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Impact of TLTRO III on bank lending: The Slovak experience¹

Marcel Barmeier^a, Juraj Falath^b, Alena Kiššová^c, Adriana Lojschová^d

Abstract

We investigate the impact of TLTRO III operations introduced by the European Central Bank on bank lending, interest rates and profitability of Slovak banks. We deploy a two-step estimation approach with a mahalanobis distance matching and a difference-in-difference approach relying on bank-level and AnaCredit data. Our findings suggest that the credit easing measures had a positive effect on bank lending and negative effect on lending rates for non-financial corporations. With respect to bank profitability, we find inconclusive evidence of a positive effect of TLTRO III on net interest income and return on assets. Banks in Slovakia have not significantly increased their reserves at the central bank in reaction to participation in TLTRO III.

Keywords: monetary policy, targeted longer-term refinancing operations, credit supply, difference-in-difference, mahalanobis distance matching, AnaCredit

JEL classification: E43, E44, E51, E52, E58

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1 Introduction

Central banks have taken several swift and powerful steps to keep the economy afloat during the COVID-19 pandemic. In the euro area, the European Central Bank (ECB) has put in place a set of monetary policy and banking supervision measures to mitigate the impact of the coronavirus pandemic on the euro area economy. The Eurosystem has provided long-term loans to banks at very favourable rates, on the condition that banks increase lending to people and businesses (targeted longer-term refinancing operations – TLTROs). Under this program, banks could borrow at a rate as low as -1% and for the first time in its history, the Eurosystem lent at a rate lower than the remuneration of banks' reserves.¹

In this paper, we study whether Slovak banks used the liquidity obtained from TLTRO III operations to increase lending volumes and/or decrease lending rates, using a matching approach in combination with a difference-in-difference estimation. For this purpose, we construct a unique monthly bank-level dataset covering the period from January 2012 to December 2021. Besides, the impact on bank lending and lending rates, we also explore the possibility of an increase in bank profitability which could result from i.a., investing into higher-yielding assets, substituting other market funding sources or increasing reserves.

Answering the question whether common monetary policy can operate effectively through unconventional targeted instruments supporting lending to the economy in a small open economy dominated by foreign-owned bank finance is important. It is an issue of monetary policy design. If viewed from the perspective of the ECB, it is important to understand if monetary policy decisions transmit homogeneously in all of its jurisdictions.

Our paper has three main findings. Firstly, we find evidence for an unambiguously positive effect of TLTRO III uptake on loan supply. Slovak banks that participated in the operations increased their lending in comparison to banks that did not participate. In our most refined estimation with controls for credit demand, we find an average increase of 5.5% of lending to non-financial corporations (NFC). Secondly, we estimate that the banks which participated in TLTRO III decreased their lending rates for NFC relative to non-participating banks. The findings suggest that TLTRO III has fulfilled the purpose it was designed for, and it has successfully passed the attractive financing conditions to the real economy. Thirdly, there is inconclusive evidence that banks have improved their profitability measured as the net interest income (NII) and the return on assets (ROA). However, with respect to an increase in profitability via an increase in reserves at the Eurosystem, we do not find evidence for an increase in deposits at the central bank.

The paper is structured as follows. Section 2 provides an overview of the institutional background and a review of the related literature. Section 3 summarizes the data and provides details about the structure of the Slovak banking sector. Section 4 explains the applied methodology. Section 5 presents the results and Section 6 concludes.

¹ The remuneration rate at that time was -0.5%.

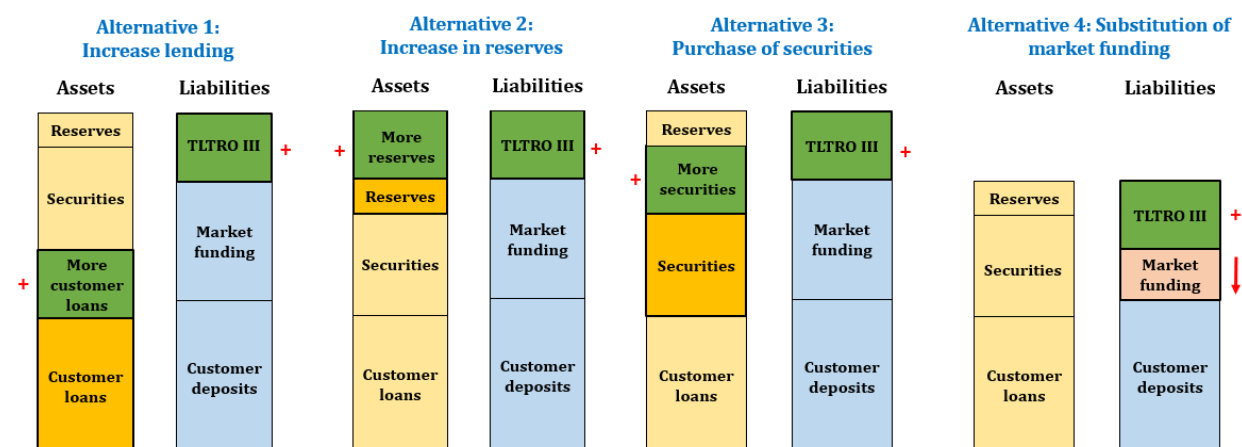
2 Institutional background and literature review

So far, the ECB has launched three series of TLTRO operations.² The third series (TLTRO III) was announced in early March 2019 and implemented in September 2019 to preserve favourable bank lending conditions to non-financial private sector. The interest rate applied to TLTRO III was linked to the participating banks' lending performance. On 30 April 2020, the ECB has decided to further reduce the interest rate applied on these operations to a rate as low as -1% from June 2020 to June 2021 for banks fulfilling the lending requirements. In addition, the set of assets eligible to collateralise the borrowing under TLTRO III were enlarged and the banks' flexibility of repayment options and participation modalities across operations were enhanced.³

In principle, there are multiple potential usages for the funds taken within the TLTRO operations, where the balance sheet implications are illustrated in **Figure 1**: Besides an increase in bank loan supply, which will be the focus in this analysis ("Alternative 1"), banks can also deposit the funds at the central bank ("Alternative 2"). In addition, banks can use the liquidity from TLTROs to increase profitability by investing it into higher-yielding securities, i.e., carry trade ("Alternative 3"), or to substitute other market funding sources ("Alternative 4"). Depending on the dominating channels at play, the TLTRO funds can lead to an expansion of the banks' balance sheet.

There are several reasons why quantifying the importance of each channel is challenging.⁴ First, the above-mentioned channels work simultaneously to some degree. Second, high-level balance sheet data might not suffice to identify detailed flows of funds. Third, motivations and goals are heterogenous across Slovak banks (different priorities and business models of each bank) and time (changing views about TLTRO participation and the use of funds). Fourth, there is a significant delay factor linked to all channels except for depositing funds at the central bank. While an increase in loan supply or investing into securities take some time, the deposit channel

Figure 1: Main channels of using liquidity from TLTRO by banks



Note: Stylized representation of possible banks' usages of TLTRO funds similar to Lozoya et al. (2022).

² A first series of TLTROs was announced on 5 June 2014, a second series (TLTRO II) on 10 March 2016 and a third series (TLTRO III) on 7 March 2019. The initial announcement of TLTRO III in March 2019 reassured markets about the extension of the pre-existing TLTRO II.

³ For more details, see the ECB press releases of 12 March 2020 and 30 April 2020.

⁴ For more details regarding the empirical challenges, please see section Methodology.

("Alternative 2" in **Figure 1**) can be observed in the short term. Finally, the composition of participating and non-participating banks is substantially different, e.g., the banks might have different business plans and the ability to cope with major economic events such as the pandemic might be heterogeneous. Many of the largest banks were the ones taking up state guarantee schemes which were partly designed to amplify the effect of TLTRO funding on lending. This might have made carry trade activities less attractive compared to offering new loans.

Our paper is linked to the literature on the effects of unconventional monetary policy tools such as negative interest rate policy (e.g., Heider et al (2019), Jobst & Lin (2016), Barmeier (2022)) or quantitative easing (e.g., Ugai (2007), Giansante et al (2020), Kapetanios et al (2012)) in general. More specifically, we enrich the literature on targeted funding-for-lending schemes used as unconventional policy tools.⁵

While the empirical literature analysing the effects of TLTRO in the first and second series is rather numerous (Benetton and Fantino, 2021; Dubovik and van Dijk, 2018; Balfoussia and Gibson, 2016; Afonso and Sousa-Leite, 2019), there are only a few empirical studies regarding the third TLTRO operation. Kwapil and Rieder (2021) study the effect of the fourth tranche of TLTRO III on banks' supply of new loans to NFC and households in Austria. Using bank-level data and applying a two-stage least squares instrumental variable strategy, they find that participation is associated with a significant positive effect on the amounts of new loans granted in Austria. Da Silva et al. (2021) assesses the impact of post-March 2020 TLTRO III operation on bank lending through so-called "targeted" and "profitability" channels. Their estimated coefficients suggest that the volume of eligible loans grew by 32% in the first quarter and 19% in the second quarter after the announcement. The profitability channel, while also effective, is estimated to be less pronounced than the "targeted" channel stemming from the direct lending incentives. Lozoya et al. (2022) find a positive effect of TLTRO III participation on lending volumes but also on reserve holdings. On the other hand, the impact on applying carry trade strategies and substitution for market funding is non-significant. Agnes et al. (2022) investigates whether collateral scarcity has been a limiting factor in participating in TLTRO III operations in Italy. They find that there were no general signs of collateral scarcity and that TLTRO III supported lending to non-financial corporations, particularly with longer maturities indicating the favouring of firm of stable funding source in times of uncertainty.

We contribute to the growing literature on TLTRO III by investigating the effects on bank lending, lending rates and profitability of Slovak banks. This provides a complementary view to the previous studies that performed the analyses mainly for specific economic regions (e.g., Kwapil and Rieder (2021) for Austria).

3 Data

Even though the Slovak banking sector is relatively small in the European context, it is a significant sector of the Slovak economy. Most of the banks located in Slovakia are universal banks, focused on retail and corporate banking. They are controlled by foreign entities (93.8%), mainly by banking groups from Austria, Italy, and Belgium. Only four banks are fully controlled by domestic investment groups (three banks) or the government (one bank). The Slovak

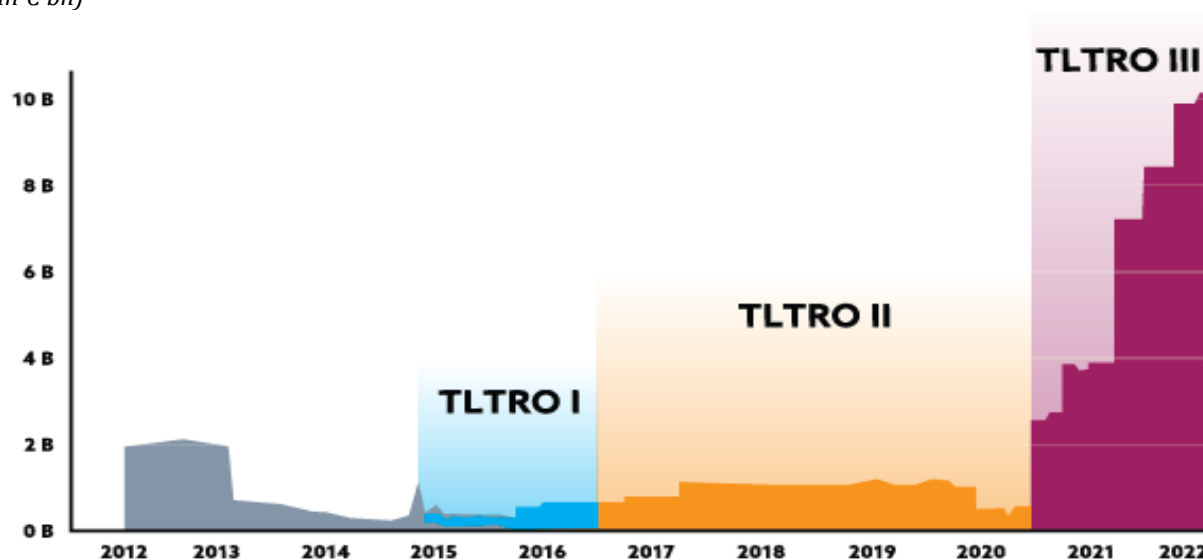
⁵ This paper is also linked to the literature on the impact of more general longer-term refinancing operations (LTRO) on banks. For example, Andrade et al. (2017) find that LTROs increased bank lending to NFC. In addition, Carpinelli and Crosignani (2021) and Crosignani et al. (2020) show that there are rising incentives of banks to use obtained liquidity for purchasing high-yield securities ("Alternative 3" in Figure 1).

banking sector is concentrated within the hands of three major players (Slovenská sporiteľňa, VUB Banka and Tatra banka) who hold around 60% of the banking assets.

With respect to the participation in TLTRO programs in Slovakia, TLTRO I and II programs had been rather moderate in magnitude. On the other side, TLTRO III take-up was ample in Slovakia (EUR 10 billion, **Figure 2**). According to the June 2021 Bank Lending Survey for banks of the Eurozone, the participation in TLTRO III was primarily motivated by its favourable pricing. Banks took the opportunity to utilize their borrowing allowance already in an early stage. Reasons for participation of banks in Slovakia were mostly related to precautionary (reducing or preventing current or future funding risks) and regulatory (fulfilment of regulatory requirements) motives. However, the participating banks have also reported a high level of uncertainty about their future involvement in TLTRO operations. The main doubts were linked to their future (in)ability to fulfil the lending criteria for receiving the most favourable pricing of the TLTRO funds. This uncertainty originated from firms' demand for credit during their recovery from the pandemic but also abundant liquidity in the market.

Figure 2: Refinancing operations in Slovakia

(in € bn)



Note: The grey area is the volume of longer-term refinancing operations, particularly VLTRO (very long-term refinancing operations) and LTRO (long-term refinancing operations). Source: NBS

To estimate the impact of TLTRO III on bank lending, rates, and profitability, we construct a unique monthly bank-level dataset combining confidential data from several sources. The main source is the internal statistical database which contains individual data on Slovak banks' balance sheet items. We extract data on banks' assets and liabilities, total and sectoral lending volumes, and sectoral lending rates on newly granted loans. We combine balance sheet data with data on profitability, such as return on assets (ROA), net interest income (NII) and reserves with the Eurosystem. We complement this dataset with confidential information on the participation of individual banks in TLTRO III, which allow us to construct a treatment and control group for the estimation.

