

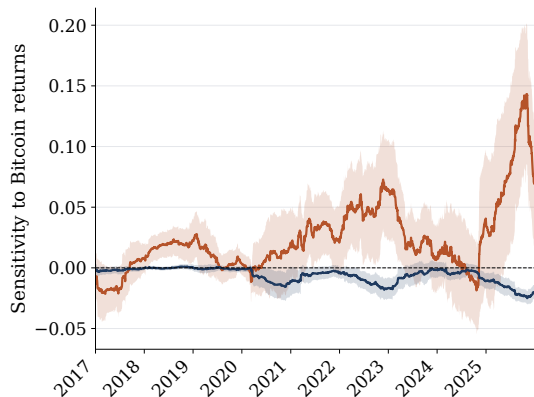
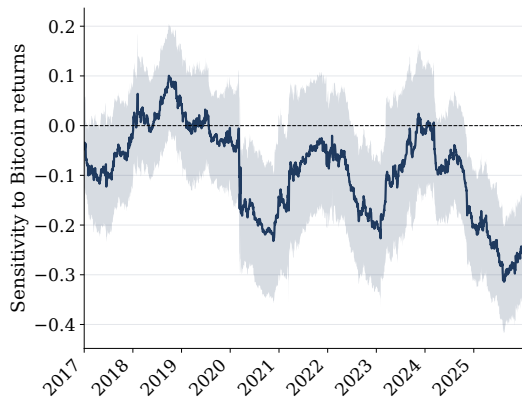
Not Just Talk: Crypto Activity, Equity Repricing, and Macro-Financial Transmission

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October 2026

Bitcoin Spillovers into the S&P 500 Are Muted. Does That Mean Crypto Has No Impact on U.S. Equities?



95% interval

Estimate

Crypto-active members

Other covered members

Index: link to Bitcoin $\approx \leq 0 \Rightarrow$ crypto-active members: still positive.

This paper: which firms are exposed to crypto, through which activities, and how does that activity reach stock prices, fundamentals and the market?

Motivation and paper summary

- **Background**

- ▶ Crypto is macro-relevant: market value about 6% of the S&P 500's. 
- ▶ Business-involved stablecoin payments (2025): 75% of volume, 38% of counts $\Rightarrow$ firms matter.

- **Question:** which firms are exposed to crypto, and how does it reach stock prices, fundamentals and the financial system?

- **Data**

- ▶ LLM classification of 10-K, 8-K and 20-F filings, 2015–2025: 6,551 issuers, 516,866 filings.
- ▶ Mentions vs. own vs. core activity; 7.05m firm-days, 3,879 US firms.

- **Design**

- ▶ Firm level: who does crypto, and how are their stocks repriced?
- ▶ Shock: in a crypto crash, who loses and how much?
- ▶ Spillover: do non-crypto peers move with Bitcoin?

- **Contribution**

- ▶ Data: the first firm-level database of corporate crypto activity.
- ▶ Asset pricing: extends the exposure framework beyond Fama–French factors to crypto.
- ▶ Financial stability: shows why the aggregate link looks muted, and industrial-level spreads.

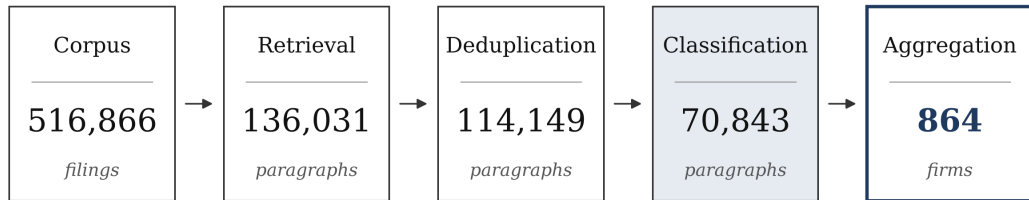
Main findings

- **1. Who is exposed: 10% of US listed firms report their own crypto activity**
 - ▶ 578 firms discuss crypto (Any) → 388 report their own activity (D) → 292 have core, price-linked activity (D^{core}).
 - ▶ Younger, smaller, cash-rich and less levered; clustered in business services and finance.
- **2. Activity is priced: a 10% Bitcoin move reprices crypto-active stocks by an extra 0.85 pp, about \$58bn of equity value**
 - ▶ Sensitivity rises from 0.045 (any disclosure) to 0.085 (own activity) to 0.128 (core activity); mentions alone are not priced.
 - ▶ Largest for holders, small firms and finance (0.171); operating income and assets move with Bitcoin too.
- **3. Exposure is concentrated but spills over within industries**
 - ▶ Shocks reach peers without crypto: contagion in business services, reallocation among banks.

Related literature and contribution

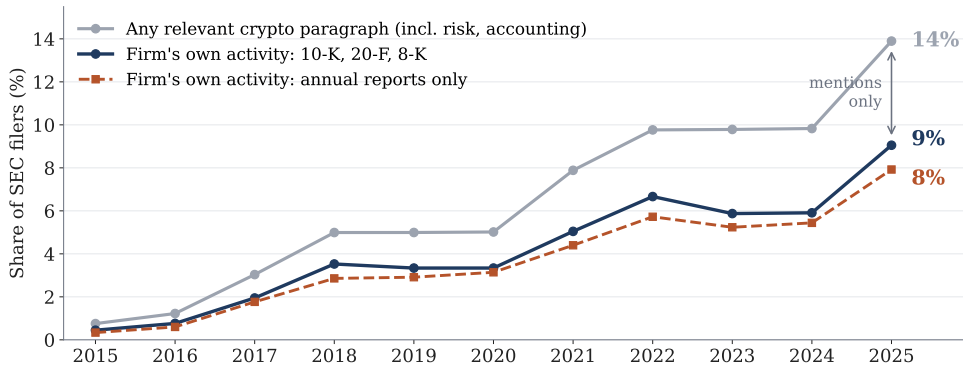
- **Measuring firms' crypto exposure.** Existing measures track holdings, announcements or keywords, not what firms actually do. Hand-collected holdings (Anderson et al. 2026); blockchain announcements (Cheng et al. 2019); text-based firm exposure (Hassan et al. 2019; Sautner et al. 2023).
⇒ **This paper:** the first dated firm-level database of crypto activity across all US filers, separating activity from talk.
- **Exposure and asset pricing.** Returns load on common risk factors and on prices tied to firms' assets and operations, as with exchange rates. Risk factors (Fama and French 1993, 2015; Carhart 1997); FX exposure (Adler and Dumas 1984; Jorion 1990); crypto returns (Liu and Tsyvinski 2021).
⇒ **This paper:** crypto activity is a priced exposure beyond Fama–French factors; markets price activity, not talk, across listed firms.
- **Crypto and financial stability.** Spillovers are measured at the index level, where they look muted; contagion work studies how shocks travel between firms. Index spillovers (IMF 2025; Iyer 2022); intra-industry contagion and competition (Lang and Stulz 1992).
⇒ **This paper:** the index is muted because exposure is concentrated; shocks spread to firms without crypto, in opposite directions across industries.

