

Determinants of credit risk provisioning in uncertain times – the role of bank conditions and accounting standards*

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* The views expressed are those of the authors and do not necessarily reflect the views of the ECB or the Eurosystem.

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Motivation

- Adequate and timely provisioning of credit risk is key for banks: ensures they can withstand shocks and makes 'hidden' balance sheet risks transparent for investors and supervisors
- Provisioning practices and their implications are prominently discussed since the pandemic:
 - Possible procyclicality vs adequacy of credit risk management (e.g., <u>ECB 2020</u>, <u>Enria 2021</u>, <u>2022</u>)
 - **Question:** are banks adequately provisioned against further possible shocks?
- Longer standing debate and substantial revision of standards since financial crisis of 2007-09:
 - Introduction of expected credit loss accounting to increase transparency and tackle "too little, too late"
 - **Question:** how did the introduction of IFRS 9 affect banks' provisioning practices?

Overview of IFRS 9 – provisions based on estimated future credit losses

Aim: frontload provisioning to earlier stages of the life of a loan, to avoid sizable jumps at the time of default



Discussion on possible side effects:

- Cliff effects and possible procyclicality if many exposures moved to Stage 2 soon after shock
 - Capital erosion may induce banks to constrain loans
- Reliance on internal provisioning models may enhance discretion and induce heterogeneity

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What this paper does

- Assess the performance of IFRS 9 in period since 2018 (characterised by pandemic and war)
- Use granular loan-level data from AnaCredit (with up to 60 million observations)
 - Compare dynamics of IFRS 9 to those of national Generally Accepted Accounting Principles (nGAAP)
 - Examine differences between well- and less-capitalised banks ('capital management' practices?)
- Use granular set of fixed effects & control variables to capture firm, bank & loan heterogeneity
 - Compare provisioning for loans to same firm in same period to systematically control for borrower risk

Main findings

- Some features of IFRS 9 seem to be working as intended: (i) higher ex ante (precautionary) provisioning for all loans; (ii) more risk-sensitive reaction to exogeneous shocks
- But provisioning dynamics around default are similar between IFRS 9 and nGAAP
 - Jump in provisions at default under IFRS 9 remains of similar magnitude as under nGAAP
 - Implications of IFRS 9 in terms of procyclicality may not be much different from those of nGAAP
- Bank capital and discretion affect provisioning practices, particularly under IFRS 9
 - Better capitalised banks generally provision more than less capitalised banks
 - IFRS 9 may have enhanced the room for discretionary adjustment and 'capital management'

Results

(i) determinants of provisioning in full sample(ii) dynamics around default events(iii) dynamics around energy price shock in 2022



EUROSYSTEM

Determinants of provisioning in the full sample

Accounting standards and bank capital affect provisioning

Determinants of loan-level provisioning:

 $Prov_{b,f,t} = \alpha_{f,t} + \beta X_{b,f,t-1} + \gamma Z_{b,t-1} + \epsilon_{b,f,t}$, with f the firm, b the bank, t the quarter

- Provisioning ratios generally higher for loans under IFRS 9 (as expected)
- Better capitalised banks provision more, consistent with capital management motive

	Α	.11	IF	RS	nGA	AAP
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
D(nGAAP)	-1.460^{***}	-0.3441^{**}				
	(0.3565)	(0.1522)				
CAP HEAD	0.0753^{**}	0.0773^{***}	0.0715^{*}	0.0731^{***}	0.0537^{***}	0.0842^{***}
	(0.0379)	(0.0188)	(0.0433)	(0.0208)	(0.0202)	(0.0135)
Fixed-effects						
ILS-Quarter	Yes		Yes		Yes	
Firm-Quarter		Yes		Yes		Yes
Fit statistics						
Observations	$62,\!536,\!680$	$62,\!536,\!680$	$54,\!518,\!281$	$54,\!518,\!281$	8,018,399	8,018,399
\mathbb{R}^2	0.03437	0.90970	0.03456	0.91270	0.03395	0.90066
Within \mathbb{R}^2	0.00950	0.00576	0.00993	0.00583	0.00434	0.00924