The data is available from January 2012 until December 2021 with a monthly frequency for every Slovak bank. In total, there are 34 banks in Slovakia in the period. However, we focus only on banks that were active in Slovakia during the whole time. In addition, we have to omit banks for which we do not have complete data. Lastly, one bank participated in TLTRO III only in the

last tranche in 12/2021, which will be excluded in the analysis. This leaves us with 20 banks of which 4 banks participated in TLTRO III and 16 banks did not participate.⁶ **Table 1** shows the summary statistics for the banks divided by the TLTRO III participation. Differences between banks in treated and control group are striking. Firstly, the median volume of total assets for treated banks is 25 times the median balance sheet size of banks in the control group. Secondly, the banks that participated in TLTRO III have different sectorial lending patterns compared to banks that did not participate. While the share of lending to non-financial corporations and for household consumption is higher for TLTRO III participating banks, non-participating banks

Table 1: Descriptive statistics

Variable	Treated banks (4 banks)				Control banks (16 banks)			
	Median	STD	P10	P90	Median	STD	P10	P90
Total assets (EUR, billion)	18.45	5.94	9.71	21,32	0.74	2.47	0.36	3.98
Total loans/Total assets	79.0%	3.0%	75.2%	81.4%	76.9%	23.9%	30.5%	89.6%
NFC loans/Total assets	21.5%	9.1%	17.3%	35.4%	19.1%	27.3%	5.3%	70.8%
HP loans/Total assets	32.9%	6.3%	27.4%	40.5%	40.2%	28.4%	0.6%	67.8%
HC loans/Total assets	6.4%	1.9%	3.5%	7.2%	3.3%	6.3%	0.3%	14.4%
TLTRO eligible loans/Total assets	44.7%	8.8%	35.9%	53.9%	40.8%	28.0%	9.1%	81.5%
NFC rates	1.69%	0.33%	1.42%	2.11%	2.38%	1.89%	1.09%	6.00%
HP rates	0.98%	0.11%	0.85%	1.07%	1.11%	1.27%	0.61%	3.68%
HC rates	8.53%	0.82%	7.57%	9.32%	6.37%	2.65%	4.14%	8.26%
Deposits/Total assets	61.2%	8.8%	48.3%	66.3%	67.6%	24.7%	19.5%	83.4%
Securities/Total assets	11.1%	6.4%	2.7%	16.0%	6.0%	12.5%	0.0%	30.7%
ROA	0.68%	0.10%	0.54%	0.75%	0.48%	0.61%	0.04%	1.33%
NII/Total assets	0.96%	0.14%	0.87%	1.14%	0.99%	0.44%	0.38%	1.51%
State Guarantees/Total assets	1.21%	0.33%	1.11%	1.70%	0.00%	3.36%	0.00%	1.69%

Notes: NFC – non-financial corporations, HP- households for house purchase, HC – households consumption credit, ROA – return on assets, NII- net interest income. Descriptive statistics are based on consolidated banking data of SK financial institutions. Data is as of 02/2019. Source: NBS.

have a higher exposure towards lending to households for house purchases.

In our most refined specification with controlling for credit demand, we rely on AnaCredit data. More in detail, we use monthly bank-firm level data from 09/2018 to 12/2021 based on AnaCredit reporting of Slovak banks. The advantage of AnaCredit data in Slovakia is that there is no reporting threshold, i.e., each outstanding credit of a firm needs to be reported in AnaCredit. Contrastingly, the sample of banks is reduced compared to the banks shown in **Table 1**. Firstly, we can only consider banks that lend to non-financial corporations as lending to households is not in scope of AnaCredit reporting. Secondly, due to the act on banks by the National Council of the Slovak Republic, loan agreements for repairing, reconstructing, or modernising shared spaces, shared equipment and appurtenances do not need to be reported in the credit register. This reduces the sample to 18 banks (4 treated and 14 control banks).

⁶ One bank in Slovakia did not participate directly in TLTRO III, but via its parent entity. In our baseline estimation, we include the bank in the control group. However, as the bank might indirectly benefit from the participation in TLTRO III via the parent institution, we exclude the bank in our robustness check. For the results, please see the Annex.

4 Methodology

For estimating the impact of TLTRO III on lending, interest rates and profitability, several challenges arise. Firstly, we have only a small number of banks in Slovakia. Compared to other studies focusing on economies with a larger banking sector⁷, we have in total only 20 banks in the sample. In addition, using a mahalanobis distance matching, we further reduce the sample to limit the selection bias from the decision to participate in TLTRO III. On the other hand, the good quality monthly bank-level data can, to some extent, compensate for the disadvantages that come from a small sample size.

Secondly, we work with few dominant banks - most of them participated in TLTRO operations at some point, which creates difficulties in establishing a comparable control group. This can lead to biased results based on differences between the characteristics, behaviour, and strategies of the banks in the two groups. Thus, as mentioned above, we identify the most similar non-participating banks via mahalanobis distance matching ensuring that control banks are as similar as possible compared to treated banks. In addition, to ensure that results are not driven by single classifications into control group, we estimate several models with different compositions of the control group.

Thirdly, challenges arise from the fact that we analyse the impact of TLTRO III which took place during the outbreak of the COVID-19 pandemic. Thus, not only central bank measures but also government measures were implemented to help banks overcome the pandemic. Slovakia, like many other countries, offered banks state guarantees. Without addressing this concern, the effect of state guarantees can confound with the impact of TLTRO III.⁸ In our analysis, we include state guarantees in our baseline specification as a control variable to adjust for their impact on lending behaviour of banks. In addition, any impact resulting from firm-specific loan demand is captured by firm-time fixed effects in our most refined specification based on AnaCredit data.

Lastly, a challenge relates to the issue that a bank participated in TLTROs operations through a parent entity. Even though we can identify group bidders, we are not able to divide their total uptake between the individual financial institutions within the group. Thus, we do not include the group bidder in our baseline specification in the group of treated banks but keep it as part of the control group, as the bank does not have to fulfil the lending benchmark. Nevertheless, we performed a robustness check, where we excluded the bank that participated in TLTRO III via a parent entity.⁹

Given the methodological challenges outlined above, we discuss the two-step approach used in the estimation: (1) Mahalanobis distance matching based on a logistic regression to select the control banks and (2) difference-in-difference approach to estimate the causal effect of TLTRO III on bank lending, rates, and profitability.

Banks that participate in TLTRO are not random and their interest in participating can be affected by several factors, such as their business model or liquidity situation, which thus,

⁷ See Laine (2019), Andreeva and García-Posada (2019), Da Silva et al. (2021) for the euro area, Balfoussia and Gibson (2016) for the euro area and Greece, Benetton and Fantino (2021), Afonso and Sousa-Leite (2019) for the euro area and Portugal or Lozoya et al. (2022) for Spain.

⁸ Da Silva et al. (2021) performed a robustness check where they excluded state-guaranteed loans from their sample and showed that results remain qualitatively unaffected.

⁹ Please see the Annex for the results.

causes endogeneity concerns.¹⁰ It is necessary to take these differences into account before proceeding with the difference-in-difference analysis as it requires the construction of two comparable groups, i.e. banks that participated in TLTRO III (*treated group*) and banks that did not participate (*control group*).

To reduce the imbalance in the covariates between the banks in control and treatment group, we rely on a matching procedure which allows to select only a subset of the banks in the control group. While the most widely used approach is the propensity score matching (PSM)¹¹, King & Nielsen (2019) show that PSM can *increase* the imbalances in the covariates, which they name the PSM paradox. Particularly in the case of a small sample size, King & Nielsen (2019) recommend not to use PSM and rely on an alternative matching method. Given the limited number of banks in our sample, we follow this suggestion and rely on mahalanobis distance matching.

For this purpose, we estimate the following logistic regression:

$$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * Z_i + \epsilon_i \quad (1)$$

Where dependent variable $Treated_i$ is a binary variable which is 1 if bank i participated in TLTRO III and 0 otherwise, $Size_i$ is the log of total assets and Z_i are other bank characteristics, such as share of securities over total assets, share of liabilities over total assets, share of loans over total assets and return on assets. Data as of February 2019, i.e., before the announcement of TLTRO III, is used for the estimation.

To support the robustness of our study we work with ten different control group selections, since choosing only one selection could lead to results that are affected by one specific bank composition. For selecting the ten different control groups, we estimate in total 72 different models that differ with respect to the bank characteristics Z_i included in the estimation, the number of control banks that are matched to the treated banks (ratio varies between 2 and 7) and whether control banks are allowed to be matched to several treated banks, i.e., with or without replacement (Annex B, Table B.1). Given the 72 results from the estimation, we use only those control group selections that (i) have at least nine banks in the sample, i.e., five banks in the control group (ii) are distinct in the composition of banks in the control group and (iii) reduce the imbalances measured by the sum of standardized mean differences to the largest extent.

The availability of data in the sample varies for the banks depending on the independent variable of interest. Thus, we estimate the 72 models separately for the full sample of 20 banks ("Baseline" in **Figure 3**) and for five reduced sample selections where the number of banks vary between 11 and 18 banks.¹²

As shown in **Figure 3**, the mahalanobis distance matching helped to reduce the imbalances in the covariates between the banks in the control and treatment group for each sample selection.

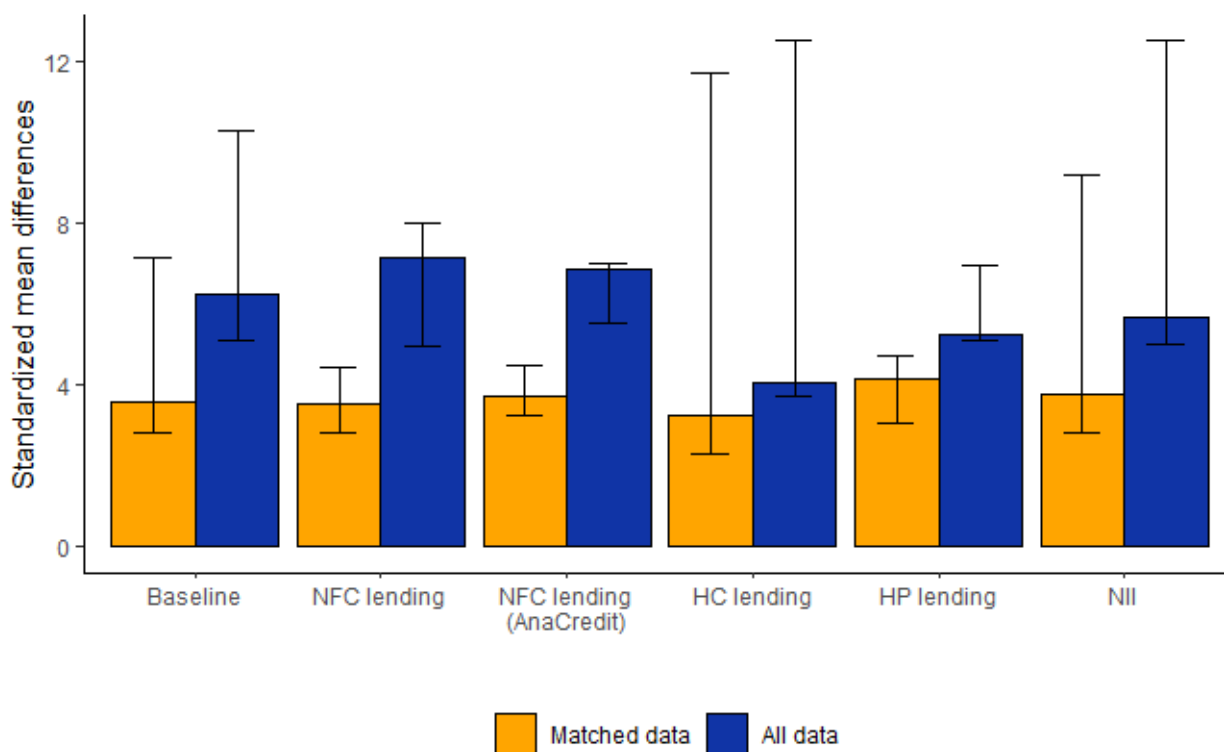
¹⁰ We are applying a matching procedure to reduce the endogeneity concerns. Other papers (e.g., Laine (2019), Benetton and Fantino (2021), Andreeva and García-Posada (2019) and Kwapil and Rieder (2021)) have used an instrumental variable approach.

¹¹ For example, Laine (2019), Giansante et al. (2020) and de Haan et al. (2019) rely on PSM to account for potential selection bias in participation of longer-term refinancing operations.

¹² Due to the low number of banks in the sample for specific independent variables the condition to have at least nine banks in the sample needed to be relaxed partly. For some models, only seven banks are in the sample. In addition, to have at least ten different models, we also considered a ratio of 1 for the number of control units that are matched to the treated units.

However, the level of reduction varies across the sample selections. While the reduction was largest for NFC lending (-50.8%), it was relatively low for HC lending (-20.8%), which can be partly explained by the low number of banks that engage in HC lending. In addition, the absolute value of the standardized mean differences, i.e., the difference in the means of each covariate between treatment and control group normalized by a standardization factor, remain relatively high after matching. For a good balance between the treatment and control group the values should be close to 0. However, given the small sample size, this is infeasible in our setting.

Figure 3: Differences between treatment and control group pre and post matching



Notes: Baseline is used for Total lending, ROA and reserves. NFC lending is used for NFC lending volumes and rates. NFC lending (AnaCredit) is used for estimation of NFC lending volumes based on AnaCredit data. HC lending is used for HC lending volumes and rates. HP lending is used for HP lending rates. NII is used for estimation of profitability based on NII. The bars show the median standardized mean differences across all ten models and the error bars show the 90% confidence interval. Source: NBS

After obtaining two groups by mahalanobis distance matching, we then evaluate the impact of TLTRO III by executing a difference-in-difference estimation. Key feature of the difference-in-difference estimation is the comparison of a treated group and a control group before and after a treatment, where the treatment period is the time of participation in the TLTRO III program in our model.

