

Loan Growth and Riskiness of Banks

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Motivation

Credit losses take shine off banks' earnings

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Wells Fargo, the fifth largest US bank, on Tuesday reported a 13 percent jump in fourth-quarter earnings on strong loan growth, but said net credit losses were on the rise (...)

Banco Espanol de Credito: Loan Growth Boosts Second-Quarter Profit

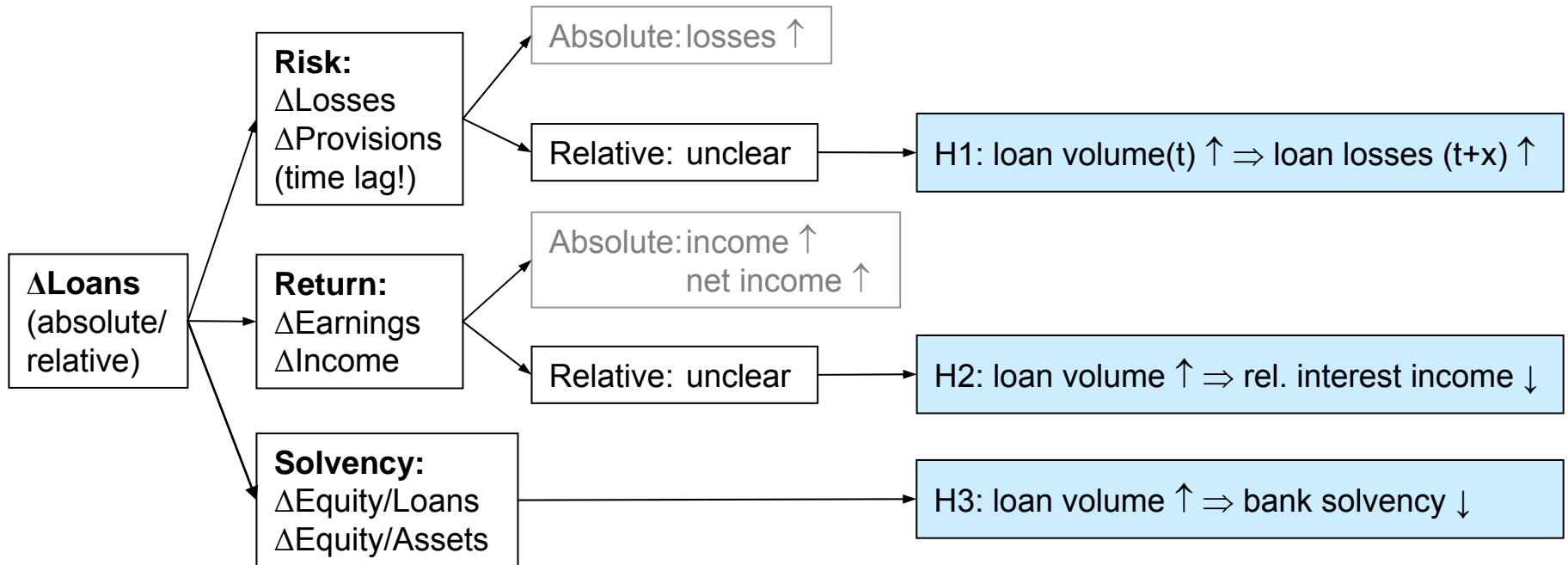
THE WALL STREET JOURNAL.

Jul 11, 2007

(...) The results were boosted by robust loan growth and wider credit margins. (...) Second-quarter net interest income rose 19% to 355.3 million Euros. Total loans rose 27% in the first half (...).

- Overwhelming anecdotic evidence on the relation between loan growth, loan losses, and credit margins
- Strategic decisions by individual banks apart from macroeconomic trends

Hypotheses



- Additional questions:
 - Impact of loan growth on risk-adjusted interest income (H1+H2)?
 - Consequences of *external* bank growth (through M&A activity)?
 - Different effects for poorly vs. well capitalized banks?