LLM Measurement: From 516,866 filings to a dated firm-day measure



Shaded: language-model step. All other steps are deterministic.

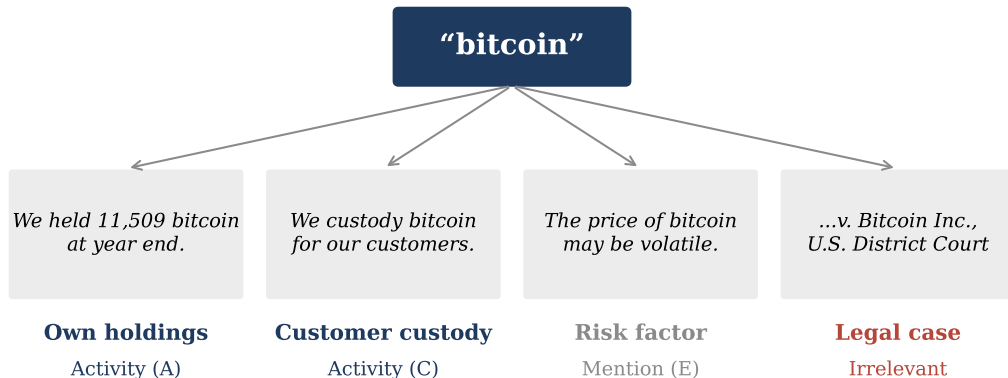
Reading activities is more accurate than counting crypto words



By 2025, 14% of SEC filers discuss crypto, but only 9% (578 firms) report their own activity.

Keyword search flags 5,397 10-K firm-years; only 1,312 describe the firm's own activity.

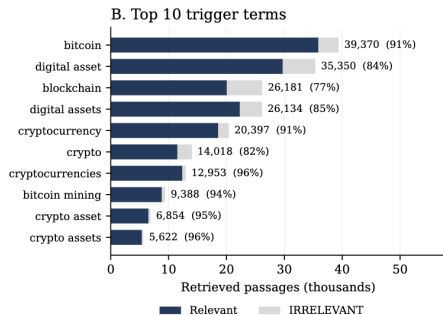
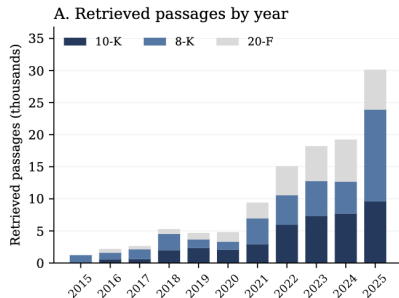
The measurement problem: one word, many meanings



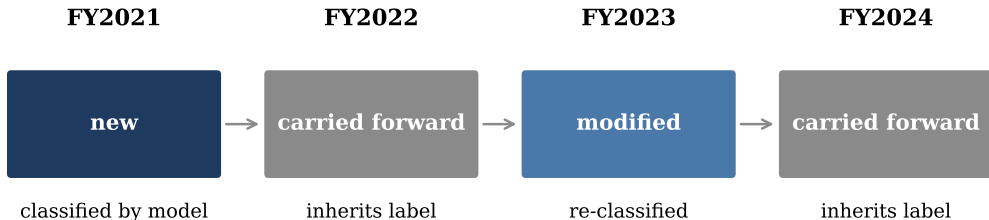
- A keyword count treats all four sentences as the same exposure.
- Only the first two describe what the firm actually does with crypto.
- **Task for the model:** read each passage in context and decide *whose* activity it is and *what* the firm does.

Step 1. Retrieval: cast a wide net

- **Corpus:** 516,866 filings, 2015–2025: 10-K, 8-K with exhibits, 20-F.
- **Dictionary:** 93 terms in three tiers
 - ▶ Full list
 - ▶ clear terms: *bitcoin*, *stablecoin*
 - ▶ ambiguous terms: *blockchain*, *token*, *mining*
 - ▶ counterparties: *Coinbase*, *Circle*, *Paxos*
- **Older terms included:** early filings say “virtual currency”.
- **Goal:** miss nothing. Precision comes in Step 3.



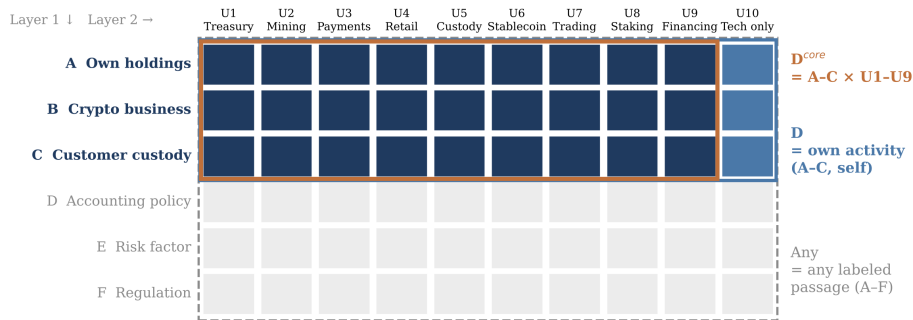
Step 2. Deduplication: classify only what is new



Same firm, same passage, compared across filings

- **Firms copy text from year to year.** Each passage is matched to the firm's earlier filings.
- **Only new or changed text goes to the model;** unchanged text keeps its earlier label.
- **Three gains:** the same sentence gets the same label every year; first appearance dates new information; cost falls.

