The most important steps of BUBOR reforms led by the Central Bank of Hungary in an international comparison*

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What do interbank reference rates show and why do they play a prominent role? Why was the reform of BUBOR (Budapest Interbank Offered Rate) necessary and what were the reform steps taken by the central bank of Hungary (Magyar Nemzeti Bank – MNB) ? In this study, we seek answers to these and similar questions, while also providing an overview of international reform measures. The aim of the reforms initiated by the central bank was to eliminate the main risks arising in connection to the use of LIBOR (London Interbank Offered Rate) methodology in the domestic environment. Reference rates are considered public goods and economic sectors have financial contracts of considerable value indexed to BUBOR; numerous legal regulations also refer to BUBOR. One of the most important reform measure was to establish the Quotation Committee within the Hungarian Forex Association (MFT), in order to strengthen the independence of the administrator. The members of the Quotation Committee include the central bank of Hungary and the delegated parties of the Hungarian Banking Association (HBA). Important changes were made in the methodology of BUBOR in compliance with international practice: (i) the so-called trimming procedure was adjusted to improve the availability and reliability of price quotations;(ii) the number of listed tenors were reduced; and (iii) the methodology of selecting BUBOR market makers was confirmed. In order to make BUBOR quotations more transparent, the central bank of Hungary publishes quotations for each panel bank through the REUTERS press agency and regularly prepares and publishes statistical reviews on whether quotations comply with market conditions. In addition to this, the minutes of the Quotation Committee meetings are public since the first session in July 2014.

Journal of Economic Literature (JEL) Classification: E43, E52, E58

Keywords: BUBOR, reference rate, LIBOR, monetary policy

* The views expressed in this paper are those of the author(s) and do not necessarily reflect the offical view of the Magyar Nemzeti Bank.

The authors are grateful to Péter Koroknai, Zsolt Kuti and Gábor Liener, Dániel Palotai and to two anonymous referees for all the useful feedback they provided in the course of assessing the study.
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1 Reasons behind the reforms

1.1 Definition of BUBOR

BUBOR (Budapest Interbank Offered Rate) is presumably Hungary's most important reference rate, which shows the trimmed average of interest rate quotations defined in a so-called fixing procedure by quoting banks for each bank day. In the course of the fixing procedure, the interest rate quotation means the interest rate that would be offered by any active quoting bank to another active quoting bank to provide an *unsecured interbank loan* on any given Hungarian bank day, based on its best knowledge and consideration for the tenors (1 day, 1 week, 2 weeks, 1 month, 2 months, 3 months, 6 months, 9 months, 12 months) specified in the quoting procedure by a bank providing interest rate quotation *(Hungarian Forex Association, 2014a)*.

1.2 BUBOR is a financial indicator of systemic importance

The development of BUBOR as a financial indicator of systemic importance influences the financial calculation of several thousands of billions of HUF corporate credit and derivative financial products (forward rate agreements, interest rate swaps, etc.) (Erhart et al., 2013). At the end of 2012, the majority of corporate credits with an estimated value of HUF 2,700 billion had a floating rate and were fixed to BUBOR. Although its proportion in relation to forint-based household loans was previously quite low (HUF 4,000 billion), BUBOR may play a more significant role in defining interest rate conditions in this sector as well following the conversion of households' FX loans. Among the off-balance sheet items fixed to BUBOR, FRA transactions and, more specifically, 3-month transactions tied to BUBOR had the largest turnover based on the K14 statistics of the MNB, however, with regard to the total outstanding stock, interest rate swaps (IRS) were the most dominant, with a value of HUF 25,000 billion. As regards FRA and IRS transactions, it should be noted that the vast majority of these were concluded with financial partners in years preceding 2012, (the period in which LIBOR-type benchmarks may have been more exposed to manipulation) *(Kocsis et al., 2013:25)*, while the risk of manipulation presented itself rather in relation to non-financial partners.

As financial indicators, BUBOR quotations are also of key importance for the central bank due to their role in monetary transmission (Horváth et al., 2004; BIS, 2013). The initial step of intervention in monetary policy is to influence market interest rate conditions and expectations. Moreover, numerous legal regulations make reference to BUBOR.[1]

1.3 International audits identified the reasons for interbank reference rates reform

Numerous issues arose in relation to interbank price quotations which called into question the credibility of reference rates in general *(Wheatley-Review, 2012a; BIS, 2013; EBA-ESMA, 2013).*

Conflict of interest and risk of manipulation:

The risk manifested in relation to the manipulation of LIBOR[2] mainly comes from the fact that the financial results and reputation of market makers would be influenced by their own quotations. Hence, it cannot be ruled out that – in addition to determining interest rate expectations, credit risk, etc. – quotations were also influenced by manipulation.

Lack of market activity:

From the aspect of determining BUBOR/LIBOR and other interbank reference rates, the liquidity of the relevant interbank markets – particularly since the crisis of 2008 – is sufficient for tenors shorter than 1 month, and, as a result, there is no actual market activity behind quotations for longer tenors, and thus they are defined by expert judgement.

Reference rates function as lighthouses for the financial markets, hence they are public goods:

Anyone can gain unlimited access to reference rates without interfering anyone else, thus reference rates are considered public goods. However, the externalities and issues arising in relation to public goods are also present for reference rates (issue of "free riders", tragedy of the commons), which makes intervention by authorities all the more necessary.

Changing requirements for reference rates:

The demand for reference rates containing no credit risk or at least a level of credit risk lower than entailed in interbank reference rates has increased sharply over the last decade. The credit risk related to transactions has dropped substantially due to the centralisation

1 Among others, Act CCXXXVII of 2013 on Credit Institutions and Financial Enterprises, Act LXXV of 2011 on the fixing of exchange rates used for repayments of foreign exchange-denominated mortgage loans and the administration of the forced sales of residential property, Act IV of 2009 on state cash surety to residential loans, Act CVI of 2007 on state assets, Government Decree 250/2000 (XII. 24.) on special provisions regarding the annual reporting and book-keeping obligation of credit institutions and financial enterprises, Government Decree No 215/2000 (XII. 11.) on the special provisions regarding the annual reporting and bookkeeping obligations of investment funds, Government Decree No 251/2000 (XII. 24.) on the specific aspects of the financial statements and accounting responsibilities of investment companies.

2 LIBOR: the abbreviation of a London-based interbank reference rate, named London Interbank Offered Rate.

and collateralisation of settlements on the OTC derivative market, and thus underlying reference rates are less expected to reflect the credit risk; however, LIBOR-type reference rates contain the credit risk component.

Lack of alternatives and the current structure of reference rates could increase monetary policy and stability risks:

Central banks became worried that the increase in banks' credit risk after the crisis spilled over to other sectors, the credit risk of which has not changed. All of this could lead to a snow-ball effect of risk in times of financial system disorder, which could jeopardise financial stability, distort transmission of monetary policy and restrain demand for credit and a macroeconomic recovery.

Incentives for efficient quoting, transparency and control:

Market makers were not encouraged to perform effective quoting either by negative or positive incentives, the efficiency of their activities did not influence the assessment of their fellow market makers, and faulty quotations did not carry any sanctions.

