Klára Pintér and György Pulai: Measuring interest rate expectations from market yields: topical issues

Learning market participants' policy rate expectations is a major issue for central banks. The underlying reason for this is that the interest rate expectations of market participants may themselves contain information on market participants' perceptions of the economic prospects, which decision-makers might want to incorporate into their own assessment of the outlook. Market participants' expectations, however, cannot be observed directly and are difficult to quantify. Of the two most common approaches, we will discuss in detail the one where we infer market expectations from the prices of the financial instruments which are closely related to expectations. In properly functioning, liquid markets we can infer market participants' expectations of future interest rates from the prices of and returns on government securities and inter-bank transactions. Before the onset of the financial crisis, BUBOR (Budapest Inter-bank Offered Rate) reflected market participants' expectations of the interest rate relatively reliably, but since the deepening of the crisis, this has changed for a number of reasons, which we will also seek to pinpoint. The fact that BUBOR no longer reflects real market expectations, i.e. it distorts them, is all the more important as this measure serves as a benchmark rate for other financial products, among other things, for corporate loans. The loss of the information content of BUBOR means that the yield curve derived from returns on inter-bank market instruments provides a more accurate measure of market expectations if we exclude data on BUBOR fixings. Nevertheless, forward rate agreements (FRAs) settled on BUBOR remain suitable for the quantification of market participants' expectations. However, in interpreting these, it is important that, in addition to credit and liquidity risk premia, the bias caused by BUBOR should also be taken into consideration.

INTRODUCTION

Knowing market participants' expectations of the key policy rate is of key importance for central banks for a number of reasons. One is that monetary policy works properly if it can influence market participants' expectations efficiently, and if the interest rate path that market participants expect to materialise is in line with the steps planned to be taken by central banks. Therefore, it is important that monetary policymakers monitor how their decisions and communications affect these expectations. Moreover, market participants' interest rate expectations may themselves contain useful information about market participants' perceptions of economic developments, which decision-makers may want to incorporate into their own assessment of the outlook.

As market participants' expectations cannot be observed directly, quantification of these expectations is not any easy task. The most common approaches used to identify future policy rate expectations fall into two main categories. One is surveys conducted among market participants (traders and analysts). Respondents are regularly asked about their future policy rate expectations for various specific points in time (e.g. the end of the following month, the given year and the one following it). Their answers contain direct information on the expected path of the key policy rate. If respondents attempt to offer the most accurate forecast of central bank rates, their answers will indeed reflect their actual interest rate expectations. But there is no absolute guarantee for this, as there is no stake involved in the opinion that respondents express, i.e. they do not incur any losses if they fail to forecast the actual interest rate accurately, and they gain nothing if they do not. Consequently, answers may reflect a number of other underlying motivations: it may, for instance, be the case that a rate of interest assumed to be the most likely rather than the one actually expected is provided as a forecast, or some analysts may want to provide accurate projections when most err significantly, and thus they provide a less likely value as the expected rate. If such is the case, surveys can provide a skewed measure of market participants' actual expectations. Another possible approach is that we infer market participants' expectations from the prices of the financial instruments which are closely related to interest rate expectations. There are a number of instruments whose returns depend strongly on the current and future base rate; it should be noted, however, that their liquidity and credit risk may vary. Accordingly, returns on these instruments embody, in addition to the interest rate expectations, the premium demanded as compensation for these risks, which are difficult to identify and measure when expectations are interpreted. Relying on two different data

sources, our earlier analysis presented both approaches. We concluded that the yield curve computed from government securities yields and Reuters surveys were both good approximations of market participants' expectations. Nevertheless, neither provides a direct, unbiased measure, and expectations derived from the two data sources may often vary significantly.[1] Thus, consistent with central bank practice, it seems reasonable to use several possible approaches and interpret them together when monitoring developments in expectations. Supplementing our earlier study, this time we offer a more in-depth analysis of recent changes in interest rate expectations computed from market instruments. We will present the instruments whose returns may serve as a starting point for measuring expectations, the bias they may contain and the ways in which the recent turbulences in the financial markets have affected their information content.

MEASURING INTEREST RATE EXPECTATIONS WITH THE PRICES OF MARKET INSTRUMENTS

Forward yields computed from returns on a financial instrument with various maturities are equal to the sum of the expected future interest rate and the risk premium usually charged for the given instrument or group of instruments. The most important risk factors facing investors in the market of these instruments that reflect policy rate expectations are credit – counterparty – and liquidity risks. Credit or counterparty risk is the risk run by investors that the counterparties to which they extend credit will default. Liquidity risk means the risk that markets may vary according to how easy and affordable trading is in them, which costs the trading involves. If, for any reason, market participants consider an instrument to be riskier than lending to the central bank, they demand a premium in return for taking on risks, which, in turn, means returns higher than the base rate.

