Monetary Policy and Bank Profitability in Germany: Evidence From a Disaggregated Bank-Level Panel

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Abstract

This paper analyses the interplay between monetary policy and bank profitability in Germany using a novel disaggregated panel dataset of over 2,700 banks from the Deutsche Bundesbank spanning 1999 to 2021. Employing fixed-effects panel regressions, the analysis identifies a regime-dependent and asymmetric impact of interest rate dynamics on bank profitability, measured by return on assets (ROA). Specifically, in the pre-2016 period, low short-term interest rates were associated with declining profitability. However, in the post-2016 environment, after the European Central Bank's Main Refinancing Operations rate reached zero, both the short-term interest rate as well as the slope of the yield curve exhibited a positive and significant effect on ROA. These findings suggest that the effectiveness and transmission of monetary policy evolve in low-rate regimes, consistent with the reversal rate hypothesis. The study offers new empirical evidence on how monetary conditions interact with bank-specific characteristics in a structurally diverse banking sector, with implications for monetary policy design in low-for-long environments.

Keywords: monetary policy, profitability, low-for-long

1. Introduction

Bank profitability is a key driver of financial stability and economic growth. Recently, profitability has gained increased attention due to mounting regulatory requirements, such as higher capital buffers, which have pressured traditional income sources. When interest margins narrow, banks may respond by shifting toward alternative revenue streams or riskier investments. The prolonged low interest rates of the European Central Bank (ECB) have further intensified these pressures, raising questions about the transmission of monetary policy and its impact on bank performance.

This study focuses the effects of the ECB's monetary policy on bank profitability in Germany, with a particular focus on the role of interest rate environments. Understanding this relationship is crucial, as changing interest rates affect not only banks' net interest income but also their lending behavior, resilience, and overall stability. By examining both conventional and ultra-low interest rate regimes, this paper highlights how monetary policy transmission mechanisms vary across different economic contexts.

This paper builds on the work of Altavilla & Boucinha & Peydró (2019) by using a large, private dataset from the Deutsche Bundesbank that includes all German banks from 1999 to 2021. The dataset allows for a granular examination of profitability dynamics in a diverse banking sector that includes small and regionally focused institutions. The study employs fixed-effects panel regressions to assess how short-term interest rates and the yield curve slope influence bank profitability in terms of the return on assets (ROA).

A key contribution of this paper is the differentiation between two periods: a "normal" interest rate environment (1999–2015) and the ultra-low interest rate phase (2016–2021), marked by the Main Refinancing Operations rate reaching zero. The findings underline the asymmetric effects of monetary policy across these regimes, providing insights relevant to both policymakers and the banking industry.

2. Contribution

This paper makes three key contributions to the literature on monetary policy and bank profitability.

First, this is the first study to exploit a disaggregated, bank-level panel of the entire German banking sector to assess how monetary policy affects profitability across distinct interest rate regimes. Unlike prior research that relies on aggregates or focuses on systemically important institutions, this paper uses granular data covering over 2,700 banks, including cooperative, public-sector, and private banks, capturing heterogeneity. A key innovation of this study is the use of the ECB's reduction of the Main Refinancing Operations (MRO) rate to zero in 2016 as a clean structural break, allowing for a clear distinction between conventional and ultra-low interest rate regimes. This enables a sharper identification of regime-dependent effects in the transmission of the ECB's monetary policy. The German banking sector, characterized by its fragmentation, strong reliance on maturity transformation, and dependence on interest income, offers a unique test case for understanding the broader implications of low-for-long monetary policy. These structural features make Germany particularly sensitive to prolonged low interest rates, and the insights derived from this analysis have broader relevance for other countries with decentralized or interest-margin-dependent banking systems. It provides a comprehensive and disaggregated analysis of the German banking sector over a long and policy-relevant time horizon.

Second, the paper builds on the work of Altavilla et al. (2019) by taking into account the very low interest rates that have been in place since 2016. By dividing the sample into pre-2016 and post-2016 sub-periods, separated by the ECB's reduction of the Main Refinancing Operations rate to zero, the analysis captures structural breaks in policy transmission. The results reveal that the impact of the monetary policy of the ECB on bank profitability is not constant over time but is instead regime-dependent.