Despite the LIBOR/EURIBOR manipulation scandal, for the majority of international interbank interest rates, including BUBOR, there were no reasons to believe that these rates had been altered from the levels set by market conditions. Generally, the average BUBOR quotations followed the changes in the central bank policy rate *(Fliszár, 2013:7)*. However, in order to maintain the credibility of BUBOR over the long term, the risks which were identified had to be managed.

1.4 Options of public engagement in producing reference rates

The manipulation of LIBOR signalled the partial failure of the market. However, it is still an important question to what extent and in what way public authorities should take part in determining reference rates.

The failure of the market may have been partially caused by the fact that the producers of reference rates did not benefit from the wider social advantages, but had to bear the costs in full. In the case of LIBOR, the British Bankers' Association (BBA) for instance served the needs of global financial markets, so that the benefits coming from free access were enjoyed by the entire financial sector, while the costs were borne solely by the administrator of the reference rate. All of this may have contributed to the BBA not investing the capital necessary for the safe function into the LIBOR system, which threatened the operational safety and quality of the service.

However, international studies drew attention to the fact that the determination and production of reference rates should be guided by a market force (Wheatley Review, *2012b:22).* Hence, the administration and participation in the work of quotation panels are still expected from independent market administrators by international authorities.

An argument against fully bringing price quotations under state control is that conflicts of interests would invariably arise, for instance in the event of conflict with certain governmental objectives. In addition, the competitive environment would cease, which would slow down the development of reference rates adjusting to new circumstances and narrow the range of available reference rates. Full state control would weaken the efforts of individual market makers, since they would not have to bear the responsibility.

Options of public engagement:

− introduction of requirements and regulations to guarantee independence of quotations from the profit targets of quoting banks;

− supervision of quotations;

− facilitating a shift to new reference rates with an active contribution to developing possible alternatives (the development of reference rates was carried out in several countries, just like in Hungary, with the participation of central banks in the past);

− participation in the governance and publication of quotations (similarly to the MNB, there are several central banks which contribute to the governance and publication of price quotations and the collection of transaction data);

− improving transparency; and

− mapping the aspects of choosing between alternative reference rates, and introducing them to market operators.

2 Schedule and measures of BUBOR reforms

2.1 Schedule of BUBOR reforms

After the manipulation of LIBOR and EURIBOR, a review of reference rates and financial indexes started. The audit in Hungary launched in June 2012 did not find any signs indicating manipulation of BUBOR, the most important Hungarian reference rate. However, the Hungarian authorities (the MNB and the former Hungarian Financial Supervisory Authority - HFSA) considered it necessary to carry out reforms in line with international reforms

(*Table 1*), due to the shortcomings in the methodology and supervision of quotation. The Monetary Council and the Financial Stability Council approved the BUBOR reform package in January and February 2013.

The reforms started with the publication of recommendations prepared by the MNB and the former HFSA in April 2013. Then, the administrator of quotations, the Hungarian Forex Association entered into multilateral negotiations with the MNB and the Banking Association on institutional and methodological reforms.

Table 1
Measures taken to restructure BUBOR

June 2012	*When the LIBOR manipulation scandal came to light*, it became obvious that a reform of LIBOR and the reference rate following the methodology of LIBOR, including BUBOR, was needed.
June–December 2012	*International and national audits into reference rates commenced.* The working groups of HFSA and MNB have not found any signs of manipulating BUBOR in Hungary; nevertheless, they deemed reforms necessary.
January–February 2013	*The Monetary Council[3] and the Financial Stability Council[4] approved strategic recommendations on the reform of BUBOR.* The recommendations covered issues related to the governance, methodology, control and alternatives of BUBOR.
April 2013 – June 2014	The reform of BUBOR commenced. The HFSA disclosed its recommendations for BUBOR panel banks in accordance with the proposals[5] discussed in the Financial Stability Council meeting held early in the year (April 2013). Four-party negotiations commenced with the administrator of BUBOR: the Hungarian Forex Association (MFT), the Banking Association, the MNB and with the HFSA on the reform of BUBOR (May 2013). The preparation of changes in methodology commenced: decreasing the number of terms, trimming procedure (June 2013).
May 2014	*MFT-MNB-Hungarian Banking Association to enter into a three-party agreement on institutional reforms and setting up the Quotation Committee.* Since July 2014, the Quotation Committee has held meetings at least every three months and has revised, amongst other things, the methodology of the regular review of quotations and the selection of market makers.

Reforms were implemented in several phases. In consideration of the significant exposure of economic agents to BUBOR and the problems of shifting to new alternatives, which was seemingly unresolvable in the short term, the institutional strengthening of BUBOR

3 Pursuant to Act CXXXIX of 2013 on the Central Bank of Hungary, the Monetary Council (Monetáris Tanács, MT) is the key decision-making organisation of the Central Bank of Hungary, while the Financial Stability Council (PST) makes decisions related to the financial transfer system and its stability within a predefined strategic framework.

4 The Financial Stability Council (PST) was a consultation organisation established by the Governor of the central bank of Hungary and the Minister for National Economy (responsible for regulating the financial, capital and insurance market) at the time of accepting BUBOR reform proposals. (After the integration of the Supervision into the central bank, the PST became an internal organisation of the central bank under Act CXXXIX of 2013 on the Central Bank of Hungary and the members of the organisation have also changed.)

5 Recommendation 8/2013. (IV.29.) of the Chair of HFSA can be found in Appendix 2 for market operators involved in quoting (http://felugyelet.mnb.hu/data/cms2394592/8_2013_ajanlas.pdf).

price quotations was of the utmost importance. This was followed by the revision of methodology from July 2013 onwards. However, several changes to BUBOR may require efforts over the long run (assessment of shifting to transactional data, enlargement of the quoting panel, widening the range of alternative reference rates, etc. The reform tasks for the future are outlined in *Chapter 4* of the study.)

2.2 Institutional reform of BUBOR

For the purposes of strengthening the credibility of quotations, the former HFSA and the MNB suggested increased independence of the organisation responsible for BUBOR quotations from quoting banks by the publication of its Recommendation 8/2013 (IV.29.) in accordance with recommendations of international authorities (IOSCO, 2013; Wheatley Review, 2012b; EBA-ESMA, 2013). In the earlier system, quoting banks influenced reference rates as BUBOR panel banks of the Hungarian Forex Association (MFT) and at the same time were influenced by reference rates, due to their balance sheet exposure. Besides credit institutions, quotations have numerous stakeholders (households and enterprises with loans priced according to BUBOR, financial market participants with a BUBOR-based derivative exposure). Therefore, the supervisory recommendations included the (i) institutional strengthening, and (ii) extension of the Hungarian Forex Association as the main responsible party for BUBOR with the representative of the MNB and with an independent expert delegated by the Hungarian Financial Supervisory Authority (HFSA)[6] in order to enhance its institutional independence.

Similarly to several other central banks (Czech, Polish, Romanian, etc.), the MNB contributed to the design of interbank reference rates and to their producing. The MNB fulfilled the technical contributor's tasks set out in the Agreement with the Hungarian Forex Association in the course of calculating and publishing BUBOR: receiving and recording interest rate data from active quoting banks and calculating trimmed averages. In addition to this, the MNB was a contributor in specifying the list of active quoting banks by the MFT and archiving the quotations.