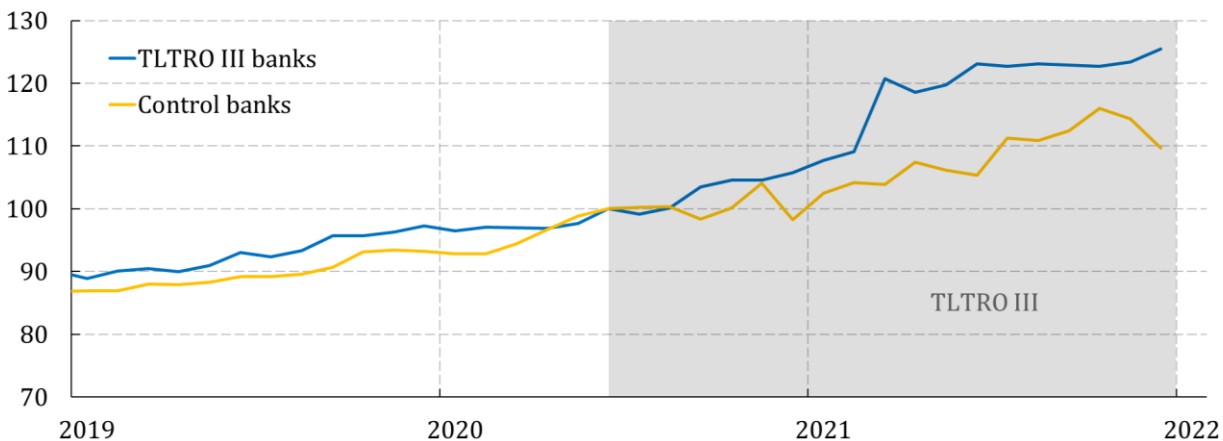
The fundamental identifying assumption in difference-in-difference estimation is that the treated banks have similar trends compared to the control banks in the absence of the treatment. As this assumption is not testable, we investigate whether there are parallel pre-trends for total lending and NFC lending rates in **Figure 4**. As shown in Panel A, the evolution of total lending was very similar for banks that participated in TLTRO III and banks that did not participate before the treatment. The observed disconnect after the start of the 4th tranche of TLTRO III in June 2020 indicates already a positive impact on lending for participating banks. With respect to NFC lending rates in Panel B, a decrease in the rates for newly granted loans are observed from June 2019 until June 2020 for banks in the treatment and control group,

which supports the existence of parallel pre-trends. While the rates for TLTRO III banks further decreased after 2020, the lending rates for new loans remained fairly constant for the banks in the control group.

Figure 4: Evolution of total loans and NFC lending rates of participating (TLTRO III banks) and non-participating banks (Control banks)

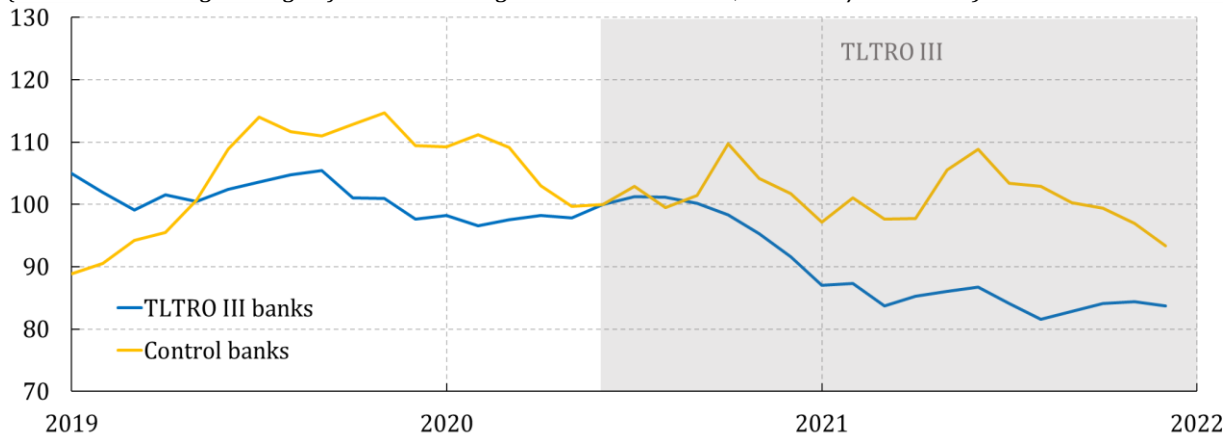
Panel A: Total loans

(Index: 06/2020=100)



Panel B: NFC lending rates

(six-month moving average of interest rates granted on new loans, index: 06/2020=100)



Notes: TLTRO III banks consists of the banks that participated in TLTRO III (4 banks) and control banks are all banks that did not participate in TLTRO III (16 banks). Total loans exclude household loans for house purchases. Source: NBS

The difference-in-difference estimation is performed to evaluate the impact of TLTRO III on bank lending, lending rates and bank profitability. The models that are used for this purpose are described below.

We estimate the following linear regression model for bank lending:

$$\log(Loans_{i,t}) = \alpha_i + \eta_t + \gamma(Treated_i * TLTRO_t) + \delta X_{i,t-1} + \theta(X_{i,t-1} * TLTRO_t) + \lambda Deposits_{i,t-1} + \mu Rates_{i,t-1} + \rho State_guarantees_{i,t} + \varepsilon_{i,t} \quad (2)$$

Where $\log(Loans_{i,t})$ is the logarithm of lending volume of bank i at time t . For this variable, we consider three alternative definitions: total lending volumes, lending volumes to non-financial

corporations (NFC) and lending volumes of consumer loans granted to households (HC). α_i and η_t are bank and time fixed effects, respectively. $TLTRO_t$ is a dummy variable that equals 1 for the duration of the TLTRO III series, starting from the TLTRO III.4 tranche¹³, and 0 otherwise. $Treated_i$ is a continuous treatment intensity variable between 0 and 1, depending on the number of months the bank participated in TLTRO III. Three banks started to participate in the TLTRO III.4 tranche and thus participated for 19 months, i.e., $Treated_i = 1$. One bank started to participate in TLTRO III.8 tranche, thus $Treated_i = 7/19$. For the control banks, $Treated_i = 0$.¹⁴ The matrix $X_{i,t-1}$ includes time-varying bank-specific control variables such as the log of total assets, securities over total assets, and return on assets (ROA). $Deposits_{i,t-1}$ is the ratio of deposits over total assets and $Rates_{i,t-1}$ are the lending rates¹⁵. To control for potential endogeneity between bank control variables and bank lending, the variables are lagged by one month. Following Giansante et al. (2020), we also include the interaction term $X_{i,t-1} * TLTRO_t$ to control for possible heterogeneous responses to the policy measure by banks with different characteristics. Finally, $State_guarantees_{i,t}$ is the share of loan volumes covered by the state guarantees over total assets.¹⁶ This variable is included in the specifications looking at the effects on total and NFC loans since this fiscal intervention was targeted at firms only.

One of the issues identified in empirical literature represents a need to disentangle credit supply from credit demand. Without controlling for possible demand-side effects, we might estimate biased credit supply elasticities. More specifically, increasing (decreasing) credit volumes can be explained not only by supplying more (less) credit by banks as the result of TLTRO treatment but also by demanding more (less) credit by borrowers of TLTRO banks over the treatment period. A widely used approach that addresses this issue was pioneered by Khwaja and Mian (2008). Relying on data on the bank-firm level, they propose to use firm-time fixed effects to control for credit demand on the firm level. However, this comes with the cost of relying only on multi-bank borrowers as firms that lend from only a single bank are excluded in the estimation.

Relying on the approach by Khwaja and Mian (2008), we control for credit demand by estimating the following model:

$$\begin{aligned} \log(Outstanding_{i,j,t}) &= \alpha_i + \kappa_{jt} + \gamma(Treated_i * TLTRO_t) + \delta X_{i,t-1} + \theta(X_{i,t-1} * TLTRO_t) \\ &+ \lambda Deposits_{i,t-1} + \mu Rates_{i,t-1} + \rho State_guarantees_{i,t} + \varepsilon_{i,j,t} \end{aligned} \quad (3)$$

¹³ Slovak banks did not participate in the first three tranches of TLTRO III.

¹⁴ In addition, we use two alternative specifications for the treatment variable as robustness checks. Firstly, we use the liquidity take-up scaled between 0 and 1 as a continuous treatment intensity variable. Secondly, we use a dummy variable, where all participating banks are set to 1 and control banks are set to 0. Please find the results in the Annex.

¹⁵ This variable is excluded in the specification where the dependent variable represents total lending volumes as lending rates are only available for the corresponding sectors (NFC lending, HC lending).

¹⁶ By state guarantees we refer to the schemes that fall under one of the projects established by the Ministry of Finance of the Slovak Republic. The package of measures called „Lex corona“ includes: SIH anti-corona guarantee and Eximbanka anti-corona guarantee. Program SIH anti-corona guarantee consists of guarantees for Slovak banks by which the SIH shoulders 90% of the banks' credit risk arising from new loans. Program Eximbanka anti-corona guarantee shoulders 80% of the banks' credit risk arising from new loans.

Where $\log(Outstanding_{i,j,t})$ represents the log of the total credit amount outstanding that was granted from bank i to firm j at point t ¹⁷. Besides κ_{jt} which capture the firm-time fixed effects to control for credit demand¹⁸, the remaining variables are defined as specified in Model (2).

For examining the impact of the TLTRO III on lending rates, we estimate the following model:

$$Rates_{i,t} = \alpha_i + \eta_t + \gamma(Treated_i * TLTRO_t) + \delta X_{i,t-1} + \theta(X_{i,t-1} * TLTRO_t) + \lambda Deposits_{i,t-1} + \rho State_guarantees_{i,t} + \varepsilon_{i,t} \quad (4)$$

where $Rates_{i,t}$ contains lending rates on newly granted loans to non-financial corporations (NFC), consumer loans to households (HC) or loans for house purchases loans (HP) of bank i at time t . While lending to consumers for house purchases was not directly targeted by TLTRO III, we investigate any indirect effects stemming from the operations. All other variables remain as defined in (2).

Lastly, we estimate the impact of TLTRO on the profitability of banks based on the following model:

$$Profitability_{i,t} = \alpha_i + \eta_t + \gamma(Treated_i * TLTRO_t) + \delta X_{i,t-1} + \theta(X_{i,t-1} * TLTRO_t) + \lambda Deposit_{i,t-1} + \rho State_guarantees_{i,t} + \varepsilon_{i,t}, \quad (5)$$

where $Profitability_{i,t}$ is defined as one of the following profitability variable of bank i at time t : Return on assets (ROA), net interest income (NII) or reserves defined as total reserves held at the Eurosystem as a share of total assets.¹⁹ All the remaining variables are as defined in (2) except that $X_{i,t-1}$ does not include ROA.

5 Results

This section presents the results of the difference-in-differences estimations regarding the impact on lending volumes, lending rates and bank profitability. We discuss the estimated coefficient $\hat{\gamma}$ from equations (2), (3), (4) and (5). $\hat{\gamma}$ represents the estimated percentage impact of TLTRO III participation on the dependent variable of interest. For each model from the equations (2), (3), (4) and (5), we estimate the regressions for ten distinct control group selections obtained from mahalanobis distance matching. For visualization purposes, we graphically display the results corresponding to individual control group selections as a boxplot, where the boxes depict the interquartile range (IQR), and the upper (lower) whisker extends from the hinge to the largest (lowest) value no further than 1.5*IQR from the hinge. Data beyond the whiskers are considered as outliers and are plotted individually.²⁰ All of the baseline results are estimated on the full dataset from January 2012 until December 2021. It is important to mention that given relatively small number of banks in our analysis, we are more confident about the sign and significance of results rather than their exact magnitude.

¹⁷ Outstanding volume include lending volumes to non-financial corporations resident in Slovakia.

¹⁸ Using firm-time fixed effects, the sample is restricted to multi-bank-borrowing firms, which represent 12.3% of all firms in the sample.

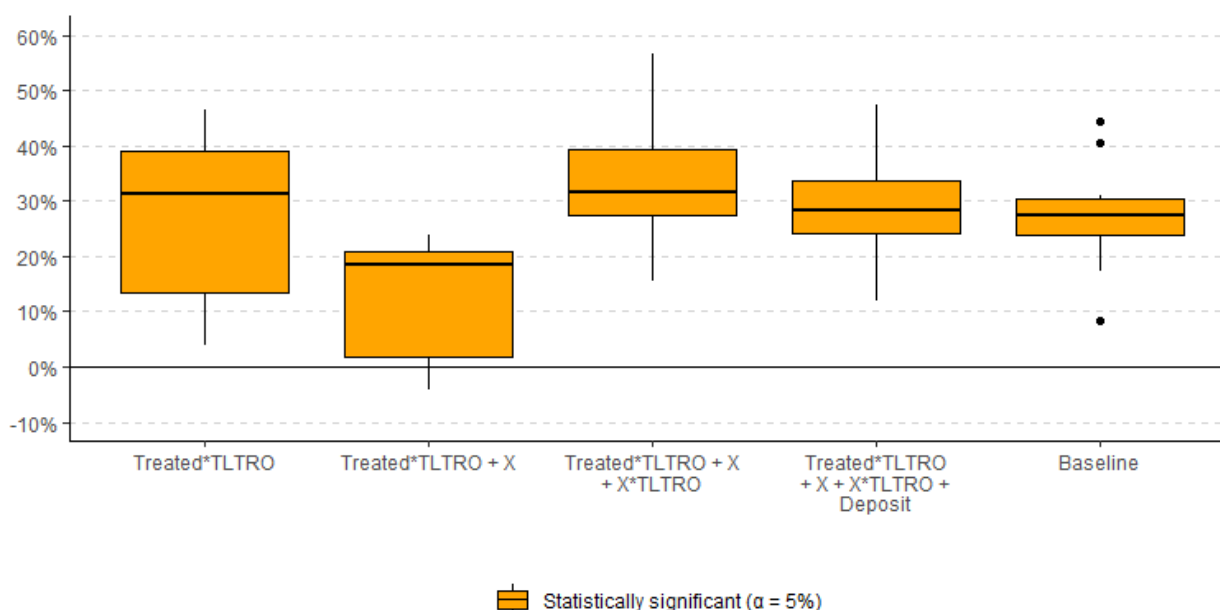
¹⁹ We rely on the share of total reserves over assets at the Eurosystem as proxy for profitability as the remuneration of the reserves was higher than the lowest rates for borrowing via TLTRO III. Thus, placing the borrowed amount at the central bank (Alternative 2 in Figure 1) would increase the profitability.

²⁰ In addition, we provide result tables with individual estimated coefficients for each selection in Annex B.

