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Bank-lending Channel, Monetary Policy, and Bank-level Heterogeneity: Contrasting Evidence from the Euro Area and Scandinavia

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Abstract

This paper investigates how bank-specific attributes influence the bank-lending channel across monetary policy cycles for commercial banks from the euro area and three Scandinavian countries (Denmark, Norway, Sweden) over the period 2004–2020, covering more than 3,200 institutions. Using fixed effects panel regressions on unconsolidated BankScope/Orbis data, we quantify the differential impact of changes in the monetary policy stance (including policy-rate increases) conditional on bank size, capitalisation, profitability and loan-loss provisioning. The results show that larger banks curb lending significantly less than their smaller peers, especially in Sweden and Norway; well-capitalised banks also cushion the contraction, whereas high provisioning amplifies it. The findings highlight the importance of tailoring macroprudential buffers to institutional structures and caution against a one-size-fits-all approach within the European Single Market. By contrasting regulatory and monetary regimes, the study contributes to the comparative literature on monetary transmission and offers comparative, ex-ante insights for authorities still navigating the post-pandemic tightening cycle.

Keywords: bank-lending channel, monetary policy, bank heterogeneity, euro area-Scandinavia comparison
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Introduction

The post-2022 shift in monetary policy stance represents one of the most pronounced policy reversals in Europe in recent decades. Over this period, the European Central Bank (ECB) raised its deposit-facility rate by 375 basis points, while central banks in Scandinavia – specifically Sweden, Norway and Denmark – adjusted their monetary policy stances in response to the same inflationary and geopolitical shocks, albeit with important cross-country differences in the timing and intensity of rate changes. Although driven by broadly similar macroeconomic factors, the structural and institutional settings of banking sectors within these regions differ significantly.

The dataset concludes in 2020, prior to the onset of the latest rate increases; accordingly, it includes two historical subperiods (2006–2008 and 2017–2019) that are used as episodes of monetary normalisation or a less-accommodative stance, rather than as uniform tightening cycles across all jurisdictions. These periods provide a valuable empirical laboratory for analysing how institutional design conditions the lending channel. Importantly, these subperiods are not interpreted as synchronised tightening episodes across the euro area and Scandinavia. In particular, between 2017 and 2019, monetary policy in Sweden and Denmark remained highly accommodative, with policy rates at or below zero, while Norway experienced gradual normalisation. We, therefore, exploit within-country variation in the monetary stance and treat these subperiods as relative shifts in policy stances within each jurisdiction, rather than common tightening shocks across regions.

The 2022–2024 episode is used purely as contemporary motivation; therefore, the results should be interpreted as ex-ante lessons for the present cycle rather than an ex-post evaluation. The 2004–2020 window is predominantly accommodative; we, therefore, examine transmission across policy cycles using 2006–2008 and 2017–2019 as historical contrasts in the monetary stance. An additional driver of the post-2022 tightening was the unconventional pandemic-era expansion of money and fiscal support, which reshaped liquidity and inflation dynamics. References to the 2022–2024 cycle serve as contemporary motivation only.

Within the euro area, banks operate under a unified monetary framework administered by the ECB. Conversely, Scandinavian banking sectors face nationally distinct monetary policies, characterised by differences in policy rates and regulatory environments. Moreover, euro area banks predominantly rely on retail deposits, while Scandinavian banks significantly depend on wholesale funding, particularly through deep, liquid covered-bond markets. Additionally, the early and proactive adoption of macro-prudential measures, such as positive-neutral countercyclical capital buffers (CCyBs), in Scandinavia starkly contrasts with the relatively conservative and delayed implementation within the euro area.

This paper extends existing research by systematically examining how bank-specific attributes – such as size, capitalisation, profitability, and asset quality – mediate the bank-lending channel's response to episodes of monetary normalisation or a less-accommodative stance across these markedly different institutional frameworks. Utilising panel data covering 2004–2020 for 2,978 euro-area banks and 295 Scandinavian banks, this study aims to elucidate how bank characteristics can yield divergent lending behaviours depending on surrounding institutional and structural contexts.

The empirical findings underscore significant institutional effects on monetary transmission mechanisms. Large banks consistently demonstrate greater resilience to monetary shocks. However, the buffering role of capital adequacy appears effective only when regulators explicitly communicate the usability of capital buffers, a dynamic clearly evidenced in Denmark. Conversely, Swedish banks, which view capital buffers as rigid and non-negotiable, respond by precautionary hoarding, exacerbating the credit contraction. Profitability operates differently depending on the banking system's funding structure; in wholesale-funded systems, such as Norway, profitability mitigates contraction, whereas in euro-area banks reliant on deposit funding, profitability intensifies credit rationing. Moreover, asset quality implications diverge notably, conditioned by varying collateral valuation methodologies and provisioning practices across these distinct banking models.

The evidence presented challenges the effectiveness of uniform regulatory strategies, instead highlighting the importance of tailoring macro-prudential policies to institutional and structural specificities. Policymakers must acknowledge that interactions between bank-specific characteristics and broader institutional structures crucially affect monetary policy effectiveness.

This paper contrasts a unified monetary regime (the euro area) with national regimes (Denmark, Norway and Sweden) to test whether bank-level transmission depends on institutional context. The euro area embeds a common policy rate and shared market infrastructures, while these countries retain national policy tools and supervisory practices. Funding structures differ materially: the euro area is more deposit-funded on average, whereas Scandinavian systems feature a stronger wholesale and covered-bond bias. These contrasts shape the marginal cost of funding and the scope to reprice liabilities when policy shifts. Macroprudential buffer usability also diverges. In some Scandinavian jurisdictions, countercyclical and other buffers were signalled as usable under stress, whereas euro-area practice has at times been more conservative. We, therefore, hypothesise heterogeneous pass-through by bank size, capitalisation, profitability and asset quality, conditional on these institutional features, and structure the empirical design accordingly.

The paper is structured as follows. Section 2 presents the literature review underpinning the bank-lending channel and our research hypotheses. Section 3 details the data sources, the econometric methodology employed, and the descriptive statistics. In Section 4, we present the main empirical results, contrasting the findings for the euro area and individual Scandinavian countries. The paper concludes with Section 5, which summarises the findings, discusses the macro-prudential policy implications, and suggests directions for future research.

Literature Review

The conceptual foundations of the bank-lending channel were articulated by Bernanke and Blinder (1988), who emphasised that monetary policy affects real economic activity not only through interest rates but also by influencing banks' ability and willingness to extend credit. In their framework, contractionary open-market operations reduce reserves held by depository institutions, thereby limiting loan extension when bank credit cannot be perfectly replaced by other assets. This theoretical contribution subsequently inspired a broad empirical literature exploring the circumstances under which monetary policy actions propagate through banks' lending decisions.

Building on this theory, Kashyap and Stein (1995) exploit cross-sectional differences in bank size and balance-sheet liquidity to assess how monetary tightening propagates through loan supply. Their findings indicate that after a tightening of monetary policy, smaller banks, constrained by their dependence on core deposits, reduce lending substantially more than larger banks, which are typically better equipped to tap alternative funding sources. This evidence underscores that the strength of the bank-lending channel varies inversely with bank size and intensifies when institutions face greater liquidity constraints.

Kishan and Opiela (2000) extend the bank-lending channel literature by demonstrating that capital adequacy critically shapes banks' responses to monetary tightening. By analysing U.S. commercial banks sorted by Tier 1 capital ratios, they show that banks with lower capital ratios respond to policy rate hikes by sharply cutting back on lending, while institutions with stronger capital positions tend to preserve their credit extension capacity. This evidence emphasises that regulatory capital requirements and individual institutions' balance-sheet strength play a central role in amplifying monetary policy's effects via the lending channel.