In the framework of the institutional reforms, the MNB has been a contributor to the methodological and auditing tasks of quotations through the Quotation Committee since July 2014. The Quotation Committee holds sessions every quarter, and the mandate of members may not be longer than two years, which can be renewed once in accordance with the recommendations of EBA-ESMA (2013).

6 As a result of its integration into the central bank in autumn 2013, the HFSA nominated two representatives to the Quotation Committee under the MFT-MNB-Banking Association Agreement.

On the basis of the three-party MFT–MNB–Banking Association Agreement, the Quotation Committee supervises among others the calculation method of BUBOR, the criteria of appointments and recalls of panel banks participating in Quoting Procedures, tenors and quotation mechanisms related to Quoting Procedures, averaging, trimming rules to be applied in the course of Quoting Procedures and the method of guaranteeing the minimum number of quoting banks as well as the management of conflicts of interest of Members arising in connection to their role in the Quotation Committee and beyond *(Hungarian Forex Association, 2014b).*

In order to strengthen independence, governance of other international reference rates has also been restructured:

- LIBOR: During the course of international institutional reforms, considerable institutional changes of LIBOR were necessary, as it had suffered from the earlier manipulation. To restore credibility a new administrator was selected instead of the British Bankers' Association. Through a tender procedure, the New York-based International Exchange (ICE) became the new LIBOR administrator. To supervise LIBOR, the Oversight Committee was established, the members of which included the Federal Reserve, the Bank of England and the Swiss National Bank, in addition to the panel banks.
- STIBOR: Following the reform proposals of the Riksbank, the management of the Swedish Bankers' Association approved that the administrator's responsibilities be taken over in January 2013.
- EURIBOR: EURIBOR – the EBF as a supervisor of EURIBOR has also carried out institutional reforms: it opted not to appoint panel bank members, and established the European Money Markets Institute to be in charge of quotations instead of EURIBOR EBF.
- TIBOR: The bodies responsible for the administration of TIBOR were established within the Japanese Bankers' Association, including the Oversight Committee involving lawyers and accounting, academic and other experts.
- WIBOR: The WIBOR Council was established with the following members: Polish Oversight Committee (KNF), Warsaw Stock Exchange (GPW), Polish Bankers' Association (ZBP), Finance Minister (MF), KDPW_CCP and the Polish Forex Association.

2.3 Minor changes to the methodology of calculating BUBOR

In order to exclude the main risks arising in relation to LIBOR quotations (manipulation, lack of market activity, potential errors of expert judgement), the methodology of BUBOR was also changed: *(i)* the number of tenors was reduced, *(ii)* the trimming procedure was modified, and *(iii)* the methodology of selecting the panel was confirmed.

Table 2
Administrators of interbank reference rates and new institutional structures of quotations

Name	Administrator			Institutional changes of quotation supervision
	2012		2014	
BUBOR	ACI Hungary		ACI Hungary	The Submission Committee has been established, and it includes members appointed by the MNB and the Hungarian Banking Association.
LIBOR	British Bankers' Association (BBA)	➔	ICE Benchmark Administration	The Oversight Committee has been established including members appointed by the Bank of England, the Federal Reserve, the Swiss National Bank, ISDA, the Association of Corporate Treasurers, DTCC New York, Thomson Reuters, etc.
PRIBOR	ACI Czech Republic		ACI Czech Republic	Czech National Bank*
EURIBOR	European Banking Federation (EBF)	➔	Euroopean Money Market Institute (EMMI)	The governing body of EMMI (Steering Committee) has been broadened to make it more independent of the banking industry. Specifically, it should include members who are not affiliated with panel banks.
WIBOR	ACI Polska		ACI Polska	The WIBOR Council has been established comprising 8 persons to be indicated by the Polish Supervision Authority (KNF), the Warsaw Stock Exchange (GPW), the Polish Bank Association (ZBP), the Minister of Finance (MF), KDPW_CCP and ACI Polska.
STIBOR	panel banks	➔	Swedish Bankers' Association	STIBOR Committee has been established, including an independent member and a member appointed by the Riksbank
TIBOR	Japanese Bankers Association (JBA)	➔	Japanese Bankers Association TIBOR Administrator (JBATA)	JBA TIBOR Oversight Committee has been established, comprising lawyers, accountants, academic experts, and other experts

*Note: *The Czech central bank had previously contributed to the calculation of quotations.*
Source: ACI Polska, CNB, EMMI, ICE, JBA, Hungarian Forex Association

2.3.1 Number of tenors reduced in the case of BUBOR as well

An important issue of quotations is that no transactions are typically concluded for tenors longer than 1-2 weeks in the unsecured interbank market; hence, the interest rates of longer-term tenors were influenced by expert's judgement (Wheatley Review, 2012a; Erhart et al., 2013). Accordingly, the reduction in the number of maturities was a high-priority recommendation to methodology at the international level as well. Implementation of the recommendation was made easier by the circumstance that financial contracts usually only refer to a few tenors (typically 1-, 3- and 6-month maturities). In some countries, instead of the 15 tenors earlier used in BUBOR and LIBOR, only a few maturities were used for interbank rate quotations even before the LIBOR case came to light (WIBOR: 9, PRIBOR: 9, ROBOR: 8, STIBOR: 8). In national and international discussions, some argued that the reduction of the number of tenors can be simply implemented, since the rates of other tenors can be interpolated if a few points of the yield curve are preserved.

Table 3
Overall number of interbank reference rate tenors and discontinuation of tenors[7]

Reference rate	Currency	Number of tenors			Tenors discontinued
		2012	2014	Change between 2014 and 2012 (%)	
BUBOR	HUF	15	9	-40%	4, 5, 7, 8, 10, 11 month
CIBOR	DKK	14	8	-43%	4, 5, 7, 8, 10, 11 month
EURIBOR	EUR	15	8	-47%	3 week, 4, 5,7,8,10,11 month
LIBOR	CHF, EUR, GBP, USD, JPY	15	7	-53%	2 week, 4, 5, 7, 8, 9, 10, 11 month
PRIBOR	CZK	9	9	0%	-
ROBOR	RON	8	8	0%	-
STIBOR	SEK	8	6	-25%	9, 12 month
TIBOR	YEN	13	13	0%	-
WIBOR	PLN	9	9	0%	-

Source: ACI Polska, BNRO, CNB, Danish Banker's Association, EMMI, ICE, JBA, Hungarian Forex Association, Riksbank

In international practice, the number of reference rate quotation terms has dropped by 20-50 percent. It was primarily tenors rarely used in contracts longer than 3 months (4, 5, 7, 8, 10, 11 months) which were removed after 2013 (Table 3).

Following the recommendations of MNB, the rules of BUBOR have been modified, so that quotations can only be made by panel banks for the 9 most important tenors (1 day,[8]

7 CIBOR (Copenhagen Interbank Offered Rate) - reference rate of interbank loans in Copenhagen denominated in Danish krone, EURIBOR (Euro Interbank Offered Rate) - reference rate of interbank loans denominated in euro, PRIBOR (Prague InterBank Offered Rate) – reference rate of interbank loans denominated in Czech koruna, ROBOR (Romanian Interbank Offered Rate) – reference rate of interbank loans denominated in Romanian leu, STIBOR (Stockholm InterBank Offered Rate) – reference rate of interbank loans in Stockholm denominated in Swedish krona, TIBOR (Tokyo InterBank Offered Rate) reference rate of interbank loans in Tokyo denominated in Japanese yen.