Step 3. Classification: two layers for every passage



- **Layer 1:** is this the firm's own activity (A-C) or a mention (D-F)?
- **Layer 2:** what is the use case (U1-U10)?
- **Also recorded:** whose activity, asset, units, value. [▶ Example: Block](#)
- Codebook and worked examples in the prompt
- Fixed output schema (JSON)
- Temperature 0, fixed model version

Step 4. Validation: models, documents and prices

- **Another model agrees.** A different model family relabels a random sample: $\kappa = 0.83$.
- **Structured data agree.** Extracted holdings match XBRL tags, e.g. Coinbase 15,389 BTC.
- **Source text agrees.** Audits check labels against the original passages.

Output: a rich, dated firm-level dataset of crypto activity, ready for analysis

6,551 issuers · 51,426 firm-years · 2015–2025

Every passage labeled by activity type, use case, entity, asset and quantity

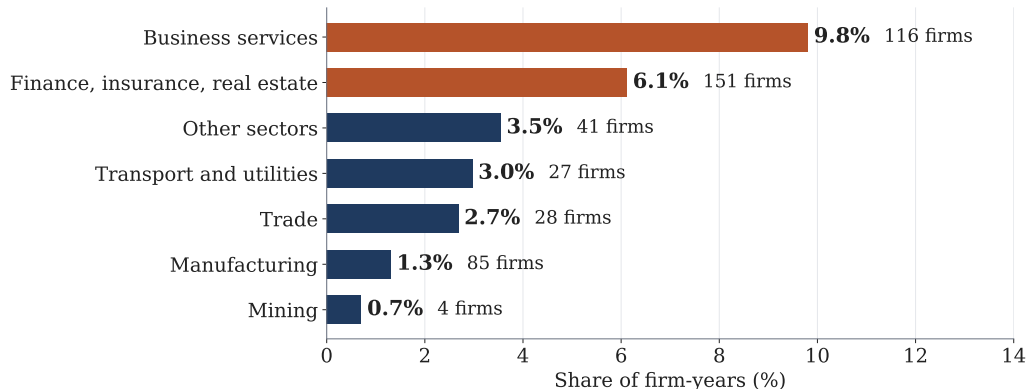
Daily exposure for 3,879 listed US firms: 7.05m firm-days

Finding 1. A profile of corporate crypto activity: crypto-active firms are younger, smaller, cash-rich and less levered, and cluster in finance and business services.

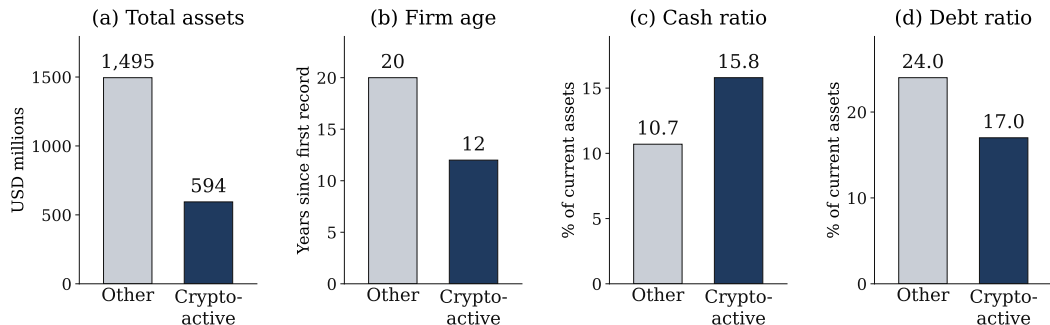
- **What they do:** 578 firms discuss crypto (Any) → 388 report their own activity (D) → 292 have core, price-linked activity . [▶ Firm distributions](#)
- **Where they are:** concentrated in business services and finance.
 - ▶ About 10% of business-services firms and 6% of finance firms report their own crypto activity in a given year, compared with about 1% in manufacturing.
- **Who they are:** younger, smaller, cash-rich and less levered.
 - ▶ Foreign issuers report crypto activity 3 times than US firms. [▶ figure](#)

Crypto activity is concentrated in business services and finance

Firms with their own crypto activity by industry, between 2015 and 2025



Crypto-active firms: smaller, younger, more cash, less debt



Finding 2. Crypto activity reprices stocks: A 10% Bitcoin move reprices crypto-active stocks by an extra 0.85 pp

- **What is priced:** activity, not talk.
 - ▶ Bitcoin sensitivity rises from 0.045 (any disclosure) to 0.085 (own activity) to 0.128 (core activity); mention-only firms carry none, even after Fama–French controls.
- **Who is most exposed:** holders, small firms and finance.
 - ▶ Holders are three times as sensitive as operating firms; the smallest firms five times the largest; finance 0.171.
- **Beyond prices:** the accounts move too.
 - ▶ Bitcoin returns raise operating income and asset growth, but not operating cash flow.

Empirical framework: is crypto activity priced in stocks?

$$\underbrace{r_{it}}_{\text{stock return}}_{\text{firm } i, \text{ day } t} = \underbrace{\beta \cdot \text{Crypto}_{it} \times r_t^{BTC}}_{\text{crypto activity} \times \text{Bitcoin return}} + \underbrace{\rho \text{Crypto}_{it}}_{\text{firm}} + \underbrace{\alpha_i}_{\text{firm}} + \underbrace{\lambda_t}_{\text{day}} + \underbrace{\Gamma' X_{it} \times r_t^{BTC} + \delta' X_{it}}_{\text{controls}} + \varepsilon_{it}$$

β : extra Bitcoin sensitivity of firms with crypto activity, relative to similar firms on the same day.

X_{it} : past market and Bitcoin betas; size, cash, leverage, profitability. λ_t absorbs the Bitcoin move itself.

