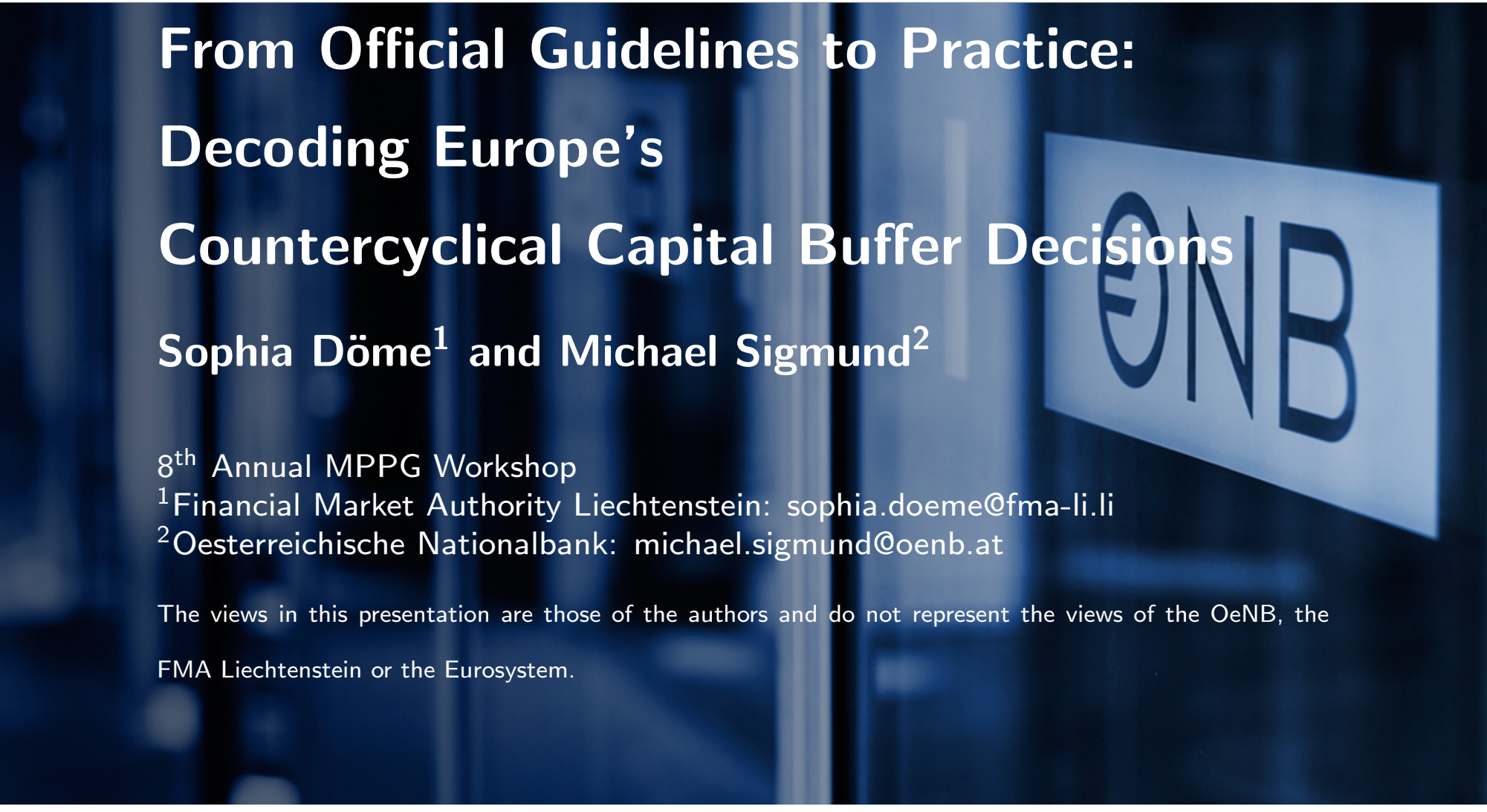

From Official Guidelines to Practice: Decoding Europe's Countercyclical Capital Buffer Decisions