Taken together, these foundational and early empirical works established that the efficacy of the bank-lending channel is not uniform across institutions but is critically mediated by bank-specific characteristics such as size, liquidity, and, crucially, capital adequacy, thereby setting the stage for more nuanced investigations into these micro-level determinants.

Subsequent research within European banking systems has validated and extended these findings. De Haan (2001) utilised bank-level panel data from the Netherlands to demonstrate that monetary tightening leads to disproportionately large contractions in unsecured lending at institutions whose capital ratios lie in the lowest quintile, indicating that thinner capital buffers amplify banks' sensitivity to policy shocks. Similarly, De Santis and Surico (2013) estimate panel regressions on bank loan growth across euro-area countries and find that cooperative banks in Germany and savings banks in Italy cut lending by significantly more than their commercial counterparts following policy tightenings – a pattern they link to these institutions' ownership forms, liquidity profiles, and localised market orientation. Altavilla, Canova, and Ciccarelli (2016) assemble a detailed monthly bank-level dataset for the euro area and document that banks in the bottom quartile of capital ratios or with elevated non-performing-loan shares reduce their lending rates – and therefore credit supply – far more in the wake of conventional rate hikes and targeted refinancing operations than do their better-capitalised peers, underscoring the centrality of balance-sheet strength in the lending channel. Collectively, these European investigations not only corroborated the earlier U.S. findings on the importance of factors like capital in the monetary transmission mechanism but also began to highlight how diverse institutional settings and bank ownership structures within developed economies could further modulate the bank-lending channel.

The role of profitability introduces additional complexity into the bank-lending channel literature. While not directly modelling lending behaviour, Caparusso, Lewrick, and Tarashev (2023) use a panel of global systemically important banks to show that banks projecting higher returns and maintaining larger discretionary capital cushions exhibit stronger market valuations and enjoy more flexibility relative to regulatory capital thresholds. Gambacorta and Marques-Ibanez (2011) presented evidence that banks with lower core capital ratios, heavier reliance on market funding, and larger shares of non-interest income reduced lending more sharply during both policy tightening and the financial crisis, demonstrating that funding structures and income composition critically determine banks' responses to monetary shocks. Thus, the literature progressively painted a more intricate picture, revealing that beyond traditional balance sheet metrics, banks' profitability, reliance on market funding, and income diversification also significantly condition their lending response to monetary policy shifts, adding further layers of complexity.

Distinct institutional features of Scandinavian banking systems provide valuable comparative insights into the functioning of the bank-lending channel. Danmarks Nationalbank (Gundersen, Secher Hesselberg, and Hove 2011) underscored the structural importance of Denmark's covered bond market, noting that its deep liquidity and integration with mortgage financing distinguish it from traditional deposit-based systems. While not explicitly framed in terms of monetary transmission, the widespread use of covered bonds in Denmark suggests a potential redistribution of interest rate sensitivity away from banks and toward bond markets. Complementing this, Norges Bank (2023) emphasised the role of macroprudential tools – particularly the countercyclical capital buffer (CCyB) – in enhancing financial system resilience. By calibrating the CCyB in response to cyclical risks, Norwegian authorities aim to ensure that capital buffers remain usable during downturns, thereby moderating banks' procyclical lending responses to monetary policy shocks. Jordà, Schularick, and Taylor (2016) demonstrate, using over a century of disaggregated credit data for advanced economies, that real estate lending booms as early warning signs of financial instability, noting that credit expansions tied to property markets often precede deeper and longer-lasting economic recessions – underscoring the role of real-estate collateral in the monetary transmission process and in crisis amplification. These distinct institutional features and macroprudential approaches observed in Scandinavian economies, alongside broader historical findings on credit cycles, underscore that the bank-lending channel operates within, and is shaped by, specific national financial architectures and policy priorities, suggesting mechanisms that may differ systematically from those in other regions.

A growing literature examines the interplay between CCyBs and the transmission of monetary policy. Angelini, Neri, and Panetta (2014) employ a dynamic general-equilibrium model with a banking sector to show that coordinating countercyclical capital buffers with interest rate decisions enhances macroeconomic stability, especially when credit supply is disrupted by financial disturbances. Altunbas, Binici, and Gambacorta (2017) complement this with cross-country regressions linking macroprudential buffer movements to subsequent changes in banks' loan growth. They find that buffers built up during expansions tend to be drawn down in downturns – thereby smoothing credit cycles. The Basel Committee (Bank for International Settlements, 2017) and the European Systemic Risk Board (2020) both define CCyBs as capital add-ons that rise with systemic-risk indicators to restrain excessive credit expansion and to provide headroom for banks when stress hits. Empirical analyses reinforce the importance of design and timing: Jiménez et al. (2017), using Spain's dynamic-provisioning experiment, demonstrate that higher provisioning requirements during booms mitigate loan contractions in the subsequent crisis. Meanwhile, Acharya, Berger, and Roman (2018) document that the calibration and activation of capital buffers materially affect banks' risk-taking incentives and credit-supply responses under stress. This burgeoning body of research, therefore, converges on the view that while CCyBs can theoretically enhance macroeconomic stability and smooth credit cycles, their practical effectiveness is contingent upon careful design, timely activation, and a clear understanding of their interaction with banks' underlying balance sheet strength and risk perceptions.

Gropp and Heider (2014) document that banks nearing their regulatory capital limits frequently avoid utilising these buffers due to concerns about reputational damage or heightened regulatory attention. As a result, institutions engage in precautionary capital hoarding, which can exacerbate credit contractions when monetary policy tightens. Haldane (2012) argues that only with clear, consistent, and credible communication from authorities regarding the conditions and implications of buffer use can banks gain confidence to draw on these reserves without fear of reputational or regulatory backlash. Survey evidence presented by Schoenmaker and Wierts (2016) confirms that jurisdictions where buffer-drawdown rules are transparently articulated see materially higher rates of actual buffer utilisation during downturns, indicating that perceived usability hinges on policymakers' articulation of drawdown frameworks. Consequently, the de facto utility of capital buffers in mitigating credit crunches appears significantly mediated by behavioural factors, such as the fear of stigma, and the credibility of regulatory communication, emphasising that the mere existence of buffers does not guarantee their use as intended shock absorbers.

Although the bank-lending channel has been extensively studied within individual jurisdictions (e.g. De Haan 2001; De Santis and Surico 2013; Altavilla, Canova, and Ciccarelli 2016), systematic cross-country comparisons remain relatively scarce. The predominance of single-region analyses constrains the generalizability of policy recommendations derived from such work. To fill this gap, the current study systematically contrasts euro-area and Scandinavian banking systems using harmonised bank-level data. This approach facilitates robust insights into how institutional differences mediate the impact of bank-specific characteristics, such as capital adequacy, on lending behaviour under monetary policy shifts.

We formulate the following hypotheses:

H1: Larger banks mitigate the contraction in lending after a rate hike.

H2: Higher capitalisation mitigates the contraction in jurisdictions where buffers are usable.

H3: Profitability mitigates the contraction in wholesale-funded systems.

H4: Higher impairments amplify the contraction, conditional on valuation practices.

Data and Econometric Methodology

The empirical work draws on an annual panel covering more than 3,200 banks over the 2004–2020 period. We splice BankScope (to 2015) with the Orbis/BankFocus files (2010–2020), hand-matching institutions where coding conventions differ. The merge yields a time-series long enough to observe both the macro backdrop (policy rates, inflation, unemployment, and GDP growth) and balance-sheet dynamics (total assets, loans, deposits, loan-loss provisions, and profitability, measured as return on assets (ROA)). After winsorising the extreme 1% tails of each bank-level variable and retaining banks with at least six consecutive observations of loan growth, we obtain a clean panel containing over 2,700 banks suited to testing the bank-lending channel and its conditioning factors.

The identification does not rely on the assumption of homogeneous monetary tightening across regions. Instead, it exploits within-country variation in policy rates and heterogeneous transmission conditional on institutional settings and bank characteristics. Accordingly, the empirical results are interpreted as robust conditional correlations rather than structurally identified causal effects.

