# Loan Loss Accounting Rules and Bank Lending over the Cycle: Evidence from a Global Sample

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This presentation represents the authors‘ personal opinions and does not necessarily reflect the views of the Deutsche Bundesbank or its staff.

# Loan loss accounting rules and the cyclicality of bank lending?

- "Considerable uncertainty regarding the appropriate levels of loan-loss reserves over the cycle."
- "Further review of accounting standards governing valuation and loss provisioning would be useful."
- "Reduce their pro-cyclical effects without compromising the goals of disclosure and transparency."

Fed Chairman Ben Bernanke, March 10, 2009

- "Existing standards require the use of judgement to determine an incurred loss for provisioning of loan losses."
- "Reconsider the incurred-loss model by analysing alternative approaches for recognising and measuring loan losses that incorporate a broader range of available credit information."
- "Undertake a review of Basel II to reduce or eliminate disincentives for establishing appropriate provisions."

Report by the Financial Stability Forum, April 2, 2009

- "Review accounting standards to determine how financial firms should be required to employ
  - more forward-looking loan-loss provisioning practices
  - that incorporate a broader range of available credit information."
- "This would likely result in recognition of higher provisions earlier in the credit cycle."

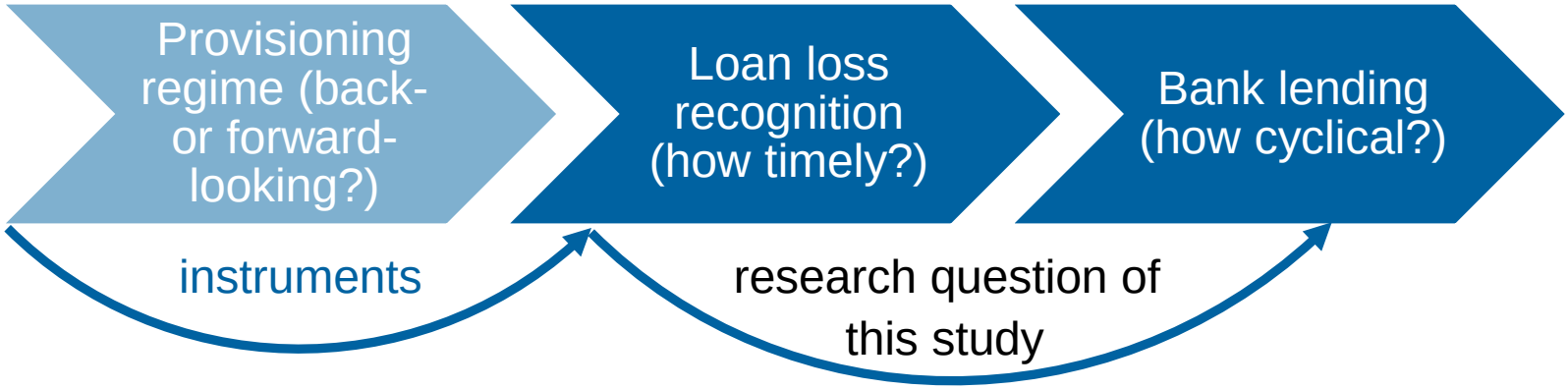
US Treasury proposal for regulatory reform, June 2009

- Trade-off between transparency and stability is a big issue since the crisis
- Do accounting standards aggravate or mitigate pro-cyclical bank lending?

# The *loan loss provisioning channel* of bank lending cyclicality

- Capital crunch hypothesis (Peek and Rosengren 1995)
  - Minimum capital requirements
  - Large loan losses during a recession

  → Banks restrict their lending




- Other factors for changes in bank lending over the economic cycle, e.g.
  - Short-term concerns (Rajan 2004)
  - Institutional memory (Berger and Udell 2004)
  - Screening profitability (Ruckes 2004)
  - Bank rivalry (Ogura 2006)

# Related literature and our contribution

- Beatty and Liao (2011)
  - How do delays in expected loss recognition affect banks' willingness to lend?
  - Banks with longer delays tend to reduce their lending more during recessions and are more frequently affected by the capital-crunch effect during recessions.
  - No evidence of such a relation before the introduction of capital regulation (1982)
- Bushman/Williams (2013)
  - Does delayed loss recognition affect balance-sheet contractions in downturns?
  - Delayed loss recognition → debt overhang → capital inadequacy in downturns → equity financing frictions (lower transparency) → balance sheet contractions

- Shortcomings in these papers
  - Loan loss provisions are chosen by banks and hence potentially endogenous. Doubtful how a change in provisioning rules affects pro-cyclicality.
  - Doubtful whether demand and supply effects in the lending market can be separated. Results reported could also reflect a decline in demand in bad times.

