

Customer Capital and Deposit Stability

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Motivation: Deposits Are Relationship-Sensitive Funding

- Customer capital, the value to a company of its relationship with its customers, is a firm's key intangible asset.
- Especially important for banks because depositing customers can quickly withdraw funds when trust deteriorates.
- Depositors respond not only to **financial** risk, but also to **non-financial** information about bank conduct and reputation (e.g., Homanen 2022, Chen et al. 2023).
- We ask: following the same bank-level reputation shock, why do some branches lose more deposits than others?

Core idea: locally accumulated customer capital may help explain this heterogeneity.

Research Question

Main question

Does stronger pre-existing branch-level customer capital mitigate deposit outflows after bank-level reputation shocks?

Two sub-questions

1. How to measure customer capital at the **branch level**?
2. Conditional on the **same bank-level shock**, do high-customer-capital branches experience more stable deposits?

Empirical setting: bank-level reputational shocks combined with branch-level deposits and customer-generated Google reviews.

Existing Measures vs. Our Measure

Existing customer-capital measures usually proxy for investment inputs:

- SG&A expenses (e.g., Gourio and Rudanko 2014)
- Advertising expenditures (e.g., Belo et al. 2014)
- Sales and marketing costs (e.g., He et al. 2025)

Our measure (ACCap): cumulative average Google rating for each bank branch.

$ACCap_{i,t}$ = Average rating of all Google reviews for branch i up to June 30 of year t

	Existing Measures	ACCap
Approach	Supply-side input	Demand-side output
Captures	Customer-acquisition effort	Realized customer experience
Data	Financial statements / disclosures	Google ratings and reviews
Level	Firm-level	Branch-level
Frequency	Annual, accounting-based	Continuously updated

What Does ACCap Capture?



City National Bank

3.4 ★★★★★ (12)
Bank

[Overview](#)

[Reviews](#)

[About](#)



Juan Carlos Pinilla Macías
5 reviews



★★★★★ 2 years ago

I have to say that my experience with CNB has been the best. Great service and assistance. In my case I'm an expat and all people in the bank has look for proactively to offer me all solutions in time. Special thanks to Klodet Eivazians.



Lewie W
15 reviews



★☆☆☆☆ 2 years ago

I don't know which is worse, their customer service or blatant incompetence. Two years after refinancing with them, we re-financed again with another more competent bank (which would be any).



Fuji Le
Local Guide · 88 reviews · 56 photos



★★★☆☆ 6 years ago

Poor customer service. Waiting over the phone for 50 min to help with bill pay. Bank has no ability to offer automatic monthly payment to their credit card from another financial institution. Even small credit unions have the feature.



Pranvera Mamudi
5 reviews



★★★★★ 2 years ago

I have had the pleasure of dealing with Jacsamel Materon at this branch. She is amazing! Jacsamel is exemplary. The responsiveness and attention to detail is exceptional. She not only provides wonderful customer service, she goes above and beyond! It is always a pleasure to work with her! This is how banks should treat their clients and she exceeds all expectations!

- Google reviews provide customer-generated evidence on local branch experience.

Predictions: Does Customer Capital Buffer Reputation Shocks?

No

- Bank-level reputation may dominate local relationships.
- Depositors may respond mainly to rates rather than relationship quality.

Yes

- Local customer capital as **reputation insurance** (Chakravathy et al. 2014, Christensen 2016, Christensen et al. 2021).

Literature and Contribution

- **Customer Capital**

Gourio and Rudanko (2014), Belo et al. (2014), He et al. (2025).

This paper: a **customer-generated, output-based, branch-level** measure of realized customer relationships.

- **Depositor Discipline**

Martinez Peria and Schmukler (2001), Homanen (2022), Chen et al. (2023), Starks (2023).

This paper: **local customer capital explains heterogeneous deposit responses** across branches of the same shocked bank.

- **Deposit Franchise**

Nelson (1996), Drechsler et al. (2023).

This paper: a **customer-relationship microfoundation** for deposit stickiness.

- **Banking Relationships**

Sharpe (1990), Berger and Udell (1995), Puri and Rocholl (2008).

This paper: relationship capital also matters on the **retail funding side**.

Data and Key Variables

Main data sources

- **Google Maps reviews:** branch-level ratings, timestamps, and review text.
- **FDIC Summary of Deposits:** branch deposits and branch characteristics.
- **RepRisk:** bank-level reputation shocks.
- **RateWatch / Call Reports / ACS:** deposit rates, bank fundamentals, and local controls.