Related Literature and Contribution

- Theoretical literature (focusing on individual bank behavior)
 - Rajan (1994, QJE)
 - Dell’Ariccia/Marquez (2006, JF)
 - Ogura (2006, JFI)
- Empirical literature
 - Sinkey/Greenawalt (1991, JFSR)
 - Clair (1992)
 - Keeton (1999)
 - Other papers: focus on emerging banking systems or macro effects
 - Salas/Saurina (2002, JFSR)
 - Bikker/Metzemakers (2005)
 - Berger/Udell (2005, JFI)
- Contribution of our paper:
 - Consequences of *individual* loan growth under *regular conditions*
 - Large sample international analysis using *micro data*
 - Broad conceptual framework, relating loan growth with
 - loan losses / bank risk
 - (risk-adjusted) interest income
 - bank equity ratios / solvency

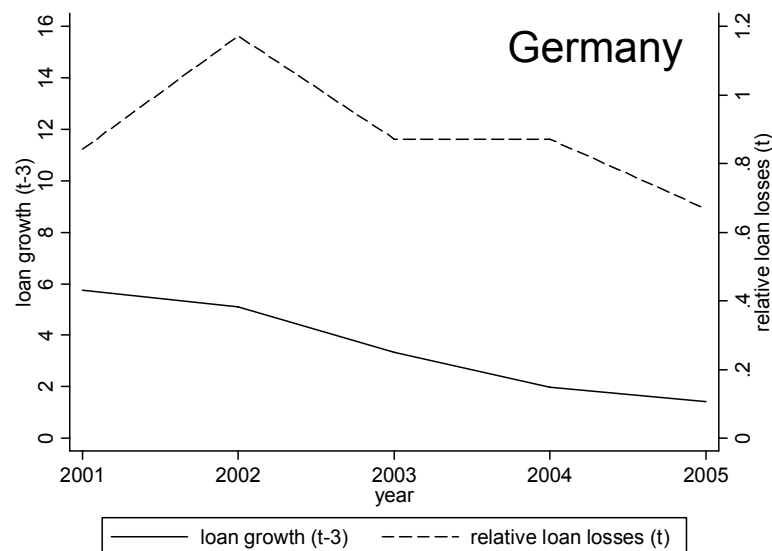
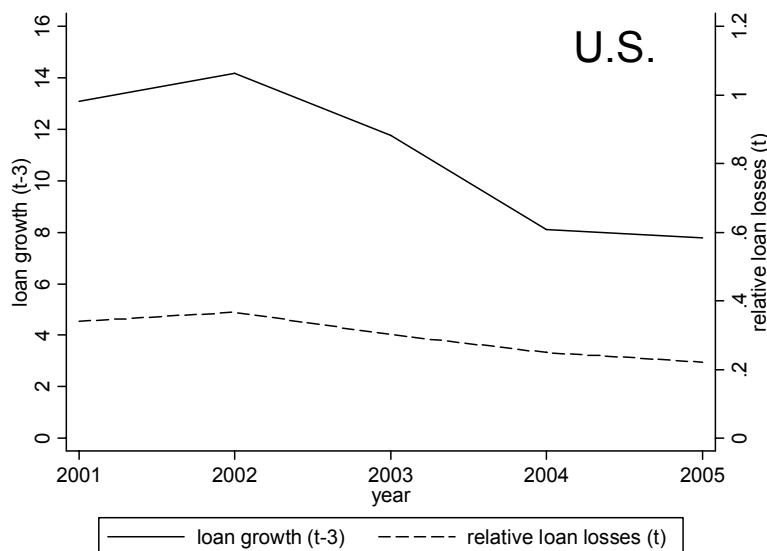
Data

- Balance sheet / income statement data (1997-2005, Bankscope)
- Data characteristics / representativeness:
 - Banks from 14 countries in North America and Western Europe
 - 11 out of the 12 largest banking systems
 - G8 countries (except Japan and Russia)
 - Fraction of banks covered >30% for large industrial countries
 - A total of 10,228 banks and 72,780 bank-year observations
- Observations are excluded if key variables are not available for at least 5 consecutive years

Loan Growth and Loan Losses (1)

Hypothesis H1: Loan growth leads to an increase of loan loss provisions in subsequent years.

