Catch the Thief!
Fraud in the U.S. Banking Industry

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Fraud in the Financial Services Industry: Anecdotes

- **Bernie Madoff's Ponzi Scheme**: the investment arms of several large banks (e.g., HSBC, Santander, Royal Bank of Scotland, BNP Paribas and BBVA) lost billions of dollars to Bernard Madoff's Ponzi scheme discovered during the 2008 financial crisis
- **JPMorgan Chase's London Whale**: JPMorgan Chase lost more than $6 billion in 2012 amid a rogue trading scandal, in which a group of traders defrauded the bank by taking unauthorized positions in complex derivative securities
- **Not a U.S. phenomenon**: Recently, **Beijing**-based Anbang Insurance lost a shattering $12 billion to embezzlement; in **Ukraine**, $5.5 billion vanished from PrivatBank in a "loan-recycling" scheme; and in **New Delhi**, the Punjab National Bank lost $2.2 billion to wayward employees working with a fugitive diamond dealer

What Do We Know? Not much...

- Other than through anecdotal evidence, there is little systematic knowledge about fraud.
  - The primary reason: dearth of available data
- "Fraud and theft" is a Top 5 operational risk for financial institutions in 2019 (*Risk.net*)
- Attracting significant regulatory and supervisory attention
  - In 2018, the Office of the Comptroller of the Currency (OCC) formed a dedicated working group to understand and tackle fraud in the banking industry
  - Broader inter-agency regulatory interest (by Fed, FDIC and OCC) and a push for better safeguards against fraud at financial institutions (and particularly the *cyber* aspect)

This Paper

Using comprehensive supervisory data, we examine a number of simple yet fundamental questions:

- How big is fraud and what is the monetary cost to institutions in the financial services industry?
- What are the leading types of fraud and the company business lines that are most exposed to losses from fraud?
- How much is usually recovered?
- How quickly is fraud discovered?
- Which banks experience more fraud?
- Does fraud affect banks' credit intermediation functions?

Data

Data

Primary data: FR Y-14 (proprietary data reported to the Federal Reserve System pursuant to Dodd-Frank Act);

- Provides a complete history of fraud losses as of the respective reporting quarter, starting from the point-in-time at which the institutions began recording losses in a systematic manner.

Coverage: U.S. bank holding companies and U.S. operations of foreign banks with total assets $\geq$ \$50 billion

- Final sample: More than 17.5 million loss events from 38 large BHCs over [2000:Q1-2016:Q4]

