

EXECUTIVE SUMMARY¹

German bank profitability is low by international standards. Although German banks rank more favorably in risk-adjusted terms, as low profitability is partially compensated by lower volatility of returns, their profitability ratios remain low. On other measures (such as returns on assets, equity, and risk-weighted assets), German banks, on aggregate, rank among the least profitable in Europe. Several factors affect bank profitability, including a complex tiered industry structure with barriers to entry and an explicit mandate of a large part of the banking system – cooperative and savings banks – to maximize welfare of stakeholders rather than profits.

Low bank profitability could undermine bank resilience, as banks are more likely to use capital than earnings to absorb losses in case of a shock. Although fierce bank competition has served bank clients well by providing competitively-priced products, low profitability may constrain banks' ability to fund growth through retained earnings, raise capital and debt more cheaply in the market, and implement recovery plans as low profitability may limit options for responding to stress scenarios. Over time, chronically low profitability could also raise questions about the sustainability of banks' business models and ability to finance the economy.

Economic growth and monetary policy stance play a vital role in bank profitability. Both cyclical and structural factors impact bank profitability. Economic growth and interest rates have been vital, as low-interest rates and flat yield curves put downward pressure on loan and deposit interest rates, squeezing profit margins. Retail banks are more susceptible to interest rate changes, as their business models are built on the traditional maturity transformation through deposit-taking and lending. Banks' ability to diversify revenues through fees and commissions is hampered by customer risk-aversion and lack of experience with fee pricing. Structural factors, such as high competition and high costs, have been eroding profits.

There is significant heterogeneity among banks, as loan volume growth boosted profits of savings and cooperative banks. Commercial banks, particularly large private banks, have reported low returns since the Global Financial Crisis (GFC). Having suffered substantial losses due to risky investments, large private banks have undergone extended periods of costly restructuring, which resulted in substantial headcount and branch network reduction, de-risking of business models, and greater digitalization. Meanwhile, savings and cooperative banks – which largely fund their operations through customer deposits, rather than the interbank market – continued to report relatively stable profitability with continuous access to funding from retail deposits. This allowed them to increase market share and loan volume growth, which partially helped offset declining interest rates.

Over the past few years, German banks have taken several steps to cut costs and increase revenues, but the gains have been insufficient to avert profit erosion. Banks have reduced substantially their branch networks and employee headcount. Significant consolidation has already occurred, mostly within savings and cooperative banks. Digitalization and fintech innovations are

¹ This technical note was prepared by Alla Myrvoda and Dan Cheng.

ongoing, albeit at a slow pace. A greater pass-through of negative interest rates to clients has helped slow the net interest income decline. Greater fee and commission income generation has been challenging but continues to remain an important objective of German banks.

Risks and vulnerabilities in the German banking sector continue to build up, calling for greater monitoring of risks. Geopolitical developments, such as the war in Ukraine, pose risks to German banks, particularly through the second-round effects via the overall economy, default rates, and inflation. A potential COVID-19 outbreak and the resulting lockdowns could lead to deteriorating economic conditions, insolvencies, and losses, and slashing bank profits. In a rising interest rate environment, low profitability would likely persist over the short-term due to a faster transmission of interest rates into liabilities than assets. Slow IT innovation and digitalization, and greater competition from fintech could put traditional banks at a disadvantage. A real estate price correction could have significant impact on profitability due to large bank exposures to residential and commercial real estate. Thus, efforts to collect granular data on bank exposures to various risks should continue. Potential effects of risk materialization on banks, particularly of real estate price decline and interest rate adjustment, should continue to be regularly examined, including through stress tests.

The build-up of risks warrants greater efforts to implement a combination of cost-reducing and income-generative measures to develop sustainable business models (Table 1). Cost-reduction measures have a limit, and on their own may not be able to offset declining revenues, thus, calling for a comprehensive approach of cost-reducing and income-generating measures. Measures to scale up profitability through headcount and branch network optimization, combined with digitalization, would help reduce cost inefficiencies. Income generation through greater revenue diversification and greater reliance on fees would also help support profitability. Continued market-led consolidation, resulting in fewer but more profitable institutions, is crucial for attaining economies of scale.

Table 1. Germany: Key Recommendations

Recommendations	Timing	Authorities
Continue to collect and ensure sufficient granularity of data to assess bank exposures to risks in RRE and CRE. Potential effects of risk materialization on banks, particularly of RRE/CRE price correction and interest rate adjustment, should continue to be assessed in depth regularly, including via stress tests.	ST	Bundesbank, BaFin, ECB
Examine the scope for cost and inefficiencies reduction, including through further consolidation in the banking system by way of mergers and optimization of the extensive branch network.	MT	Banks
Analyze the benefits of revenue diversification and implement measures to boost non-interest revenues.	MT	Banks
Step up digitalization and automation efforts to face competition from fintech.	MT	Banks
Note: ST=short-term, MT=medium-term, RRE=residential real estate, CRE=commercial real estate.		

INTRODUCTION

1. Low bank profitability undermines bank resilience, as it hinders the build-up of capital and makes banks more likely to resort to using capital rather than earnings to absorb losses in case of a shock. Amid low interest rates, the profitability of German banks remains low, despite efforts to cut costs and diversify revenues. Although high bank competition has served clients well by providing competitively-priced loans, low profitability may constrain banks' ability to: fund growth through retained earnings, raise capital and debt more cheaply in the market, and implement recovery plans. Over time, chronically low profitability could raise questions about banks' ability to finance the economy and about the sustainability of their business models.

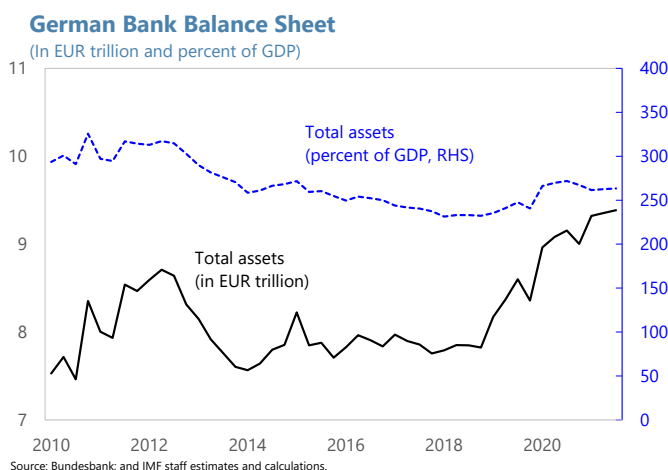
2. This technical note analyzes German banks' performance in the context of the German FSAP. It investigates factors driving low profitability and steps needed to improve it. The note provides an overview of the German banking system, discusses the evolution of bank profitability over time in the European context and considers the heterogeneous performance of German banks by group. Risk-adjusted profitability is also considered against a sample of European banks. Drivers of bank profitability are determined based on empirical models using two samples: Single Supervisory Mechanism (SSM)-supervised European banks, and German Monetary and Financial Institutions (MFIs). Lastly, the technical note considers some of the risks that German banks may face going forward and discusses different measures that could help mitigate them.

BANKING SYSTEM STRUCTURE

3. German MFIs' balance sheet size declined relative to GDP over the last ten years. German banks' assets increased from about EUR 7.5 to EUR 9.4 trillion in 2010-21Q3. Relative to GDP, however, these declined from 291 to 263 percent of GDP during this period (text chart).

4. The banking sector comprises over 1,400 institutions, generating intense competition. At end-2020, the banking system included about 1,408 credit institutions, structured along the three pillars: commercial banks, public sector banks, and cooperative banks (Table 2). Institutions under these three pillars differ considerably in their business models, branch network, market share, ownership, and objectives. Specifically, the three pillars include:

- **The privately-owned commercial banks constitute the largest share of the banking system assets, holding about 43 percent of assets at end-2020.** The 164 commercial banks include a)



three large banks: Deutsche Bank², Commerzbank, and UniCredit, which held about 70 percent of commercial bank assets³; b) 139 medium and small regional and other commercial banks and c) 22 branches of foreign banks. The large banking groups operate as universal banks with retail, corporate, and investment bank operations. Medium- and small-size commercial banks tend to focus more on retail and corporate clients.

- **The public sector banks include savings banks (“Sparkassen”) and their head institutions (“Landesbanken”)⁴, which jointly held about ¼ of total assets at end-2020.** ⁵ There were 377 savings banks and 6 Landesbanken at end-2020. Savings banks have a dense branch network and provide universal bank services to clients of all incomes, focusing on households and small- and medium-sized enterprises (SMEs). *Landesbanken* typically operate as the “central banks” for the savings institutions, helping them manage liquidity- and maturity-mismatch risks, offer back-office operations, settlement, and asset management services, among others.
- **The third pillar includes many small credit cooperatives.** At end-2020, there were 814 credit cooperatives, which jointly held about 11 percent of bank assets. They are owned by their members, who are also depositors and borrowers.

5. The savings and cooperative banks operate on a regional principle, which reduces competition within each pillar. Savings banks operate within certain geographical areas, which are defined by the governing public law, and thus compete with commercial and cooperative banks but not with other Sparkassen.⁶ Cooperative banks usually operate on a regional principle voluntarily, given that their members tend to reside in the same region; they tend to compete with commercial and savings banks, but not with other cooperative banks. This partial segmentation of the market helps reduce competition within the two pillars, as savings and cooperative banks typically refrain from competition with institutions of the same pillar.

6. Savings and cooperative banks’ mandate is to maximize welfare – rather than profits – of their stakeholders and members. The public institutions are governed by public law with a mandate to foster the economic development of their regions, which includes subsidy provision to local public goods, such as recreational facilities and art festivals. Cooperative institutions are also less focused on profit maximization than commercial banks, as they tend to focus on supporting their members. Retained earnings serve as the main source for funding new business for savings and cooperative banks. This is because capital injections into savings institutions by local governments

² Deutsche Bank is a Global Systemically Important Bank (GSIB).

³ Deutsche Bank and Commerzbank are German institutions, while UniCredit bank is a public company headquartered in Italy.

⁴ There are also regional and national public development banks.

⁵ Mortgage banks and building and loan societies operate in all three sectors.

⁶ *Landesbanken*, however, have been increasingly involved in recent years in investment banking and international business activities, thus directly competing with commercial banks.

would burden the local government budgets, while cooperative banks generally cannot raise funding on the equity market (Brunner et al., 2004).⁷

Table 2. Germany: Banking Sector Composition 1/

Category of banks /1	Reporting institutions		Total assets			Number of branches
	Number	Percent of total	EUR bn	Percent of total	Percent of GDP 2/	
All categories of banks	1,408	100	9,207	100	273	24,060
Commercial banks	164	12	3,966	43	118	6,453
Big banks	3	0	2,749	30	82	5,146
Regional banks and other commercial banks	139	10	1,094	12	32	1,142
Branches of foreign banks	22	2	123	1	4	165
Landesbanken	6	0	898	10	27	210
Savings banks	377	27	1,407	15	42	8,318
Credit cooperatives	814	58	1,030	11	31	7,765
Mortgage banks	10	1	242	3	7	37
Building and loan associations	18	1	242	3	7	1,259
Banks with special task	19	1	1,421	15	42	18

Source: Bundesbank; and IMF staff estimates and calculations.
1/ As of 2020.
2/ In percent of 2020 GDP. Source: German Statistics Office.

BANK PROFITABILITY

A. Bank Profitability in the European Context

7. Profitability of German banks is relatively low by international comparison. In 2020, German banks' reported returns on total assets (ROA) and on risk-weighted assets (RORWA) of 0.13 and 0.34 percent, respectively (Figure 1).⁸ This was lower than the EU average of 0.15 and 0.43 percent, respectively. At 1.95 percent, the reported return on equity (ROE) was also below the 2.3 percent average for the European Union.⁹ It also fell short of the bank cost of capital, estimated by a sample of large European banks to be in the range of 8-12 percent.¹⁰

⁷ Cooperative banks also rely on equity contributions from new members.

⁸ Low profitability is also reflected in the low price-to-book ratio of German banks. For details, see [IMF's 2021 Staff Report](#).

⁹ Based on the consolidated bank data for domestic banking groups and standalone banks provided by the European Central Bank.

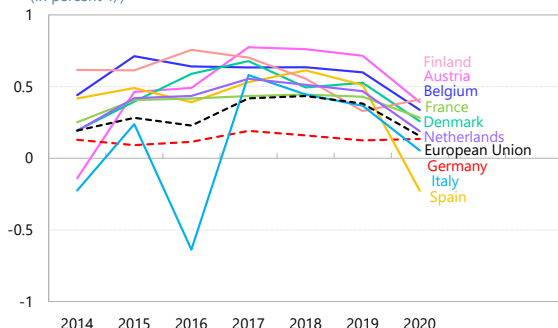
¹⁰ As reported by the [EBA Risk Assessment Questionnaire](#) (Autumn 2021), more than 70 percent of banks estimate their cost of equity within the range of 8 to 12 percent.

Figure 1. Bank Profitability in the European Context

Returns of German banks have remained low relative to total and risk-weighted assets, ...

Return on Assets

(In percent 1/)



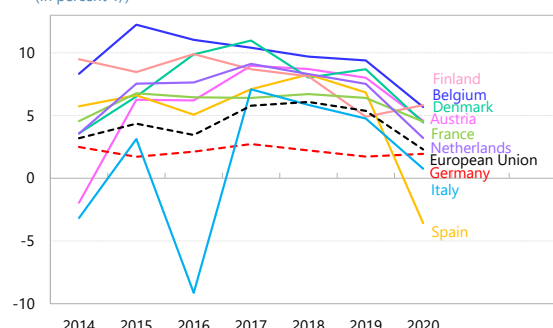
Source: ECB; and IMF staff estimates and calculations.

1/ Based on consolidated bank data for domestic banking groups and standalone banks.

... and relative to equity.

Return on Equity

(In percent 1/)



Source: ECB; and IMF staff estimates and calculations.

1/ Based on consolidated bank data for domestic banking groups and standalone banks.

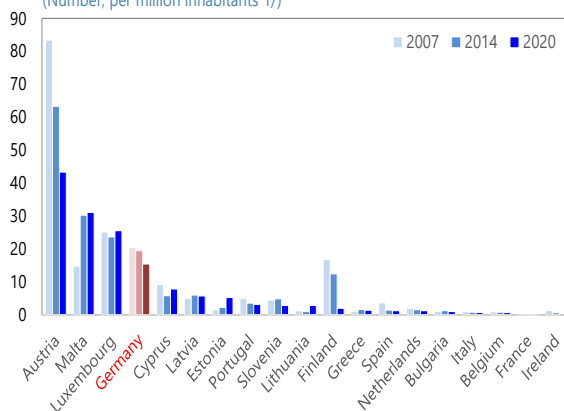
8. In part, this reflects the high competition in the German banking sector. With over 1,400 banks, competition in the German banking sector is fierce. The traditional German bank business models rely on a fairly extensive branch network with a significant employee base (Figure 2). Although, both the number of bank branches and bank employees per capita have declined substantially over the past several decades. During 2010-20 alone, branch penetration declined from 0.48 to 0.29 branches per thousand of inhabitants, while the number of bank employees per capita declined from about 8.3 to 6.9 employees per thousand of inhabitants. Nevertheless, the number of credit institutions and employees remains high relative to some peers.

Figure 2. Banking Sector Penetration

But banks continue to operate in a highly competitive environment, ...

