

## Research Note

# The Outlook for Libor

- **We provide an overview of BBA Libor and discuss proposals for building a better Libor**
- **In our view, the Libor fixing process is not broken; BBA Libor broadly reflects the borrowing costs of top tier large banks. Differences between Libor and other indices can largely be explained by the composition of the Libor panel. The main limitations of Libor are due more to lack of liquidity in the market rather than any bias in the fixing process**
- **We present a model of the spread between 3-month Libor and OIS; the model suggests Libor is currently too wide relative to measures of balance sheet pressures and credit risk**
- **We expect the spread between 3-month Libor and OIS to narrow sharply in the coming months; increased liquidity measures by Central Banks along with increased term funding by financials are the main drivers**

## A besieged benchmark

In 1984 the British Banker's Association (the BBA) began producing a survey of interbank lending rates within the London market. The resulting London Interbank Offer Rate (Libor) has since grown from an arcane gauge of bank lending into one of the most widely used global interest rate benchmarks. It is the central metric for the world's money, credit and interest rate derivatives markets.

In spite of the crucial role Libor plays in the global credit markets, certain aspects of it are widely misunderstood. This fact, combined with the extreme levels of stress currently in the global banking system, has prompted a Libor credibility crisis, leading many market participants to question the accuracy of the benchmark. The most biting of these criticisms comes from those who believe Libor is too low relative to actual bank borrowing rates due to systemic bias on the part of contributors to under-report their actual borrowing costs. As evidence of this, these critics point to the lower level of daily Libor postings relative to other objective measures of bank borrowing costs. Taking matters a step further, some critics have suggested that Libor be

overhauled or reformulated to more accurately reflect the state of the markets.

That BBA Libor has flaws is beyond question. It is the product of a survey, as opposed to observed market values. It is supposed to track interbank lending rates for maturities out to one-year, even though most of the volume traded in this market is inside one-month, and much of this in overnights. Longer maturity Libor rates often have more to do with interest rate expectations than they do to interbank lending. Eurodollar deposits, which are the closest traded market proxy for Libor, see most of their daily volume traded hours after Libor rates are set and published, frequently with significant market news, like US economic releases, made public in between.

While all this is true, it is not news. Some of these criticisms can be traced back to the benchmark's inception. Rather, we think the intensity of the global liquidity crisis has illuminated these flaws, making them more apparent. Our view is that BBA Libor continues to function largely as it was designed to do and, counter to criticisms, it does a fairly good job of representing bank borrowing costs and excluding systemic underreporting bias. But, whether or not BBA Libor could be made better remains an open question.

In this report we will seek to clarify some of the confusion around Libor, the process by which it is determined, and how it relates to other credit market metrics. Then we will consider some common proposals for building a better Libor. Next, we present a model explaining the relationship between USD Libor and Fed Funds. Finally, we detail our outlook for Libor.

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## Understanding Libor

Libor is like a Rorschach test. Different people can look at the same ink-blot on a card and see wildly different things.

Similarly, people can see very different things based off of the same numbers. This currently seems to be the case with Libor.

A good place to start understanding Libor is that unlike many other interest rate benchmarks it's not an observable traded commodity. Although banks regularly do lend excess reserves and other funds to one another, interbank trades are private, bilateral transactions the terms of which are normally known only to the parties involved. Eurodollar deposits – dollar denominated deposits held at a foreign bank – are generally considered the most similar observable commodity. While similar, they are not exactly the same. Interbank loan rates reflect banks willingness and ability to lend to one another, while Eurodollar and other time deposits reflect the credit market's willingness to lend to banks.

The BBA attempts to replicate the yields at which banks are willing to lend to each other by conducting and publishing the results of a survey of banks on each London business day<sup>1</sup>. It conducts surveys across 10 different currencies, asking a specified panel of banks active in each market to estimate borrowing rates for a series of maturities ranging from overnight out to one-year. Specifically the BBA asks each contributor bank to submit for each maturity the rate at which the contributor could borrow funds, were it to do so by asking for and then accepting inter-bank offers in reasonable market size just prior to 11:00, London time. The levels quoted by the banks are non-binding, meaning the banks are under no obligation to prove that they can actually trade at those yields. The BBA compiles the contributed data, and then calculates the average level for each maturity using a trimmed-mean process intended to screen-out abnormally high or low rates.