Third, the study incorporates both conventional monetary policy indicators (short-term rates) and unconventional measures (yield curve slope), accompanied by key macroeconomic controls and bank-specific characteristics. This integrated approach allows for a more nuanced understanding of the transmission mechanisms affecting bank profitability. The findings show that during the ultra-low interest rate period, the slope of the yield curve becomes a particularly significant determinant of profitability, emphasizing the value of term structure manipulation as a policy tool.

Together, these contributions offer new empirical evidence on how interest rate regimes condition the effectiveness of monetary policy and its implications for financial sector resilience. The German case provides valuable lessons for other euro area countries with similar banking systems, particularly in understanding how different interest rate regimes can impact monetary policy effectiveness and financial stability.

3. Literature Review

Monetary policy in combination with bank profitability has been in academic spotlight for years already, particularly in the context of persistently low interest rates. Existing studies offer mixed findings, with the direction and strength of effects often varying across interest rate environments and time horizons, indicating that some studies suggest a positive impact of low interest rates on bank profitability, while others highlight potential negative effects due to reduced interest margins.

Altavilla et al. (2019) show that lower short-term interest rates and a flatter yield curve do not necessarily reduce bank profitability when accounting for the endogeneity of monetary policy to macroeconomic expectations. Their results suggest that while net interest income (NII) tends to decline, non-interest income (NNI) and provisioning adjustments may partially offset this effect. However, over extended periods, even these compensatory mechanisms may be insufficient to preserve profits, particularly in the face of prolonged low interest rates and changing economic conditions that can further impact bank revenue streams.

Similarly, Alessandri and Nelson (2015) conclude that bank profitability and interest rates are positively correlated in the long-term but not necessarily in the short-term. Busch and Memmel (2015) and Borio & Gambacorta (2015) and Borio & Gambacorta & Hofmann (2017) support this finding, emphasizing that the profitability impact intensifies in a prolonged low-interest-rate environment. Claessens & Coleman & Donelly (2017) further argue that interest margins are particularly vulnerable in low-for-long scenarios, suggesting that banks may struggle to maintain profitability as interest rates remain persistently low, which could lead to reduced lending and tighter financial conditions.

Much of the existing literature focuses primarily on the effect of interest rate changes on banks' interest income. The transmission to non-interest income, comprising fees, commissions, and trading income, is less well understood and often omitted. Borio et al. (2015) highlight that although interest income typically dominates profitability measures like return on assets (ROA), the overall effect of monetary policy should account for multiple income sources and risk provisions, including non-interest income such as fees, commissions, and trading income, which can

significantly impact a bank's financial performance.

The German context introduces additional considerations. Entrop & Memmel & Ruprecht & Wilkens (2015) highlight the role of maturity transformation and interest rate risk in shaping German banks' pricing strategies. Their findings suggest that banks with greater exposure to interest rate volatility adjust loan and deposit fees accordingly. Given that German banks rely heavily on maturity transformation, the interest rate channel is likely to play a particularly prominent role in profitability outcomes.

In summary, prior research provides strong evidence of a positive long-term relationship between interest rates and bank profitability. However, the existing empirical work focuses either on aggregate euro area data or on systemically important banks, with limited attention paid to heterogeneous effects across bank types and national contexts. This paper contributes to filling that gap by offering a disaggregated analysis of the German banking sector over two distinct monetary policy regimes.

4. Mechanisms of the Interest Rate Channel

The interest rate channel is a fundamental transmission mechanism of monetary policy that influences economic activity by affecting borrowing costs, asset prices, and bank profitability. Changes in the central bank's policy rate directly impact short-term interest rates, which in turn influence the broader economy through multiple interlinked channels. Real interest rates represent the true cost of borrowing and the real return on investment. The real interest rate is defined as the nominal interest rate adjusted for inflation. As noted by Taylor (1995), when nominal rates decline and inflation expectations remain stable, real interest rates fall, encouraging borrowing and stimulating aggregate demand. The basic transmission logic can be summarized as follows:

$$i_{\text{short-term}} \downarrow \Rightarrow r_{\text{short-term}} \downarrow \Rightarrow r_{\text{long-term}} \downarrow \Rightarrow I,\ C,\ H \uparrow \quad (1)$$

where I is investment, C is consumption, and H is housing investment.