Number of Credit Institutions

(Number, per million inhabitants 1/)



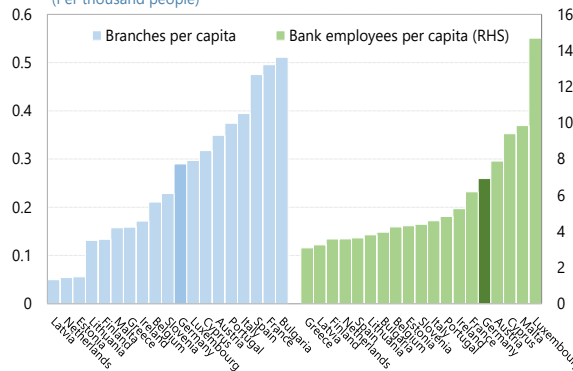
Source: ECB; and IMF staff estimates and calculations.

1/ Based on consolidated bank data for domestic banking groups and standalone banks.

... with a fairly extensive branch network and staff.

Bank Branches and Employees per Capita

(Per thousand people)

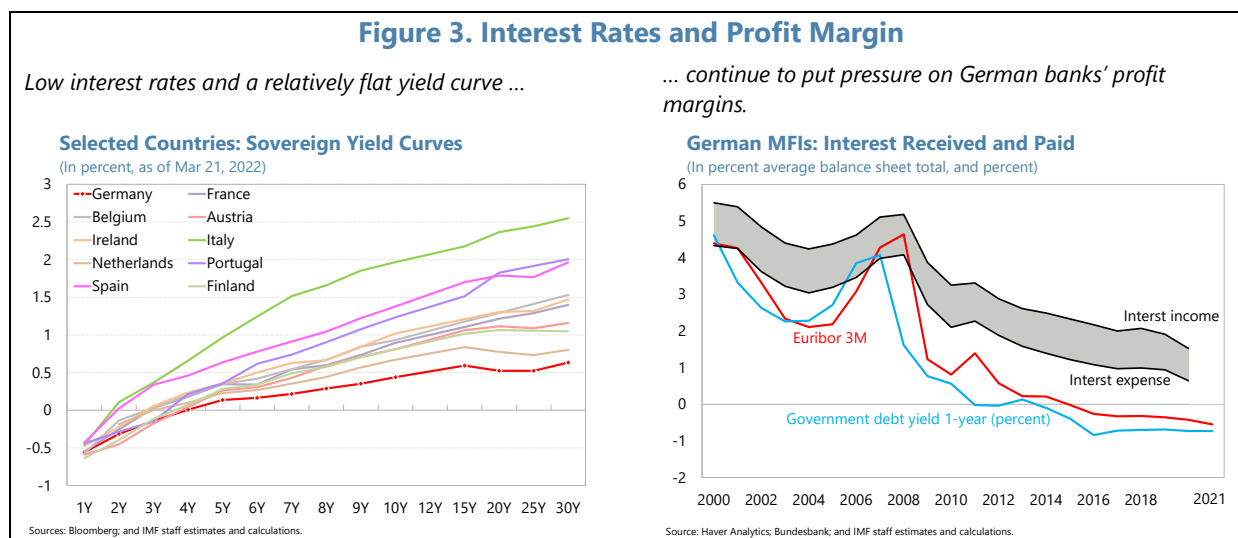


Source: ECB; IMF WEO; and staff estimates and calculations.

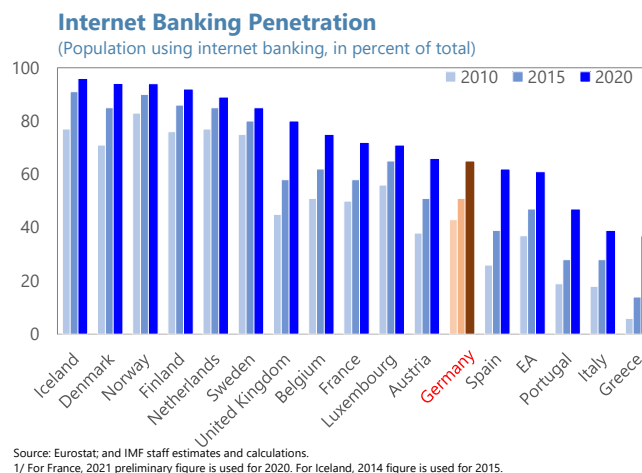
9. Fundamental structural factors also partly explain low profitability. This includes a complex tiered structure of the banking system, which increases fragmentation and inhibits

attainment of economies of scale. Additionally, a large part of the financial system – credit cooperatives and savings banks – maximize welfare of all stakeholders rather than profits.

10. Low interest rates and flat yield curves, boosted by strong bank competition, have squeezed bank profit margins, putting significant pressure on banks' interest income (Figure 3). A prolonged period of low and declining interest rates has led to net interest income (NII) reduction, which is the main source of profits for the retail banks, given the heavy reliance on loans, particularly mortgages. On aggregate, German banks' NII relative to total income has remained broadly on par with the EU average. But NII per unit of assets is lower than the European average (Figure 4).



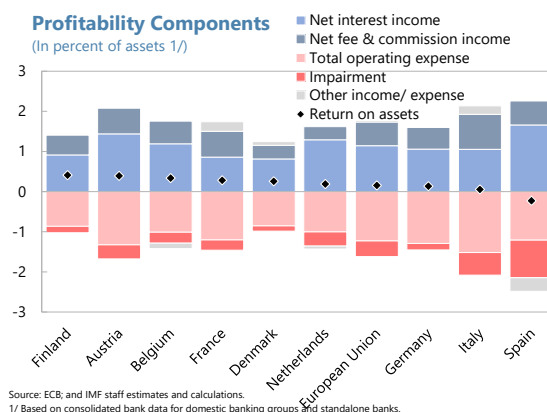
11. German banks' ability to generate fee and commission income has been hampered by customer risk aversion and limited experience with fee pricing, exacerbated by strong bank competition. On average, German retail banking customers are risk-averse, prefer in-person interaction with bank staff, and opt for saving over investment products. This has led to limited customer experience with fee-based products and subdued ability to generate net fee and commission income (NFCI).¹¹ In part, this is reflected in the low, albeit increasing, internet banking penetration and limited credit card use relative to other countries (text chart). Additionally, high bank competition has led to banking products being



¹¹ More recently, lower NFCI generation may have also resulted from the Federal German Court of Justice ruling in May 2021 against German retail banks' approach to raising service fees without customers' explicit consent.

competitively priced and to banks' reluctance to increase fees and commissions amid fears of losing market share. As a result, NFCI-to-assets ratios have largely remained stable (Figure 4). Since the start of the COVID-19 pandemic, however, bank customers have expressed growing preference for asset management products in lieu of the traditional saving accounts, prompted by low (or negative) interest rates on saving products and higher saving rates.

12. Impairment charges from Non-Performing Loans (NPLs) put little pressure on German bank profitability, as NPL ratios remain low by EU standards. Unlike other countries in the EU with low bank profitability, impairment charges do not appear to constitute a significant portion of the German banks' expenses, given the low aggregate NPL ratios in German banks (text chart).

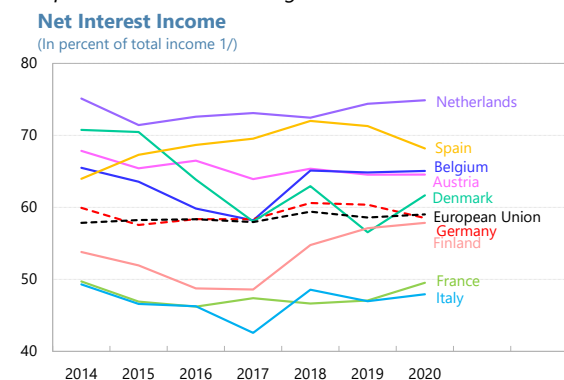


13. Cost efficiency of German banks is broadly comparable to the European average. At 72 percent, the German banks' cost-to-income ratios, which directly relate to profitability, are among the highest in Europe and well above the EU average of 63 percent in 2020. At 1.3 percent, the cost-to-asset ratio, which is a more suitable measure of cost efficiency, however, has been broadly comparable to the European average of 1.2 percent (Figure 4).

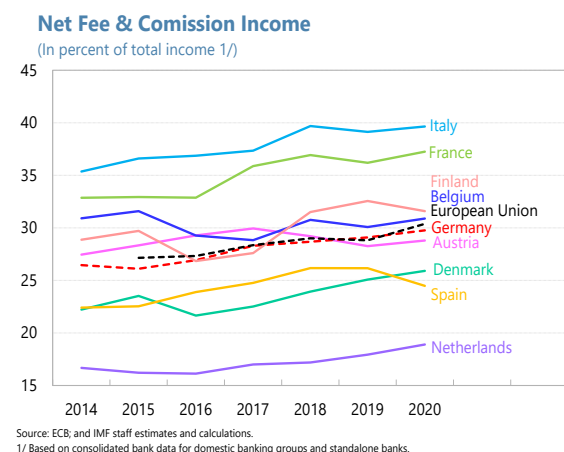
14. This suggests that the underperformance of the German banking system to a large extent reflects low revenues. Aggregate indicators of German bank performance suggest that low profitability, to a large extent, is driven by low revenues: declining NII (prompted by a long period of low-interest rates and flat yield curves) and stagnant NFCI, as measures to increase fees and commissions are hampered by customer preference for more traditional saving products.

Figure 4. Components of Bank Profitability: In the European Context
(Based on consolidated bank data for domestic banking groups and standalone banks)

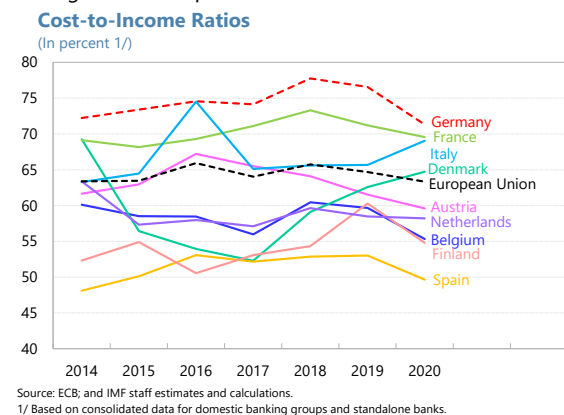
Net interest income share in total income is broadly comparable to the EU average...



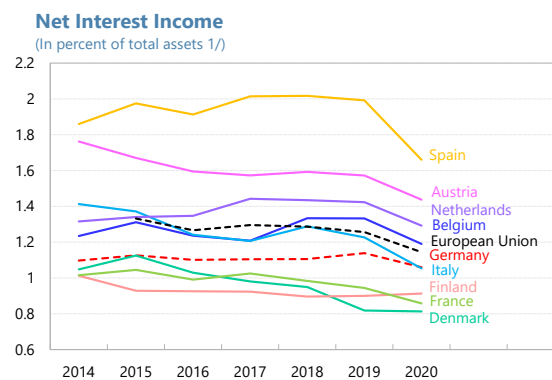
While income diversification is relatively in line with the EU average, ...



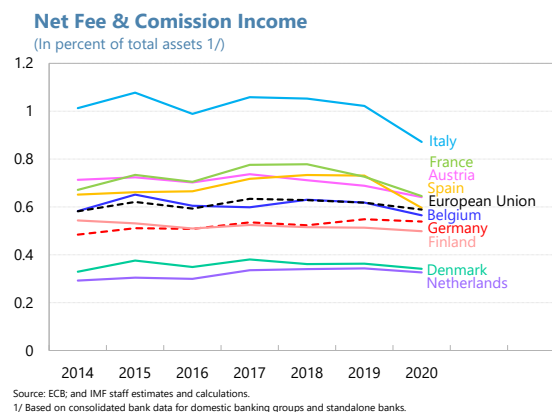
Although German banks' cost-to-income ratios are among the highest in Europe...



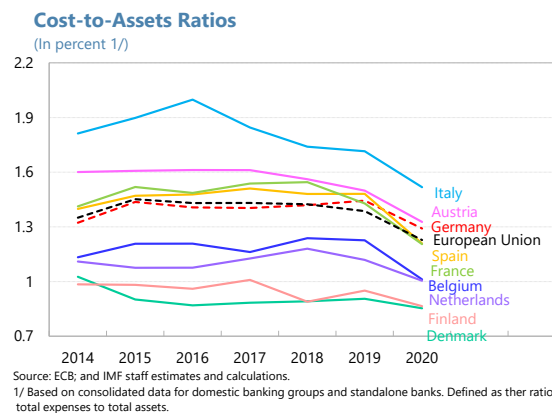
... but lags behind peers, in relative to assets terms.



... banks' ability to generate fee and commission income is constrained amid the traditional bank customer risk aversion, little consumer experience with fee pricing and strong bank competition.



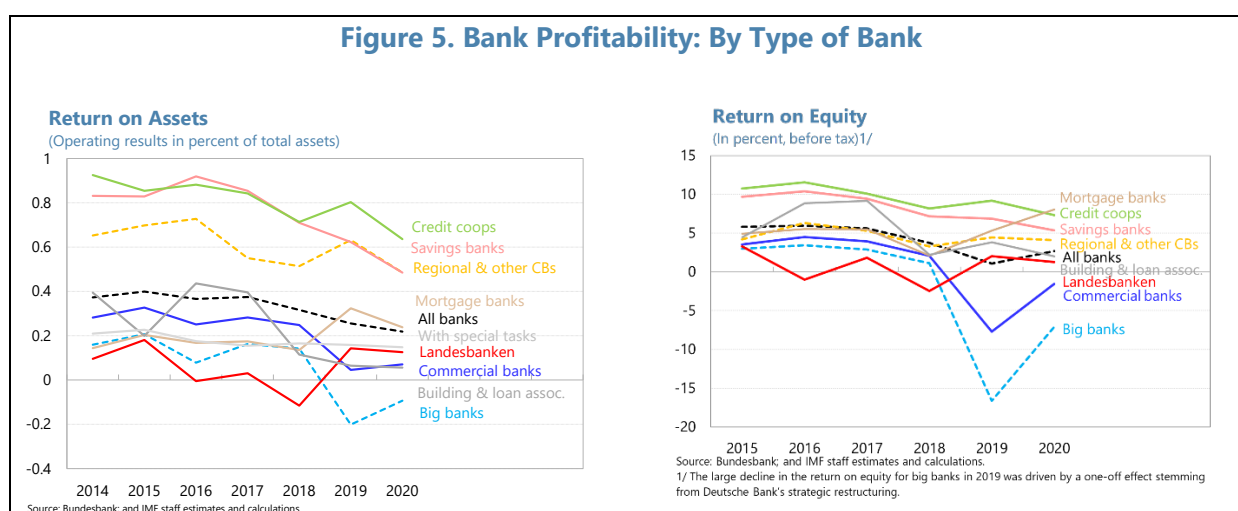
... their cost-to-asset ratios are broadly comparable to some peers



B. Bank Performance by Type of Credit Institution

15. The challenge with aggregate system-wide profitability estimates of German banks is that average figures hide large heterogeneity among various types of institutions. Different institution types rely on different business models, follow different mandates, and serve different segments of customers, thus, performing differently in terms of profitability.

16. Savings and cooperative banks have continued to outperform commercial banks (Figure 5). Private banks have been substantially outperformed by the savings and cooperative banks, although profitability ratios have been declining for all bank groups over time partly due to declining interest rates.



17. Savings and cooperative banks share several commonalities, which distinguish them from commercial banks and help generate economies of scale. These include:

- *Ownership structure and mandates* of the savings and cooperative banks are different from private banks: savings and cooperative banks follow mandates to maximize the welfare of stakeholders and members rather than profit maximization.
- These institutions operate on a *regional principal*, where they do not compete with other institutions of the same pillar, reducing within-pillar competition. Local and rural presence also helps reduce exposure to strong competition. Commercial banks, on the other hand, face more competition as they compete among themselves and with other pillars.
- *Sector-wide economies of scale* help reduce costs. Savings and cooperative banks improve fixed cost management by sharing platforms and services across the pillars. This allows smaller banks to operate at lower costs. Commercial banks, however, have limited ability to manage fixed costs jointly (for instance, IT costs) due to intense competition within and between pillars. Although, commercial banks, which are often larger than savings banks and credit cooperatives, may also experience economies of scales in through diversification of business model and geographic footprint.