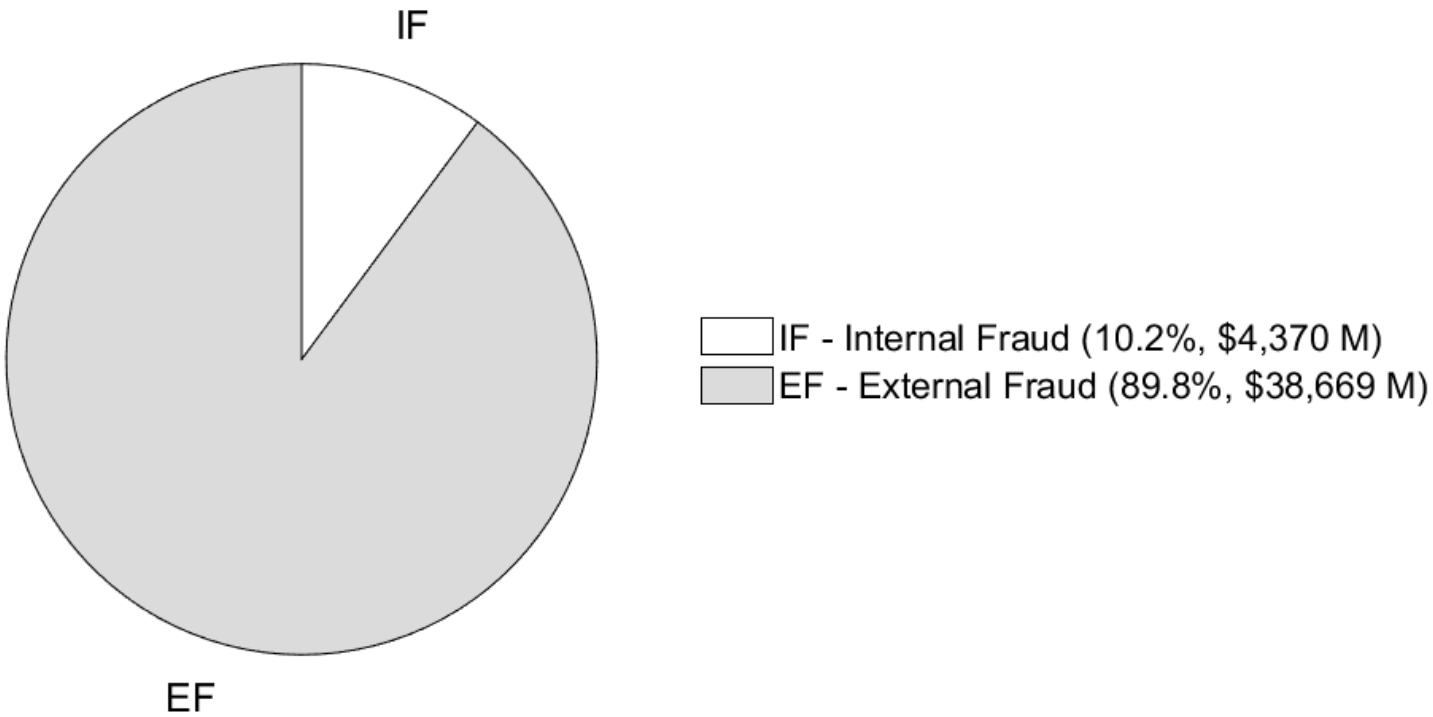
Other data: FR Y-9C (financial statement data); FRED (macroeconomic data); SoD (summary of deposits); NACJD (crime)

Descriptive Analysis

Fraud Classification: Types

Event Type	Description
Internal Fraud	Acts of a type intended to defraud, misappropriate property or circumvent regulations, which involves at least one internal party
External Fraud	Acts of a type intended to defraud, misappropriate property or circumvent the law, by a third party