Double clustered (Firm \times Quarter & Bank) standard-errors in parentheses

Signif. Codes: ***: 0.01, **: 0.05, *: 0.1





Dynamics of provisioning around credit events

IFRS 9 has higher provisioning pre-default, but dynamics are similar

$$Prov_{b,f,t,d} = \alpha_{f,t} + \sum_{h=-3}^{2} I_h \left(\beta_d | \mathsf{FRS}_{b,f,t,d} + \gamma_i n \mathsf{GAAP}_{b,f,t,d}\right) + I_h W_{b,f,t} + \Gamma Z_{b,t} + \varepsilon_{b,f,t,d}$$

- f the firm, b the bank, t the quarter, d the number of quarters to default at bank-firm level
- Result is robust to several checks: e.g., PSM to account for bank heterogeneity; excluding pandemic period



Note: The sample includes all firm-bank pairs reporting a default and without missing values in the interval between [-3; +2] quarters around default. The x-axis reports the distance in quarter to the quarter in which the bank starts reporting default. The vertical lines report the 90% confidence interval. Solid (dashed) confidence interval if the Wald-test for difference of the coefficients is (non)-significant at the 10\% level.

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What explains the similar dynamics for IFRS 9 and nGAAP loans?

- Actual pattern of IFRS 9 provisions around default is more similar to nGAAP than to the theoretical IFRS 9
- Timing of move to Stage 2 differs across loans and tends to occur rather late or not at all
- Still sizeable jump at default also for loans from stage 2:
 - Ø ratios: 1.5% (stage 1); 6.5% (stage 2), 24.5% (stage 3)

Implications and interpretation:

- IFRS9 did not fundamentally change provision patterns
- Inherent reluctance to impair assets can prevent timely loss
 recognition also in ECL approach if incentives unchanged
 - Built-in discretion (relying on internal models) may facilitate this

IFRS 9 loans in different stages ahead of default



Note: Distance to default measured in quarters. The sample is an unbalanced panel with 53,088 bankfirm observations nine quarters before default and 207,201 observations one quarter before default.

Banks with more excess capital provision more conservatively

- Banks in top half of excess capital (above MDA trigger) provision more before and after default
- Effect is more pronounced for banks using IFRS 9 than for those using nGAAP
- → Consistent with "provisioning as much as you can afford", facilitated by discretion under IFRS 9



Note: The sample includes all firm-bank pairs reporting a default and without missing values in the interval between [-3; +2] quarters around default. The x-axis reports the distance in quarter to the quarter in which the bank starts reporting default. The vertical lines report the 90% confidence interval. Solid (dashed) confidence interval if the Wald-test for difference of the coefficients is (non)-significant at the 10% level.

Capital headroom also affects likelihood of moving a loan to Stage 2

Logit regression:

I(move to stage 2)_{b,f} = $\alpha_f + \gamma X_b + \Gamma Z_{b,f} + \varepsilon_{b,f}$

- Lower capital headroom is associated with a lower probability of moving the loan to stage 2
- Suggests discretion on both level of provisions and classification of loans into stages \rightarrow two levers

Dependent Variable:	D(moved	to stage 2)
-	(1)	(2)
Variables		
CAP HEAD Low	-0.3681**	-0.4039**
	(0.1524)	(0.1597)
Fixed-effects		
Firm	Yes	Yes
Fit statistics		
Observations	696,333	696,333
Squared Correlation	0.09634	0.13168
Pseudo R^2	0.07442	0.10263
BIC	4,059,280.2	4,032,488.5

Clustered (Firm & Bank) standard-errors in parentheses

Signif. Codes: ***: 0.01, **: 0.05, *: 0.1





EUROSYSTEM

Provisioning dynamics around the energy price shock in 2022

Provisioning after outbreak of war depends on accounting and capital

Change in provisioning due to energy price shock in 2022:

 $\Delta Prov_{b,f} = \delta_f + \theta W_{b,f} \times E_f + \delta W_{b,f} + \gamma X_{b,f} + \Theta Z_b + \epsilon_{b,f}$

b the bank, f the firm, E a measure of energy dependence

- IFRS 9 provisions react more risk sensitively to the shock
- Better capitalised banks with broader reaction to shock:
 - Generally consistent with 'capital management' motives
 - · 'Provisioning across the board' vs targeted increases