Lower real interest rates also increase the present value of future cash flows, thereby raising asset prices. The resulting wealth effect can improve consumer confidence and spending, further amplifying economic activity. When the discount rate used in asset valuation declines, investors are willing to pay more for income-generating assets, such as bonds and equities, increasing their market value.

The banking sector is sensitive to these factors due to its reliance on maturity transformation, meaning the practice of funding short-term and lending long-term. As Choudhry (2023) explains, this structure exposes banks to interest rate risk, as changes in the slope of the yield curve directly impact their net interest margins (NIM). When the yield curve flattens or inverts, the profitability of maturity transformation reduces, putting pressure on banks' income.

Germany's fragmented banking sector heavily relies on interest-based income, making this effect particularly pronounced. According to Entrop (2015), banks with higher exposure to interest rate risk often adjust their fee structures, raising loan fees and lowering deposit fees, to offset the reduced profitability caused by maturity mismatches. These adjustments serve as partial hedges against rate volatility but may not fully compensate for margin compression in prolonged low-rate environments, particularly as banks may still face challenges in maintaining profitability due to ongoing low interest rates and competitive pressures in the market.

Overall, the interest rate channel operates not only through macroeconomic demand stimulation but also via its direct influence on the income structure of banks. Persistent ultra-low interest rates can crunch bank profitability, potentially weakening intermediation, altering risk-taking incentives, and challenging the resilience of financial institutions.

5. Methodological Analysis

5.1 Data and Dataset Structure

The empirical analysis is based on a proprietary panel dataset provided by the Deutsche Bundesbank, covering the period from 1999 to 2021. The dataset includes annual observations for 2,719 German banks, yielding a total of 43,122 observations. All variables are fully observed over the study horizon, except for provisioning data, which has a slightly smaller sample size due to reporting gaps. Given the considerable heterogeneity in monetary policy regimes during the sample period, the analysis distinguishes between two sub-periods: a conventional interest rate environment from 1999 to 2015 and an ultra-low interest rate regime from 2016 to 2021. The year 2016 marks a structural break, as the ECB reduced the Main Refinancing Operations (MRO) rate to zero. Alternative cut-off points were tested but did not yield statistically robust differentiation.

The dataset comprises comprehensive balance sheet and income statement data submitted to the Bundesbank under

regulatory reporting obligations. The BAID_MOF (multi-office institute identifier) is used to identify banks. This makes it possible to keep track of institutions over time, even those with branch structures but no legally dependent. German banks are particularly well-suited for such an analysis due to the sector's structural diversity. The dataset includes three major categories of banks: private commercial banks, public-sector credit institutions (e.g., savings banks), and cooperative banks. These institutions differ significantly in size, governance structure, regional scope, and income composition, offering a unique opportunity to assess the heterogeneity of monetary policy transmission.

All monetary policy and macroeconomic indicators were harmonized to an annual frequency. The Euro Overnight Index Average (EONIA) shows the short-term interest rate by adding up the rates over a year. The new EONIA methodology, which is based on the euro short-term rate (€STR), is used for periods after October 2019. The yield curve slope is calculated as the spread between 10-year and 2-year German sovereign bond yields, capturing both conventional and unconventional policy effects.

Macroeconomic control variables include expected real GDP growth and expected inflation, both sourced from OECD economic outlook projections. The Chicago Board Options Exchange Volatility Index (VIX) captures financial market volatility, averaged annually. Bank-specific characteristics include the equity ratio, defined as total equity over total assets, and the lagged return on assets (ROA), which accounts for profitability persistence. The main dependent variable is ROA, which is the ratio of net income to average total assets. Net interest income (NII), non-interest income (NNI), and provisions are also included as underlying components of profitability and serve as supplementary variables for robustness checks.

5.2 Descriptive Statistics

Appendix A provides an overview of the data sources. Table 1 displays the descriptive statistics for the variables used in the estimation. The given percentiles describe the distribution of the variables. N is 43,122 for all the variables mentioned above, except for Provisions, whose N is equal to 43,095. The values for NII, NNI and Provisions are indicated in thousand euro.