8 Overnight (o/n)

1 week, 2 weeks, 1 month, 2 months, 3 months, 6 months, 9 months, 12 months) instead of the previous 15. This simplifies the procedures for market makers and reduces the administration costs of price quotations.

2.3.2 The trimming method was also changed to improve the reliability and availability of quotations

Extremely low and high quotes are disregarded in the international practice when calculating reference rates, which is called a trimming procedure (or just trimming) in the technical terminology. Trimming lowers the risk of manipulation and the spillover of the volatility of individual bank transactions. However, trimming has the drawback that some part of quotations are disregarded every day (in the past it was the four highest and lowest quotations in the case of BUBOR), even if the risks to be managed are not present, and, as a result, valuable information might be disregarded potentially leading to a distortion effect.

If the number of market makers is low, the range of options available to the benchmark administrator is narrower, since valuable observations have to be excluded from the sample. Consequently, in Sweden and some Asian countries, where the number of market makers is low, simple averages are currently used or the extent of trimming depends on the number of market makers.

According to the former BUBOR rules, the highest and lowest four quotations were excluded from the sample of quotations in the trimming procedure conducted by the MNB to calculate averages. In response to the reduction of the number of market makers, however, trimming became dependent on the number of market makers following the recommendations of the MNB. In the new procedure, trimming is adjusted to the number of market makers, so when the number of market makers is lower, less quotations were excluded from the calculation of averages *(Hungarian Forex Association, 2014a)*.

Table 4
Absolute and relative value of trimming in the case of different panel sizes according to the former and new methodology*

Overall number of panel banks (N)	Former methodology		New methodology	
	Trimming (absolute number)	Relative trimming	Trimming (absolute number)	Relative trimming
16<=N	4	<25%	4	<=25%
12<=N < 16	4	27-33%	3	20-25%
7<=N < 12	4	36-57%	2	18-29%
N < 7	4	66%<	1	17%<

*Note: *In the table, the extent of an unidirectional trimming was shown.*

In international practice, alternatives to the calculation of the mean value were suggested which were less vulnerable to manipulation. These included the median, random selection and adaptive trimming. The disadvantage of these, however, is that their interpretation and control is more difficult for the public. Considering that there were no suggestions in the international practice for adopting a new calculation method, no such changes were implemented in the case of BUBOR either.

2.3.3 Reversing the reduction of panel size became a priority objective

A larger panel size is beneficial from statistical aspects, particularly in light of the fact that only a part of the sample can be used in the calculation of BUBOR due to trimming (see Chapter 2.3.2 for more details on trimming).

After the manipulation of LIBOR, the risks related to quoting activity increased, leading to a temporary, unwanted decline in the size of the panels in several countries. Quoting activity has become costly, as meeting the recommendations related to the reforms has grown more and more difficult. Furthermore, quoting activity now entails more stringent regulatory supervision and carries a risk to reputation. International authorities have also drawn attention to the risks of declining willingness for voluntary quotation *(IOSCO, 2013:32)*. However, the greatest decline occurred in countries where there were relatively larger panel of submitting banks; for instance the number of EURIBOR market makers dropped from 44 to 25 in a little more than two years.

In the case of WIBOR, only 10 market makers were temporarily active in January 2013, while their number reached 13 by December 2014, which was a figure last achieved in November 2012. A contributing factor may have been the modification of the Money Market Maker system by the National Bank of Poland (NBP) in response to the decline in the size of panel, since from March 2013 only WIBOR panel banks have access to quick tenders of the NBP shorter than 7 days *(NBP, 2013)*.

Table 5
Number of panel banks in the case of interbank reference rates

Reference rate	Currency	Overall number of panel banks		
		September 2012	December 2014	Change (%)
BUBOR	HUF	16	9	-44%
CIBOR	DKK	9	6	-33%
EURIBOR	EUR	44	25	-43%
LIBOR	CHF, EUR, GBP, USD, JPY	8-16 (dependent on the currency)	11-18 (dependent on the currency)	21%
PRIBOR	CZK	8	6	-25%
STIBOR	SEK	6	6	0%
TIBOR	YEN	16	15	-6%
WIBOR	PLN	13	13	0%

Source: ACI Polska, CNB, Danish Banker's Association, EMMI, ICE, JBA, Hungarian Forex Association, Riksbank

In the BUBOR panel, 16 banks were represented in September 2012, while the number of panel banks dropped to 9 in 2014. In an international comparison, the panel size is still considered large compared to countries of similar size (Czech Republic – PRIBOR: 6, Denmark – CIBOR: 6, Sweden – STIBOR: 6), however, due to the challenges of trimming, stopping and reversing the decline in the number of market makers became a priority objective.

The supervisory recommendation prepared in 2013 in cooperation with the MNB suggested an expansion of the panel size, along with other methodological issues (reduction of tenors, trimming, etc.):

"The group of panel banks participating in quotation should be maintained and preferably enlarged, and the HFSA expects this from the participants of the Hungarian interbank market."[9]

The MNB officially requested certain banks to contribute to BUBOR quotations following the revision of the selection criteria of panel banks in November 2014.

In the event of the continued decline in the number of panel banks, quotations might be made mandatory in the spirit of the pending regulatory recommendation of the European Parliament and Council.

2.4 Improving transparency would be beneficial to quotations

Reviews criticised reference rates because the procedures and decisions related to reference rates are not adequately transparent and a higher degree of transparency would be needed in order to restore credibility (Wheatley Review 2012b; Riksbank 2012; EU Commission 2012; IOSCO, 2013).

To this end, the Wheatley Review (2012b) suggested that the minutes of the LIBOR administrator's meetings and its sanctions be made public. Furthermore, the report suggested a regular statistical review of quotes to check whether the quotes truly reflect market conditions.

The following measures were taken by the MNB to improve transparency in the reform of BUBOR:

- Publication of BUBOR quotes: In order to reduce risks of manipulation, the MNB published individual bank quotations in time series format on the site of the REUTERS

9 MNB Recommendation 8/2013. (IV. 29.) for market operators participating in BUBOR quotation. https://felugyelet.mnb.hu/data/cms2394592/8_2013_ajanlas.pdf.

news agency (BUBOR PANEL). BUBOR averages had been made available before that on the website of the MNB as well as through the news agencies Bloomberg and Reuters.[10]

- Regular statistical analysis of BUBOR quotes: Following international recommendations, the Hungarian Banking Association–MNB–MFT entered into a three-party agreement including points that the MNB prepares a regular, annual analysis on whether quotations are in line with market conditions and to investigate if there are any signs of potential manipulation of BUBOR. The Quotation Committee approved the suggestions of the MNB on the methodology of annual statistical analysis of BUBOR quotes. The first regular audit was carried out in February 2015, and the MNB will make the details of this audit publicly available.
- Publication of the protocols drawn up in the sessions of the Quotation Committee: The Quotation Committee decided to publish the shortened protocol of its sessions in accordance with the recommendations of the central bank.

