

Bidding behaviour of counterparties in the Eurosystem's regular open market operations

The Eurosystem's regular open market operations play an important role in steering interest rates and managing the liquidity situation in the money market. This article describes the main features of counterparties' bidding behaviour, focusing on the weekly main refinancing operations in the period from January 1999 to mid-June 2001. The period under review therefore covers both the fixed rate and the variable rate tenders. The spread between short-term money market rates and the tender rate, i.e. the rate applied to the fixed rate tender and the minimum bid rate in the variable rate tender, is identified as playing a key role in the bidding behaviour. In fixed rate tenders, the spread influenced the amount of bids submitted, while in the variable rate tenders, it significantly affected not only the level of the marginal and average rates of allotment, but also the dispersion of the bid rates. This article also describes and analyses the evolution of the degree of concentration of bids and allotments among bidders and suggests the conclusion that the bidding in the Eurosystem's tender operations is highly competitive. Generally, the analysis of the bidding behaviour confirms that the Eurosystem's regular tender operations are a market-oriented and highly efficient way to allot central bank funds to the banking system.

I Introduction

The Eurosystem's regular open market operations play a prominent role in the implementation of monetary policy. In the period from January 1999 to mid-June 2001, the period under review in this article, the Eurosystem conducted 127 main refinancing operations (MROs) with an average allotment volume of around €80 billion and 31 longer-term refinancing operations (LTROs) with an average allotment volume of around €18 billion. This article analyses the bidding behaviour of counterparties in the weekly MROs conducted in the first two and a half years of Stage Three of Economic and Monetary Union (EMU). In Box 2, the bidding behaviour in the MROs is compared with the bidding behaviour in the LTROs.

The procedures for conducting MROs are described in detail in the document "The single monetary policy in Stage Three: General documentation on Eurosystem monetary policy instruments and procedures", November 2000 (the "General Documentation"). MROs are regular liquidity-providing reverse transactions with a weekly frequency which normally have a maturity of two weeks. They were conducted as fixed rate tenders from January 1999 to 20 June

2000, and from then until the end of the period under review as variable rate tenders with a minimum bid rate.

Although the banking system as a whole structurally needs liquidity from the Eurosystem, the individual counterparties can consider interbank borrowing, using mainly short-term maturities (overnight, one week, two week, one month), as an alternative to obtaining funds directly from the Eurosystem. Therefore, an equilibrium condition between the expected cost of refinancing with the Eurosystem and the expected cost of obtaining funds through the interbank market has to be satisfied. In particular, the difference between the two-week money market rates and the rate for refinancing directly with the Eurosystem naturally plays a key role in the counterparties' preference for the latter funding alternative.

The article is structured as follows: Section 2 analyses the bidding behaviour in the MROs conducted as fixed rate tenders, while Section 3 focuses on the bidding behaviour in the MROs conducted as variable rate tenders. Section 4 concludes.

2 Bidding behaviour in the fixed rate tenders

In fixed rate tenders counterparties submit bids only at the pre-announced fixed tender rate. From January 1999 to 20 June 2000 a total of 76 MROs were conducted as fixed rate tenders. The average allotment volume in the fixed rate tender MROs amounted to €69 billion. If the total amount of bids was higher than the intended allotment volume, the ECB allotted only a corresponding proportion of the bid amount to each bidder.

The aggregate bidding behaviour

The total bid amount submitted to the fixed rate tenders was mainly driven by the spread between the short-term money market rates and the fixed tender rate (see Chart 1). After having increased in the first months of 1999, the total bid amount fell markedly in March and April 1999 as strong expectations of an imminent interest rate decrease by the ECB meant that the short-term market rates fell below the fixed tender rate. The smallest aggregated bid amount experienced under the fixed rate tender (€67 billion) was submitted at the MRO conducted on 6 April

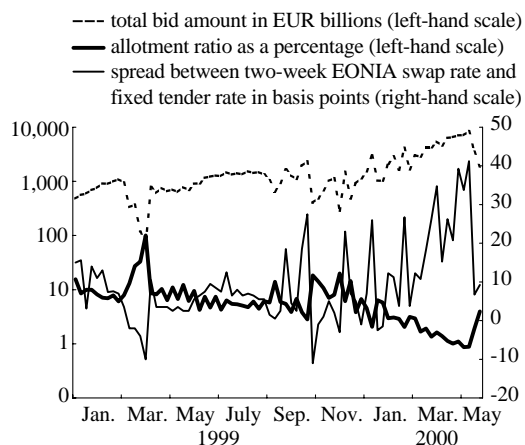
1999. It did not allow the ECB to allot an amount of liquidity that would normally have ensured a smooth fulfilment of minimum reserve requirements.¹

From mid-1999 to mid-2000, the short-term market rates were, on account of expectations of interest rate increases, most of the time above the fixed tender rate. This made refinancing through the fixed rate tender very attractive and, as a consequence, the bid amounts tended to expand exponentially. The highest aggregated amount of bids of €8,491 billion was submitted to the MRO of 6 June 2000. This total bid amount was more than 100 times greater than the actual liquidity needs implied by the reserve requirements and the autonomous factors.² Reflecting the expansion of bids, the allotment ratios, i.e. the ratios between the total allotments and the bid amounts, shrank over this period and finally fell to below 1% in the MRO allotted on 30 May 2000. In addition to this declining trend, significant volatility in allotment ratios was observed, particularly in the second half of 1999.

