteboards surrounding clusters of brokers' desks, and you can occasionally see a broker using binoculars to read a distant whiteboard or screen – but a more crucial skill is 'broker's ear': the capacity to monitor what is being said by all the other brokers at nearby desks, despite the noise and while at the same time holding a voicebox conversation with a client. As one broker put it to me: 'When you're on the desk you're expected to hear everyone else's conversations as well, because they're all relevant to you, and if you're on the phone speaking to someone about what's going on in the market there could be a hot piece of information coming in with one of your colleagues that you would want to tell your clients, so you've got to be able to hear it coming in as you're speaking to the person.'

When you first encounter it, broker's ear is disconcerting. You'll be sitting beside a broker at his desk, thinking he's fully engaged in his conversation with you, when suddenly he'll respond to a question or comment, from several desks away, that you simply hadn't registered. It's an embodied skill that affects the way Libor is calculated. The inputs to the calculation are provided daily by the money-market traders from banks that are on panels established by the British Bankers' Association. There is one panel for each currency, and those for the main currencies each have 16 banks on them. What each bank has to provide is the rate at which it could borrow funds ('unsecured' – that is, backed only by the bank's creditworthiness, not more specific collateral – and 'governed by the laws of England and Wales'), 'were it to do so by asking for and then accepting interbank offers in reasonable market size just prior to 11.00' in the currency and for the time period in question.

Note the conditional: a Libor input is what a bank could do, not what it has done. So judgment is involved. A bank might not have borrowed anything in the minutes before 11 a.m. Deals for longer than overnight are intermittent, and there is little borrowing at some of the time periods involved, such as 11 months. 'Reasonable market size' is deliberately not defined exactly: it will vary from currency to currency and according to time period and market conditions. The need for judgment is why the information provided by brokers is important to the calculation of Libor. It helps a bank's traders to estimate the rate at which they could borrow money, even if they're not trying to do so. They get some of the information they need from the screens provided by their various brokers: all serious traders employ several. The screens indicate the lowest rate at which banks are currently offering to lend and the highest rate at which they are prepared to borrow. Only the naive, however, would give the former rate as their Libor input. The screens don't reveal the amount actually available for borrowing at the lowest quoted rate, and it may fall short of 'reasonable market size'. It could range from a mere $50 million or so to a yard or more ('yard' – originally an abbreviation of 'milliard' – is the money-market term for billion, a word that in a noisy environment is all too easy to confuse with 'million').

The screens can't be expected to tell you with any precision how much you would have to pay to borrow a few hundred million dollars (reasonable market size for short-term borrowing in a major currency), and are even less reliable when it comes to borrowing several yards. It can take an experienced trader talking to a

number of brokers with good ears to form a realistic estimate. There's also an element of judgment in the rates that brokers put on the screens: they can, for example, consider it as misleading their clients to quote a bid to borrow at an unusually high rate, if it comes from a bank with poor credit standing to which many of their clients would be reluctant to lend.

Originally, Libor was an informal notion, and when different sets of banks were polled the resultant Libors could differ by as much as 25 basis points (a basis point is a hundredth of a percentage point). The current British Bankers' Association system for calculating Libor, involving a fixed procedure and predetermined panels of banks that change only infrequently, was set up in 1985, and has worked remarkably well, which is why the participants in financial markets are prepared to have $300 trillion indexed to Libor.

The obvious risk to the integrity of the calculation is that a bank on a Libor panel might make a manipulative input, trying to move Libor up or down so as to influence interest rates or the value of its swaps portfolio. That risk is the main reason for the exclusion from the calculation of the highest quarter and lowest quarter of inputs. Furthermore, once a day's Libor rates are set, each input – and the name of the bank that has made it – is also disseminated electronically, and so attempts at manipulation would have to take place in what is in effect the public gaze. The inputs to Libor can be viewed around 45 minutes after they are made on more than 300,000 computer terminals worldwide, and they are thoroughly scrutinised. On one occasion, well before the recent problems, a banker showed me the day's inputs into three-month sterling Libor, pointing with suspicion to a bank that had reduced its input – by a single basis point – from the previous day's, while all the others had either increased theirs or left them unchanged. The brokers see and hear a lot. An input wildly at odds with what their screens show would be obvious, and word of persistent attempts at manipulation would quickly spread as brokers chat with their clients. The ultimate sanction – used in the past, I was told, but not recently – is a bank's removal from a Libor panel. In the current climate, that would deeply damage the bank's reputation.