As we can compute the sum of only these two components (i.e. the expected interest rate and the premium expected in return for the perceived risk) from market returns, in order to be able to identify expectations of the future path of interest rates, we must make some assumption on risk premia. The conventional assumption used when determining the expected path of the interest rate is that risk premia are constant over time. If this condition is fulfilled, both premia and the expected path of the interest rate can be estimated over a longer horizon, or we may make inferences about changes in expectations directly from changes in returns.

WHAT YIELDS HELP US MAKE INFERENCES ABOUT INTEREST RATE EXPECTATIONS?

Government securities are the most obvious choice for measuring expectations. Relative to the credit risk posed by the central bank policy instrument, they are close to being risk free in terms of credit risks, and the deviation of forward yields from the expected path of interest rates is due mainly to liquidity premia. Therefore, forward yields computed from yield curves comprising the information content of government securities with various maturities offer a good approximation of the future path of central bank rates as long as the government securities market is sufficiently liquid.

Alternatively, we may infer market participants' expectations of interest rates from the prices of certain inter-bank transactions (unsecured lending and deposit transactions, forward rate agreements and interest rate swap deals) or from estimated yield curves comprising the information content of various instruments.[2] In order to be able to measure short-term expectations (i.e. those over a time horizon for up to 1 year), we use BUBOR or forward rate agreements (FRAs).

BUBOR (Budapest Inter-bank Offered Rate) denotes the rate at which commercial banks are willing, for various maturities, to provide unsecured loans to each other. The MNB collects – from the domestic commercial banks – quotes for a maturity range of 1 day to 1 year, which serve as a basis for setting BUBOR, daily, at a pre-set point of time. Pursuant to the regulations of the Hungarian FOREX Association, quoting banks participating in the setting of BUBOR undertake to quote real inter-bank lending interest rates valid at the time of fixing. BUBOR depends fundamentally on the interest rate expectations of banks; however, as it is a rate charged for unsecured lending, it also contains a credit risk premium demanded in return for counterparty default. Furthermore, as the liquidity situation of the banking system also affects the terms and conditions under which banks lend each other, interest rates also contain a liquidity premium.[3] Accordingly, BUBOR reflects the interest rate expectations of banks along with a credit risk and liquidity premium.

[1] Gábriel and Pintér (2006).

[2] For a detailed presentation of how inter-bank transactions are used for estimating the yield curve, see Reppa (2008).

[3] Changes in very short-term interest rates are due to short-term fluctuations in liquidity; in order to measure interest rate expectations we only take into consideration BUBOR with a two-week or longer maturity.

Forward rate agreements (FRAs) are arrangements in which two parties agree on a notional interest rate to be paid, at a specified settlement date, on a notional amount of principal that is never exchanged; the only payment (the payment of the settlement amount) that takes place relates to the difference between the agreed FRA rate and the prevailing market rate (or benchmark rate) at the time of settlement. Transactions are settled when their maturity period actually begins, i.e. after the conclusion of an FRA with a 3-month maturity starting 3 months later, the parties to the agreement will exchange fixed interest rate payments for floating interest rate payments in three months. In HUF FRAs the benchmark rate is BUBOR, thus, the two rates correlate strongly. Similar to inter-bank lending transactions, FRAs also contain a liquidity premium and one compensating the credit risk run by the counterparty. But as only the interest due is exchanged, and the principal is not, the credit risk premium may be lower than in standard lending transactions.

FRAs with a maturity of 3 months 1 to 12 months ahead are traded in the inter-bank market. In order for longer-term interest rate expectations to be quantified, *interest rate swap (IRS)* transactions[4] can be used. Parties to IRS transactions exchange interest rate payments on amounts denominated in the same currency. In the most common and most widely used form of IRS transactions one party receives floating interest rate payments during the term of the swap transaction, in exchange for which the other party receives fixed interest rate payments. As a rule, the term of the transaction is over 1 year. The most important difference between IRS and FRA transactions is that in the former the floating rate is fixed at the start of the successive interest periods, while in the latter the market interest rate prevailing at the date of interest payment applies. In addition, IRS transactions are usually longer maturity transactions and interest rate payments are exchanged several times. The two products are similar, and so are risks and expected premia; albeit as interest rate payments are exchanged several times, credit risk premia in IRS transactions are likely to be higher.