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Introduction I

- In 2010, the BCBS set up the Basel III framework that includes new minimum capital requirements, countercyclical measures, the leverage ratio and liquidity requirements.
- One important countercyclical measure is a time-varying capital-based macroprudential instrument known as **the countercyclical capital buffer** (CCyB).
- The CCyB was designed to mitigate risks arising from **excessive credit growth** in their banking sectors.
- Banks should build an additional capital buffer during the "upswing" phase of the financial cycle.
- The BCBS published a framework for setting the CCyB. The common reference guide for taking buffer decisions is based on the "credit-to-GDP gap" (BIS, 2010).
- The ESRB (2014) suggests considering further indicators or qualitative information in light of national characteristics.

Introduction II

- **Is the CCyB potentially relevant?** In total, European Union banks hold around 2,000 billion euros of common equity tier 1 (CET1) capital at the end of 2022. A CCyB of 2.5% could potentially increase this number by around 20%.
- Credit-to-GDP gap as an indicator for detecting excessive credit growth (Drehmann and Borio, 2010; Jordà et al., 2011; Schularick and Taylor, 2012; Aikman et al., 2014; Jokivuolle et al., 2015)
- Forecasting performance of the credit-to-GDP gap/ratio for various forms of banking and financial crises (Laeven and Valencia, 2008; Lo Duca et al., 2017; Laeven and Valencia, 2018).
- There is one paper that analyzes the CCyB decisions (Herz and Keller, 2023). Their effects are not identified due to sample selection and endogeneity bias.

Research questions

1. Would the BCBS CCyB guidance have worked for building up sufficient additional capital to cover the losses of the banking sector in the context of the GFC of 2007–2008?
2. What are the primary determinants of CCyB rates in light of the different CCyB approaches?
   - 2A Do regulatory authorities follow the BCBS CCyB guidance?
   - 2B Do they consider the variables listed in the ESRB recommendation (ESRB, 2014)?
   - 2C Do characteristics of the supervisor play a role? What role does a positive cycle-neutral CCyB approach play in normal times?

Preview – Main Results

- The rules-based CCyB methodology would have worked well for building up sufficient additional capital prior to the GFC in 2007–2008.
- CCyB decisions are not driven by the BCBS CCyB guide (BIS, 2010), which confirms the finding in Herz and Keller (2023).
- Additional "ESRB" variables (ESRB, 2014), improve the explanatory power of the CCyB decision models, but are also mainly insignificant. We neither find that the 5-year house price growth nor that the non-performing loan ratio significantly influence the CCyB decision as in Herz and Keller (2023).
- However, CCyB decisions are strongly driven by the supervisory funding structure and **the positive, cycle-neutral CCyB approach**.

Data

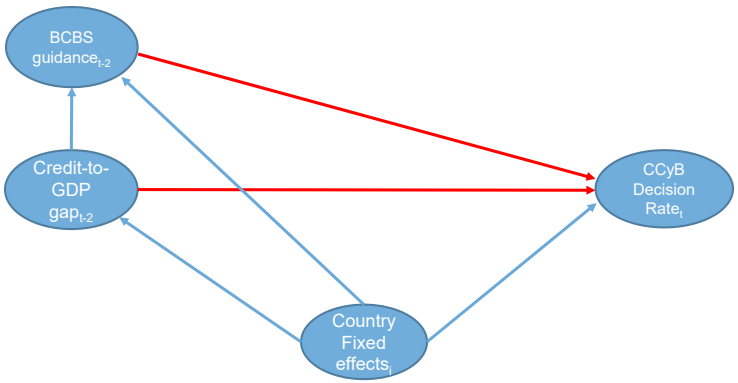
- We use quarterly publicly available data sets from the BIS, the European Central Bank (ECB), the ESRB and the Worldbank.
- BIS data are mainly used for the first research question.
- When studying the determinants for CCyB decision rates in European countries (second research question), we use the ECB data. It covers all European Union countries, Norway and Iceland from the period 2015Q4 until 2022Q4.
- Supervisory quality data are taken from the Worldbank's Bank Regulation and Supervision Survey from 2019 (Anginer et al., 2019).