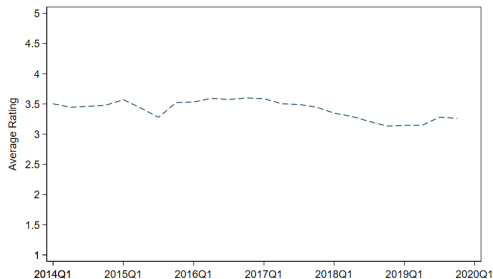
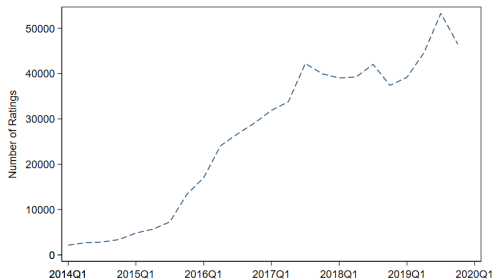
Key variables

- **ACCap:** cumulative average Google rating for each branch.
- **DepositGrowth:** annual branch deposit growth.
- **Rep^J:** indicator for a RepRisk Index increase of at least J points, where $J \in \{10, 15, 20, 25\}$.
- **Controls:** deposit rates, branch size, market share, bank condition, uninsured deposits, and local characteristics.

Sample: 36,507 branches of 206 U.S. banks during 2014–2020.

- The main ACCap tests focus on branches of banks with observed reputation shocks.
- The 206 banks hold approximately 64.7% of total U.S. commercial bank assets and 61.9% of total U.S. commercial bank deposits.

Time Trend: Number of Reviews and Average Rating



- The quarterly number of reviews: 2,340 in Q1 2014, 47,571 in Q4 2019.
- The average rating remains relatively stable over time.

RepRisk Reputation Shocks

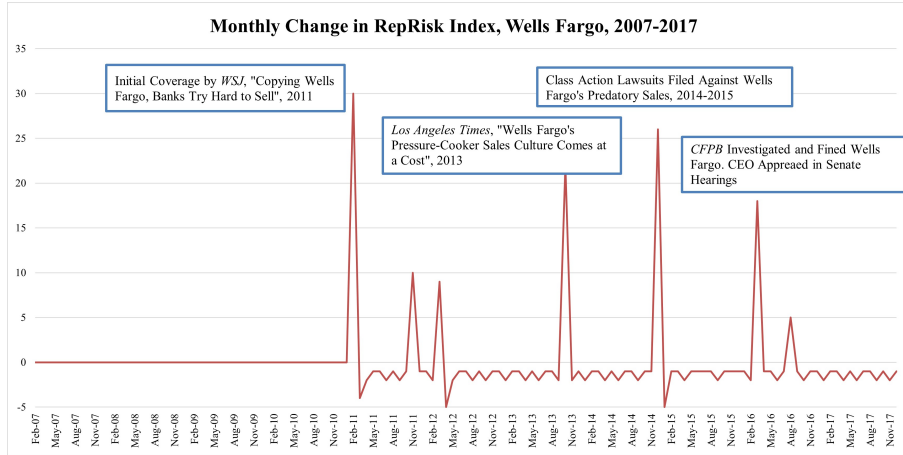
- RepRisk tracks negative ESG and business-conduct events from public sources.
- **Methodology:** incident-driven; firm-specific monthly RepRisk Index.
- **RepRisk Index (RRI):** 0–100; higher values indicate greater reputational risk exposure.
- **Reputation-shock variables:**

$$Rep_{k,t}^J = 1 \quad \text{if bank } k\text{'s RRI increases by at least } J$$

where $J \in \{10, 15, 20, 25\}$. For $J > 10$, observations with RRI increases between 10 and J are excluded; the control group always has an increase below 10.

Timing: shocks are measured over the July–June window and used to predict branch deposit growth from June t to June $t + 1$.

Visualizing RRI: The Wells Fargo Scandals



Validation

- **Review language:** Higher ACCap is associated with more positive, trust, and joy language, and with less negative, anger, and fear language in customer reviews.
- **CFPB complaints:** Higher ACCap is associated with fewer CFPB complaints across major consumer financial product categories.

Empirical Design I: Do Reputation Shocks Reduce Deposits?

Step 1: Are RepRisk shocks economically meaningful?

$$DepositGrowth_{i,t+1} = \beta Rep_{k,t}^J + \Lambda C_{k,i,t} + \alpha_i + \alpha_{j,t} + \varepsilon_{i,t}$$

- i : branch; k : bank; j : county; t : year.
- Outcome: branch deposit growth from year t to $t + 1$.
- $Rep_{k,t}^J = 1$ one if the bank's RRI increases by at least J points, where $J \in \{10, 15, 20, 25\}$.
- α_i : branch FE; $\alpha_{j,t}$: county $\times$ Year FE; SE clustered at the branch level.