The strength of these long-standing fortifications around Libor's status has been questioned over the course of the last twelve months. Ever since the rescue of Northern Rock, whether or not banks are sound, whether they are prepared to lend to each other, and sometimes even the levels of Libor have been topics for TV news, not just the *Financial Times*. Much of the most vocal criticism of Libor has come

from the US, and has focused on dollar Libor – especially three-month dollar Libor, the rate used more than any other in the swaps market. Some seem unhappy that the benchmark dollar interest rates are set in London just after 6 a.m. New York time, when traders are only starting to arrive at their desks, and that the US dollar Libor panel contains only three recognisably 'American' banks. The British Bankers' Association – membership of which is open to any bank operating in the UK, wherever it is domiciled – counters by pointing out that all the banks on the panel are global institutions, some with a major presence on the ground in the US, and that collectively they are responsible for most London interbank dollar lending and borrowing.

The most prominent critic has been the *Wall Street Journal*. It has suggested that the public dissemination of banks' inputs – which is intended to make the process more transparent – has the effect of biasing inputs downwards, because banks fear that reporting publicly that they can borrow only at high rates would spark rumours about their creditworthiness. On 16 April, under the headline 'Finance markets on edge as trust in Libor wanes,' the *WSJ* reported a claim by Scott Peng, an analyst at Citigroup, that although, because of the credit crunch, Libor was already high relative to the rates set by central banks, it should be even higher. Three-month US dollar Libor, Peng suggested, should actually be 30 basis points higher than it was – a difference that represents huge amounts of money, given the trillions of dollars indexed to it.

The British Bankers' Association responded by telling the *WSJ* that it was monitoring inputs closely and that if it was 'deemed necessary', it would 'take action to preserve the reputation and standing in the market of our rates' – a warning that the *WSJ* read as a threat to remove any bank making dubious inputs. Over the next two days, three-month dollar Libor rose by 16 basis points, but in a context in which rates have been highly volatile it's impossible to be certain that this was because of the *WSJ*'s reporting, the British Bankers' Association's statement, or different factors altogether. Central bankers began watching the controversy over Libor closely, the *FT* reported, 'because some officials fear that the debate could be contributing to a broader sense of investor unease in the money markets'.

Given the criticism of Libor, why not abandon its conditional aspect (the submission of rates at which banks *could* borrow), and shift, as some critics have suggested, to an index based on actual transactions? At least two such indices

already exist. Eonia (Euro Overnight Index Average), calculated by the European Central Bank, is a weighted average of the rates of overnight interbank loans denominated in euros. Sonia, its sterling equivalent, is a similar average of overnight loans transacted via London's main money brokers.

Eonia and Sonia have their attractions. In June, LIFFE, the London International Financial Futures Exchange, whose interest-rate contracts have traditionally been based on Libor, launched additional contracts based on Eonia, and it would like to do so using Sonia, although it hasn't yet got permission from the index's owners (the leading brokers). But the names of the two indices indicate their limitations. They are averages of overnight lending, and the market for longer-duration interbank loans is probably too patchy to sustain credible indices based directly on the transactions that have actually taken place. Right now, much more than a week can seem far too long a time for a bank to lend its carefully husbanded cash to one of its peers. It's also the case, brokers and traders told me, that until the Bank of England applied sustained pressure – and eventually, in May 2006, instigated reforms – the sterling overnight market could be unruly, with surprisingly volatile rates strongly influenced by position-taking on the part of individual big banks.

It's also an illusion to think that indices based on transactions can't ever be manipulated. 'Closing prices' – the average of the day's final deals on an exchange – are widely used as indices, but there's then sometimes an incentive to 'bang the close', in other words to trade aggressively in the final minutes or seconds so as to influence the closing price. In July, the US Commodity Futures Trading Commission charged three oil traders with allegedly doing just that.

A potential alternative to Libor as a benchmark, at least as far as the US dollar is concerned, is the New York Funding Rate, launched by the brokers Wrightson ICAP in June. Its poll of banks is conducted in the US at 9.15 a.m. New York time; inputs are anonymous; and each bank is asked to report the rates at which a typical bank with a high credit rating could borrow, not those at which it itself could. Despite these differences, however, the resulting numbers have tended not to differ much from US dollar Libor. What could have been a rival has in practice provided a confirmatory second opinion that has helped restore confidence in Libor. The membership of the panels of banks that make Libor inputs may now be broadened, and a new British Bankers' Association subcommittee will draw on independent third-party analysis of inputs and have the power to demand that banks justify any that seem anomalous. So the controversy seems to be passing. Nevertheless, its

sharpness, and how unsettling some market participants seem to have found it, indicate just how important Libor is to the world's financial system.

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