WHICH MARKET INSTRUMENT TO CHOOSE TO MEASURE INTEREST RATE EXPECTATIONS?

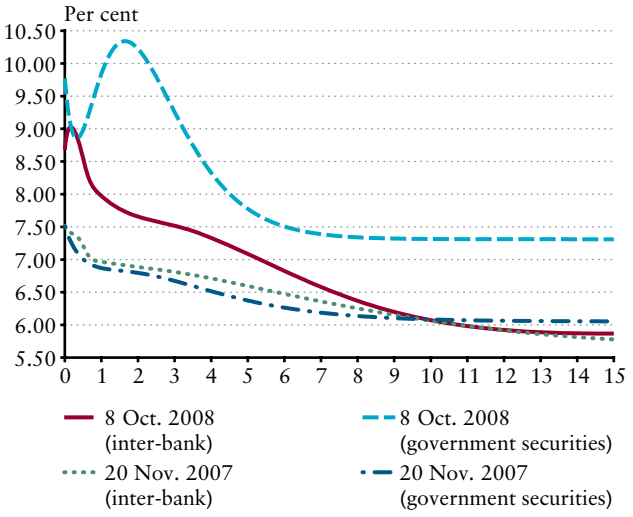
If financial markets operate properly, interest rate expectations computed from various instruments will be similar, taking into account the diversity of the risk characteristics of the instruments. That is, if forward yields are adjusted for the premium corresponding to the risk implied in an instrument or changes in yields are analysed, they will reflect similar expectations. The conditions for the above are that the market must be sufficiently deep and liquid for information on expectations to be reflected in returns and for changes in risk premia not to be the major drivers of changes in returns.

Initially, central banks used forward yields computed from government securities market yields to quantify expectations, because government securities markets were liquid and operated properly in most countries, and the direct link between yields and expectations was the most important consideration when selecting instruments. The development of financial markets and the emergence of new instruments have increased the liquidity and importance of the inter-bank markets significantly over the past decade. This has led to inter-bank yields playing an increasingly central role in measuring interest rate expectations. Although, due to credit risks, the linkage between yields and expectations is less direct than in the government securities market, this is counterbalanced by the depth of the market which allows for more information to be gathered. As a result, the number of the central banks that place a great emphasis on information derived from inter-bank returns has been rising, with yield curves estimated with these returns becoming increasingly common as a tool for measuring market participants' expectations.

In 2008, however, disturbances in the financial markets raised both the risk premia and their volatility, rendering the assumption about stability untenable. Growth in risk premia led to yields higher and more volatile than they used to be.

Chart 1

Two-week forward yields computed from government securities market and inter-bank yield curves



[4] For a detailed discussion of the HUF IRS market, see Balogh et al. (2007).

Consequently, if we adjusted forward yields for former average risk premia, we would provide a biased estimate of interest rate expectations, concluding that they will increase and become uncertain. The difference could be especially striking in the case of short-term expectations, because if markets function properly, risk premia are lower at shorter maturities; thus, our measure of the expectations is also more accurate.

Disturbances and tensions affected the individual market segments and risk factors to a varying extent and at different points in time. Accordingly, the extent to which the information content of the expectations measured with different instruments has become distorted and uncertain varies.

Chart 1 reveals that in November 2007 the path of 2-week forward yields computed from the yield curves estimated from government securities market yields and inter-bank returns reflected rate cut expectations that were steep over the short run and moderate over the medium term. In contrast, both the shape and the level of the forward interest rate path derived from the yield curves of October 2008 were markedly different: inter-bank yields follow a steep path over the very short term and a declining path beyond a 6-month horizon; as regards the path settled on yields on government securities, they first decline, then rise steeply over a horizon of up to 2-2.5 years.

Box: International experiences

Significant differences between expectations computed from various data sources are not an isolated occurrence. In August 2007, a sharp rise in the size and the volatility of risk premia triggered by disturbances in the financial markets prompted several central banks to check whether the conventional instruments and methods used for the quantification of interest rate expectations still suited that purpose. The issue was particularly important for the Bank of England (BoE) and the European Central Bank (ECB) as they make their macro-economic projections on the basis of market participants' interest rate expectations rather than the assumption of an unchanged central bank rate path. In their case, market disturbances hit inter-bank markets rather than the government securities market hard and permanently.