Control Variables

Branch controls

Variable	Definition
BetterRate	1 if branch 12-month CD rate exceeds county median
CountyShare	Branch share of county deposits
RateChg	Change in branch deposit rate
Lag DepositGrowth	Prior-year branch deposit growth
Deposits	Branch deposit amount

Bank controls

Variable	Definition
Loan	Loan-to-asset ratio
ROA	Return on assets
Liquidity	Cash divided by total deposits
Sensitivity	Short-term asset-liability mismatch scaled by assets
NPL	Nonperforming loans divided by gross loans
Uninsured	Share of uninsured deposits
Capital	Core Tier 1 capital ratio

Empirical Design II: Does ACCap Buffer Reputation Shocks?

Step 2: Compare branches of the same shocked bank in the same local market.

$$DepositGrowth_{i,t+1} = \beta ACCap_{i,t} + \Lambda C_{i,t} + \alpha_{k,j,\tau} + \alpha_n + \varepsilon_{i,t}$$

- Sample: branches in years when the bank experienced a reputation shock.
- $\alpha_{k,j,\tau}$: Bank $\times$ County $\times$ Shock-Year FE; α_n : number-of-reviews FE; SE clustered at the bank level.
- Additional controls: New, RateSetter, ConvenienceIndex.

Main empirical challenges:

- Ratings may not be comparable across regions.
- Confounding time-varying bank-county factors.
- Review activity may vary across markets.

Resolution: identification comes from **within-bank-county-shock-year variation** in branch ACCap, comparing branches exposed to the same bank-level shock in the same local market.

Reputation Shock and Deposit Growth

Dependent Variable:	DepositGrowth				
RepShock:	Rep ¹⁰	Rep ¹⁵	Rep ²⁰	Rep ²⁵	RepInc
	(1)	(2)	(3)	(4)	(5)
RepShock	-0.691*** (0.117)	-0.414*** (0.146)	-1.451*** (0.206)	-1.412*** (0.233)	-0.024*** (0.007)
Controls	+	+	+	+	+
Branch FE	+	+	+	+	+
County $\times$ Year FE	+	+	+	+	+
Observations	200,825	153,328	121,263	115,487	200,825
Adjusted R^2	0.211	0.204	0.208	0.218	0.211

- Deposit growth rate is 0.4 to 1.5 p.p. lower following a reputational shock, economically meaningful relative to the sample mean deposit growth of 10.8%.

Main Result: Customer Capital Buffers Deposit Outflows

Dependent Variable: RepShock:	DepositGrowth			
	Rep ¹⁰	Rep ¹⁵	Rep ²⁰	Rep ²⁵
	(1)	(2)	(3)	(4)
ACCap	0.200** (0.081)	0.311*** (0.078)	0.394*** (0.113)	0.321*** (0.102)
Controls	+	+	+	+
Bank $\times$ County $\times$ Shock Yr FE	+	+	+	+
# of Reviews FE	+	+	+	+
Observations	63,510	29,204	11,131	8,014
Adjusted R^2	0.162	0.155	0.172	0.154

- For Rep¹⁰, a 1-SD increase in ACCap (1.114) increases deposit growth by 0.223 pp. (1.114×0.200), offsetting 32.3% of the baseline decline in deposit growth following a reputation shock ($0.223 \div 0.691$).

Robustness

- **Granular geography** - Bank $\times$ ZIP Code $\times$ Shock Year FE
- **Placebo** - ACCap does not predict deposit growth in normal periods
- **Review sparsity** - Weighted by reviews and require ≥ 3 reviews
- **Inference** - Alternative clustering by bank-year and bank-county-year
- **Design check** - Matched triple-difference comparison

Event-Related Cross-Sections: Customer-Facing and Fraud-Related

Dependent Variable: Cross-Sectional Variable:	DepositGrowth			
	Customer-Facing Events		Fraud Events	
	No	Yes	No	Yes
	(1)	(2)	(3)	(4)
ACCap	0.290*** (0.068)	0.131 (0.103)	0.197** (0.093)	0.221 (0.198)
Controls	+	+	+	+
Bank $\times$ County $\times$ Shock Year FE	+	+	+	+
Number of Reviews FE	+	+	+	+
Observations	34,930	26,738	53,327	10,152
Adjusted R^2	0.169	0.109	0.158	0.183

- **The stabilizing effect of customer capital is conditional:** customer capital is most protective when the adverse event is
 - NOT directly tied to customers' own banking experience.
 - NOT serious fraud that directly undermines trust in the bank and weakens the value of accumulated goodwill.