Our contribution:

*We analyse the impact of (exogenous) LLP rules on lending behaviour*

*We measure loan demand using survey data and verify the robustness of our results*

# Identification strategy and micro / macro data used

## MODEL

- $\Delta Loans = f(MacroVariable * ProvisioningRegime, ControlVariables)$
- Cross-sectional (not inter-temporal) identification strategy on bank level
- Pooled OLS with standard errors clustered at country level
- WLS; static and dynamic bank-level fixed effects as robustness tests

## DATA

| | |
|---|---|
| Bank-level financial reports | • Annual data (BankScope)<br>• 4,575 banks from 52 countries, 1997-2012<br>• Loan growth and balance sheet ratios |
| Country-level macro variables | • Nominal / real GDP growth, unemployment rate<br>• Peak-trough classification by ECRI<br>• Loan demand (survey data) |
| Accounting regime | • Bank Regulation and Supervision Survey (World Bank)<br>• Indices of backward- and forward-looking loan loss provisioning rules |

# Indices of backward- and forward-looking loss accounting rules

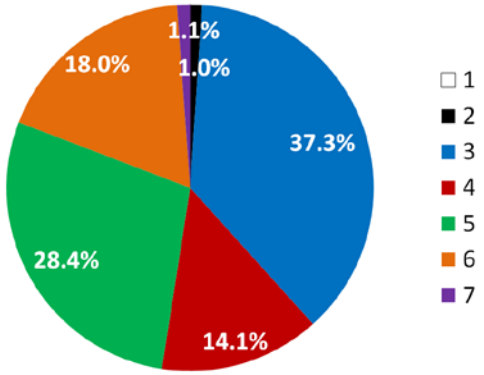
- **First-stage indices:**

| Classification of non-performing loans (NPL) … | Index 2 | Index 3 |
|---|---|---|
| …based only on a forward-looking estimate of the PD | 1 | 1 |
| …based both on days in arrears and on a forward-looking estimate of the PD | 2 | |
| …based only on days in arrears | 3 | 2 |

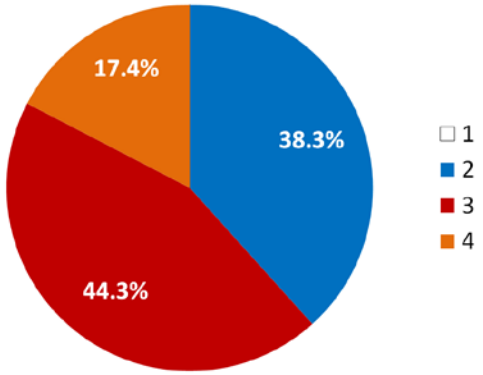
- Higher index values indicate more backward-looking LLP rules
- Details and descriptives: *Ch. Domikowsky (2014): „Loan Loss Accounting Rules across the Globe: What do we Know?"* *http://dx.doi.org/10.2139/ssrn.2521338*

- **Second-stage indices:**
  - *ProvIndex(1/2/3)a*: add +1 if there is a formal definition of a NPL and
  - *ProvIndex(1/2/3)b*: subtract 1 if general LLP are allowed or required

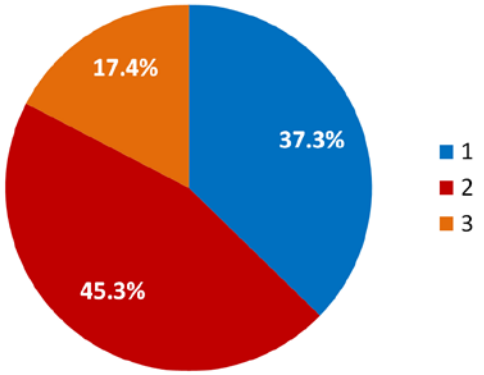
# Distribution of indices for loan loss provisioning rules