The analysis employs unconsolidated financial statements, aligning with methodological recommendations for isolating the bank-lending channel's transmission mechanisms (Kashyap and Stein 2000; Jiménez et al. 2012). Unconsolidated data provide a more precise representation of individual banks' standalone liquidity positions, capital adequacy, and lending capacity, which are critical for disentangling monetary policy effects on credit supply. By excluding subsidiary operations and intra-group transactions, this approach minimises confounding factors such as cross-subsidisation, regulatory arbitrage, and risk-sharing within banking conglomerates. In contrast, consolidated financial statements aggregate parent and subsidiary activities, thereby obfuscating the direct linkages between monetary policy shocks and core lending behaviours at the institutional level. This aggregation bias may attenuate empirical estimates of policy transmission efficacy, particularly in heterogeneous banking systems where parent-subsidiary interdependencies dilute granular insights (Borio, Gambacorta, and Hofmann 2015). Consequently, the use of unconsolidated data enhances the internal validity of the empirical analysis of monetary policy transmission at the bank level.

Although not directly included in the empirical model, selected indicators of market structure and financial depth are presented to provide context for cross-country differences in banking sector configurations and to outline directions for future research. For example, deposit-to-GDP ratios across the euro area reveal marked heterogeneity: from 385% in Luxembourg – reflecting its role as a financial hub (elevated ratios are also observed, for example, in Cyprus at 139% and Malta at 125%) – to just 40% in Latvia. Meanwhile, Scandinavian countries exhibit a narrower range (Denmark: 57%, Norway: 59%, Sweden: 62%), suggesting a degree of structural alignment despite differing macroeconomic and monetary frameworks. While not statistically analysed in this study, these disparities underscore the uneven intermediation capacity across jurisdictions. The observed convergence within the Scandinavian group, despite the absence of a unified monetary policy, points to the influence of region-specific regulatory frameworks or institutional complementarities that may support structural consistency across the region (e.g. Molyneux, Reghezza, and Xie 2019), warranting further investigation in future research.

Table 1. Characteristics of the banking sector

	Euro area	Denmark	Norway	Sweden
3-bank asset concentration	72%	82%	95%	93%
5-bank asset concentration	85%	90%	97%	96%
Bank deposits to GDP	93%	57%	59%	62%

Note: Average characteristics during the period covered by the analysis. 3-bank asset concentration – assets of the three largest commercial banks as a share of total commercial banking assets; 5-bank asset concentration – assets of the five largest banks as a share of total commercial banking assets; Bank deposits to GDP – total value of deposits in commercial banks and other financial institutions as a share of GDP.

Source: World Bank (Global Financial Development Database 2022).

Prior to examining the analysed characteristics, it is essential to assess the distinctions and commonalities among the studied markets from a data-driven perspective. The analysis first outlines changes in key policy rates within the euro area and Scandinavia, followed by an evaluation of the broader macroeconomic context, including indicators such as GDP growth and unemployment rates.

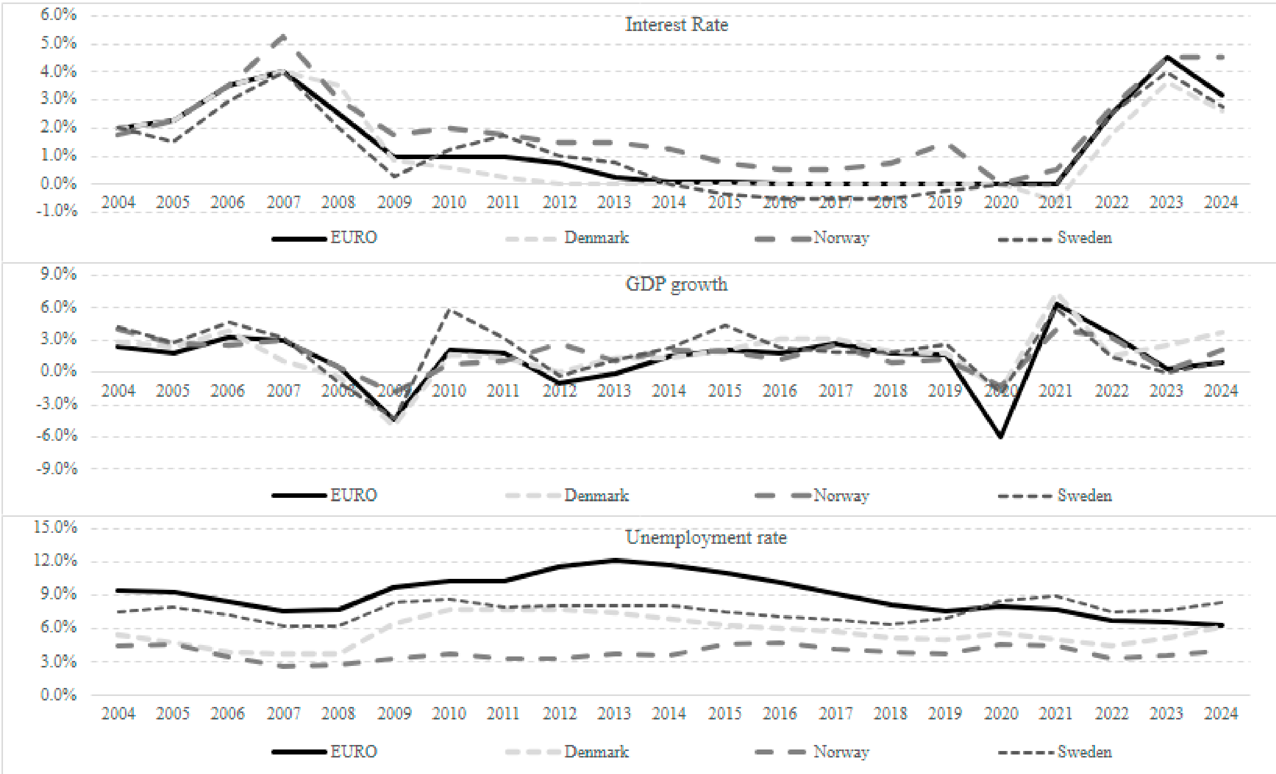

Chart 1. Interest rates, GDP growth and unemployment rate in the euro area and Scandinavian countries

Source: ECB, IMF.

Bank-level data includes key variables such as size (total assets), capitalisation (Tier 1 capital ratio), profitability (ROA), and asset quality (loan-loss provisions, LLP). Furthermore, these variables were standardised across the study sample to ensure comparability and facilitate the interpretation of the results. Each of these bank-specific variables is lagged by one year to mitigate potential endogeneity concerns.

The characteristics of the variables used in the model are outlined in the table below.