In the case of USD Libor, the contributor panel consists of 16 banks from seven nations, including many of the world's largest banks (Table 1). For each maturity, BBA will exclude the highest and lowest quartile of rates, and calculate Libor using a simple average of the remaining contributions. The BBA employs a parallel process with the other currencies, although in several cases a smaller reference panel is used. Once calculated,

<sup>1</sup> The BBA provides an excellent summary of the Libor setting mechanism on its website [www.bba.org.uk](http://www.bba.org.uk)

**Table 1: USD Libor Panel**

The 16 banks that contribute to USD BBA Libor

Banks	Credit Profile		
	Moody's	S&P	Fitch
Bank of America	Aa2	AA	AA
Bank of Tokyo - Mitsubishi UFJ	Aa2	AA	NR
Barclays Bank plc	Aa2	AA-	AA
Citibank NA	Aa3	AA-	AA-
Credit Suisse	Aa2	A+	AA-
Deutsche Bank AG	Aa1	AA	AA-
HBOS	Aa2	AA-	AA+
HSBC	Aa2	AA-	AA
JP Morgan Chase	Aa2	AA-	AA-
Lloyds TSB Bank plc	Aaa	AA	AA+
Rabobank	Aaa	AAA	AA+
Royal Bank of Canada	Aaa	AA-	AA
The Norinchukin Bank	Aa2	A+	NR
The Royal Bank of Scotland Group	Aa1	AA-	AA
UBS AG	Aa1	AA-	AA-
West LB AG	A2	A-	A-

Source: JP Morgan

the BBA will publish the results shortly after 11:30am, London time.

Historically, the dispersion of rates contributed to the survey has been reflective of the credit conditions facing banks. For several years preceding the current crisis this meant the spread between the highest and lowest contributed rates was relatively tight as the credit environment was benign. For example, using data from the USD Libor panel, the average distance between the highest and lowest contributed rates (untrimmed) for the 3-month tenor during the first four months of 2007 registered about 1.5bp, with the largest difference during that time reaching 2bp. In contrast, the average spread between the high and low quotes during the first four-months of 2008 was 5.9bp, with the widest one-day difference hitting 17bp.

The increase in the dispersion of rates contributed to the BBA also mirrors the greater credit costs in the bank markets since the start of the crisis. The magnitude of these costs can be seen in the disparity between Libor and various central bank influenced overnight rates, often expressed in terms of overnight index swap rates (OIS). An OIS is a short-term interest rate swap where one side pays an overnight rate, compounded over the tenor of the swap while the other side pays a fixed rate. The gap between Libor and an OIS swap of the same tenor is often viewed as a measure of short-term risk premia. The bigger the gap, the greater the perceived risk.

Following the inception of the liquidity crisis last summer, short-term risk premia surged, ballooning the Libor-OIS spread across many currencies (Chart 1). Since then, risk premia have ebbed

and surged and ebbed again as perceptions of risks facing the global financial system have changed. The persistence of a wide gap between Libor and OIS has led some participants to conclude that the Libor benchmark is too high relative to other measures of bank liquidity, such as Fed funds. We have an opposing view on this point, namely that the gap between Libor and OIS remains high because the investors that provide funding to the banks, and the banks themselves, harbor ongoing concerns about the state of the global banking system. By our reckoning, through May 15, the sixteen banks that comprise the USD Libor panel, account for just over half of the \$342bn in credit losses reported by banks worldwide. Furthermore, within the USD Libor panel six of the sixteen banks account for nearly 80% of the panel's combined losses to date. Those investors who lend money to banks are wondering about the other ten on the panel. Are the others smarter, or luckier, or just slower to face reality? And what about the dozens of banks outside the Libor panel? The uncertainty, along with balance sheet constraints, is weighing on Libor, leaving many bank investors anxious about potential future losses, and we believe this anxiety is largely feeding the gap between Libor and OIS.

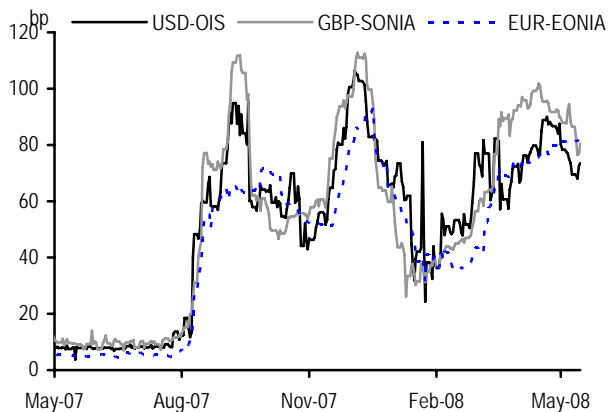
Systematically higher short-term risk premia combined with greater credit tiering fueled by bank specific factors have led other market participants to conclude that posted libor levels are actually too low. Because there is greater dispersion in quotes contributed by the Libor banks when the market is under stress, the question of how the BBA calculates the mean takes on greater weight. Some market participants also suggest the dispersion in spreads creates an incentive for panel participants to under-report their borrowing levels relative to actual market levels. One piece of evidence often cited to support this claim is the difference between posted Libor levels and the yield on the three-month Eurodollar deposit rate published daily in the Federal Reserve's H.15 report (Chart 2).