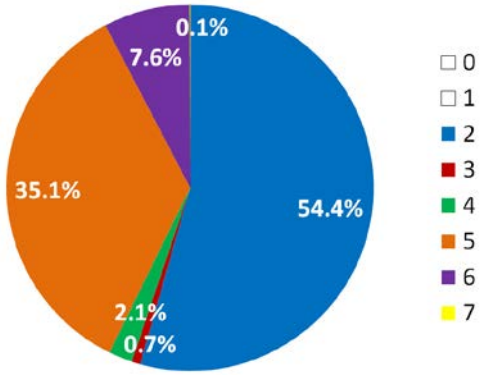

**ProvIndex1a**



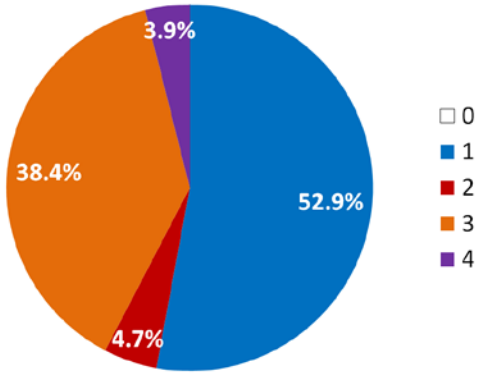

**ProvIndex2a**



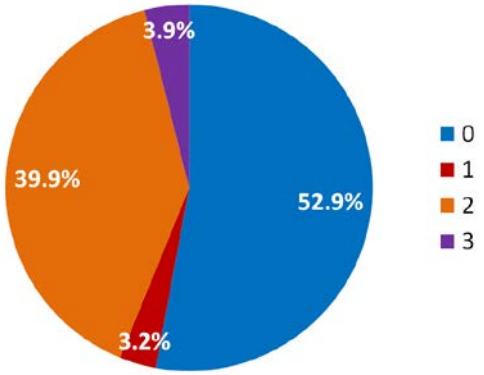

**ProvIndex3a**




**ProvIndex1b**




**ProvIndex2b**




**ProvIndex3b**

# Baseline econometric model for loan growth

- **Model:**

$$\begin{aligned}\Delta\text{Loans}_{i,t} = \beta_0 &+ \beta_1 \cdot \text{NDI}_{i,t-1} + \beta_2 \cdot \text{Equity}_{i,t-1} + \beta_3 \cdot \text{Loans}_{i,t-1} \\ &+ \beta_4 \cdot \text{Deposits}_{i,t-1} + \beta_5 \cdot \log(\text{TA})_{i,t-1} \\ &+ \beta_6 \cdot \Delta\text{NGDP}_{c,t} + \beta_7 \cdot \text{ProvIndex(1/2/3)b}_{c,t} \\ &+ \beta_8 \cdot \Delta\text{NGDP}_{c,t} \cdot \text{ProvIndex(1/2/3)b}_{c,t} + \epsilon_{i,t}.\end{aligned}$$

- **Dependent variable:** $\Delta\text{Loans}_{i,t} = \dfrac{\text{Total Lending}_{i,t}}{\text{Total Lending}_{i,t-1}} - 1$

- **Control variables:**
  - Non-Discretionary Income ($\text{NDI}_{i,t-1}$): Positive impact on $\Delta\text{Loans}_{i,t}$ ✓
  - Equity-to-total-assets ratio ($\text{Equity}_{i,t-1}$): Positive impact on $\Delta\text{Loans}_{i,t}$ ✓
  - Loans-to-total-assets ratio ($\text{Loans}_{i,t-1}$): Negative impact on $\Delta\text{Loans}_{i,t}$ ✓
  - Deposits-to-total-liabil. ratio ($\text{Deposits}_{i,t-1}$): Positive impact on $\Delta\text{Loans}_{i,t}$ (–)
  - Bank size ($\log(\text{TA})_{i,t-1}$): Negative impact on $\Delta\text{Loans}_{i,t}$ ✓