	Change in Im	pairment Ratio
	(1)	(2)
D(IFRS)	-0.1141	-0.0152
	(0.0712)	(0.0536)
CAP HEAD	0.0131	0.0312***
	(0.0101)	(0.0106)
$D(IFRS) \times Energy$	0.0140^{*}	
	(0.0081)	
CAP HEAD \times Energy		-0.0021*
		(0.0011)
Fixed-effects		
Firm	Yes	Yes
Fit statistics		
Observations	1,398,742	1,398,742
\mathbb{R}^2	0.74735	0.74737

Full table

Conclusion

Conclusion

- IFRS 9 partly delivered on objective to foster transparency and prompt timelier provisioning
 - Higher ex ante (precautionary) provisioning and more risk-sensitive reaction around exogeneous shock
 - But bulk of provisioning still occurs at default, and IFRS 9 and nGAAP exhibit overall similar dynamics
 - Implication of IFRS 9 in terms of procyclicality may not be much different from nGAAP (no 'cliff effects')
- Evidence for 'capital management' & higher discretion under IFRS 9; ambiguous implications:
 - Discretion may help to prevent procyclical increases at the onset of a shock ...
 - ... but reduces transparency and conflicts with objective of fostering timelier / more adequate provisions
- Difficult to assess overall adequacy of current provisions, but banks with less capital headroom may be at greater risk of being under-provisioned (partly due to discretion offered by IFRS 9)

Appendix

Related literature and contribution of the paper

Growing literature on interactions between accounting standards, bank regulation and financial stability, and on the role of discretion & risk modelling in financial regulation

- Impact of provisioning on lending, financial stability, and cyclicality of economic outcomes (Jiménez et al. 2017, Huizinga & Laeven 2019, Blattner et al. 2020, Morais et al. 2022)
- Impact of expected credit loss accounting (Abad & Suarez 2018, Buesa et al. 2019)
- Role of discretion in accounting practices (Huizinga & Laeven 2012, Bischof et al. 2021)
- Role of discretion and risk modelling in financial regulation (Rajan et al. 2015, Begley et al. 2015, Behn et al. 2016, 2022, Koijen & Yogo 2015, 2016, Plosser & Santos 2018)
- We are the first to empirically assess how IFRS 9 performs under economic stress and whether and how it has altered the role of discretion in banks' loss recognition

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Relation between accounting provisions and default classification



Bank assessing the borrower as unlikely to pay (UTP)

Data

- Granular corporate loan data from Eurosystem's Analytical Credit Database (AnaCredit)
 - Corporate loan exposures > EUR 25,000 from 20 euro area countries
 - Loan characteristics such as carrying amount, impairments, maturity, guarantees, collateral, moratoria
 - Borrower characteristics such as firm size, country of residence, economic sector (NACE-2)
 - Loan data aggregated at firm-bank level (consolidating at ultimate euro area parent level on bank side)
 - Focus on loans to non-financial corporations (excluding intra-financial sector loans)
- Matched with supervisory balance sheet and P&L data (COREP/FINREP) for 1,721 banks
- Firm exposure to energy price shocks constructed at industry sector level using OECD data
- Sample period: 2018-Q3 to 2022-Q2

Loan-level descriptive statistics for the 62,536,680 observations

			IFRS 9			nG	AAP
		Stage 1	Stage 2	Stage 3		General allowance	Specific allowance
# of observations		44,698,975	7,074,824	2,744,482	-	7,170,866	847,533
	Mean	S.D.	Min	Q1	Median	Q3	Max
Credit volume	398,466.7	818,181.6	9,130.0	44,548.0	$111,\!654.8$	310,881.6	4,260,878.8
Provisioning ratio	2.6	10.0	0.00	0.04	0.19	0.83	100.00
Default	4.4	20.6	0.0	0.0	0.0	0.0	100.0
Maturity	5.6	4.8	0.12	2.18	4.17	7.51	19.45
Guarantee	13.3	31.7	0.0	0.0	0.0	0.0	100.0
Moratoria	1.2	9.9	0.0	0.0	0.0	0.0	100.0