A Structural Causal Model for the CCyB Decision Rule I

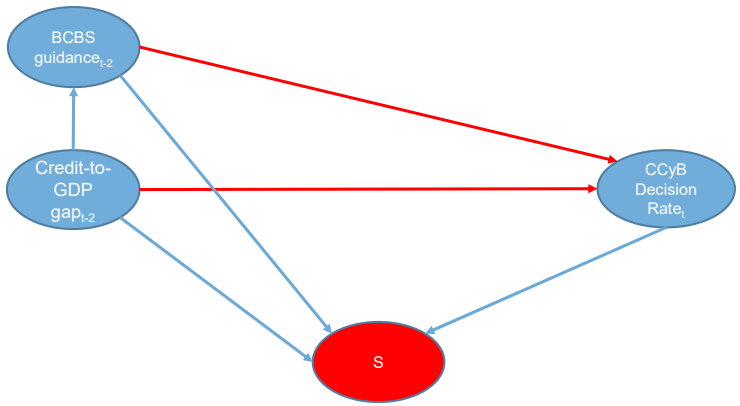
- An SCM (Pearl, 2009) is defined as tuple $\mathcal{M} = \langle U, V, F, P(U) \rangle$.
- U – Exogenous variables (external factors, shocks).
- V – Endogenous variables (determined within the model).
- F – Structural functions which define causal mechanisms.
- Endogenous variables: $V := \{ C_i,\ X_{i,t-j},\ Y_{i,t} \}$.
  - $Y_{i,t}$: CCyB rate (pp).
  - $X_{i,t-j}$: lagged indicators used by the authority.
  - C_i: time-invariant country traits.
- Exogenous variables: $U := \{ u_i^C,\ u_{i,t-j}^X,\ u_{i,t}^Y \}$.
- Structural equations:

$$C_i \leftarrow g_C(u_i^C),$$
$$X_{i,t-j} \leftarrow f_X(C_i, u_{i,t-j}^X),$$
$$Y_{i,t} \leftarrow f_Y(X_{i,t-j}, C_i, u_{i,t}^Y)$$

Identification of CCyB Drivers



(a) Identification in our model



(b) Identification in Herz and Keller (2023)

The left figure shows the identification problem in our setting. The right graph shows the identification problem in Herz and Keller (2023). The node S is a sample selection indicator $S = 1$, if a country has set the CCyB Decision Rate > 0 in any time period, and $S = 0$ otherwise. Their effects are not identified because of sample section, similar to Heckman (1979).

Identification via Backdoor Criterion and Estimation

- Target causal effect: $P\big(Y_{i,t} \mid do(X_{i,t-j} = x)\big)$.
- Backdoor path(s): $X_{i,t-j} \leftarrow C_i \rightarrow Y_{i,t}$.
- Valid adjustment set: $Z = \{C_i\}$. (blocks all backdoor paths from $X_{i,t-j}$ to $Y_{i,t}$ and contains no descendants of $X_{i,t-j}$).
- Backdoor adjustment leads to this conditional probability:

$$P\big(Y_{i,t} \mid do(X_{i,t-j} = x)\big) = \sum_s P\big(Y_{i,t} \mid X_{i,t-j} = x,\ C_i = c\big)\ P(C_i = c).$$

- We use a fixed effects model to estimate it:

$$y_{i,t} = C_i + X_{i,t-j}^{\top}\ \beta + \epsilon_{i,t} \tag{1}$$

Results – Hypothetical CCyB

Date	Additional CET1 requirements (in thousand EUR)
2004Q1	165,437,412
2004Q4	187,771,891
2005Q1	193,433,239
2005Q4	235,597,705
2006Q1	244,739,735
2006Q4	289,306,914

Additional CET1 requirements for all European countries assuming that the hypothetical CCyB rates for all countries in the previous figure are binding.