- *Cross-guarantee networks* within the groups exist to protect savers if one institution fails, which constitutes a safety net for its members.
- *Pulling of resources* helps limit costs. This includes sector-wide insurers, asset manager, “central bank”-type institution, such as DekaBank and DZ bank.

18. In part, poor performance of commercial banks reflects private banks’ prolonged implementation periods of restructuring plans to resolve GFC-related legacies. During the GFC, private commercial banks and Landesbanken suffered the most losses from their investment portfolios due to relatively risky investments. The largest German banks – Deutsche Bank and Commerzbank – came out of the GFC with large losses and having to pay substantial amounts in fines and settlements. Meanwhile, savings and cooperative banks – which largely fund their operations through customer deposits rather than the interbank market – continued to report relatively stable profitability with continuous access to retail deposit funding.

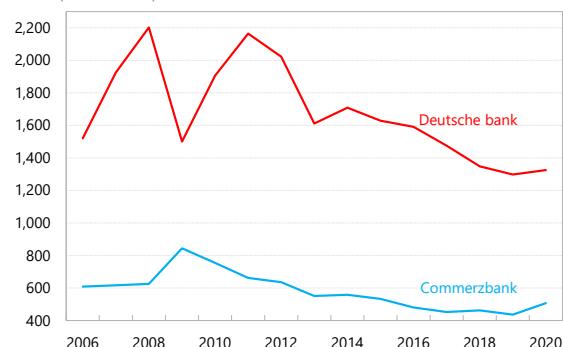
19. The strategic restructuring plans of the Deutsche Bank and Commerzbank focused on headcount and branch reduction, digitalization, and de-risking. To cut costs and improve profitability, the two banks implemented plans for a strategic overhaul of their operations. Measures included significant headcount and branch network reduction, and efforts to automate processes and improve cost efficiency through digitization and digitalization. Global investment banking operations were downsized, some subsidiaries in emerging markets sold, and fixed-income investments and stock-trading businesses were reduced. The banks shifted their focus toward more traditional business lines, such as serving corporate clients and private individuals. Between 2006 and 2020, the balance sheet size of these institutions reduced by 13 and 17 percent for Deutsche Bank and Commerzbank, respectively. As part of efforts to reduce costs, Deutsche Bank’s headcount declined by about 17 percent over the last 10 years. And branch networks shrunk by almost 40 percent, both internationally and domestically for each bank between 2010-20 (Figure 6).

20. In the process of restructuring, Deutsche Bank and Commerzbank’s business models have evolved, now focusing more on domestic operations. Deutsche Bank and Commerzbank’s balance sheet composition has changed substantially since the GFC. International operations have been reduced significantly as they de-risk and pull out of emerging markets. Derivatives and securities portfolios declined substantially, while loans broadly remained stable. As a result, these two banks have simplified their business models, resembling a more traditional bank business model with greater reliance on customer deposits and loans (Figure 7).

Figure 6. Deutsche Bank and Commerzbank: Consolidation Measures

Balance sheet reduced by 13 and 17 percent between 2006-20 for Deutsche Bank & Commerzbank, respectively...

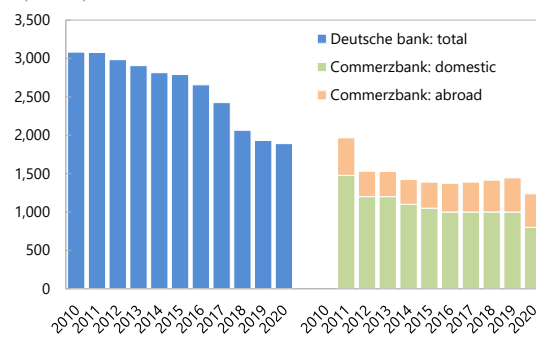
Balance Sheet Size
(In EUR billion)



Source: Statista; and IMF staff estimates and calculations.

... meanwhile headcount declined, and branch networks shrunk by almost 40 percent for each institution between 2010-20.

Branches
(Number)

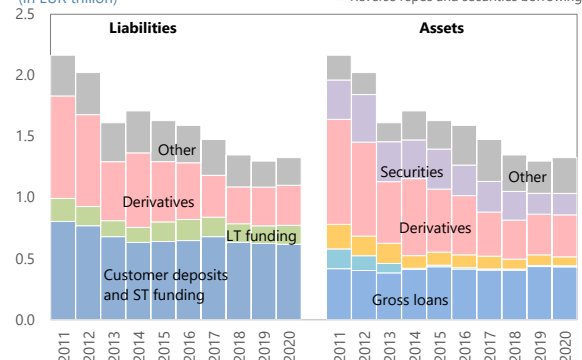


Sources: Statista; and IMF staff estimates and calculations.

Figure 7. Deutsche Bank and Commerzbank: Balance Sheet Composition

Deutsche bank & Commerzbank have transformed their business models into more traditional banking focusing on loans and customer deposits in the domestic market.

Deutsche Bank
(In EUR trillion)

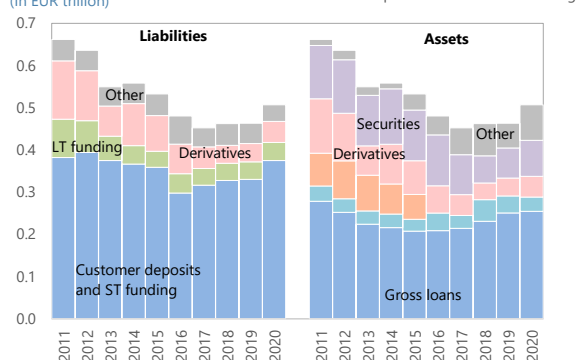


Source: FitchConnect; and IMF staff estimates and calculations.

Note: LT=long-term; ST=short-term.

Cost-reduction measures should be reflected in profitability over the medium-term.

Commerzbank
(In EUR trillion)

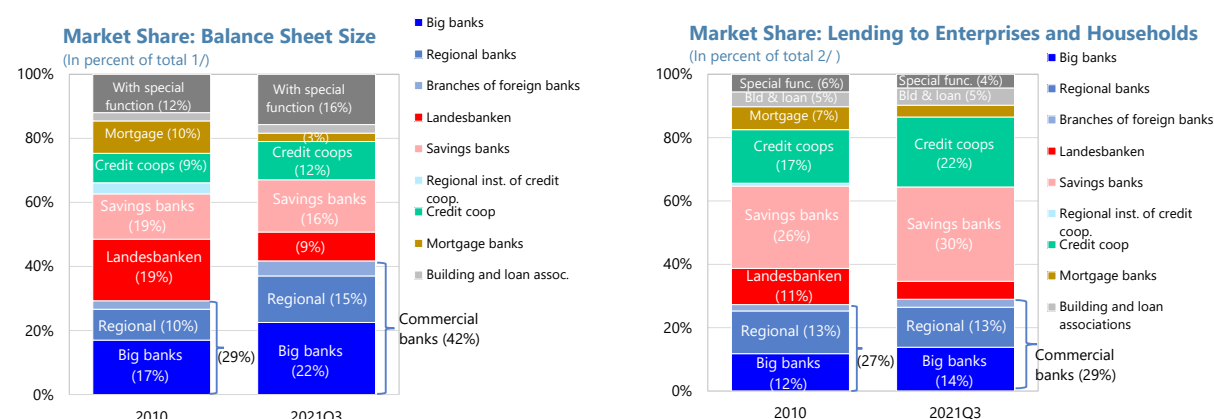


21. While private commercial banks focused on resolving GFC legacies, savings and cooperative banks increased lending, gaining greater market share in lending to the private sector. Following the GFC, savings and cooperatives banks increased lending in support of economic recovery, gaining greater market share in lending to the domestic private sector. Although the distribution of banks in terms of assets has hardly changed, the distribution of loans to the private sector has changed noticeably (Figure 8). Savings and cooperative banks substantially increased their market share in lending to households and enterprises, particularly small- and medium-sized enterprises (SMEs), as their joint market share in private sector loans increased from about 43 to 52 percent during 2010–21Q3.

Figure 8. Market Share

Over the last decade, savings & cooperatives institutions have broadly maintained their market share in total assets, ...

... but increased their market share in lending to households and enterprises (particularly SMEs).



Source: Bundesbank; and IMF estimates and calculations.

Note: LT=long-term; ST=short-term.

1/ In percent of total balance sheet of all banks. Commercial banks include big banks, regional banks, and branches of foreign banks.

2/ Defined as lending to domestic enterprises and resident households.

22. Savings and cooperative banks' risk-weighted assets grew broadly in line with total assets, whereas the risk of commercial banks declined substantially. Between end-2008 and 2021Q3, savings and cooperative banks increased their total (and risk-weighted) assets by 45 percent (43 percent) and 77 percent (68 percent), respectively. As a result, boosted by loan volume growth, the ratio of risk-weighted-to-total assets remained broadly stable for savings banks, and slightly increased in credit cooperative banks. In efforts to deleverage their balance sheets, commercial banks, however, substantially reduced their risk-weighted-to-total-assets ratios.

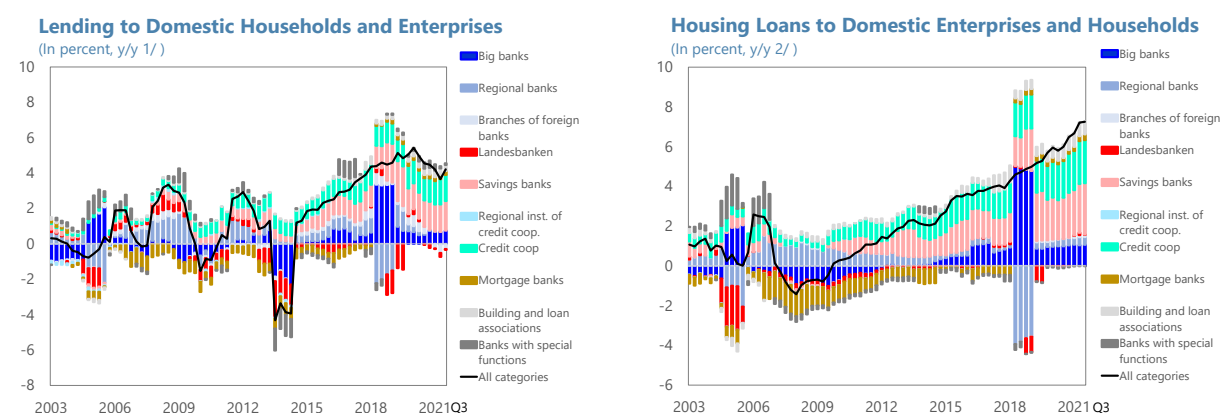
23. Elevated loan volume growth has helped savings and cooperative banks generate additional income streams to offset declining interest rates. Several factors helped support savings and cooperative banks' lending activity. Declining interest rates have helped stimulate demand for housing loans, while steady loan demand from SME customers helped support loans to enterprises. By 2021Q3, borrowing for real estate purchases reached record levels. As of 2021Q3

lending to domestic households and private enterprises grew 4.2 percent year-on-year, of which about 3.2 percentage points were attributed to savings and cooperative banks. Similarly, housing loans grew by 7.3 percent year-on-year, to which savings and cooperative banks contributed 4.8 percentage points (Figure 9).

Figure 9. Loans to Households and Enterprises

Savings and cooperative banks' profit reduction due to falling interest rates has been partially offset by loan growth.

This makes these institutions highly exposed to real estate price correction.



Source: Bundesbank; and IMF staff estimates and calculations.

1/ Defined as loans to domestic enterprises and resident individuals.

2/ Defined as housing loans to domestic enterprises and resident individuals.

24. Accelerated lending increased the exposure of savings and cooperatives banks to real estate. Both households and corporates have benefitted from the increased savings and cooperative banks' loan volume growth. For savings banks, housing loans increased from 29 to 35 percent of assets between 2008-21Q3, of which lending to households increased from 21 to 24 percent of assets, and to corporates from 7 to 11 percent. For credit cooperatives, housing loans increased from 29 to 36 percent of assets over the same period, of which loans to households increased from 23 to 26 percent of assets, and to corporates from 6 to 10 percent of assets. Savings banks' lending to commercial real estate sectors – namely construction, housing enterprises, and other real estate enterprises – has increased from 9.1 to 14.1 percent of assets for savings banks, and from 5.4 to 11.8 percent of assets for credit cooperatives during 2008-21Q3. Most of this increase was attributed to housing enterprises.

25. Loan growth, to some extent, has been driven by rising average loan amounts due to surging property prices. During 2010-21, country-wide owner-occupied housing prices increased by some 60 percent in real and over 90 percent in nominal terms. In the largest 7 cities, house prices increased by 143 percent during this period. Strong house price growth is largely driven by supply shortages, also supported by income growth over the last decade, as strong economic outlook reinforced the demand for real estate, while immigration and urbanization increased demand in urban areas. Housing supply has been constrained by the construction sector labor shortages and

capacity constraints, limited land availability in larger cities, and, more recently, shortages of construction materials due to supply disruptions. Rising housing demand, coupled with supply bottlenecks, has led to surging housing backlogs. Housing has become increasingly less affordable, as income has not kept up with the rising residential real estate (RRE) prices.

26. Savings and cooperative banks deploy their asset base more effectively than commercial banks in generating income. Greater asset productivity of savings and cooperative banks is reflected in higher income earned per unit of assets, as both NII- and net commission income (NCI)-to-assets ratios of savings and cooperative banks are greater than those reported by commercial banks (Figure 10). Since the GFC, however, NII earnings of savings and cooperative banks have fallen more than those of commercial banks. This is because their business models largely focus on traditional maturity transformation, as deposit-taking and lending are the backbone of operations, making them actively engaged in maturity transformation, and more susceptible to interest rate changes. Savings and cooperative banks tend to serve private households and domestic SMEs by taking their deposits and providing loans. Efforts to diversify revenues through greater reliance on fee- and commission-based products has produced subdued results, as net commission income has grown in line with assets for most bank types.

27. Savings and cooperative banks generated about 90 percent of the industry's profits in 2020. Since the GFC, as profits of the largest commercial banks continued to decline, savings and cooperatives jointly increased their share in the industry profits from 30 percent in 2006 to over 90 percent in 2020 (text chart).

28. Loan volume growth has helped offset declining interest rates of savings and cooperative institutions and maintain their cost-to-income ratios. Elevated loan

volume growth has helped offset some of the income decline for savings and cooperative banks. As a result, costs relative to income increased much less so than for commercial banks, who saw a much deeper decline in income. This resulted in a relatively stable cost ratio for cooperative and savings banks, while cost-to-income ratios for commercial banks, and in particular big banks, exploded over the last few years. While savings and cooperative banks can still cover their costs with NII, this income source is insufficient for commercial banks (Figure 11).

