

The Profit-Credit Cycle

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The credit cycle

- Schularick and Taylor (2012):
Credit expansion \Rightarrow banking crisis risk
- Mian, Sufi, and Verner (2017):
Credit expansion (household credit) \Rightarrow lower GDP growth
 - But: Economic forecasters fail to account for this
- Baron and Xiong (2017):
Credit expansion \Rightarrow bank equity crash risk
 - But: Shareholders not compensated for this risk

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- Open questions (Mian and Sufi 2018):
 - What are the underlying drivers?
 - What is the sequence of events initiating the crisis?
- Recent credit cycle models: “Instability from beliefs”
 - Positive news create excess optimism and lending.
 - Followed by predictable reversals (optimism wanes).
- Why? Recent outcomes overweighted in expectation formation
 - Diagnostic: Bordalo, Gennaioli and Shleifer 2017
 - Extrapolative: Greenwood, Hanson and Jin 2018

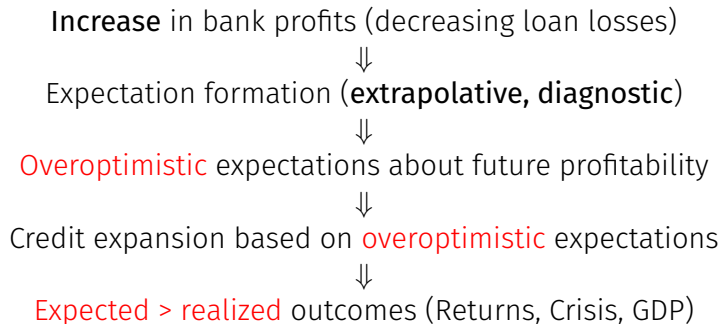
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“Instability from beliefs”: credit expansion and crisis



Existing empirical evidence

Increase in bank profits (decreasing loan losses)



Expectation formation (extrapolative, diagnostic)



Overoptimistic expectations about future profitability



Credit expansion based on overoptimistic expectations



Expected > realized outcomes (**Returns, Crisis, GDP**)

What we do

- New data on banking sector profit and loss accounts (17 countries, 1870-2015)
 - ... to study the relationship between past profits, credit expansions and crises,
 - ...despite low frequency of credit cycles and rare events nature of banking crises.
- Recent survey data on expectations of US bank CFOs
 - ... to study the relationship between past performance, expectations (optimism), and lending.

What we find: The Profit-Credit Cycle

- 1 In long run panel data:
 - **Credit expansions:** increases in bank profitability predict a credit expansion over the following years
 - **Reversals:** increases in profitability predict elevated crisis risk
 - **Channel:** Instability from beliefs, but also evidence for a bank net worth channel
- 2 In US CFO survey data:
 - **Expectations:** expected profitability and optimism depend excessively on past profitability
 - **Credit:** bank lending reflects these expectations

The Long Run Data

A new long-run dataset of bank profitability

- Previously: balance sheet data and market prices
- New: banking sector profit and loss accounts
- Advantage: measure of past performance, but not affected by expectations
- Main variable:

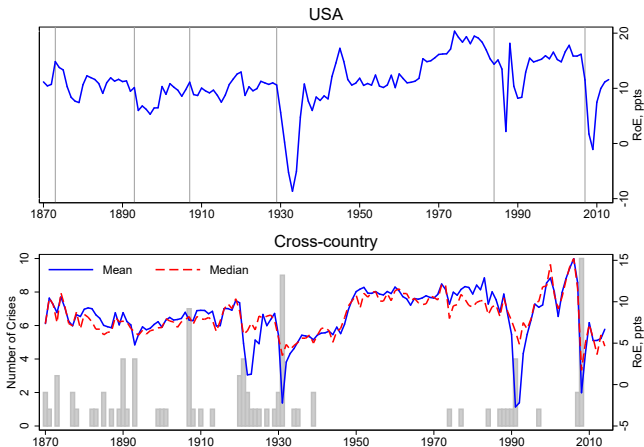
$$\text{Return on Equity} = \frac{\text{Net profits after Tax}}{\text{Book Equity}}$$

Coverage

- Main sources of the new data:
 - Official publications (central banks or statistical offices)
 - Previous work of financial historians
 - Banking associations
 - Aggregation from largest banks
- 17 countries: 13 × Europe + US, Canada, Australia, Japan
- Yearly data: 1870-2015
- Bank balance sheet data, crisis dates and control variables from Macroeconomic history database

Profitability in the US and around the World

- RoE rather stable in the long run (despite ▶ leveraging)
- Large losses in financial crises



Decomposition of profits

Additional data series (available for subsamples)

1 Sources of profits:

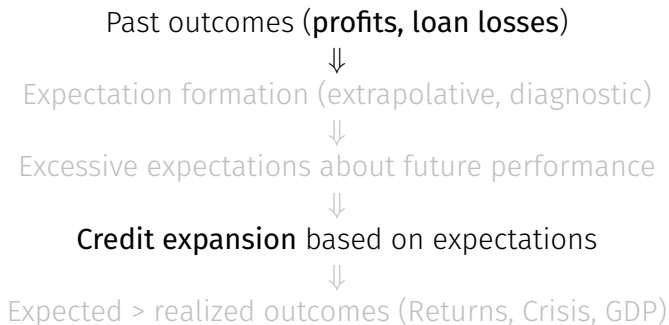
$$\text{Revenues} - \text{Costs} - \text{Loan Losses} \approx \text{Net Profits after Tax}$$

