

How Banks Optimized Their Balance Sheets Under ECB's Funding for Lending Programs: Necessary Refinancing Tool or Hidden Recapitalization?



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Abstract

In this note, we summarize our recent article, *“Take it or leave it: Banks' Balance Sheet Optimization and Targeted Longer-Term Refinancing Operations”* (Sigmund et al., 2024). In this paper, we develop and solve a dynamic optimization model of a bank's balance sheet, with a particular focus on the costs associated with balance sheet adjustments and the spreads between bank-specific rates and the interbank rate. We assess the impact of the ECB's funding-for-lending programs using data from 200 large euro area banks, covering the period from 2007 to 2021. Our findings reveal that the programs had a relatively limited effect on lending to the private sector. Instead, banks expanded their central bank assets and liabilities, as predicted by our theoretical model. This effect was particularly pronounced during TLTRO III in 2020, when the ECB set the TLTRO rate below the deposit facility rate.

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Introduction

In the aftermath of the 2007-2008 financial crisis, central banks around the world adopted unconventional monetary policies to stabilize their economies and achieve their inflation targets. In the euro area, the European Central Bank (ECB) introduced several measures alongside large asset purchase programs, such as a negative interest rates and a series of Targeted Long-Term Refinancing Operations (TLTROs), to encourage banks to increase lending to the private sector. To obtain the most favorable TLTRO interest rates, banks had to fulfill certain lending targets for non-financial corporations and consumption loans, which changed over time.¹ Over the years the conditions for the TLTRO were adjusted to encourage banks to take up lending, up to the point when the ECB implemented negative rates of -1% during the COVID-19 pandemic in 2020. It was the first time in the history of central banks that, from the perspective of the bank, it was profitable to borrow from the central bank at -1% and then deposit at the central bank at -0.5% or even at 0%, depending on how much of the tiering exemption scheme was used.²

While there is extensive evidence that the negative interest rate policy (NIRP) had detrimental effects on bank profitability (Borio et al., 2017; Claessens et al., 2018; Molyneux et al., 2019; Raunig and Sigmund, 2022 and Agati and Sigmund, 2025), the impact of the TLTRO programs on banks are not as clear. The complexity of the program — affecting both central banks' balance sheets and the composition of commercial banks' assets and liabilities — required banks to adapt to an environment of abundant liquidity. This complexity makes it challenging to assess the policy's effectiveness.

Some papers based on reduced-form equations, such as Benneton et al. (2021), and many subsequent papers, find small positive effects on lending growth. However, these findings do not imply causality and not even correlation, as they fail to control for all possible factors that can simultaneously influence both lending behavior and the TLTRO uptake. First, the bank's uptake in a TLTRO program is certainly not a randomized controlled experiment with assignment into treatment or no treatment; rather, it reflects an endogenous decision by the participating banks. Second, the allowed uptake ("allowance"³) in the previous TLTRO program does not determine the uptake in the current program. Instead, the TLTRO uptake depends on 1) the "allowance" of the current TLTRO, which varied significantly over time, going from 7% of the loan book (excluding mortgages) to 55% and 2) the available collateral, which was also changing over time.⁴

In our recent study (Sigmund et al., 2024), we develop a dynamic optimization model of a commercial bank that adjusts to monetary policy measures.⁵ Using this model, we analyze the effectiveness of these measures through the bank's balance sheet. Our results provide valuable insights into bank behavior and the complexities of balance sheet management, which at the aggregate have implications for the real economy. We show that interactions with other policy measures which increased liquidity in the system, such as APP, significantly influence lending volumes, interest rates, and bank profitability. Their full impact can only be understood through an optimization model that considers adjustments to the entire balance sheet, rather than focusing solely on individual positions like lending, i.e., relying on reduced-form equations. Moreover, our model allows us to assess the effects of TLTROs on lending while controlling for all other balance sheet positions, funding sources, lending and deposit rates, and government bond yields. By explicitly including government bond volumes and yields, we also account for the impact of quantitative easing programs.

¹ See Da Silva et al. (2021) for the details of the programs.

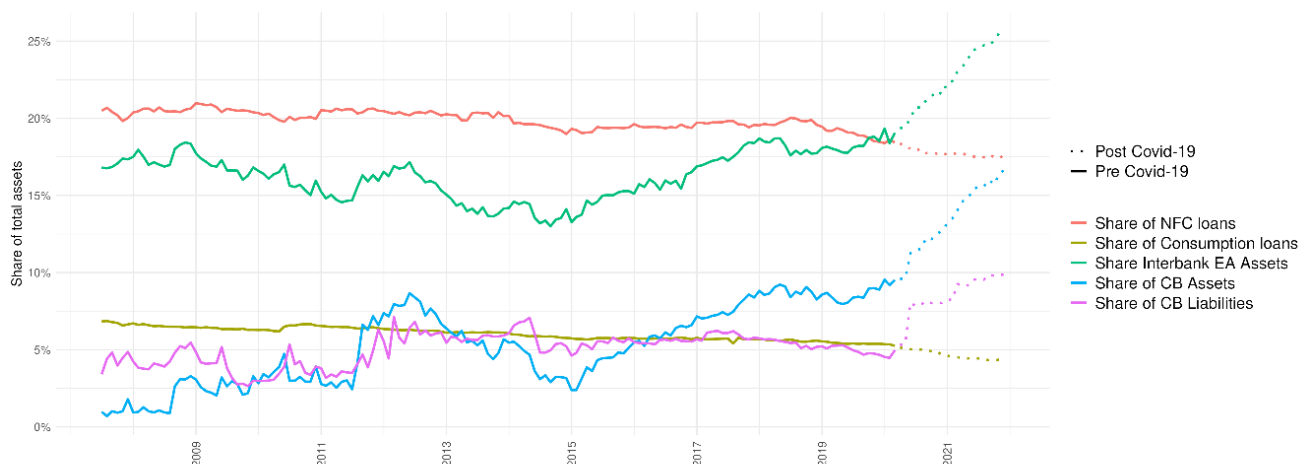
² One measure to reduce the effects of the NIRP was to exempt up to 6 times the reserve requirement from paying the DFR of -0.5%. See <https://www.ecb.europa.eu/mopo/implement/mr/two-tier/html/index.en.html> for more details.

