



LIBOR Manipulation: A Brief Overview of the Debate

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1 Introduction

There have been numerous articles in the press recently discussing the investigations that are being mounted by the SEC and DOJ in America, and the FSA in the U.K. In order to understand the allegations, one needs to know how the “LIBOR fixing” works, and the banks’ role in it. Also, it is important to understand the nature of the studies and evidence that have led to the allegations of manipulation.

LIBOR is a key, central part of the global financial market system. Over \$10 trillion in corporate loans, floating rate notes, adjustable rate residential mortgages etc., are pegged to LIBOR. Additionally, LIBOR is the key rate in the \$350 trillion market for interest rate swaps. Finally, many other derivatives depend upon LIBOR in some manner or other.

Therefore, if LIBOR rates are being distorted or manipulated in any way, the ramifications extend to nearly every corner of the global money markets and to participants in many sectors of the global economy other than banks and financial institutions.

There has been no evidence, to date, of manipulation of LIBOR arising from such activities as illegal contacts between banks or breaches of Chinese walls, etc. Rather, the allegations have been based on empirical analysis (sometimes of a very *ad hoc* nature) either of the bids from which published LIBOR rates have been calculated or of a comparison of LIBOR with similar interest rate benchmarks.

There have been numerous such studies that have been undertaken in the last three years. Several of them are summarised below. While some claim to have found evidence of manipulation by one or more banks, their evidence is not conclusive and in some areas is in fact highly questionable.

2 The LIBOR Fixing Process

LIBOR stands for London InterBank Offered Rate. It is produced for ten currencies with 15 maturities quoted for each, ranging from overnight to 12 Months producing 150 rates each business day. LIBOR is a benchmark; giving an indication of the average rate a leading bank,

for a given currency, can obtain unsecured funding for a given period in a given currency. It therefore represents the lowest real-world cost of unsecured funding in the London market.

Individual LIBOR rates are the end product of a calculation based upon submissions from a panel, made up of the largest, most active banks in each currency. According to the British Bankers Association (BBA):¹

*“Every contributor bank is asked to base their bbalibor submissions on the following question; ‘At what rate **could** you borrow funds, were you to do so by asking for and then accepting inter-bank offers in a **reasonable market size** just prior to 11 am?’ Therefore, submissions are based upon the lowest perceived rate that a bank on a certain currency panel could go into the inter-bank money market and obtain sizable funding, for a given maturity.”*

Two comments are in order here, related to the terms in bold type. First, a bank’s bid reflects what it *could* do, not what it has actually done. Thus, it does not reflect actual transactions. Second, the term *reasonable market size* is not defined, and in fact will tend to vary from currency to currency and according to prevailing market conditions. For major currencies this is typically a few hundred million dollars.

The LIBOR panel consists of a group of banks who every day are asked to submit their rates for each of 15 maturities (overnight to 12 months) confidentially to Reuters, who performs the calculation and publishes the rates. In 2007 the US dollar LIBOR panel contained 16 members, since 2009 it has contained 20. The composition of the USD LIBOR panel in 2007 is shown in Table 1, below. The banks who known to be the subject of the investigation are highlighted in bold.

¹ “bbalibor: The Basics”. <http://www.bbalibor.com/bbalibor-explained/the-basics>. Emphasis added.

Table 1: LIBOR USD Panel in 2007

Bank of America	JP Morgan
Bank of Tokyo-Mitsubishi	Lloyds TSB
Barclays	Norinchukin
Citibank	Rabobank
Credit Suisse	Royal Bank of Canada
Deutsche Bank	RBS
HBOS	UBS
HSBC	West LB

Source: *British Bankers' Association* (www.bbalibor.com)

Reuters, "Five banks probed over benchmark rate-source", 17 March 2011

For each maturity, the BBA ranks the 16 rates from highest to lowest and then drops the highest 4 and the lowest 4. The remaining 8 rates are averaged, and this average is reported as the LIBOR rate for that maturity on that day. The rate calculated using this method is sometimes called the "trimmed mean".

The original intent and use of the LIBOR rate setting process was to determine banks' cost of funds. With the explosive growth of the swaps and derivatives markets, however, it also came to be used as the benchmark rate for pricing floating rate instruments and associated derivatives. The fact that the banks who help set the rate also have positions (either long or short) tied to LIBOR means that they have an incentive to misquote. For example, market participants with large positions in derivative contracts referencing a rate fixing might seek to move the fixing higher or lower by contributing biased quotes.

The scope for such strategic behaviour to influence the fixing can to some extent be limited by trimming, in which biased or extreme quotes are disregarded. However, even trimmed means can be manipulated if contributor banks collude or if a sufficient number change their behaviour.

3 Evidence For and Against Manipulation

On May 29, 2008, the Wall Street Journal (the Journal) printed an article alleging that several global banks were reporting unjustifiably low borrowing costs for the calculation of the daily

Libor benchmark.² Specifically, the writers alleged that the banks were reporting costs that were significantly lower than the rates that were justified by bank-specific cost trend movements in the CDS market. Although the Journal acknowledged that its “analysis doesn’t prove that banks are lying or manipulating Libor,” it conjectured that these banks may “have been low-balling their borrowing rates to avoid looking desperate for cash.”

Since the publication of the original article in the Journal, there have been numerous studies by academics and practitioners that have looked into the question of whether there was collusion or manipulation in the LIBOR fixing process. They can be roughly divided into those that found evidence of collusion, and those that found little or no evidence.

The studies have been based on two main types of empirical analysis to determine whether manipulation of LIBOR took place. One focuses on the fact that LIBOR was originally intended to serve as a measure of banks’ cost of funds, by comparing published LIBOR rates and the bids from which they were calculated with estimates of the banks’ contemporaneous cost of funds. The other approach looks at banks’ bids relative to one another, and uses statistical methods such as “cluster analysis” to determine whether specific banks were attempting to manipulate the LIBOR fixing.

