

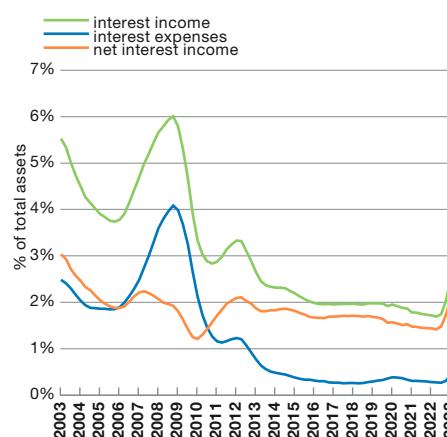
APPENDIX 1. FACTORS AFFECTING THE NET INTEREST MARGIN IN THE ESTONIAN BANKING SECTOR

The main source of income for banks is interest income, which needs to cover the interest costs of liabilities, provisions to cover loan losses, and administration costs. One way of measuring the profitability of banks is consequently the net interest margin (NIM), which expresses the direct return for banks of financial intermediation activity, as net interest income earned as a ratio to interest earning assets. The smaller this is, the more effectively the banks are managing to inter-mediate money between borrowers and depositors. At the same time, if little is earned as net interest income, the banks are less able to make provisions to cover loan losses and increase their internal resources, or capital from undistributed profit. This means that if the NIM is low, the risks hidden in the loan portfolio may not be accurately estimated and the future operations of the bank could be threatened if those risks were to be realised. This appendix explains the dynamics of the net interest margin of the Estonian banking sector through different periods by looking at the factors affecting interest income and interest expenses.

Net interest income was mainly affected in the early 2000s by falling interest margins, which fell largely because risk assessments improved with integration into the European Union. Loan interest rates were at 6-7% before Estonia joined the European Union, and net interest income was earned of around 3% as a ratio to total assets. As the economy developed rapidly and the loan market started to grow fast just before and after Estonia joined the European Union, the risk assessments improved and the interest margins, and consequently also net interest income, fell quickly (see Figure A1.1). The entrance of the big Nordic banks into the market brought with it rapid growth in the credit market and narrower margins. Funding received through them allowed some banks to gain market share fast.

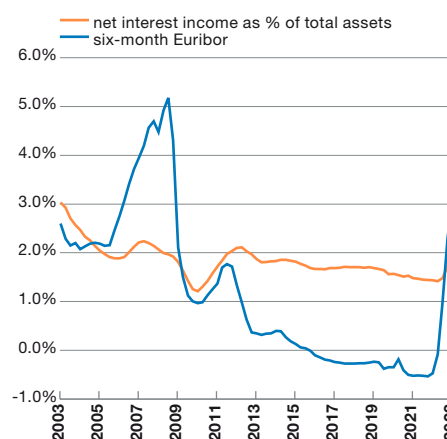
Movements in subsequent years in interest income and expenses were fairly similar, and so there was little change in net interest income. The financing of the large Nordic banks came mainly from the money and capital markets, and so the price of funding for the local banks came to depend on money market interest rates. Consequently the loans issued since almost the beginning of the development of the credit market came with floating interest rates that depended on money market interest rates, reflecting the preference of the banks for passing interest rate risk on to their clients. Money market interest rates affected both the asset and liability sides, and so the changes in

Figure A1.1. Banking sector interest income, expenses and net interest income



Source: Eesti Pank

Figure A1.2. Banking sector net interest income and six-month Euribor



Sources: European Central Bank, Eesti Pank

interest income and interest expenses were quite synchronised during the global financial crisis and the recession of 2009-2010. Loan interest rates automatically reacted faster though and net interest income also fell a little during the recession when money market interest rates fell (see Figure A1.2), but this was also affected by a severe deterioration in loan quality and a consequent fall in interest income.

