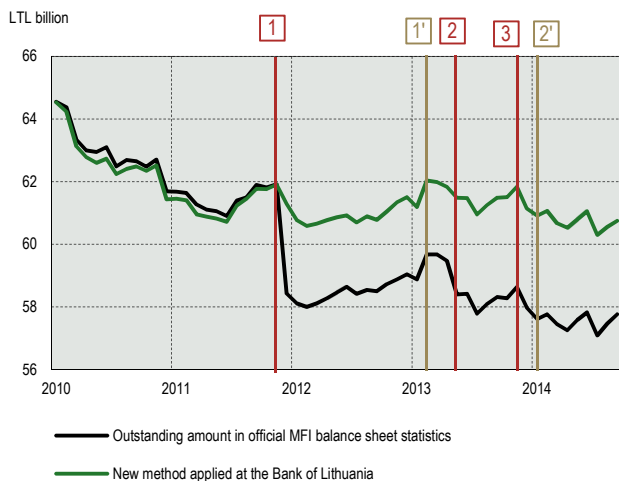


ANNEX 2. MFI loan portfolio adjustment for technical factors

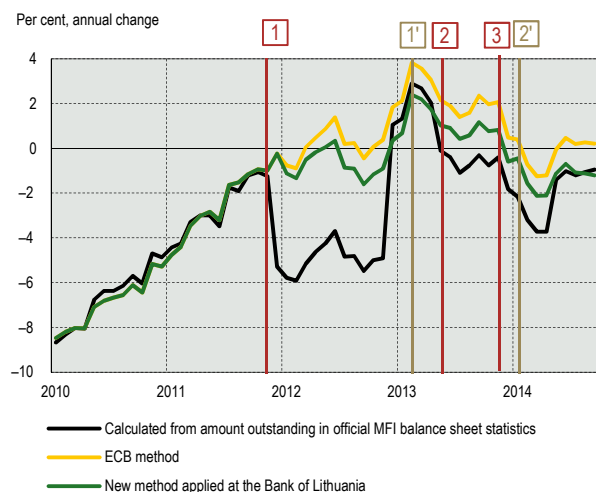
This annex describes the methodology of data correction, which aims to provide an estimate of loan portfolio of monetary financial institutions (MFI), cleared of the factors unrelated to economic transactions. This is all the more important for the period between November 2011 and April 2014, during which several banks and credit unions were stripped of their business licences or discontinued operations in Lithuania (see Charts A and B). In line with the methodology applied by the Bank of Lithuania and the ECB for the compilation of MFI balance sheet statistics, which is used for monetary policy analysis, the MFI balance sheet and monetary statistics exclude the balance sheet data of such institutions, which has led to structural breaks in the reported data of MFI loan portfolio outstanding amounts. In order to make such data suitable for macroeconomic analysis, MFI loan portfolio developments can be measured on the basis of transaction data, which is part of MFI balance sheet statistics and which eliminates the effects of some technical factors, such as reclassification, write-downs and write-offs, exchange rate movements. However, such data does not show the changes related to loans, which have been securitised or transferred, or the amortisation of the loan book of the institutions eliminated from the MFI list, therefore, the measurements of portfolio developments may lack precision. Due to these reasons, the Bank of Lithuania produces a loan portfolio estimate, which also excludes additional technical factors and is used for economic analysis and modeling. Charts A and B show differences in loan portfolio developments, which become apparent when using the standards of financial transaction accounting (hereinafter referred to as the “ECB method”) and the methods applied by the Bank of Lithuania (hereinafter referred to as the “Old method” (which uses the official outstanding amount data) and the “New method”).

Chart A. MFI loan portfolio
(January 2010–September 2014)



Source: Bank of Lithuania calculations.

Chart B. Annual development of MFI loan portfolio
(January 2010–September 2014)



Source: Bank of Lithuania calculations.