Evolution of aggregate provisioning ratios over the sample period

- All - IFRS - nGAAP



- Aggregate provisioning ratios declined over sample period
 - Driven by continued reduction of NPL portfolios (stage 3)
 - COVID pandemic triggered a marked increased in stage 2 without substantial impact on aggregate provisioning ratio

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IFRS 9 – support measures during the pandemic

20 March 2020: ECB <u>recommends</u> banks to avoid procyclical assumptions in IFRS9 models and to opt for IFRS9 transitional rules 3 April 2020: BCBS <u>states</u> that public guarantees / moratoria should not automatically imply transfer to Stage 2; provides guidance on the use of forecasts to avoid procyclicality 4 December 2020: ECB <u>letter</u> placing greater emphasis on sound credit risk management and the need to allocate exposures to the appropriate IFRS9 stages based on all relevant information

1 April 2020: ECB <u>letter</u> to banks providing further guidance on application of IFRS9 transitional rules and the use of forecasts in estimating provisions to avoid procyclicality **26 June 2020:** '<u>CRR quick fix</u>' extended IFRS9 transitional arrangements by two years, and allowed additional addbacks to CET1 capital of stage 1 and stage 2 provisions that were due to COVID-19

Role of support measures implemented during the pandemic

- Pandemic hit while banks still transitioning to IFRS 9 and prompted several support measures to prevent excessive procyclicality and facilitate banks' ability to support the economy
 - Banks encouraged to make use of flexibility embedded in IFRS 9; guidance to avoid excessive procyclicality in models
 - Extension of IFRS 9 transitional arrangements and expanded set of provisions that could be added back to CET1 capital
- Impact on provisioning likely to vary over time and across measures (e.g., potentially lower provisioning due to initial supervisory guidance; neutral or positive impact of addbacks)
- Our analysis considers the possible impact of these measure in various ways:
 - Robustness test excluding the imminent period of the pandemic in 2020 (strongest impact of supervisory guidance)
 - Exploiting cross-sectional variation: e.g., support measures apply to well- and less-capitalised banks in similar manner
 - Controlling for the impact of COVID-related guarantees and moratoria by including corresponding control variables
 - Conduct an additional test on period less affected by support measures: energy price shock after outbreak of war

Aggregate provisioning ratios around credit risk shocks (IFRS 9 loans)

Panel A: St	age 1 in the quarter	before default					
	% of loans in stage 1 before default	>1 quarter before moving to default			1 quarter before moving to default	On default	4 quarters after default
Overall	39.8%	1.59			1.60	16.83	17.88
High capital	36.4%	1.82			1.77	18.60	22.14
Low capital	38.0%	1.25			1.41	14.95	13.47
Panel B: St	age 2 in the quarter	before default					
	% of loans in stage 2 before default	>1 quarter before moving to stage 2	1 quarter before moving to stage 2	After moving to stage 2	1 quarter before moving to default	On default	4 quarters after default
Overall	60.2%	0.92	1.52	6.93	8.76	22.37	26.14
High capital	63.6%	1.00	1.55	7.20	9.34	22.57	26.29
Low capital	62.0%	0.80	1.50	6.63	7.99	22.34	26.07

Accounting framework does not affect reporting of default

- nGAAP tend to report default slightly ahead of IFRS after the first report of default
- No significant difference (Poisson regression)



Dependent Variable:	Nb quarters since
	first default report
Model:	(1)
Variables	
nGAAP	-0.0094
	(0.1165)
Fixed-effects	
Firm	Yes
Fit statistics	
Observations	$15,\!599$
Squared Correlation	0.47815
Pseudo \mathbb{R}^2	0.25452
BIC	110,779.1

Clustered (Firm) standard-errors in parentheses Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

Note: Only consider bank-firm pairs which report a default in the time series.