5.1 Lending volumes

We begin the analysis with assessing the effect of TLTRO III on total lending volumes and sectoral lending volumes as the program was directly targeted in increasing loan supply. **Figure 5** plots the range of estimated coefficients for five different model specifications, starting with the most basic specification ("Treated*TLTRO") without any control variables to the most refined specification ("Baseline") for total lending as described in Equation (2). The results show an unambiguously positive impact of TLTRO III on total lending, where the median estimate ranges between 18.5% and 31.7%.

Figure 5: Range of estimated coefficients for total lending volumes



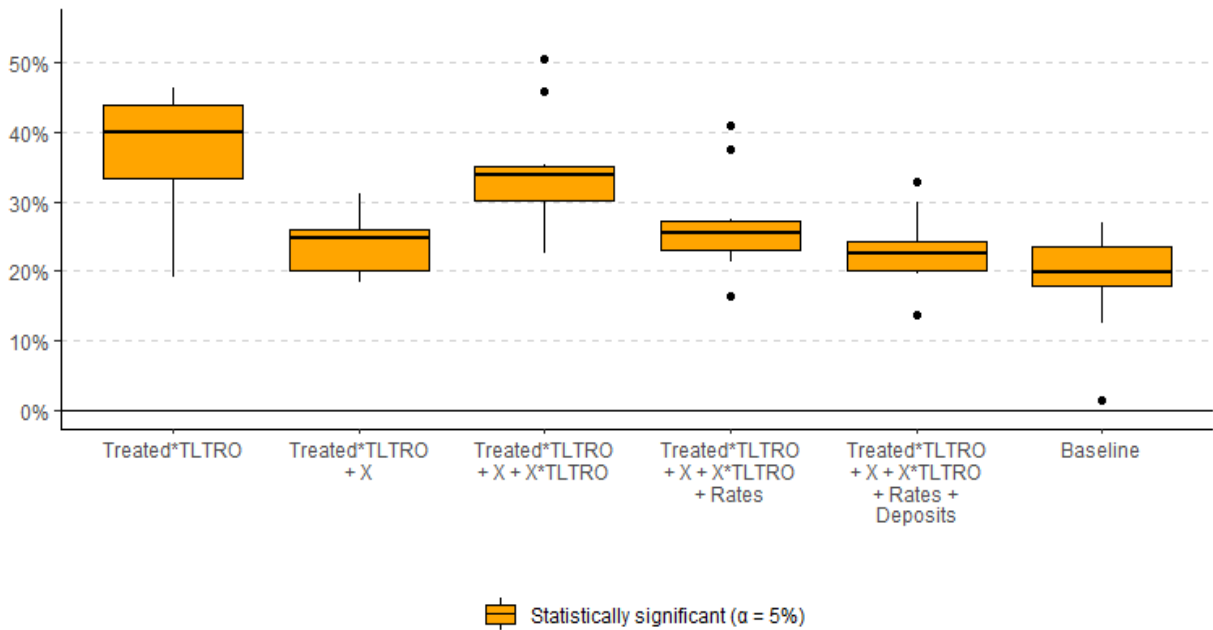
Note: Estimation results are based on Model (2). Estimation excludes lending rates in the specification as this information is not available for total lending. Note that a model specification is considered as statistically significant ($\alpha = 5\%$) if estimation results are statistically significant ($\alpha = 5\%$) for more than 50% of the estimated models. Estimated coefficients are shown in Table B.2 in the Annex. Source: NBS.

Similarly, **Figure 6** (Panel A) shows the range of estimated coefficients for six different model specifications for NFC lending volumes. All models are significant on a 5% significance level. The most refined model ("Baseline") has the lowest median estimate of 19.8% compared to the most basic model without any controls ("Treated*TLTRO") with the highest median estimate of 39.9%. In addition, as specified in Model (3), we control for credit demand, using firm-time fixed effects relying on bank-firm level data. The results of the baseline model specification with bank-level data ("Baseline") and bank-firm level data ("Baseline with control for credit demand") are shown in Panel B of **Figure 6**. Controlling for firm-specific credit demand is crucial as it decreases the estimated impact of TLTRO III on bank lending to NFC to 5.5%.

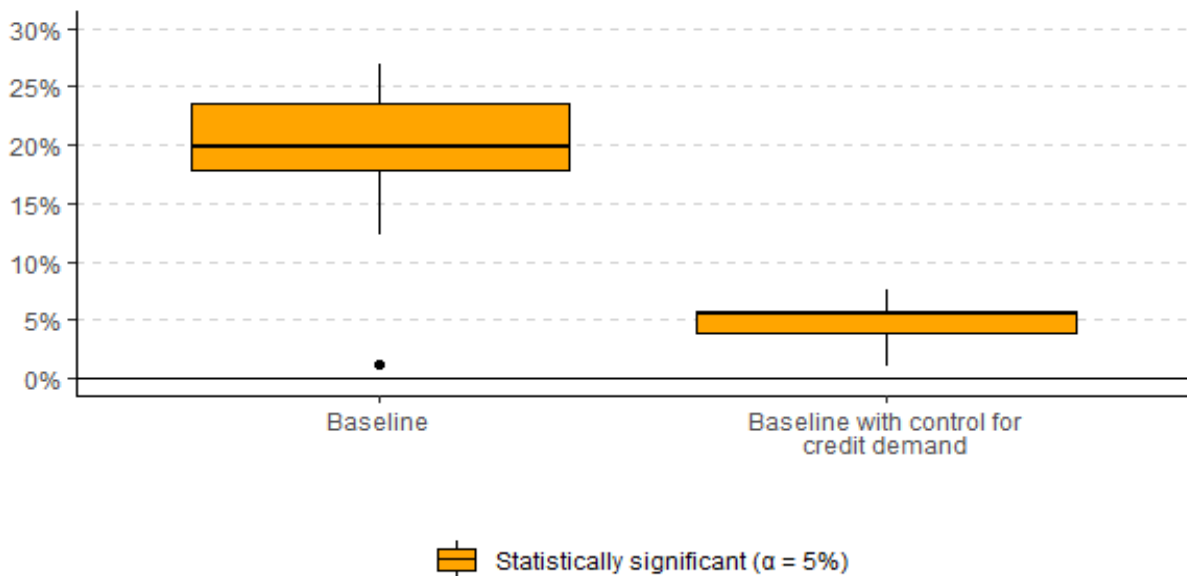
Estimated coefficients for HC lending volumes as shown in **Figure 7** are more ambiguous compared to Total and NFC lending. While the median estimate is positive across all model specifications, partly insignificant results are observed. Driven by the even smaller sample size of only seven to eleven banks for HC lending, we also observe a larger dispersion of results. In the baseline specification, we observe a significant positive median estimate of 20%.

Figure 6: Range of estimated coefficients for NFC lending volumes

Panel A: Model (2) without controlling for credit demand

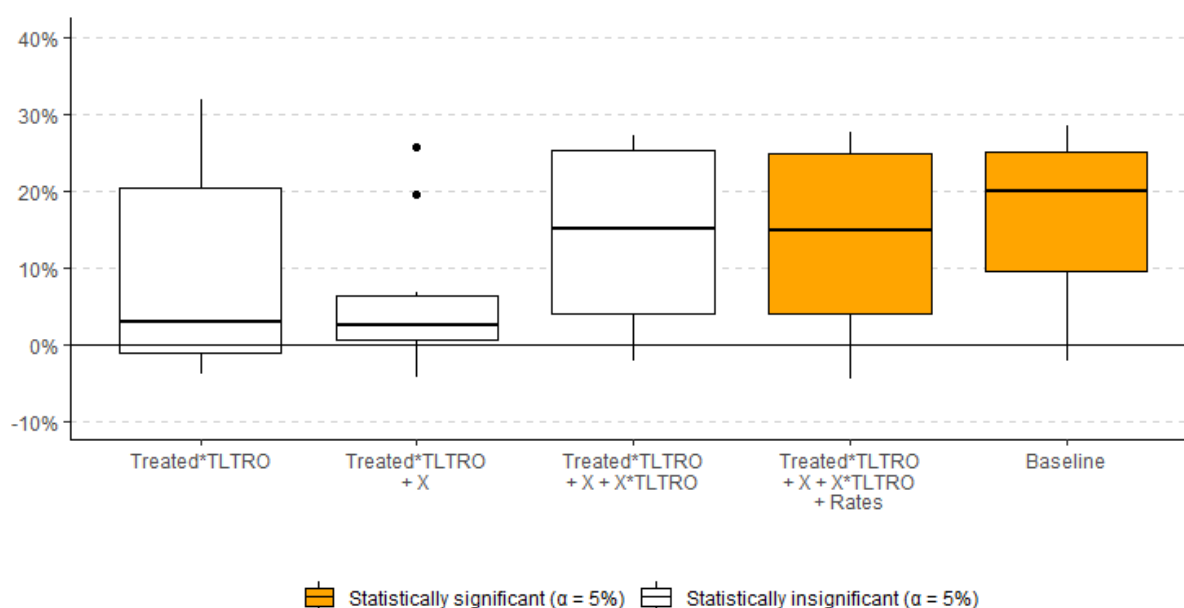


Panel B: Model (3) with controlling for credit demand



Note: Estimation results are based on Model (2) and (3). Note that a model specification is considered as statistically significant ($\alpha = 5\%$) if estimation results are statistically significant ($\alpha = 5\%$) for more than 50% of the estimated models. Estimated coefficients are shown in Table B.3 in the Annex. Source: NBS.

Figure 7: Range of estimated coefficients for HC lending volumes



Note: Estimation results are based on Model (2). Note that a model specification is considered as statistically significant ($\bar{\alpha} = 5\%$) if estimation results are statistically significant ($\alpha = 5\%$) for more than 50% of the estimated models. Estimated coefficients are shown in Table B.3 in the Annex. Source: NBS.

Overall, TLTRO III had a positive impact of bank lending. The most conservative estimation for NFC lending controlling for credit demand suggests an increase of 5.5% of lending of participating banks compared to banks that did not participate in TLTRO III. To ensure that the estimation results are not driven by specific model choices such as the definition of the $Treated_i$ variable or the consideration of a bank that indirectly participated in TLTRO III via their parent entity, we perform several robustness checks.

Firstly, instead of the share of months participating in the TLTRO III program, we consider the total take-up of TLTRO III as the treatment intensity variable.²¹ Alternatively, we consider a Treatment dummy variable, where all banks that participated in TLTRO III are assigned a 1 and control banks a 0. As Figure A1.1 in Annex A shows, the results for Total lending and NFC lending are robust to changes in the definition of the $Treated_i$ variable. A positive significant impact is observed for the changes in the treatment specification. For HC lending, the previous found ambiguous effects are confirmed, i.e., a partly positive impact is observed. In addition, we adapt the consideration of a bank that participated in TLTRO III via a parent institution. While in the baseline estimation, the banks are considered as candidates for the control group, we exclude the banks in a further robustness check, which leaves us with 19 banks in the pre-matching sample. As shown in Figure A2.1 in Annex A, the positive impact of TLTRO III on bank lending remains. However, we observe that the estimation results on average are insignificant for NFC lending. Further looking into the ten estimated models, we observe that the results are only marginally insignificant as four of the ten estimated models report statistically significant results ($\alpha = 10\%$) for the estimated coefficient $\hat{\gamma}$. This change indicates that banks who participated via its parent institution had less incentives to increase lending as they did not have to fulfil the lending benchmark.²²

²¹ $Treated_i$ is defined as the amount of funds that the banks took-up scaled from 0 for non-participating banks to 1 for the bank that took-up the highest amount of TLTRO III funds.

²² This indicatively confirms the importance of the “targeted” channel as shown in Da Silva et al. (2021).

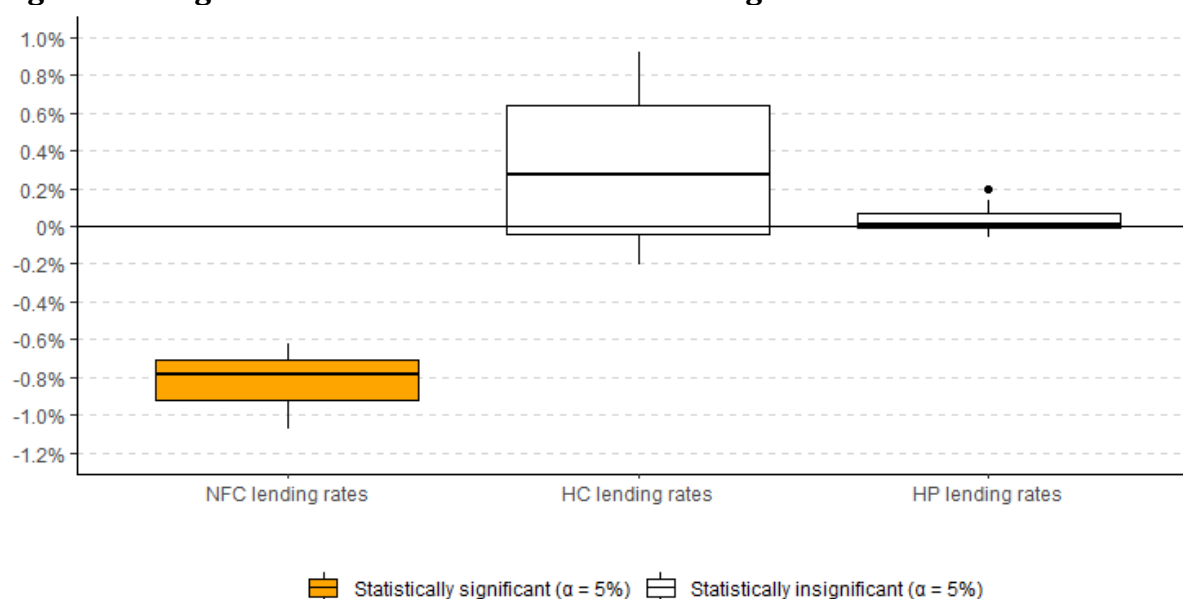
5.2 Lending rates

In addition to lending volume, we investigate the impact of TLTRO III on lending rates, i.e., whether banks passed the convenient financing conditions onto more favourable conditions for their clients. We look at the impact of lending rates for non-financial corporations, households for consumption and households for house purchases. While lending to non-financial corporations and households for consumption was directly targeted with the TLTRO III program, the latter was explicitly excluded in the design of the lending program. However, besides evaluating direct effects for NFC lending and lending to households for consumption, we also investigate any potential indirect effects that could lead to changes in the lending rates for households for house purchases.