When Is Customer Capital Most Valuable: County Characteristics

Dependent Variable:	DepositGrowth			
Cross-sectional Variable:	Household Income		Population Inflow	
	Low (1)	High (2)	Low (3)	High (4)
ACCap	0.076 (0.159)	0.289*** (0.093)	0.140* (0.079)	0.252** (0.102)
Controls	+	+	+	+
Bank $\times$ County $\times$ Shock Yr FE	+	+	+	+
Number of Reviews FE	+	+	+	+
Observations	24,733	37,402	29,654	33,797
Adjusted R^2	0.125	0.181	0.165	0.159

- Stronger in **higher-income counties**, where customers may value relationship-based and non-price aspects of banking more, e.g., customized services.
- ACCap preserves **existing customer relationships**, while also enhances a branch's capacity to **form new customer relationships** in higher-inflow counties.

When Is Customer Capital Most Valuable: Bank Size

Dependent Variable: Total Assets:	DepositGrowth			
	Below median (1)	Above median (2)	Below 75th percentile (3)	Top quartile (4)
ACCap	0.278** (0.125)	0.164 (0.109)	0.239*** (0.066)	0.149 (0.190)
Controls	+	+	+	+
Bank $\times$ County $\times$ Shock Yr FE	+	+	+	+
Number of Reviews FE	+	+	+	+
Observations	17,856	45,639	37,207	24,077
Adjusted R^2	0.156	0.159	0.153	0.163

- Stronger for **smaller banks**, whose deposit funding depends more heavily on local retail relationships, offering support for ACCap as a retail-oriented measure of customer capital.

Topic-Specific Customer Capital

Which dimensions of customer experience matter?

- Word2Vector (Li et al. 2021), a semi-supervised machine learning approach, extracts topics from review texts.
- We decompose ACCap into four topic-specific dimensions:

Topic	Interpretation	Seed Words
Accessibility	Ease of reaching and using branch services	time, wait, line, call, location
Hospitality	Friendly, welcoming, and helpful interactions	communicate, assist, experience, greet, solve
Product	Banking products and product attributes	checking, mortgage, investment, rate, fee
Facility	Physical environment and branch infrastructure	building, lobby, parking, facility, ATM

Topic-Specific Customer Capital

- TopicACCap combines **topic mentions** in the review text with the customer's **star rating**:

$$TopicACCap_{i,t,d} = \frac{\sum_{n=1}^{N_{i,t}} ScaledRating_{i,t,n} \times TopicLoading_{i,t,n,d}}{N_{i,t}}$$

- i : branch; t : year; n : review; d : topic.
- *ScaledRating*: the scaled rating (-2 to 2) assigned to the review.
- *TopicLoading*: share of topic-related words in the review.
- Intuition: a high-rated review mentioning “staff” or “service” contributes to Hospitality capital.

Which Customer Experiences Matter Most?

Dependent Variable:	DepositGrowth			
TopicACCap:	Accessibility (1)	Hospitality (2)	Product (3)	Facility (4)
TopicACCap	0.385 (0.812)	3.983** (1.921)	2.368 (2.003)	3.302*** (1.240)
Controls	+	+	+	+
Fixed Effects	Bank $\times$ County $\times$ Shock Yr FE, # of Reviews FE			
Observations	29,204	29,204	29,204	29,204
Adjusted R^2	0.155	0.155	0.155	0.155

- The effect of customer capital is concentrated in **Hospitality** and **Facility**.
- Customer capital operates primarily through **interpersonal service quality, relationship continuity, and the local branch experience**, rather than through general convenience or product features.

Conclusion

- Develop a novel, branch-level measure of **customer capital** using customer-initiated Google reviews, an output-based measure that captures local variation in the strength of bank-customer relationships.
- **Customer capital stabilizes deposits during reputational stress.** Following the same bank-level reputation shock, branches with stronger pre-existing customer capital experience significantly higher subsequent deposit growth.
- **Reputation insurance is conditional.** The buffering effect is stronger for non-customer-facing and non-fraud shocks, and for branches located in markets where customers and banks place greater weight on relationship-based banking.
- Textual analysis shows that the stabilizing effect is concentrated in **Hospitality** and **Facility**, highlighting interpersonal service quality and the local branch experience as important sources of deposit stickiness.

Customer relationships are an economically meaningful intangible asset that helps banks retain stable funding when reputation is damaged.