2 Uses of profits:

$$\text{Net Profits after Tax} \approx \text{Retained Profits} + \text{Dividends}$$

Credit expansions

Profits and subsequent credit expansion



Relationship between profitability and credit-to-GDP

Approach similar to Mian, Sufi, and Verner, 2017:

- Main dependent variable: credit expansion (bank loans to private non-financial sector)

$$\Delta_3 y_{i,t+3} = (\text{Credit/GDP})_{i,t+3} - (\text{Credit/GDP})_{i,t}$$

- Main explanatory variables:

- $\text{RoE}_{i,t-1}$

- $\Delta_3 \text{RoE}_{i,t-1} = \text{RoE}_{i,t-1} - \text{RoE}_{i,t-4}$

- Controls include the real GDP level and three lags of real GDP growth, short and long term interest rates, inflation, and the current account-to-GDP ratio.

Main finding

Three-year credit expansion ($\Delta_3 y_{it+3}$) is predicted by changes/levels of bank profitability

	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{RoE}_{i,t-1}$	0.39*** (0.06)	0.34*** (0.04)	0.33*** (0.04)			
$\text{RoE}_{i,t-1}$				0.50*** (0.08)	0.47*** (0.09)	0.46*** (0.09)
Capital Ratio $_{i,t-1}$			0.23*** (0.09)			0.24** (0.10)
$\Delta_3(\text{Capital/GDP})_{i,t-1}$			0.17 (0.24)			-0.01 (0.23)
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓
Macrocontrols		✓	✓		✓	✓
R ²	0.06	0.11	0.12	0.10	0.15	0.16
Observations	1611	1463	1462	1646	1494	1486

Further robustness

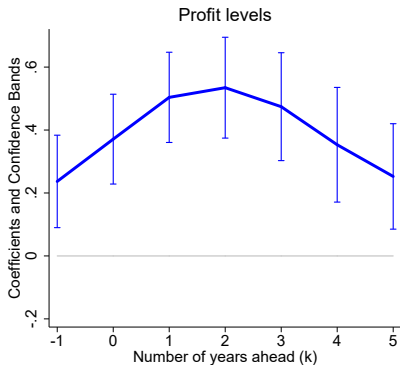
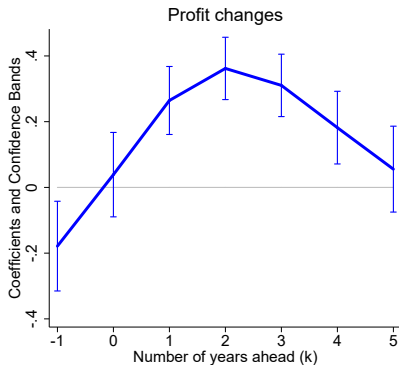
- Subsamples: Post-1973, pre-2000, no crisis
 - ▶ Subsamples
- Definition of dependent and profit variables
 - ▶ Real private credit per capita
 - ▶ Bank assets
 - ▶ Non-loan bank assets
 - ▶ Return on Assets
 - ▶ Profits to GDP
 - ▶ Real profits per capita
- Subsample of crisis observations
 - ▶ Crisis recovery
- Country level time series analysis
 - ▶ Country level
- Expectations
 - ▶ 2-stage procedure
- Bank-level evidence using US call report data
 - ▶ Bank-level

Timing

- Vary dependent variable:

$$\Delta_3 y_{i,t+k} = (\text{Credit/GDP})_{i,t+k} - (\text{Credit/GDP})_{i,t+k-3}$$

- Strongest correlation for $k = 2$ or $k = 3$



Alternative channels

- Increases in profitability predict credit expansion.
- Consistent with “instability from beliefs” view.
- What about alternative explanations?
 - 1 Credit demand
 - 2 Banking sector net worth
 - 3 Other channels (refinancing conditions and efficiency)

1. Credit supply or demand

Quantity and price of credit for supply vs. demand driven expansions:

- Supply expansion: credit volume increases and price of credit decreases
- Demand expansion: credit volume increases and price of credit increases

→ Price of credit: corporate bond spreads from Kuvshinov (2018)

1. Supply vs. demand: quantity and price of credit

- Increases in profitability predict lower price of credit (bond spreads)

	Dependent variable: Bond Spread _{i,t}		
	(1)	(2)	(3)
$\Delta_3 \text{RoE}_{i,t-1}$	-1.01*** (0.36)	-1.08** (0.49)	-0.83* (0.44)
Country fixed effects	✓	✓	✓
Macrocontrols		✓	✓
Net-worth controls			✓
R ²	0.00	0.09	0.11
Observations	1272	1272	1272

2. Credit supply explanations

How to distinguish between net-worth and expectations mechanisms?