Between November 2004 and August 2007, the Bank of England used forward yields computed from the yield curve settled on unsecured inter-bank transactions to determine the path of interest rate expectations. The reason why unsecured inter-bank transactions was selected was market liquidity. Liquidity in both the secured inter-bank market and the government securities market was tighter and the number of the available instruments was lower especially at short maturities. Implied forward yields were adjusted for credit risk premia measured with the historical average difference between returns on secured (repo) transactions and those on unsecured deals as well as the average differential between returns on repo transactions and the central bank base rate. But in August 2007, inter-bank returns and government securities market yields diverged, which was attributable to banks' mistrust of each other and a steep rise in credit risk premia. As a result, the adjustment made earlier no longer reflected credit risk premia properly. Therefore, the group of the instruments used for measuring short-term expectations was changed, and until May 2008 the Inflation Report was settled on the path of expectations calculated from repo yields, which, although it was previously less liquid, did not reflect credit risks. Later, repo yields were replaced by OIS[5] transactions because liquidity in this market segment rose significantly. No similar difficulty was experienced in respect of longer-term expectations; the disturbances thought to be temporary first of all markedly raised returns on short-term instruments. Therefore, the data source used to predict the yield curve at a horizon of over 1 year remained the same.[6]

Nearly a year later, the ECB also changed the group of instruments that it used for measuring market expectations. Prior to September 2008, it used the forward yield curve estimated from inter-bank market data (swap returns) to approximate the market expectations of the policy rate. As an alternative, the use of EURIBOR futures was also considered, but this market was sufficiently liquid only for contracts with a maturity of up to 3 years, and the models that it used required the quantification of a longer path of expectations.[7] By September 2008 the gap between the expectations computed from one data source and those computed from the other had grown wide, and in the opinion of the ECB, the path derived from EURIBOR futures better reflected actual expectations in the short run and their information content was less distorted by market disturbances.[8]

Difference in the expectations measured with the prices of the various instruments does not offer any guidance as to which path is the "right" one, the one better reflecting actual expectations. In order to be able to make the right decision, we must analyse the extent to which turbulences in the financial markets affected the individual market

[5] Overnight index swap: a short-term interest rate swap whose underlying product (the benchmark yield of a leg changing daily) is SONIA, the Sterling Overnight Interbank Average Rate.

[6] *Inflation Report,* November 2007, Bank of England and Inflation Report Conditioning Path for Interest Rates.

[7] *ECB Monthly Bulletin,* March 2007.

[8] *ECB Monthly Bulletin,* September 2008.

segments and identify the impacts in play in the markets of the individual instruments. In order to measure expectations, we would like to use returns on the instruments which contain the largest possible amount of information; therefore, our primary concern is trends in liquidity in the individual markets. Furthermore, we can compare the forward yields obtained from various data sources with the expectations expressed in surveys. Expectations in analyst surveys, however, may not necessarily reflect market participants' expectations accurately, as possible biases originate from respondents' motivations rather than market disturbances. Accordingly, the expected interest rate path may serve as a benchmark that is left unaffected by market turbulences.

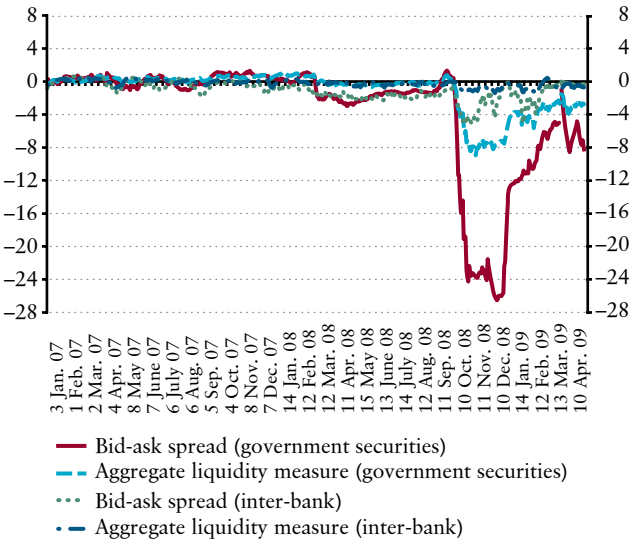
LIQUIDITY AND THE INFORMATION CONTENT OF PRICES IN THE INDIVIDUAL MARKET SEGMENTS DURING MARKET TURBULENCES

Indicators[9] describing changes in the liquidity of the individual market segments (Chart 2) suggest that, in respect of the Hungarian financial markets, it is the government securities market where strong and permanent disturbances in operation emerged. In particular, liquidity indicators related to the behaviour of prices suggest disturbances in both the government securities and the unsecured inter-bank credit markets.[10] The widening of the bid-ask spread is especially significant, which compromises the information content of the observed prices, and, even if we exclude risk premia, significant errors materialise in measuring expectations.