In subsequent years, net interest income started to be affected primarily by changes in the funding structure of the banks that reduced their interest expenses. Funding from parent banks was reduced sharply after the financial crisis and growth in the loan portfolios started to depend above all on growth in deposits. Quite unusually, deposits actually grew in Estonia in the years of the crisis and the growth picked up even further as the economy recovered. When the European debt crisis erupted and monetary policy interest rates fell, the interest paid on deposits also fell and so the share of deposits that were term deposits started to decline in favour of demand deposits. This gradually brought interest expenses down. Risk assessments deteriorated in the early stages of the financial crisis of 2009-2010 and interest margins rose, and although margins came down in the years after the crisis, they still remained higher than they were before it. This meant that although the part of interest rates that came from base interest rates was reduced by falling monetary policy rates, the increase in the average interest margin in the loan portfolio came to support interest income as the share of earlier loans with lower interest margins in the loan portfolio decreased over time.

Net interest income has increased rapidly since the second half of 2022 by tighter monetary policy causing money market interest rates to rise. As interest income has increased, so interest expenses have started to rise gradually, though term deposits are still a small share of total deposits since interest rates stayed low for years, and although that share is increasing, it has a relatively small effect on interest expenses. As the funding structures of the banks are different though, some banks are affected more by the increase in interest expenses than others and the gain from the increase in net interest income from rising base interest rates is consequently smaller.

The model for estimating the net interest income of the banks shows that net interest income is affected not only by money market interest rates, but also by cost efficiency and the quality of the loan portfolio. The literature on the subject has found that there are many other factors that affect the net interest margins of the banks alongside market interest rates. It has been found that factors affecting the size of margins include the operating cost efficiency of banks^{14 15 16}, credit risk^{17 18}, liquidity¹⁹ and competition in the market^{20 21}. To analyse the factors that affect the net interest margins of the banking sector, a model was compiled using quarterly data from Eesti Pank from 2003-2022.

14 Kukk, M., & Levenko, N. (2022). Interest rate spreads in Estonia: different stories for different types of loan. Eesti Pank.

15 Angori, G., Aristei, D., & Gallo, M. (2019). Determinants of banks' net interest margin: Evidence from the Euro area during the crisis and post-crisis period. *Sustainability*, 11(14), 3785

16 Setiawan, C., & Wisna, N. M. M. M. (2021). The determinants of net interest margin: An empirical study of Indonesia category-IV banks for the period of 2014-2017.

17 Benkovskis, K., Tkacevs, O., & Vilerts, K. (2021). Interest Rate Spreads in the Baltics and the Rest of the Euro Area: Understanding the Factors behind the Differences. Bank of Latvia Discussion Paper No. 2021/02.

18 Karmelavičius, J., Mikaliūnaitė-Jouvanceau, I., & Buteikis, A. (2022). What drove the rise in bank lending rates in Lithuania during the low-rate era? (No.43). Bank of Lithuania.

19 Setiawan, C., & Wisna, N. M. M. M. (2021). The determinants of net interest margin: An empirical study of Indonesia category-IV banks for the period of 2014-2017.

20 Karmelavičius, J., Mikaliūnaitė-Jouvanceau, I., & Buteikis, A. (2022). What drove the rise in bank lending rates in Lithuania during the low-rate era? (No.43). Bank of Lithuania.

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The model takes the following form:

$$NIA_t = \alpha + \beta_1 C_t + \beta_2 E_t + \beta_3 P_{t-8} + \beta_4 LD_t + \beta_5 HHI_t + \epsilon_t ,$$

where:

NIA_t is the quarterly change in the ratio of net interest income to total assets at time t,

α is the constant of the regression,

C_t is the quarterly change in the ratio of administrative costs to total assets,

E_t is the quarterly change in the six-month Euribor,

P_{t-8} is the quarterly change in the ratio of provisions to the loan portfolio with a lag of eight quarters,

LD_t is the quarterly change in the loan-to-deposit ratio,

HHI_t is the quarterly change in the Herfindahl-Hirschmann index.

The results of estimating the model show that the efficiency of operating costs, market interest rates and the lagged share of loans covered by provisions have a statistically significant positive impact on the net interest margins of the Estonian banking sector (see Table A1.1). Contrary to expectations, the concentration index has a negative statistically significant impact.