1 Using Payouts:

- Net worth channel depends on retained earnings
- Dividends paid out to shareholders orthogonal to net worth channel
- Decomposition of profits by uses

$$RoE_{i,t} = DoE_{i,t} + REToE_{i,t}$$

- Repeat baseline specification including both variables
- ### 2 Controlling for the level of profitability, changes in profitability are a measure of the recent profitability path

2. Net worth or expectations?

Dependent variable: $\Delta_3 y_{i,t+3}$						
	Uses of profits				Profit path	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{DoE}_{i,t-1}$	0.95*** (0.16)	0.76*** (0.20)	0.81*** (0.17)	0.70*** (0.19)		
$\Delta_3 \text{REToE}_{i,t-1}$			0.27*** (0.08)	0.21*** (0.07)		
$\text{RoE}_{i,t-1}$					0.44*** (0.09)	0.41*** (0.10)
$\Delta_3 \text{RoE}_{i,t-1}$					0.12** (0.06)	0.10** (0.04)
R^2	0.029	0.121	0.052	0.133	0.092	0.155
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy		✓		✓		✓
Control variables		✓		✓		✓
Observations	939	939	939	939	1640	1462

3. Other channels

Other candidate explanations:

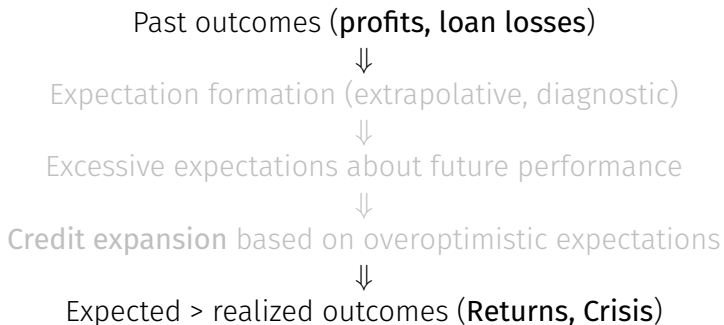
- Refinancing conditions for banks: linked through net interest income
- Efficiency / technology: linked through costs
- Extrapolation (of past defaults): linked through loan losses

3. Loan losses drive the relationship

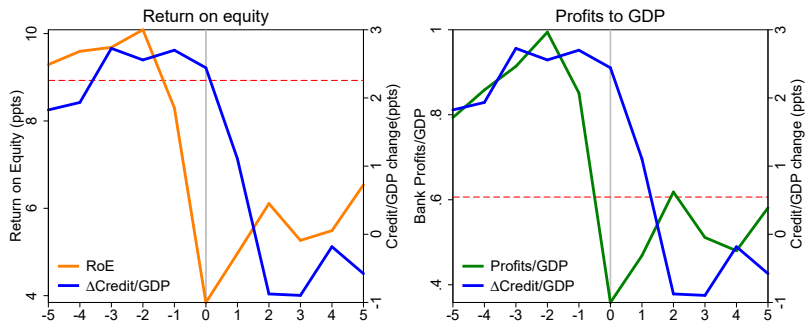
	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1) <u>Revenue</u> Equity	(2) <u>Revenue</u> Equity	(3) <u>Cost</u> Equity	(4) <u>Cost</u> Equity	(5) <u>LoanLoss</u> Equity	(6) <u>LoanLoss</u> Equity
$\Delta_3 \text{Change}_{i,t-1}$	0.01 (0.04)	-0.08 (0.08)	-0.25*** (0.07)			
$\text{Level}_{i,t-1}$				0.04 (0.03)	-0.02 (0.04)	-0.48*** (0.10)
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓
R ²	0.14	0.14	0.15	0.14	0.14	0.19
Observations	837	837	837	837	837	837

Crises and reversals

Past profitability and crises



Event study around financial crisis dates



Notes: These figures display the evolution of credit and profit variables around a financial crisis, i.e. 0 refers to a year in which a financial crisis starts. Blue (solid) lines display the mean of changes credit/GDP around crises. The orange line displays RoE around crises, the green line the ratio of bank profits to GDP. Red (dashed) lines present the full sample average for the respective variable. All variables are expressed in percentage points.

Probit models to predict financial crises

The probability of a crisis starting in country i at time t conditional on observables ($X_{i,t-1}$):

$$\Pr[S_{i,t} = 1 | \alpha_i, X_{i,t-1}] = \Phi(\alpha_i + \beta X_{i,t-1}).$$

where:

$S_{i,t}$ is a financial crisis dummy (Jordà et al. 2016).

α_i is a country fixed effect.

$X_{i,t-1}$ are changes in profitability

Formal crisis models

	RoE		Loan Losses/Loans		Profits/GDP	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_{t-6 \rightarrow t-1}$	0.05 (0.06)		-0.89 (0.82)		0.83* (0.43)	
$\Delta_{t-2 \rightarrow t-1}$		-0.07** (0.03)		0.21 (0.75)		-0.91** (0.40)
$\Delta_{t-6 \rightarrow t-2}$		0.24*** (0.07)		-1.68** (0.70)		1.71*** (0.42)
Credit Growth	✓	✓	✓	✓	✓	✓
AUROC	0.72	0.75	0.72	0.73	0.72	0.76
Number of Crises	55	55	40	40	55	55
Observations	1634	1634	909	909	1622	1622