Unlike BBA Libor, the Fed's measure of USD Eurodollar rates is based on yields observed within the Eurodollar deposit market, where posted levels are generally binding. Year to date, the average daily difference between three-month USD BBA Libor and the equivalent H.15 series has been about 9.9bp, up from -1.1bp over the same time frame last year. While some view this as an indicator that BBA Libor is being managed lower by panel members, there are other explanations that can account for this discrepancy:

- **Benchmark composition:** The constituents of the BBA Libor panels are defined and limited to a relatively small number, while just about any major bank in the world can try to raise

**Chart 1: Short-term risk premia has surged across currencies**

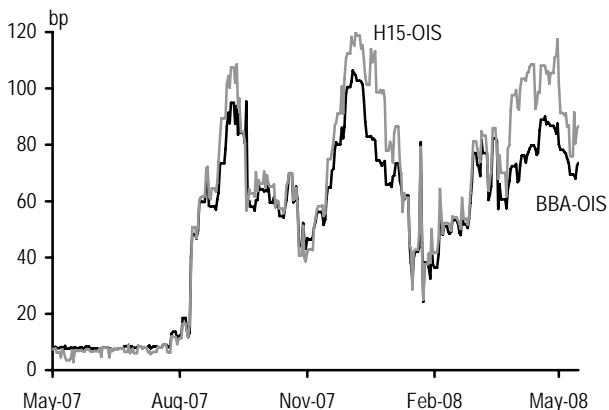
Libor-OIS spreads across USD, GBP, and EUR



Source: JP Morgan

**Chart 2: H.15 Eurodollar levels have been higher than Libor when the markets have been under duress**

Spreads to OIS for 3-month Libor and 3-month Eurodollar deposits



funds in the Eurodollar deposit market. The Libor panelists generally constitute some of the best known and best capitalized banks in the world. In a market where significant credit tiering is evident, it seems plausible the BBA panel banks could enjoy an advantage in credit costs.

- **Benchmark weighting:** after trimming out the higher and lower quartiles, the BBA averages the remaining rates. In contrast, the Fed data is untrimmed and is likely to contain more outlying observations. If the BBA Libor panel does represent a collection of banks with better than average funding, it would be likely that more H.15 outliers would represent high funding cost institutions, and therefore tend to pull the H.15 number above the BBA Libor level.

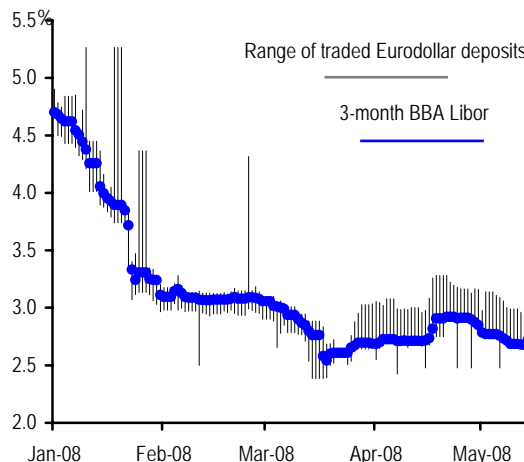
Besides these considerations, data from the Eurodollar deposit market also tends to contradict the notion that BBA Libor is out

of line with actual bank borrowing levels. During 2008, three-month BBA Libor has consistently been within the range of traded Eurodollar deposit levels as measured by Bloomberg's Eurodollar deposit composite, which tracks levels over that market's 24-hour trading day. Interestingly, the H.15 values have tended to be at high end of the traded range, while BBA levels have oscillated between the high-end and low-end as market conditions have shifted. Where Libor fits into the range of traded deposits may also have a lot to do with the shifting composition of the market. For instance, in Chart 3 BBA Libor was at the high-end of the traded deposit range immediately prior to the Bear Stearns crisis in mid-March because the funding markets were under stress and only a few of the strongest banks could borrow in the three-month tenor, while weaker banks were limited to shorter tenors. After the rescue, market conditions improved and many weaker institutions were willing to pay significant yields above Libor in order to secure three-month funding and as a result BBA Libor shifted to the low end of the range. This episode demonstrates that BBA Libor can and does reflect a central anchor point in the bank funding market.