Figure 8 shows the results obtained from estimations of the baseline specification for lending rates as specified in Model (4). Results shown in the first boxplot of **Figure 8** suggest that banks borrowing from the Eurosystem in the TLTRO III operations decreased their lending rates for NFCs by roughly 0.8% relative to non-participating banks. We observe insignificant coefficients for lending rates for household consumption and house purchases.

The robustness checks using alternative definitions of the treatment variable and excluding a bank that indirectly participated in TLTRO III via a parent entity confirm the results in our baseline estimation (see Figure A1.2 and Figure A2.2 in the Annex). We find a negative effect of TLTRO III on lending rates for NFC, indicating a pass-through of favourable borrowing rates to lending rates for non-financial corporations.

Figure 8: Range of estimated coefficients for lending rates



Note: Estimation results are based on Model (4). Note that a model specification is considered as statistically significant ($\alpha = 5\%$) if estimation results are statistically significant for more than 50% of the estimated models. NFC – non-financial corporations, HP – households for house purchase, HC – households consumption credit. Source: NBS.

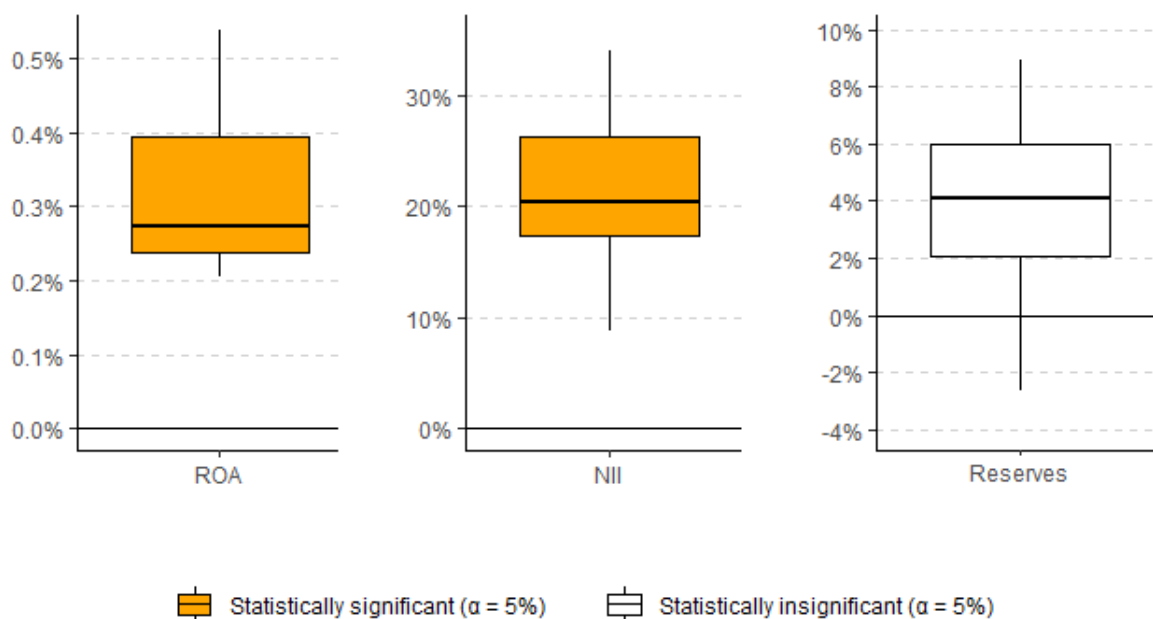
5.3 Profitability

As shown in **Figure 1**, multiple possibilities for using the TLTRO funds arise for banks. While the previous estimations focused on the very nature of the TLTRO program, i.e., bank lending and lending rates, we now investigate the impact on bank profitability that could be influenced

via alternative uses of funds. Particularly, using the funds to invest in high-yield securities or deposit the funds with the Eurosystem are potential profit-increasing strategies by banks.

To estimate the impact on profitability, we use three variables, namely return on assets (ROA), net interest income (NII) and reserves. While we observe positive significant effects for profitability measured as ROA and NII, the estimation results suggest no significant increases in the reserve holdings at the Eurosystem (**Figure 9**), indicating that the Alternative I in **Figure 1** is not the predominant channel of using the additional funds.

Figure 9: Range of estimated coefficients for banks' profitability



Note: Estimation results are based on Model (5). Note that a model specification is considered as statistically significant (α = 5%) if estimation results are statistically significant for more than 50% of the estimated models. ROA-return on assets, NII-net interest income. Source: NBS.

The robustness checks specified before do not fully confirm the increase in profitability for banks participating in TLTRO III. Using alternative definitions of the treatment variable, we find that the impact on bank profitability becomes insignificant for all variables. However, when we exclude the bank that indirectly participated in TLTRO III via a parent entity, the estimation results for ROA and NII are significantly positive. Thus, we have inconclusive evidence on the effects of TLTRO on bank profitability. Results also confirm previous findings in the literature, that the carry trade channel has not been extensively used to increase bank profitability significantly (e.g., de Haan et al. (2019), Lozoya et al. (2022)). However, it should be noted that the impact on profitability might not have materialized by YE 2021. Particularly, the increase in the policy rates during the year 2022 made funding via TLTRO III even more financially attractive compared to other sources of funding.²³ Thus, the impact on profitability is likely to be more visible in 2022.

²³ The ECB decided to recalibrate the conditions for TLTRO III in October 2022 which resulted in less favourable interest rates applied to the funding via TLTRO III and increase the incentives to repay TLTRO III funds.

6 Conclusion

There is a growing body of literature that discusses the effects of the monetary policy response to the COVID-19 pandemic. The fact that unconventional tools, to a large extent, replaced conventional ones, but are still relatively new and therefore underexplored instruments, has raised many questions about their impacts. These questions have established an attractive field for empirical studies. Several studies are trying to shed light on whether unconventional tools have fulfilled the purpose they were designed for, and which channels played a role during their transmission. These questions are still topical, and studies that contribute to answering them can help with better understanding and future calibration of these tools.

We show that participation of banks in TLTRO III operations is associated with an increase in lending of Slovak banks. In the most refined specification for NFC lending, we estimate an increase of 5.5% of lending for banks that participated in TLTRO III. In addition, we see a decrease of lending rates to NFCs. This suggests that the ample and cheap liquidity within the funding-for-lending program helped to increase lending and to provide cheaper loans to the NFCs. With respect to the impact on bank profitability, we observe inconclusive evidence of an increase in ROA and NII. However, as we only investigate the impact until YE 2021, the full materialization on the bank profitability, particularly after the start of the policy rate hiking cycle in 2022, is not yet visible. Regarding other possible uses of TLTRO liquidity by banks, we do not find evidence of a statistically significant increase in the reserves at the Eurosystem of participating banks.

Avenues for future research are manifold. While we confirm the evidence of some previous research on the effectiveness of TLTRO on increasing bank lending and reduction in lending rates for Slovakia, several aspects for the TLTRO programs are underresearched. Particularly, the impact of the increase in lending on credit risk has only been partially addressed by looking on mainly ex-ante risk measures and self-reported risk indicators for banks (Barbiero et al 2022). In addition, the impact of the recalibration of the TLTRO III conditions on the effectiveness of tightening of monetary conditions, such as lending rates and credit availability is an interesting avenue for future research.

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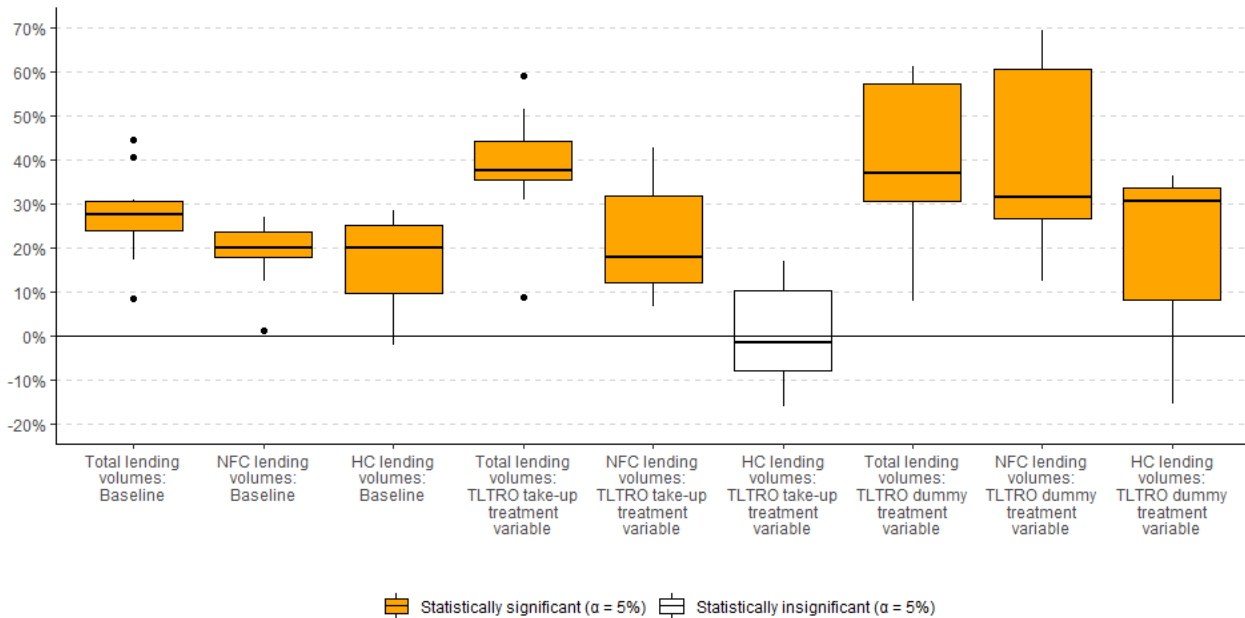
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Annex A: Figures

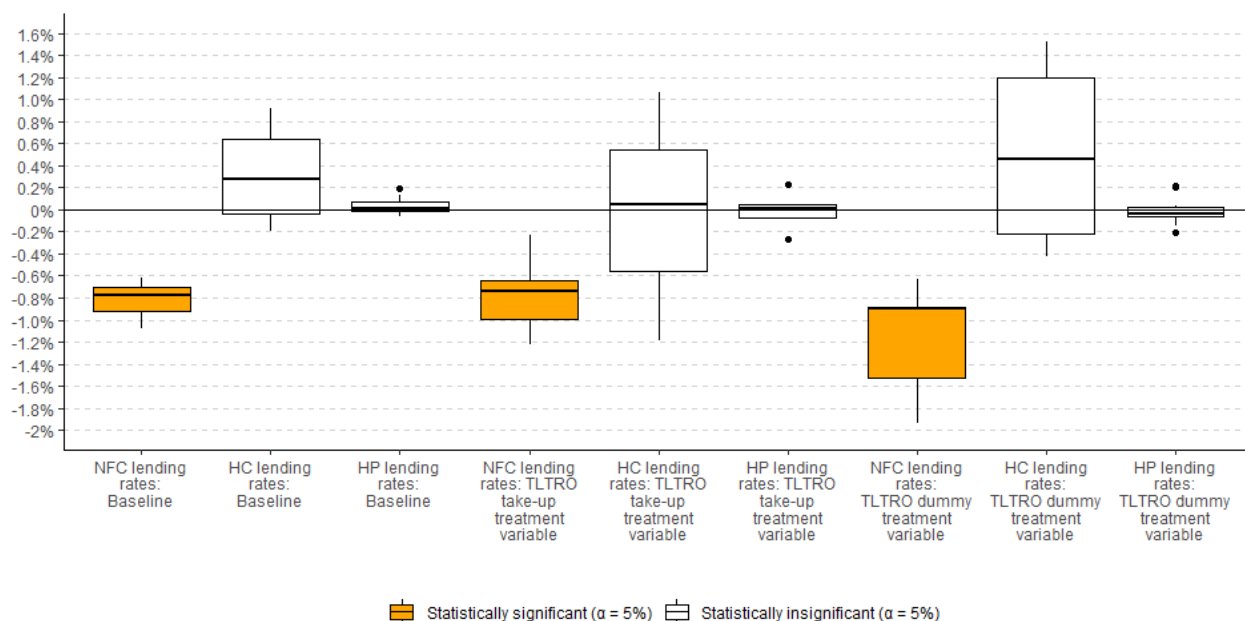
A.1 Change in the definition of the treatment variable

Figure A.1.1: Range of estimated coefficients for lending volumes



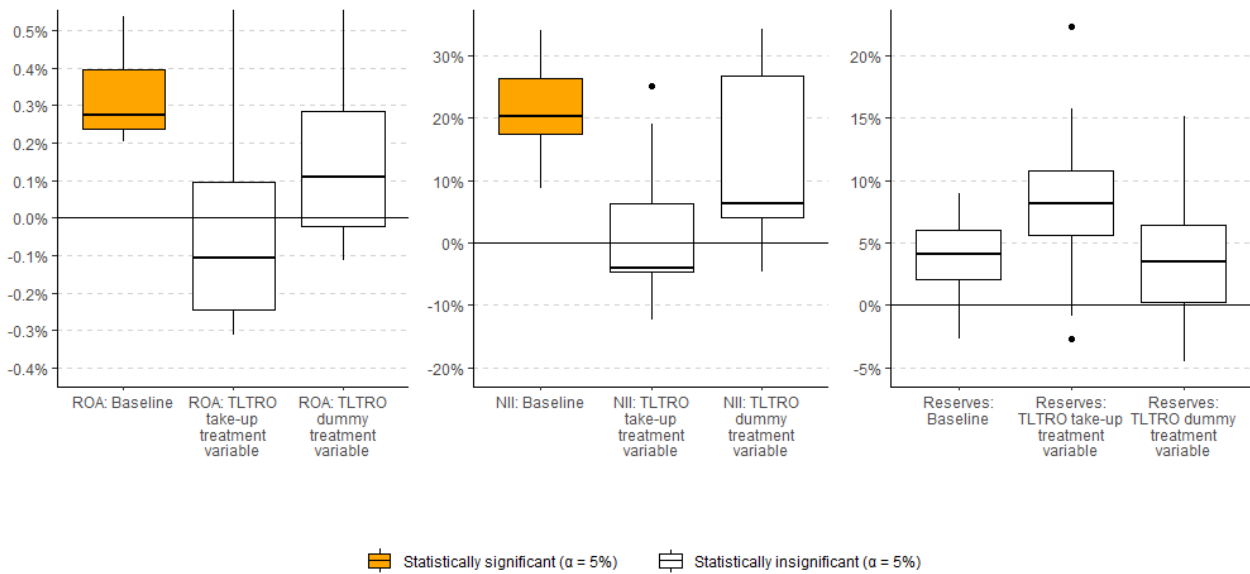
Note: Results are based on Model (2) in the Baseline estimation. For „TLTRO take-up treatment variable“, the liquidity take-up is scaled between 0 and 1 as a continuous treatment intensity variable. For the „TLTRO dummy treatment variable“, all participating banks are set to 1 and control banks are set to 0. Note that a model specification is considered as statistically significant ($\alpha = 5\%$) if estimation results are statistically significant ($\alpha = 5\%$) for more than 50% of the estimated models. Estimated coefficients are shown in Table B.2, B.3 and B.4 in the Annex. Source: NBS.