The volatility and associated uncertainty regarding the allotment ratio meant that counterparties who bid substantially more than their available collateral, i.e. who “overbid”, were facing the risk of not having sufficient collateral to cover the allotted amount.³ The degree of risk involved, however, depended on the overall amount of collateral available to the individual counterparties, in the sense that counterparties with a large amount of collateral faced a somewhat smaller risk of running short of collateral when overbidding. This may partly explain why there was a marked change in the ranking of the largest

Chart 1
Total bid amount, allotment ratio and the spread between the two-week EONIA swap rate and the fixed tender rate

(weekly data; left-hand scale: logarithmic; right-hand scale: linear)

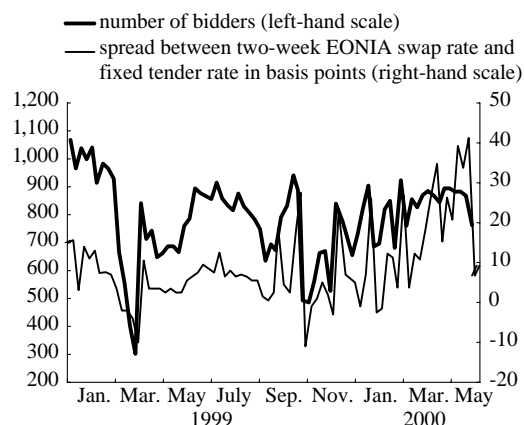


Sources: Reuters and ECB.

- 1 See the discussion of the underbidding phenomenon in Box 1.
- 2 Autonomous liquidity factors can be defined as the items in the consolidated balance sheet of the Eurosystem, apart from monetary policy operations, which provide or withdraw liquidity and thus affect the current accounts which credit institutions hold with the Eurosystem.
- 3 The ECB clarified in a press release in February 1999 that only the allotted amount and not the bid amount needs to be covered by collateral.

Chart 2

Number of bidders and the spread between the two-week EONIA swap rate and the fixed tender rate (weekly data)



Sources: Reuters and ECB.

bidders during the fixed rate tender period: in May 2000, when overbidding was close to its highest intensity, the three counterparties who had bid the most on average in June 1999 were ranked only between 11th and 27th in terms of bids submitted. From June 1999 to May 2000 these counterparties increased their total bid amounts by an average factor of just under four. This contrasts with the three largest bidders in May 2000, who had increased their bids by an average factor of 31 since June 1999. None of the three largest bidders in May 2000 had been among the largest 30 in June 1999.

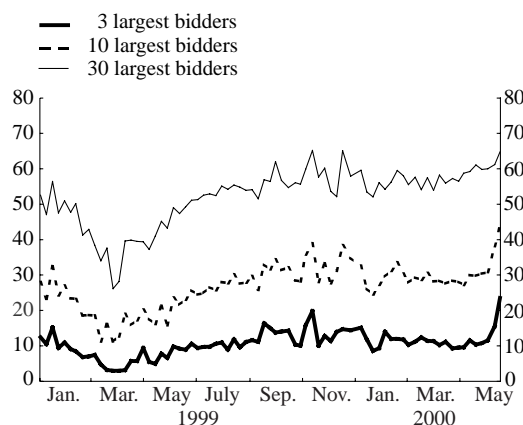
The number of bidders was also mainly driven by the spread between the short-term money market rates and the tender rate (see Chart 2). The highest number of bidders participating in the fixed rate tender, 1,068, was achieved in the second tender of 1999. A few months later, on 6 April 1999, the number of bidders reached its lowest value of 302 for MROs conducted as fixed rate tenders as a result of the strong expectations of an interest rate reduction that prevailed at this point in time. During the rest of the fixed rate tender period, the number of bidders was fairly stable around the mean of 788.

Concentration of bids and allotments

The extent to which the bids and allotments are concentrated on a small number of counterparties can be summarised by the share of bids and allotments of the 3, 10 and 30 largest bidders. In the case of fixed rate tenders, the concentrations of bids and allotments are equal. On average the 3, 10 and 30 largest bidders in the fixed rate tenders received, respectively, 11%, 27% and 52% of the overall liquidity allotted, suggesting a sufficient degree of competition for the allotment amounts. The large bidders significantly reduced their share of the overall bids from January 1999 to the interest rate reduction in April 1999 (see Chart 3). Their allotment shares increased again in the months following the interest rate reduction as well as in the two-week period between the announcement and the implementation of the variable rate tender procedure. Nevertheless, in spring 2000, when overbidding was increasing at a somewhat faster rate, the large bidders did not in general receive an unusually high share of the overall allotments.

Chart 3

The largest bidders' share of the aggregated bids and the overall allotments during the fixed rate tender (weekly data; percentage share of total allotments and bids)



Source: ECB.