Fraud Classification: Types

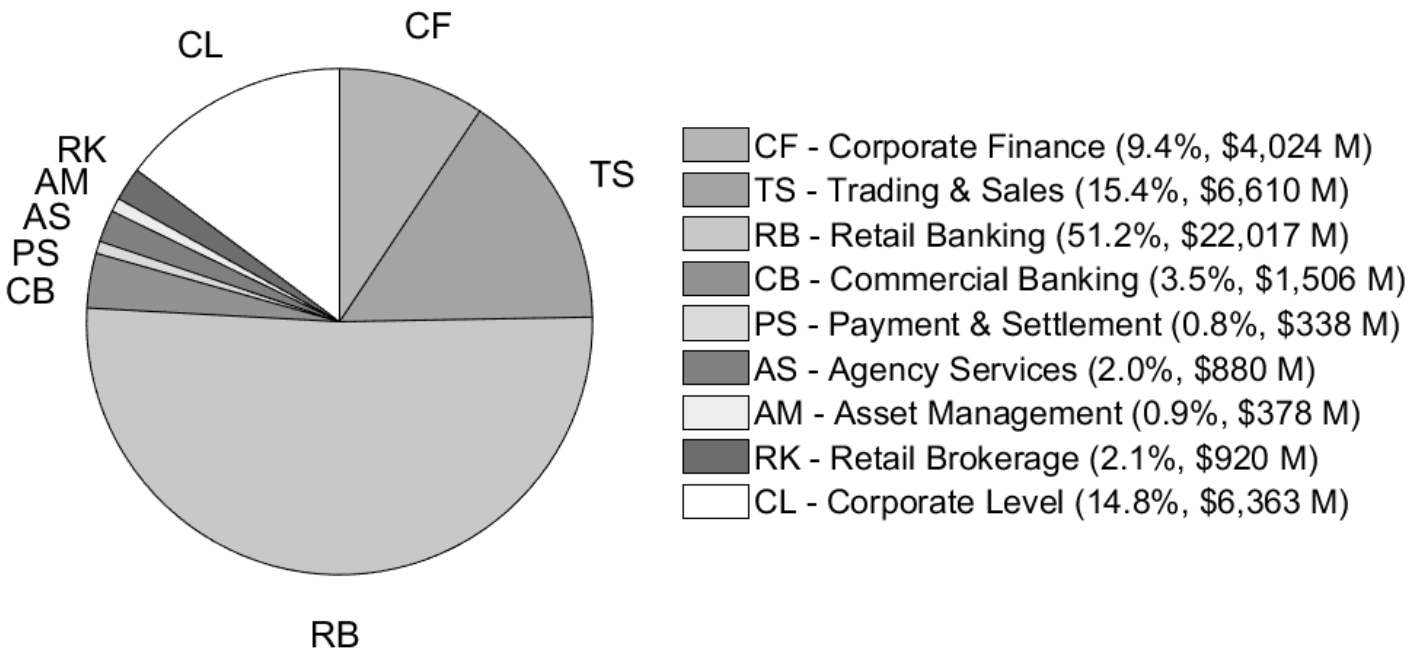


Most losses from fraud are sourced to agents external to a bank.

Fraud Classification: Business Lines

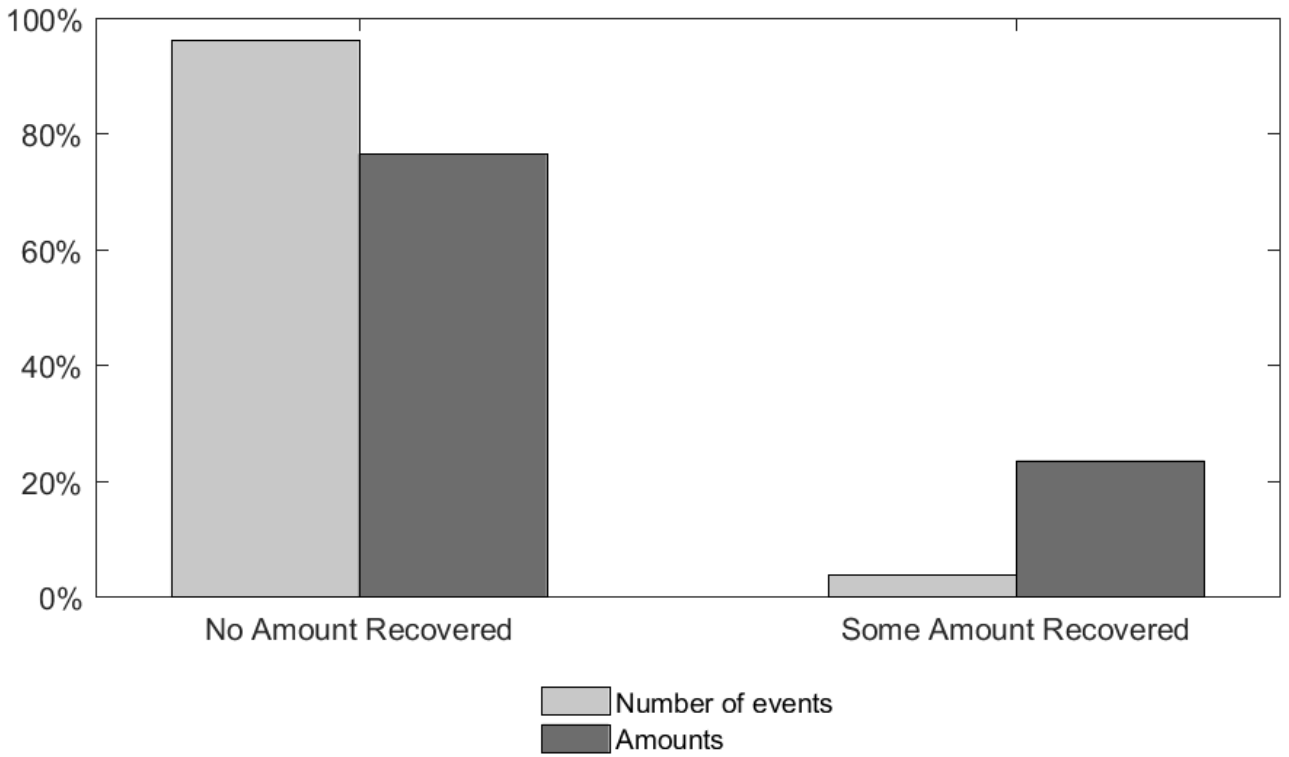
Business Line	Activity Groups
Corporate Finance	Mergers and acquisitions, underwriting, privatizations, securitization, research, debt (government, high yield), equity, syndications, IPO, secondary private placements.
Trading and Sales	Fixed income, equity, foreign exchanges, commodities, credit, funding, own position securities, lending and repos, brokerage, debt, prime brokerage.
Retail Banking	Retail and private lending and deposits, banking services, trust and estates, investment advice, Merchant/commercial/corporate cards, private labels and retail.
Commercial Banking	Project finance, real estate, export finance, trade finance, factoring, leasing, lending, guarantees, bills of exchange.
Payment and Settlement	Payments and collections, funds transfer, clearing and settlement.
Agency Services	Escrow, depository receipts, securities lending (customers) corporate actions, issuer and paying agents.
Asset Management	Pooled, segregated, retail, institutional, closed, open, private equity.
Retail Brokerage	Execution and full service.
Corporate Level (Other)	Losses originating from a corporate function that cannot be linked to a specific BL.