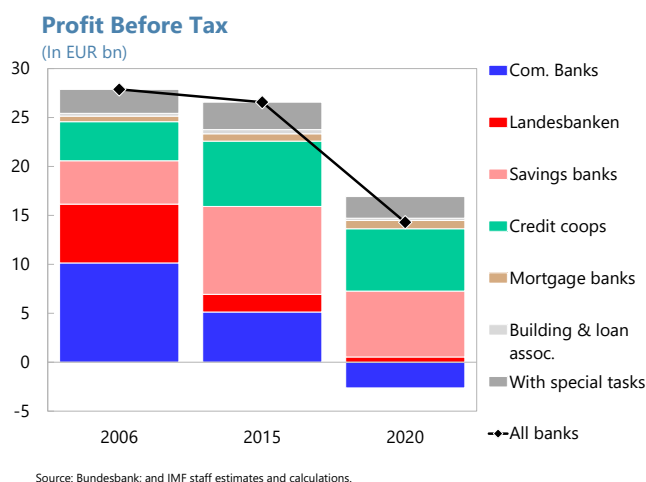
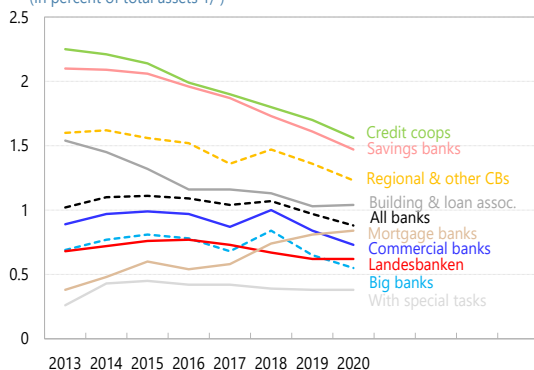


Figure 10. Asset Productivity

Declining interest rates have shrunk net interest income, more so for savings and cooperative banks, given their dependence on NII.

Net Interest Income

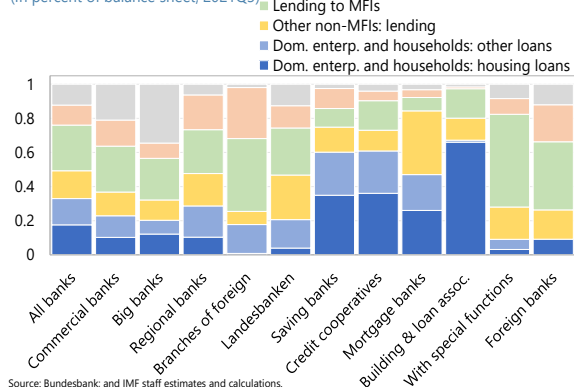
(In percent of total assets 1/)



Savings and cooperative banks focus more on loans...

Asset Composition

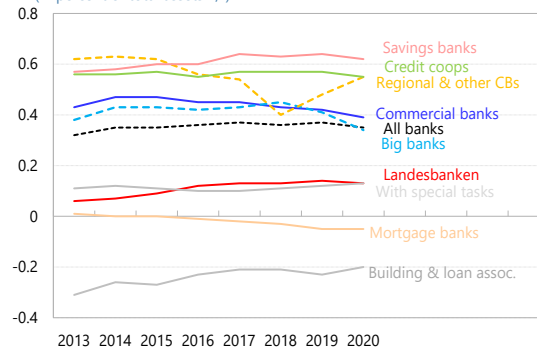
(In percent of balance sheet, 2021Q3)



Revenue diversification is limited as fees and commissions continued to grow in line with assets.

Net Commission Income

(In percent of total assets 1/)



... with customer deposits as the main funding source.

Liabilities Composition

(In percent of balance sheet, 2021Q3)

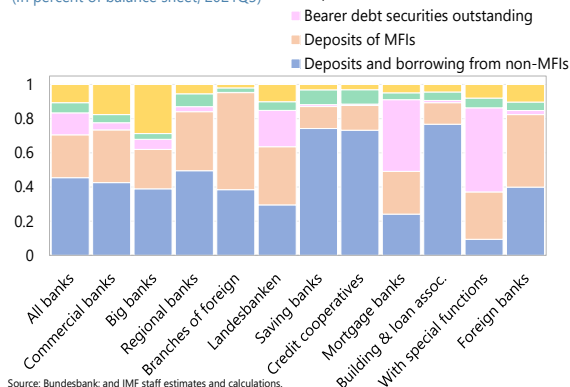
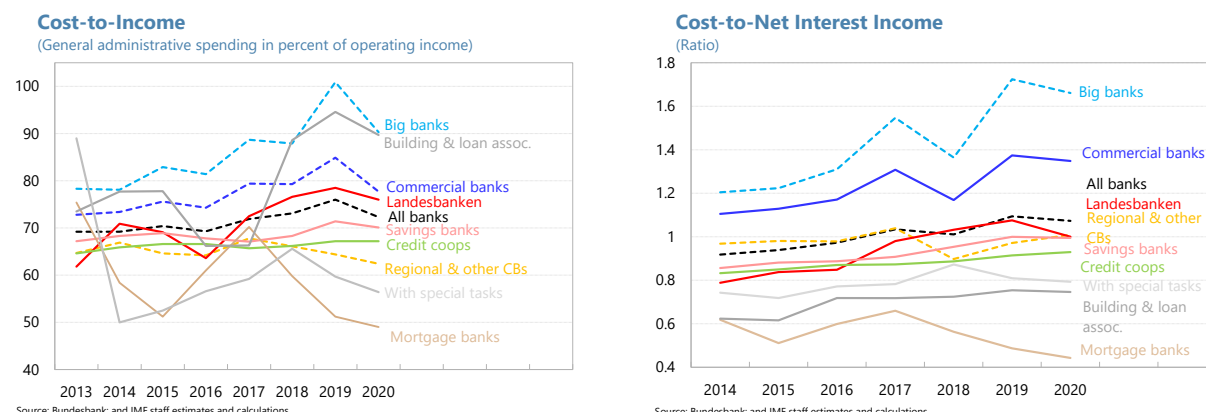


Figure 11. Cost-to-Income Ratios

High loan volume growth has partially helped offset declining NII due to falling interest rates of savings and cooperative banks, ...

... but their NII was barely sufficient to cover costs 2020.

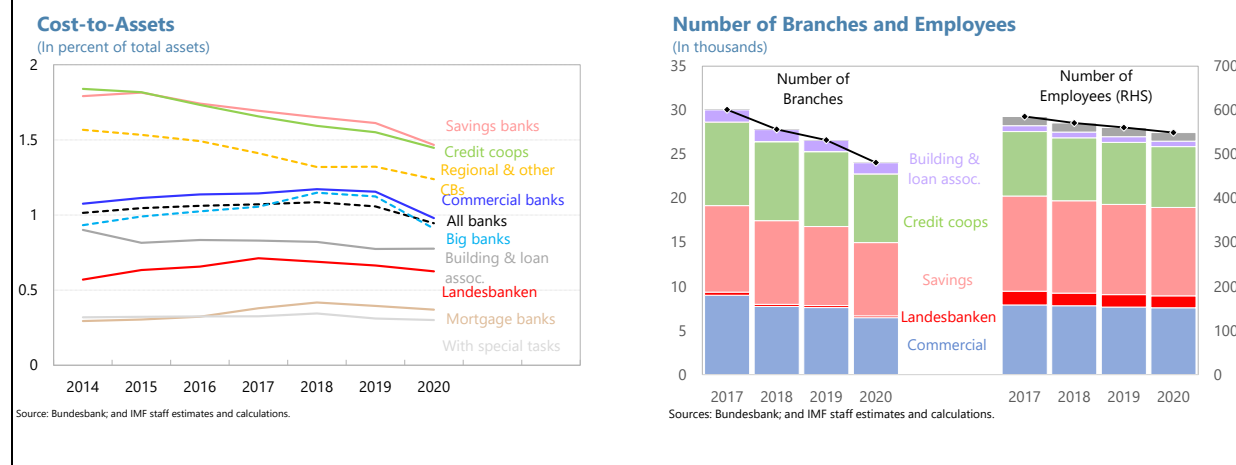


29. However, savings and cooperative banks' costs per unit of assets are high, reflecting the high-cost base. The cost-to-asset ratio, which is a more suitable measure for cost efficiency, as it measures costs relative to the asset base, is high for savings and cooperative banks. This reflects the high-cost base, with extensive branch network and substantial employee presence. Credit cooperatives and savings banks, however, have managed to achieve the largest reduction in costs per assets, which declined by 0.4 and 0.3 percentage points between 2013-20, respectively (Figure 12).

Figure 12. Cost Efficiency

Savings and cooperative banks' costs relative to total assets are high, ...

... reflecting large number of branches and employees.



PROFITABILITY IN RISK-ADJUSTED TERMS

30. The risk-return analysis considered three risk-adjusted profitability measures. Higher returns should be generally associated with higher volatility and vice versa. To control for the return-risk trade-offs, the analysis uses three risk-adjusted measures (as in IMF, 2011) to define bank profitability in risk-adjusted terms:

- Sharpe ratio (Sharpe, 1966). The Sharpe ratio calculates the return per unit of risk: $\frac{E(r_i) - r_f}{\delta_i}$,

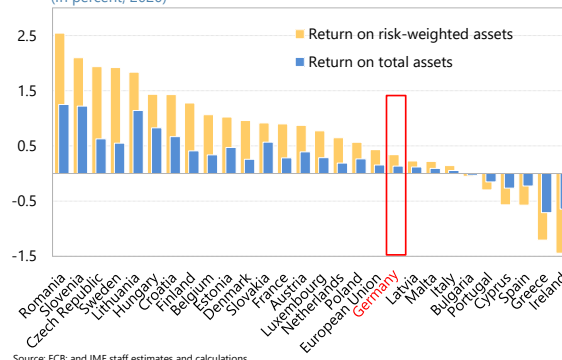
where r_i = return equity of bank i , r_f = one-year German government bond rate, δ_i = standard deviation of the return on equity of bank i

- The risk-adjusted performance (Modigliani and Modigliani, 1997). The risk-adjusted performance is derived by multiplying the Sharpe ratio by the standard deviation of the benchmark and adding the risk-free return. Specifically, $RAP_i = (\delta_m / \delta_i) * (r_i - r_f) + r_f$, where r_i = return on equity of bank i , r_f = one-year German government bond rate, δ_i = standard deviation of the return on equity of bank i , δ_m = standard deviation of the return on equity of bank performance in the European comparator sample.
- Return on risk-weighted assets.

31. Bank returns on risk-weighted assets place German banks as weak performers.

Adjusting profitability for risk using return on risk-weighted assets data suggests that German banks are less profitable than many European peers (text chart).

Return on Total and Risk-Weighted Assets
(In percent, 2020)



32. In risk-adjusted profitability terms, the performance of German banks appears more favorable, as low profitability is partially compensated by lower volatility of returns. For

benchmarking purposes, German bank profitability is compared to a sample of 200 largest banks operating in the developed European countries (Table 3).¹² In terms of average ROE, German banks' long-term profitability averages fall within the 20th percentile of the European comparator sample. However, when adjusted for risk using the Sharpe and Modigliani ratios, German banks' profitability fairs better, with estimated Sharpe ratios of German banks within the 24th percentile of the European bank sample. While the estimated risk-adjusted profitability of commercial and savings banks falls short of the European sample median, credit cooperatives' profitability in risk adjusted terms fairs

¹² Selection is done based on latest available data on the size of total assets, provided by S&P Capital IQ. Developed Europe classification is defined by the source.

above the median of the European sample (60th percentile), thanks to higher average weighted returns and low volatility of returns of cooperative banks in the sample.¹³

33. The profitability of German SSM-supervised significant institutions (SIs) also appears more favorable when the volatility of returns is considered, but estimates fall short of the SSM-supervised SIs sample median. For benchmarking purposes, German SIs are compared to a sample of 112 SSM-supervised institutions headquartered in 19 countries.¹⁴ The average weighted risk-adjusted ROE of German SIs estimated over 2001-20 was equivalent to the 28th percentile of the European SI sample. In risk-adjusted terms, the ranking of the estimated Sharpe and Modigliani ratios of German SIs improved to the 35th percentile but fell short of the EU average and median.

Table 3. Germany: Banks–Risk-Adjusted Profitability 1/

	Average weighted 2/			Percentile among 200 largest European banks 3/		
	ROAE	Sharpe	Risk-adjusted	ROAE	Sharpe	Risk-
	(percent)	ratio	performance	(percentile)	(percentile)	adjusted
All German banks 4/	3.0	0.7	19	20	24	24
Commercial banks 5/	2.3	0.7	19	17	24	24
Credit cooperatives 5/	5.4	2.0	50	35	60	60
Savings banks 5/	2.2	0.6	17	17	23	23

Source: FitchConnect; S&P Capital IQ; CEIC; Haver Analytics; Bundesbank; and IMF staff estimates and calculations.

1/ ROAE = return on average equity. Calculations based on long-term 2001-20 averages. Data availability varies by bank and year.

2/ Average weighted by total assets.

3/ The sample includes 200 banks operating in early 2022 in developed Europe. Data availability varies by institution and year.

4/ Sample of German banks includes 1,358 institutions operating in Germany in mid-2021 (with available data).

5/ Data vary by bank and year.

REGRESSION ANALYSIS ON DETERMINANTS OF BANK PROFITABILITY

A. Data and Scope

34. The regression analysis is based on two samples of banks: German MFIs and European SIs. The sample of German banks includes all German MFIs with data available through public and private sources. This includes both Less Significant Institutions (LSIs) supervised by the Federal

¹³ Results reported in Table 3. Averages of banks with available data over 2001-20. Risk free rate is based on the German interest rate of the federal securities with residual maturities of 1 year.

¹⁴ Based on the classification as of January 2021. Three institutions were excluded from the analysis due to data limitations in the data sources used, including one German institution. Calculations rely on ROE averages for 2001-20. Data availability varies by bank and year. Average weighted estimates are weighted by bank assets.

Financial Services Supervisory Authority (*Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin*) and *Deutsche Bundesbank* and indirectly supervised by the ECB, and German SIs under the SSM supervision. The European SI sample includes banks classified as SIs.¹⁵

35. The regression analysis is based on data from private and public data sources. The dataset is constructed at bank level and covers the period of 2000-20.¹⁶ For many banks, however, the regression analysis is largely focused on 2008-20, since some variables have limited data prior to 2008. The bank balance sheet and income statement data were obtained from FitchConnect and S&P Capital IQ; the macroeconomic series were derived from the IMF's World Economic Outlook and Haver Analytics; and the structural banking data was taken from the ECB's Banking Structural Statistical Indicators.¹⁷

B. Methodology for Regression Analysis

36. Panel data techniques are used to examine the determinants of bank profitability. Empirical literature on determinants of bank profitability focuses on three main categories: bank-specific, cyclical, and structural indicators. Thus, the empirical analysis controls for bank characteristics, business models, banking industry structure, macroeconomic and cyclical factors. The dependent variable includes different measures of profitability, including return on average assets (ROAA), return on average equity (ROAE), operating ROAA, operating ROAE, and operating profits-to-risk-weighted assets (RWA).

37. Panel regressions are estimated using the Arellano-Bover/Blundell-Bond linear dynamic panel-data estimator with robust standard errors.¹⁸ The model specification is:

$$Y_{k,j,t} = \delta Y_{k,j,t-1} + \varphi_k + \phi' X_{k,j,t} + \theta' I_{j,t} + \lambda' M_{j,t} + \varepsilon_{k,j,t} \quad (1),$$

where $Y_{k,j,t}$ is the headline profitability measure for bank k , in country j , at time t . Bank characteristics are included in the set of bank-fixed effects (φ_k) and a vector of time-varying bank-specific indicators ($X_{k,j,t}$), which captures bank-specific indicators. Banking industry structural indicators are captured by ($I_{j,t}$), which include industry concentration and measures of excess capacity. Macroeconomic and cyclical variables are incorporated via ($M_{j,t}$), including GDP growth and short-term interest rates.

¹⁵ Based on the [list of SSM-supervised entities as of 1, January 2021](#).

¹⁶ Due to missing data in the early years, estimates of most regression specifications heavily rely on observation in the post-GCF period.

¹⁷ See Appendix Tables 1 and 2 for descriptive statistics of the main variables in the European SIs and German banks samples, respectively.

¹⁸ The use of the dynamic panel regression is warranted by the persistence in profitability measures. The Arellano-Bover/Blundell-Bond system estimator is an extension of the Arellano-Bond estimator that accommodates large autoregressive parameters and a large ratio of the variance of the panel-level effect to the variance of idiosyncratic error. The Arellano-Bover/Blundell-Bond system estimator is designed for datasets with many panels and few periods, which is the case for our datasets (for example, data is only available for most banks between 2008-20 or less for many banks). For details, see <https://www.stata.com/manuals/xttdpdsys.pdf>.