→ Increases in profitability associated with **elevated crisis risk**

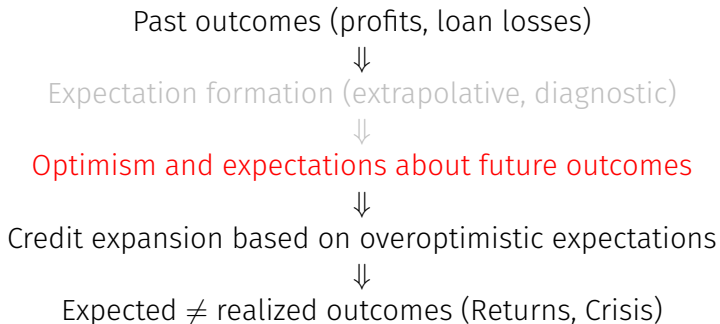
→ Reversal in RoE in the **year before** a crisis

Intermediate summary

- Bank profits lead the credit cycle
- Patterns consistent with “instability from beliefs” view
- Evidence on potential channels
 - 1 Credit demand: **bond spread results**
 - 2 Banking sector net worth: **dividend results**
 - 3 Decomposition: **loan losses matter**
- Increases in profitability furthermore associated with: expectations > realized outcomes
 - 1 Crisis
 - 2 Shareholder returns [▶ BX exercise](#)

Expectations

Expectations missing in the long run data



Duke CFO survey

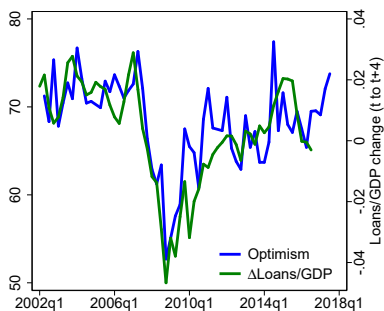
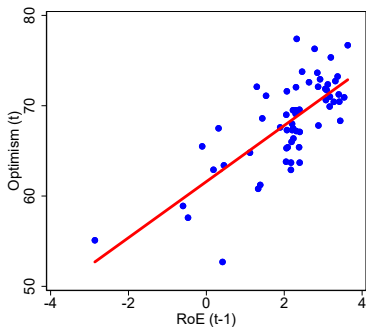
- Survey data increasingly used in finance to understand expectations (e.g. Myers and De la O 2019)
- Quarterly survey data on optimism and expectations from the Duke CFO survey.
- Focus on data for bank CFOs in the United States.
- We combine this (aggregate) data with quarterly accounting data on banking sector balance sheets and income.

Optimism measure

- Survey data contains a measure of optimism for bank CFOs:
- “Rate your optimism about the financial prospects for your own company on a scale from 0-100, with 0 being the least optimistic and 100 being the most optimistic”

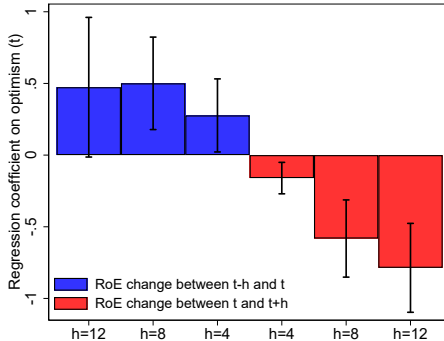
Optimism and past profitability

- Optimism today strongly correlated with past profitability.
- Optimism today strongly correlated with changes in Loans/GDP over the next year.



Is optimism justified?

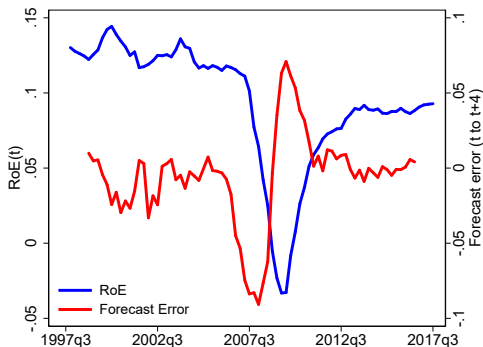
- Increases in RoE associated with optimism today.
- BUT: Optimism not justified by future increases in RoE.



Alternative measure

- Question: “Relative to the previous 12 months, what will be your company’s PERCENTAGE CHANGE during the next 12 months?” (Earnings)
- Similar to Bordalo et al. (2017) we define:
 - 1 Profit over past year: RoE_t
 - 2 Expected profit: $E_t(RoE_{t+4})$
 - 3 Forecast error: $RoE_{t+4} - E_t(RoE_{t+4})$ (actual - expected profitability)

Profits and forecast errors of CFOs



Negative relationship between profits and forecast errors implies that...

- ...bankers are too optimistic when current profits are high;
- ...bankers are excessively pessimistic when profits are low.

RoE, expectations and credit supply

- Changes in RoE affect optimism and expectations about future profitability...
- ...but not realized future profitability.

	Δ Optimism	Δ RoE _{t+4}	Δ E _t (RoE _{t+4})	Δ Error	Δ %Tightening
	(1)	(2)	(3)	(4)	(5)
Δ RoE _t	1.70*** (0.52)	0.06 (0.14)	0.73*** (0.19)	-0.66*** (0.23)	-7.14*** (0.99)
R ²	0.08	0.00	0.17	0.10	0.18
Observations	57	78	73	69	82

- Data from Senior Loan Officer Survey suggest that lending standards are relaxed.
- Carvalho et al. (2019) show that loan officers price credit based on personal experience of economic developments.