During the period of turbulence on the government securities market in March 2008 liquidity risk rose sharply and its fluctuation was also stronger than before. The increased volatility of the liquidity premium leads to considerable uncertainty in estimating its size. Furthermore, there were dry spells in the market during certain periods, so much so

Chart 2

Liquidity indicators in unsecured inter-bank and the government securities markets



that quoting banks had to suspend quoting for some time, or there were quotes only for limited volumes. As a result, the information content of benchmark yields concerning expectations is highly questionable, which renders 2-week forward yields derived from the yield curve estimated from yields on government securities useless as a tool for the quantification of policy rate expectations.

There were also disturbances in the Hungarian inter-bank market in the autumn of 2008: a confidence crisis led to a rise in perceived counterparty risks and inter-bank trading came to a standstill with transactions concluded with the central bank replacing the inter-bank market. This led to a rise in both credit risk and liquidity premia. Nevertheless, according to the liquidity measures tension seemed to be lower than in the government securities market and wore off faster. Only estimates and aggregate data are available on the liquidity of FRA and IRS markets prior to 2009 (Table 1). From 2008

Table 1

Liquidity of the HUF FRA and IRS markets

(an estimate for the London inter-bank market)

	Average daily traded volume (HUF billion)	Bid-ask spread (basis point)	
		FRA	IRS
2006–2007	100	8	5
2007–2008	40	20	10

Source: JPMorgan.

[9] For the calculation and interpretation of liquidity indicators, see Páles and Varga (2008).

[10] The chart contains indicators of overnight maturity.

Chart 3

2-week forward yields beginning at various points in time estimated from the government securities market yield curve and the inter-bank yield curve

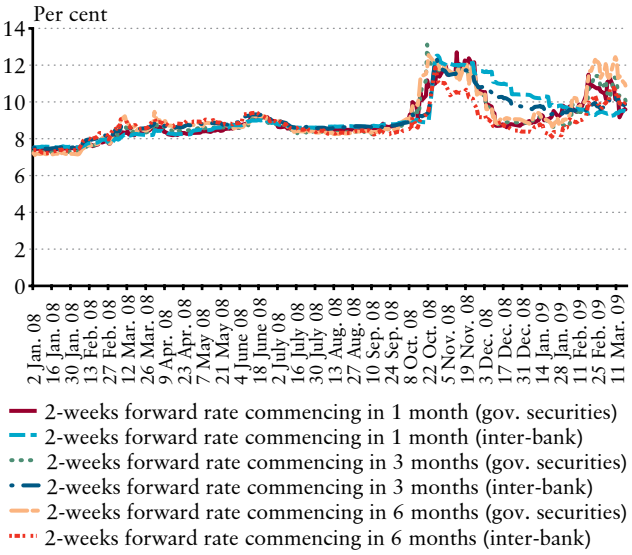


Chart 4

Base rate expected to be set at the next rate-setting meeting of the central bank

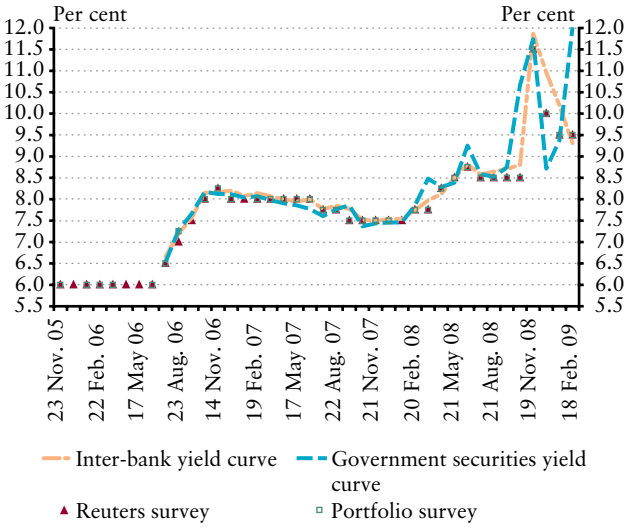
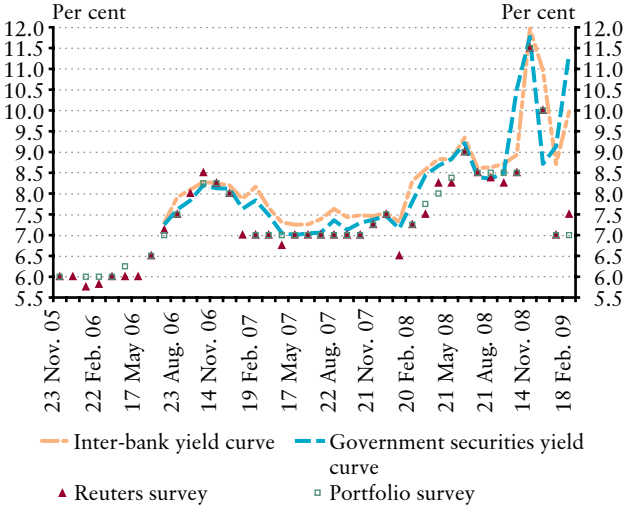