Table 1. Descriptive statistics

Variable	(1) Mean	(2) sd	(3) p25	(4) p50	(5) p75
Short term rate	0.02	0.02	0	0.02	0.03
Slope	0.01	0.01	0.01	0.01	0.02
VIX	20.51	6.05	15.48	19.66	24.37
Exp. real GDP growth	0.01	0.02	0	0.01	0.03
Exp. inflation	0.91	0.09	0.82	0.91	0.99
Equity ratio	0.07	0.06	0.05	0.06	0.08
NII	47 330	266 917	3 960	10 545	28 475
NNI	137 577	1 080 000	4 614	13 007	36 202
Provisions	31 319	205 115	1 179	4 134	12 986
ROA	0.07	0.13	0.03	0.06	0.09

Source: Research Data and Service Centre of Deutsche Bundesbank, BISTA and GuV, 1999-2021, own calculations as well as ECB, OECD, Deutsche Bundesbank and CBOE (Cf. Appendix A)

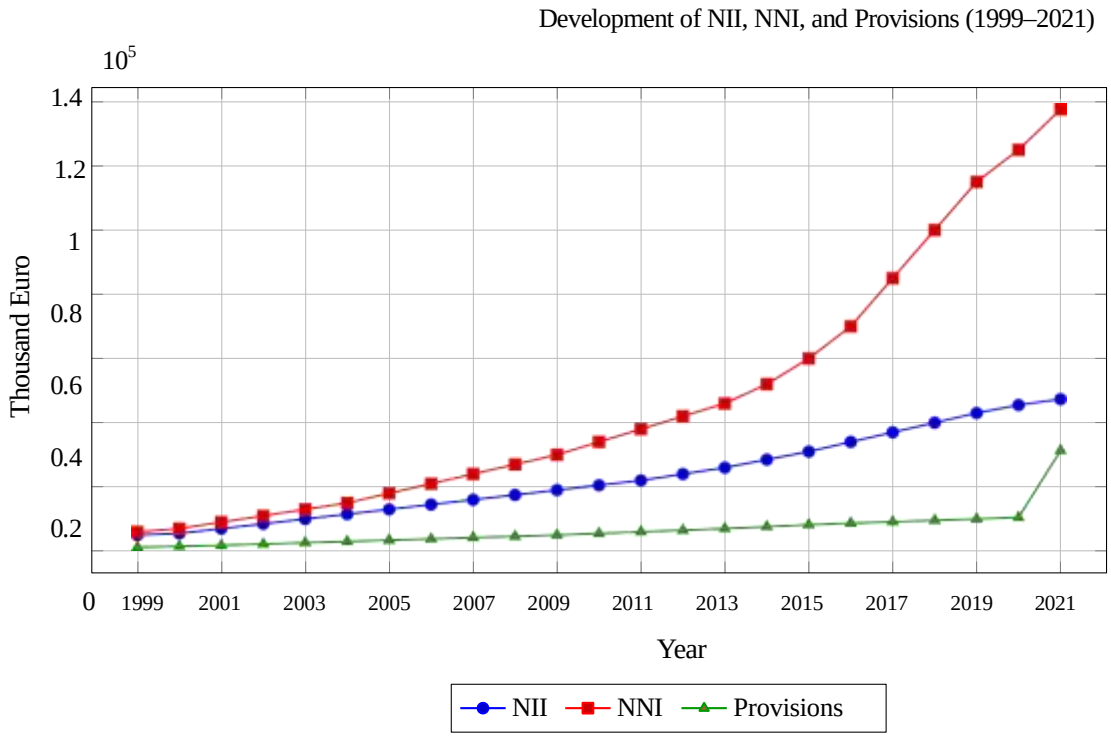

Figure 1. Development of NII, NNI and Provisions for German Banks (1999–2021)

Source: Research Data and Service Centre of Deutsche Bundesbank, BISTA and GuV, 1999-2021, own calculations.

5.3 Regression Model and Results

To take bank fixed effects and time effects into account, fixed effects regressions with time dummies for each year and cluster-robust standard errors were conducted. To estimate the effect of monetary policy on bank profitability, the following fixed-effects panel regression model is used:

$$\text{ROA}_{i,t} = \alpha_i + \beta_1 \cdot \text{ShortRate}_t + \beta_2 \cdot \text{Slope} + \gamma' \mathbf{X}_{i,t} + \varepsilon_{i,t} \quad (2)$$

where:

- $\text{ROA}_{i,t}$ is the return on assets of bank *i* in year *t*.
- α_i captures bank fixed effects.
- ShortRate_t is the short-term interest rate (EONIA or €STR).
- Slope_t is the yield curve slope (10-year minus 2-year German bond yields).
- $\mathbf{X}_{i,t}$ is a vector of control variables (lagged ROA, equity ratio, macroe- conomic indicators).
- $\varepsilon_{i,t}$ is the idiosyncratic error term.