Figure A.1.2: Range of estimated coefficients for lending rates



Note: Results are based on Model (4) in the „Baseline“ estimation. For „TLTRO take-up treatment variable“, the liquidity take-up is scaled between 0 and 1 as a continuous treatment intensity variable. For the „TLTRO dummy treatment variable“, all participating banks are set to 1 and control banks are set to 0. Note that a model specification is considered as statistically significant ($\alpha = 5\%$) if estimation results are statistically significant ($\alpha = 5\%$) for more than 50% of the estimated models. Estimated coefficients are shown in Table B.2, B.3 and B.4 in the Annex. Source: NBS.

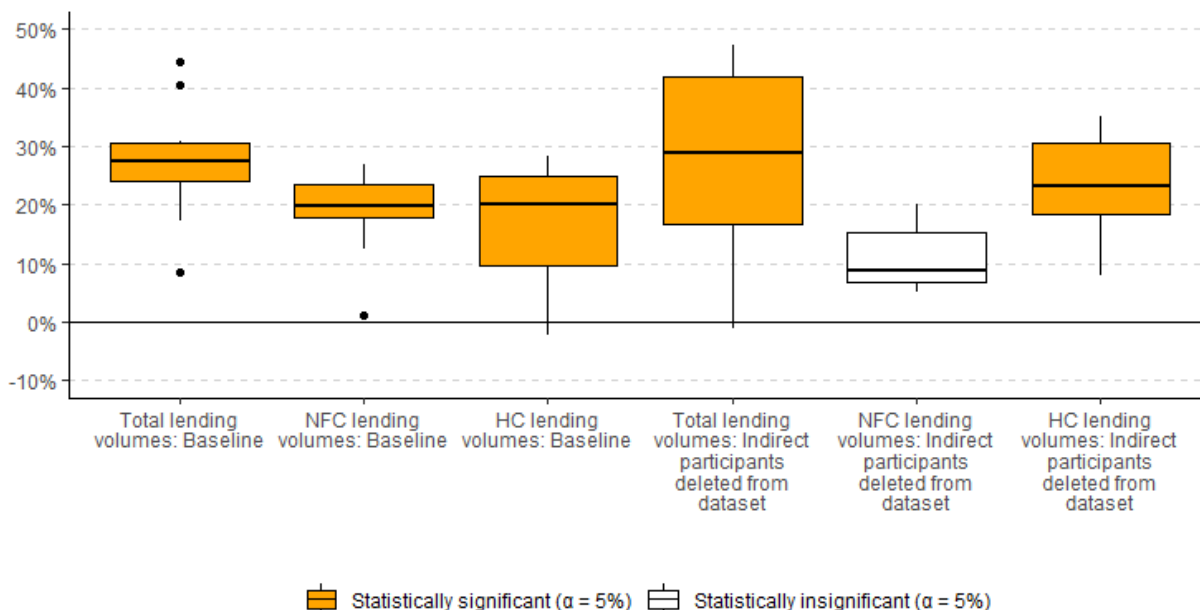
Figure A.1.3: Range of estimated coefficients for profitability



Note: Results are based on Model (5) in the Baseline estimation. For „TLTRO take-up treatment variable“, the liquidity take-up is scaled between 0 and 1 as a continuous treatment intensity variable. For the „TLTRO dummy treatment variable“, all participating banks are set to 1 and control banks are set to 0. Note that a model specification is considered as statistically significant ($\alpha = 5\%$) if estimation results are statistically significant ($\alpha = 5\%$) for more than 50% of the estimated models. Estimated coefficients are shown in Table B.2, B.3 and B.4 in the Annex. Source: NBS.

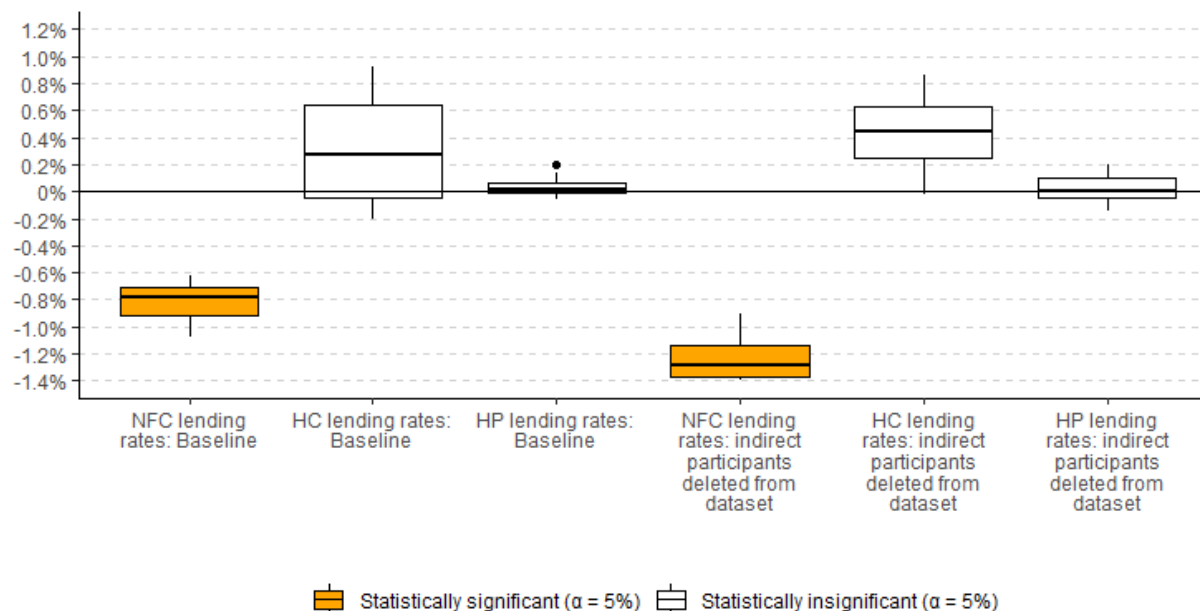
A.2 Change in the composition of the control group

Figure A.2.1: Range of estimated coefficients for lending volumes



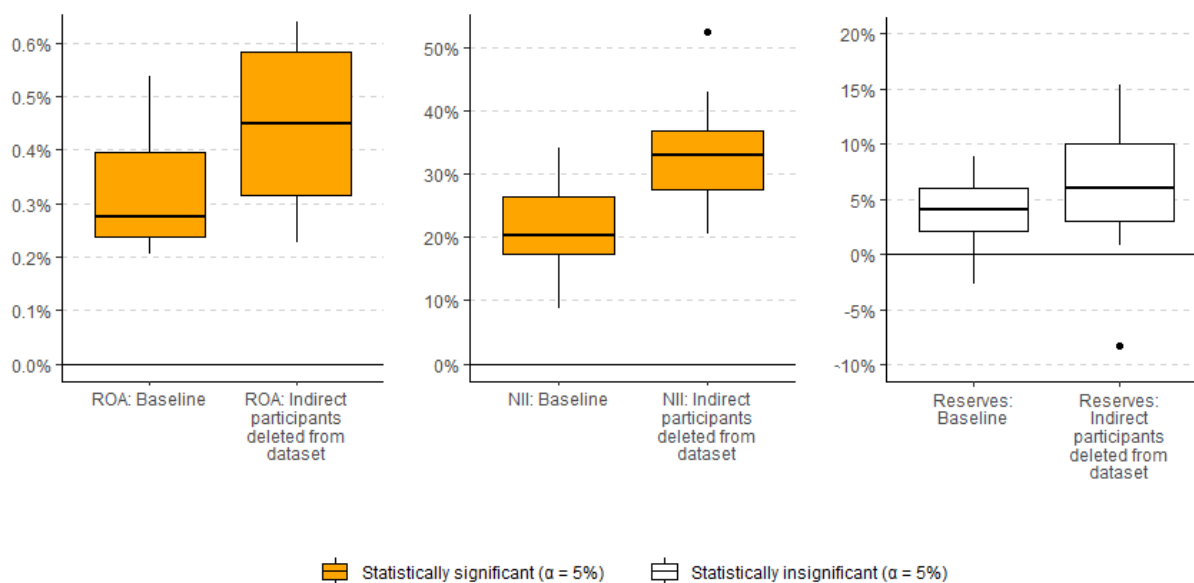
Note: Results are based on Model (2) in the Baseline estimation. For „Indirect participants deleted from dataset“, the bank that participated via a parent entity is excluded from the control group. Note that a model specification is considered as statistically significant ($\alpha = 5\%$) if estimation results are statistically significant ($\alpha = 5\%$) for more than 50% of the estimated models. Estimated coefficients are shown in Table B.2, B.3 and B.4 in the Annex. Source: NBS.

Figure A.2.2: Range of estimated coefficients for lending rates



Note: Results are based on Model (4) in the Baseline estimation. For „Indirect participants deleted from dataset“, the bank that participated via a parent entity is excluded from the control group. Note that a model specification is considered as statistically significant ($\alpha = 5\%$) if estimation results are statistically significant ($\alpha = 5\%$) for more than 50% of the estimated models. Estimated coefficients are shown in Table B.2, B.3 and B.4 in the Annex. Source: NBS.

Figure A.2.3: Range of estimated coefficients for profitability



Note: Results are based on Model (5) in the Baseline estimation. For „Indirect participants deleted from dataset“, the bank that participated via a parent entity is excluded from the control group. Note that a model specification is considered as statistically significant ($\alpha = 5\%$) if estimation results are statistically significant ($\alpha = 5\%$) for more than 50% of the estimated models. Estimated coefficients are shown in Table B.2, B.3 and B.4 in the Annex. Source: NBS.

Annex B: Tables

Table B.1: All versions of the model for mahalanobis distance matching as described in Model (1)

Model	Combinations of ratio and replacement							
$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * Securities/Total_assets_i + \epsilon_i$	2F	3F	2T	3T	4T	5T	6T	7T
$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * Total_liabilities/Total_assets_i + \epsilon_i$								
$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * Loans/Total_assets_i + \epsilon_i$								
$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * ROA_i + \epsilon_i$								
$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * Securities/Total_assets_i + \beta_3 * Total_liabilities/Total_assets_i + \epsilon_i$								
$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * Securities/Total_assets_i + \beta_3 * Loans/Total_assets_i + \epsilon_i$								
$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * Securities/Total_assets_i + \beta_3 * ROA_i + \epsilon_i$								
$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * Total_liabilities/Total_assets_i + \beta_3 * Loans/Total_assets_i + \epsilon_i$								
$Treated_i = \beta_0 + \beta_1 * Size_i + \beta_2 * Total_liabilities/Total_assets_i + \beta_3 * ROA_i + \epsilon_i$								

Notes: We combine each of the listed models with each of the listed combinations of ratios and replacement, which results in 72 models.

Table B.2: Total lending volumes results

Total lending volumes		Mahalanobis distance matching number									
		1	2	3	4	5	6	7	8	9	10
Treated*TLTRO	γ	0,2646***	0,4152***	0,4636***	0,3947***	0,3621***	0,2538**	0,0394	0,0958	0,382***	0,0509
	Std Error	(0,0291)	(0,0535)	(0,0552)	(0,053)	(0,0514)	(0,0879)	(0,0795)	(0,0711)	(0,0494)	(0,0696)
	R ²	0,9807	0,9456	0,9487	0,9519	0,9491	0,9152	0,9202	0,9283	0,9539	0,9154
Treated*TLTRO + X	γ	0,2108***	0,2041***	0,2375***	0,2128***	0,1722***	0,0831	-0,0046	-0,0421	0,1981***	-0,0337
	Std Error	(0,0275)	(0,0449)	(0,0456)	(0,0439)	(0,0436)	(0,0693)	(0,0554)	(0,053)	(0,0424)	(0,0496)
	R ²	0,9834	0,9637	0,9668	0,9689	0,9653	0,9486	0,9624	0,9606	0,9677	0,9582
Treated*TLTRO + X + X*TLTRO	γ	0,1702***	0,3982***	0,4365***	0,3407***	0,2697***	0,1544	0,5673***	0,3832***	0,2824***	0,2937***
	Std Error	(0,04)	(0,0664)	(0,0643)	(0,0597)	(0,0615)	(0,1011)	(0,0811)	(0,0751)	(0,059)	(0,0719)
	R ²	0,9845	0,9658	0,9702	0,9719	0,9669	0,9488	0,9657	0,9631	0,9694	0,9596
Treated*TLTRO + X + X*TLTRO + Deposits	γ	0,1478***	0,3159***	0,344***	0,2943***	0,2411***	0,1199	0,4742***	0,3789***	0,2734***	0,2443***
	Std Error	(0,0385)	(0,0617)	(0,0592)	(0,0559)	(0,0576)	(0,1006)	(0,0758)	(0,07)	(0,056)	(0,0665)
	R ²	0,9857	0,9707	0,975	0,9755	0,971	0,9495	0,9724	0,9679	0,9724	0,9655
Baseline	γ	0,1724***	0,2784***	0,3089***	0,2943***	0,2369***	0,0848	0,4446***	0,4049***	0,2719***	0,2468***
	Std Error	(0,0452)	(0,0715)	(0,0693)	(0,0685)	(0,0703)	(0,1016)	(0,0887)	(0,0855)	(0,0683)	(0,0676)
	R ²	0,9857	0,9707	0,975	0,9755	0,971	0,9496	0,9703	0,9679	0,9724	0,9655
Number of banks		9	10	9	10	11	16	10	12	12	16
Robustness: TLTRO take-up treatment variable	γ	0,3085***	0,5152***	0,4404***	0,3528***	0,385***	0,0891	0,8058***	0,5906***	0,3738***	0,375***
	Std Error	(0,0571)	(0,0894)	(0,087)	(0,0787)	(0,0817)	(0,1266)	(0,1076)	(0,0972)	(0,0788)	(0,0844)
	R ²	0,9859	0,9712	0,9752	0,9755	0,9713	0,9496	0,9711	0,9683	0,9725	0,9656
Robustness: TLTRO dummy treatment variable	γ	0,2769***	0,6109***	0,6086***	0,4103***	0,3591***	0,0777	0,9045***	0,573***	0,3683***	0,3061***
	Std Error	(0,0556)	(0,0858)	(0,0828)	(0,0717)	(0,0735)	(0,1055)	(0,1033)	(0,0879)	(0,0705)	(0,0708)
	R ²	0,9859	0,9717	0,9759	0,9758	0,9713	0,9496	0,9716	0,9684	0,9726	0,9656
Robustness: Indirect participant excluded	γ	0,1643.	0,4489***	0,473***	0,3776**	0,1598.	0,3879***	0,1745.	0,4289***	-0,0109	0,1987*
	Std Error	(0,0937)	(0,113)	(0,116)	(0,112)	(0,0939)	(0,0818)	(0,0911)	(0,1108)	(0,1176)	(0,0873)
	R ²	0,9701	0,9647	0,967	0,9664	0,97	0,9647	0,9748	0,9629	0,9451	0,9759