³ Allowance refers to the maximum amount that banks can borrow. It is a fraction of their stock of non-financial corporate and consumption loans. Additionally, banks might take their liability and their asset structures into account when decision on TLTRO uptakes.

⁴ In any case, the "allowance" is not a valid instrument for TLTRO uptake, as past lending is well known to be highly autocorrelated with current lending, even before the introduction of TLTRO programs. This well-established fact violates the exclusion restriction required for the instrumental variable approach used by Benneton et al. (2021) and many others.

⁵This paper is part of the ChaMP Research Network (<https://www.ecb.europa.eu/pub/research-networks/html/champ.en.html>).

Figure 1. Effects of TLTROs on a bank’s balance sheet



Source: ECB SDW, IBSI, and IMIR. This figure shows the evolution of the monthly averages of all dependent variables. To make them easier to compare, we calculated the ratios for each bank using total assets. The share of NFC loans refers to the share of non-financial corporation loans. The share of consumption loans refers to the share of household consumption loans. Share of CB Assets refers to the share of central bank assets. Share Interbank EA Assets refer to the share of interbank loans granted to other euro area banks. Share of CB liabilities refers to the share of central bank liabilities, e.g., TLTROs.

Take it and leave it strategy: Deposit TLTRO funding at the central bank

Our analysis suggests that the ECB's goal of increasing private sector lending through TLTROs was not met when evaluated as a proportion of banks' total assets. Instead, banks often directed a larger portion of their assets to the ECB’s deposit facility. This trend was especially evident during TLTRO III, when, in response to the COVID-19 crisis, the ECB set the TLTRO lending rate below the deposit facility rate.

Across all TLTRO programs, banks borrowed up to €2,500 billion, depositing an average of 54% in the ECB’s deposit facility and lending approximately 30% to other banks. Especially, under TLTRO III, this “take-it-and-leave-it” strategy was a rational choice, as banks could borrow from the ECB at a negative rate of -1% while depositing funds at the facility at -0.5%, effectively earning a risk-free profit. This approach allowed banks to boost profitability, strengthen capitalization or distribute record dividends, all without taking additional risk.

Banks’ optimization strategies

To better understand why banks adopted this strategy, we develop a model that accounts for the costs associated with changing a bank's balance sheet structure and the interactions between its various components, following a change in their funding costs and sources. Adjusting a balance sheet is not straightforward—banks face significant operational and financial frictions and costs when altering the composition of their assets and liabilities.

Our model extends the work of Elyasiani et al. (1995), who studied optimal bank behavior under varying market conditions. In our research, we examine three possible cases to understand how banks might respond:

1. **No Adjustment Costs:** Banks adjust their positions swiftly, responding immediately to changes in reference rates and interest rates for specific balance sheet items. As a result, no autocorrelation would be expected in these items.

- 2. Adjustment Costs with Independent Decisions:** Banks adjust gradually, yet each asset and liability item can still be optimized independently, without considering interactions with other balance sheet components. For example, TLTRO uptake would not necessarily affect lending.
- 3. Adjustment Costs with Interdependent Decisions:** Banks' decisions regarding loans, deposits, and central bank assets are inherently interconnected, meaning these components cannot be adjusted independently due to the structural interdependence within the balance sheet.

Empirical validation of our model suggests that the third scenario best captures bank behavior. High adjustment costs, combined with the interdependence of balance sheet components, made banks more cautious in reallocating funds. Instead of directing funds toward new loans, banks largely retained them as risk-free reserves and interbank loans.

This outcome arises because TLTRO uptake expands the liability side of the balance sheet. To maximize profits, minimize risk, and meet regulatory requirements, banks had to adjust their asset allocation accordingly. Consequently, many banks found it more advantageous to exploit the carry trade by increasing their holdings in the ECB's deposit facility rather than expanding lending, which carried greater risk.

Conclusion

These findings have significant implications for future monetary policy, particularly as input for the ongoing ECB Strategy Review in 2025. While TLTROs boosted banks' profitability to record levels during a period of heightened uncertainty, they did not lead to a substantial increase in lending to the real economy relative to the expansion of the financial system's balance sheet. Policymakers should consider introducing stronger micro-founded incentives to more effectively stimulate bank lending.

To achieve the desired outcomes, it is crucial to consider broader balance sheet dynamics, including adjustment costs. Furthermore, we demonstrate that to truly assess the effectiveness of policy measures, it is essential to understand a bank's balance sheet optimization and its adjustments in response to policy changes, rather than relying on reduced-form equations to evaluate complex policy interventions.

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