Chart 5

Expected end-year central bank base rate



onwards, they all point to liquidity constraints. At the same time, however, despite its widening, the bid-ask spread is roughly what can be regarded as average in the government securities market and lower than what was experienced there in turbulent times.

Based on liquidity indicators, it seems reasonable to say that forward yields computed from the yield curve estimated from inter-bank yields better approximate actual short-term policy rate expectations than those derived from the government securities market curve.

Increased volatility of forward yields computed from the yield curve (Chart 3) also suggests that disturbances leave a stronger footprint in the government securities market. The volatility of forward yields reflecting interest rate expectations for various points in time used to be similar in the case of both yield curves. Since the second half of October 2008, however, the volatility of government securities market yields has grown significantly. This means that we face considerably higher uncertainty regarding the information content of our measures of expectations if we rely on government securities yields rather than on inter-bank returns.

WHAT DID ANALYST EXPECTATIONS SUGGEST DURING THIS PERIOD?

Comparing data on implied forward yields obtained from the two different data sources with the results of the surveys conducted by Reuters and portfolio.hu among analysts, we arrive at a similar conclusion (Charts 4 and 5). Prior to the spring of 2008, forward yields computed from the two data sources reflect similar interest rate expectations. The government securities market curve was generally below the curve estimated from inter-bank returns, reflecting a lower credit risk premium. In the first half of 2008 we detected the first major divergence between the two curves. The government securities market curve reflected 50-100-basis point higher short-term expectations than surveys and the curve computed from inter-bank returns did. The difference became even more conspicuous after September 2008 and emerged even in longer-term expectations. The gap that became narrower temporarily widened significantly in February 2009. Based on the above, it seems that, overall, in

turbulent times it was forward yields computed from inter-bank returns that approximated short-term rate expectations better.

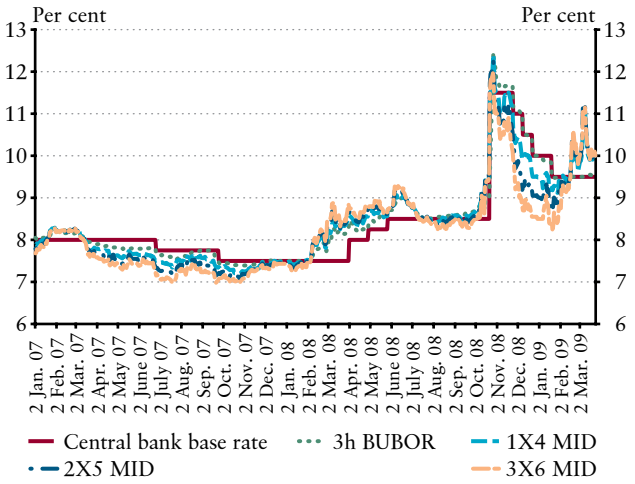
THE INTER-BANK YIELD CURVE IN PERIODS OF TURBULENCE: WHAT DOES BUBOR REFLECT?

Based on the above, it is safe to say that since the spring of 2008, the forward yield curve for inter-bank market yields has predicted interest rate expectations more reliably. However, disturbances also emerged in the inter-bank market in the autumn of 2008, with liquidity ebbing away. This may lead to distortions also in BUBOR and FRA fixings, on which the yield curve estimates are based, and thus to erroneous conclusions about expectations. In the following, we will examine possible biases in detail, and describe how – taking these factors into consideration – we can measure and interpret expectations more reliably. In doing so, we will focus on developments in the 3-month BUBOR. The reason for this is that this maturity is of key importance for two reasons. One is that the 3-month BUBOR is the underlying product of other market instruments (e.g. FRAs), and the other is that it serves as a benchmark interest rate for several types of corporate loans.