3 Revision of the set of criteria for active quoting banks of BUBOR

3.1 International review

For the purposes of revising the set of criteria for BUBOR quoting banks, the reference rates of 10 mainly European countries and the Eurozone[11] were assessed. No quotation rules were found in 3 of these countries (Bulgaria, Croatia, Serbia). The rules of the rest of the reference rates *can be divided into 3 groups based on the extent of regulation of quoting banks:*

1. No regulated predetermined criteria:

a. The Czech Republic (PRIBID/PRIBOR): Within 60 days the Czech Forex Club assesses the written application of the bank after consulting with the Czech National Bank, and either rejects (without the obligation of any justification) or accepts it *(CNB, 2013)*.

10 BUBOR quotes in chronological order from 1996: http://www.mnb.hu/Root/Dokumentumtar/ENMNB/Monetaris_politika/mnben_jegybanki_eszkoztar/mnben_egynaposjegybankieszkozok/bubor2.xls.

11 Bulgaria (SOFIBID/SOFIBOR), the Czech Republic (PRIBID/PRIBOR), Denmark (CIBOR), United Kingdom (LIBOR), Eurozone (EURIBOR), Croatia (ZIBOR), Japan (TIBOR), Poland (WIBID/WIBOR), Romania (ROBID/ROBOR), Sweden (STIBOR), Serbia (BELIBOR).

b. United Kingdom (LIBOR): Future editions of the LIBOR Code of Conduct will include material on criteria for banks joining or leaving the relevant panel of contributing banks. The effective LIBOR Code does not contain precise guidelines. The reason for the lack of criteria is that ICE Benchmark Administration Ltd. only took over the regulation of LIBOR on 1 February 2014 *(ICE, 2014*).

2. Criteria cannot be quantified or only hardly:

a. Sweden (STIBOR): The bank must have a significant indirect or direct link to STIBOR in its operations for at least one year and act as an intermediary or issuer on the Swedish money market; moreover, it must have personnel and systems that guarantee the bank can report interest rates every business day. The bank applies for membership and in its proposal it indicates its commitment to meeting the STIBOR rules and the decisions made by the Swedish Bankers' Association and the STIBOR Committee *(SBA, 2014)*.

b. Denmark (CIBOR): Reporting banks can be divided into two groups with the members of the first group available on the market all day long (between 0830 and 1600) and it can be assumed that they have sufficient lines for all the other CIBOR reporting banks. The members of the first group take part in other quotation beyond CIBOR. In order to join the second group, an application must be submitted to the Danish Bankers' Association or the recommendation of a bank in the first group is necessary, and the bank must have been active in the money market for at least one year The CIBOR committee assesses the followings upon admission:

- the applicant should characterise the market in several products within the product range;
- it should have sufficient resources available; and
- its participation should enhance the quality of the reference rate *(DBA, 2012)*.

3. Criteria can be easily quantified:

a. Eurozone (EURIBOR): Only those banks qualify for panel membership which have the capacity to handle significant volumes of euro-interest rate related instruments. Mainly the following items are considered in assessing the activities and expertise of the potential panel bank:

- short-term loans;
- money market papers (e.g. Certificate of Deposits and Commercial Papers);
- reverse repurchase agreements;
- short-term deposits;
- repurchase agreements;
- to a lesser extent derivatives referring to a EURIBOR underlying denominated in the currency of EMU countries; and
- foreign currency exchange swaps with at least one leg denominated in EMU currency *(EMMI, 2014)*.

b. Poland (WIBID/WIBOR): The invitation of the Organiser (the Polish Financial Markets Association) is necessary to participate in the fixing process. A credit institution can be invited if it has at least a 1 percent share in the assets of the Polish banking sector. The Organiser considers the following when deciding to invite a new member:
- the role the bank plays in the interbank market, in particular, its ability to provide liquidity and its transaction figures;
- the Tier 1 capital ratio of the bank; and
- the bank's professionalism and reputation on the interbank market *(ACI POLSKA, 2013).*

c. Japan (TIBOR): In selecting reference banks, the administrator generally take into account the continuity of TIBOR, the diversification of the financial industry as well as the following features of banks:
- market trading volumes (Yen TIBOR - Japanese market; Euroyen TIBOR – offshore markets);
- yen asset balance;
- track record in providing rate submissions (if it is not a newly selected bank); and
- degree of establishment of the processes required to comply with the Code of Conduct *(JBA, 2014)*.

d. Romania (ROBID/ROBOR): The following criteria are taken into consideration when inviting banks:
- activity on the interbank money market;
- the limits for RON deposits granted by the credit institution to other Participants; and
- the other credit institutions' limits for RON deposits granted to this credit institution. *(BNRO, 2014)*.

Based on the above, the reference rates where the rules contain criteria that can be easily translated into numbers share a common feature, namely, that that the unsecured interbank loan market activity of the applying credit institution is assessed. In addition to depo market turnover, other transactions in financial markets linked to the reference yield or turnover of financial markets similar to the market of its underlying product (repo activity, money market papers issued, foreign currency exchange swaps and other derivatives) are also included in the regulations of several reference rate. In the case of WIBOR and TIBOR, similarly to BUBOR, the criteria related to the size of banks are included (size of the balance sheet, Tier 1 capital level).

3.2 Range of indicators used for selecting the BUBOR panel

In line with the BUBOR regulation in effect prior to November 2014, the basis for listing active quoting banks had two components: 50 percent was the ranking of the HUF interbank loan/deposit and FX swap deals turnover in the calendar quarter prior to the actual period, weighted by maturity (turnover ranking), and the other 50 percent was the ranking calculated on the basis of the total assets of each bank reported as of the end of the calendar quarter. In the case of FX swap transactions, the HUF amount at the first leg of the swap is taken into account. Amongst the banks specified on the list prepared in accordance with the above, those banks may participate in the BUBOR fixing procedure the ranking of which on the list is not lower than the number specified by the Quotation Committee with the contribution of the MNB (the central bank of Hungary), provided that the number of such participating banks may not exceed 16 under any circumstances *(Hungarian Forex Association, 2014)*.

Accordingly, under the BUBOR regulation in effect prior to November 2014 a maximum of 16 banks can take part in the fixing procedure; hence we focus on the first 16 banks in the ranks in studies used in this chapter. In the course of the revision, the extent to which the application of various indicators differentiate between individual banks is assessed and we examine how the list of 16 banks potentially arriving in the best 16 would change if certain indicators were to be used. To do this, the list of the 16 banks was compiled using the criteria set out in the BUBOR regulation and based on the most up-to-date data (August – September – October 2014), which could be compared to existing rankings made in accordance with the time series of indicators measuring the market activity spanning from January 2011 to September 2014. The ranks were defined for 39 credit institutions with VIBER (the Real-time Gross Settlement System) or BKR (Interbank Clearing System) membership and reserve obligation. The source of data are the D01, K02, K12, K14 and E06 data services of the credit institutions and KELER performed towards the MNB.