Fraud Classification: Business Lines



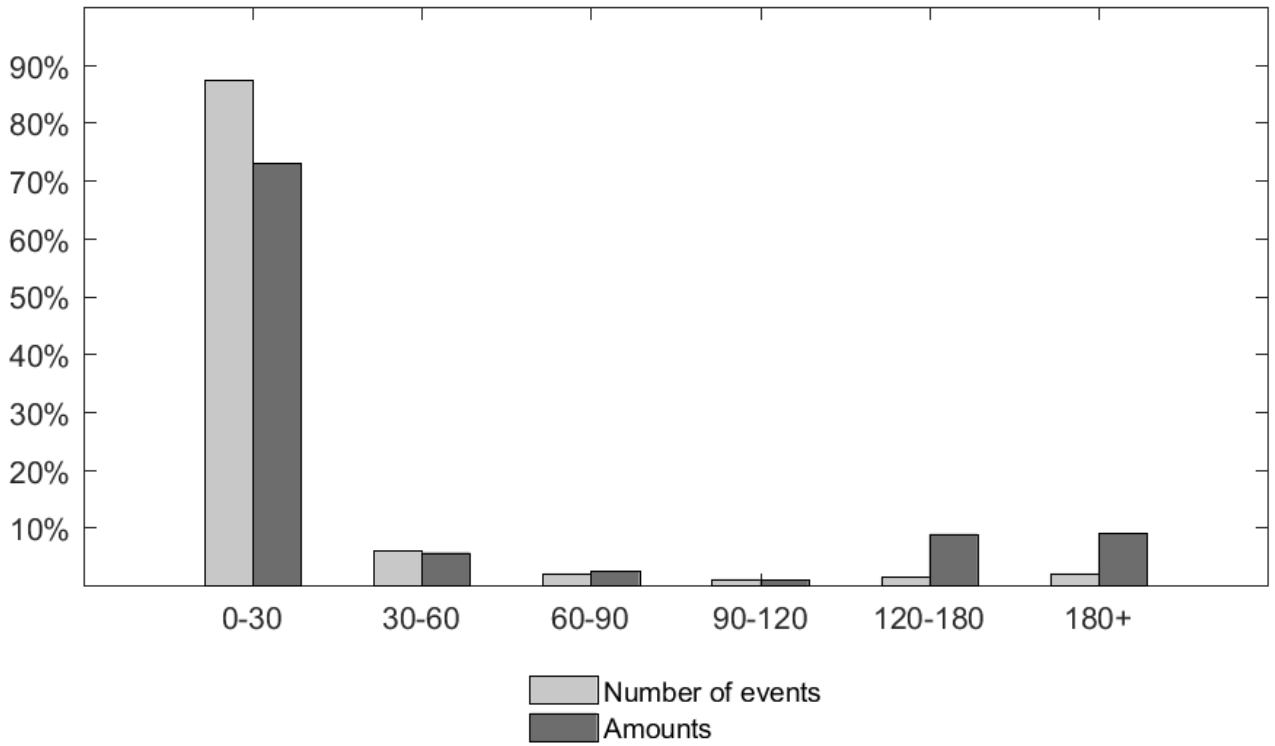
Most losses from: **Retail Banking** (biggest category of "External Fraud"), **Trading & Sales** (biggest category of "Internal Fraud")