Table 2. Descriptive statistics of variables used in the model

Variable	EURO AREA		SCANDINAVIA		Denmark		Norway		Sweden	
	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev
d_loans_real	4.4	9.3	5.8	11.3	5.9	13.3	5.3	11.3	6.5	8.4
d_equity_real	6.5	9.1	7.1	11.5	6.7	11.8	7.3	12.1	7.3	10.0
d_cust_dep_real	5.0	15.8	6.5	10.8	7.0	12.9	6.3	10.9	6.3	7.8
gdpg	0.9	2.8	1.6	1.7	1.1	2.1	1.4	1.3	2.5	1.7

Variable	EURO AREA		SCANDINAVIA		Denmark		Norway		Sweden	
	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev	Mean	Std.Dev
d_ir	−0.3	0.7	−0.3	0.9	−0.2	0.8	−0.2	1.1	−0.4	0.6
unempl	7.2	3.0	5.2	1.8	6.0	1.4	3.7	0.6	7.2	0.6
CR5	37.0	14.5	77.6	17.8	66.1	1.4	96.7	1.6	57.6	2.1
NIM	2.4	1.0	2.4	1.2	3.2	1.4	2.1	0.9	2.4	1.3
Size	13.5	1.6	13.3	1.7	13.3	1.9	13.3	1.4	13.4	2.1
CAP	17.4	6.2	19.2	4.8	18.6	5.2	18.6	3.4	21.2	5.9
ROA	0.3	0.6	0.9	0.8	0.7	1.1	0.8	0.5	1.1	0.7
LLP	0.5	1.0	0.5	1.0	1.2	1.6	0.2	0.4	0.2	0.5
N (banks)	2 505		268		70		120		78	
Obs	18 283		2 845		803		1 339		703	

Note: d_loans_real – real loan growth rate, calculated as the log difference of inflation-adjusted bank loans (percentage points); d_equity_real – real equity growth rate, computed analogously to d_loans_real using the logarithm of inflation-adjusted equity(percentage points); d_cust_dep_rea – real growth rate of consumer deposits, adjusted for inflation (percentage points); gdpg – annual GDP growth rate (percentage points); d_ir – change in the reference interest rate set by central banks (percentage points); unempl – unemployment rate (percentage points); Size – logarithm of total assets (in the table before standarisation); CAP – Tier 1 capital ratio, measuring core equity relative to risk-weighted assets (percentage points, in the table before standarisation); ROA – return on assets, defined as net income divided by total assets (percentage points, in the table before standarisation); LLP – loan-loss provisions ratio, calculated as loan-loss provisions divided by total assets (percentage points, in the table before standarisation).

Source: STATA; own calculations.

Due to the critical role of the d_loans_real variable in this analysis, its distribution across the studied countries is illustrated below. To address the structural diversity of the euro area, findings are reported separately for individual member states.

The baseline econometric specification used to capture the bank-lending channel's sensitivity to monetary policy, moderated by bank characteristics, is formulated as:

$$\begin{aligned}\Delta \mathrm{Loans}_{i,j,t} &= \alpha_1 + \alpha_2\,\Delta\,\mathrm{Loans}_{i,t-1} + \alpha_3\,\Delta\,\mathrm{Equity}_{i,t} + \alpha_4\,\Delta\,\mathrm{Dep}_{i,t} \\ &+\alpha_5\,\Delta\,\mathrm{ir}_{j,t-1} + \alpha_6 \mathrm{gdpg}_{j,t-1} + \alpha_7 \mathrm{unempl}_{j,t} + \alpha_8 \mathrm{NIM}_{i,t} \\ &+\alpha_9 \mathrm{CR}\,5_{j,t} + \beta_k \mathrm{X}_{k,i,t} + \gamma_k(\mathrm{X}_{k,i,t}\cdot\Delta \mathrm{ir}_{j,t-1}) + \delta_i + \mu_t + \varepsilon_{i,j,t},\end{aligned}$$

where, $\Delta\mathbf{Loans}_{i,t}$ represents the real growth rate of loans; $\Delta\mathbf{Equity}_{i,t}$ represents the real equity growth rate; $\Delta\mathbf{Dep}_{i,t}$ represents the real growth rate of consumer deposits; *NIM* (net interest margin) measures the difference between the interest income generated by banks and the amount of interest paid out to their lenders, divided by the amount of their average earning assets. $\Delta\mathbf{ir}_{j,t-1}$ captures the lagged annual changes in policy rates, while $X_{k,i,t}$ represents the set of *k* bank-specific characteristics (Size, CAP, ROA and LLP). The equation also includes the interaction term $X_{k,i,t}\cdot\Delta\mathbf{ir}_{j,t-1}$ between bank-specific characteristics and lagged annual changes in policy rates. Additionally, macroeconomic conditions ($\mathbf{gdpg}_{j,t-1}$, $\mathbf{unempl}_{j,t}$) are controlled to isolate policy effects precisely. CR5 denotes asset concentration, defined as the assets of the five largest banks as a share of total commercial banking assets; δ_i denotes unobservable bank-specific effects; μ_t represents time fixed effects; and $\varepsilon_{i,j,t}$ represents white-noise errors. The indexes are marked: i – bank, j – country, and t – year.

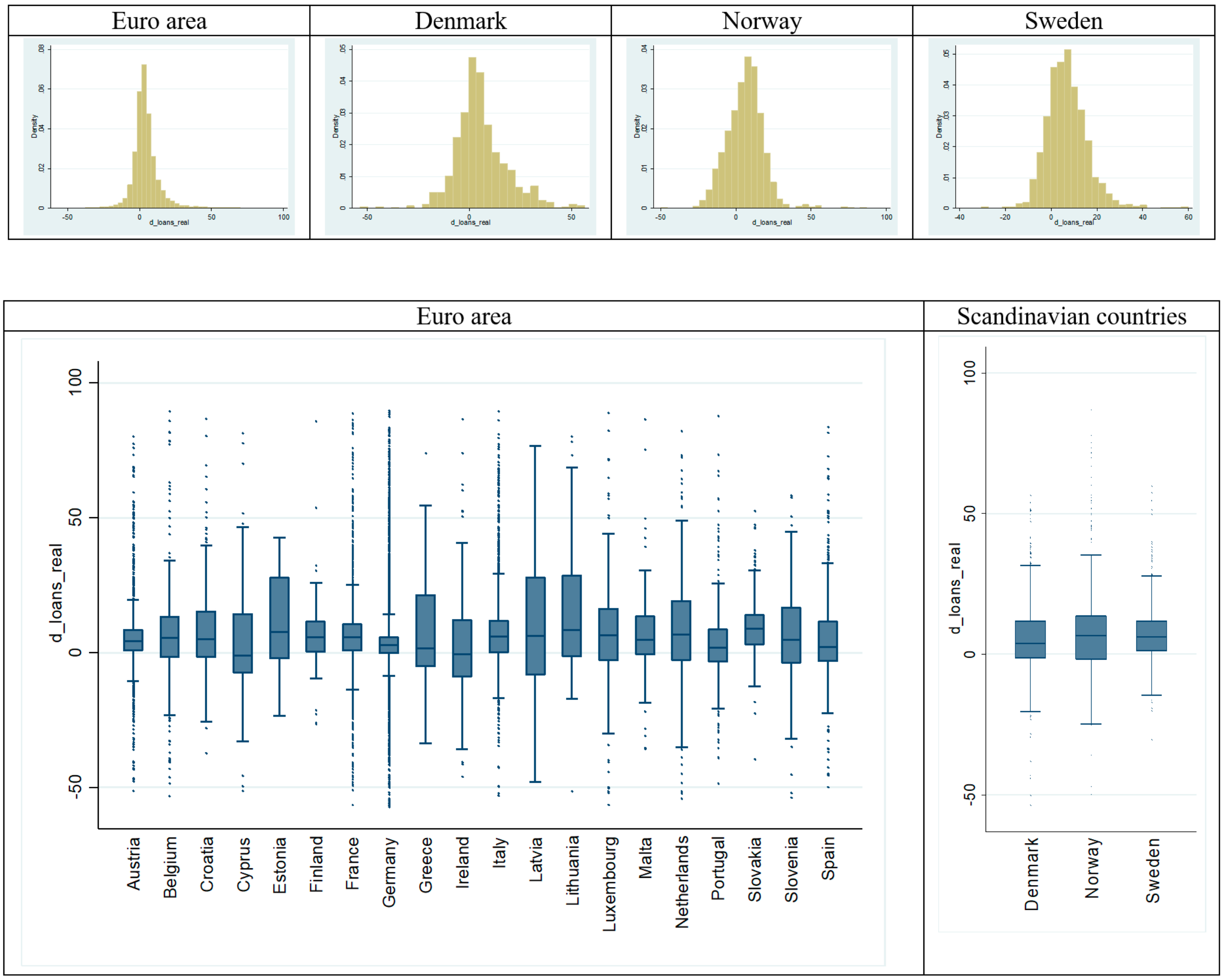

Chart 2. **Real loan growth rate distribution**

Source: STATA; own calculations.