In addition to the fact that lower liquidity caused by a confidence crisis and the temporary drying-up of the inter-bank market distorted the information content of returns, the question which also arises in connection with BUBOR is how well the quotes provided by quoting banks reflect actual expectations. As no actual transaction is concluded at BUBOR, no costs are incurred if the interest rates provided by quoting banks reflect neither expectations of the base rate, nor the rate to be applied to possible transactions reliably. This type of bias does not necessarily originate from a lack of interest on the banks' part. Rather, lower liquidity in the unsecured inter-bank market is very likely to play a role during market turbulences. This particularly affected the market segment of transactions with longer maturities where business turnover is far lower than that in the market segment of overnight transactions. Since December 2008, loan transactions with a maturity of 3 months or longer have practically disappeared from the inter-bank market. As the market is illiquid, banks quoting BUBOR have no benchmark with which to compare their quotes. They cannot adjust their fixings to the interest rates of actual transactions. Although the adoption of BUBOR as a benchmark rate for corporate loans may mean that banks do have a stake at risk and bet on the accuracy of their expectations, this does not necessarily guarantee that quotes are in line with interest rate expectations.

Chart 6

Movements in the 3-month BUBOR and FRA returns



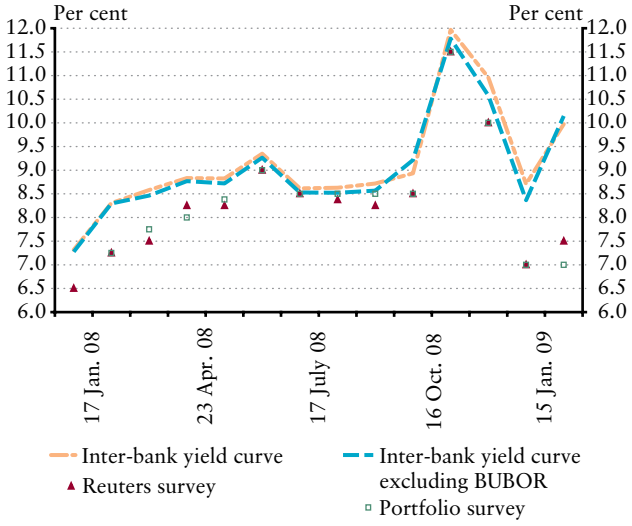
This concern seems to be justified by the recent rigidity of BUBOR fixings. Since December 2008 the 3-month BUBOR has practically been identical with the current base rate despite the fact that until mid-February FRAs and, occasionally, analyst projections had reflected significant rate cut expectations (Chart 6).

Theoretically, a higher BUBOR may reflect either the fact that, in the case of inter-bank lending, relative to FRA transactions and lending to the central bank, banks expect higher premia compensating counterparty risks or a higher liquidity premium due to market frictions. During easing cycles and corresponding expectations of rate cuts, it is particularly difficult to decide whether the fact that the level of BUBOR exceeds FRA returns is attributable to credit risk premia or a bias in fixings. There are two phenomena suggesting that BUBOR has recently reflected market participants' expectations to a lesser extent and banks simply give the prevailing base rate as their quotes. One is that, if a higher BUBOR were attributable to risk premia, there would be more or less continuous fluctuations in BUBOR, as market participants would revise their expectations in response to new incoming information. Sudden changes after rate-setting meetings occur only if the new base rate differs from expectations, it came as a surprise. Furthermore, fluctuations in risk premia may also lead to volatility in the level of BUBOR rates. However, fluctuations in BUBOR are minimal, in fact, much lower than those in FRAs; changes occur in a step-wise manner, coinciding with rate cuts.

Furthermore, BUBOR remained unchanged when, between mid-February and end of March 2009, FRA returns, consistent with analyst expectations, reflected the pricing-out of rate cut expectations and the emergence of expectations of

Chart 7

Expected end-year central bank rate



a base rate increase. If the explanation concerning the risk premium were valid, BUBOR fixings should be substantially higher than the prevailing policy rate since early March. The above notwithstanding, BUBOR has stayed close to the policy rate and has hardly followed the rise or the volatility experienced in FRAs since late January. However, as Chart 6 clearly shows, this was not always the case over the past two years. Subject to the prevailing market situation, BUBOR has changed nearly as dynamically as FRAs have.[11]

One of the consequences of BUBOR losing its information content is that the yield curve estimated from the returns on inter-bank instruments offers a somewhat more accurate picture of expectations if we do not use data on BUBOR fixings (Chart 7).

HOW ARE FRA RETURNS TO BE TREATED?