Fraud Recovery (Zero vs. Non-zero)



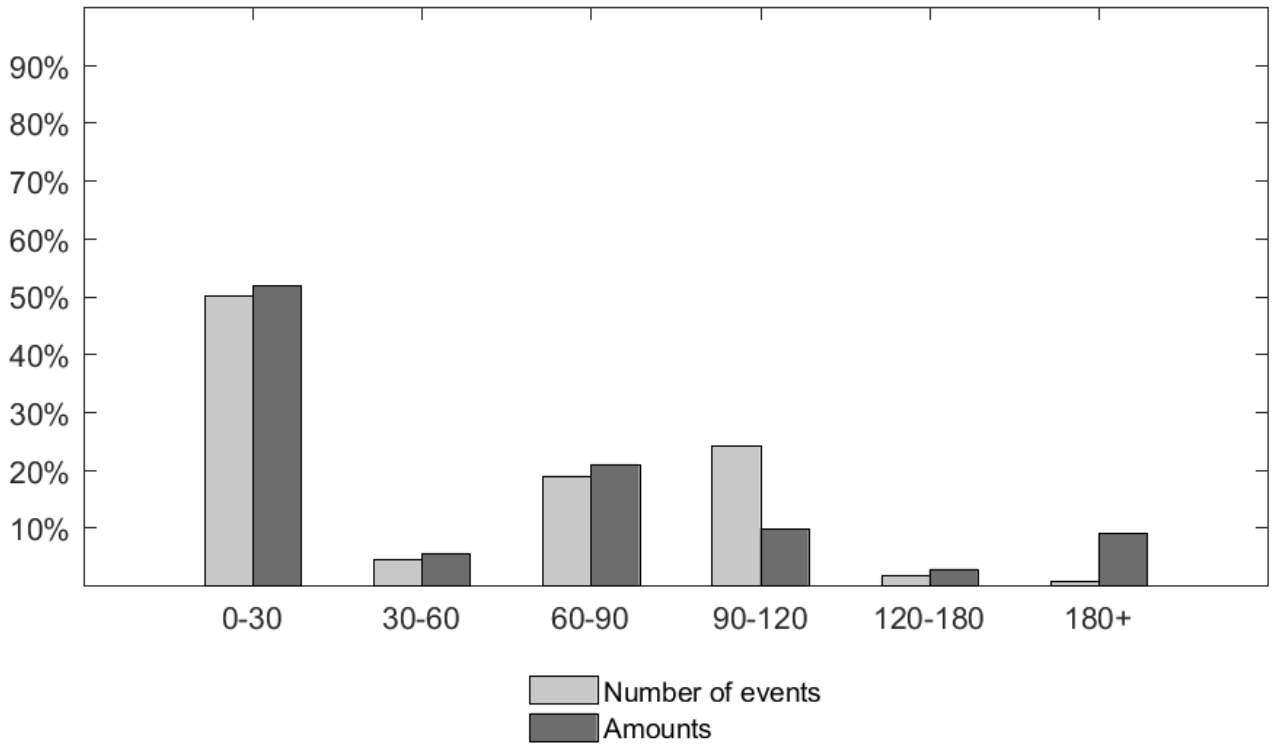
There is 0 recovery for most fraud losses (especially when fraud is for smaller amounts).

Number of Days b/w Occurrence and Discovery of Fraud



Fraud is almost immediately discovered after it occurs.

Number of Days b/w Discovery and Accounting of Fraud



Half of fraud losses are expensed away within a month of discovery.