By adding more explanatory variables (Note 1), the author aims to identify how the effects of the short-term rate and the slope on ROA are affected.

While this study establishes robust associations between monetary policy variables and bank profitability, it does not claim full causal identification. One potential concern is endogeneity, specifically the possibility that unobserved macroeconomic factors jointly influence monetary policy decisions and bank profitability. To partially address this issue, the empirical strategy includes bank fixed effects and time dummies to control for unobserved heterogeneity and common shocks. Additionally, the inclusion of lagged explanatory variables (e.g., ROA and macro controls) helps mitigate concerns of simultaneity. Robustness checks using alternative cut-off dates for the interest rate regime and additional macro-financial controls support the stability of the results. Nevertheless, future extensions could

further strengthen identification by using external instruments for short-term rates, such as monetary policy surprises, ECB forward guidance announcements, or shadow rates.

Table 2. Regression results: ROA on monetary policy variables, 1999–2021

Variable	(1)	(2)	(3)	(4)	(5)	(6)
	ROA	ROA	ROA	ROA	ROA	ROA
	99-21	99-21	99-15	99-15	16-21	16-21
ROA_Lag1	0.40***	0.38***	0.34***	0.31***	0.11	0.11
	(0.08)	(0.08)	(0.07)	(0.07)	(0.13)	(0.13)
Short term rate	461.50***	387.15***	0.62	-0.06	631.94***	637.90***
	(127.81)	(132.04)	(1.83)	(1.75)	(109.61)	(175.86)
Slope	7.06**	5.42	11.36	12.53*	12.02***	12.16***
	(3.22)	(3.30)	(7.07)	(6.84)	(2.36)	(4.06)
VIX	-0.05***	-0.04***	0.01***	0.01***	-0.07***	-0.07***
	(0.01)	(0.01)	(0)	(0)	(0.01)	(0.02)
Expected real GDP growth	-17.47***	-14.70***	0.34	0.62	-24.04***	-24.27***
	(5.03)	(5.18)	(0.68)	(0.65)	(4.28)	(6.71)
Expected inflation	13.95***	11.71***	3.13**	3.61**	19.14***	19.32***
	(3.98)	(4.10)	(1.50)	(1.44)	(3.39)	(5.39)
Equity ratio		-0.56***		-0.82***		0.04
		(0.20)		(0.17)		(0.90)
Observations	40 136	40 136	31 439	31 439	8 697	8 697
R-squared	0.18	0.20	0.16	0.21	0.02	0.02
Number of banks	2 719	2 719	2 705	2 705	1 601	1 601

Robust standard errors (clustered at bank level) in parentheses: *** p<0.01, ** p<0.05, * p<0.1.

Source: Research Data and Service Centre of Deutsche Bundesbank, BISTA and GuV, own calculations as well as ECB, OECD, Deutsche Bundesbank and CBOE (Cf. Appendix A).

5.4 Interpretation of Results

The regression results reveal important insights into the relationship between monetary policy and bank profitability in Germany, with clear evidence of asymmetric effects across interest rate regimes. Specifically, the findings underscore that the transmission of interest rates to bank-level return on assets (ROA) is not constant over time but instead regime-dependent.

For the full sample period (1999–2021), both the short-term interest rate and the slope of the yield curve are positively and significantly associated with ROA. This result aligns with theoretical expectations rooted in the maturity transformation model of banking, whereby banks profit from borrowing short and lending long. In traditional banking systems like Germany's, where interest income makes up a large part of revenue, higher short-term rates and steeper yield curves tend to improve net interest margins (NIM).

However, when splitting the sample around the 2016 threshold, marking the ECB's reduction of the Main Refinancing Operations (MRO) rate to zero, a more nuanced picture emerges. In the pre-2016 period, the coefficients for both the short-term rate and slope lose significance when controlling for macroeconomic variables. This suggests that during more "conventional" monetary policy periods, bank profitability was more influenced by macroeconomic growth expectations, inflation, and capital structure, rather than by interest rate levels alone.