Accounting standards and bank capital affect provisioning

	А	.11	IF	RS	nGA	AAP
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
D(nGAAP)	-1.460^{***}	-0.3441^{**}				
	(0.3565)	(0.1522)				
Maturity	0.0514	0.0254	0.0676	0.0267	-0.0300***	0.0084^{**}
	(0.0442)	(0.0181)	(0.0528)	(0.0237)	(0.0052)	(0.0036)
Guarantee	-2.986***	-1.298***	-3.063***	-1.338***	-1.127***	-1.011***
	(0.2811)	(0.0935)	(0.3034)	(0.0998)	(0.1524)	(0.1192)
Moratoria	-1.923***	-0.0049	-2.021***	0.0054	-0.6986***	0.0018
	(0.3828)	(0.2035)	(0.4379)	(0.2226)	(0.1228)	(0.1250)
CAP HEAD	0.0753^{**}	0.0773^{***}	0.0715^{*}	0.0731^{***}	0.0537^{***}	0.0842^{***}
	(0.0379)	(0.0188)	(0.0433)	(0.0208)	(0.0202)	(0.0135)
LOG(TA)	-0.1025	0.0298	-0.1825	0.0551	-0.0076	-0.0056
	(0.0974)	(0.0537)	(0.1549)	(0.0782)	(0.0673)	(0.0406)
DEP/TA	-0.0088	0.0076	-0.0240	0.0041	0.0127	0.0207***
	(0.0158)	(0.0074)	(0.0268)	(0.0133)	(0.0091)	(0.0040)
RW	0.0052	-0.0141^{*}	0.0020	-0.0163	0.0030	-0.0116***
	(0.0145)	(0.0073)	(0.0241)	(0.0120)	(0.0059)	(0.0032)
ROA	-0.8437***	-0.1470	-0.8380**	-0.0508	-0.8900***	-0.4562***
	(0.2709)	(0.1426)	(0.3540)	(0.1778)	(0.1130)	(0.0724)
CASH/TA	-0.0587^{**}	-0.0325^{*}	-0.0604	-0.0412^{*}	-0.0170^{*}	-0.0223***
	(0.0292)	(0.0168)	(0.0458)	(0.0246)	(0.0097)	(0.0062)
LOAN/TA	-0.0026	-0.0090	0.0060	-0.0159	-0.0044	-0.0040
	(0.0227)	(0.0088)	(0.0404)	(0.0167)	(0.0066)	(0.0034)
TLTRO/TA	0.0216^{*}	-0.0196^{***}	0.0261^{*}	-0.0189^{***}	-0.0098	-0.0114***
	(0.0121)	(0.0055)	(0.0137)	(0.0063)	(0.0061)	(0.0034)
Fixed-effects						
ILS-Quarter	Yes		Yes		Yes	
Firm-Quarter		Yes		Yes		Yes
Fit statistics						
Observations	62,536,680	$62,\!536,\!680$	54,518,281	54,518,281	8,018,399	8,018,399
\mathbb{R}^2	0.03437	0.90970	0.03456	0.91270	0.03395	0.90066
Within R ²	0.00950	0.00576	0.00993	0.00583	0.00434	0.00924

 $\textit{Double clustered (Firm \times \textit{Quarter & Bank) standard-errors in parentheses}$

Signif. Codes: ***: 0.01, **: 0.05, *: 0.1

Determinants of loan-level provisioning:

 $Prov_{b,f,t} = \alpha_{f,t} + \beta X_{b,f,t-1} + \gamma Z_{b,t-1} + \varepsilon_{b,f,t}$

f the firm, b the bank, t the quarter

- Provisioning ratios generally higher for loans under IFRS 9 (as expected)
- Better capitalised banks provision more, consistent with capital management motive
 - Occurs under both IFRS 9 and nGAAP



Capital headroom also affects likelihood of moving a loan to Stage 2

Logit regression:

I(move to stage 2)_{b,f} = $\alpha_f + \gamma X_b + \Gamma Z_{b,f} + \varepsilon_{b,f}$

- Lower capital headroom is associated with a lower probability of moving the loan to stage 2
- Suggests discretion on both the level of provisions and the classification of loans into stages
- Banks have two levers to manage provisioning ratios