Crypto _{it}	Disclosed in the past 365 days	Layers
Layer 1 class	Six indicators, one per class, entered jointly	A, B, C, D, E, F
Any	Any crypto passage, including mentions	A–F
D	The firm's own crypto activity	A–C
D ^{core}	Own activity tied to crypto prices	A–C × U1–U9

Result 1: own holdings carry the largest Bitcoin sensitivity among Layer 1 classes

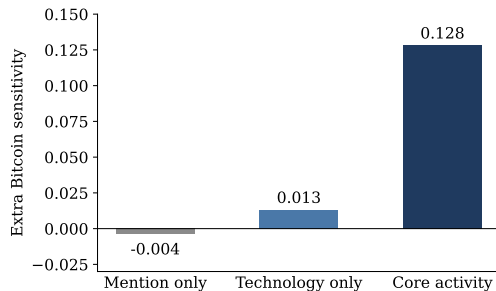
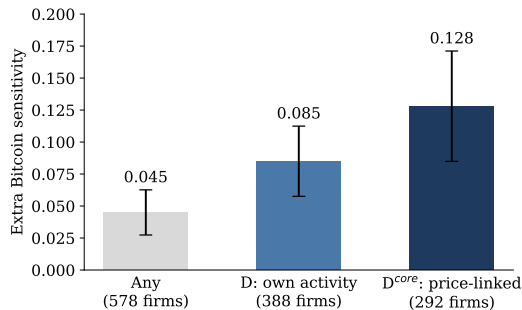
Dependent variable: daily stock return	(1)	Firms with class
<i>Activity</i>		
A: Own holdings $\times r_t^{BTC}$	0.144*** (0.032)	173
B: Crypto business $\times r_t^{BTC}$	0.016** (0.007)	363
C: Customer custody $\times r_t^{BTC}$	-0.008 (0.066)	39
<i>Mentions</i>		
D: Accounting policy $\times r_t^{BTC}$	0.049* (0.026)	123
E: Risk factors $\times r_t^{BTC}$	0.025 (0.024)	155
F: Regulation $\times r_t^{BTC}$	0.107*** (0.028)	114
Firm and day fixed effects	Yes	

Result 2: A 10% Bitcoin move reprices crypto-active stocks by an extra 0.85 pp

Dependent variable: daily stock return	(1)	(2)	(3)	(4)
$\text{Crypto}_i \times r_t^{BTC}$	0.086*** (0.015)	0.085*** (0.014)	0.077*** (0.013)	0.063*** (0.009)
How Crypto_i is measured	Dummy	Dummy	Dummy	Frequency
Firm and day effects (α_i, λ_t)	✓	✓	✓	✓
Controls $X_i \times r_t^{BTC}$, past betas	✓	✓	✓	✓
Extra risk controls		✓	✓	✓
Industry $\times$ day effects			✓	
Firms (crypto-active)	3,879 (388)	3,879 (388)	3,875 (387)	3,879 (388)
Firm-days	7,050,425	7,050,425	7,036,831	7,050,425

Dummy: own crypto activity disclosed in the prior 365 days. *Frequency*: $\log(1 + n)$, n = number of such paragraphs.

Result 3: markets price crypto activity, not crypto talk

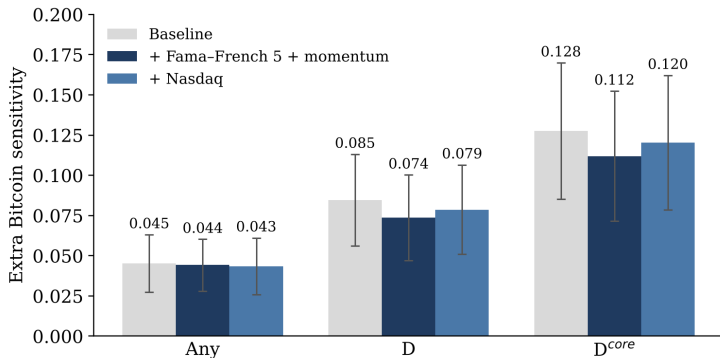


Sensitivity nearly triples from any disclosure to core activity; mention-only firms carry none.

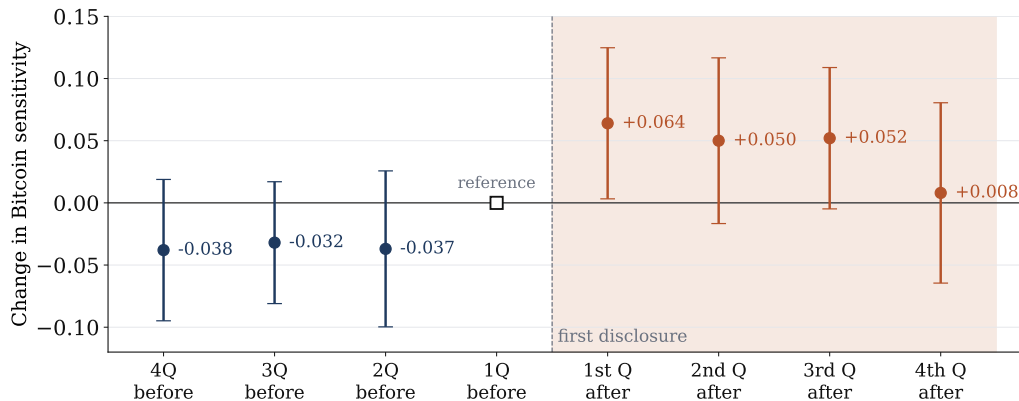
Robustness checks: crypto reprcing still exists when considering Fama–French controls

$$r_{it} = \beta \text{Crypto}_{it} \times r_t^{BTC} + \underbrace{\sum_f \phi_f \text{Crypto}_{it} \times F_{ft}}_{\text{crypto firms' extra exposure to each factor } f} + \alpha_i + \lambda_t + \text{controls} + \varepsilon_{it}$$

F_{ft} : Fama–French five factors (market, size, value, profitability, investment) and momentum; or the Nasdaq return.



Robustness checks: Bitcoin repricing begins only after firms disclose crypto activity

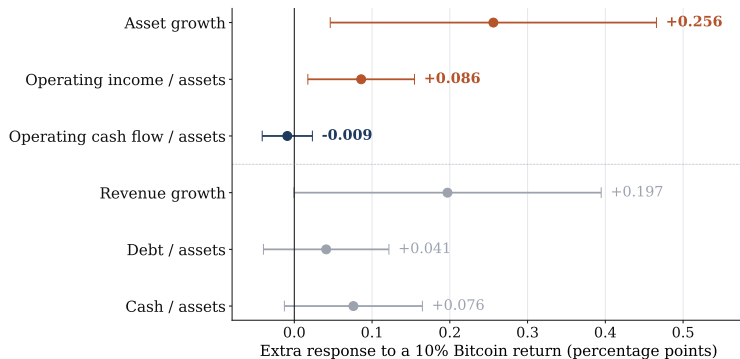


No pre-trend before disclosure; sensitivity rises by 0.078 in the six months after.