A Simple Value-at-Risk Model for Fraud

For every BHC:

- Estimate a Poisson (frequency) distribution $\rho(N_t)$ that describes the number of fraud events N_t in a given quarter t
- Estimate a severity distribution $f(X_{i,t})$ that describes the loss amount of a single loss event (for simplicity, use the inflation-adjusted empirical distribution of dollar losses)
- Convolution of the frequency and severity distributions:
  1. Draw a number of events N_t from the frequency distribution
  2. Draw N_t losses from the severity distribution $f(X_{i,t})$
  3. Sum the N_t losses and obtain one quarterly loss
  4. Repeat Steps 1–3 to obtain 1 million quarterly simulated losses
  5. Determine the quarterly loss corresponding to a given percentile

Then, fit a line through the estimated BHCs' quarterly losses for a given percentile (as a function of BHC size).

Fraud Value-at-Risk Estimates

	Fraud Percentile ($ Mil)				
Total Assets ($ Bil)	1^{st}	25^{th}	50^{th}	75^{th}	99^{th}
50	1.097	1.299	1.447	1.750	33.463
100	2.194	2.599	2.895	3.501	66.926
250	5.487	6.498	7.237	8.753	167.315
500	10.974	12.997	14.475	17.506	334.631
1,000	21.949	25.994	28.951	35.013	669.262
1,500	32.924	38.991	43.426	52.519	1,003.893
2,000	43.899	51.988	57.902	70.026	1,338.524
2,500	54.874	64.985	72.377	87.533	1,673.155

- A BHC with assets of $500 billion can expect to lose to fraud $14.5 million in a "typical" calendar quarter and as much as $334.6 million in a single calendar quarter once every 25 years.

Correlates of Fraud

- Log total assets to capture banks' scale of operations, volume of transactions and number of business relationships
- Deposits-to-assets ratio, loans-to-assets ratio, and non-interest-to-interest-income ratio characterize banks' activities (e.g., traditional versus non-traditional)
- Cost efficiency (the proximity of a bank's costs to that of a best-practice bank producing the same output under the same conditions) to capture the quality of bank management
- Location crime intensity to capture banks' physical exposure to crime (the deposit-weighted average location property crime arrest rate)
- Unemployment rate to capture the U.S. macro environment

Regression Specifications

OLS with standard errors clustered at the BHC and quarter levels:

$$Ln(Fraud)_{b,t} = \alpha_b + \alpha_t + \beta \times Fraud\ Correlates_{b,t-1} + \epsilon_{b,t}$$

where

- $Ln(Fraud)$ is the log-transformed fraud that occurs at a bank over a quarter
- α_b and α_t denote BHC and quarter fixed effects
- *Fraud Correlates* represents our previously discussed set of explanatory variables, measured at the end of the quarter prior to fraud occurrence

Correlates of Fraud: Results

	Ln(Fraud)			
	(1)	(2)	(3)	(4)
Ln(Size)	0.944***	1.069***	0.968***	0.822**
	(0.000)	(0.000)	(0.000)	(0.017)
Deposits-to-TA	2.192***	0.706	2.532***	1.421**
	(0.001)	(0.248)	(0.004)	(0.029)
Loans-to-TA	−1.180	−3.670*	−0.846	−2.345
	(0.337)	(0.100)	(0.526)	(0.201)
NII-to-II	−0.228	−0.206	−0.161	−0.089
	(0.292)	(0.123)	(0.507)	(0.480)
Cost Efficiency	−1.365***	−1.219*	−1.469**	−1.103*
	(0.007)	(0.080)	(0.012)	(0.099)
Crime	0.652*	0.393*	0.707*	0.277
	(0.073)	(0.060)	(0.066)	(0.172)
Unemployment	−0.070**	−0.035		
	(0.028)	(0.333)		
BHC FE	No	Yes	No	Yes
Quarter FE	No	No	Yes	Yes
N	991	991	991	991
Adj R^2	0.558	0.783	0.562	0.798