3 Bidding behaviour in the variable rate tenders

In a pure variable rate tender, counterparties may submit bids at several interest rates. When conducted according to the multiple rate allotment procedure, all bids above the marginal allotment rate are fully allotted at the interest rates at which the bids are placed, while bids at the marginal rate of allotment are allotted pro rata. At its meeting on 8 June 2000, the Governing Council of the ECB decided that, as from the maintenance period ending on 23 July 2000, the MROs of the Eurosystem would be conducted as variable rate tenders using the multiple rate allotment procedure. This decision was a response to the severe overbidding in the fixed rate tender procedure. Furthermore, the Governing Council decided to set a minimum bid rate which would take over the role from the fixed tender rate to signal the stance of monetary policy, and to publish a forecast of the liquidity needs together with the announcement of each MRO. The latter was introduced in order to facilitate counterparties' preparation of bids.⁴ Counterparties adapted easily to the new tender procedure. Even in the first variable rate tender, there was a relatively low dispersion of bids, and already by the second tender, the spread between the marginal and the weighted average rate of allotment had reached its long-term average of 1 basis point.

Overview of the aggregated bidding behaviour in the variable rate tenders

In the variable rate tender the array of bids cannot simply be described by means of the bid amounts as in the fixed rate tender, but is rather illustrated by means of the bid curves, which express the amount of bids (on the y axis) submitted at the various bid rates (on the x axis).⁵ Thus useful information on the bidding behaviour is provided by both the level of the bid rates and the extent to which the bids are spread around this level. In this article, the level and the heterogeneity of the bids are analysed by means of the marginal and average rates of allotment and

by the "unevenness" of the bid curve. The absolute values of the marginal and average rates are a measure of the level around which the bid rates were concentrated, while the difference between the two expresses the dispersion of the bid rates. The unevenness is defined as the number of times the bid curve changes from an upward to a downward slope or vice versa, and hence describes how "non-smooth" the bid curve is.⁶ In general, when bidding is more dispersed, the unevenness increases (i.e. the bid curve becomes less smooth), partly owing to the attractiveness of submitting bids at "round" rates at which the bid curve accordingly peaks. Chart 8 and Table 3 provide examples of bid curves and, among other key figures, the corresponding values for dispersion and unevenness.

The level of bids

The marginal rates of the MROs are highly correlated with the comparable short-term money market rates of, for instance, a two-week maturity (see Chart 4). This is a result of the fact that the latter represent the costs of an alternative funding opportunity, namely the interbank market, and are therefore used as "benchmarks" by counterparties when preparing their bids for the MROs. Consequently, the main factors that drive the level of the expected marginal rates are broadly related to those that drive the short-term money market rates. These factors include market expectations of changes in the key ECB interest rates, the liquidity

⁴ For a more detailed description of these forecasts, see the box on autonomous factors in the article entitled "The switch to variable rate tenders in the main refinancing operations" in the July 2000 issue of the ECB Monthly Bulletin, as well as Box 2, entitled "Autonomous liquidity factors in the euro area and the use of the forecasts of liquidity needs provided by the ECB", in the July 2001 issue.

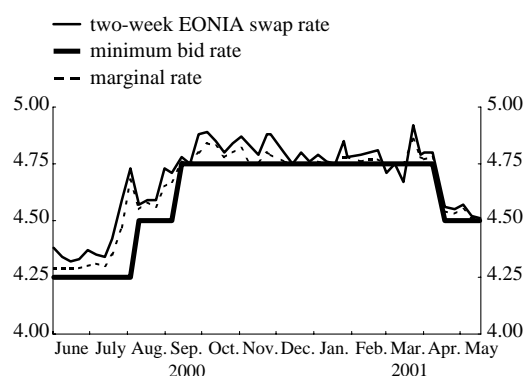
⁵ The Eurosystem will in future provide the aggregate bidding curves in regular open market operations which have been conducted at least six months previously. Interested parties who may require this information for research purposes should contact Directorate General Operations.

⁶ Only changes of above €100 million are counted.

Chart 4

Evolution of the two-week EONIA swap rate, the minimum bid rate and the marginal rate in the variable rate tenders

(weekly data; as a percentage)



Sources: Reuters and ECB.

conditions of the euro area (and hence also the result of the tenders), and special events such as ends of years.

Reflecting the very high degree of liquidity in the EONIA swap market, the two-week EONIA swap rate appears to be the most widespread benchmark among counterparties when preparing their bids. However, the two-week unsecured deposit rate, which is normally higher than the two-week swap rate, and the two-week general collateral repo rate, which, conversely, is normally lower, are also relevant. In fact, the marginal rate is usually below the deposit and swap rates and broadly in line with the repo rate (see Table 1). Consequently, bids are normally below the deposit rate and are mainly concentrated between the minimum bid rate and the swap rate (see Table 3).

Heterogeneity of bids

The fact that bids are heterogeneous, i.e. they are submitted at more than one interest rate, is related to a number of factors, of which the following may be highlighted:

- Counterparties concentrate their bids at different levels because they have different expectations regarding the marginal rate.
- Each individual counterparty may diversify its bids in a range centred around its expectation regarding the level of the marginal rate and hence submit bids at different rates. The degree of diversification depends on the extent of the uncertainty regarding the marginal rate and the counterparty's aversion to the possibility of not obtaining any funds directly from the central bank. This aversion may vary across counterparties on account of different credit risk premia to be paid in the interbank market, collateral considerations, different balance sheet structures, etc.