Another metric sometimes cited as indicating that BBA Libor is too low comes from the currency markets. Forward interest rates imputed from currency market futures contracts can be used to calculate an implied Libor rate. The difference between this implied rate and BBA Libor is often referred to as the FX basis. Like the Fed H.15 data, the FX basis has suggested BBA Libor might be low (Chart 4). But, like the Eurodollar deposit market data, the FX basis considers the full breadth of its market, and so represents a wider range of market observations than the relatively limited observations captured by the BBA data. In addition, the FX basis can be influenced by a relatively small number of institutions who are transacting in very large size.

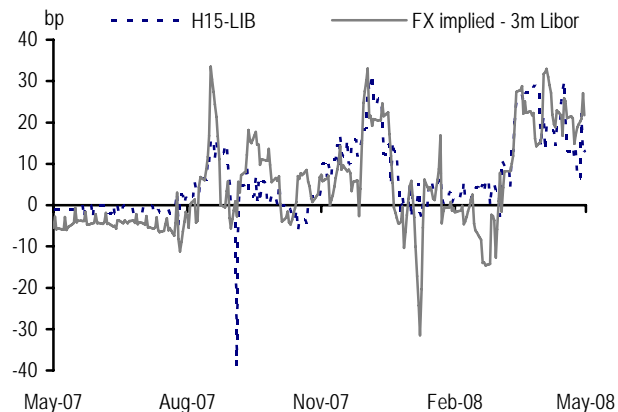
Rorschach tests are impossible to fail, and consequently just as impossible to pass. In the case of Libor, we think the financial press is making too much of the difference in the BBAs product and other measures of bank borrowing costs. While the still swollen gap between Libor and OIS signifies elevated risks, and may well be a significant consideration for monetary policy, the differences between BBA Libor and rates implied by Eurodollar deposits or FX markets, can largely be explained by technical differences, the impact of which are magnified by stressed market conditions. One of the biggest differences is the way Libor's trimmed mean approach edits outliers on both the high and low side, encouraging a representative, and less volatile average of borrowing rates. BBA Libor appears to be functioning as it was

**Chart 3: As market conditions improved, BBA Libor moved to the lower end of the trading range in Eurodollar deposits**  
Eurodollar deposits trading range, and 3-month BBA Libor



**Chart 4: The FX-basis has also been cited as evidence Libor might be too low**

H.15 and the FX implied Libor\* spread to the 3-month BBA Libor



Source: JP Morgan. \* FX implied 3M USD Libor is calculated from EUR/USD forwards.

intended to function. Whether or not the banking system that Libor measures is behaving as intended remains an open question.

### Building a better Libor

Another open question is whether BBA Libor could somehow be changed so that it becomes a better, or at least more robust, measure of bank borrowing levels. As we imply above, we do not believe that BBA Libor is broken. Even so, it might be possible to improve upon Libor and several different ideas for "upgrades" have recently been floated in the financial press.

We believe that any potential changes should be contemplated with two goals in mind. The first of these is that any change should not lead to a discrete change in long term Libor expectations. This is a real consideration because interest rate derivatives markets are built around the market's current understanding of Libor, and too great of a shift in definition could result in a market disruption.

The second goal should be to maintain the perception of Libor as representing the unsecured borrowing rate of a prime quality bank (generally a low double-A or better rating profile). While diversification is generally a good thing, the inclusion of banks that are not representative, that function as too large of an outlier, could actually detract from the index's stability.

The following represent a few of the most common, and potentially most practical proposals:

**Increase the size of the panel.** In the case of the USD panel it has been suggested that increasing the number of panel participants might have the joint effect of making the panel less UK focused and provide a more global fixing. Although the panel is geographically diverse, the fact that currently more members hail from the UK than the US leads some participants to question how global the Libor fixing is. It would be possible to add more US banks to this panel, and potentially others in pursuit of a better global cross section.

An interesting case study on this is available in the Euro area where two different interbank market rates are quoted in the market, the Euro-Libor and the Euribor® (Euro-Interbank- Offered-Rate). The Euro Libor is following the standard BBA fixing methodology with 16 banks in the panel and the elimination of the top and bottom quartile (Table 2). The Euribor®, which is the standard floating leg for the euro swap market and also the reference rate for the Liffe Euribor futures contract, is calculated on a different panel of banks (Table 3) and with a different rule for the calculation of the average. It is the rate at which euro interbank term deposits within the euro area are offered by one prime bank to another prime bank and it is published at 11:00 CET for spot value (T+2). The panel of banks provide quotes for 15 maturities from 1-week to 12-months. The calculation of the Euribor is processed by Reuters, eliminating the top and bottom 15% quote from the sample and averaging the remaining quotes. The current panel of 43 banks quoting Euribor consists of banks from the European Union in the Euro area, banks from