The choice of a fixed effects (FE) panel estimator with a comprehensive set of control variables is a well-established and conservative approach in the empirical banking literature for isolating within-bank variation in lending behaviour (e.g., Kashyap and Stein 2000; Jiménez et al. 2012). While this specification does not claim to establish causality in a structural sense, it provides transparent and robust estimates of the conditional correlations central to our comparative research question. The FE framework effectively controls for time-invariant, unobserved bank heterogeneity, thereby mitigating a key source of omitted variable bias. Our rich set of controls, including lagged bank conditions and macroeconomic factors, further strengthens the credibility of the estimated associations between monetary policy, bank characteristics, and loan growth.

For the sake of reliable inference, we report both random effects (RE) and FE models in the appendix with standard errors clustered at the bank level (Table 4), FE regressions with Driscoll–Kraay standard errors (Table 5), and a dynamic specification estimated using system GMM (Table 6).

Bank-level clustering accounts for the unbalanced panel structure with varying numbers of banks across years and countries. As highlighted by Moody and Marvell (2020), clustering is essential in FE panel regressions to mitigate potential bias in standard errors and, consequently, unreliable inference regarding statistical significance. The Driscoll-Kraay estimator extends the standard FE framework by producing standard errors that are simultaneously robust to heteroskedasticity, serial correlation within entities, and cross-sectional dependence. This is particularly relevant in banking and macro-finance research, where common shocks – such as monetary policy decisions or regulatory changes – may affect all institutions in a given period, generating contemporaneous correlation across units. Coefficient estimates remain comparable to those obtained from standard FE regressions, while inference relies on a more robust variance-covariance structure.

In addition, we estimate a dynamic panel specification using the two-step system GMM estimator of Blundell and Bond (1998) with Windmeijer's (2005) finite-sample correction (Table 6) to address potential dynamic persistence and endogeneity concerns. Explanatory variables are instrumented using their own lagged values. The validity of the instrument set is assessed using the Hansen test of overidentifying restrictions. Results are interpreted cautiously and used as robustness checks rather than as primary causal estimates.

Empirical Results and Robustness Checks

It is important to frame the interpretation of the following results. This study is primarily exploratory and comparative in nature. Our aim is to document and contrast systematic patterns in how bank-level characteristics are associated with lending reactions to monetary policy across different institutional settings. The findings are, therefore, interpreted as robust conditional correlations that illuminate heterogeneous transmission channels, rather than as causal estimates. This comparative lens is valuable because it highlights where institutional context appears to matter most, providing a map for future research and more targeted policy analysis.

The econometric approach is rooted in a fixed effects panel model, chosen after comprehensive diagnostic testing, including Hausman specification tests favouring fixed effects over random effects models. The baseline FE estimation results are summarised in the table below, while supplementary specifications – including RE models and FE regressions with robust standard errors clustered at the bank level (utilising a fixed effects variance-covariance estimator, or FE-VCE) – are reported in the appendix (Table 4). To preserve clarity in the primary results, Scandinavian countries are aggregated and analysed as a regional subset exclusively in the supplementary appendix (Table 4, models 9–10). The models estimate the influence of bank-specific determinants (Size, CAP, ROA, LLP) on credit growth dynamics. However, the central empirical contribution lies in the statistically significant interaction effects between these bank-specific determinants and lagged changes in the policy rate (Δir_{t-1}), which reveal heterogeneous transmission channels contingent on institutional liquidity and capitalisation buffers. Because bank traits are z-scored, a one-standard-deviation increase in a specific trait changes the marginal effect of a 1 p.p. rate hike by the corresponding interaction coefficient; for example, in Sweden, $\gamma(\mathrm{Size}_t \cdot \Delta\mathrm{ir}_{t-1}) = 0.79$ implies materially smaller contractions for larger banks. Where coefficient signs diverge from standard priors, we avoid strong structural claims and treat such patterns as context-specific correlations. Modest

R^2 is expected with annual bank-level growth rates, where borrower demand and idiosyncratic shocks dominate; nevertheless, FE with rich controls still identifies average marginal effects. Alternative specifications and additional tables are provided in the appendix; figures are illustrative, and inference relies solely on the regression tables.

Table 3. Fixed effect model

VARIABLES	Euro area		Denmark		Norway		Sweden	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
L.d_loans_real	0.053***	0.051***	0.037	0.030	−0.002	−0.002	0.014	−0.014
	(0.007)	(0.007)	(0.036)	(0.036)	(0.017)	(0.017)	(0.036)	(0.036)
d_equity_real	0.237***	0.237***	0.161***	0.161***	0.388***	0.373***	0.142***	0.158***
	(0.008)	(0.008)	(0.039)	(0.038)	(0.027)	(0.027)	(0.034)	(0.034)
d_cust_dep_real	0.132***	0.132***	0.320***	0.333***	0.511***	0.510***	0.429***	0.411***
	(0.004)	(0.004)	(0.030)	(0.031)	(0.028)	(0.027)	(0.040)	(0.040)
L.gdpg	0.052*	0.039	1.327***	1.383***	0.567***	0.598***	0.314*	0.307
	(0.031)	(0.031)	(0.490)	(0.499)	(0.191)	(0.189)	(0.190)	(0.190)
L.d_ir	−0.627***	−0.488***	−2.752**	−2.491*	0.223	−0.026	−2.472***	−3.500***
	(0.112)	(0.118)	(1.392)	(1.410)	(0.281)	(0.309)	(0.650)	(0.666)
Size	−0.875***	−0.675***	−2.266	−2.174	−3.543***	−3.777***	1.266	0.911
	(0.254)	(0.257)	(1.806)	(1.801)	(1.244)	(1.248)	(1.974)	(1.943)
CAP	−0.272***	−0.264***	−0.516***	−0.408***	−0.397***	−0.404***	−0.162*	−0.223**
	(0.022)	(0.022)	(0.110)	(0.114)	(0.102)	(0.102)	(0.091)	(0.095)
ROA	0.857***	0.703***	0.713	0.591	−1.416*	−1.346*	−1.838***	−1.603**
	(0.170)	(0.179)	(0.635)	(0.632)	(0.797)	(0.798)	(0.620)	(0.690)
LLP	−0.110	−0.072	−0.100	−0.487	−2.573***	−2.364***	0.039	−1.844
	(0.081)	(0.086)	(0.438)	(0.446)	(0.765)	(0.772)	(0.790)	(1.201)
Size_Ld_IR		0.416***		0.030		0.353**		0.793***
		(0.054)		(0.232)		(0.153)		(0.177)
CAP_Ld_IR		0.015		0.257***		0.003		−0.127*
		(0.015)		(0.088)		(0.060)		(0.069)
ROA_Ld_IR		−0.403**		−1.095*		0.144***		0.955
		(0.181)		(0.580)		(0.038)		(0.743)

VARIABLES	Euro area		Denmark		Norway		Sweden	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LLP_Ld_IR		0.159		− 1.732***		0.597		− 2.809**
		(0.111)		(0.519)		(0.616)		(1.360)
unempl	− 1.070***	− 1.076***	− 3.100***	− 3.025***	1.048**	0.799*	− 1.880***	− 1.927***
	(0.041)	(0.042)	(0.486)	(0.486)	(0.462)	(0.466)	(0.621)	(0.628)
CR5	− 0.150***	− 0.154***	0.251	0.371	− 0.121	− 0.070	0.297*	0.301*
	(0.014)	(0.014)	(0.290)	(0.311)	(0.180)	(0.180)	(0.169)	(0.166)
NIM	1.322***	1.425***	1.289*	1.507**	2.801***	3.312***	1.510***	1.361***
	(0.163)	(0.165)	(0.699)	(0.698)	(0.746)	(0.748)	(0.438)	(0.438)
Constant	11.291***	11.332***	− 2.828	− 12.324	0.238	− 4.692	− 5.681	− 5.518
	(0.829)	(0.828)	(18.523)	(20.064)	(16.577)	(16.542)	(9.461)	(9.306)
Observations	18,165	18,165	800	800	1,339	1,339	703	703
No. of Banks	2,503	2,503	70	70	120	120	78	78
R-sq Within	0.260	0.263	0.459	0.472	0.691	0.700	0.356	0.389
R-sq Between	0.050	0.048	0.195	0.201	0.454	0.418	0.251	0.220
R-sq Overall	0.132	0.131	0.374	0.384	0.596	0.578	0.255	0.323