38. Bank-specific indicators capture bank size and business models, asset quality, solvency, and cost structure.

- *Bank size* is measured as the natural logarithm of total assets. We also use the natural logarithm of the number of bank employees to proxy for size for robustness checks. As discussed by Elekdag and others (2020), controlling for bank size is important, but its relation to profitability is inconclusive: some studies find that larger banks may benefit from economies of scale, thus enhancing their bottom line, while others claim diseconomies of scale due to agency, overhead, and managerial costs.
- *Solvency* is captured by capitalization variables, such as Tier 1 capital and equity-to-assets ratios. Additionally, capitalization is measured by the ratio of the tangible common equity-to-total asset since the regulatory measures of capital adequacy may be difficult to compare across time due to changes in the definitions of the numerator and the denominator because of regulatory reforms; meanwhile, tangible common equity-to-total assets is comparable over time.¹⁹ The relationship between capital ratios and profitability is also inconclusive: on the one hand, banks with higher capital ratios may have lower funding costs and thus improve profitability, while on the other the other hand, greater capitalization may also be reflective of lower risk-taking and hence lower expected returns (Elekdag and others, 2020).
- *Asset quality* is measured by the non-performing loans ratios (NPLs). Empirical studies suggest that higher credit risk, as proxied by NPLs, is associated with lower profitability (Detragiache and others, 2018).
- *Cost efficiency* is measured by the cost-to-income ratio. Banks with greater cost efficiency tend to be associated with better profitability (Elekdag and others, 2020).
- *Diversification* is measured by the ratio of noninterest income-to-total income. While some studies report finding a positive relationship, others indicate that a higher share of non-interest income may be associated with higher volatility in earnings (Kok and others, 2016).
- *Bank business models* are proxied by the loan-to-asset and deposit-to-asset ratios, the share of wholesale funding in total funding, deposit and asset growth rates, and the income diversification measure.

39. Banking industry structural indicators capture competition and excess capacity.

Banking sector capacity is measured by branches per capita and banking sector employees per capita. Banking sector concentration, or competition, is measured by the Herfindhal index and the share of the largest 5 banks in total assets.

¹⁹ Also, the numerator of the tangible common equity-to-total asset ratio includes only high quality, loss-absorbing capital, and assets in the denominator not risk-adjusted, which is relevant for cross-country comparison due to different risk weights for similar exposures across banks and countries (Detragiache et al, 2018).

40. Cyclical indicators factor in the effect of macroeconomic environment. Economic activity is measured by the real GDP growth. Policy rates account for the monetary policy stance, where 3-months EURIBOR is used as a proxy.²⁰ Due to turbulent market conditions prevailing over the last decade, the analysis controls for broader financial conditions (Financial Conditions Index, FCI).²¹

C. Empirical Findings: European Significant Institution Bank Sample

41. The European SI bank sample is based on 112 SSM-supervised institutions operating in 19 countries.²² The twenty German SIs included in the sample contributed about 17 percent to the total sample assets.

42. Average returns of German SIs lag European peers, as capacity to generate revenue fall short amid the high-cost inefficiencies (Figure 13 and 14). On aggregate, the overall income of German SIs is well-diversified (measured by non-interest operating income in percent of total income), more so than the income streams of several other European peers (Figure 13, panel 4). Relative to assets, however, the non-interest income of German SIs is broadly similar to the sample average (Figure 13, panel 3). The interest income of German SIs is subdued and falls short of the European peers (Figure 13, panel 1), reflecting a low share of loans in total assets (Figure 13, panel 2). This indicates that German SIs' cost base is too high for the revenues generated (Figure 14).

43. The regression analysis on the European SI sample suggests that larger banks with lower NPLs, higher capitalization, and better cost efficiency tend to be more profitable (Table 4)²³. The regression results produce statistically significant coefficients in most regression specifications. Specifically, the bank size – measured by the natural log of total assets – is positively correlated with bank profitability, where coefficients are found to be statistically significant with ROAA as the dependent variable but not statistically significant when other measures of bank profitability are used. This is consistent with the view that larger banks may benefit from the economies of scale and, thus, can generate greater profits. Higher capitalization – measured by tangible common equity-to-tangible assets – is positively correlated with higher profitability, and the results are statistically significant across most model specifications. This correlation, however, warrants caution in interpretation. While this finding may reflect the ability of banks with higher capitalization ratios to source funding at lower costs, given the lower perceived probability of

²⁰ Since EURIBOR remained close to zero since the GFC as monetary policy remained expansionary due to quantitative easing, yield on a 2-year German government bond is used in the German bank sample as a proxy for monetary policy stance. Alternative regression specifications also included the 3-month zero-coupon yield on AAA Euro Area securities, and a government bond spread (as a measure of yield curve steepness), measured as the difference in yield between the 10-year and 1-year securities.

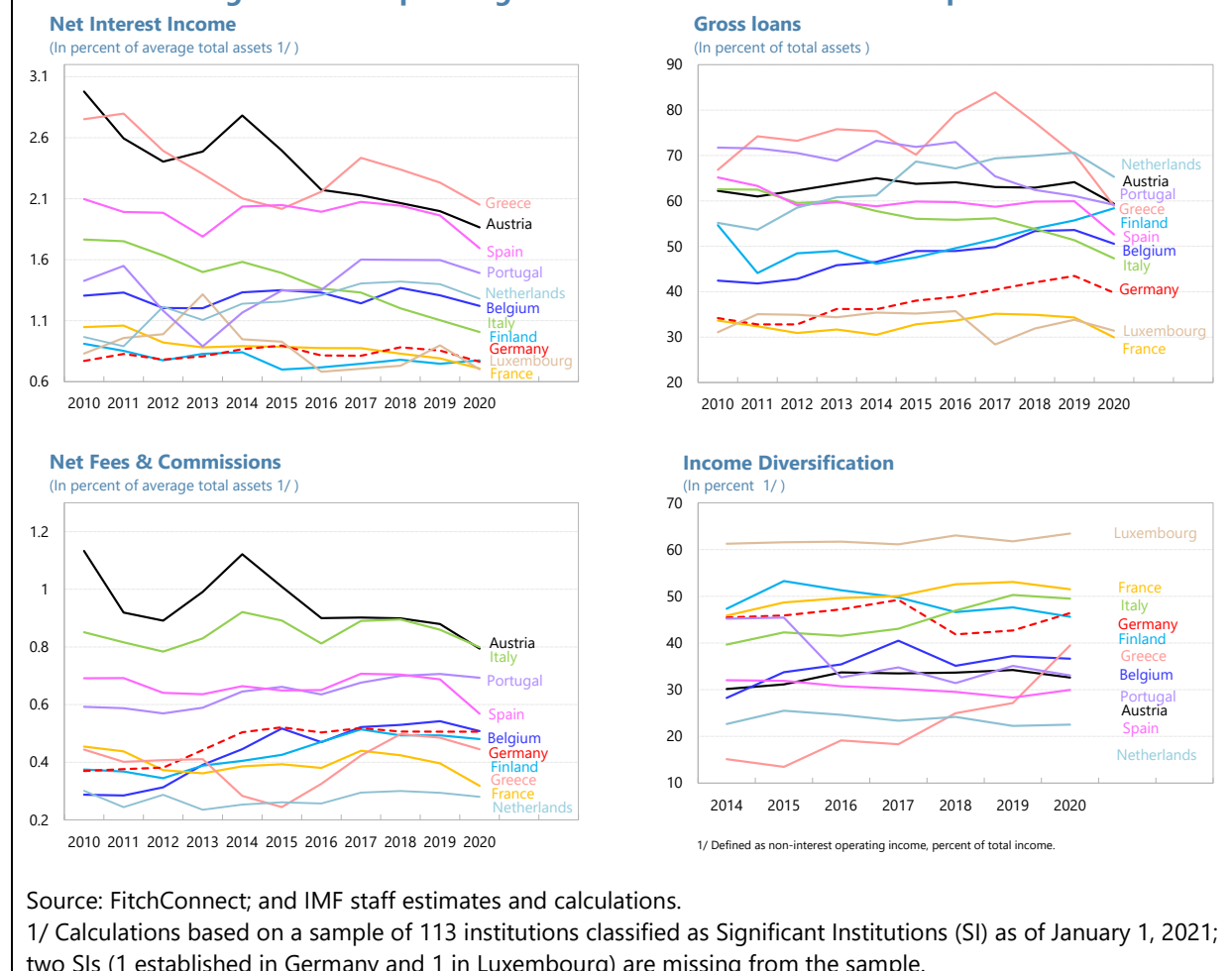
²¹ For details on the calculation of the FCI index, see Online Annex 1.1 Technical Note to Chapter 1 of the October 2018 Global Financial Stability Report (IMF). Can be found at: <https://www.imf.org/~media/Files/Publications/GFSR/2018/Oct/CH1/doc/Annex1-1.ashx>.

²² Three institutions were excluded from the analysis due to data limitations in the data sources used, including one German institution.

²³ Estimates based on the Arellano-Bover/Blundell-Bond linear dynamic panel-data estimation, where bank-specific and banking industry variables treated as endogenous, are reported in Appendix Table 3. Estimates produced by the Arellano-Bond linear dynamic panel-data estimation with robust standard errors clustered by bank also produce similar results (not reported here).

default, it could also be reflective of greater ability of more profitable banks to recapitalize faster through retained earnings. Better asset quality, measured by lower NPL ratios, is associated with higher profitability as loan losses tend to drain profits. This correlation is statistically significant in most model specifications. As measured by the lower cost-to-income ratio, banks with better cost efficiencies tend to be more profitable. The variables reflecting business models, such as income diversification and the share of wholesale funding in total funding, are not statistically significant in most specifications.²⁴ Overall, German SIs do not appear to be different from the sample average, given that the interaction variables were not statistically significant.

Figure 13. European Significant Institutions: Income Components



²⁴ Coefficients on other variables, included to control for business models, such as loan and asset growth, loan-to-assets and deposits-to-assets ratios, were also not robust in sign and statistical significance across different model specifications. Data limitations prevented the use of domestic loans-to-total loans as a measure of geographical diversification.

44. Economic growth and monetary policy stance play a vital role in determining bank profitability. On average, stronger economic performance and higher interest rates tend to be associated with higher profitability, as economic growth drives up loan demand, reducing NPLs due to improved borrower ability to service loans and raising interest margins and profits. Similarly, regression results suggest that higher interest rates are associated with higher profitability, which reflects developments since the GFC when declining interest rates put downward pressure on loan and deposit interest rates, squeezing profit margins and reducing profitability.²⁵ Among the structural indicators, the number of bank branches per capita in a country was found to be negatively correlated with ROAA, suggesting that dense branch networks may be a drag on profitability. Bank concentration, as measured by the share of the largest five banks in banking sector assets, is positively correlated with higher profitability. However, coefficients on the structural indicators were neither robust nor statistically significant across different model specifications.²⁶

²⁵ Overall, using country short-term interest rates as a measures of monetary policy stance also produced similar results.

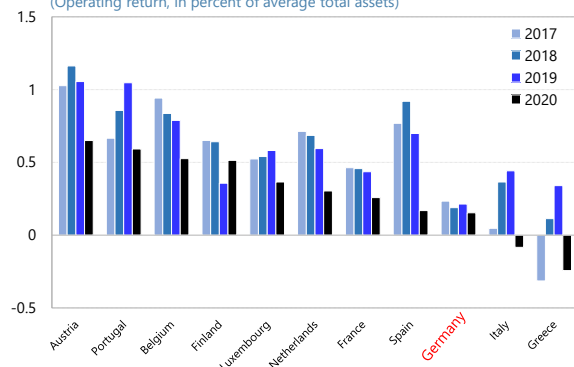
²⁶ Other industry structural indicators, such as banking sector employees per capita and the Herfindhal index, were positively correlated with ROAA, but not statistically significant at 5 percent.

Figure 14. European Significant Institutions: Profitability Developments

Returns of German SIs lags behind many of their European peers, both relative to total assets, ...

Operating ROAA

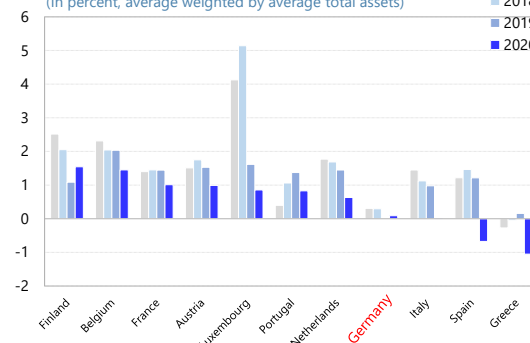
(Operating return, in percent of average total assets)



... and to risk-weighted assets.

Return on Risk-Weighted Assets

(In percent, average weighted by average total assets)

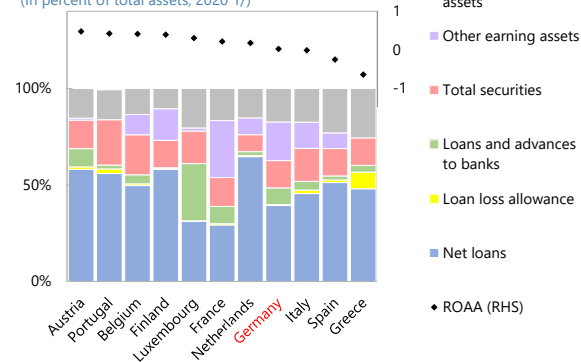


Source: Bundesbank and IMF staff estimates and calculations.

Although balance sheet composition of German SIs is ...

Asset Composition

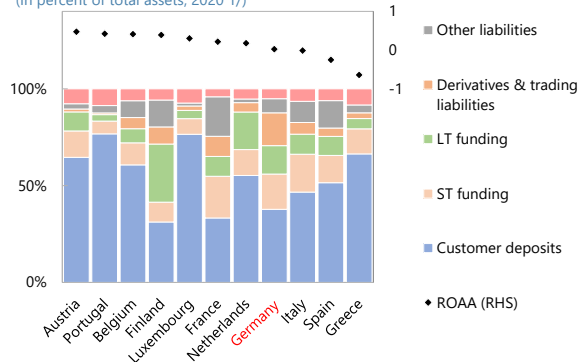
(In percent of total assets, 2020 1/)



... comparable to SIs in other countries, ...

Liability Composition

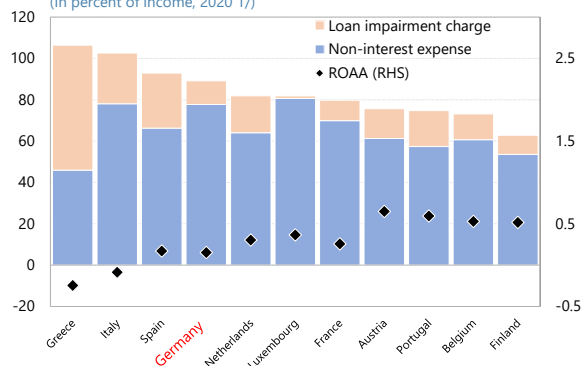
(In percent of total assets, 2020 1/)



... elevated cost base relative to income...

Non-Interest Expense and Loan Impairment Charge

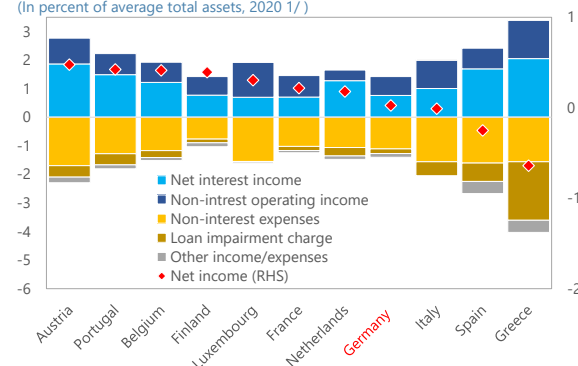
(In percent of income, 2020 1/)



... depletes revenues of German SIs.