# Empirical results: Nominal GDP growth and ProvIndex(1/2/3)b

| Dep. Variable | (1) $\Delta Loans_{i,t}$ | (2) $\Delta Loans_{i,t}$ | (3) $\Delta Loans_{i,t}$ |
|---|---|---|---|
| Control Variables | YES | YES | YES |
| $\Delta NGDP_{c,t}$ | -0.071 | -0.144 | 0.236 |
| | (0.322) | (0.298) | (0.211) |
| $ProvIndex1b_{c,t}$ | 0.006 | | |
| | (0.004) | | |
| $\Delta NGDP_{c,t} \cdot ProvIndex1b_{c,t}$ | 0.184*** | | |
| | (0.060) | | |
| $ProvIndex2b_{c,t}$ | | 0.005 | |
| | | (0.006) | |
| $\Delta NGDP_{c,t} \cdot ProvIndex2b_{c,t}$ | | 0.382*** | |
| | | (0.108) | |
| $ProvIndex3b_{c,t}$ | | | 0.005 |
| | | | (0.006) |
| $\Delta NGDP_{c,t} \cdot ProvIndex3b_{c,t}$ | | | 0.372*** |
| | | | (0.114) |
| Constant | 0.203*** | 0.198*** | 0.196*** |
| | (0.023) | (0.025) | (0.024) |
| Observations | 35,780 | 35,780 | 35,780 |
| $R^2$ | 0.062 | 0.062 | 0.062 |
| $ProvIndex_{c,t}$: Min. value | 2 | | |
| $ProvIndex_{c,t}$: Max. value | 7 | | |

More backward-looking LLPs ➔
Higher sensitivity of ΔLoans to ΔNGDP

# Robustness: Indicator variables for the provisioning index

| Dep. Variable | (1) $\Delta Loans_{i,t}$ | (2) $\Delta Loans_{i,t}$ | (3) $\Delta Loans_{i,t}$ |
|---|---|---|---|
| $CONTROLS_{i,t-1}$ | YES | YES | YES |
| $\Delta NGDP_{c,t}$ | 0.406*** | 0.018 | 0.017 |
| | (0.007) | (0.014) | (0.014) |
| $\Delta NGDP_{c,t} \cdot [ProvIndex(1/2/3)b_{c,t} = 1]$ | | | 0.899*** |
| | | | (0.109) |
| $\Delta NGDP_{c,t} \cdot [ProvIndex(1/2/3)b_{c,t} = 2]$ | | 0.779*** | 0.937*** |
| | | (0.145) | (0.094) |
| $\Delta NGDP_{c,t} \cdot [ProvIndex(1/2/3)b_{c,t} = 3]$ | -0.390*** | 0.960*** | 1.172*** |
| | (0.020) | (0.092) | (0.401) |
| $\Delta NGDP_{c,t} \cdot [ProvIndex(1/2/3)b_{c,t} = 4]$ | 0.245 | 1.171*** | |
| | (0.489) | (0.399) | |
| $\Delta NGDP_{c,t} \cdot [ProvIndex(1/2/3)b_{c,t} = 5]$ | 0.462*** | | |
| | (0.161) | | |
| $\Delta NGDP_{c,t} \cdot [ProvIndex(1/2/3)b_{c,t} = 6]$ | 0.622*** | | |
| | (0.072) | | |
| $\Delta NGDP_{c,t} \cdot [ProvIndex(1/2/3)b_{c,t} = 7]$ | 0.761** | | |
| | (0.329) | | |
| Constant | 0.246*** | 0.215*** | 0.219*** |
| | (0.024) | (0.022) | (0.024) |
| Observations | | | |
| $R^2$ | | | |