In sum, a higher degree of uncertainty about the marginal rate increases the heterogeneity of bids (i.e. the dispersion and unevenness), as counterparties place their bids in line with their different expectations, and, in addition, react to uncertainty by diversifying their bids.⁷

⁷ Furthermore, it can be expected that, *ceteris paribus*, the heterogeneity of bids would increase in periods of market strain, when credit limits are stricter and credit risk premia are higher, because the latter increase the cost of not obtaining funds at the MROs.

Table 1

Spreads between market and MRO rates in the period from 27 June 2000 to 12 June 2001

Spread (basis points)	Average	Standard deviation	Maximum	Minimum
Weighted average rate – Deposit rate	-3.3	2.5	+4	-11
Marginal rate – Deposit rate	-4.9	3.4	+4	-14
Weighted average rate – Swap rate	-1.8	2.7	+8	-9
Marginal rate – Swap rate	-3.4	3.4	+8	-12
Weighted average rate – Repo rate	+1.0	2.5	+6	-6
Marginal rate – Repo rate	-0.6	3.2	+6	-9

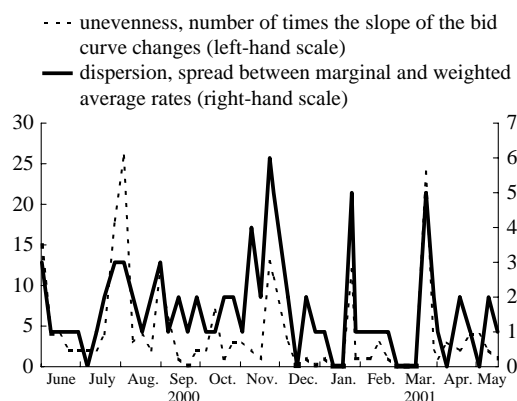
If the short-term money market rates are very close to or even below the minimum bid rate, the uncertainty regarding the marginal rate is rather low as the bids tend to cluster at the minimum bid rate. Hence, in such a scenario, the variable rate tender with a minimum bid rate becomes similar to a fixed rate tender. This was the case during most of the period from the end of 2000 to mid-June 2001, when the short-term money market rates were relatively low compared with the minimum bid rate (see Chart 4) because of general expectations of stable interest rates or interest rate decreases. Consequently, the dispersion and the unevenness were relatively low during most of this period (see Chart 5). However, on 13 February 2001 and 10 April 2001, counterparties bid, as on 6 April 1999 under the fixed rate tender, below the allotment amount that would have allowed for a steady fulfilment of the minimum reserve requirements. This “underbidding” implied a high degree of uncertainty regarding the marginal rate for the subsequent tenders, as counterparties did not know to what extent the allotment decisions would normalise the liquidity situation and hence bring short-term money market rates back to more normal levels. Thus, the dispersion and unevenness peaked significantly in the tenders conducted on 20 February 2001 and 18 April 2001 (see Chart 5). A discussion of the underbidding phenomenon is provided in Box 1.

More generally, it can be observed that whenever the short-term money market rates are above the minimum bid rate, the uncertainty regarding the marginal rate and consequently the heterogeneity of bids are normally relatively high, as bids then do not simply cluster around the minimum bid rate. Indeed, for most of the second half of 2000, when the spread between the short-term money market rates and the minimum bid rate was relatively high (see Chart 4), the dispersion and unevenness of the bids were somewhat higher than during the period from the end of 2000 to mid-June 2001 (see Chart 5).

Chart 5

Unevenness and dispersion in variable rate tenders

(weekly data; left-hand scale: unevenness; right-hand scale: basis points)



Source: ECB.

The declining trend of the unevenness and the dispersion indicators that was experienced from the introduction of the variable rate tender to mid-June 2001 may not, however, only reflect the evolution of the market rates as explained above, but also, to some extent, a “learning process” among bidders.

The dispersion reached its maximum value on 19 December 2000, probably on account of the combination of an end of maintenance period and a year-end effect, while the unevenness was at its highest on 29 August 2000, owing to strong interest rate increase expectations as is further explained below.

The factors influencing the bidding behaviour reviewed so far suggest that a positive correlation is to be expected between the number of bidders and the total bid amount on the one hand, and the level of the spread between the short-term money market rates and the minimum bid rate on the other. Indeed, Chart 6 suggests that the general decline in the spread between the money market rates and the minimum bid rate that was experienced during the variable rate

Box I**Underbidding in the fixed and variable rate tenders**

As seen in the main text of this article, the variable rate tender with a minimum bid rate becomes very similar to a fixed rate tender when there are strong expectations of rate decreases. Indeed, two of the three cases of underbidding in the period from January 1999 to mid-June 2001 occurred under the variable rate tender with a minimum bid rate.