**Table 2: EUR and GBP Libor panels**

Banks in the panel quoting Libor for EUR and GBP

Euro-Libor	GBP-Libor
Bank of America	Abbey National plc
Barclays Bank plc	Bank of America
Bank of Tokyo – Mitsubishi UFJ	Bank of Tokyo – Mitsubishi UFJ
Citibank NA	BNP Paribas
Credit Suisse	Barclays Bank plc
Deutsche Bank AG	Citibank NA
HBOS	Deutsche Bank AG
HSBC	HBOS
JP Morgan Chase	HSBC
Lloyds TSB Bank plc	JP Morgan Chase
Rabobank	Lloyds TSB Bank plc
Royal Bank of Canada	Rabobank
Société Générale	Royal Bank of Canada
The Royal Bank of Scotland Group	The Royal Bank of Scotland Group
UBS AG	UBS AG
West LB AG	West LB AG

the European Union not part of the Euro area (British and Scandinavian banks) and international banks.

Interestingly, simple comparison between the fixings does not indicate the presence of a significant bias between the Euribor and Euro-Libor. The average spread between Euribor and Euro Libor was about -0.25bp over the last 2-years with no significant change between the stress period, which we define between August 2007 and today and the period preceding that. Although the average was close to zero in the period before the crisis and about -0.4bp since August 2007, the standard deviation of the spread of fixings has stayed broadly in the 0.5bp-0.6bp range, indicating no statistical significance to the different averages (Table 4).

The negligible difference in the two interbank rates would indicate a modest impact to the level or to the volatility of the fixing in the case the set of banks quoting in Libor were to be expanded. Our interpretation is that in the Euro area the 16 banks in the Libor panel are representative of the full sample of banks active in the money markets, and would argue that expansion for expansion's sake is not necessarily productive.

That said, in the case of the USD panel expansion may still make sense, if only to offset the London focus. Still the BBA would need to exercise care in expanding the group as potential US based additions like Wachovia or Wells Fargo have significant retail funding bases, and as a result could be less aggressive in pursuing interbank deposits. If not offset

**Table 3: Banks in the Euro area, outside the Euro area as well as other international banks are part of the Euribor panel**  
Banks in the panel quoting Euribor

Euribor		
Erste Bank der Österreichischen Sparkassen*	DZ Bank Deutsche Genossenschaftsbank*	Confederacion Española de Cajas de Ahorros*
RZB - Raiffeisen Zentralbank Österreich AG*	Dresdner Bank*	Banco Santander Central Hispano*
Dexia Bank*	Landesbank Baden-Württemberg Girozentrale*	Barclays Capital**
Fortis Bank*	Landesbank Hessen - Thüringen Girozentrale*	Den Danske Bank**
KBC*	Norddeutsche Landesbank Girozentrale*	Svenska Handelsbanken**
Nordea*	National Bank of Greece*	Bank of Tokyo - Mitsubishi***
BNP - Paribas*	AlB Group*	J.P. Morgan Chase & Co.***
Natixis*	Bank of Ireland*	Citibank***
Société Générale*	UCI Milan*	UBS (Luxembourg) S.A.***
Crédit Agricole s.a.*	Banca IntesaBci*	
HSBC France*	Monte dei Paschi di Siena*	
Crédit Industriel et Commercial CIC*	Banque et Caisse d'Épargne de l'État*	
Bankgesellschaft Berlin*	ABN Amro Bank*	
WestLB AG*	Rabobank*	
Bayerische Landesbank Girozentrale*	ING Bank*	
Commerzbank*	Caixa Geral De Depósitos (CGD)*	
Deutsche Bank*	Banco Bilbao Vizcaya Argentaria*	

\*Banks from EU countries participating in the Euro

\*\*Banks from EU countries NOT participating in the Euro

\*\*\*Non-EU banks with important Euro area operations

Source: www.euribor.org

with other wholesale funded institutions, the revised postings could gravitate lower, exacerbating the perception of some that USD Libor is too low.

**Change the time of the quote.** A driving force behind this suggestion is to try to improve dollar Libor pricing by better aligning the setting time with the US markets. It has been long noted in the Eurodollar deposit market that there is often a drop in rates when the US markets open, reflecting a surge in activity resulting from US money markets where the majority of trading takes place very early in the morning. Delaying the Libor setting until 10:00 am or so US time could have positive effects such as allowing for key economic data to price into the market. Also the delay would doubtless prove popular with hundreds of money market professionals if it meant they could come to work an hour or so later.

On the negative side, 13 of the 16 current panel members are domiciled outside the US, and the later setting could prove problematic in processing and settling trades that late in the day. For some smaller, mostly European, banks that borrow heavily from the US, the time change might increase funding risk by shortening the trading day, and on a bad day potentially leaving the banks with unrolled funding late in the day when they might have few other alternatives.