Net Income Components

(In percent of average total assets, 2020 1/)



Source: FitchConnect; and IMF staff estimates and calculations.

1/ Calculations based on a sample of 113 institutions classified as Significant Institutions (SI) as of January 1, 2021; two SIs (1 established in Germany and 1 in Luxembourg) are missing from the sample.

Table 4. Germany: Regression Results–European Significant Institutions Sample 1/

<i>Dependent variable:</i>	ROAA		ROAE		Operating profit/RWA	
	(1)	(2)	(3)	(4)	(5)	(6)
Bank-specific indicators						
NPL ratio	-0.0821*** (0.0113)	-0.0873*** (0.0119)	-1.314*** (0.432)	-1.309*** (0.408)	-0.131*** (0.0281)	-0.135*** (0.0292)
Total assets	0.363*** (0.125)	0.422*** (0.129)	3.200 (3.611)	3.390 (3.599)	0.00677 (0.457)	0.0807 (0.430)
Tangible common equity/tangible assets	0.167*** (0.0141)	0.169*** (0.0153)	1.948* (1.071)	2.028* (1.149)	0.191*** (0.0415)	0.203*** (0.0452)
Wholesale funding/total funding and capital ratio	-0.0248** (0.0124)	-0.0124 (0.0114)	-0.641 (0.424)	-0.710 (0.453)	-0.0400 (0.0257)	-0.0436 (0.0280)
Non-interest income/Total operating income ratio	0.00481 (0.00532)	0.00519 (0.00556)	0.207 (0.150)	0.208 (0.149)	-0.00734 (0.0103)	-0.00610 (0.0110)
Cost-to-income ratio	-0.0124** (0.00501)	-0.0134*** (0.00491)	-0.298* (0.156)	-0.290* (0.160)	-0.0536*** (0.0141)	-0.0524*** (0.0148)
Macroeconomic indicators						
Real GDP growth	0.0981*** (0.0149)	0.0985*** (0.0148)	1.263*** (0.215)	1.235*** (0.226)	0.180*** (0.0260)	0.175*** (0.0263)
EURIBOR 3-month	0.112*** (0.0387)	0.148*** (0.0365)	4.890*** (1.537)	4.575*** (1.573)	0.161 (0.108)	0.140 (0.0859)
Banking industry indicators						
Branches per capita		-1.280** (0.614)		12.11 (19.78)		1.392 (3.208)
Share of 5 largest banks in total assets		0.0240** (0.0115)		-0.0440 (0.353)		0.0148 (0.0280)
Macroeconomic indicators						
Dependent variable $t-1$	-0.120*** (0.0344)	-0.128*** (0.0323)	-0.00501 (0.0355)	-0.000124 (0.0324)	-0.0578 (0.0503)	-0.0666 (0.0476)
Dependent variable $t-2$	-0.183*** (0.0359)	-0.182*** (0.0329)	-0.0804*** (0.0293)	-0.0774*** (0.0270)	-0.0514 (0.0335)	-0.0540* (0.0301)
Dependent variable $t-3$			-0.0218 (0.0227)	-0.0221 (0.0232)		
Constant	-8.052*** (2.954)	-10.52*** (3.537)	-56.53 (84.44)	-63.39 (95.96)	5.176 (11.53)	1.846 (10.83)
Observations	1,135	1,133	1,025	1,025	917	917
Number of banks	98	98	95	95	92	92

1/ Estimates based on Arellano–Bover/Blundell–Bond linear dynamic panel-data estimation with robust standard errors. The number of lagged dependent variables varies by specification to ensure no serial correlation in the idiosyncratic errors.

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

D. Empirical Findings: German Bank Sample

45. The German bank sample is based on 1,358 banks operating in Germany as of mid-2021. The sample includes commercial banks, savings banks, credit cooperatives, building and loan associations, mortgage banks, Landesbanken, a regional institution of credit cooperatives, and banks with special, development and other central support tasks. Data availability, however, varies by bank and year.

46. Regression analysis suggests that smaller, better-capitalized banks operating with better cost efficiency are likely to be more profitable (Table 5)²⁷. Bank size, measured by total assets and the number of employees, is negatively correlated with bank profitability; estimated coefficients, however, are not statistically significant in most regression specifications.²⁸ The size, however, is more relevant for savings banks and credit cooperatives, as the estimated coefficients become significant when sample size is restricted to these bank types. This reflects the observed trend that smaller banks – namely, savings banks and credit cooperatives – have reported higher profitability ratios than those published by larger banks. Cost efficiency – measured by the cost-to-income ratio – is negatively correlated with the profitability measures.²⁹ Asset quality, as measured by the NPL ratio, is negatively correlated with profitability, but it is not statistically significant in the German bank sample.³⁰ Coefficient on the level of capitalization – a measure of bank solvency, defined as tangible common equity-to-tangible total assets and equity-to-assets – is not statistically significant across model specification.

47. Economic growth, monetary policy, and banking industry concertation constitute important drivers of bank profitability (Table 5). Real GDP growth and monetary policy stance, measured by the 2-year government debt yield, are both strongly correlated with higher bank profitability in most regression specifications.³¹ In both cases, the correlation is positive, as stronger economic growth tends to promote greater loan demand and increase borrowers' ability to service debt, resulting in higher bank profits. A positive correlation between interest rates and profitability reflects the period of declining interest rates and shrinking interest margins post-GFC.³² In the case of 2-year government bond yield, the strong correlation appears to be largely driven by credit cooperatives, as reflected by the statistically significant coefficient for the credit cooperatives sub-sample (Table 5, regressions 4 and 9).³³ Greater bank concentration, measured by the market share of largest 5 institutions, is also positively correlated with profitability.

²⁷ Given less persistence in profitability in the German bank sample (as evidenced by the coefficient on the lagged dependent variable, which is not statistically significant in most specifications in Table 5), robustness check estimation is performed using OLS estimators (see Appendix Table 4). Excluding 2020 from analysis as the COVID-19 pandemic year does not alter the results of the analysis.

²⁸ Coefficients on bank size are statistically significant across most model specifications when using OLS estimates (see Appendix Table 4). This also holds when bank size is measure by the number of employees.

²⁹ An alternative measure of cost efficiency, defined as staff expense-to-revenue ratio, also generated similar results.

³⁰ Coefficients on additional business model variables, such as wholesale funding ratio, loan-to-deposit ratio, are not statistically significant.

³¹ Given that EURIBOR remained close to zero since the GFC as monetary policy remained expansionary due to quantitative easing, yield on a 2-year German government bond is used as a proxy for monetary policy stance.

³² Coefficients on the yield curve steepness, measured as the difference between the yields on 10-year and 1-year government bonds, included in alternative specifications, are not statistically significant. Controlling for the financial conditions index (FCI) also did not produce any statistically significant coefficients.

³³ In the OLS regressions (Appendix Table 4), both sub-samples with credit cooperatives and savings banks produces statistically significant coefficients on 2-year government bond yields.

Table 5. Germany: Regression Results—German Banks Sample 1/

Dependent variable:	ROAA					ROAE				
	Sample:		Commercial	Credit	Savings	Sample:		Commercial	Credit	Savings
	Full sample	Full sample	banks	cooperatives	banks	Full sample	Full sample	banks	cooperatives	banks
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Bank-specific										
Dependent variable t_{-1}	0.0388 (0.0682)	0.0381 (0.0682)	-0.00192 (0.111)	0.0837** (0.0353)	-0.0861 (0.0611)	0.0388 (0.0682)	0.0381 (0.0682)	-0.00192 (0.111)	0.0837** (0.0353)	-0.0861 (0.0611)
Size (log assets)	-0.0303 (0.0564)	-0.0326 (0.0562)	0.153 (0.125)	-0.133** (0.0520)	-0.175*** (0.0582)	-0.0303 (0.0564)	-0.0326 (0.0562)	0.153 (0.125)	-0.133** (0.0520)	-0.175*** (0.0582)
Equity-to-assets		-0.00201 (0.0113)					-0.00201 (0.0113)			
Tangible common equity-to-tangible assets	-0.00137 (0.0114)		0.0313 (0.0294)	-0.0110*** (0.00350)	0.0252 (0.0168)	-0.00137 (0.0114)		0.0313 (0.0294)	-0.0110*** (0.00350)	0.0252 (0.0168)
NPL ratio	-0.0148 (0.0119)	-0.0148 (0.0119)	-0.0572 (0.0450)	-0.00190 (0.00209)	0.00213 (0.00303)	-0.0148 (0.0119)	-0.0148 (0.0119)	-0.0572 (0.0450)	-0.00190 (0.00209)	0.00213 (0.00303)
Cost-to-income ratio	-0.00842*** (0.00205)	-0.00841*** (0.00204)	-0.0164*** (0.00504)	-0.00603*** (0.00213)	0.00334*** (0.000962)	-0.00842*** (0.00205)	-0.00841*** (0.00204)	-0.0164*** (0.00504)	-0.00603*** (0.00213)	-0.00334*** (0.000962)
Loan-to-assets ratio	-0.00369* (0.00189)	-0.00366* (0.00189)	-0.0118* (0.00627)	0.000118 (0.00107)	-0.00209 (0.00211)	-0.00369* (0.00189)	-0.00366* (0.00189)	-0.0118* (0.00627)	0.000118 (0.00107)	-0.00209 (0.00211)
Deposits-to-assets ratio	6.55e-05 (0.00287)	7.91e-05 (0.00288)	-0.00316 (0.00767)	0.000208 (0.00132)	-0.00154 (0.00151)	6.55e-05 (0.00287)	7.91e-05 (0.00288)	-0.00316 (0.00767)	0.000208 (0.00132)	-0.00154 (0.00151)
Noninterest income-to-total income	-0.000467 (0.00124)	-0.000453 (0.00124)	-0.00313 (0.00296)	-0.000187 (0.00186)	0.000534 (0.00106)	-0.000467 (0.00124)	-0.000453 (0.00124)	-0.00313 (0.00296)	-0.000187 (0.00186)	0.000534 (0.00106)
Macroeconomic & structural										
GDP growth	0.0152*** (0.00324)	0.0151*** (0.00324)	0.0416*** (0.0152)	0.00682*** (0.00132)	0.00485*** (0.00139)	0.0152*** (0.00324)	0.0151*** (0.00324)	0.0416*** (0.0152)	0.00682*** (0.00132)	0.00485*** (0.00139)
Government 2-year debt yield	0.0497*** (0.0182)	0.0490*** (0.0182)	0.00209 (0.0507)	0.0287*** (0.0104)	0.0303 (0.0199)	0.0497*** (0.0182)	0.0490*** (0.0182)	0.00209 (0.0507)	0.0287*** (0.0104)	0.0303 (0.0199)
Bank industry concentration	0.0142*** (0.00365)	0.0141*** (0.00365)	-0.00332 (0.0157)	0.00992*** (0.00152)	0.00566*** (0.00156)	0.0142*** (0.00365)	0.0141*** (0.00365)	-0.00332 (0.0157)	0.00992*** (0.00152)	0.00566*** (0.00156)
Constant	1.290 (1.211)	1.341 (1.209)	-0.899 (3.186)	3.111*** (0.943)	3.975*** (1.273)	1.290 (1.211)	1.341 (1.209)	-0.899 (3.186)	3.111*** (0.943)	3.975*** (1.273)
Observations	7,350	7,350	423	4,170	2,445	7,350	7,350	423	4,170	2,445
Number of banks	1,237	1,237	71	758	367	1,237	1,237	71	758	367

1/ Estimates based on Arellano-Bond linear dynamic panel-data estimation with robust standard errors adjusted for clustering by bank. In this specification, bank-specific variables are considered endogenous, which are treated similarly to the lagged dependent variable.

Robust standard errors, clustered by bank, in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

MEASURES UNDERTAKEN TO BOOST PROFITS

48. Over the past few years, German banks have taken several steps to cut costs and increase revenues. ³⁴ Given customer preference for the traditional brick-and-mortar bank business models and conventional products, for years German banks reportedly continued to display reluctance to cut costs and increase revenues more aggressively in fear of losing customers amid strong bank competition. More recently, however, urbanization and migration increased population growth in larger cities, where customers increasingly prefer cheaper and faster bank services instead of physical branches. Historically low interest rates on bank savings accounts prompted interest in asset management products, potentially giving rise to greater noninterest fee earnings in the future. The COVID-19 pandemic accelerated this trend toward digital products, facilitating banks transition to digital platforms, thus reducing their costs over time.

49. Banks have reduced substantially their branch networks and employee headcount. Some banks also report operating co-branded branches to reduce maintenance and fixed costs.

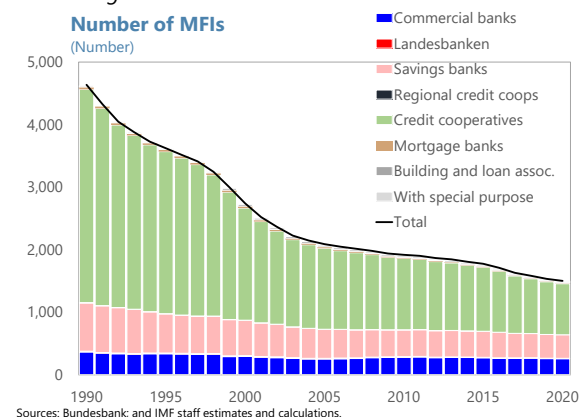
50. Significant consolidation has already taken place, mostly within savings and cooperative banks. This is because savings and Landesbanken are governed by laws that prohibit private banks' stakes in publicly-owned banks (IMF, 2011). Since the GFC alone, the number of credit institutions declined by about a quarter (over 500 institutions). Although bank consolidation has achieved a significant reduction in the number of institutions relative to the population size (from 20 to 15 institutions per million inhabitants), it remains larger than in most other European countries. Despite the significant headcount and branch reduction, bank employee and branch per capita estimates also continue to operate with larger networks than in some other European countries. In end-2020, Germany had about 0.28 branches and 6.9 bank employees per thousand inhabitants (Figure 15).³⁵

³⁴ Targeted Long-Term Refinancing Operations (TLTROs), which constitute part of a broad set of complementary policy instruments that include asset purchases, negative interest rates and forward guidance by the ECB, also helped banks secure funding at favorable terms to support access to credit for firms and households and augment bank profitability. For details, see [TLTRO and Bank Lending Conditions](#) (ECB Economic Bulletin, Issue 6/2021).

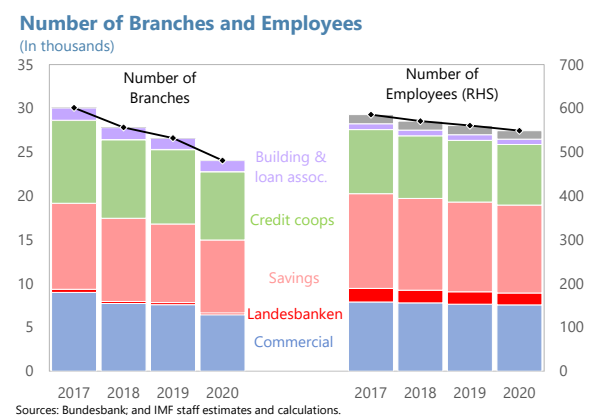
³⁵ Calculated using the number of domestic banking groups and stand-alone banks (ECB's consolidated banking statistics), number of bank branches and employees (ECB's structural bank statistics) and population size (IMF's World Economic Outlook).