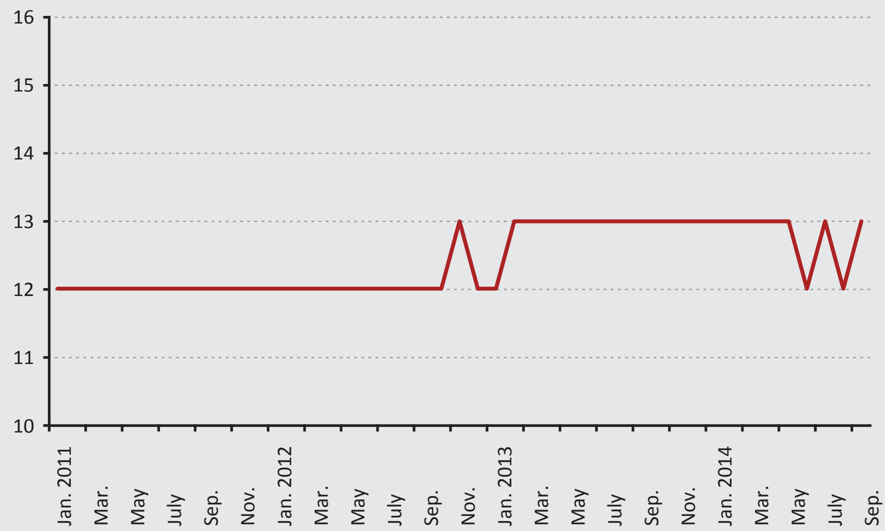
3.2.1 Indicators on the size of banks (balance-sheet total)

Among indicators on the size of banks, the most obvious and easy-to-produce are the banks' balance-sheet totals, which have already taken into consideration by the Quotation Committee in cooperation with the MNB under the BUBOR regulation effective until November 2014 prior to the revision to determine the list of active quoting banks. In the case of the Japanese reference rate, it is not the balance-sheet total measuring the entire pool of assets which is assessed during selection, but rather a part of it, and the size of assets denominated in domestic currency is taken into account. A significant part of the financial market turnover of Hungarian credit institutions is concluded on FX-swap markets, which partly serve to hedge the exchange rate risk arising from foreign currency denominated or foreign currency based assets of banks; accordingly, besides their forint-denominated instruments, their assets denominated in foreign currency also have influence on the market presence and market knowledge of banks. All this justifies that, in contrast to the Japanese practice, in the selection process of quoting banks for BUBOR an indicator relating to the size of banks should be used that expresses the size of foreign currency denominated assets as well, not only the size of assets denominated in forint.

The balance-sheet total expresses the size of forint and foreign currency denominated assets of credit institutions, it is available for all credit institutions and unambiguous ranking can be assigned based on it. Consequently, *the balance-sheet total is an indicator suitable for differentiating between individual banks.* However, moving from larger banks towards smaller ones in the ranking the difference between the balance-sheet total of neighbouring credit institutions decreases, the combined balance-sheet total of the 16 largest banks makes up 89 percent of the balance-sheet total of the 39 studied banks. As a result, in the course of differentiating banks with smaller balance-sheet totals, *ranking is strongly influenced by even small nominal difference, which justifies the diversification of indicators, and the consideration of other indicators when assigning ranks.*

Based on *Figure 1*, out of the 16 banks in the most recent ranking based on BUBOR Regulation, 12-13 banks were included in the highest 16 positions in the ranking based merely on their balance-sheet totals. Accordingly, *the other component of the criterion specified in the Regulation (the interbank deposit/credit and foreign currency swap market ranking) has an effect on the position of 3-4 banks.*

Figure 1
Development of the number of banks in the highest 16 positions in the ranking based on balance-sheet totals of the top 16 banks using the ranking scheme specified in the BUBOR Regulation



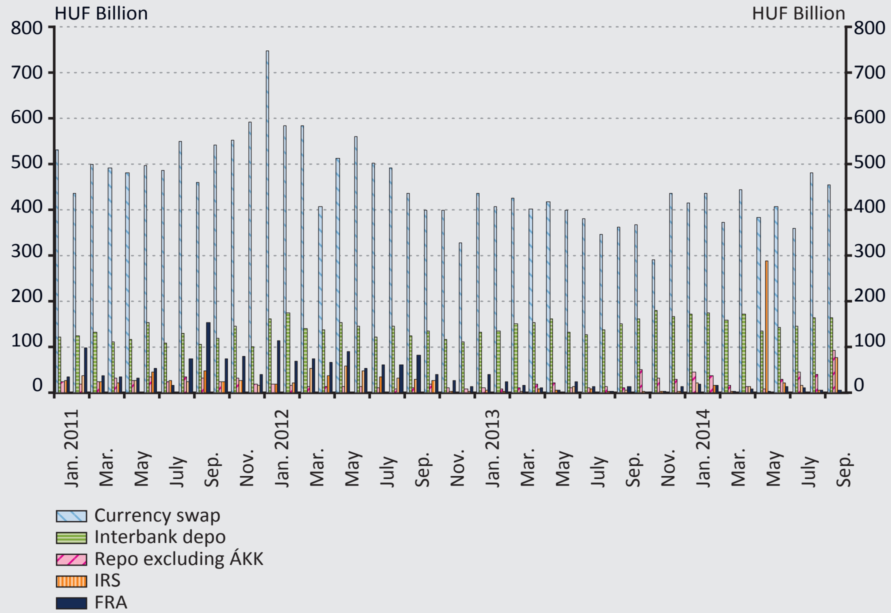
Source: Internal calculations on the basis of (non-public)supervisory balance sheet reports submitted to the central bank

3.2.2 Indicators for measuring the market activity of banks

The turnover of the most important domestic interbank markets (foreign currency swap, depo, repo, FRA, IRS) were assessed among the indicators measuring the market activity of banks. In the case of EURIBOR, the Steering Committee examines money market papers as well; however, due to the low issuing volumes in the domestic market, the assessment of this market is not reasonable in the case of Hungary. Although, among the examined markets, only depo, FRA and IRS markets[12] are linked to BUBOR, the foreign currency swap and repo market activity of the credit institutions also influences the market knowledge of credit institutions' dealers, and hence we deemed it reasonable to extend the study to these markets as well.

Among domestic interbank markets, the foreign currency swap market has the highest turnover, while the second in the ranking based on dealing volumes is the unsecured interbank credit/deposit (depo) market. The turnover of other domestic interbank markets (repo excluding ÁKK[13] transactions, IRS, FRA) lags behind the turnover of the first two markets, particularly from the end of 2012 (except a few months with extraordinary figures).[14] *If merely the data available on the turnover of interbank markets are considered,*

Figure 2
Development of the daily average turnover of the most important domestic interbank markets on a monthly basis



Source: Internal calculations based on D01, K02, K12, K14 and E06(non-public) data services towards the central bank

12 BUBOR quotes apply to credit provision in the HUF-based depo market, and the HUF-based IRS and FRA transactions' payment function is tied to BUBOR.

13 The Hungarian public debt management agency.

14 The low domestic turnovers in the FRA and IRS markets are more or less due to the fact that IRS and FRA contracts are often performed by a foreign member of the bank group in the foreign markets in the case of domestic credit institutions that belong to foreign bank groups. These transactions are not among the data services assessed, and hence the MNB does not have a direct oversight over these.