Overview of the three cases of underbidding

	7 April 1999	13 February 2001	10 April 2001
Bid amount (EUR billions)	66.6	65.3	25.0
Allotment allowing for a smooth fulfilment of minimum reserve requirements (EUR billions)	96.0	88.0	53.0
Accumulated net recourse to the marginal lending facility in the remaining days of the reserve maintenance period (EUR billions)	11.3	71.7	61.4
Maximum spread between the EONIA and the minimum bid rate until the end of the reserve maintenance period (basis points)	43	97	100
Average spread between the EONIA and the minimum bid rate until the end of the reserve maintenance period (basis points)	12	54	77

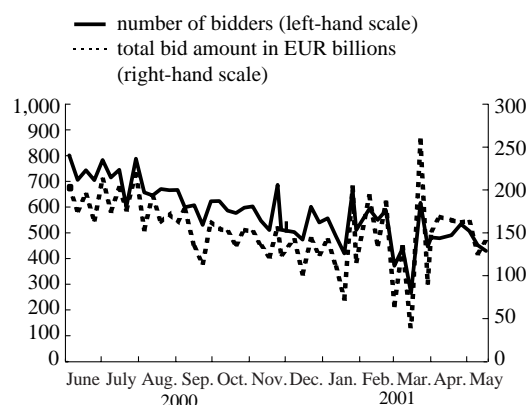
This box focuses on the two most recent cases in the period under review, both of which took place in 2001. On 13 February only €65.3 billion was allotted, when an allotment in the order of €88 billion would have allowed for a smooth fulfilment of reserves up to 20 February. On 10 April only €25 billion was bid, which was less than half of the amount that would have allowed counterparties to fulfil their reserve requirements smoothly up to 17 April. After both instances of underbidding the ECB provided large amounts of liquidity in the following MRO without, however, fully restoring neutral liquidity conditions. Indeed, the implied accumulated recourse to the marginal lending facility in the February and the April maintenance periods amounted to €78 billion and €65 billion respectively. When allotting high volumes in the tenders following the underbidding, the ECB also had to take into account the balance of the liquidity supply in the current and subsequent maintenance periods. The resulting tight liquidity conditions and exceptionally high interbank overnight rates enhanced the understanding that underbidding is a non-profit-making strategy for the banking community. Indeed, the high level of short-term market rates rewarded those who participated in the tenders as usual, while they imposed additional costs on those who bid less than usual. This underlines that underbidding is not an equilibrium strategy even when rate decreases are expected.

tender period (see Chart 4) was mirrored by a decrease in the number of bidders and the size of the total bid amount.

In the second half of 2000 the average number of bidders in the MROs amounted to 640, which was about 30% more than the average number of bidders in the first half of 2001 (485). The same declining trend was also observed for the total bid amount. The overall decline in the total bid amount meant that the “bid-cover ratio”, which expresses

how many times the total bid amount exceeds the total allotment amount, declined from levels of around 2.5 in June 2000 to levels of around 1.5 at the end of the period under review. At the same time, the average amount each counterparty bid per bid rate increased significantly from levels of around €100 million to current levels of around €150 million.⁸

⁸ The average total bid amount per participant also increased from levels of around €250 million to current levels of around €300 million.

Chart 6**Number of bidders and total bid amounts in variable rate tenders***(weekly data)**Source: ECB.*

Over the whole variable rate tender period the number of participants in the MROs averaged 567, which is significantly lower than the average of 788 for the fixed rate tender period. This probably reflects the fact that, by contrast with the marginal rate of the variable rate tenders, the rate of the fixed rate tenders is certain (i.e. known in advance when the bids are submitted), and is lower than the money market rates with comparable maturity during periods of expectation of interest rate increases. In the same way, the difference between the number of bidders in the two tender periods may also partly be due to the fact that expectations of interest rate increases dominated the fixed rate tender period to a greater extent than the variable rate tender period. Considering the number of counterparties that actually received liquidity in the variable rate tenders, the decrease is even more significant. On average, 463 banks, or 83% of the participants, received liquidity in the variable rate tenders, which is 41% less than the average number of banks that participated in the fixed rate tenders (and thus by construction received liquidity).

Concentration of bids and allotments

A high degree of competition in the MROs could also be observed during the variable rate tender period. Hence the concentration of the bids on the largest bidders remained rather limited, although slightly higher than in the fixed rate tender period. The share of the total allotment received by the largest 3, 10 and 30 bidders (see Chart 7) fluctuated in general around the mean values given in Table 2. However, there seems to have been a tendency for the concentration to increase since February 2001 and until the end of the period under review, which is probably related to the fall in the number of bids and bidders during that period.

The concentration of individual allotments was a little higher than the concentration of individual bids, i.e. large bidders were submitting more successful bids, in relative terms, in the sense that a higher proportion of their bids actually resulted in an allotment of liquidity (see Table 2).