Notes: Total lending volumes enter the regression as dependent variable. In specifications “Treated*TLTRO”, “Treated*TLTRO + X”, “Treated*TLTRO + X + X*TLTRO”, “Treated*TLTRO + X + X*TLTRO + Deposits” and “Baseline” we use a continuous treatment intensity variable between 0 and 1 depending on the number of months the bank participated in TLTRO III. “Treated*TLTRO”, “Treated*TLTRO + X”, “Treated*TLTRO + X + X*TLTRO” and “Treated*TLTRO + X + X*TLTRO + Deposits” correspond to the gradual enhancement of the model (starting from the most basic model, then adding the control variables Size (measured as log of Total assets), Securities/Total assets and return on assets, then adding interaction terms and finally adding the control variable Deposits/Total assets). In the “Baseline” specification we show results for the most saturated model which include control variables: Size (measured as log of Total assets), Securities/Total assets, return on assets (ROA) with interaction terms and control variables Deposits/Total assets and State guarantees as it is described in the chapter 4 Methodology. Results from the “Baseline” are displayed on Figure 5 and every other Figure displaying results for total lending volumes. “Robustness: TLTRO take-up treatment variable” and “Robustness: TLTRO dummy treatment variable” correspond to results of the robustness check: Change in the definition of the treatment variable. Results are displayed on Figure A.1.1. “Robustness: Indirect participants deleted from dataset” corresponds to results of the robustness check: Change in the composition of the control group. Results are displayed on Figure A.2.1. Check corresponding subchapters for more details.

Signif. codes: ***, **, * and . indicates significance at the 0.1%, 1%, 5% and 10% level, respectively. Total lending volumes exclude the household loans for house purchases.

Table B.3: NFC lending volumes results

NFC lending volumes		Mahalanobis distance matching number									
		1	2	3	4	5	6	7	8	9	10
Treated*TLTRO	γ	0,1905***	0,361***	0,3651***	0,4646***	0,4413***	0,4335***	0,4606***	0,3121***	0,3242***	0,4377***
	Std Error R ²	(0,0329) 0,9755	(0,0552) 0,9388	(0,0519) 0,9445	(0,0478) 0,9521	(0,0565) 0,9447	(0,0527) 0,9498	(0,0502) 0,9529	(0,055) 0,9438	(0,06) 0,937	(0,0474) 0,9532
Treated*TLTRO + X	γ	0,1822***	0,1972***	0,1953***	0,3112***	0,2551***	0,26***	0,2988***	0,2128***	0,2405***	0,2593***
	Std Error R ²	(0,0303) 0,98	(0,0489) 0,9545	(0,0476) 0,9557	(0,0452) 0,96	(0,0503) 0,9584	(0,0485) 0,96	(0,0465) 0,9618	(0,0441) 0,9649	(0,0517) 0,9553	(0,0444) 0,9617
Treated*TLTRO + X + X*TLTRO	γ	0,2255***	0,4587***	0,2407***	0,3036***	0,5061***	0,3526***	0,2996***	0,3495***	0,3434***	0,3312***
	Std Error R ²	(0,0429) 0,9824	(0,0714) 0,9582	(0,0675) 0,9573	(0,0616) 0,9629	(0,0693) 0,9643	(0,0653) 0,9646	(0,0622) 0,9657	(0,0622) 0,9666	(0,0759) 0,9602	(0,0601) 0,9652
Treated*TLTRO + X + X*TLTRO + Rates	γ	0,2131***	0,3757***	0,1644*	0,2426***	0,4101***	0,2679***	0,2272***	0,274***	0,246***	0,2612***
	Std Error R ²	(0,0432) 0,9825	(0,0699) 0,9608	(0,0654) 0,9605	(0,0593) 0,966	(0,0665) 0,9678	(0,062) 0,9685	(0,0595) 0,969	(0,0596) 0,9697	(0,0741) 0,963	(0,0577) 0,9683
Treated*TLTRO + X + X*TLTRO + Rates + Deposits	γ	0,1977***	0,2987***	0,1363*	0,227***	0,3288***	0,2239***	0,2135***	0,237***	0,1952**	0,2436***
	Std Error R ²	(0,0429) 0,9829	(0,0656) 0,9658	(0,0613) 0,9654	(0,0556) 0,9701	(0,0582) 0,9722	(0,0558) 0,9724	(0,0543) 0,9728	(0,0566) 0,9727	(0,0707) 0,9666	(0,0543) 0,9719
Baseline	γ	0,2369***	0,241**	0,1237.	0,2291***	0,2688***	0,2026**	0,1945**	0,0125	0,1771*	0,1853***
	Std Error R ²	(0,0498) 0,9829	(0,0755) 0,9658	(0,0745) 0,9654	(0,0678) 0,9701	(0,0722) 0,9722	(0,0711) 0,9724	(0,0682) 0,9728	(0,0631) 0,9738	(0,0789) 0,9665	(0,0543) 0,9727
Number of banks		9	10	11	12	9	10	11	12	9	12
Baseline with control for credit demand	γ	0,0576***	0,0558***	0,0548***	0,0355**	0,0558***	0,0623***	0,0104	0,0313**	0,0459***	0,0765***
	Std Error R ²	(0,0119) 0,8961	(0,0111) 0,8925	(0,0121) 0,8959	(0,0111) 0,893	(0,0111) 0,8925	(0,0118) 0,8959	(0,0094) 0,8852	(0,0112) 0,8932	(0,0108) 0,8928	(0,0108) 0,8904
Number of banks		9	12	9	10	11	10	12	9	11	14
Robustness: TLTRO take-up treatment variable	γ	0,3391***	0,4269***	0,1577.	0,1986*	0,282**	0,11	0,115	0,0676	0,3296***	0,1396*
	Std Error R ²	(0,0632) 0,983	(0,0946) 0,9662	(0,0868) 0,9654	(0,0771) 0,9721	(0,0912) 0,9722	(0,0819) 0,9726	(0,0783) 0,9726	(0,0764) 0,9738	(0,0997) 0,9668	(0,0701) 0,9726
Robustness: TLTRO dummy treatment variable	γ	0,5048***	0,6944***	0,2409**	0,314***	0,6543***	0,3161***	0,2878***	0,1254.	0,6367***	0,2585***
	Std Error R ²	(0,0603) 0,9837	(0,0904) 0,9673	(0,0781) 0,9656	(0,0699) 0,9703	(0,0864) 0,9734	(0,0746) 0,9726	(0,0708) 0,9729	(0,0668) 0,9739	(0,0952) 0,9679	(0,0584) 0,9729
Robustness: Indirect participants deleted from dataset	γ	0,1515*	0,0728	0,0554	0,0697	0,0693	0,1717.	0,1528.	0,0506	0,1999**	0,1037
	Std Error R ²	(0,0695) 0,9817	(0,0994) 0,9638	(0,0949) 0,9641	(0,094) 0,9715	(0,0895) 0,9717	(0,088) 0,9687	(0,0921) 0,9616	(0,1043) 0,964	(0,0649) 0,9712	(0,0645) 0,9715

Notes: NFC lending volumes enter the regression as dependent variable. In specifications “Treated*TLTRO”, “Treated*TLTRO + X”, “Treated*TLTRO + X + X*TLTRO”, “Treated*TLTRO + X + X*TLTRO + Rates”, “Treated*TLTRO + X + X*TLTRO + Rates + Deposits” and “Baseline” we use a continuous treatment intensity variable between 0 and 1 depending on the number of months the bank participated in TLTRO III. “Treated*TLTRO”, “Treated*TLTRO + X”, “Treated*TLTRO + X + X*TLTRO”, “Treated*TLTRO + X + X*TLTRO + Rates” and “Treated*TLTRO + X + X*TLTRO + Rates + Deposits” correspond to the gradual building of the model (starting from the most basic model, then adding the control variables Size (measured as log of Total assets), Securities/Total assets and Return on assets, then adding interaction terms and finally adding the control variables Rates and Deposits/Total assets). In the “Baseline” specification we show results for the most saturated model which include control variables: Size (measured as log of Total assets), Securities/Total assets, return on assets (ROA), NFC Lending rates, Deposits/Total assets, and State guarantees as it is described in the chapter 4 Methodology. Results from the “Baseline” are displayed on Figure 6 and every other Figure displaying results for NFC lending volumes. “Baseline with control for credit demand” corresponds to results of the baseline model with using AnaCredit loan-level data. “Robustness: TLTRO take-up treatment variable” and “Robustness: TLTRO dummy treatment variable” correspond to results of the robustness check: Change in the definition of the treatment variable. Results are displayed on Figure A.1.1. “Robustness: Indirect participants deleted from dataset” corresponds to results of the robustness check: Change in the composition of the control group. Results are displayed on Figure A.2.1. Check corresponding subchapters for more details.

Signif. codes: ***, **, * and . indicates significance at the 0.1%, 1%, 5% and 10% level, respectively. NFC – non-financial corporations.

Table B.4: HC lending volumes results

HC lending volumes		Mahalanobis distance matching number									
		1	2	3	4	5	6	7	8	9	10
Treated*TLTRO	γ	0,0252	-0,0048	-0,0198	0,1945**	-0,0133	0,2064**	-0,0387	0,0342	0,3172***	0,2288**
	Std Error	(0,0726)	(0,0382)	(0,0616)	(0,073)	(0,0742)	(0,0708)	(0,0676)	(0,0624)	(0,0615)	(0,0786)
	R ²	0,9666	0,9697	0,9661	0,9654	0,9601	0,9717	0,9678	0,9757	0,9777	0,9672
Treated*TLTRO + X	γ	-0,0092	0,0155	0,0018	0,0679	0,0327	0,0143	0,0486	-0,0437	0,256***	0,1952**
	Std Error	(0,0611)	(0,0345)	(0,0579)	(0,0692)	(0,0641)	(0,066)	(0,0571)	(0,0565)	(0,0439)	(0,0656)
	R ²	0,9767	0,9753	0,9706	0,9704	0,971	0,9769	0,9772	0,9809	0,9887	0,9777
Treated*TLTRO + X + X*TLTRO	γ	0,2722**	0,0568	-0,0218	0,238*	0,257**	0,2676**	0,0286	0,0345	0,1774**	0,1239
	Std Error	(0,0887)	(0,048)	(0,085)	(0,1005)	(0,0964)	(0,0924)	(0,0902)	(0,0802)	(0,0643)	(0,1002)
	R ²	0,9776	0,9755	0,9706	0,9717	0,9721	0,9778	0,9772	0,981	0,9893	0,9784
Treated*TLTRO + X + X*TLTRO + Rates	γ	0,2752**	0,0952*	-0,0462	0,2366*	0,2521**	0,2704**	0,0215	0,002	0,1702**	0,1246
	Std Error	(0,0887)	(0,0443)	(0,0835)	(0,1003)	(0,0963)	(0,0924)	(0,0858)	(0,079)	(0,0606)	(0,1001)
	R ²	0,9776	0,9793	0,9716	0,9718	0,9722	0,9778	0,9794	0,9816	0,9904	0,9784
Baseline	γ	0,2835**	0,1081*	-0,0221	0,2312*	0,2526**	0,2771**	0,0917	0,0087	0,2412***	0,1686
	Std Error	(0,0888)	(0,0434)	(0,0824)	(0,101)	(0,0968)	(0,0927)	(0,0816)	(0,0779)	(0,0557)	(0,0993)
	R ²	0,9776	0,9802	0,9725	0,9717	0,9721	0,9778	0,9815	0,9822	0,992	0,979
Number of banks		11	7	8	9	10	10	7	9	7	8
Robustness: TLTRO take-up treatment variable	γ	0,1707	0,119	-0,1609	-0,0782	0,0466	0,116	-0,0762	-0,0795	0,0673	-0,1436
	Std Error	(0,114)	(0,0702)	(0,1225)	(0,144)	(0,1349)	(0,1205)	(0,1282)	(0,1006)	(0,0776)	(0,1358)
	R ²	0,9775	0,9801	0,9725	0,9716	0,972	0,9776	0,9815	0,9822	0,9918	0,9789
Robustness: TLTRO dummy treatment variable	γ	0,3517***	0,1824**	-0,1541	0,3002*	0,3624**	0,3377***	0,0476	-0,0573	0,334***	0,3135*
	Std Error	(0,0957)	(0,0638)	(0,1087)	(0,1297)	(0,1217)	(0,1009)	(0,1084)	(0,0862)	(0,0738)	(0,1248)
	R ²	0,9777	0,9802	0,9726	0,9717	0,9722	0,9778	0,9815	0,9822	0,9921	0,9791
Robustness: Indirect participants deleted from dataset	γ	0,3503***	0,0792	0,2978**	0,3087**	0,3445**	0,1831	0,2412*	0,1305	0,1845*	0,2237*
	Std Error	(0,1043)	(0,0941)	(0,1148)	(0,1094)	(0,1095)	(0,0935)	(0,1118)	(0,0911)	(0,0859)	(0,1037)
	R ²	0,9775	0,9735	0,9724	0,9725	0,9777	0,9821	0,9794	0,9826	0,9828	0,9835

Notes: HC lending volumes enter the regression as dependent variable. In specifications “Treated*TLTRO”, “Treated*TLTRO + X”, “Treated*TLTRO + X + X*TLTRO”, “Treated*TLTRO + X + X*TLTRO + Rates” and “Baseline” we use a continuous treatment intensity variable between 0 and 1 depending on the number of months the bank participated in TLTRO III. “Treated*TLTRO”, “Treated*TLTRO + X”, “Treated*TLTRO + X + X*TLTRO” and “Treated*TLTRO + X + X*TLTRO + Rates” correspond to the gradual building of the model (starting from the most basic model, then adding the control variables Size (measured as log of Total assets), Securities/Total assets and return on assets, then adding interaction terms and finally adding the control variable Rates). In the “Baseline” specification we show results for the most saturated model which include control variables: Size (measured as log of Total assets), Securities/Total assets, return on assets (ROA), HC Lending rates and Deposits/Total assets as it is described in the chapter 4 Methodology. Results from the “Baseline” are displayed on Figure 7 and every other Figure displaying results for HC lending volumes. “Robustness: TLTRO take-up treatment variable” and “Robustness: TLTRO dummy treatment variable” correspond to results of the robustness check: Change in the character of the treatment variable. Results are displayed on Figure A.1.1. “Robustness: Indirect participants deleted from dataset” corresponds to results of the robustness check: Change in the composition of the control group. Results are displayed on Figure A.2.1. Check corresponding subchapters for more details. Signif. codes: ***, **, * and . indicates significance at the 0.1%, 1%, 5% and 10% level, respectively. HC – households consumption credit.