Figure 15. German Banks: Consolidation Measures

Significant bank consolidation has occurred over the last few decades, particularly within the credit cooperatives and savings banks.



In efforts to cut costs, banks have continued to reduce the number of branches and staff.



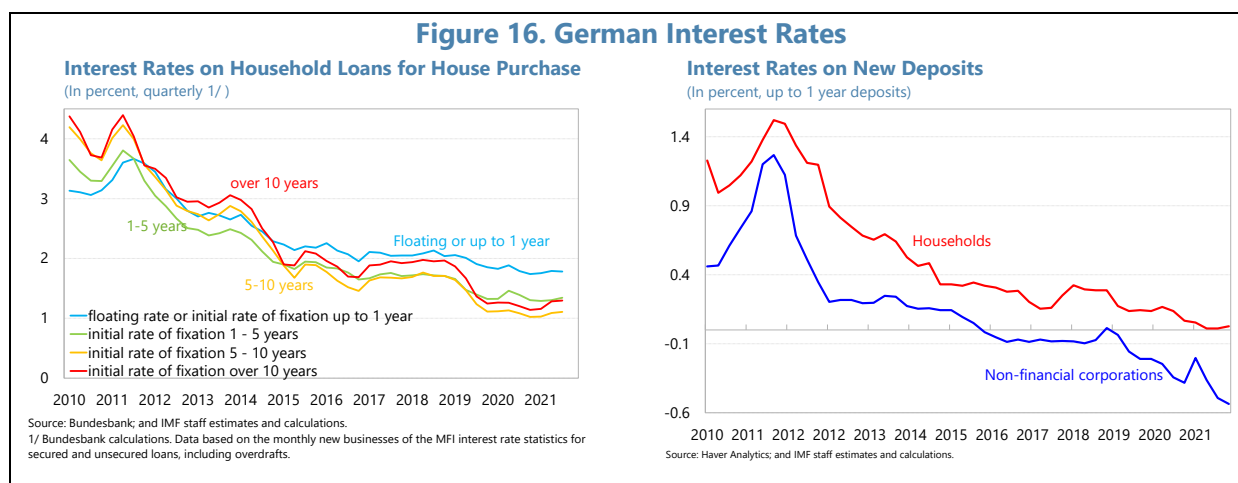
51. Digitalization and fintech innovations are ongoing, albeit at a slow pace. Banks report utilizing innovative technologies, such as digital wallets, cloud computing solutions, big data analytics, and artificial intelligence. But progress has been limited relative to other European peers. The COVID-19 outbreak, however, accelerated the adoption of technological innovations, with increased investment in IT upgrades and maintenance and digital transformation. While digitalization increases cost in the short run, cutting into profitability, it is expected to generate benefits over the medium-term. The COVID-19 pandemic also increased customer use of online banking, with customers increasingly looking to compare bank products and pricing across different institutions.

52. Banks have increasingly become aware of and taken measures to mitigate climate-related risks. Banks reported that climate factors are considered in their risk management, including their consideration in credit risk, and for reputational and operational risks.³⁶ Going forward, banks' shifting business models away from brown and toward evolving green industries may affect profitability.

53. A greater pass-through of negative interest rates to clients has helped slow the net interest income decline. German retail banks are largely funded by customer deposits, for which banks are increasingly charging negative rates when deposits rise above a certain threshold. Amid strong competition and fear of losing market share, many banks reportedly delayed introducing negative interest rates. More recently, however, profitability pressures amidst ample liquidity – as consumer propensity to save increased during COVID – have prompted more widespread implementation of negative interest rates. For instance, interest rates on new deposits of non-financial corporations (NFCs) (up to 1 year) declined to -0.54 percent by end-2021 (Figure 16). This

³⁶ EBA's Risk Assessment Questionnaire – Summary results can be found [here](#).

reduction in interest rate expenses, which banks pay on deposits, however, has not fully offset the declining interest revenues, resulting in shrinking interest margins.



54. Fee and commission income generation has been challenging but remains an important initiative of German banks. Efforts to diversify revenues are ongoing and remain a priority for German banks. More recently, the historically low (or negative) interest rates on saving products have prompted some customers to shift their preference toward exploring investment products in place of the traditional saving account. For savings banks, such products are typically offered by DekaBank, and for cooperatives by a subsidiary of DZ Bank AG. Despite the gradual shift in preferences, on average, banks have only managed to grow fee and commission income in line with assets.

55. Cooperative and savings banks continue to rely on resources-sharing to help reduce costs and generate sector-wide economies of scale. These institutions improve fixed cost management by sharing platforms and services across pillars. This includes IT support, customer services, and audit functions. In efforts to achieve product standardization, savings and cooperative banks have increased their use of mortgage origination software solutions. Pulling of resources, for instance through sector-wide insurers, asset manager, “central bank”-type institution, such as Deka bank and DZ bank, also helps curtail costs. Cross-guarantee networks within the groups are safety nets for its members; they exist to protect savers if an institution were to fail.

RISKS TO PROFITABILITY

56. Risks and vulnerabilities in the German banking sector continue to build up. Risks are largely tilted to the downside, despite expected potential profitability gains of private banks as they capitalize on the successful and timely completion of strategic restructuring plans. Downside risks would include another COVID outbreak and worsening economic developments, monetary policy adjustments, potential collateral overvaluation and price correction of residential and commercial real estate (CRE), and possible underestimation of credit risk, among others.

57. A potential resurgence of the COVID-19 pandemic could pose significant risks to banks' balance sheets and profitability. The worsening of the health situation, lockdowns, and deteriorating economic conditions could lead to losses, and impact banks' ability to generate profits. Further asset quality deterioration in loans to industries that are already impacted by the COVID-19 pandemic, such as hotels and restaurants, could pose additional risks.

58. Low interest rates with a flat yield curve would likely squeeze bank interest margins further. All banks are generally exposed to low interest rates, but savings and cooperative banks may be more vulnerable. This is due to their strong dependence on net interest income, and the business model of traditional maturity transformation through deposit accumulation and loan provision, and longer-term loan book profile due to greater reliance on mortgages. In general, smaller banks in Germany tend to largely earn their income through lending and deposits, which makes their earnings more susceptible to a flat yield curve that depresses interest margins.

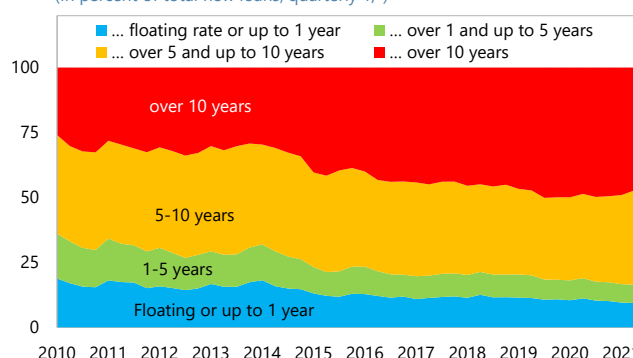
59. With the faster transmission of rising interest rates into liabilities than assets, low banking profitability is likely to persist over the short-term even in an increasing interest rate scenario.³⁷ This

is due to faster transmission of higher interest rates into liabilities (deposits) than into assets (loans). The growing duration mismatch between assets (mortgages) and liabilities (customer deposits) increases the risk. Over the last few years, banks have increasingly been funded by sight deposits, prompted by depositors' shift to short-term deposits, as longer-term deposits lost their appeal amid low

interest rates. At the same time, banks' higher-yielding mortgages over the last decade have been gradually replaced by refinanced or underwritten loans, which carry longer fixing interest rate periods and lower interest rates (text chart). Negative valuation effects could also squeeze interest income. Credit cooperatives and savings banks are likely to be more affected than commercial banks, given that commercial banks more commonly employ interest rate swaps to hedge against the interest rate risk.^{38,39}

Household Loans for House Purchase

(In percent of total new loans, quarterly 1/)



Source: Bundesbank; and IMF staff estimates and calculations.

1/ Bundesbank calculations. Calculated as domestic banks' volume of new business with respective rate of fixation periods as a share of total new business, excluding extensions.

60. Exposures to CRE could pose significant risks to profitability. The COVID-19 pandemic resulted in divergent dynamics in residential and commercial real estate markets, where residential

³⁷ In addition to maturity composition of assets and liabilities, profitability will also depend on the shape (steepness) of the yield curve and on the speed of repricing of assets and liabilities.

³⁸ As also suggested by the regression results with statistically significant coefficients on the interest rate variable, particularly for credit cooperatives and savings banks.

³⁹ Eventually phasing out of such ECB support measures as TLTRO III may also have impact bank profitability.

prices continued to climb throughout 2021, while prices on some commercial properties declined. After some decline in 2021, office prices registered a positive, albeit small increase in 2021Q4, while retail prices continued to decline because of competition from online retailers, further exacerbated by the COVID-19 pandemic. Immediate risks stem from sub-segments where prices have already been affected, such as non-food retail and hotels. Uncertainty about future price developments are high, including for office properties amid challenges to develop hybrid work-from-home models. Given large exposures of many German banks to CRE, continued decline in CRE prices would likely reduce the value of collateral and ultimately translate into higher NPL ratios.

61. A real estate price correction, particularly in the context of a substantial increase in unemployment rate, could significantly affect banks through declining values of collateral and rising NPL ratios.⁴⁰ High residential property valuations and estimates of RRE overvaluation suggest that loan collateral may be overvalued, particularly in larger cities. The existing RRE valuations may not be sustainable as housing demand cools off amid rising mortgage rates on new lending. A real estate price decline could force some mortgages into negative equity positions, particularly those obtained at peak valuations, resulting in higher NPLs, particularly if severe adverse macroeconomic conditions occur. Savings and cooperating banks are more exposed to this risk, given their large and rising share of housing loans relative to total assets. Reportedly conservative collateral valuations, extended fixed-rate periods on mortgages, and a full recourse on residential mortgages (unlike CRE loans), mitigates the risk of (mortgage) borrower default.^{41, 42}

62. Low profitability may encourage risk-taking behavior by banks amid the search for yield. Efforts of some banks to offset lower profits through greater loan volume growth may have increased risks in some banks. A shift toward greater accumulation of less liquid loans on banks' books, combined with gradual lengthening of loan maturities, may have increased liquidity and maturity risk. While by end-2021, the Bundesbank's survey of banks indicated that, on average, no changes in banks' loan approval criteria were reported⁴³, pockets of vulnerability may exist as the continued low profitability could have put banks under pressure to increase exposures to riskier borrowers.

⁴⁰ A Deutsche Bundesbank stress test suggests that, in an adverse macroeconomic scenario with a strong reversal in the RRE prices and a significant increase in the unemployment rate, credit losses rise considerably at the bank-individual and the aggregate level. For details, see [Barasinska and others \(2019\)](#).

⁴¹ In a recourse mortgage, the lender can foreclose on the secured asset (collateral) and has recourse to the borrower's unsecured personal assets and future income.

⁴² In response to rising vulnerabilities, including from residential real estate, BaFin set a countercyclical capital buffer of 0.75 percent of risk-weighted assets on domestic exposures and introduce a sectoral systemic risk buffer of 2.0 percent of risk-weighted assets on loans secured by residential real estate. The rates are currently at zero percent. Institutions have to meet the additional capital requirements by February 1, 2023.

⁴³ Some tightening of lending standards was observed during the pandemic. For details, see Bundesbank's [Bank Lending Survey](#) from January 2022. The Bank Lending Survey provides information on the changes in banks' internal guidelines (loan approval criteria) and not hard data implied by lending standards. Representative hard data on lending standards are not available on a regular basis. The latest special survey on lending standards was conducted by BaFin and Bundesbank in 2019, and by the ECB in 2019. Regular collection of bank lending standards will begin in 2023.

63. Relatively low loan loss provisions may be indicative of underestimated credit risks.

The COVID-19 pandemic prompted fears of large NPLs, triggering greater loan loss provisions in 2020, as warranted by banks' forward-looking models. The feared surge in NPLs and insolvencies, however, did not materialize due to a comprehensive package of government support measures, and absence of cliff effects when moratoria expired. As a result, NPLs remained relatively low overall, but increased in sectors most affected by the pandemic, such as hotels and restaurants. In 2021, loan loss provisions of 2020 were largely reversed with aggregate provisioning falling back to pre-pandemic levels. In the environment of rising vulnerabilities and a build-up of risks, however, the relatively low loan loss provisions amid low NPLs raise questions of potential underestimation of credit risks.

64. Slow IT innovation and digitalization, and greater competition from fintech could put mainstream banks at a disadvantage.

German fintech sector has grown dynamically, with Germany being the leading country in continental Europe for fintech, hosting some of the largest neobanks and related service providers. Some fintech have already begun to encroach on bank's businesses, such as payment systems, for instance. In light of the mounting competition from fintech, inability of German banks to accelerate technological innovation, digitization, and digitalization could put them at a competitive disadvantage, resulting in loss of market share and profits.

65. Along with greater opportunities for banks, digitalization also carries greater risks of cyber attacks. German banks increasingly recognize the importance of digitalization on the sustainability of their business models and their ability to generate profits in the future. Since the COVID-19 pandemic, banks have stepped up their efforts to accelerate digitalization. Greater digitalization, however, also increases cyber attack risks. According to an EBA survey (Fall of 2021), a significant share of interviewed banks (55 percent) continued to expect an increase in operational risk, specifically from cyber risk and data security issues (90 percent), followed by conduct and legal risk (42 percent) (2021Q3 EBA risk dashboard).⁴⁴

66. Changes in consumer behavior and demographic shifts could favor banks that offer innovative banking products. Due to conservative preferences and an ageing population, German clients traditionally have favored the brick-and-mortar bank business models. In recent years, however, urbanization and migration patterns have led to population growth in larger cities, where customers increasingly prefer opting for cheaper and faster bank services in lieu of dense branch networks. The COVID-19 pandemic accelerated this trend toward digital products. Further shift in preferences may slowly move the client base to more populated areas, forcing smaller institutions in rural areas out of business. Over the long term, declining population, along with rising old-age dependency ratios, may slow demand for financial services, curtailing bank balance sheet growth, and potentially resulting in lower income generation.⁴⁵

⁴⁴ For details, see EBA, "[Risk Dashboard](#)", 2021Q3.

⁴⁵ For reference on demographic change projections, see European Commission Report [The Impact of Demographic Change](#).

67. Sustainability risks – namely environmental, social, and governance – could pose challenges for German banks if preparations of holistic risk management frameworks come off track.

A BaFin survey suggests that the majority of German entities recognize the need of a comprehensive approach to potential sustainability risks, with climate and environmental risks receiving marginally more attention and accounting for both physical and transition risks. Climate risks for banks could stem from potential losses in the value of existing assets due to extreme weather events (physical risks) or changing patterns of consumption and investment, which arise in connection with the transition to a climate-neutral economy (transition risks).⁴⁶ Most institutions, however, are yet to incorporate fully climate risks into their business practices.⁴⁷

68. Geopolitical developments could pose risks to German banks, as the fallout from the war in Ukraine is expected to delay the economic recovery.

While direct exposures of German banks to Russia and Ukraine are limited, the war is likely to exert a material drag on GDP growth through higher energy prices, tighter financial conditions, and elevated uncertainty, as well as disruptions in supply chains, including energy supply, and rising inflation. This could affect banks' clients' ability to service debt, leading to higher NPLs and lower profitability.

CONCLUSIONS AND POLICY RECOMMENDATIONS

69. The structurally low profitability of the German banking sector remains a concern for financial stability. Risk-adjusted profitability measures suggest that performance of German banks appears more favorable, as low profitability is partially compensated by lower volatility and risk-taking, but most banks fall below the comparator group averages and medians. Using other profitability measures, such as returns on assets, equity, and risk-weighted assets, German banks rank among the lowest in Europe (Figure 1). Although the German banking system has served the economy well in providing competitively-priced products, low profitability undermines banking sector resilience, as banks may be more likely to use capital rather than earnings to absorb losses in case of a shock.