Credit Intermediation

Credit Intermediation and Fraud

- Do the consequences of fraud extend beyond just direct monetary costs?
- We examine potential effects on credit intermediation functions of banking organizations
- Two aspects of credit intermediation:
  - Deposit taking
  - Lending
- Different mechanisms and amplifiers for the potential effects of fraud on deposits and loans

Empirical Strategy

- Separate the *unanticipated* component of fraud losses relative to "normal levels"
- *Abnormal Fraud* equals a bank's quarterly fraud loss at t minus the trailing 20-quarter average ($[t-20, t-1]$)

OLS with standard errors clustered at the BHC and quarter levels:

$$\textit{Deposit / Loan Growth}_{b,t+4} =$$
$$\alpha_b + \alpha_t + \beta \times \textit{Abnormal Fraud}_{b,t} + \delta \times \textit{Ctrls}_{b,t} + \epsilon_{b,t+4}$$

where

- *Deposit Growth* and *Loan Growth* measure bank deposit growth and loan growth over the following year ($[t,\ t+4]$)
- α_b and α_t denote BHC and quarter fixed effects
- *Ctrls* include: *Size Growth*, Δ *NII − to − II*, Δ *Cost Efficiency*, Δ *Crime* (measured over $[t-1,\ t]$)

Deposit Growth & Abnormal Fraud

Fraud at banking organizations might affect deposit growth through several channels:

- **Negative customer experience** (frustration of dealing with fraud leads direct victims to divert deposits)
- **Bank reputation impairment** (prospective depositors avoid an institution caught engaging in fraud or one that cannot protect its customers from external fraud)
- **With large-scale fraud, bank customers may run on a bank** (even with insurance recovery requires effort and entail delays)
- **Loss of talent** (loss of customer know-how, service deterioration and the loss of business due to loss of essential personnel)

Hypothesis: *Fraud at banks leads to lower deposit growth.*

Deposit Growth & Abnormal Fraud

	Deposit Growth	
	(1)	(2)
Abnormal Fraud	-0.013^{***}	-0.013^{**}
	(0.009)	(0.011)
Controls	*No*	*Yes*
BHC FE	Yes	Yes
Quarter FE	Yes	Yes
N	871	871
Adj R^2	0.186	0.183

- Based on Column (2), a one-standard-deviation increase in *Abnormal Fraud* is associated with 1.53 percentage points reduction in deposit growth over the following year after fraud occurrence.

Deposit Growth & Abnormal Fraud: Additional Results

The effects of abnormal fraud on deposit growth are stronger:

- when fraud occurs in banking business lines
- when banks operate in more competitive markets
- when banks have less local branch representation
- when banks pay lower interest on deposits
- during banking crises

Loan Growth & Abnormal Fraud

Since banks rely heavily on deposits for their funding, deposit outflows induce a contraction in credit provision (Drechsler et al., 2017). If fraud drains deposits, then fraud at banking organizations should also spill over to bank lending.

Hypothesis: *Fraud at banks leads to lower loan growth.*

Loan Growth & Abnormal Fraud

	Loan Growth	
	(1)	(2)
Abnormal Fraud	-0.009^{***}	-0.008^{**}
	(0.009)	(0.012)
Controls	*No*	*Yes*
BHC FE	Yes	Yes
Quarter FE	Yes	Yes
N	871	871
Adj R^2	0.192	0.197

- Based on Column (2), a one-standard-deviation increase in *Abnormal Fraud* is associated with 0.91% percentage points reduction in loan growth over the following year after fraud occurrence.

Loan Growth & Abnormal Fraud: Additional Results

The effects of abnormal fraud on deposit growth are stronger:

- when fraud occurs in banking business lines
- when banks are less capitalized
- when banks hold less liquidity

Conclusion

Summary and Conclusion

This study provides an important first characterization of fraud in the financial services sector. Using rich supervisory data from large banking organizations, we:

- Examine the different categories of fraud and their materiality, the recovery from fraud, the timing of fraud
- Quantify bank exposure to fraud and study determinants of fraud losses at the organizational level
- Investigate and find a significant effect of fraud on bank credit intermediation

Our findings are consistent with anecdotal evidence of significant costs to financial firms. This research can inform bank risk managers, policy makers and bank supervisors alike.