Notes: (i) the outstanding amount in official MFI balance sheet data shows the outstanding amount of the loan portfolio of existing MFIs, while the ECB method and the New method applied at the Bank of Lithuania shows the outstanding amount of loans originated by MFIs; (ii) highlighted events: 1. Reclassification of portfolio of AB Bankas SNORAS (December 2011); 2. Reclassification of portfolio of UAB Ūkio Bankas, transfer of portfolio of the Lithuanian branch of AS UniCredit Bank, elimination of data of the credit union Laikinosios Sostinės Kreditas from statistics (May 2013); 3. Takeover of portfolio of the leasing subsidiary of AB SEB Bankas (November 2013); 1'. Elimination of data of the credit union Nacionalinė Kredito Unija from statistics (February 2013); 2'. Elimination of data of the credit union Vilniaus Taupomoji Kasa from statistics (January 2014).

Standards of financial transaction accounting in accordance with the ECB's methodology

Loans and deposits are recorded in the MFI statistics at nominal value, net of accrued interest. The data shows both outstanding amounts and transactions during a reference period. Such transactions are derived indirectly, i.e. by subtracting other adjustments, unrelated to transactions between MFIs and other institutional sectors (i.e. non-financial corporations, households, general government or financial intermediaries) from the difference in outstanding amounts:

$$F_t = (L_t - L_{t-1}) - C_t - E_t - V_t$$

where: F_t is the monthly transaction flow, L_t is the outstanding amount at the end of the month, L_{t-1} is the amount outstanding at the end of the previous month, C_t is the change due to reclassification or other adjustment, E_t is the change due to exchange rate adjustment, and V_t is the adjustment for write-downs or write-offs.

In other words, transactions F_t is the net flow of lending in a reference period, i.e. the loans provided (or acquired, or purchased) by other MFIs to other institutional sectors in the reference period less the loans paid back to other MFIs (or transferred, or sold by other MFIs) during the same period, not including the interest payable. The monthly growth rate α_t^M at the end of the month is calculated from the transaction data or on the basis of notional stock indexes:

$$a_t^M = \left(\frac{F_t}{L_{t-1}} \right) \times 100$$

or

$$a_t^M = \left(\frac{I_t}{I_{t-1}} - 1 \right) \times 100$$

where $I_t = I_{t-1} \times \left(1 + \frac{F_t}{L_{t-1}} \right)$ is the index of notional stocks.

The annual growth rate is derived by multiplying the monthly growth rates:

$$a_t = \left[\prod_{j=0}^{11} \left(1 + \frac{F_{t-j}}{L_{t-1-j}} \right) - 1 \right] \times 100$$

or from the index of adjusted notional stocks:

$$a_t = \left(\frac{I_t}{I_{t-12}} - 1 \right) \times 100$$

When compiling the MFI balance sheet statistics, such adjustments to MFI balance sheet items are usually calculated (e.g. by the ECB¹², the Czech National Bank¹³ or the Bank of Lithuania¹⁴) with the aim to eliminate the adjustments that are directly unrelated to economic transactions.

New method applied by the Bank of Lithuania

In most cases, the basic method is only used to calculate changes in portfolio. The results of such calculations reflect the economic transactions. However, the adjusted outstanding amount of MFI loan portfolio is not calculated, to some extent due to the fact that such a value of portfolio will be inaccurate if there are any substantial reclassification adjustments. For example, the methodology used to compile the MFI balance sheet statistics stipulates that a MFI, which discontinues its operations shall be removed from the statistical MFI list and its data shall be excluded from the statistics, starting from the period, during which it is eliminated from the list. The resulting adjustment to the MFI portfolio in the period concerned is recorded as reclassification (i.e. the MFI is reclassified as a non-financial corporation). Calculations of the chain index I_t in subsequent periods take into account the full scale of such reclassification, despite the probable gradual decrease in the loan portfolio of the institution removed from the statistics, alongside the repayment of liabilities by the institution's debtors. Moreover, if the abovementioned reclassification adjustment is included in subsequent periods in its full scale and the institution's borrowers individually refinance their loans in active MFIs, the same loans may be added to the portfolio repeatedly.