Table B.5: Sectoral lending rates results

Sectoral lending rates			Mahalanobis distance matching number									
			1	2	3	4	5	6	7	8	9	10
NFC lending rates	Baseline	γ	-0,6537*	-0,9527*	-0,7796*	-0,6206.	-0,8431*	-0,7108.	-0,7059.	-0,7808*	-1,0766**	-0,9481**
		Std Error	(0,3139)	(0,3779)	(0,3661)	(0,3566)	(0,3952)	(0,3853)	(0,3686)	(0,3301)	(0,4024)	(0,292)
		R ²	0,705	0,7177	0,7091	0,7124	0,7103	0,6975	0,6903	0,6898	0,7155	0,6902
	Robustness: TLTRO take-up treatment variable	γ	-0,2368	-1,0037**	-0,6401*	-0,5213	-1,1686*	-0,7035*	-0,6548	-0,7754*	-1,2249**	-0,9418*
		Std Error	(0,4012)	(0,4766)	(0,4276)	(0,4049)	(0,4974)	(0,4432)	(0,4229)	(0,4004)	(0,5106)	(0,3768)
Robustness: TLTRO dummy treatment variable	γ	-0,8989*	-1,6976***	-0,9064*	-0,6255.	-1,695***	-0,8932*	-0,7993*	-0,8899*	-1,9372***	-1,0351**	
	Std Error	(0,3884)	(0,459)	(0,3846)	(0,3689)	(0,4787)	(0,4058)	(0,3837)	(0,3497)	(0,4902)	(0,3146)	
Number of banks			9	10	11	12	9	10	11	12	9	12
Robustness: Indirect participants deleted from dataset	γ	-0,9095*	-1,3666**	-1,2154**	-1,368**	-1,2401**	-1,111*	-1,1185**	-1,3603**	-1,394***	-1,3182***	
	Std Error	(0,3967)	(0,4714)	(0,4484)	(0,494)	(0,4707)	(0,4497)	(0,4302)	(0,4949)	(0,3221)	(0,3369)	
HC lending rates	Baseline	γ	0,4054	0,7809*	0,6726.	0,1383	-0,1793	0,5419	-0,0323	0,9241*	-0,201	-0,0427
		Std Error	(0,3815)	(0,3497)	(0,3791)	(0,4059)	(0,3955)	(0,3875)	(0,4164)	(0,3724)	(0,41)	(0,4191)
		R ²	0,8447	0,8396	0,7958	0,7504	0,7592	0,8489	0,8012	0,8749	0,7933	0,7612
	Robustness: TLTRO take-up treatment variable	γ	0,609	0,3511	0,2662	-0,1662	-0,7421	0,727	-1,1815.	1,064*	-0,5024	-0,5781
		Std Error	(0,488)	(0,5677)	(0,5657)	(0,5768)	(0,5484)	(0,5019)	(0,6503)	(0,4815)	(0,5639)	(0,5714)
Robustness: TLTRO dummy treatment variable	γ	0,7083.	1,5202**	1,3133**	0,209	-0,422	0,8418*	-0,0651	1,4497***	-0,2654	-0,4007	
	Std Error	(0,4113)	(0,5127)	(0,4984)	(0,5209)	(0,4976)	(0,4215)	(0,5527)	(0,4096)	(0,544)	(0,5275)	
Number of banks			11	7	8	9	10	10	7	9	7	8
Robustness: Indirect participants deleted from dataset	γ	0,3849	0,8567*	0,3476	-0,0208	0,5207	0,2162	0,1957	0,8244.	0,6629	0,5082	
	Std Error	(0,4439)	(0,4277)	(0,4565)	(0,4439)	(0,453)	(0,4593)	(0,4587)	(0,4358)	(0,4211)	(0,4483)	
HP lending rates	Baseline	γ	0,1335	-0,014	0,0119	-0,0439	0,0111	0,0742	-0,0573	-0,0077	0,0523	0,1951
		Std Error	(0,0989)	(0,1588)	(0,157)	(0,1625)	(0,1551)	(0,155)	(0,1659)	(0,1637)	(0,1625)	(0,1426)
		R ²	0,936	0,8195	0,8144	0,8209	0,8254	0,8192	0,8129	0,8067	0,8124	0,8293
	Robustness: TLTRO take-up treatment variable	γ	0,0405	0,0149	0,0498	-0,2715	-0,0862	0,047	-0,0836	-0,0017	-0,0315	0,2344
		Std Error	(0,1388)	(0,2003)	(0,1941)	(0,2098)	(0,1965)	(0,1906)	(0,2118)	(0,2033)	(0,201)	(0,1734)
Robustness: TLTRO dummy treatment variable	γ	0,2076.	-0,0516	-0,0129	-0,2064	-0,0636	0,0403	-0,1513	-0,0645	-0,024	0,2132	
	Std Error	(0,1256)	(0,1716)	(0,1672)	(0,1792)	(0,1683)	(0,1653)	(0,1814)	(0,1757)	(0,1755)	(0,1438)	
Number of banks			9	11	12	9	10	11	10	11	10	12
Robustness: Indirect participants deleted from dataset	γ	0,2.	-0,0526	0,0077	0,1664	-0,1442	0,0411	-0,0299	0,1254	-0,0843	-0,0134	
	Std Error	(0,1133)	(0,1828)	(0,1825)	(0,1299)	(0,1936)	(0,18)	(0,1866)	(0,1686)	(0,1967)	(0,1913)	
			0,9364	0,8109	0,8023	0,934	0,8037	0,8056	0,8067	0,8124	0,7973	0,7917

Notes: Dependent variable in the regression is either NFC lending rates or HC lending rates or HP lending rates. In “Baseline” specifications we use a continuous treatment intensity variable between 0 and 1 depending on the number of months the bank participated in TLTRO III and include control variables: Size (measured as log of Total assets), Securities/Total assets, return on assets (ROA) and Deposits/Total assets as it is described in the chapter 4 Methodology. Results from “Baseline” are displayed on Figure 8 and every other Figure displaying results for sectoral lending rates. “Robustness: TLTRO take-up treatment variable” and “Robustness: TLTRO dummy treatment variable” correspond to results of the robustness check: Change in the character of the treatment variable. Results are displayed on Figure A.1.2. “Robustness: Indirect participants deleted from dataset” corresponds to results of the robustness check: Change in the composition of the control group. Results are displayed on Figure A.2.2. Check corresponding subchapters for more details.

Signif. codes: ***, **, * and . indicates significance at the 0.1%, 1%, 5% and 10% level, respectively. NFC – non-financial corporations, HP – for house purchase, HC – households consumption credit.

Table B.6: Profitability results

Profitability			Mahalanobis distance matching number									
			1	2	3	4	5	6	7	8	9	10
ROA	Baseline	γ	0,0024*	0,002.	0,002*	0,0024**	0,0026**	0,0037***	0,0029**	0,0045***	0,004***	0,0054***
		Std Error	(0,001)	(0,001)	(0,0009)	(0,0008)	(0,0009)	(0,0011)	(0,001)	(0,0011)	(0,0011)	(0,0012)
		R ²	0,6578	0,6311	0,7041	0,7163	0,6453	0,5333	0,7526	0,6722	0,5666	0,526
	Robustness: TLTRO take-up treatment variable	γ	-0,0028*	-0,003*	-0,0031*	-0,0013	-0,0009	0,0033*	-0,0012	0,0012	0,0004	0,0058***
		Std Error	(0,0014)	(0,0014)	(0,0012)	(0,001)	(0,0011)	(0,0014)	(0,0013)	(0,0013)	(0,0013)	(0,0014)
Robustness: TLTRO dummy treatment variable	γ	-0,0011	-0,0007	-0,0005	0,0007	0,0009	0,0035**	0,0013	0,003**	0,0023*	0,0057***	
	Std Error	(0,0013)	(0,0013)	(0,0012)	(0,0009)	(0,001)	(0,0011)	(0,0012)	(0,0011)	(0,0011)	(0,0012)	
Number of banks			9	10	9	10	11	16	10	12	12	16
Robustness: Indirect participants deleted from dataset	γ	0,0029*	0,0045***	0,0045***	0,0064***	0,0034**	0,0023*	0,0031**	0,0063***	0,0059***	0,0057***	
	Std Error	(0,0013)	(0,0012)	(0,0012)	(0,0014)	(0,0012)	(0,0011)	(0,0011)	(0,0016)	(0,0014)	(0,0014)	
NII	Baseline	γ	0,3286***	0,2766***	0,2256***	0,1933***	0,1933***	0,0881*	0,2142***	0,1679**	0,3402***	0,155***
		Std Error	(0,0468)	(0,0494)	(0,0452)	(0,0553)	(0,0553)	(0,0414)	(0,0551)	(0,0524)	(0,0637)	(0,039)
		R ²	0,9878	0,9867	0,9863	0,9854	0,9854	0,9911	0,9861	0,9866	0,983	0,9897
	Robustness: TLTRO take-up treatment variable	γ	0,1912**	0,0903	-0,0473	-0,0465	-0,0465	-0,0324	-0,0191	-0,1084	0,252***	-0,1242**
		Std Error	(0,0632)	(0,065)	(0,06)	(0,0658)	(0,0658)	(0,0488)	(0,0656)	(0,0622)	(0,0734)	(0,0481)
Robustness: TLTRO dummy treatment variable	γ	0,3428***	0,29***	0,2015***	0,0635	0,0635	-0,0458	0,0643	0,0326	0,3147***	0,0018	
	Std Error	(0,06)	(0,0619)	(0,0572)	(0,0576)	(0,0576)	(0,0432)	(0,0575)	(0,0546)	(0,0649)	(0,0411)	
Number of banks			9	10	9	10	11	16	10	12	12	16
Robustness: Indirect participants deleted from dataset	γ	0,3388***	0,3342***	0,379***	0,3273***	0,2803***	0,4295***	0,2588***	0,2753***	0,2042***	0,5256***	
	Std Error	(0,0597)	(0,0718)	(0,0632)	(0,0728)	(0,0686)	(0,0567)	(0,0694)	(0,0693)	(0,0556)	(0,0785)	
Reserves	Baseline	γ	0,0205***	0,0223***	0,0258***	0,0608***	0,0567***	-0,0143	0,0894***	0,0826***	0,0558***	-0,0264
		Std Error	(0,0054)	(0,0051)	(0,0054)	(0,0064)	(0,0062)	(0,0176)	(0,0211)	(0,0198)	(0,006)	(0,0183)
		R ²	0,7574	0,7538	0,7563	0,785	0,7847	0,4292	0,6087	0,5487	0,7767	0,3871
	Robustness: TLTRO take-up treatment variable	γ	0,0562***	0,0572***	0,0649***	0,1094***	0,1028***	-0,0089	0,2237***	0,1577***	0,0977***	-0,0272
		Std Error	(0,0069)	(0,0065)	(0,0068)	(0,0073)	(0,007)	(0,0218)	(0,0264)	(0,0232)	(0,0068)	(0,0226)
Robustness: TLTRO dummy treatment variable	γ	0,0019	0,0036	0,0084	0,0658***	0,0618***	-0,0301	0,1511***	0,0989***	0,061***	-0,0449*	
	Std Error	(0,0069)	(0,0065)	(0,0068)	(0,0067)	(0,0064)	(0,0181)	(0,0258)	(0,0205)	(0,0062)	(0,0188)	
Number of banks			9	10	9	10	11	16	10	12	12	16
Robustness: Indirect participants deleted from dataset	γ	0,0087	0,1289***	0,1534***	0,101***	0,0295***	0,1***	0,0365***	0,0854***	-0,0822***	0,0343***	
	Std Error	(0,0065)	(0,0263)	(0,0265)	(0,0261)	(0,0082)	(0,0205)	(0,0087)	(0,0249)	(0,0204)	(0,0082)	
Number of banks			9	10	9	10	11	16	10	12	12	16
Robustness: Indirect participants deleted from dataset	γ	0,0087	0,1289***	0,1534***	0,101***	0,0295***	0,1***	0,0365***	0,0854***	-0,0822***	0,0343***	
	Std Error	(0,0065)	(0,0263)	(0,0265)	(0,0261)	(0,0082)	(0,0205)	(0,0087)	(0,0249)	(0,0204)	(0,0082)	

Notes: Dependent variable in the regression is either Return on assets (ROA) or Net interest income (NII) or Reserves/Total assets. In “Baseline” specification we use a continuous treatment intensity variable between 0 and 1 depending on the number of months the bank participated in TLTRO III and include control variables: Size (measured as log of Total assets), Securities/Total assets, Deposits/Total assets and State guarantees as it is described in the chapter 4 Methodology. Results from “Baseline” are displayed on Figure 9 and every other Figure displaying results for profitability. “Robustness: TLTRO take-up treatment variable” and “Robustness: TLTRO dummy treatment variable” correspond to results of the robustness check: Change in the character of the treatment variable. Results are displayed on Figure A.1.2. “Robustness: Indirect participants deleted from dataset” corresponds to results of the robustness check: Change in the composition of the control group. Results are displayed on Figure A.2.2. Check corresponding subchapters for more details.

Signif. codes: ***, **, * and . indicates significance at the 0.1%, 1%, 5% and 10% level, respectively. ROA – return on assets, NII – net interest income.