- Dependent variable: Relative loan losses $LL1 = \frac{\text{loan loss provisions (t)}}{\text{total customer loans (t-1)}}$
- Main explanatory variable: Loan growth $LG = \frac{\text{total customer loans (t)}}{\text{total customer loans (t-1)}} - 1$
- Medians of $LL1_t$ (- - -) and LG_{t-3} (—) by year



Loan Growth and Loan Losses (2)

$$\text{LOGLL1}_t = \alpha + \beta_1 \text{LOGLL1}_{t-1} + \sum_{k=1}^4 \beta_{\kappa+1} \text{LG}_{t-k} + \beta_6 \text{SIZE}_t + \beta_7 \text{MACRO}_t + \beta_8 \text{INT_LONG}_t + \gamma \text{ specialization dummies} + \delta \text{ country dummies} + \varepsilon$$

Dep. Var.: LOGLL1 _t	(1)		(2)		(3)	
Explanatory Var.	Coeff.	p-val.	Coeff.	p-val.	Coeff.	p-val.
LOGLL1 _{t-1}	0.601375***	0.000	0.597702***	0.000		
LG _{t-1}	-0.000615	0.133	-0.000248	0.553	0.000248	0.602
LG _{t-2}	0.001364***	0.000	0.001283***	0.001	0.002452***	0.000
LG _{t-3}	0.001888***	0.000	0.001917***	0.000	0.003005***	0.000
LG _{t-4}	0.000629**	0.013	0.000544**	0.032	0.002699***	0.000
LOGTCL _t	0.002606	0.576	-0.002259	0,635	0.015767*	0.061
GDP_GROW _t	-0.061806***	0.000			-0.126000***	0.000
INFLAT _t			-0.164160***	0.000		
INT_LONG _t	0.325026***	0.000	0.405538***	0.000	0.230798***	0.000
+ special. dummies						
+ country dummies						
Constant	-3.764025***	0.000	-3.880508***	0.000	-6.677734***	0.000
No. of obs.	18,283		18,283		18,585	
No. of clusters	8,718		8,718		8,863	
Adj. R ²	0.515		0.516		0.273	

P-values are calculated from Huber-White robust standard errors, controlling for clustering at individual banks.

***, **, * indicate that coefficients are statistically significant at the 1%, 5%, and 10%-level.

Loan Growth and Interest Income

Hypothesis H2: Loan growth causes a decrease in relative gross interest income

- Dependent variable: Change in relative interest income

$$\Delta RII = \frac{\text{int. income (t)}}{\text{total loans (t-1)} \cdot (1 + LG(t)/2)} - \frac{\text{int. income (t-1)}}{\text{total loans (t-2)} \cdot (1 + LG(t-1)/2)}$$

- Regression results:

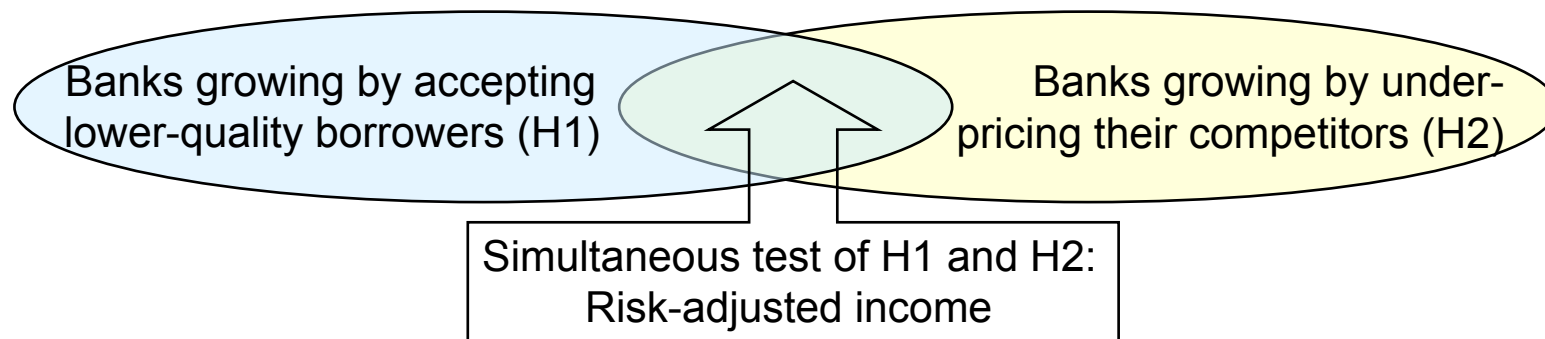
$$\Delta RII_t = \alpha_t + \beta_1 LG_t + \beta_2 LOGTCL_t + \beta_3 INFLAT_t + \beta_4 INT_LONG_t + \gamma \text{ dummies} + \varepsilon$$