Note: Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The variables Size, CAP, ROA, and LLP were standardised (z-score transformation) prior to model estimation to mitigate multicollinearity and facilitate coefficient interpretation. Interaction terms were constructed as the multiplication of each standardised variable and lagged policy rate changes (Δir_{t-1}), thereby isolating the moderating role of monetary policy shocks on bank-specific characteristics. This specification allows for testing heterogeneous monetary policy transmission across institutions, where the marginal effect of a rate change depends non-linearly on pre-existing liquidity (Size), capitalisation (CAP), profitability (ROA), net interest margin (NIM), risk provisioning (LLP) and concentration ratio (CR5). Standardisation ensures that interaction coefficients reflect effect sizes in standard deviation units, enhancing comparability across variables (Wooldridge 2010).

Source: STATA; own calculations.

The empirical findings indicate that larger banks generally exhibit greater resilience to policy-rate increases; however, this relationship is not uniform across countries. Interaction estimates show that bank size significantly mitigates the contraction in loan growth in Norway and the euro area, while the corresponding interaction in Sweden is positive but less stable across specifications. In the case of Denmark, the size interaction coefficient is small and statistically insignificant. This pattern suggests that institutional factors, rather than sheer scale, condition the usability of balance-sheet diversification during episodes of monetary normalisation or a less-accommodative stance. The models reported in the appendix confirm the distinctiveness of the Danish results. It should also be noted that the *Size* variable proved to be statistically insignificant in the Swedish specification – both in the baseline model and in robustness checks. This outcome contrasts with a substantial body of empirical research, including our own findings, which typically underscore the importance of bank size in explaining variations in credit dynamics. We, therefore, interpret the Swedish result cautiously as context-specific.

Capital adequacy shows marked cross-country heterogeneity. Drawing down capital buffers significantly offsets the initial change in Denmark, but the interaction is insignificant in the euro area and Norway and turns weakly negative in Sweden. The *CAP* variable exerts a statistically significant influence on credit dynamics across all examined Scandinavian countries as well as in the euro area. This effect is consistently confirmed across all estimated models. These results qualify the earlier view that buffers are uniformly effective, highlighting instead that supervisory credibility and releasability are preconditions for buffer usability.

Profitability, measured by ROA, conditions the policy-lending relationship in the euro area once other characteristics are controlled for. In Denmark, higher profitability marginally also intensifies contraction, whereas in wholesale-funded Norway, it significantly mitigates the effect. The contrast underscores how funding structure mediates whether profits are deployed to protect market share or preserved through margin management.

Asset-quality interactions likewise diverge. Loan-loss provisioning amplifies the contraction in Sweden and Denmark but is neutral in Norway and in the euro area. The robustness checks presented in the appendix suggest that this conclusion should be interpreted with caution. Specifically, the VCE (bank cluster) models (Table 4) indicate that the interaction between *LLP* and the change in policy rate is statistically insignificant. Only in the case of Denmark is there evidence of a contractionary effect on credit growth (as shown in Table 5 in the regression with Driscoll-Kraay errors). Moreover, the direct impact of the *LLP* variable on credit growth proves to be insignificant in all countries except Norway (Table 4).

The observed cross-country differences in the significance of interactions between bank-specific determinants and lagged changes in the policy rate across the Scandinavian countries indicate that analysing the region as a single aggregate may yield limited insights. Consequently, the results presented in the appendix should be interpreted with appropriate caution. The estimated average effect for Scandinavia is primarily driven by the Danish, Norwegian, and Swedish subsamples. A nuanced understanding of the heterogeneity in national banking market characteristics is essential for accurately interpreting the effectiveness of the bank-lending channel.

The variables included in the model account for just 26% of the within-bank variance in lending in the euro area, compared to 70% in Norway and 47% in Denmark, highlighting the substantial role of institutional heterogeneity. All models presented in the main analysis are estimated using fixed effects. While alternative specifications reported in the appendix do not always yield identical coefficient magnitudes, the qualitative patterns are stable across estimation methods. To ensure comparability across subsamples, a consistent estimation technique was applied throughout the main analysis. The appendix reports both fixed effects and random effects estimates with bank-clustered standard errors, as well as models with Driscoll-Kraay standard errors and GMM estimation. Importantly, regardless of the estimation method, the core findings remain consistent. Beyond statistical significance, the magnitude of these moderating effects is economically meaningful.

Conclusion

This study provides a large-scale, comparative exploration of the bank-lending channel across the euro area and Scandinavia. By design, our analysis emphasises comparative patterns and institutional contrasts over causal identification. The core contribution lies in systematically demonstrating that the well-documented mediation of monetary transmission by bank-specific factors is not uniform, but is fundamentally reshaped by the surrounding monetary, funding, and regulatory environment. These empirical insights provide implications for regulatory frameworks and macro-prudential policies.

Firstly, the evident variation in capital buffer effectiveness underscores the importance of regulatory clarity regarding buffer usability. Policymakers should strive to establish clear, credible guidelines governing capital buffer deployment during economic downturns to prevent counterproductive precautionary behaviour, as observed in Sweden. The empirical results align with H1 in the euro area, Norway, and Sweden, whereas the effect is muted in Denmark; H2 is clearly supported only in Denmark; H3 shows a differentiated pattern – profitability mitigates contraction in Norway but is broadly neutral in the euro area; and H4 points to contractionary effects in Denmark and Sweden, with limited evidence in the euro area and Norway. Taken together, these outcomes indicate that the strength and even the direction of monetary pass-through depend on institutional architecture and cannot be generalised across jurisdictions. For Central and Eastern Europe and prospective euro adopters, the usability of buffers, funding structures, and valuation-sensitive provisioning should be made explicit in supervisory guidance and stress-testing.

Furthermore, the divergent role profitability plays in the euro area versus Scandinavian contexts emphasises the need for differentiated liquidity and funding regulations. Wholesale-funded systems might benefit from tailored liquidity management policies that recognise the stabilising role of profitability, while deposit-funded banks require vigilance against margin-protective credit rationing behaviours.

Lastly, asset-quality dynamics highlight the necessity of nuanced stress-testing and provisioning requirements reflective of specific collateral market characteristics. Two caveats merit emphasis. First, annual frequency masks intra-year balance-sheet adjustment; quarterly data (where available) could sharpen identification. Second, by terminating in 2020, the panel omits the large-scale liquidity facilities deployed during the pandemic-reopening phase. Consequently, the estimates provide a lower-bound on the shielding role of central-bank liquidity in the most recent cycle. Supervisors should incorporate region-specific asset-valuation practices into stress tests and prudential provisioning standards to better capture banks' risk exposure and response capacity during shifts in the monetary policy stance.

Overall, the evidence indicates that the effectiveness of the bank-lending channel varies across institutional frameworks within the euro area and Scandinavia. Bank characteristics such as size, capitalisation, profitability, and asset quality exert complex, context-dependent influences on lending responses to monetary policy stance. This underscores the limitations of uniform regulatory policies, advocating instead for tailored macro-prudential frameworks responsive to specific banking sector structures and institutional environments.