The new method provides for the addition of loan portfolios held by institutions, removed from the statistical list, to the reported official loan portfolio series so as to restore the data series of MFI loan portfolio in as precise form as possible, starting from the end of 2011. In later periods, precise data showing changes in the loan portfolio of the institutions removed from the statistics is not available. Hence the calculations are made under the assumption of amortization in that portfolio. The amended outstanding amount of MFI loans, thus is calculated using this formula:

$$L_t^* = L_t + X_t$$

where L_t^* is the amended outstanding amount at the end of the month, L_t is the amount outstanding at the end of the month in accordance with official data, X_t is the loan portfolio of institutions removed from statistics from 2011 (with loan amortisation included):

$$X_t = \sum_{i=1}^{N_t} (X_{i,t-1} - A_{i,t})$$

$$X_{i,t} = 0 \text{ and } A_{i,t} = 0, \text{ when } t < T_i$$

¹² See, e.g., European Central Bank, *Handbook for the Compilation of Flow Statistics on the MFI Balance Sheet*, February 2006.

¹³ See, e.g., http://www.cnb.cz/en/statistics/money_and_banking_stat/stat_mb_met/stat_mb_harm_growthrates.html.

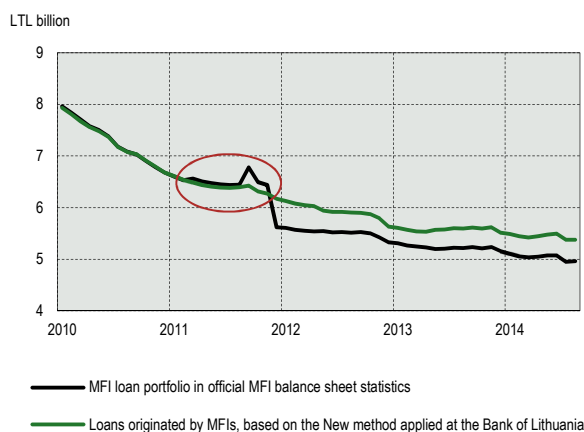
¹⁴ Tables 2.4.1, 2.4.2 and 2.4.3 of Monetary Statistics are available online at http://www.lb.lt/stat_pub/statbrowser.aspx?group=7273&lang=en.

$$X_{i,t} \geq 0 \text{ and } A_{i,t} \geq 0, \text{ when } t \geq T_i$$

where i is the index of the institution removed from the MFI list in period t_i , N_t is the number of such institutions at the end of period t , $X_{i,t-1}$ is the loan portfolio of the institution i , which has been removed from the MFI list, at the end of period $t-1$, $A_{i,t}$ is the unobserved change as a result of amortisation, in period t , of loan portfolio of the institutions that have been removed from the MFI list. If amortisation data is not available, it is calculated using the

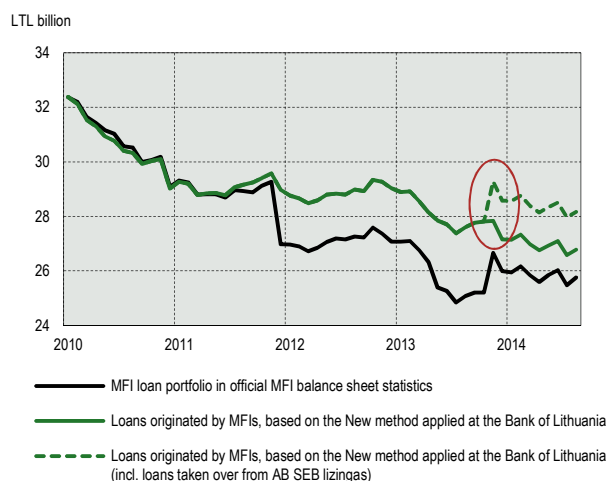
equation $A_{i,t} = \sum_{s=1}^S \frac{L_{i,s,T_i}}{\tau_{i,s,T_i}}$ under the assumption that loans are being repaid in equal principal payments, i.e. the principal is being paid back in equal instalments. In this formula, s is the sector's index, S is the number of sectors, which the portfolio can be broken down into, T_i is the last month before the removal of the institution i from the statistics, where the size of that institution's portfolio and its breakdown between sectors are known, L_{i,s,T_i} is the amount of the portfolio of loans issued by the institution i to the sector s as of the end of period T_i , and τ_{i,s,T_i} is the weighted average remaining maturity of the portfolio of loans issued by the institution i to the sector s at the end of period T_i (calculations are based on the data stored in the Loan Risk Database of the Bank of Lithuania).