**Table 4: No bias is evident between Euribor and Euro-Libor before or during the recent crisis**

Spread between the 3-month Euribor and Euro-Libor fixings and standard deviation of the spread over different sampling periods; bp:

	Last 2 years	Jun06/Jul07	Aug07/May08
Std dev	0.6	0.5	0.6
Average	-0.3	0.0	-0.4

With a global index and a round planet time will always be a problem for somebody. We are not sure that changing the time solves more problems than it creates.

**Change the calculation to use a median rather than a trimmed mean.** The idea here is to subtly change the rate determination process in a way that actually selects the level supplied by a representative institution, the median one, rather than take an average from the middle of the pack. While the idea has appeal on an intellectual level, the actual statistical difference may be fairly minimal, even in periods like 2008 where the dispersion between high and low postings have been significant.

Using year-to-date data from the current USD Libor panel we attempted to simulate what the average difference between a median and trimmed mean would have meant in terms of

basis points. To be effective the change would require an odd number of panelists, instead of the current 16, so using a random variable we dropped one contributor from each day's postings, took the median of the remaining 15 and compared that to the original trimmed mean. Across 20 simulations we generated an average difference (trimmed mean less median) of about -0.15bp with a very small standard deviation. In other words, over a period of record wide dispersions in the postings, changing to a median from a trimmed mean, produced only a slightly higher Libor reading. Under more normal circumstances, such as in early 2007 we expect the statistical difference between the two measures would be statistically imperceptible.

**Change the survey question.** This suggestion is driven by the idea that shifting the definition of the rate to be quoted in the survey might provide a fairer picture of the level where banks are willing to transact with one another. For instance, those critics that believe the current definition ("the rate at which the contributor could borrow funds, were it to do so by asking for and then accepting inter-bank offers in reasonable market size just prior to 11:00, London time") results in too low a libor, might want the change the definition to something more outward facing like "the rate at which interbank term deposits within the euro area are offered by one prime bank to another prime bank," which is effectively the definition used by Euribor. As our earlier discussion indicates, in spite of semantic and other differences, the small difference in positing levels raise questions about the value of these kinds of changes. Moreover, we feel that any definitional change that was large enough to move the market could actually change long-term Libor expectations and therefore violate our first principle outlined above.

In addition to these proposals, we suspect there are many more suggestions that have been presented to the BBA. Like these proposals, most seem likely to create marginal value if they work, but could be potentially harmful to the reputation of BBA Libor if they fail.

Things that are not broken should generally not be fixed. The market is smart and understands what Libor is: a benchmark off of which credit is priced. The market then makes its own adjustments to the benchmark – adding or subtracting basis points – to reflect its own value judgements. We believe the BBA should be free to restructure Libor if it is absolutely necessary. But some of the proposed changes amount to no more than tinkering. We feel the markets would be best served if the BBA

**Table 5: A model for the 3-month Libor – OIS spread**

Statistics from regressing 1-week moving average of 3-month Libor – OIS spread against 1-week moving average MBS repo spread to OIS, 1-week moving average of Libor panel banks' average CDS\* and 1-week average dispersion\*\*; past 1 year; bp

Name	Coefficient	T-statistic
Intercept	10.19	7.7
MBS repo	0.94	20.6
Libor panel CDS	0.12	6.9
Dispersion of Libor quotes	8.66	10.4

\*Average of 5Y CDS for the 16 Libor panel banks

\*\*Standard deviation of quotes for 3-month Libor from the 16 Libor panel banks

resists the temptation to tinker, and instead let the market make its own adjustments.

## Modelling the spread between USD Libor and OIS

Although markets have recently been heavily focused on technical issues related to the calculation of Libor, the more important issue remains that Libor is quite wide relative to OIS. In order to better understand why Libor is so wide relative to Fed funds, and be better able to predict any eventual narrowing, we have developed an empirical model of the spread between 3-month USD Libor and OIS. The model attempts to quantify the effects of three separate drivers of the Libor/funds basis including credit risk, balance sheet or liquidity pressures, and volatility risk. We measure credit risk by the average CDS spread of the 16 banks in the Libor panel. Balance sheet pressures are measured by the spread between Agency mortgage financing rates and OIS. These rates, which are collateralized lending rates at which bank repo desks will finance client positions in Agency MBS, provide one of the best measures of pure balance sheet pressures that banks face. Finally, to capture volatility risk, we include a measure of dispersion across individual bank Libor quotes, defined as the standard deviation of the 16 quotes of the Libor panel. Markets with higher dispersion, which reflect increased stresses at some banks and relative strength at others, should lead to increased demand for short term funding which should increase Libor.