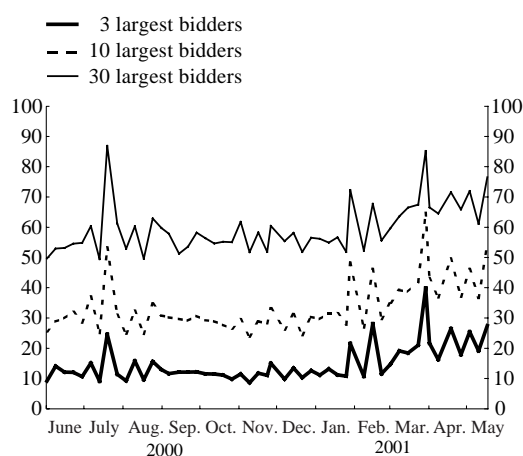
Chart 7**The largest bidders' share of the overall allotments during the variable rate tender***(weekly data; percentage share of total allotments)**Source: ECB.*

Table 2**Average concentration of individual allotments and bids in the variable rate tenders**

	3 largest bidders	10 largest bidders	30 largest bidders
Average share of bids	12.5%	28.8%	53.5%
Average share of allotment	15.0%	33.8%	59.7%

Specific bidding behaviour in different market scenarios

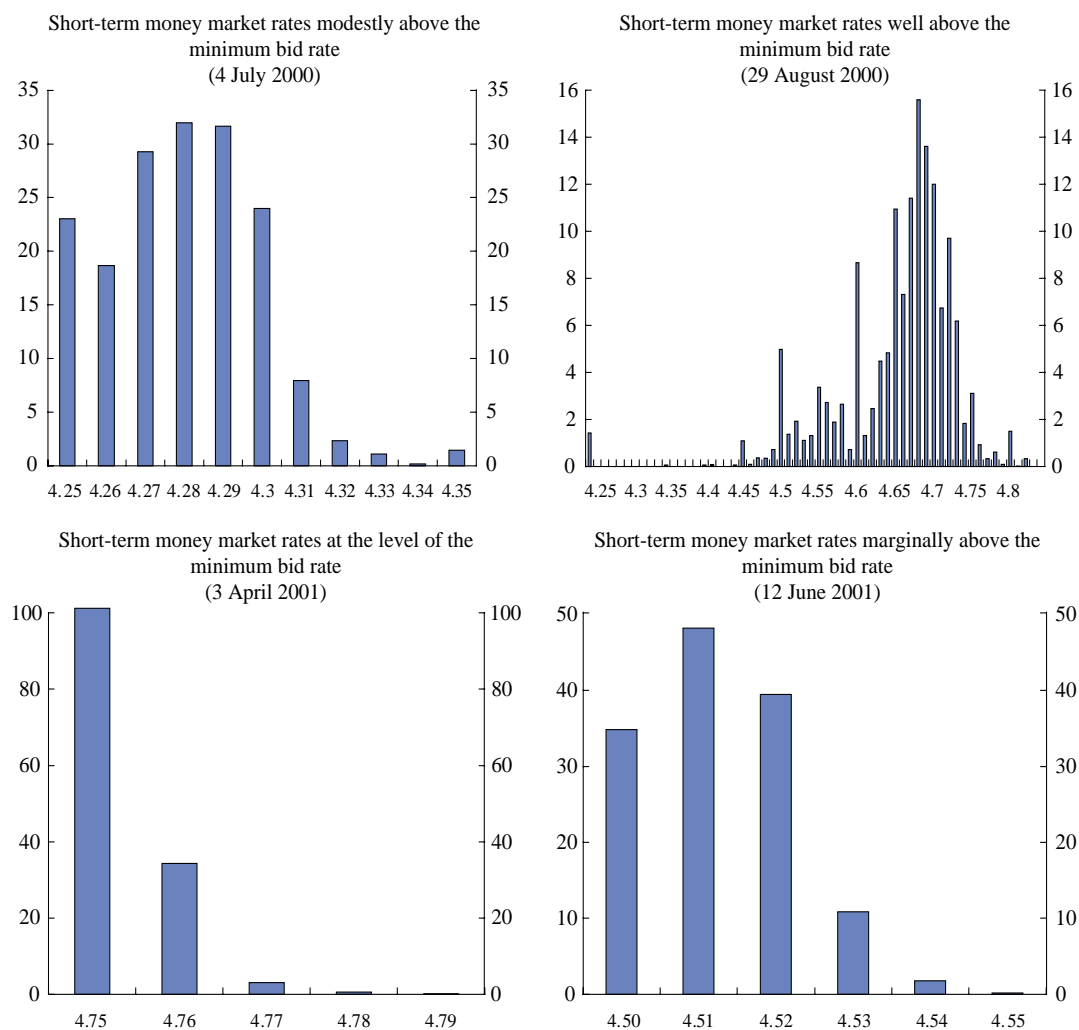
The selection of bid curves in Chart 8 provides a more detailed overview of the typical bidding behaviour under different

market conditions experienced in the period under review.

Most of the statistics for the four selected tenders that are provided in Table 3, which also shows average, minimum and maximum

Chart 8**Bid curves under different market conditions**

(x axis: bid rates as a percentage; y axis: bid amount in EUR billions)



Source: ECB.