Coeff.: -0.0054*** 0.039*** 1.015*** 0.829***

(Controlling for clustering at bank level, 49,907 observations, 10,228 banks, Adj. R² = 0.175)

- Recall the positive impact of loan growth on loan losses (H1)
→ Risk-adjusted loan pricing would require *higher* loan rates!

Loan Growth and Risk-Adjusted Interest Income



- Relative net interest income: $RNII = \frac{\text{int. income (t)} - \text{int. expenses (t)}}{\text{total cust. loans (t-1)} \cdot (1 + LG(t)/2)}$
- Loss-Income-Ratio: $LIR_t = \frac{LOGLL1_t}{\text{Average}(RNII_{t-1}, RNII_{t-2}, RNII_{t-3}, RNII_{t-4})}$
- Mean Loan growth: $MLG_t = \text{Average}(LG_{t-1}, LG_{t-2}, LG_{t-3}, LG_{t-4})$

$$\Delta LIR_t = \alpha_t + \beta_1 MLG + \beta_2 LOGTCL_t + \beta_3 INFLAT_t + \beta_4 INT_LONG_t + \gamma \text{ dummies} + \varepsilon$$

Coeff. 0.0031*** -0.081*** -0.131*** -0.006

(Controlling for clustering at bank level, 18,562 observations, 8,859 banks, Adj. R² = 0.119)

Loan Growth and Bank solvency

Hypothesis H3: Loan growth has a negative impact on bank solvency

- Dependent variable: Changes in the equity-to-total assets ratio

$$\Delta ETA = \frac{\text{equity (t)}}{\text{total assets (t)}} - \frac{\text{equity (t-1)}}{\text{total assets (t-1)}}$$

- Effect not trivial!
- Regression results:

$$\Delta ETA_t = \alpha_t + \beta_1 LG_t + \beta_2 LOGTCL_t + \beta_3 INFLAT_t + \beta_4 INT_LONG_t + \gamma \text{ dummies} + \varepsilon$$

Coeff.: -0.025*** 0.087*** -0.070*** 0.049***

(Controlling for clustering at bank level, 60,050 observations, 10,228 banks, Adj. R² = 0.129)

Further Results and Robustness Checks

- Effects for H1 – H3 confirmed:
 - for different bank types and virtually all of the 14 countries
 - for different levels of bank's capitalization
 - using alternative measures of loan growth
 - Abnormal loan growth $ALG = LG - \text{Average}(\text{country}, \text{year})$
 - Categorical variable $DLG \in \{-1;0;1\}$
- Smaller impact of loan growth if a bank's equity increases by more than 40% (assumed as M&A-driven bank growth)
- Reverse causality: Loan losses \rightarrow Loan growth?
 - Tested using a VAR model
 - Small, positive impact of past loan losses on loan growth
- Alternative methodology
 - Fixed effects / random effects / dynamic (GMM) panel estimators
 - Main results confirmed

Conclusions

- Main Findings
 - Under *regular conditions*: Loan growth (t) → peak in loan losses (t+3)
 - Rapidly growing banks exhibit a decline in relative interest income
 - Bank solvency is negatively affected by loan growth
- Implications
 - Bankers should be aware of the additional risk and therefore carefully assess the risk-income structure of additionally granted loans
 - Supervisors may monitor the link between loan growth and loan losses
- Avenues for future research
 - *Volatility* of bank lending, bank ownership, macroeconomic conditions (Foos, 2008)
 - Loan growth under *particular conditions*, e.g. deregulation, market entry (Illueca, Norden, and Udell, 2008)
 - Analysis of *off-balance* sheet bank growth