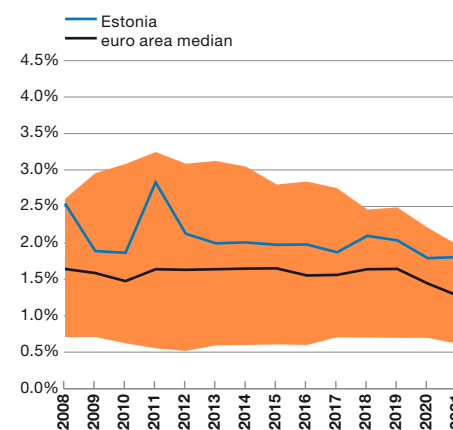
Table A1.1. Results of estimating the model for the ratio of net interest income to total assets

Independent variables	Coefficients
Quarterly change in administrative costs/assets	1.136112**** (0.19094)
Quarterly change in six-month Euribor	0.074985*** (0.01558)
Quarterly change in provisions/loan portfolio, lagged eight months	0.052806** (0.02214)
Quarterly change in loans/deposits	0.00130 (0.00142)
Quarterly change in the Herfindahl-Hirschman index	-0.021797** (0.01023)
Constant	0.00003 (0.00006)
Observations	72
R2	0.60206
Adjusted R2	0.57191
Standard error	0.00049
F-statistic	19.97068

Standard errors for the coefficients are in brackets and show how reliable they are (the smaller the better). *, ** and *** indicate that the coefficient is statistically significant at the 10%, 5% and 1% levels respectively.

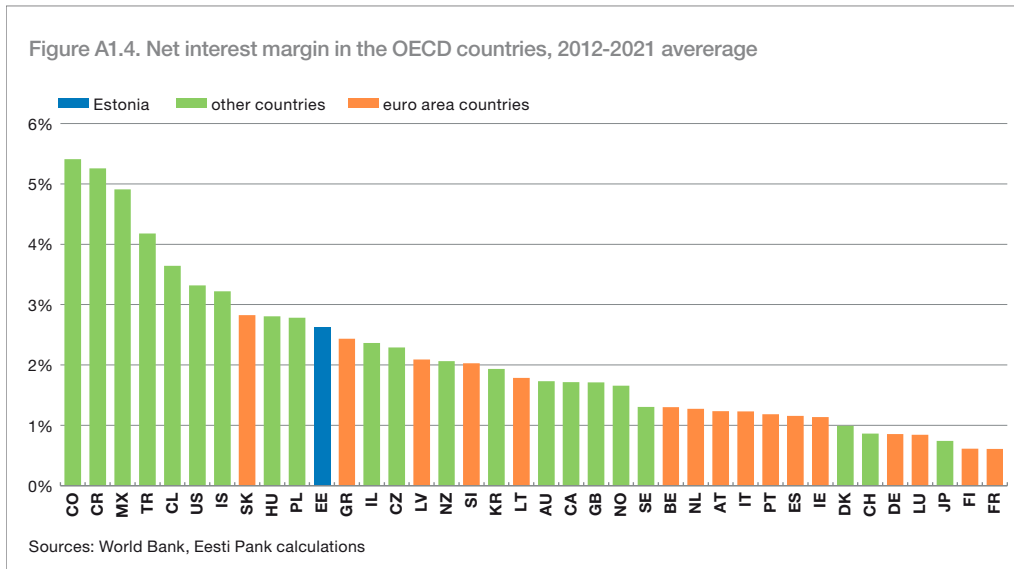
Estonia stands out in international comparison for having net interest income that is a little above the average. The net interest income of the Estonian banking sector as a ratio to assets in 2008-2021 was above the median figure for the euro area in all years (see Figure A1.3). The net interest income of the euro area has however been relatively small next to that of other regions, and this has held the profitability of the banks in the euro area at a low level. The European Central Bank has repeatedly pointed out that the low profitability of the banks is one of the critical systemic risks to financial stability

Figure A1.3. Ratio of net interest income to total assets in the euro area



Last observation 31.12.2021
Source: European Central Bank

in the euro area²². Data from the World Bank²³ for countries outside the euro area show that Estonia was above the OECD median for net interest income as a ratio to income earning assets (see Figure A1.4), but if the very low figures for the countries of the euro area are excluded, then the Estonian banking sector is quite close to the average.



22 European Central Bank. Financial Stability Review, November 2018.

23 <https://databank.worldbank.org/source/global-financial-development/Series/GFDD.EI.01>.