The question now arises whether FRA fixings, even if they change dynamically in response to changes in market sentiment, contain any bias caused by the fact that they are settled against a "sticky" BUBOR that fails to reflect expectations over the following 3-month period. In this case, FRA transactions can be regarded as if their underlying product (the benchmark rate) were a 3-month interest rate identical with the central bank base rate prevailing at the due date. In this case, FRA deals reflect expectations in relation to this instrument, i.e. expectations of the central bank base rate prevailing at the due date. In interpreting expectations, this represents a significant difference: FRA returns show expectations regarding the central bank base rate prevailing at the start of the transaction rather than the average base rate during the maturity period of the transaction. Thus, if the 3-month BUBOR reflected market participants' average interest rate expectations for the coming 3 months, then the 3-month FRA 1 month ahead would reflect expectations of a BUBOR prevailing 1 month later, which comprises the expectations of the average of the central bank rates during the 3-month period 1 month ahead. If, however, BUBOR is identical with the base rate, then it reflects the expectations prevailing at the start of the transaction, i.e. expectations of the following month's base rate. In this case, FRA returns commencing at various points in time directly indicate the expected central bank rate path. This would also mean that FRA returns have a characteristic gradual pattern, because expectations of rate cuts are reflected in prices when the period leading up to the settlement of the transaction contains the day, immediately following the rate-setting meeting, on which change is expected to occur.[12] If BUBOR did not get stuck at all, no calendar effects of this type, only expectations of future policy rates and the difference in BUBOR relative to them should be reflected in FRA returns.

There are sharp falls in FRA returns on some days, especially on rate-setting days or on the days immediately preceding them, which might lead to the conclusion that this is because of the 'cave-in' of future BUBOR fixings related to expected rate cuts. This hypothesis has also been confirmed by anecdotal information. Nevertheless, examining the dates closely reveals that such major falls do not occur exactly on the day of rate cuts at the beginning of the relevant future period (i.e. the day when a fall in BUBOR serving as a benchmark rate is expected to materialise).[13] Furthermore, significant changes in returns on FRAs with various maturities (e.g. 1 v 4, 2 v 5, etc.) occur on the same day despite the fact that the period intervening between two rate-setting meetings is not exactly one month. It follows that the data do not fully prove our assumption that FRA returns reflect expectations of the base rate directly. This is due, in part, to the fact that recent lower liquidity is manifest in a less efficient FRA market, and it may be the case that some banks fail to change fixings on these 'cut off dates'.

[11] As during the initial period the benchmark rate for BUBOR is fixed, its volatility should be lower than that of FRAs.

[12] Except for extraordinary cases, a new base rate enters into force on the day immediately *following* rather than *on* the rate-setting day. Thus, under our assumption, it will be reflected in the following day's BUBOR fixings.

[13] For instance, conventionally, the value date of a 1 v 4 FRA transaction concluded on 7 April 2009 is 9 April (T+2); the start date of the forward period would thus be 9 May. As, however, it falls on a weekend, it is the first working day following it (i.e. 11 May). BUBOR, which forms the basis for settlement, is the 7 May fixing for this day (T-2).

At the same time, however, the very fact that, in addition to expectations reflecting a declining interest rate path, FRA rates fall before rate-setting meetings without either fundamentals or market sentiments changing significantly suggests that market participants take into consideration the rigidity of BUBOR and its adherence to the base rate in their pricing.

CONCLUSIONS

In August 2007, a sharp rise in the level and the volatility of risk premia triggered by disturbances in the financial markets prompted several central banks to check whether the conventional instruments and methods used for measuring interest rate expectations still suited that purpose. Our analysis argued that it was in the government securities market that market turbulences caused the largest and the lengthiest disturbances in Hungary. Therefore, the yield curve computed from yields in the government securities market is less suitable for measuring market participants' expectations than it used to be. Recently, analyst expectations in various surveys have been followed more closely by forward yields computed from yield curves estimated from inter-bank returns. However, liquidity in the inter-bank market has decreased tangibly and the prices of certain instruments have become distorted. Since the end of 2008 BUBOR has been unsuitable for measuring market expectations. Fixings have lost their former flexibility and now cling to the prevailing rather than the future base rate. One of the consequences of BUBOR losing its information content is that the yield curve estimated from the returns on inter-bank market instruments offers a somewhat more accurate measure of expectations if we do not use data on BUBOR fixings. Nevertheless, FRAs based on BUBOR remain suitable for quantifying market participants' expectations provided that, when interpreting them, in addition to credit and liquidity premia we take into account the bias caused by BUBOR. If BUBOR is basically identical with the prevailing base rate, FRA returns reflect expectations of the central bank base rate prevailing at the start of their maturity period rather than expectations of the average central bank base rate during their maturity.

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