Expectations and credit expansion

- Expectations matter for credit expansion

	Dependent variable: 4-quarter change in credit/GDP				
	(1) Optimism	(2) RoE _t	(3) E _t (RoE _{t+4})	(4) Error	(5) %Tightening
RHS variable (see column header)	0.13*** (0.04)	0.37*** (0.04)	0.29*** (0.03)	-0.28*** (0.05)	-0.02*** (0.01)
R ²	0.79	0.85	0.83	0.71	0.65
Controls	✓	✓	✓	✓	✓
Observations	56	75	71	71	75

Takeaways

- The Profit-Credit Cycle
 - Bank profitability leads the credit cycle
 - Profitability measures predict financial distress
 - Too optimistic after good profitability news and too pessimistic after bad news
- Implications
 - Early warning systems: profitability misleading (similar to volatility paradox, credit spreads)
 - Policy: role for countercyclical capital requirements/provisioning

Appendix

Predictability of excess returns

- Do shareholders anticipate this risk?
- If yes, they would require higher expected returns as a compensation.
- Based on Baron and Xiong (2017) approach and their data on total excess returns on bank equity indices.

$$r_{i,t+h} - r_{i,t+h}^f = \alpha_{h,i} + \beta^h \text{Predictors}_{i,t-1} + \epsilon_{i,t+h},$$

Predictability of excess returns

- Increases in RoE are associated with predictably lower excess returns on the bank equity index over 3-6 year horizons
- Credit as in Baron and Xiong (2017), both variables standardized at country level

	Dependent variable: cumulative bank equity index excess returns					
	(1) 1-year	(2) 2-year	(3) 3-year	(4) 4-year	(5) 5-year	(6) 6-year
$\Delta_3 \text{RoE}_{i,t-1}$	-0.01 (0.02)	-0.01 (0.03)	-0.05* (0.03)	-0.08** (0.03)	-0.08* (0.04)	-0.06** (0.03)
$\Delta_3 \text{Loans}/\text{GDP}_{i,t-1}$	-0.05*** (0.01)	-0.08*** (0.02)	-0.11*** (0.03)	-0.11** (0.04)	-0.11*** (0.04)	-0.09** (0.03)
Country fixed effects	✓	✓	✓	✓	✓	✓
Observations	899	867	839	813	787	764

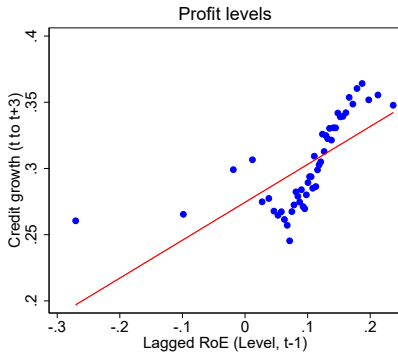
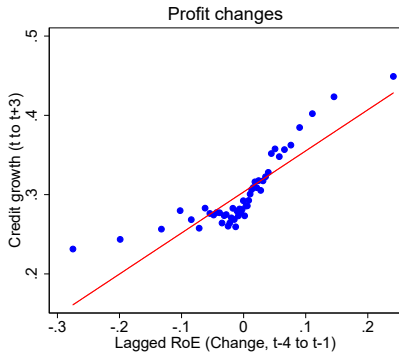
Bank level analysis

Does the profit-credit cycle also exist at the bank-level?

- Quarterly call report data from the US (1983-2013).
- We convert to yearly data and define variables corresponding to variables at the macro level.
- We re-estimate our baseline specifications at the bank level including additional controls and time-fixed effects.

Bank level analysis

- Results confirm the macro-analysis (further: no aggregate demand)



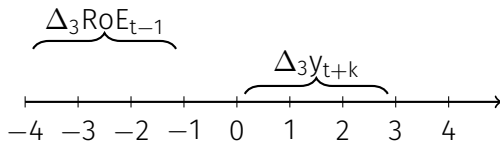
Bank level evidence

	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1) Full	(2) Full	(3) Full	(4) No overlap	(5) No overlap	(6) No overlap
$\Delta_3 \text{RoE}_{i,t-1}$	0.12*** (0.02)		0.11*** (0.03)	0.17*** (0.05)		0.12*** (0.04)
$\text{RoE}_{i,t-1}$		0.12*** (0.04)	0.03 (0.05)		0.20** (0.08)	0.10 (0.09)
Bank fixed effects	✓	✓	✓	✓	✓	✓
Year fixed effects	✓	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓	✓
R ²	0.20	0.20	0.20	0.21	0.21	0.21
Observations	178605	178605	178605	56122	56122	56122

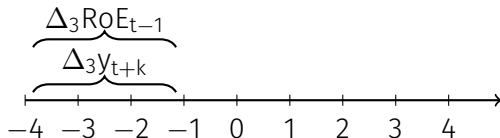
▶ back

$$\Delta_3 y_{i,t+k} = \alpha_i + \beta^{\text{ROE}} \Delta_3 \text{ROE}_{i,t-1} + u_{i,t+k}$$