Dependent Variable:	D(moved	to stage 2)
	(1)	(2)
Variables		
CAP HEAD Low	-0.3681**	-0.4039**
	(0.1524)	(0.1597)
Maturity		-0.0027
		(0.0085)
Guarantee		0.5813^{***}
		(0.1293)
Moratoria		0.0081
		(0.1567)
TA.log		0.4635^{***}
		(0.0600)
RW		0.0388^{***}
		(0.0109)
DEP/TA		0.0265^{**}
		(0.0116)
RoA		-0.2024^{*}
		(0.1085)
CASH/TA		-0.0113
		(0.0174)
LOAN/TA		-0.0087
		(0.0171)
TLTRO		0.0094^{*}
		(0.0053)
Fixed-effects		
Firm	Yes	Yes
Fit statistics		
Observations	696,333	696,333
Squared Correlation	0.09634	0.13168
Pseudo R ²	0.07442	0.10263
BIC	4,059,280.2	4,032,488.5

Clustered (Firm & Bank) standard-errors in parentheses Signif. Codes: ***: 0.01, **: 0.05, *: 0.1



Provisioning after outbreak of war depends on accounting and capital

	Change in Im	pairment Ratio	Impairment R	atio (2022-Q2)
	(1)	(2)	(3)	(4)
D(IFRS)	-0.1141	-0.0152	0.4468^{*}	0.4272**
D(II III)	(0.0712)	(0.0536)	(0.2476)	(0.2063)
CAP HEAD	0.0131	0.0312***	0.1361***	0.1041***
	(0.0101)	(0.0106)	(0.0307)	(0.0293)
$D(IFRS) \times Energy$	0.0140*		-0.0041	(0.0100)
	(0.0081)	\frown	(0.0169)	
CAP HEAD \times Energy		-0.0021*	· · · · ·	0.0038
0.0		(0.0011)		(0.0034)
Maturity	0.0155^{***}	0.0153^{***}	0.0609^{***}	0.0612***
-	(0.0046)	(0.0046)	(0.0193)	(0.0192)
Guarantee	-0.1459***	-0.1466***	-1.322***	-1.321***
	(0.0464)	(0.0465)	(0.1136)	(0.1140)
Moratoria	0.1380^{**}	0.1319^{**}	0.0556	0.0652
	(0.0624)	(0.0618)	(0.2319)	(0.2329)
$\log(TA)$	0.0726	0.0704	-0.0736	-0.0698
	(0.0474)	(0.0472)	(0.1088)	(0.1090)
RW	0.0074	0.0068	-0.0245^{*}	-0.0234^{*}
	(0.0066)	(0.0066)	(0.0127)	(0.0126)
DEP/TA	0.0040	0.0041	-0.0119	-0.0119
	(0.0063)	(0.0063)	(0.0111)	(0.0110)
RoA	0.3760^{***}	0.3749^{***}	-0.3784	-0.3757
	(0.1305)	(0.1294)	(0.2992)	(0.2985)
CASH/TA	0.0197^{***}	0.0196^{***}	-0.0270	-0.0269
	(0.0071)	(0.0070)	(0.0212)	(0.0211)
LOAN/TA	0.0118^{**}	0.0117^{**}	-0.0173	-0.0172
	(0.0052)	(0.0051)	(0.0123)	(0.0123)
TLTRO/TA	-0.0019	-0.0021	-0.0177^{***}	-0.0174^{***}
	(0.0019)	(0.0018)	(0.0054)	(0.0053)
Fixed-effects				
Firm	Yes	Yes	Yes	Yes
Fit statistics	1 800 740	1 000 740	1 501 014	1 501 014
Observations R ²	1,398,742	1,398,742	1,501,814	1,501,814
R ² Within R ²	0.74735	0.74737	0.87521	0.87522
Within K-	0.00249	0.00254	0.01019	0.01025

Change in provisioning due to energy price shock in 2022:

 $\Delta Prov_{b,f} = \delta_f + \theta W_{b,f} \times E_f + \delta W_{b,f} + \gamma X_{b,f} + \Theta Z_b + \epsilon_{b,f}$ b the bank, f the firm, E a measure of energy dependence

- IFRS 9 provisions react more risk sensitively and are higher after the shock (mainly due to initial differences)
- Better capitalised banks with generally higher levels of provisions, but reacting less risk sensitively to the shock
 - Generally consistent with 'capital management' motives
 - · 'Provisioning across the board' vs targeted increases