Result 4. Fundamental impact: Bitcoin moves firms' assets and income...

$$Y_{iq} = \beta \cdot \text{Crypto}_i \times r_q^{BTC} + \underbrace{\rho \text{Crypto}_i + \gamma r_q^{BTC}}_{\text{lower-order}} + \underbrace{\alpha_i + \lambda_q + \text{controls}}_{\text{firm, quarter effects}} + \varepsilon_{iq}$$

Quarterly data; r_q^{BTC} : Bitcoin return over the firm's fiscal quarter.



Assets and income rise with Bitcoin, cash flow does not: a revaluation effect.

► All outcomes

► Rebalancing test

...Especially firm with crypto holding

	Op. income	Op. cash flow	Revenue growth	Asset growth	Debt	Cash
Holds crypto $\times$ Bitcoin	0.036*** (0.008)	-0.001 (0.009)	0.052 (0.034)	0.068 (0.027)	0.033 (0.018)	0.023 (0.019)
Operations $\times$ Bitcoin	0.011 (0.006)	-0.000 (0.003)	0.052* (0.017)	0.031 (0.024)	0.006 (0.010)	0.007 (0.009)
Intermediation $\times$ Bitcoin	0.002 (0.005)	0.004 (0.004)	-0.000 (0.026)	-0.010 (0.020)	-0.017 (0.008)	0.020* (0.007)
Holding firms	31	32	31	33	33	31
Operating firms	126	140	139	142	142	137
Intermediation firms	69	79	81	81	82	78
All firms in regression	2,421	2,940	2,880	2,969	3,092	2,928
Firm-quarters	55,462	65,013	66,009	71,032	65,980	68,792

Holders: income respond most. Operating firms: revenue.

Heterogeneity: holders, small firms and finance are the most exposed

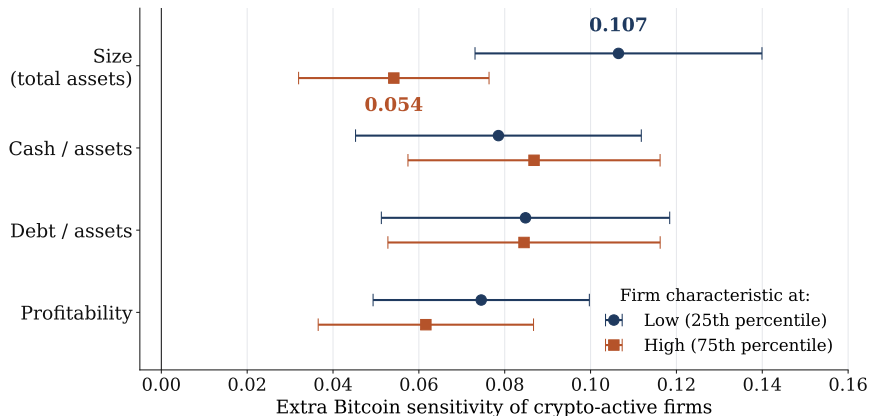
$$r_{it} = \beta_g \text{Crypto}_{it} \times r_t^{BTC} \times \mathbb{I}[i \in g] + \alpha_i + \lambda_t + \text{controls} + \varepsilon_{it}$$

Split by	Most exposed	vs.	Least exposed	
Firm size	Small +1.07 pp	2×	Large +0.54 pp	▶ Details
Industry	Finance 0.171	3–6×	Other industries ≤ 0.050	▶ Details

Heterogeneity 1: Small firms are more sensitive to Bitcoin

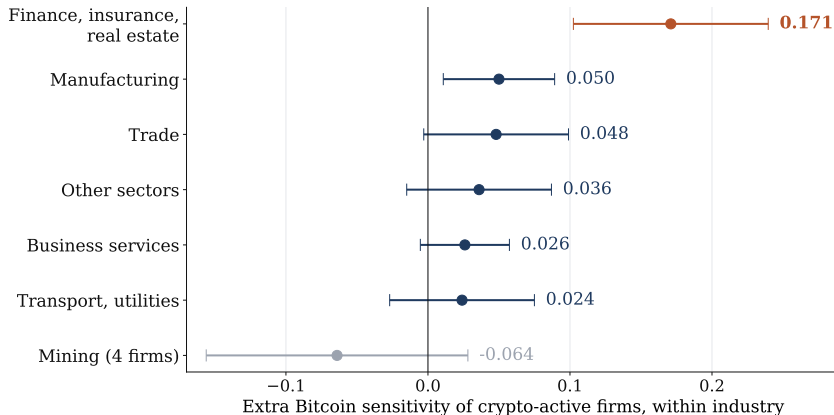
$$r_{it} = \beta \cdot \text{Crypto}_i \times r_t^{BTC} + \theta \cdot Z_i \times \text{Crypto}_i \times r_t^{BTC} + \underbrace{\alpha_i + \lambda_t + \text{controls}}_{\text{as in baseline}} + \varepsilon_{it}$$

Z_i : size, cash, debt or profitability, one per model; points at its 25th and 75th percentiles.



Heterogeneity 2: Financial firms are most exposed to Bitcoin

$$r_{it} = \sum_j \beta_j \cdot \text{Crypto}_i \times \text{Ind}_i^j \times r_t^{BTC} + \underbrace{\sum_j \rho_j \text{Crypto}_i \text{Ind}_i^j}_{\text{lower-order}} + \underbrace{\alpha_i + \lambda_{j,t} + \text{controls}}_{\text{industry} \times \text{day effects}} + \varepsilon_{it}$$



Finding 3. crypto exposure is concentrated, and negative shock would spread within industries

- **Why the index looks muted:** exposure is concentrated.
 - ▶ Crypto-active members are 8.9% of S&P 500 value but carry 15.9% of its Bitcoin link.
- **How shocks spread:** within industries, in opposite directions.
 - ▶ Contagion in business services, reallocation among banks, nothing in non-bank crypto finance.