Future research should explore borrower-level data to further clarify demand-supply interactions, incorporate central bank liquidity interventions in monetary shock analyses, and investigate the increasingly pertinent issue of climate-related collateral risks within monetary policy transmission frameworks.

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Appendix

Table 4. Random effect model VCE (cluster Bank) and Fixed effect model VCE (cluster Bank)

VARIABLES	Euro area		Denmark		Norway		Sweden		Scandinavia	
	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
L.d_loans_real	0.207***	0.061***	0.108	0.028	0.044**	0.016	0.096**	− 0.002	0.106***	0.025
	(0.015)	(0.017)	(0.069)	(0.076)	(0.020)	(0.018)	(0.043)	(0.049)	(0.025)	(0.023)
d_equity_real	0.245***	0.243***	0.181***	0.193***	0.327***	0.369***	0.149***	0.171***	0.292***	0.302***
	(0.017)	(0.018)	(0.068)	(0.062)	(0.038)	(0.043)	(0.030)	(0.032)	(0.048)	(0.042)
d_cust_dep_real	0.124***	0.133***	0.327***	0.316***	0.558***	0.517***	0.473***	0.431***	0.472***	0.419***
	(0.020)	(0.018)	(0.084)	(0.078)	(0.039)	(0.042)	(0.037)	(0.041)	(0.069)	(0.061)
L.gdpg	0.092**	0.073*	0.611	0.829	1.078***	0.828***	0.295	0.405*	0.889***	0.661***
	(0.040)	(0.037)	(0.398)	(0.576)	(0.180)	(0.190)	(0.199)	(0.221)	(0.120)	(0.147)
L.d_ir	− 0.080	− 0.438***	− 1.019	− 1.043	− 0.627**	− 0.152	− 2.985***	− 3.298***	− 0.775***	− 1.244***
	(0.146)	(0.150)	(1.139)	(1.487)	(0.292)	(0.343)	(0.574)	(0.607)	(0.267)	(0.257)
Size	− 0.247***	− 0.840**	− 0.468***	− 3.796	− 0.885***	− 5.316***	− 0.047	− 0.906	− 0.401***	− 3.208**
	(0.060)	(0.381)	(0.151)	(2.911)	(0.164)	(1.312)	(0.261)	(2.854)	(0.119)	(1.489)
CAP	− 0.112***	− 0.344***	− 0.185	− 0.485*	− 0.180**	− 0.485***	− 0.044	− 0.294***	− 0.077	− 0.387***
	(0.018)	(0.042)	(0.145)	(0.278)	(0.085)	(0.125)	(0.052)	(0.099)	(0.063)	(0.101)

VARIABLES	Euro area		Denmark		Norway		Sweden		Scandinavia	
	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ROA	1.809***	1.539***	1.400**	0.913	0.798	− 0.195	− 0.233	− 0.947	0.052	0.018
	(0.265)	(0.305)	(0.608)	(0.651)	(0.502)	(1.022)	(0.440)	(0.693)	(0.053)	(0.051)
LLP	0.178	0.119	− 0.250	− 0.178	− 0.770	− 1.478	− 0.870	− 1.420	− 0.613	− 0.616
	(0.140)	(0.158)	(0.439)	(0.480)	(0.488)	(0.983)	(0.946)	(1.691)	(0.386)	(0.439)
Size_Ld_IR	0.381***	0.360***	0.045	0.113	0.363**	0.347**	0.494**	0.629***	0.162	0.227*
	(0.077)	(0.081)	(0.262)	(0.249)	(0.158)	(0.148)	(0.197)	(0.199)	(0.147)	(0.134)
CAP_Ld_IR	0.019	0.005	0.252*	0.250	0.049	0.024	− 0.068	− 0.111	0.055	0.059
	(0.023)	(0.025)	(0.152)	(0.163)	(0.052)	(0.057)	(0.085)	(0.098)	(0.091)	(0.089)
ROA_Ld_IR	0.080***	0.022	− 0.083	− 0.108	0.109*	0.128	0.143*	0.089	0.094*	0.095
	(0.029)	(0.031)	(0.076)	(0.109)	(0.065)	(0.078)	(0.085)	(0.104)	(0.051)	(0.066)
LLP_Ld_IR	0.256	0.228	− 1.009	− 1.387	0.905	0.713	− 2.010	− 2.961	0.133	0.286
	(0.191)	(0.205)	(0.726)	(1.028)	(0.932)	(1.048)	(2.165)	(2.652)	(0.468)	(0.539)
unempl	− 0.324***	− 1.063***	− 2.597***	− 2.590***	− 0.255	0.168	− 1.183**	− 1.517***	− 0.292**	− 2.361***
	(0.033)	(0.067)	(0.621)	(0.771)	(0.424)	(0.449)	(0.468)	(0.554)	(0.116)	(0.419)
Constant	3.350***	9.158***	16.054***	15.357***	− 1.450	− 2.591	8.529**	11.155***	− 0.157	11.340***
	(0.296)	(0.557)	(4.345)	(5.129)	(1.621)	(1.606)	(3.541)	(4.142)	(0.801)	(2.411)

VARIABLES	Euro area		Denmark		Norway		Sweden		Scandinavia	
	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)	re vce (cluster Bank)	fe vce (cluster Bank)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Observations	18,248	18,248	797	797	1,339	1,339	702	702	2,838	2,838
No. of Banks	2,504	2,504	70	70	120	120	77	77	267	267
R-squared	0.213	0.251	0.449	0.463	0.687	0.694	0.363	0.378	0.496	0.525
Hausman Chi2		3316.32		8.25		65.21		60.39		88.74
p-value		0.00		0.8757		0.00		0.00		0.00

Note: Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The Hausman test statistic is derived from the comparison between standard random effects and fixed effects models.

Source: STATA; own calculations.

Table 5. Panel Regression Results with Robust Standard Errors (Driscoll-Kraay SE)

VARIABLES	Euro Area		Denmark		Norway		Sweden		Scandinavia	
	(1)	(2)	(3)	(4)	(5)	(6)	(5)	(6)	(7)	(8)
L.d_loans_real	0.051**	0.029	0.030	− 0.046	− 0.002	0.001	− 0.014	0.004	0.018	− 0.014
	(0.023)	(0.019)	(0.071)	(0.063)	(0.021)	(0.027)	(0.029)	(0.044)	(0.023)	(0.029)
d_equity_real	0.237***	0.237***	0.161***	0.149***	0.373***	0.248***	0.158**	0.096	0.289***	0.251***
	(0.033)	(0.032)	(0.041)	(0.034)	(0.038)	(0.031)	(0.059)	(0.069)	(0.037)	(0.027)
d_cust_dep_real	0.132***	0.128***	0.333***	0.321***	0.510***	0.384***	0.411***	0.312**	0.429***	0.371***
	(0.013)	(0.012)	(0.102)	(0.089)	(0.052)	(0.063)	(0.092)	(0.115)	(0.062)	(0.068)
L.gdpg	0.039	0.410*	1.383	0.241	0.598*	0.505**	0.307	− 0.567**	0.664**	− 0.629
	(0.101)	(0.232)	(1.164)	(0.248)	(0.341)	(0.205)	(0.359)	(0.231)	(0.238)	(0.538)
L.d_ir	− 0.488	3.239	− 2.491	− 0.743	− 0.026	− 0.780*	− 3.500***	− 0.816	− 1.213**	− 1.337
	(0.406)	(2.692)	(3.107)	(1.005)	(0.472)	(0.415)	(0.840)	(1.425)	(0.497)	(1.247)
Size	− 0.675	1.440	− 2.174	5.448	− 3.777***	− 0.617	0.911	1.483	− 2.516***	2.216
	(0.798)	(1.428)	(2.761)	(3.270)	(1.239)	(1.451)	(1.863)	(2.008)	(0.813)	(1.612)
CAP	− 0.264***	− 0.207***	− 0.408***	0.026	− 0.404***	− 0.400***	− 0.223**	− 0.197**	− 0.330***	− 0.239***
	(0.048)	(0.045)	(0.095)	(0.135)	(0.125)	(0.130)	(0.089)	(0.074)	(0.095)	(0.064)
ROA	0.703	0.199	0.591	0.344	− 1.346	− 0.937	− 1.603*	− 0.433	− 0.291	− 0.324
	(0.429)	(0.399)	(1.082)	(0.514)	(0.966)	(0.874)	(0.796)	(1.174)	(0.507)	(0.543)