Table 3**Bidding data for the MROs conducted through a variable rate tender**

	4 July 2000	29 Aug. 2000	3 Apr. 2001	12 June 2001	Average ¹⁾	Maximum ¹⁾	Minimum ¹⁾
1 Allotment volume (EUR billions)	58.0	68.0	118.0	67.0	88.9	172.0	5.0
2 Bid volume (EUR billions)	171.8	149.9	129.1	135.4	148.0	257.7	24.9
3 Bid-cover ratio	3.0	2.2	1.1	2.0	2.1	16.7	1.0
4 Number of bidders	700	649	422	411	567	800	240
5 Number of bids per bidder	3.0	3.0	1.4	1.8	2.3	3.3	1.2
6 Minimum bid rate (as a percentage)	4.25	4.25	4.75	4.50	4.60	4.75	4.25
7 Spread between minimum bid rate and marginal rate (basis points)	4	43	0	1	4.9	43	0
8 Spread between lowest bid rate and highest bid rate (basis points)	65	60	6	7	24	95	4
9 Dispersion (spread between marginal rate and weighted average rate in basis points)	1	3	0	2	1.6	6	0
10 Unevenness (number of times the slope of the bid curve reverses)	4	26	0	1	4.3	26	0
11 Share of bids placed between minimum bid rate and repo rate	59.9%	51.6%	0%	25.7%	55.3%	99.9%	0.0%
12 Share of bids placed between repo rate and swap rate	39.9%	42.6%	78.4%	35.6%	33.0%	99.0%	0.0%
13 Share of bids placed between swap rate and deposit rate	0.0%	3.9%	0.0%	37.2%	5.3%	48.5%	0.0%
14 Share of bids placed between deposit rate and highest bid rate	0.2%	1.9%	21.6%	1.5%	6.3%	100%	0.0%

1) For the period from 27 June 2000 to 12 June 2001.

values up to mid-June 2001, were published on wire services when the tender was announced or when the results were known (rows 1, 2, 3, 4, 6, 7, 8 and 9). The rest of the information has not yet been made publicly available (rows 5 and 10). The last four rows of the table provide the percentage of bids in four different ranges, delimited by the minimum bid rate, the repo rate, the EONIA swap rate, the deposit rate and the highest bid rate.

Already at the second MRO conducted as a variable rate tender on 4 July 2000, there was only a 1 basis point spread between the marginal and the weighted average rate, suggesting that counterparties had very quickly adapted to the new tender procedure. However, the spread between the lowest

bid rate and the highest bid rate was, at 65 basis points, rather wide, although the volume bid at the highest rate was limited (€50 million). In this example, where no strong market expectations of imminent interest rate changes prevailed, a concentration of bids at the minimum bid rate was observed as counterparties were speculating on the off chance that the marginal rate would turn out to be the same as the minimum bid rate. This explains the relatively high proportion of bids submitted at a rate between the minimum bid rate and the repo rate.

When comparing the tender of 4 July 2000 to the last tender of the period under review, conducted on 12 June 2001, the “learning process” among counterparties mentioned above is clearly evident, although the bidding

Box 2**Longer-term refinancing operations**

Between January 1999 and the end of May 2001, the Eurosystem conducted a total of 31 longer-term refinancing operations (LTROs) as variable rate tenders with pre-announced allotment volumes. In all the LTROs a multiple allotment procedure was applied and, other than for the very first operations, all had a three-month maturity, while the allotment volumes were set at between €15 billion and €25 billion. As regards the tender procedure, the main differences between LTROs and MROs are the pre-announced allotment volume and the absence of a minimum bid rate in the LTROs, such that the ECB acts as a “rate-taker” in LTROs. Furthermore, by contrast with the MROs, the allotment result in LTROs normally has no information content regarding liquidity conditions. Therefore, the allotment result itself should not normally have a significant impact on the market. The following table summarises the time series of the bidding parameters for the LTRO by providing the average, maximum and minimum values for the period from January 1999 to May 2001.

Bidding data for the LTROs conducted from January 1999 to May 2001

	Average	Maximum	Minimum
1 Allotment volume (EUR billions)	17.7	25.0	15.0
2 Bid volume (EUR billions)	55.6	91.1	15.9
3 Bid-cover ratio	3.2	5.3	1.1
4 Number of bidders	285	466	165
5 Number of bids per bidder	2.6	3.1	1.9
6 Marginal rate as a percentage	3.75	5.06	2.53
7 Spread between lowest bid and highest bid rate (basis points)	73	120	31
8 Dispersion (spread between marginal rate and weighted average rate in basis points)	3	23	0
9 Unevenness (number of times the slope of the bid curve reverses)	7.2	18	1

Both the dispersion and unevenness of bids in LTROs are higher than in MROs, which mainly reflects the absence of a minimum bid rate in the former and the differences between the counterparties involved in the two operations. LTROs represent a good opportunity for smaller counterparties, which have limited or no access to the interbank market, to receive liquidity for a longer period (i.e. three months). In LTROs the unevenness and dispersion also fell extremely early, indicating a quick learning process. They reached their minimum value as early as May 1999, implying that no further convergence of bidding was observed afterwards. While the bid-cover ratio fluctuated around 4 until April 2001, it has been closer to 2 since then. The number of participants has clearly been lower in the LTROs than in the MROs: an average of only 285 counterparties participated in the LTROs compared with 699 for MROs. All in all, 607 different banks participated in at least one LTRO compared with 1,199 for MROs. 34 banks participated exclusively in LTROs and 626 exclusively in MROs, while 573 banks participated in both MROs and LTROs. The number of bids per bidder was on average 2.6 (slightly higher than in MROs) and exhibited only limited fluctuations.

in the latter case of course also reflects low expectations of interest rate decreases. On 12 June 2001, the concentration at the minimum bid rate was much more pronounced, the bid curve was more even (with unevenness at one), and the spread between the lowest bid rate and the highest bid rate was, at only 7 basis points, much

lower. Furthermore, it may be noted that the amount of bids in this operation remained rather high and the bid-cover ratio comfortable. This may reflect the fact that counterparties remembered the consequences of the two previous rounds of underbidding (see Box 1).