The difference in conclusions depends primarily on the models of bank costs and the statistical methods used to perform the analysis. Any defence against an accusation of having manipulated the LIBOR fixing will therefore depend heavily on being able to analyse the strengths and flaws of each method used.

The evidence for manipulation

Studies that have found evidence of manipulation of LIBOR have used both banks’ cost of funds and cluster analysis in arriving at their conclusions. A few of these studies are summarised here.

Snider and Youle (2010) first examine banks’ LIBOR bids and find that it is difficult to find evidence that the bank quotes reflect observable cost measures, including both CDS spreads and

² Mollenkamp, C. and Whitehouse, M. 2008. Study casts doubt on key rate; WSJ analysis suggests banks may have reported flawed interest data for Libor. *Wall Street Journal* (May 29), A1.

LIBOR quotes by the same bank in other currencies.³ They then base their conclusion that “there is strong evidence of the predicted bunching behaviour in the data” on a theoretical model of bank quotes and the model’s predictions of bunching behaviour.

On the other hand, Hartheiser and Spieser (2009) base their conclusions that “the market suffered from a ‘distortion’ if not a genuine manipulation and the banks having participated to that distortion can be clearly identified” on a theoretical econometric model of LIBOR based on observable market inputs (CDS spreads and at-the-money put implied volatilities).⁴

The drawback with any attempt to make inferences as to whether LIBOR has been manipulated by comparing it with a model of bank costs is that it involves a simultaneous test of two hypotheses: first, that LIBOR has not been manipulated or distorted, and second that the model of bank costs is an accurate reflection of those costs. One cannot tell whether rejection of the hypothesis is because the data are saying that LIBOR was in fact manipulated, or whether it is because the model of banks’ costs is inaccurate.

Similarly, if one tests for manipulation by constructing a theoretical version of what LIBOR would have been “but for” the manipulation, one cannot tell definitively whether any findings are due to manipulation having been present or to a faulty model of LIBOR.

The evidence against manipulation

This section should perhaps be called “lack of evidence of manipulation”, because it is difficult to find dispositive evidence that no manipulation has taken place.

Simply because posted LIBOR rates diverge from other reference rates or from theoretical benchmarks it does not automatically mean that the LIBOR fixing has been manipulated or that there has been collusion among the panel members. Gyntelberg and Wooldridge (2008) at the BIS found that while LIBOR did diverge from other key reference rates to “an unusual extent” during the relevant period, they also found that the divergence could be explained by a “deterioration in market liquidity, an increase in interest rate volatility and differences in the

³ Connan Snider and Thomas Youle, “Does the LIBOR reflect banks’ borrowing costs?”, mimeo, April 2010.

⁴ Alexandre W. Hartheiser and Philippe K. Spieser, “Libor rate and financial crisis: has the Libor rate been manipulated?”, mimeo, 2009.

composition of the contributor panels”.⁵ They concluded that “if there were any attempts to manipulate fixings during the recent turbulence, trimming procedures appear to have minimised their impact.”

The approach taken by Abrantes-Metz *et al.* is similar to, but different from “cluster analysis”.⁶ Their methodology involves examining structural breaks in the series of LIBOR rates and comparing them with benchmarks that are not suspected of manipulation. They conclude that “while there are some apparent anomalies within the individual quotes, the evidence found is inconsistent with an effective manipulation of the level of the Libor.”

Studies that compare LIBOR with other interest rates are subject to several potential problems, relating to market practice. For example, the ‘reasonable market size’ aspect of the BBA’s definition of LIBOR becomes important if one is comparing bids submitted by panel members with rates that were posted on various broker screens immediately before the 11 AM fixing. This is because the broker screens do not show how much can be borrowed at any given posted rate, and it may therefore fall short of ‘reasonable market size’.

Similarly, several studies (including the original *Wall Street Journal* article) found evidence of manipulation by comparing LIBOR to CDS spreads as a proxy for banks’ contemporaneous cost of funds. There are numerous flaws with making such a comparison, most of which are technical and beyond the scope of this summary article. However, it is well known that CDS spreads reflect more than just default risk.⁷ For example, the CDS market is less liquid than the inter-bank lending market, which will lead to CDS spreads being larger because of an illiquidity premium. These additional components of CDS spreads will tend to distort comparisons with LIBOR.

⁵ Jacob Gyntelberg and Philip Wooldridge, “Interbank fixings during the recent turmoil,” *BIS Quarterly Review*, March 2008, pp. 59 – 72.

⁶ Rosa M. Abrantes-Metz, Michael Kraten, and Albert D. Metz, “LIBOR Manipulation?”, mimeo, August 2008.

⁷ See, for example, Hull, J., Predescu, M., White, A., “The relationship between credit default swap spreads, bond yields and credit rating announcements”, 2004, mimeo; Hull, J., Predescu, M., White, A., “Bond Prices, Default Probabilities and Risk Premiums,” *Journal of Credit Risk*, Vol 1, No. 2 (Spring 2005), pp. 53-60. See also Longstaff, F. A., Mithal, S. and Neis, E. “Corporate Yield Spreads: Default Risk or Liquidity? New Evidence from the Credit Default Swap Market”, *The Journal of Finance* Vol LX No. 5 (October 2005), pp.2213 – 2253.

4 Conclusion

This overview of the debate about whether LIBOR was manipulated at the height of the crisis has, of necessity, been brief and has not been able to go into any of the studies in great detail. There is as yet no conclusive evidence of manipulation of the LIBOR fixing process. Much of the evidence that has been put forward is subject to criticism or interpretation. A thorough, exhaustive study of the LIBOR market has yet to be published.

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