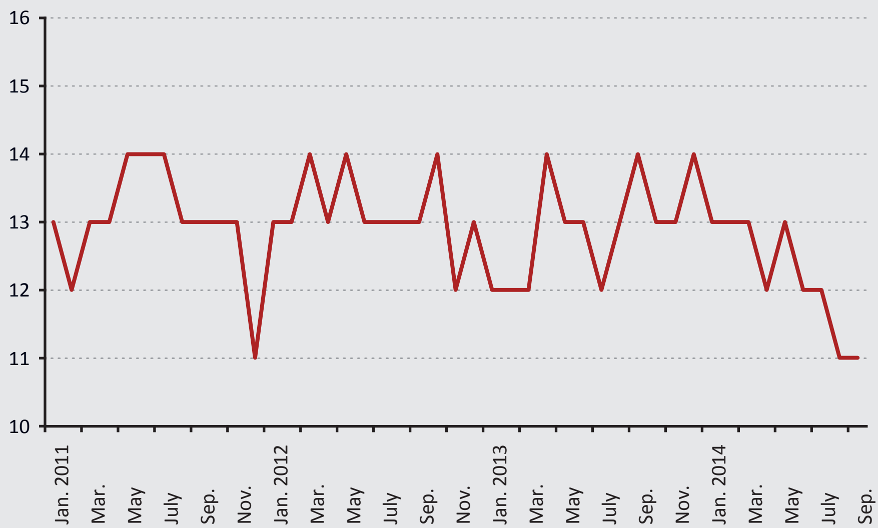
then it was not reasonable that the turnovers of domestic interbank markets other than depo and foreign currency swap market influence the selection of active quoting banks. However, the modification of EMIR[15] and relevant regulatory technical standards may bring a remarkable extension of data available to central banks on transactions concluded in foreign markets, which could well justify the future revision of conclusions.

In the following chapters, we examine the suitability and usefulness of the assessment of aspects other than turnover in improving the quality and data content of the ranking of the most important domestic interbank markets.

3.2.2.1 Interbank unsecured forint credit/deposit market (depo market)

The depo market is considered substantial on the basis of BUBOR's definition, since BUBOR quotes apply to credit provision in the depo market. If its turnover is considered, it is the second largest segment of domestic interbank markets; its daily turnover is near HUF 140 billion. Almost all domestic banks with direct VIBER or BKR membership (35 out of 39 banks) conclude transactions in the depo market, and thus the *market is suitable for ranking banks*. Due to its importance, it is justified to include its turnover among the

Figure 3
Development of the number of banks in the highest 16 positions in the ranking based on the maturity-weighted depo market turnover of the top 16 banks using the ranking scheme specified in the BUBOR Regulation



Source: Internal calculations based on K02 and K12 (non-public) data services towards the central bank

15 Resolution No. 648/2012/EU of the European Parliament and Council on OTC derivatives, central counterparties and trade repositories.

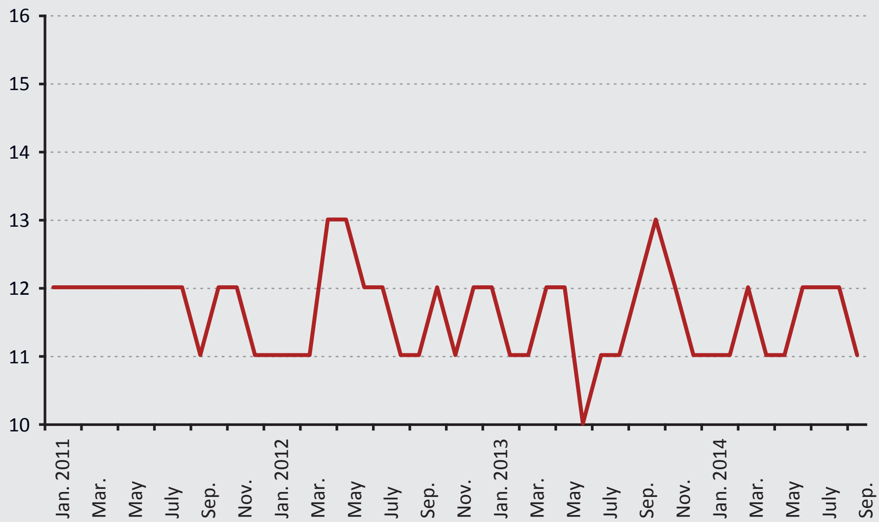
examined indicators. However, it also applies to this market, that when moving from banks with higher turnover towards ones with lower volumes, the difference between neighbouring banks decreases. The transactions of the 16 banks with the highest turnover in the depo market represent 96 percent of the total market turnover, therefore *the depo market is suitable for stable differentiation among banks with lower turnover only with certain limitations.*

Based on *Figure 3* out of the 16 banks in the most recent ranking based on BUBOR Regulation, 11-14 banks were included in the highest 16 positions in the ranking based merely on their depo market turnover. Accordingly, *the other 2 components of the criteria specified in the Regulation (the interbank foreign currency swap market and balance-sheet total rankings) have an effect on the position of 2-5 banks.*

3.2.2.2 Foreign currency swap market

Domestic banks execute the highest turnover in the foreign currency swap market among the interbank markets, with the average volume of daily transactions exceeding HUF 450 billion. Although the significance of the domestic foreign currency swap market

Figure 4
Development of the number of banks in the highest 16 positions in the ranking based on the maturity-weighted foreign currency swap market turnover of the top 16 banks using the ranking scheme specified in the BUBOR Regulation



Source: Internal calculations based on D01 (non-public) data service to the central bank will decrease as a result of the conversion of residential loans denominated in or based on foreign currency, it is believed that its role among domestic interbank markets will remain important. Foreign currency swap market transactions are parts of the examined indicators even under the current set of criteria. Most foreign banks with direct VIBER or BKR membership (24 out of 39 banks) conclude transactions in the foreign currency swap market, and hence the *market is suitable for ranking banks*. However, it is also true in this market, that when moving from banks with higher turnover towards ones with lower volumes, the difference between neighbouring banks decreases. The transactions of the 16 banks with the highest turnover in the foreign currency swap market make up 99 percent of the total market turnover, while 15 out of 39 banks did not conclude any transactions in the market between July and September 2014, so *the foreign currency swap market is not suitable in itself for differentiating banks with lower turnover.*

Based on *Figure 4*, of the 16 banks in the most recent ranking based on the BUBOR Regulation, 10-13 banks were included in the highest 16 positions in the ranking based merely on the basis of their foreign currency swap market turnover. Accordingly, the other 2 *components of the criteria specified in the Regulation (the interbank deposit/credit market and balance-sheet total rankings) have an effect on the position of 3-6 banks.*

3.2.2.3 Forint repo market filtered from ÁKK transactions

The turnover of the domestic interbank forint repo market is quite low, amounting to around a daily HUF 20 billion on average. The number of banks trading on the market is quite concentrated, as only 12 out of 39 examined banks concluded transactions between July and September 2014, so *the market is less suitable for ranking banks and is unsuitable for differentiating banks with lower transaction volumes.*