Do shocks spread to firms without crypto? Design

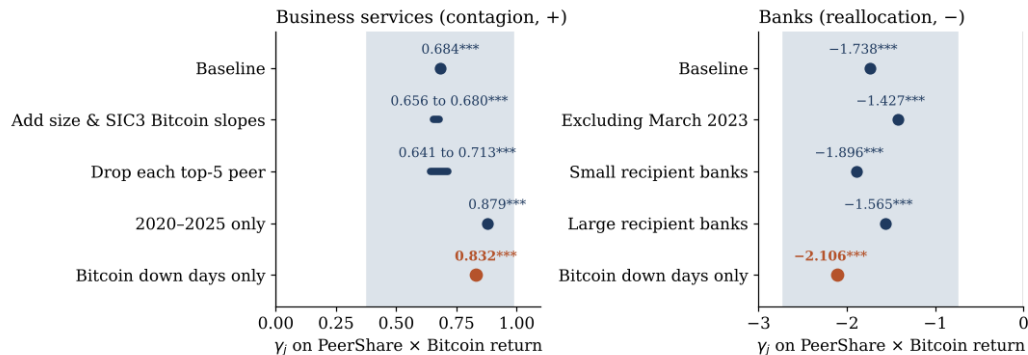
$$r_{it} = \gamma_j \cdot \underbrace{\text{PeerShare}_{i,t-1} \times r_t^{BTC}}_{\substack{\text{share of industry peers with crypto} \\ \times \text{Bitcoin return}}} + \underbrace{\eta_j r_t^{BTC}}_{\substack{\text{industry} \\ \text{Bitcoin slope}}} + \alpha_i + \lambda_t + \text{controls} + e_{it}$$

- **Sample:** firm-days *without* crypto exposure.
- **PeerShare:** share of the firm's industry peers with exposure, excluding the firm, on the previous day.
- **Identification:** changes in peer exposure within an industry over time; η_j absorbs each industry's own link to Bitcoin.
- **Reading** γ_j (Lang and Stulz 1992):
 - ▶ $\gamma_j > 0$: contagion, non-exposed firms move *more* with Bitcoin as peers adopt;
 - ▶ $\gamma_j < 0$: reallocation, they move *less*.

Spillovers: contagion in business services, reallocation among banks

Coef. on $\text{PeerShare}_{t-1} \times r_t^{BTC}$, by industry	Dep. var.: daily return of firms <i>without</i> crypto exposure		
	(1) Any	(2) D	(3) D ^{core}
Business services	0.301*** (0.080)	0.316*** (0.102)	0.684*** (0.155)
Banks	-0.148* (0.079)	-1.322** (0.524)	-1.738*** (0.503)
Non-bank credit	-0.017	-0.021	-0.001
Brokerage	0.011	-0.007	-0.004
Firm FE, day FE, industry $\times r_t^{BTC}$	Yes	Yes	Yes

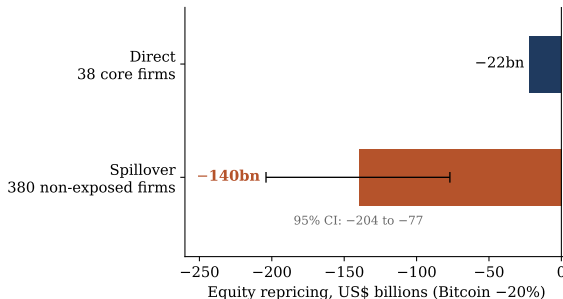
The spillovers are robust, and stronger when Bitcoin falls



Both signs survive every check and grow on Bitcoin's down days.

Business services: most of the loss lands on firms without crypto

$$\Delta V_{73} = \underbrace{\sum_{i \in \text{core}} \beta_{q(i)} MV_i \Delta r^{BTC}}_{\text{direct}} + \underbrace{\sum_{k \notin \text{core}} \gamma_{73} \text{PeerShare}_k MV_k \Delta r^{BTC}}_{\text{spillover}}$$



Bitcoin -20%, Dec 2025

- Total: **-\$162bn**, 1.2% of industry value
- Spillover is **6×** the direct loss
- 86% borne by firms with no crypto

Alternatives

- Value-weighted peer share: **-\$175bn**
- Excl. four firms **>\$500bn**: **-\$59bn**

Monitoring only exposed firms misses most of the industry's loss.

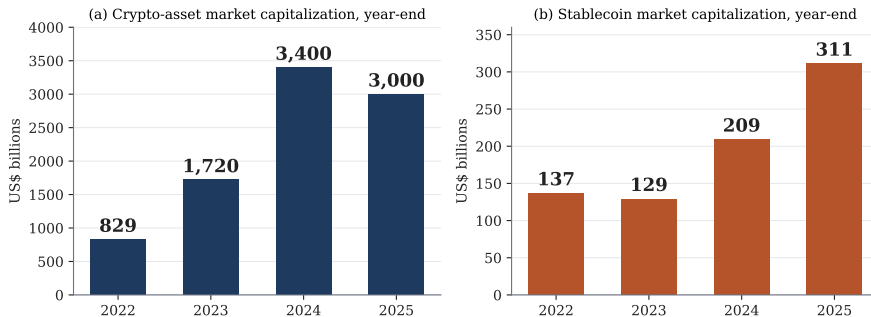
Recap

- **Measurement: read what firms do, not crypto words**
 - ▶ LLM classification of 516,866 filings identifies 388 US firms with their own crypto activity.
- **Pricing: crypto activity is priced**
 - ▶ Bitcoin sensitivity rises from 0.045 for any disclosure to 0.128 for core activity, and reaches income and assets.
- **Transmission: a muted index hides concentrated exposure**
 - ▶ Shocks spread to firms without crypto: in a 20% Bitcoin decline, 86% of the business-services loss falls on them.