Table 5 and Chart 5 provide some summary statistics on the model which is estimated over the last 1-year of data. All variables are statistically and numerically significant and the overall standard error of the regression is 8 bp. Three interesting conclusions can be drawn from the model.

First, although both credit risk and balance sheet pressures have played a role, the model is supportive of conventional wisdom that the bulk of the widening in Libor this cycle has been driven

by balance sheet constraints. We estimate that each 10 bp widening in MBS repo spreads has caused Libor to widen by 9.4 bp; each 10 bp increase in the average CDS spread has caused Libor to widen by 1.2 bp. The relative importance of balance sheet was most evident early on in the crisis as the collapse of the securitization markets caused the ABCP market and other off-balance sheet funding vehicles to contract, with Libor widening as these assets came on balance sheet. The contraction resulted in collateralized ABCP spreads widening 90 bp in early August, Agency MBS repo spreads widening 40 bp, while Libor widened 50 bp. During the same period, the average CDS spread of the Libor panel was virtually unchanged. The relative importance of balance sheet serves as an important reminder that an improvement in credit conditions alone will not be sufficient to cause the Libor/funds basis to narrow. Instead, spreads in the securitization and other collateralized funding markets are likely a more important indicator of when Libor/OIS is likely to narrow.

Second, dispersion matters as well. Before the onset of the crisis, dispersion of individual panel bank quotes was almost negligible. It increased dramatically after the start of the crisis reflecting significant funding pressures at a handful of banks. All else equal, we estimate that each 1 bp rise in dispersion translates into a 9 bp increase in the Libor/OIS spread.

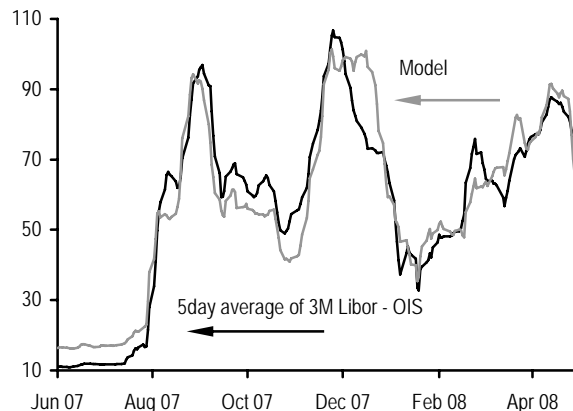
Third, the Libor-OIS spread now appears wide relative to its underlying drivers (Chart 5). Since late April, CDS spreads for banks in the Libor panel have narrowed 10 bp, and spreads in the MBS repo market have narrowed 30 bp. Despite these moves, Libor/OIS has remained rangebound and, by our estimates, is now trading about 15 bp wide relative to fair value.

### Outlook for Libor/OIS spreads

As discussed above, we expect only modest changes in the methodology used by the BBA for fixing Libor. These changes are likely to take place gradually and are not expected to have a significant impact on average Libor values over time. Instead, the medium term direction of Libor/OIS is likely to be dominated by continued improvements in bank balance sheet and liquidity conditions. On balance, three factors point towards a significant narrowing of Libor/OIS as these conditions continue to improve.

First, the Fed appears increasingly focused on reducing funding pressures in the Libor market. This week's speech by Fed Chairman Bernanke highlighted that "spreads of term dollar Libor over OIS...remain abnormally high" and highlighted the

**Chart 5: Libor-OIS appears wide relative to fair value**  
5-day moving average of 3-month Libor minus OIS vs. our empirical model\*; bp



\* Our model is a function of (1) credit risk measured by the average CDS spread of the 16 banks in the Libor panel, (2) balance sheet pressures measured by the spread between Agency mortgage financing rates and OIS, (3) volatility risk measured as the standard deviation of the 16 quotes of the Libor panel. 1-year of data used for analysis.

**Table 6: Term Auction Facility program results**

Data for TAF auctions; amount (\$bn); TAF rate (%); TAF rate minus 1-month Libor (bp)

	Amt. \$bn	TAF rate (%)	Spread to 1M Libor (bp)
17-Dec-07	20	4.65	-32
20-Dec-07	20	4.67	-23
14-Jan-08	30	3.95	-13
28-Jan-08	30	3.12	-16
11-Feb-08	30	3.01	-13
25-Feb-08	30	3.08	-4
10-Mar-08	50	2.80	-14
24-Mar-08	50	2.62	1
07-Apr-08	50	2.82	10
21-Apr-08	50	2.87	-3
05-May-08	75	2.22	-48
Average			-14

Fed's intention to "increase the size of the [TAF] auctions if warranted by financial developments." Given this increased focus, we view further increases in the size of the TAF auction or an increase in the term of the auction as highly likely over the next few months. And, although the data is limited, last week's auction provides some evidence that TAF is working. The upsized \$75 bn auction on May 5th cleared at a rate 48 bp below 1-month Libor (Table 6). Since then, 1-month Libor has declined 20 bp.