If $k = 3$:

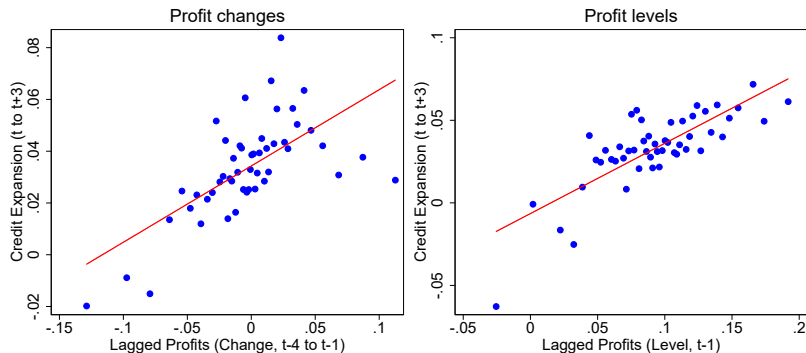


If $k = -1$:



The Profit-Credit Cycle [▶ back](#)

Main result: bank profits predict subsequent credit expansion.



Note: Based on data from 17 advanced economies 1870-today. Binned scatterplots including country fixed effects and control variables.

Subsamples and time effects [▶ back](#)

	Dependent variable: $\Delta_3 y_{i,t+3}$				
	(1) Post-1973	(2) Pre-2000	(3) No overlap	(4) No crisis	(5) Year effects
$\Delta_3 \text{RoE}_{i,t-1}$	0.25*** (0.07)	0.31*** (0.05)	0.30*** (0.09)	0.18*** (0.04)	0.16*** (0.04)
Country fixed effects	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓
Exclude 5-year crisis window				✓	
Year effects					✓
R ²	0.22	0.11	0.17	0.15	0.31
Observations	640	1275	484	1207	1462

	Dependent variable: $\Delta_3 y_{i,t+3}$				
	(1) Post-1973	(2) Pre-2000	(3) No overlap	(4) No crisis	(5) Year effects
$\text{RoE}_{i,t-1}$	0.53*** (0.10)	0.36*** (0.10)	0.43*** (0.08)	0.33*** (0.08)	0.31*** (0.07)
Country fixed effects	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓
Control variables	✓	✓	✓	✓	✓
Exclude 5-year crisis window				✓	
Year effects					✓
R ²	0.26	0.13	0.21	0.17	0.32
Observations	643	1299	493	1225	1486

Real private credit per capita [▶ back](#)

	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{RoE}_{i,t-1}$	0.57*** (0.18)	0.45*** (0.12)	0.45*** (0.12)			
$\text{RoE}_{i,t-1}$				0.79*** (0.20)	0.63*** (0.14)	0.67*** (0.15)
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓
Macrocontrols		✓	✓		✓	✓
Net-worth controls			✓			✓
R ²	0.04	0.12	0.12	0.06	0.13	0.14
Observations	1621	1464	1462	1658	1496	1486

Non-loan bank assets [▶ back](#)

	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{RoE}_{i,t-1}$	0.13 (0.19)	0.27 (0.20)	0.29 (0.18)			
$\text{RoE}_{i,t-1}$				0.35* (0.20)	0.44** (0.22)	0.43* (0.22)
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓
Macrocontrols		✓	✓		✓	✓
Net-worth controls			✓			✓
R ²	0.02	0.09	0.09	0.03	0.09	0.09
Observations	1592	1444	1444	1620	1469	1468

Total assets [▶ back](#)

	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{RoE}_{i,t-1}$	0.47** (0.23)	0.54** (0.21)	0.56*** (0.20)			
$\text{RoE}_{i,t-1}$				0.84*** (0.23)	0.95*** (0.25)	0.92*** (0.24)
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓
Macrocontrols		✓	✓		✓	✓
Net-worth controls			✓			✓
R ²	0.03	0.10	0.10	0.06	0.12	0.13
Observations	1628	1477	1477	1658	1504	1503

Alternative profitability measure – return on assets

▶ back

	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{RoA}_{i,t-1}$	4.52*** (0.67)	3.89*** (0.57)	3.82*** (0.54)			
$\text{RoA}_{i,t-1}$				2.68*** (0.90)	4.28*** (0.95)	5.04*** (1.12)
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓
Macrocontrols		✓	✓		✓	✓
Net-worth controls			✓			✓
R ²	0.05	0.11	0.12	0.04	0.14	0.14
Observations	1617	1469	1462	1646	1494	1486

Alternative profitability measure – log real profits per capita

[▶ back](#)

	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{Log}(\text{profits})_{i,t-1}$	0.04*** (0.01)	0.04*** (0.00)	0.04*** (0.00)			
$\text{Log}(\text{profits})_{i,t-1}$				0.01*** (0.00)	0.02*** (0.00)	0.02*** (0.01)
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓
Macrocontrols		✓	✓		✓	✓
Net-worth controls			✓			✓
R ²	0.06	0.11	0.12	0.05	0.10	0.11
Observations	1503	1359	1359	1576	1426	1419