Since the number of banks concluding transactions in the repo market is lower (i.e. 12) than the maximum number of quoting banks specified in the BUBOR Regulation, *the activity in the repo market would not influence the list of banks in the top 16 positions in the ranking.*

3.2.2.4 Domestic forint interbank IRS market

Similarly to repo markets, the turnover of the domestic interbank forint IRS market is quite low, amounting to around a daily HUF 20 billion on average.[16] The number of banks trading on the market is quite concentrated, as only 9 out of 39 examined banks concluded transactions between July and September 2014; accordingly, similarly to the repo market, *the IRS market is also less suitable for ranking banks and is unsuitable for differentiating banks with lower transaction volumes.*

16 See the previous footnote on the reasons behind low transaction volume.

Since the number of banks concluding transactions in the IRS market is lower (i.e. 9) than the maximum number of quoting banks specified in the BUBOR Regulation, *the activity in the IRS market would not influence the list of banks in the top positions in the ranking.*

3.2.2.5 Domestic interbank forint FRA market

Similarly to the repo and IRS markets, the turnover of the domestic interbank forint IRS market is quite low, fluctuating around a daily HUF 10 billion on average in the last two years.[17] The number of banks trading on the market is quite concentrated, since only 3 out of 39 concluded transactions between July and September 2014, so *the FRA market is not suitable for ranking banks.*

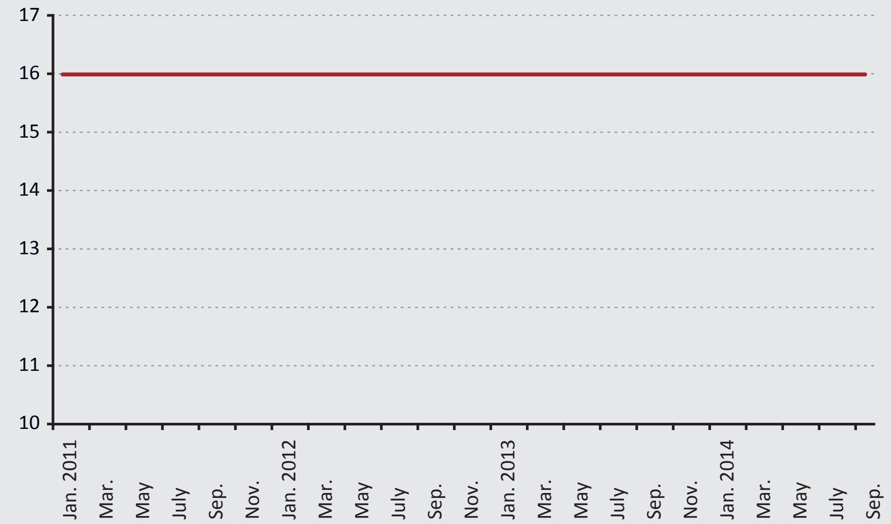
Since the number of banks concluding transactions in the FRA market is lower (i.e. 3) than the maximum number of quoting banks specified in the BUBOR Rules, *the activity in the FRA market would not influence the list of banks in the top positions in the ranking.*

3.3 Conclusions of the revision of the criteria for active quoting banks

Compared to the examined international reference rate regulations, the set of criteria assessed in the case of determining the list of active quoting banks for BUBOR can be easily quantified and I considered well-regulated in an international comparison. Assessing the characteristics of domestic interbank markets, and, within these, the transaction figures and the number of banks trading actively leads us to the conclusion that a further extension of markets taken into account under the BUBOR Regulation in effect until November 2014 would only provide very limited additional information in the course of differentiating between banks and is not likely to significantly influence the ranking obtained using the current methodology. However, the analysis pointed to the fact that there is no single indicator that would perfectly enable differentiation between credit institutions in its own right, including mainly the differentiation between banks with smaller balance-sheet totals and lower transaction volumes; thus when defining the set of criteria the final ranking is justified to be determined based on multiple indicators.

17 See the previous footnote on the reasons behind low transaction volume.

Figure 5
Development of the number of banks in the highest 16 positions in the ranking based on maturity-weighted repo, IRS and FRA market turnover of the top 16 banks using the ranking scheme specified in the BUBOR Regulation



*Note: *The figure would show 16 banks for individual market segments (repo, IRS, FRA) as well.*
Source: Internal calculations based on K14 and E06 (non-public) data services towards the central bank

The study confirmed the reasons behind the methodology applied to the selection of quoting banks and its robustness, hence the Quoting Committee made the decision to preserve the methodology on its session on 27 November 2014.

4 Further measures of BUBOR reforms

On the basis of national and international institutional recommendations, further measures would be needed to finalise the BUBOR reforms. On the one hand, the code of conduct of BUBOR quotes should be drawn up under the recommendation of the MNB, which contains the order of procedure expected from participants of quotations and guidelines on the management of conflicts of interest. On the other hand, quotations should be replaced with transactional data as much as possible, as this is an important requirement *(Wheatley Review, 2012b; IOSCO, 2013)*, and alternative reference rates should be developed in accordance with user requirements. After establishing BUBOR in late 1990s, *since 2007 the*

MNB has been actively contributing to developing and publishing the BIRS index (quotation of interest rate swap transactions)and since 2010 the HUFONIA SWAP index[18]. These indexes have a lesser importance compared to BUBOR, since they serve as references for far fewer transactions. Moreover, the preparation of contingency plans is an additional task in cases when BUBOR cannot be produced in opposition to scenarios assuming "normal" market and other conditions (e.g. the number of market makers fall, operating risks, etc.).

5 Summary

Modifications to international reference rates following the manipulation of LIBOR made implementation of the BUBOR reform necessary in 2013. The main objective of the reforms initiated by the MNB was to eliminate primary risks arising in the course of quoting interbank reference rates in the domestic environment. In order to restore the credibility of BUBOR, the methodology of BUBOR has been supervised by a new body since July 2014, the Quotation Committee, whose members include the delegated parties of the central bank of Hungary and the Hungarian Banking Association in addition to the Hungarian Forex Association encompassing the representatives of quoting banks. There were some adjustments to the methodology of BUBOR in the last two years: *(i)* the so-called trimming procedure was changed to strengthen the availability and reliability of price quotations; *(ii)* the number of listed tenors were reduced; and *(iii)* the methodology of selecting BUBOR market makers was confirmed. In order to make BUBOR quotations more transparent, time series data of quotations are disclosed for each panel bank through the REUTERS agency, and the minutes of the Quotation Committee meetings are also publicly available since December 2014. Following the MNB recommendation on preserving the criteria of selecting active quoting banks, several banks were invited to take part in quotations. Future measures of BUBOR reform could be the revision of the code of conduct, considering the shift to transactional data and preparing contingency plans. The draft resolution of the European Parliament and Council on the regulation of financial reference indicators may also influence the development of domestic financial indexes in Hungary.

18 HUFONIA SWAP: interest rate swap transactions within one year, where one-day interbank interest rate (HUFONIA) is swapped by the parties for a fixed interest rate agreed beforehand. http://www.acihungary.hu/doc/HUFOIS_Fixing.pdf
BIRS: Budapest Interest Rate Swap index, swap transactions, http://www.acihungary.hu/index.php?id=birs.

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