Second, beyond the Fed's attempts to provide alternative sources of funding, banks themselves are raising capital and increasing longer term debt issuance in order to reduce their need for short

term funding. Fixed rate issuance by financials totaled \$52 billion in April and is tracking a similar amount in May. These volumes are at all time highs and are nearly 3 times the average monthly issuance over the last three years (Chart 6).

Third, some tentative evidence is emerging that bank balance sheet pressures are declining. One-month repo rates on Agency MBS have declined 30 bp this month retracing half of this year's widening (Chart 7). Because these rates represent collateralized bank lending on high quality collateral, they are one of the better barometers of balance sheet pressures at banks. Similarly, there are tentative signs of a modestly improved tone in the ABCP market and certain other vehicles where banks can secure off-balance sheet financing. For example, outstandings on large sec arb CP programs increased in Q1 for the first time in the credit cycle after declining nearly 30% in H207.

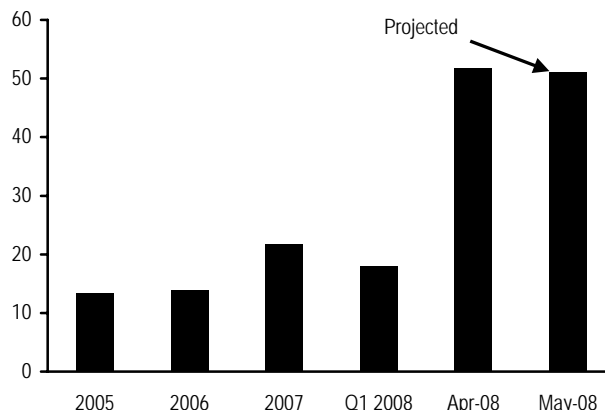
While these are all positive signs for Libor, we should emphasize that Libor-OIS is unlikely to narrow in a straight line. Indeed, as Charts 5 and 7 illustrate, spreads have been extremely volatile during the crisis. Rallies that occurred in both October and January were quickly reversed only to find Libor revisiting its previous wides. But, with liquidity measures now acting as the Fed's main weapon, and banks actively repairing their balance sheets, we expect Libor to continue to narrow relative to funds. Our 3 month target for spot 3-month Libor/OIS spread is 40 bp or roughly 35 bp below current levels. This puts it near the lows reached in both October and January and is consistent with another 25 percent retracement of balance sheet pressures as measured by Agency MBS repo.

### A benchmark freed

Most of the criticisms recently leveled at BBA Libor is a reflection of extreme market conditions, and are not indicative of fatal flaws in the benchmark's construction. The question of whether a benchmark could be designed that is less flawed than Libor is debatable. Whether such a benchmark could effectively replace Libor is not. From the banks, to the money markets, to the interest rate swaps market to the Eurodollar futures pits, Libor is baked into the global financial system.

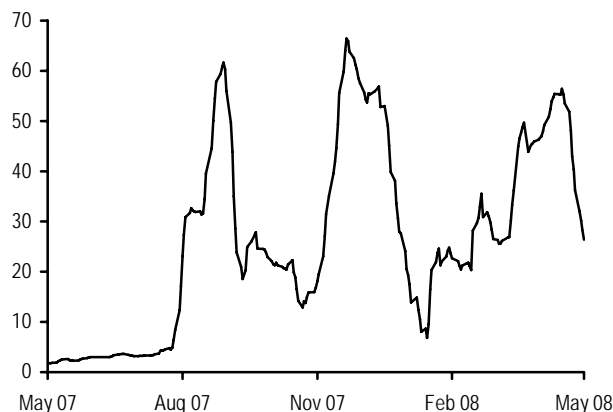
**Chart 6: Record fixed rate issuance by financials is reducing their reliance on short term funding**

Average monthly fixed rate financial issuance and projected issuance for May 2008; \$bn



**Chart 7: Agency MBS repo rates have declined recently suggesting bank balance sheet pressures are declining**

5-day moving average of Agency MBS repo rates minus OIS; bp



It is clear that the Fed and other central banks comprehend the special role Libor plays in the market, and it is a positive development that they are taking steps to address the conditions that have driven a wedge between Libor and OIS. We expect to see conditions in the Libor market gradually improve in the coming months. As they do, we expect most of the current criticisms of BBA Libor to be forgotten.

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