70. Rising risks and vulnerabilities challenge the sustainability of savings and cooperative banks' business models and call for greater risk monitoring. Until now, increased lending, particularly for residential and commercial real estate, has helped savings and cooperative banks boost revenues and partially offset declining interest rates. Going forward, however, rising risks and vulnerabilities in the German banking sector, particularly those stemming from real estate, challenge the sustainability of such business models. Other risks, including those stemming from interest rate

⁴⁶ An example of transition risks includes political measures that may lead to fossil fuels becoming more expensive and/or scarce or to high investment costs because of the required clean-up of buildings and plants. For details, see BaFin's report titled ["Germany's financial sector and the issue of sustainability risks: A status survey conducted by BaFin"](#).

⁴⁷ The stocktaking published by the ECB in 2020 demonstrated that virtually none of the institutions in the scope of the assessment would meet the minimum level of disclosures set out in the "ECB Guide on climate-related and environmental risks" (published 27 November 2020). A [subsequent assessment](#) (2022) of the gaps in risks disclosures revealed clear progress toward the goal.

changes, cyber risks, and geopolitical developments, are also on the rise. Thus, efforts to collect detailed data on bank exposures to various risks should continue, including granular information on exposures to residential real estate, particularly in markets with greater estimated overvaluation (such as larger cities), and on exposures to commercial real estate sub-sectors (such as office, logistics, food/non-food retail properties). The impact of risk materialization, such as price correction in RRE/CRE and interest rate normalization, on banks should be examined closely.

71. Rising risks warrant greater efforts to implement a combination of cost-reducing and income-generative measures to develop sustainable business models. Cost-reduction measures have a limit and, on their own, may not be able to offset declining revenues, thus, calling for a comprehensive approach of cost-reducing and income-generating measures to improve profitability.

72. Measures to scale up profitability, such as headcount and branch network optimization combined with digitalization, would help reduce cost inefficiencies of German banks. Greater reliance on digitization may promote cost efficiency and creation of new business opportunities when developing bank strategic responses to various risks.

73. Scope for greater process automation and product standardization should be reviewed to help cut costs and face competition from fintech. Operating in a highly competitive environment, some banks, for instance savings and cooperative banks, may customize their retail products to accommodate client's needs. This in turn may inhibit bank cost reduction that could be achieved from the economies of scale by process automation and product standardization. Thus, banks should assess the possibility of replacing tailored with more standardized products to help reduce costs and increase profitability, while ensuring that such measures do not worsen adverse selection problems that may affect financial stability.

74. Income generation through revenue diversification and greater reliance on fees would help bolster profitability. Banks' ability to capitalize on changing customer preferences – as low-interest rates have prompted more customer interest in fee-based products – could boost banks' profits. As interest rate stabilization is likely to reduce gains on securities, greater contribution from fees and commissions would help improve profits.

75. Continued market-led consolidation, resulting in fewer but more profitable institutions, is crucial for attaining economies of scale. According to the EBA questionnaire, around 60 percent of surveyed European banks reported, considering or have considered, mergers and acquisitions. Market analysts consider the complexity and regulatory requirements as the main obstacles to banking consolidation and banks cite the lack of business opportunities.⁴⁸ Obstacles to cross-border consolidation should be reduced to the extent possible. These include differences in reporting requirements, insolvency schemes, taxation regimes, AML/CFT, data privacy laws, etc.

⁴⁸ For details, see EBA, "[Risk Dashboard](#)", 2021Q3.

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Appendix I. Descriptive Statistics and Additional Results

**Table 1. Descriptive Statistics of Main Variables:
European SIs Sample**

Measure	Variable	Definition and specification	Observations	Median	Mean	SD
Bank-specific variables						
Profitability	ROA	Return on average assets	1,842	0.4	0.5	1.5
	ROA	Return on average assets	1,839	7.0	6.3	24.3
	Profit relative to RWA	Operating profit to risk-weighted assets (RWA)	1,279	1.3	1.2	2.9
Size	Asset size	Log (assets)	1,934	24.6	24.6	2.0
Solvency	Tangible equity	Tangible common equity-to-tangible assets	1,934	4.9	6.5	8.6
Asset quality	NPL ratio	Nonperforming loans-to-total gross loans	1,416	3.6	6.3	8.3
Efficiency	Cost-to-income	Overhead cost-to-operating income ratio	1,916	62.1	63.0	22.1
Funding	Wholesale funding ratio	Wholesale funding/total funding and capital ratio	1,851	20.1	24.8	22.9
Diversification	Income diversification	Non-interest income-to-total income	1,915	36.1	39.9	59.7
Macroeconomic						
Income growth	GDP growth	Real GDP growth rate	1,935	1.7	1.5	3.6
Policy rate	EURIBOR	3M EURIBOR rate	1,935	0.8	1.4	1.7
Structural						
Branch density			1,922	0.4	0.4	0.2
Industry concentration			1,931	47.6	52.8	22.1

Sources: Bundesbank; FitchConnect; Haver Analytics; ECB; and IMF staff estimates and calculations.

**Table 2. Descriptive Statistics of Main Variables:
German Banks Sample**

Measure	Variable	Definition and specification	Observations	Median	Mean	SD
Bank-specific variables						
Profitability	ROA	Return on average assets	25,134	0.2	0.3	1.1
	ROE	Return on average equity	25,132	3.0	3.7	8.8
Size	Asset size	Log (assets)	25,671	20.4	20.5	1.6
	Employees	Log (employees)	23,770	5.2	5.2	1.4
Solvency		Equity-to-assets ratio	25,671	7.3	8.1	6.1
		Tangible common equity-to-tangible assets	25,671	7.3	8.1	6.0
Asset quality	NPL ratio	Nonperforming loans-to-total gross loans	9,515	2.1	2.8	3.5
Efficiency	Cost-to-income	Overhead cost-to-operating income ratio	25,574	69.4	70.1	15.9
	Loans-to-assets	Total loans-to-total assets	25,654	60.9	58.6	16.6
	Deposits-to-assets	Total deposits-to-total assets	25,621	74.6	70.6	16.4
Diversification		Non-interest income-to-total income	25,624	26.0	28.4	16.5
Macroeconomic						
Economic growth	GDP growth	Real GDP growth rate	28,728	1.2	1.1	2.4
Policy rate	EURIBOR	3M EURIBOR rate	28,728	1.2	1.6	1.8
	Term spread	Government bond yield spread: difference between 10-year and 1-year debt	28,728	1.2	1.3	0.8
	ECB policy rate proxy	3M zero-coupon yield on AAA Euro Area securities	23,256	0.1	0.6	1.5
FCI		Financial conditions index	28,728	-0.2	0.1	0.6
Structural						
Industry concentration		Share of 5 largest credit institutions in total assets	28,728	29.1	26.9	5.1

Sources: Bundesbank; FitchConnect; Haver Analytics; ECB; and IMF staff estimates and calculations.

Table 3. European SIs Sample: Regression Results 1/

<i>Dependent variable:</i>	ROAA		ROAE		Operating profit/RWA	
	(1)	(2)	(3)	(4)	(5)	(6)
Bank-specific indicators						
NPL ratio	-0.0629*** (0.0126)	-0.0678*** (0.0129)	-1.026*** (0.271)	-1.079*** (0.269)	-0.124*** (0.0199)	-0.128*** (0.0195)
Total assets	0.188*** (0.0664)	0.236*** (0.0765)	5.018** (2.337)	4.858** (2.022)	0.238 (0.243)	0.227 (0.228)
Tangible common equity/tangible assets	0.138*** (0.0169)	0.142*** (0.0186)	1.567* (0.830)	1.597* (0.842)	0.180*** (0.0568)	0.181*** (0.0560)
Wholesale funding/total funding and capital ratio	-0.0106** (0.00535)	-0.00492 (0.00493)	-0.438** (0.186)	-0.422** (0.185)	-0.0156* (0.00870)	-0.0196** (0.00980)
Non-interest income/Total operating income ratio	0.00464 (0.00375)	0.00535 (0.00400)	0.148 (0.0970)	0.146 (0.0951)	-0.00151 (0.00730)	-0.00143 (0.00777)
Cost-to-income ratio	-0.0116*** (0.00388)	-0.0113*** (0.00383)	-0.246** (0.102)	-0.249** (0.1000)	-0.0457*** (0.00844)	-0.0460*** (0.00890)
Macroeconomic indicators						
Real GDP growth	0.103*** (0.0144)	0.104*** (0.0143)	1.555*** (0.207)	1.460*** (0.209)	0.204*** (0.0251)	0.193*** (0.0236)
EURIBOR 3-month	0.113*** (0.0310)	0.136*** (0.0291)	2.715*** (0.730)	2.767*** (0.733)	-0.0525 (0.0680)	-0.0382 (0.0775)
Banking industry indicators						
Branches per capita		-0.487 (0.359)		-2.572 (11.90)		-0.407 (1.066)
Share of 5 largest banks in total assets		0.0128*** (0.00485)		0.100 (0.0747)		0.00356 (0.00898)
Macroeconomic indicators						
Dependent variable t_{-1}	-0.0623** (0.0314)	-0.0777** (0.0313)	-0.00116 (0.0352)	-0.00678 (0.0372)	-0.0266 (0.0382)	-0.0267 (0.0404)
Dependent variable t_{-2}	-0.159*** (0.0325)	-0.168*** (0.0308)	-0.0846*** (0.0166)	-0.0936*** (0.0176)	-0.0275 (0.0276)	-0.0279 (0.0284)
Dependent variable t_{-3}			-0.0400 (0.0280)	-0.0327 (0.0266)		
Constant	-4.038** (1.649)	-5.906*** (2.160)	-106.3* (62.67)	-106.5** (52.60)	-1.838 (6.471)	-1.454 (6.031)
Observations	1,135	1,133	1,025	1,025	917	917
Number of banks	98	98	95	95	92	92

1/ Estimates based on Arellano–Bover/Blundell–Bond linear dynamic panel-data estimation with robust standard errors. The number of lagged dependent variables varies by specification to ensure no serial correlation in the idiosyncratic errors. In this specification, bank-specific and banking industry indicators are considered endogenous.

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 4. German Banks Sample: OLS Regression Results 1/

Dependent variable:	ROAA							ROAE						
	Sample:	Full sample	Full sample	Full sample	Full sample 2/	Commercial	Credit	Savings	Full sample	Full sample	Full sample	Full sample 2/	Commercial	Credit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Bank-specific														
Size (log assets) _{t-1}	-0.134*** (0.0393)			-0.108** (0.0455)	0.157 (0.236)	-0.0966*** (0.0152)	-0.0436* (0.0244)	-1.683** (0.787)			-1.994** (0.843)	2.275 (1.847)	-1.478*** (0.268)	-0.440 (0.494)
Size (log employees) _{t-1}		-0.0939*** (0.0267)	-0.0930*** (0.0267)						-2.081*** (0.654)	-2.078*** (0.653)				
Equity-to-assets _{t-1}	0.00886 (0.0107)	0.0107 (0.0111)		0.0130 (0.0119)	-0.0296 (0.0286)	-0.00122 (0.00698)	-0.00597*** (0.00200)	-0.126 (0.0976)	-0.119 (0.0956)		-0.126 (0.0994)	-0.199 (0.157)	-0.307** (0.136)	-0.295*** (0.0339)
Tangible common equity-to-tangible assets _{t-1}			0.0113 (0.0110)							-0.108 (0.0891)				
NPL ratio _{t-1}	0.00153 (0.00437)	0.00334 (0.00549)	0.00336 (0.00550)	4.20e-05 (0.00440)				0.00726 (0.0643)	0.0392 (0.0871)	0.0397 (0.0873)	-0.0153 (0.0660)			
Cost-to-income ratio _{t-1}	-0.00189** (0.000787)	-0.00152* (0.000825)	-0.00152* (0.000827)	-0.00185** (0.000789)	-0.0114* (0.00616)	-0.00343*** (0.000469)	-0.000981 (0.000602)	-0.0260*** (0.00937)	-0.0182* (0.00992)	-0.0184* (0.00999)	-0.0279*** (0.00903)	-0.0988*** (0.0335)	-0.0459*** (0.00542)	-0.00780 (0.0137)
Loan-to-assets ratio _{t-1}	-0.000309 (0.00169)	1.84e-05 (0.00170)	2.53e-05 (0.00170)	-1.69e-05 (0.00176)	-0.00119 (0.00669)	-0.00207** (0.000899)	0.000239 (0.000503)	0.00902 (0.0250)	0.0161 (0.0258)	0.0157 (0.0258)	0.00249 (0.0246)	0.0379 (0.0729)	-0.0343*** (0.0118)	0.00266 (0.00906)
Deposits-to-assets ratio _{t-1}	6.63e-05 (0.00218)	0.000749 (0.00213)	0.000768 (0.00211)	8.92e-05 (0.00221)	-0.00239 (0.00474)	0.000558 (0.000984)	0.00191*** (0.000558)	0.0140 (0.0312)	0.0219 (0.0320)	0.0216 (0.0320)	-0.000598 (0.0330)	0.00241 (0.0435)	-0.00110 (0.0146)	0.0335*** (0.0111)
Noninterest income-to-total income _{t-1}	0.000132 (0.000914)	6.30e-05 (0.000913)	4.11e-05 (0.000913)	0.000324 (0.000870)	0.00805 (0.00583)	-0.00229* (0.00118)	-0.00297*** (0.000757)	0.0448 (0.0276)	0.0423 (0.0263)	0.0421 (0.0263)	0.0342 (0.0229)	0.00145 (0.0507)	-0.0506** (0.0205)	-0.0608*** (0.0206)
Macroeconomic & structural														
GDP growth	0.00722*** (0.00180)	0.0113*** (0.00147)	0.0113*** (0.00146)		0.0398* (0.0233)	0.00362*** (0.000930)	0.00246*** (0.000567)	0.106*** (0.0362)	0.163*** (0.0318)	0.163*** (0.0317)		0.442** (0.176)	0.0212* (0.0109)	0.0179* (0.0101)
Government debt yield 2-year	0.0359* (0.0209)	0.0521** (0.0215)	0.0526** (0.0213)		0.0378 (0.0873)	0.0181*** (0.00430)	0.00594*** (0.00229)	0.678* (0.368)	0.798** (0.378)	0.810** (0.373)		1.355** (0.572)	0.252*** (0.0771)	0.156*** (0.0426)
Bank industry concentration _{t-1}	0.00897*** (0.00317)	0.0140*** (0.00309)	0.0141*** (0.00308)		0.0288 (0.0201)	0.00771*** (0.000690)	0.00236*** (0.000809)	0.203*** (0.0700)	0.270*** (0.0759)	0.272*** (0.0760)		0.0594 (0.230)	0.0523*** (0.00923)	-0.00192 (0.0136)
Constant	2.834*** (0.903)	0.288 (0.228)	0.274 (0.231)	2.495** (1.031)	-2.722 (5.328)	2.250*** (0.319)	0.972* (0.536)	31.71* (16.28)	4.217 (4.162)	4.130 (4.176)	45.77*** (17.42)	-38.86 (35.83)	38.38*** (5.157)	12.90 (10.94)
Observations	8,586	8,560	8,560	8,586	2,215	13,578	7,290	8,586	8,560	8,560	8,586	2,214	13,578	7,290
R-squared	0.696	0.695	0.695	0.701	0.413	0.584	0.297	0.403	0.407	0.406	0.463	0.436	0.376	0.287
Includes year fixed effects 2/				Yes							Yes			

1/ Estimates based on OLS estimators with bank fixed effects. Bank and year fixed effects not shown. Robust standard errors, clustered by bank, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

2/ Includes bank fixed effects (not shown).