Chart C. Outstanding amount of consumer and other loans to households calculated by different methods (January 2010–September 2014)



Source: Bank of Lithuania calculations.
Note: several transfers and takeovers of loans of banks and their subsidiaries took place between June and October 2011.

Chart D. Outstanding amount of loans to non-financial corporations calculated by different methods (January 2010–September 2014)



Source: Bank of Lithuania calculations.

It should be noted that the reported transactions F_t are not corrected for adjustments related to loans that have been securitised or transferred¹⁵, although the Bank of Lithuania has been collecting such data since 2010. Such adjustments reflect the specific features of bank accounting, rather than the actual change in financing of the economy, hence they should be taken into account. For example, the period between June and October 2011 saw several transfers and takeovers of loans of banks and their subsidiaries, which can be seen from the data related to the portfolio of consumer and other loans to households (see Chart C). A substantial change in the portfolio of loans to non-financial corporations was recorded in November 2013 as AB SEB Bankas integrated its leasing subsidiary and took over its loans. Still, the actual financing of the economy remained unaffected save that the loans issued by a former subsidiary were transferred to another economic entity. Data comparison (see Chart D) shows differences in loans to non-financial corporations, as well as loans to other financial intermediaries and in their developments between November 2013 and September 2014 (with loans taken over by AB SEB Bankas included).

Taking into consideration the additional factors – securitisation of loans and amortisation of the removed portfolio – transactions are recalculated using the following formula:

$$F_t^* = F_t - D_t - A_t$$

where F_t^* is the monthly transaction flow after additional adjustments, D_t is the adjustment for securitisation or transfer of loans, $A_t = \sum_{i=1}^{N_t} A_{i,t}$ is the amortisation of loan portfolio of the institutions, removed from the MFI list, in period t .

¹⁵ Since 2011, such transactions have been recorded in statistics several times. In most cases, they involve a MFI and its subsidiary hence they do not have much of an effect on the total loan portfolio data. However, they can clearly be seen from the portfolios of loans to households, loans to non-financial corporations and loans to financial intermediaries.

The adjusted monthly growth rate $a_t^{M^*}$ is calculated on the basis of indexes of notional stocks:

$$a_t^{M^*} = \left(\frac{I_t^*}{I_{t-1}^*} - 1 \right) \times 100$$

where $I_t^* = I_{t-1}^* \times \left(1 + \frac{F_t^*}{I_{t-1}^*} \right)$ is the index of notional stocks.

Adjusted outstanding amounts at the end of the month are calculated using this equation:

$$L_t^{**} = L_{2007M06}^* \times I_t^*$$

where L_t^{**} is the adjusted outstanding amount of loans and $L_{2007M06}^*$ is the unadjusted value of the amended outstanding amount of loans in the base period. The choice of the base period does not affect the calculations of growth rates; however, it does affect the values of adjusted outstanding amounts. June 2007 has been set as the base for the new method applied at the Bank of Lithuania in order to make sure that the portfolio values comply with the classification that has recently been in use and, at the same time, to prevent the reduction of portfolio value as a result of portfolio write-downs and write-offs implemented after the crisis.

To sum up, this methodology enables to produce an estimate of MFI loan portfolio cleared of the factors unrelated to economic transactions, such as exchange rate adjustments, write-down/write-off adjustments, reclassification or other adjustments, adjustments owing to unobserved amortisation of loan portfolio of the institutions that have been removed from the MFI list, or adjustments related to loans that have been securitised or transferred and taken over.