- Eurostat (2018) compute the losses in the financial sector of the GFC 2007/08 with 240 billion euros.

Expected Results – Fixed effects BCBS models

Table 1: Model specifications: BCBS CCyB guidance

Model names	Dependent variable	Independent variables	Expected sign
BCBS Model 1	CCyB rate	(1) BCBS CCyB guide (-2)	+
BCBS Model 2	CCyB rate	(1) BCBS CCyB guide (-4)	+
BCBS Model 3	CCyB rate	(1) Credit-to-GDP gap (-2) (2) Credit-to-GDP ratio (-2)	+ +
BCBS Model 4	CCyB rate	(1) Credit-to-GDP gap (-4) (2) Credit-to-GDP ratio (-4)	+ +
BCBS Model 5	CCyB rate	(1) BCBS CCyB guide (-2) (2) Supervisory funding (3) Mapru supervision index	+ ~ ~
BCBS Model 6	CCyB rate	(1) BCBS CCyB guide (-2) (2) Supervisory funding without banks (3) Mapru supervision index	+ ~ ~
BCBS Model 7	CCyB rate	(1) BCBS CCyB guide (-2) (2) positive CCyB dummy	+ +

The CCyB rate is the dependent variable, which is the buffer rate at the date of announcement.
BCBS CCyB guidance refers to the BCBS CCyB framework and considers the credit-to-GDP gap as the only input variable to calculate the buffer rate.
Positive CCyB dummy is set to 1 for the current and the following time periods when the authority in a country communicates the adoption of a positive cycle-neutral CCyB rate in equilibrium and 0 otherwise.

Estimation Results – Fixed effects BCBS models I

	BCBS 1	BCBS 2	BCBS 3	BCBS 4	BCBS 5	BCBS 6	BCBS 7
Intercept					−0.2429	−0.2475	0.0826*
BCBS CCyB(-2)	−0.0303				0.0720	0.1267	0.0115
BCBS CCyB(-4)		−0.0040					
Credit-GDP-gap(-2)			−0.0005				
Credit-GDP-ratio(-2)			0.0007				
Credit-GDP-gap(-4)				0.0010			
Credit-GDP-ratio(-4)				−0.0012			
F. banks, other					0.1009		
					(0.1577)		
F. gov					1.0958***		
					(0.0721)		
F. gov, banks					0.6841		
					(0.5021)		
F. other					0.3254		
					(0.2135)		
F. no banks						0.4141*	
						(0.2211)	
Mapru index					0.1278	0.1613*	
					(0.0913)	(0.0864)	
positive CCyB							1.0230***
							(0.0793)
Country FE	*yes*	*yes*	*yes*	*yes*	*no*	*no*	*no*