Expectations of an interest rate decrease had an effect on the bidding behaviour in the tender of 3 April 2001 – the one preceding the underbidding on 10 April. Consequently, a significant concentration (more than 80%) of bids at the minimum bid rate could be observed. Hence, the marginal and the weighted average rates were both at the minimum bid rate and the unevenness and dispersion indicators were very low (the bid curve falls continuously). The average number of bids per bidder was, of course, also rather low at 1.4, and the bid-cover ratio stood at 1.1, suggesting that the risk of underbidding had already become substantial. With deposit and swap rates at the level of the MRO minimum bid rate, and the repo rate just 1 basis point below the minimum bid rate, most of the bids to this MRO were submitted at the minimum bid rate, while a few bids were placed above this rate in order to secure the provision of central bank liquidity.

This contrasts with the bid curve in a scenario of expectations of interest rate increases, as prevailed, for example, on 29 August 2000. In this tender, the expectations of an interest rate

increase not only led to a record spread between the minimum bid rate and the marginal rate (43 basis points), but also to a relatively high dispersion of bids, as indicated by the comparatively large spread between the marginal and the weighted average rates (3 basis points). Related to this, the bid curve was also exceptionally uneven (unevenness stood at 26), as counterparties tended to submit bids at round numbers. Indeed, local peaks of the bid curve appear at 4.45, 4.50, 4.55, 4.60, 4.65, 4.75 and 4.80, each of which increases the unevenness by two points. Here, too, a concentration of bids at the minimum bid rate could be observed, although the latter was 20 basis points away from the next bid rate at which bids of above €100 million were submitted. Again, this concentration at the minimum bid rate explains the relatively high proportion of bids submitted between the minimum bid rate and the repo rate.

Focusing mainly on the differences as compared with the MROs conducted as variable rate tenders, Box 2 describes some elements of the LTROs the Eurosystem conducted in the period under review.

4 Concluding remarks

This article has reviewed counterparties' bidding behaviour with regard to the main refinancing operations conducted by the Eurosystem in the period from January 1999 to mid-June 2001. In this period, both the fixed and the variable rate tender procedures were applied. The analysis identifies the most important factor for determining bidding behaviour as being the spread between short-term money market rates and the tender rate, i.e. the rate of the fixed rate tender or the minimum bid rate under the variable rate tender. In the spring of 2000 this spread was relatively high owing to market expectations of an increase in the key ECB interest rates. This resulted in an exponential increase in the total bids submitted to the fixed rate tenders. When overbidding reached very high levels, it was decided to switch to the variable rate tender procedure with a minimum bid rate in June 2000 and, at the same time, to

start publishing a forecast of the liquidity needs together with the announcement of each MRO.

The transition to the variable rate tender procedure with a minimum bid rate was very smooth. The new tender procedure immediately solved the overbidding problem. Furthermore, the observed concentration of bids around the corresponding market rates suggested that counterparties could very quickly adapt to it.

Some increase in the dispersion and the unevenness of the bids appeared in periods of more intense expectations of interest rate increases, as a result of increased uncertainty regarding the marginal rate. A similar development was also observed when other factors, such as very tight liquidity conditions, resulted in greater uncertainty

regarding the marginal rate. Bids clustered at, or just above, the minimum bid rate when expectations of unchanged or falling interest rates prevailed. Uncertainty regarding the marginal rate tended to vanish under these circumstances and the variable rate tender became similar to a fixed rate tender.

The number of bidders declined during the period under review, reflecting at least to some extent the evolution of interest rate expectations, as well as a step decline resulting from the switch to the variable rate tender procedure.

Nevertheless, the number of bidders remained at a high level and, as suggested by the rather limited concentration of bids and allotments on the largest individual bidders in both tender regimes, there seems to be a high degree of competition in the Eurosystem's tender operations. In particular,

the largest bidders did not receive an unusually high share of allotments during the period of strong overbidding in the fixed rate tender period. Furthermore, the marginal and weighted average rates of the variable rate tenders were well in line with the prevailing market rates.

In sum, it may be concluded that the Eurosystem's tender operations emerged, from the beginning of 1999, as a market-oriented and highly efficient way to channel central bank funds directly to a wide range of counterparties. The market orientation was supported by the move from the type of fixed rate tender applied by the Eurosystem in the first 18 months of Stage Three to the variable rate tender, whereby the minimum bid rate replaced the fixed tender rate in signalling the stance of monetary policy associated with the main refinancing operations.