In contrast, during the post-2016 period, characterized by ultra-low interest rates and the ECB operating near the

effective lower bound, the results change substantially. Both the short-term rate and the slope of the yield curve exhibit strong and statistically significant positive effects on ROA. The coefficient for the short-term rate is large in magnitude: a one percentage point increase in the short-term interest rate is associated with an estimated increase in ROA of approximately 0.63 percentage points, a non-trivial effect given the sample mean ROA of 0.07. This finding supports the reversal rate hypothesis (Brunnermeier, 2018), which posits that beyond a certain threshold, further monetary easing can become contractionary by impairing banks' profitability and intermediation capacity.

The consistent positive and significant coefficient on the yield curve slope in the post-2016 subsample further reinforces the view that term structure manipulation (e.g., via forward guidance or asset purchases) plays a critical role in bank performance under low-rate regimes. Banking systems like Germany's, which structurally embed reliance on interest income and maturity transformation, find these effects particularly significant.

Other control variables behave as expected: the VIX is negatively associated with profitability, reflecting the dampening effect of financial market volatility on lending activity and risk pricing. Expected inflation shows a positive effect, consistent with higher nominal growth and debt servicing capacity. Meanwhile, the negative coefficient on the equity ratio, particularly in the full sample, may reflect a trade-off between capital strength and risk-taking: more conservative, well-capitalized banks may earn lower short-term returns due to reduced leverage or risk exposure.

It is worth noting that the R^2 values in the regressions are relatively moderate (ranging from 0.02 to 0.21), which is common in banking studies involving large, heterogeneous samples. The relatively low explanatory power likely reflects unobserved bank-level behaviors, such as internal asset-liability management strategies, risk appetite, or regional market conditions, which are not captured by the controls. This highlights the complexity of modeling profitability across diverse banks and business models and recommends that future research could benefit from more granular data on risk-taking and asset structure.

6. Policy Implications

The findings of this paper carry important implications for the design and steering of monetary policy, particularly in low interest rate environments:

- The positive relationship between short-term interest rates and bank profitability in the post-2016 period brings up the concept of a **"reversal rate" effect**, where further monetary easing may miss the mark and carve away banks' net interest margins. This underscores the need for the European Central Bank (ECB) to carefully weigh the costs of prolonged ultra-low rates against their marginal stimulative benefits, especially in bank-based financial systems.
- Germany's banking sector, dominated by small, regionally focused institutions heavily reliant on interest income, demonstrates particular vulnerability to low-for-long interest rate regimes. Policymakers in other euro area countries with similar banking structures (e.g., Austria, Italy) should recognize that harmonised monetary policy may produce uneven effects across jurisdictions due to structural differences in banking systems.
- The significant role of the yield curve slope in supporting bank profitability suggests that policymakers may benefit from **combining** short-term rate decisions with policies that influence the term structure of interest rates (e.g., forward guidance or asset purchase programs targeting longer maturities).
- Reduced profitability can constrain banks' ability to build capital buffers, support credit provision, and absorb shocks. Therefore, monetary policy decisions should be made with consideration of their **second-round effects** on financial stability, particularly in regimes approaching the effective lower bound.

In sum, the results emphasize the necessity of differentiated monetary policy assessments that account for banking system structure and regime-specific transmission effects. A one-size-fits-all approach may lead to unintended consequences in heterogeneous financial landscapes.

7. Conclusion

This paper investigates the relationship between monetary policy and bank profitability in Germany from 1999 to 2021, using a disaggregated bank-level dataset from the Deutsche Bundesbank. By exploiting variation across conventional and low interest rate regimes, the analysis demonstrates that the effects of monetary policy on bank profitability are not constant but vary significantly depending on the interest rate environment. The findings demonstrate that both the short-term interest rate and the yield curve's slope positively affect bank profitability, especially during the ultra-low interest rate phase commencing in 2016. This regime-dependent effect suggests that

in environments where interest rates approach or reach the effective lower bound, small adjustments to policy rates or the yield curve can have disproportionately large impacts on banks' net interest margins and overall earnings. These findings are especially relevant in the German context, where the banking sector is characterized by a large number of small, regionally focused, and interest income–dependent institutions.