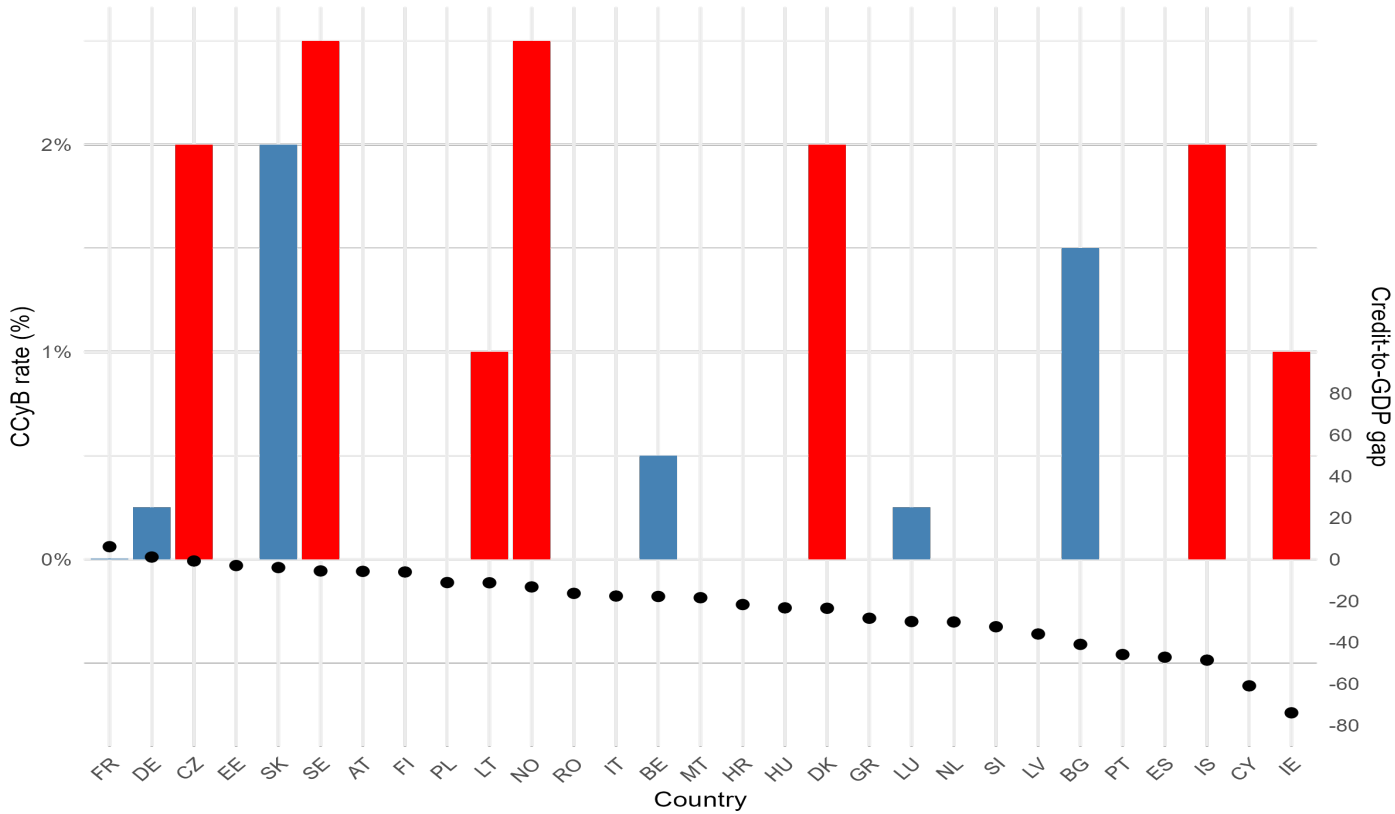
Estimation Results – Fixed effects BCBS models II

Within R^2	0.00	0.00	0.00	0.00			
Between R^2	0.04	0.05	0.09	0.09			
Overall R^2	0.01	0.01	0.05	0.05	0.23	0.09	0.44
Nof Obs	709	725	709	725	689	689	709
Nof Groups	29	29	29	29	29	28	29
Avg. Obs. per Group	24.45	25	24.45	25	23.76	24.61	24.45
Min Obs. per Group	12	13	12	13	7	12	12
Max Obs. per Group	39	39	39	39	39	36	36

Estimation Results – Fixed effects BCBS models III

- The estimation results show that authorities do not take the BCBS CCyB guidance into account.
- Models "BCBS 3" and "BCBS 4" confirm the findings of the previous two models, since the inputs to the BCBS CCyB guidance have negative coefficients.
- The funding structure of banking supervision without banks' participation affects the CCyB rates positively.
- Countries, such as CZ, DK, NO, SE and SK, which communicated to follow a positive CCyB approach set their CCyB rate at around 1.02 pp higher than that of other countries not following this approach.
- Only by considering this dummy variable, the explanatory power of the model increases to almost 60%, highlighting the importance of this variable in setting CCyB rates.