VARIABLES	Euro Area		Denmark		Norway		Sweden		Scandinavia	
	(1)	(2)	(3)	(4)	(5)	(6)	(5)	(6)	(7)	(8)
LLP	− 0.072	− 0.090	− 0.487	− 0.075	− 2.364***	− 1.476**	− 1.844*	− 2.043*	− 0.946*	− 0.352
	(0.230)	(0.272)	(0.802)	(0.508)	(0.693)	(0.658)	(0.932)	(0.975)	(0.493)	(0.392)
Size_Ld_IR	0.416***	0.441***	0.030	0.230	0.353*	0.461***	0.793***	0.640**	0.330	0.511**
	(0.070)	(0.076)	(0.221)	(0.220)	(0.182)	(0.155)	(0.213)	(0.230)	(0.234)	(0.223)
CAP_Ld_IR	0.015	0.030	0.257*	0.469***	0.003	− 0.002	− 0.127	− 0.051	0.041	0.108*
	(0.031)	(0.033)	(0.124)	(0.146)	(0.051)	(0.023)	(0.085)	(0.086)	(0.047)	(0.062)
ROA_Ld_IR	− 0.403	− 0.579	− 1.095**	− 2.220***	0.144*	0.107	0.955	− 0.387	0.921**	0.567
	(0.360)	(0.358)	(0.402)	(0.590)	(0.070)	(0.069)	(0.815)	(1.410)	(0.406)	(0.483)
LLP_Ld_IR	0.159	0.102	− 1.732***	− 1.177**	0.597	1.550***	− 2.809*	− 2.963	0.151	1.099**
	(0.179)	(0.162)	(0.396)	(0.449)	(0.388)	(0.405)	(1.381)	(1.724)	(0.396)	(0.425)
unempl	− 1.076***	− 0.996***	− 3.025***	− 2.752***	0.799	4.717***	− 1.927	0.195	− 2.365***	− 1.741**
	(0.160)	(0.156)	(0.970)	(0.618)	(0.810)	(0.913)	(1.294)	(1.593)	(0.743)	(0.738)
CR5	− 0.154***	0.183**	0.371	0.235**	− 0.070	− 0.208***	0.301	0.076	0.129	− 0.373
	(0.044)	(0.082)	(0.486)	(0.082)	(0.170)	(0.025)	(0.219)	(0.210)	(0.196)	(0.397)
NIM	1.425***	0.841*	1.507	0.807	3.312***	1.314	1.361***	− 0.870	0.786	− 0.417
	(0.397)	(0.450)	(1.483)	(0.880)	(1.068)	(1.093)	(0.416)	(0.586)	(0.782)	(0.779)
Constant	11.332***	8.101*	− 12.324	0.000	− 4.692	0.000	− 5.518	0.000	− 0.614	0.000
	(1.725)	(4.398)	(35.638)	(0.000)	(15.421)	(0.000)	(13.604)	(0.000)	(15.660)	(0.000)

VARIABLES	Euro Area		Denmark		Norway		Sweden		Scandinavia	
	(1)	(2)	(3)	(4)	(5)	(6)	(5)	(6)	(7)	(8)
Observations	18,165	18,165	800	800	1,339	1,339	703	703	2,842	2,842
No. of Banks	2,503	2,503	70	70	120	120	78	78	268	268
within R-squared	0.263	0.285	0.472	0.573	0.700	0.736	0.389	0.445	0.526	0.573
F	4 566	1 320	412.8	14 440	45 359	4 460	93.49	22 302	889.4	3 301
Year	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

Note: Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: STATA; own calculations.

Table 6. GMM Estimation Results (robust twostep)

VARIABLES	Euro Area	Denmark	Norway	Sweden	Scandinavia
	GMM lag(2 4)	GMM lag(2 2)	GMM lag(2 3)	GMM lag(2 4)	GMM lag(3 3)
	(1)	(2)	(3)	(4)	(6)
L.d_loans_real	0.005	− 0.080	− 0.019	− 0.086	0.009
	(0.135)	(0.142)	(0.026)	(0.099)	(0.030)
d_equity_real	− 0.034	0.070	0.233	0.227***	0.174**
	(0.109)	(0.170)	(0.156)	(0.078)	(0.082)
d_cust_dep_real	0.459***	0.155*	0.803***	0.482***	0.762***
	(0.138)	(0.080)	(0.161)	(0.089)	(0.076)
L.gdpg	− 0.017	3.607	0.749**	0.169	0.682***
	(0.118)	(2.197)	(0.331)	(0.212)	(0.261)
L.d_ir	− 0.529	− 6.064	− 0.343	− 3.952***	− 0.325
	(1.841)	(5.493)	(0.841)	(0.960)	(0.512)
Size	− 3.609	− 8.168	− 1.047	0.218	− 2.836
	(2.462)	(9.052)	(1.354)	(0.782)	(2.247)
CAP	1.994**	− 1.435***	− 0.039	0.380	− 0.323
	(0.879)	(0.534)	(0.363)	(0.391)	(0.294)
ROA	2.459	− 0.376	− 4.595*	− 4.790***	− 3.773***
	(4.499)	(2.737)	(2.668)	(1.668)	(1.156)
LLP	− 7.613***	− 1.149	− 16.383***	− 5.153	− 8.898***
	(1.824)	(2.049)	(3.895)	(3.939)	(1.469)
Size_Ld_IR	0.695	2.391	0.807**	1.322***	0.128
	(1.843)	(2.116)	(0.341)	(0.320)	(0.837)
CAP_Ld_IR	− 0.124	0.745	− 0.043	− 0.371**	0.050
	(0.816)	(0.479)	(0.213)	(0.173)	(0.201)
ROA_Ld_IR	1.228	− 0.736	− 0.028	− 0.426	4.047***
	(2.039)	(3.268)	(0.142)	(1.906)	(1.408)
LLP_Ld_IR	− 1.906	− 2.370	0.026	− 6.542	1.889*
	(2.321)	(2.268)	(2.755)	(4.193)	(1.098)

VARIABLES	Euro Area	Denmark	Norway	Sweden	Scandinavia
	GMM lag(2 4)	GMM lag(2 2)	GMM lag(2 3)	GMM lag(2 4)	GMM lag(3 3)
	(1)	(2)	(3)	(4)	(6)
unempl	0.312	− 2.179	1.412*	− 1.343	0.086
	(0.465)	(1.854)	(0.729)	(0.878)	(0.500)
CR5	− 0.010	0.830	− 0.364	0.486**	0.035
	(0.176)	(1.139)	(0.320)	(0.221)	(0.092)
NIM	9.353**	− 4.531	5.907**	2.665***	4.820***
	(3.779)	(4.913)	(2.863)	(0.971)	(1.453)
Constant	− 23.043**	− 29.628	14.882	− 23.472**	− 17.737*
	(9.640)	(84.570)	(28.716)	(11.090)	(10.063)
Observations	18,165	800	1,339	703	2,842
No. of Banks	2,503	70	120	78	268
No. of Instruments	49	45	76	61	61
AR(1) p-value	0.000	0.011	0.000	0.002	0.000
AR(2) p-value	0.741	0.400	0.371	0.477	0.168
AR(3) p-value	0.898	0.373	0.311	0.195	0.173
Hansen p-value	0.355	0.226	0.566	0.321	0.262

Note: Standard errors in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: STATA; own calculations.