Thank you

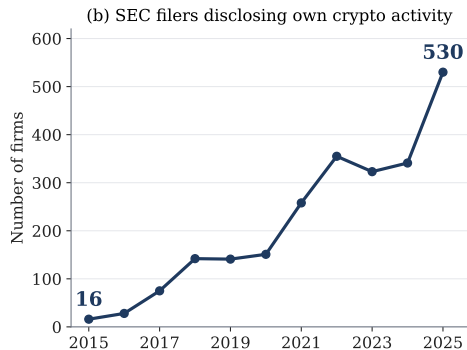
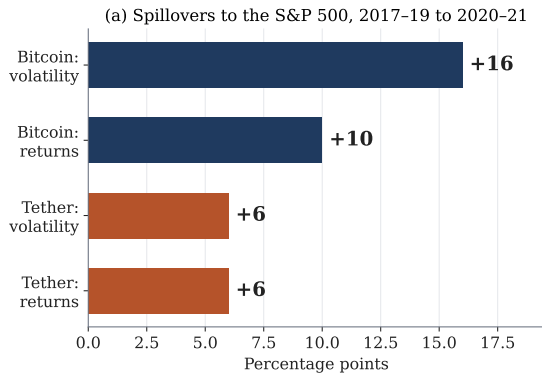
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Crypto is large relative to US equities



Total crypto market value relative to S&P 500 market value, 2015–2025. Source: [crypto market-cap source]; S&P 500 market value from [source].

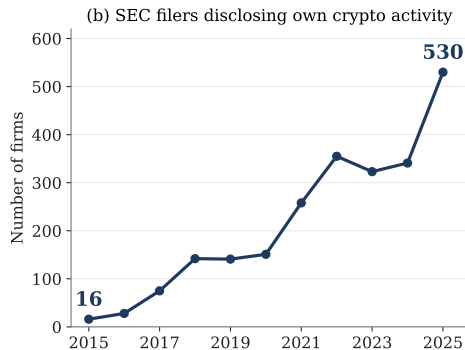
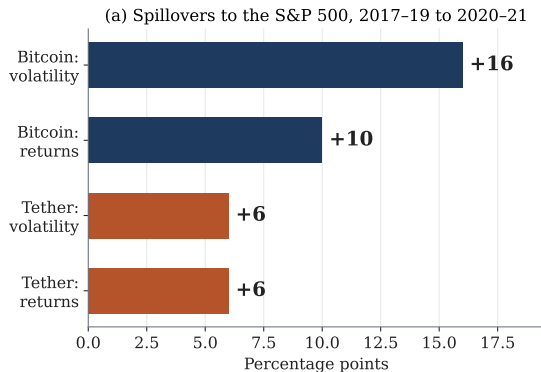
Firm-level crypto activity spiked from 2015 to 2025



“Bitcoin spillovers into S&P 500 remain muted,”
but interconnectedness “may increase, requiring close monitoring.”

Sources: IMF Crypto-Assets Monitor, Oct. 2025; GFSR, Apr. 2025.

Firm-level crypto activity spiked from 2015 to 2025

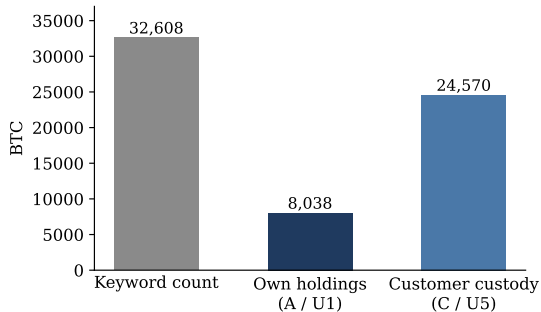


Aggregate spillovers can mask concentrated exposure across firms.

Which firms engage in crypto, and how does that activity shape their exposure?

Sources: IMF Crypto-Assets Monitor, Oct. 2025; GFSR, Apr. 2025.

Backup: why the layers matter, Block, fiscal 2023



- Block's 10-K reports bitcoin in two places.
- **Own holdings** (A / U1): 8,038 BTC on its balance sheet.
- **Customer custody** (C / U5): 24,570 BTC held for clients.
- A keyword measure adds them up and overstates the firm's own position fourfold.
- The classification keeps them apart, so only own holdings enter the revaluation channel.

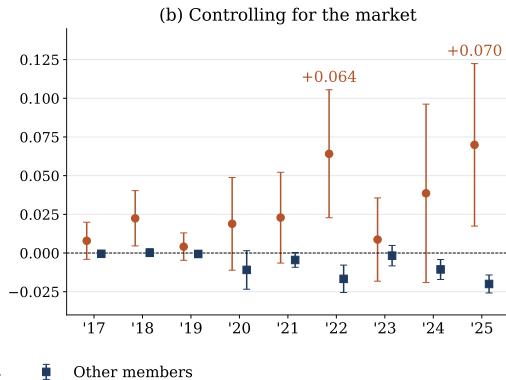
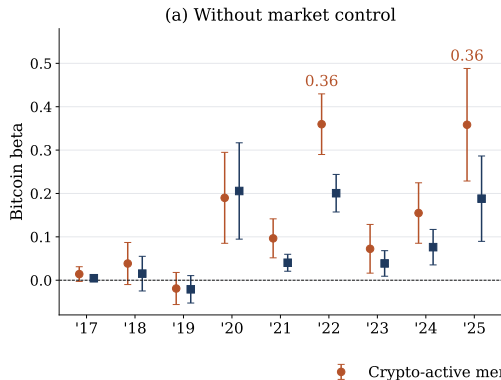
Backup: do crypto-active firms exit more often?

	Crypto activity	Other firms
Annual exit rate, any reason	0.89%	0.77%
Annual exit rate, distress	0.89%	0.41%
<i>Conditional on size, cash, leverage, profitability, year (LPM, pp)</i>		
Any exit	−0.377 (0.212)	
Distress exit	−0.148 (0.209)	

- 257 recorded delistings in 2015–2025; 14 had prior crypto disclosure, all small (largest \$86m).
- Raw gap reflects size and balance sheets, not crypto disclosure.

CRSP CIZ delisting records; author's dated disclosure panel. Firm-clustered SEs. Descriptive; 14 crypto exit events.

S&P 500: crypto-active members are more sensitive to Bitcoin



Twice the Bitcoin beta of other members (0.36 vs. 0.19 in 2025), and +0.07 beyond the market.