The BCBS method does not matter for CCyB decisions



The figure shows the credit-to-GDP gap and the CCyB rates as of 2019Q1 for all countries in our dataset that report these variables. The countries are ranked in descending order of their credit-to-GDP gap which is represented by blue dots in the top figure. In the bottom figure, we show the CCyB rates, which are between the interval $[0, 2.5\%]$. If a country has no bar, then their CCyB rate is 0%. We assign a red bar to countries, whose macroprudential authorities follow a positive cycle-neutral CCyB approach.

Key Findings and Policy Implications

- BCBS rules-based CCyB guide (credit-to-GDP gap) would have provided sufficient buffers before 2007–2008 crisis.
- Countries often **deviate** from the BCBS guide; its influence on actual CCyB decisions is limited.
- Additional BCBS/ESRB indicators (e.g., credit variables) have **little impact** on EU CCyB rates.
- Positive cycle-neutral CCyB approach and funding structure of supervision are major determinants of CCyB rates.
- Harmonization of CCyB frameworks could reduce disparities, spillovers, and improve financial resilience.
- Centralized and stable funding for banking supervision strengthens CCyB enforcement.

Thank you!

Questions or comments?

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Full paper forthcoming:

`https://www.oenb.at/Publikationen/Volkswirtschaft/Working-Papers.html`

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Data – Summary Statistics

Dependent variables	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	Data.Cov
CCyB decision rate	0.00	0.00	0.00	0.30	0.01	2.50	94.99
Explanatory Variables							
BCBS CCyB guidance	0.00	0.00	0.00	0.15	0.00	2.50	98.39
positive CCyB dummy	0.00	0.00	0.00	0.19	0.00	1.00	100.00
Credit-to-GDP gap	-93.10	-34.00	-16.90	-19.70	-4.55	26.00	98.39
Credit-to-GDP ratio	31.10	73.33	93.00	95.36	111.30	284.00	98.39
Banks	0.00	0.00	0.00	0.46	1.00	1.00	97.67
Banks, other	0.00	0.00	0.00	0.22	0.00	1.00	97.67
Government	0.00	0.00	0.00	0.05	0.00	1.00	97.67
Government, banks	0.00	0.00	0.00	0.08	0.00	1.00	97.67
Other	0.00	0.00	0.00	0.20	0.00	1.00	97.67
Mapru supervision index	0.00	2.00	3.00	2.67	3.00	4.00	100.00
2-year HH loan growth	-29.01	-0.15	5.51	5.03	10.78	26.58	83.18
2-year NFC loan growth	-26.67	-0.95	6.08	5.70	11.00	57.79	82.65
2-year RPP growth	-18.49	3.91	9.80	9.22	14.46	35.91	83.01
2-year LM growth to HH	-60.90	-18.84	-5.39	-5.39	5.28	112.79	77.46
2-year LM growth to NFC	-64.05	-15.04	-3.40	-2.17	9.01	91.22	78.18
Current account	-0.20	-0.01	0.02	0.02	0.03	0.15	93.38
Unemployment rate	2.00	5.10	6.64	7.77	9.16	24.30	93.38
y-o-y GDP growth	-29.49	2.31	3.57	3.96	6.07	34.80	89.27
Leverage ratio	4.83	6.63	8.73	9.03	11.22	15.14	93.38
CET 1 ratio	10.86	15.19	16.40	17.00	18.45	34.79	86.76
CBR (% of RWA)	0.00	1.59	2.74	2.91	4.03	12.03	61.90
ROA	-2.61	0.42	0.61	0.62	0.78	2.14	93.38
NPL ratio	0.83	2.39	4.37	7.43	9.26	42.07	92.13
Euro area CISS	0.05	0.07	0.08	0.10	0.12	0.18	93.38