More backward-looking LLPs ➔
Higher sensitivity of ΔLoans to ΔNGDP

# Differentiate the cyclicality of loan supply-side effects from demand-side effects using survey data (BLS /SLOS)

| Dep. Variable | (1) $\Delta\text{Loans}_{i,t}$ | (2) $\Delta\text{Loans}_{i,t}$ | (3) $\Delta\text{Loans}_{i,t}$ | (4) $\Delta\text{Loans}_{i,t}$ |
|---|---|---|---|---|
| $\text{High Demand}_{c,t}$ | -0.016 | -0.017 | 0.015 | 0.045* |
| | (0.013) | (0.019) | (0.012) | (0.021) |
| $\Delta\text{NGDP}_{c,t}$ | -0.552** | -0.615* | -1.327* | -0.203 |
| | (0.242) | (0.346) | (0.624) | (0.718) |
| $\Delta\text{NGDP}_{c,t} \cdot \text{High Demand}_{c,t}$ | | 0.054 | 0.483 | -0.870 |
| | | (0.316) | (0.378) | (0.817) |
| $\text{ProvIndex1b}_{c,t}$ | -0.003 | -0.003 | -0.001 | 0.003 |
| | (0.004) | (0.004) | (0.003) | (0.003) |
| $\text{ProvIndex1b}_{c,t} \cdot \text{High Demand}_{c,t}$ | | | -0.014* | -0.022** |
| | | | (0.007) | (0.009) |
| $\Delta\text{NGDP}_{c,t} \cdot \text{ProvIndex1b}_{c,t}$ | 0.386*** | 0.394*** | 0.535*** | 0.291* |
| | (0.059) | (0.074) | (0.133) | (0.156) |
| $\Delta\text{NGDP}_{c,t} \cdot \text{ProvIndex1b}_{c,t} \cdot \text{High Demand}_{c,t}$ | | | | 0.337 |
| | | | | (0.218) |
| Constant | 0.159*** | 0.161*** | 0.150*** | 0.131*** |
| | (0.029) | (0.035) | (0.026) | (0.027) |
| Observations | 23,606 | 23,606 | 23,606 | 23,606 |
| $R^2$ | 0.054 | 0.054 | 0.055 | 0.056 |
| $\text{ProvIndex}_{c,t}$: Min. value | 2 | 2 | 2 | 2 |
| $\text{ProvIndex}_{c,t}$: Max. value | 7 | 7 | 7 | 7 |

# Accounting index values as instruments for loan loss provisions ($\log(\text{LLP})_{i,t}$) and their impact on the cyclicality of bank lending

| Dep. Variable | (1) $\Delta\text{Loans}_{i,t}$ | (2) $\Delta\text{Loans}_{i,t}$ | (3) $\Delta\text{Loans}_{i,t}$ |
|---|---|---|---|
| $\text{NDI}_{i,t-1}$ | 1.026 | 0.940 | 0.936 |
| | (0.720) | (0.687) | (0.680) |
| $\text{Equity}_{i,t-1}$ | 0.414*** | 0.423*** | 0.423*** |
| | (0.080) | (0.079) | (0.079) |
| $\text{Loans}_{i,t-1}$ | -0.177*** | -0.187*** | -0.188*** |
| | (0.050) | (0.042) | (0.041) |
| $\text{Deposits}_{i,t-1}$ | -0.029* | -0.027 | -0.026 |
| | (0.018) | (0.018) | (0.018) |
| $\log(\text{TA})_{i,t-1}$ | -0.004** | -0.004** | -0.004* |
| | (0.002) | (0.002) | (0.002) |
| $\Delta\text{NGDP}_{c,t}$ | 0.789*** | 0.779*** | 0.779*** |
| | (0.187) | (0.204) | (0.207) |
| $\log(\text{LLP})_{i,t}$ | -0.048*** | -0.055*** | -0.056*** |
| | (0.018) | (0.021) | (0.021) |
| Constant | -0.053 | -0.085 | -0.087 |
| | (0.079) | (0.085) | (0.085) |
| Observations | 28,223 | 28,223 | 28,223 |
| $R^2$ | 0.048 | 0.031 | 0.031 |
| $\text{ProvIndex}_{c,t}$: Min. value | 2 | | |
| $\text{ProvIndex}_{c,t}$: Max. value | 7 | | |

Higher LLPs (instrumented by indices)
➔ Lower increase in lending (ΔLoans)

# Our findings prove to be robust in alternative settings

1. Estimation using static and dynamic bank-level fixed effects
2. Accounting-weighted sample (to increase heterogeneity in the indices) through Weighted Least Squares
3. Restrict sample to countries with expert-reviewed accounting index values
4. Extend sample to countries for which information on general LLP is missing
5. Exclusion of the top three countries (DE, JP, US) in terms of # observations
6. Alternative business-cycle variables (real GDP, unemployment rate, binary peak-trough indicator series)
7. Upswings vs. downturns: Interaction terms with recession indicator variable
8. Differentiation by bank size (small and large banks within each country)

# Conclusions and possible extensions

- Significant and sizable impact of loan-loss accounting rules on loan growth
  - The more backward-looking a country‘s LLP rules, the more loan growth varies with the business cycle
  - Findings are robust to variations in the sample and estimation strategy
  - New indices of backward- and forward-looking loan loss accounting rules prove their relevance in several specifications

➔ Evidence consistent with capital crunch hypothesis of loan loss provisions

- Strong policy implications for the envisaged move from incurred-loss to expected-loss provisioning rules and the potential real-sector consequences

- Possible extensions
  - Consequences regarding bank-specific risk and financial stability?
  - Further interactions with regulatory standards, tax considerations etc.