The paper also confirms that financial market volatility, inflation expectations, and bank-specific characteristics, such as capitalization, play non-negligible roles in shaping profitability. Notably, reduced profitability consistently correlates with higher market uncertainty (proxied by the VIX), while moderate inflation appears to support earnings. From a policy perspective, these findings underscore the need for central banks to consider the structural composition of national banking sectors when designing and implementing monetary policy. The effectiveness and potential unintended consequences of interest rate changes depend not only on macroeconomic conditions but also on the institutional characteristics of the banking system. Policymakers should be particularly mindful of the non-linear effects that arise in low-rate environments, where profitability constraints may eventually reduce lending, increase risk-taking, or weaken financial stability.

Several limitations should be acknowledged. The use of annual data may obscure short-term dynamics and more granular policy effects, such as the immediate responses of banks to monetary policy changes that could vary significantly within a year. Moreover, while the focus on Germany enhances internal validity, it may limit the ability to generalise the results to more concentrated or differently structured banking systems. Future research could extend the analysis by incorporating quarterly data, differentiating among bank types (e.g., large vs. small, cooperative vs. commercial), or conducting comparative cross-country studies to explore how institutional features mediate the transmission of monetary policy to bank profitability. In light of the ongoing normalization of the ECB's monetary policy, continued research in this field remains essential to guide both supervisory strategies and monetary policy design.

Competing interests

The author declares that she has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal and publisher adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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Note

Note 1. Regression 2: VIX, Regression 3: Expected real GDP growth and Expected inflation, Regression 4: Equity ratio.

Appendix A. Data

Balance sheet data: Research Data and Service Centre of Deutsche Bundesbank, BISTA, 1999-2021, DOI=10.12757/BBk.BISTA.99Q1-

21Q4.01.01, research project 2020/0110 (GaFo), use of data between January 2021 and May 2024, own calculations.

Calculation ROA:

ROA = Net income/Average total assets gvK120 Average total assets

Net income = gvK080 + gvK090 gvK080: Operating result

gvK090: Other and extraordinary result

Calculation NNI:

NNI = gvE000 - gvK010

gvE000: Total income gvK010: Net interest income

EONIA: European Central Bank via https://sdw.ecb.europa.eu/quickview.do;jsessionid=F1C1B6BFA435DF1DC66338A12E7A2026?SERIES_KEY=198.EON.D.EONIA_TO.RATE&start=01-01-1999&end=31-1

2-2020&submitOptions.x=0&submitOptions.y=0&trans=AF. Expected

GuV data: Research Data and Service Centre of Deutsche Bundes- bank, GuV, 1999-2020, DOI=10.12757/Bbk.GuV.9920.01.01, research

project 2020/0110 (GaFo), use of data between January 2021 and Oc- tober 2022, own calculations.

Inflation: Statistisches Bundesamt via https://www-genesis.destatis.de/genesis/online?operation=previous&levelindex=0&step=0&titel=Tabellenaufbau&levelid=1652607724748&acceptscookies=false#abreadc rumb.

MRO: European Central Bank via https://www.ecb.europa.eu/stats/policy

_and_exchange_rates/key_ecb_interest_rates/html/index.en.html.

Real GDP growth: Statistisches Bundesamt via https://www.destatis.de/DE/Themen/Wirtschaft/Volkswirtschaftliche-Gesamtrechnungen-Inlandsprodukt/Tabellen/bruttoinland-vierteljahresdaten-xls-ab-1970.ht ml.

Slope (Yields of German sovereign bonds with residual maturities of 10 and 2 years): Deutsche Bundesbank via https://www.bundesbank.de/dy namic/action/de/statistiken/zeitreihen-datenbanken/zeitreihen-datenbank/759778/759778?listId=www_skms_it03b.

VIX: CBOE via https://www.cboe.com/tradable_products/vix/vix_histo rical_data/.

As required by the Research Data and Service Centre of Deutsche Bundesbank, the following table describes from which output table of the research project, the in the paper mentioned results were taken:

Table 1: STATA_Step1_Descriptive analysis_clean

Table 2: STATA_Step2_1999-2021_clean

Table 3: STATA_Step2_1999-2015_clean

Table 4: STATA_Step2_2016-2021_clean

Table 5: STATA_Step3_1999-2021_clean

Table 6: STATA_Step3_1999-2015_clean

Table 7: STATA_Step3_2016-2021_clean