Alternative profitability measure – profits/GDP [▶ back](#)

	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{Profits to GDP}_{i,t-1}$	6.02*** (0.73)	5.39*** (0.55)	5.24*** (0.55)			
Profits to GDP $_{i,t-1}$				4.94*** (1.12)	4.67*** (0.94)	4.62*** (0.93)
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓
Macrocontrols		✓	✓		✓	✓
Net-worth controls			✓			✓
R ²	0.09	0.14	0.14	0.07	0.14	0.14
Observations	1610	1462	1462	1645	1493	1486

Funding constraints (LtD as dependent variable) [▶ back](#)

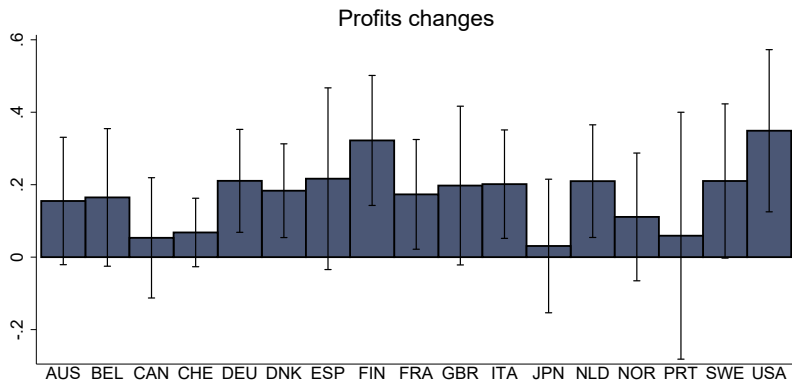
	Dependent variable: $\Delta_3 y_{i,t+3}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_3 \text{RoE}_{i,t-1}$	0.35*** (0.11)	0.30*** (0.07)	0.31*** (0.07)			
$\text{RoE}_{i,t-1}$				0.51*** (0.13)	0.38*** (0.14)	0.39*** (0.14)
Country fixed effects	✓	✓	✓	✓	✓	✓
Distributed lag in Δy	✓	✓	✓	✓	✓	✓
Macrocontrols		✓	✓		✓	✓
Net-worth controls			✓			✓
R ²	0.03	0.10	0.11	0.05	0.11	0.11
Observations	1603	1451	1450	1635	1479	1476

Using only a sample of crisis years

	Dependent variable: $\Delta_3 y_{i, \tau+3}$			
	(1)	(2)	(3)	(4)
$\Delta_3 \text{RoE}_\tau$	0.72*** (0.12)	0.49** (0.17)		
RoE_τ			0.92*** (0.17)	0.77*** (0.18)
Distributed lag in Δy		✓		✓
Control variables		✓		✓
R^2	0.22	0.29	0.33	0.40
Observations	60	60	60	60

Country Level Evidence

- Country-level time series regressions



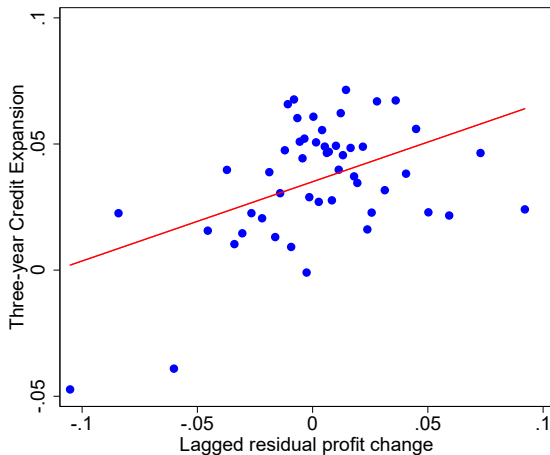
What if changes in RoE were expected?

- We use a 2-stage procedure:

	Dependent variable: $\Delta\text{RoE}_{i,t}$
	(1)
$\text{RoE}_{i,t-1}$	0.01 (0.15)
$\Delta\text{RoE}_{i,t-1}$	-0.39*** (0.07)
$\Delta\text{RoE}_{i,t-2}$	-0.33*** (0.06)
$\Delta\text{RoE}_{i,t-3}$	-0.13*** (0.03)
Bank equity index excess return $_{i,t-1}$	0.01 (0.02)
Bank equity index excess return $_{i,t-2}$	-0.02 (0.02)
Bank equity index excess return $_{i,t-3}$	-0.01 (0.02)
R^2	0.160
Credit growth	✓
Observations	901

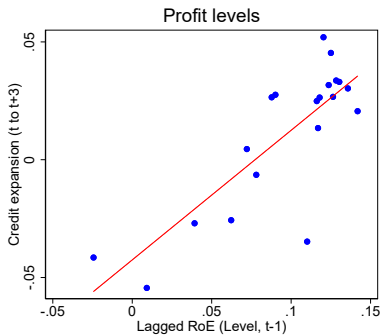
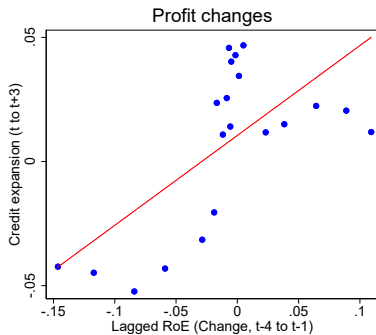
Unexpected changes in RoE

- Lagged residuals predict credit expansions



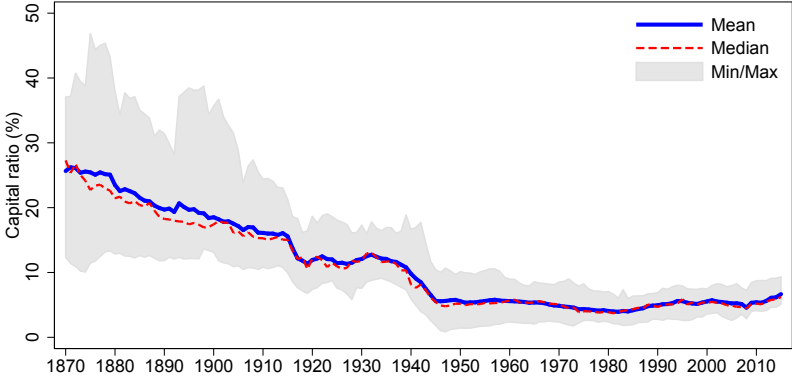
Note: Based on data from 17 advanced economies 1870-today. Binned scatterplots including country fixed effects and control variables.

Baseline correlations in quarterly US data [▶ back](#)

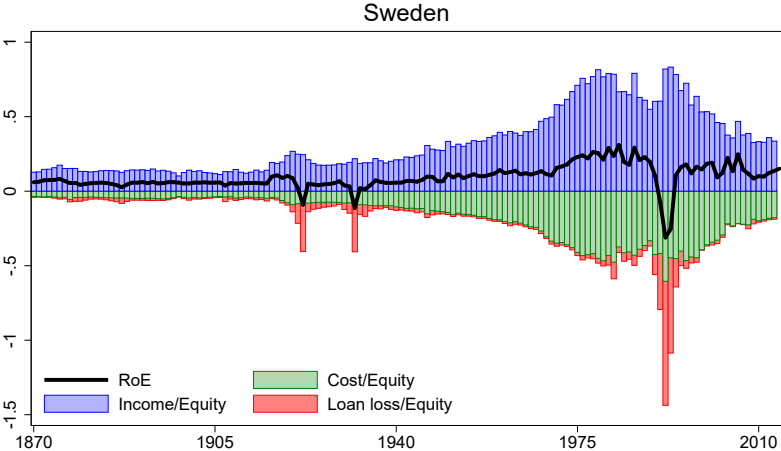


- Lagged levels and changes in RoE predict three-year changes in credit/GDP

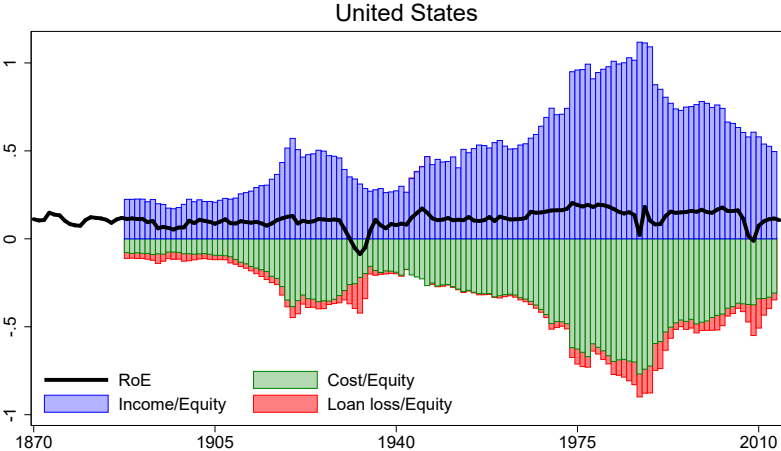
Banking system leverage, 1870-2015 (JRST) [▶ back](#)



Decomposition of profitability



Decomposition of profitability



Banking crises

Definition: “major bank failures, substantial losses, recapitalization, or government intervention...”

AUS: 1893, 1989.

BEL: 1870, 1885, 1925, 1931, 1934, 1939, 2008.

CAN: 1907.

CHE: 1870, 1910, 1931, 1991, 2008.

DEU: 1873, 1891, 1901, 1907, 1931, 2008.

DNK: 1877, 1885, 1908, 1921, 1931, 1987, 2008.

ESP: 1883, 1890, 1913, 1920, 1924, 1931, 1978, 2008.

FIN: 1878, 1900, 1921, 1931, 1991.

FRA: 1882, 1889, 1930, 2008.

GBR: 1890, 1974, 1991, 2007.

ITA: 1873, 1887, 1893, 1907, 1921, 1930, 1935, 1990, 2008.

JPN: 1871, 1890, 1907, 1920, 1927, 1997.

NLD: 1893, 1907, 1921, 1939, 2008.

NOR: 1899, 1922, 1931, 1988.

PRT: 1890, 1920, 1923, 1931, 2008.

SWE: 1878, 1907, 1922, 1931, 1991, 2008.

USA: 1873, 1893, 1907, 1929, 1984, 2007.