Where the S&P 500's Bitcoin link sits

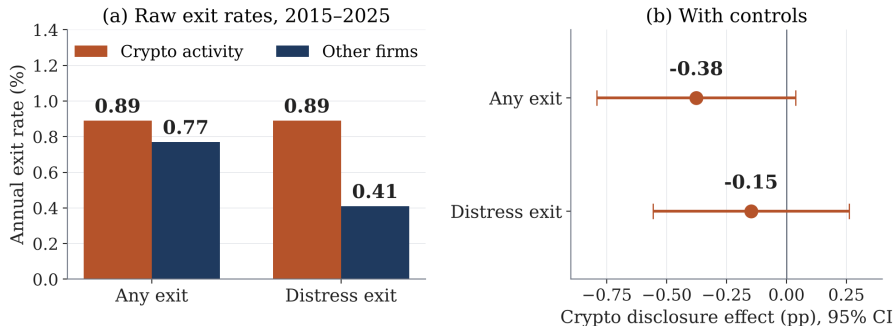
figs/sp500_decomp_raw.pdf

Year	Covered firms	Crypto-active	Value share	Bitcoin link share
2017	401	8	2.5%	—
2018	423	16	4.8%	—
2019	434	15	8.0%	—
2020	442	12	9.8%	9.1%
2021	451	17	6.1%	13.6%
2022	455	24	8.9%	14.9%
2023	462	16	9.5%	16.4%
2024	466	14	4.9%	9.4%
2025	481	23	8.9%	15.9%

Since 2021, their share of the Bitcoin link exceeds their value share.

No market control. Bars: crypto-active contribution = average value weight $\times$ group Bitcoin beta; other members = remainder; line: index beta. Covered: firms matched to filings and CRSP, of 503–505 constituents (481, about 95% of value, in 2025). Value share: annual average, full-cap weights. Link share omitted when the index beta is near zero (2017–19). Descriptive.

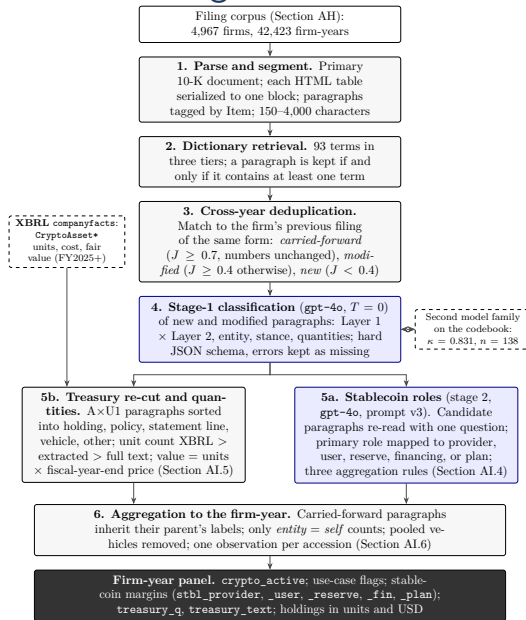
Backup: do crypto-active firms exit more often?



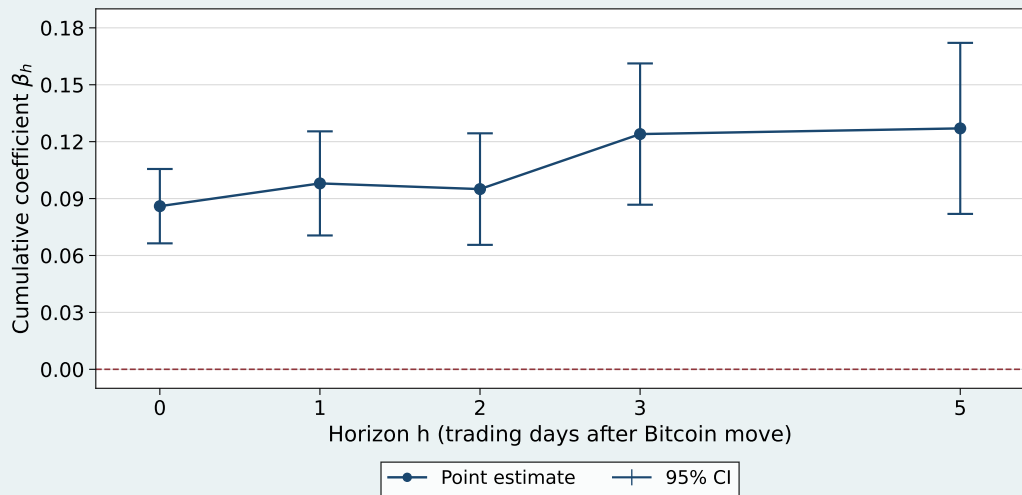
Raw distress exits are higher, but the gap disappears once size and balance sheets are controlled for.

CRSP CIZ delisting records, 2015–2025: 257 delisted firms, 14 with prior crypto disclosure (largest \$86m). Panel (b): linear probability model, $100 \times 1\{\text{exit}\}$ on prior crypto disclosure, controls for log assets, cash/assets, debt/assets, net income/assets and year FE; 26,554 firm-years; firm-clustered SEs. Descriptive.

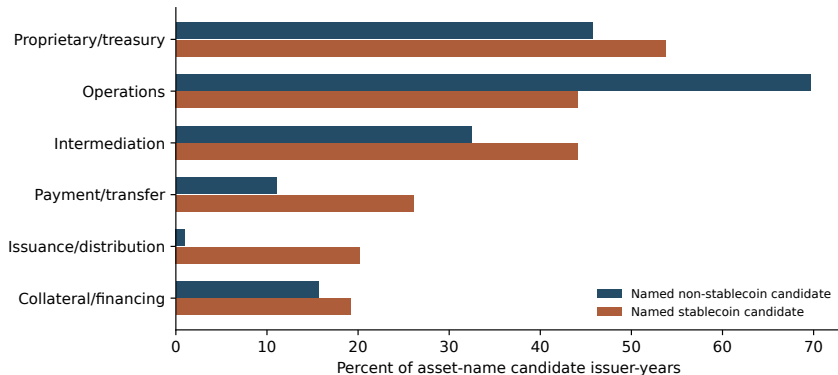
Measurement: From 516,866 filings to a dated firm-day measure



The sensitivity keeps building over the next five days



Backup: economic functions by named asset

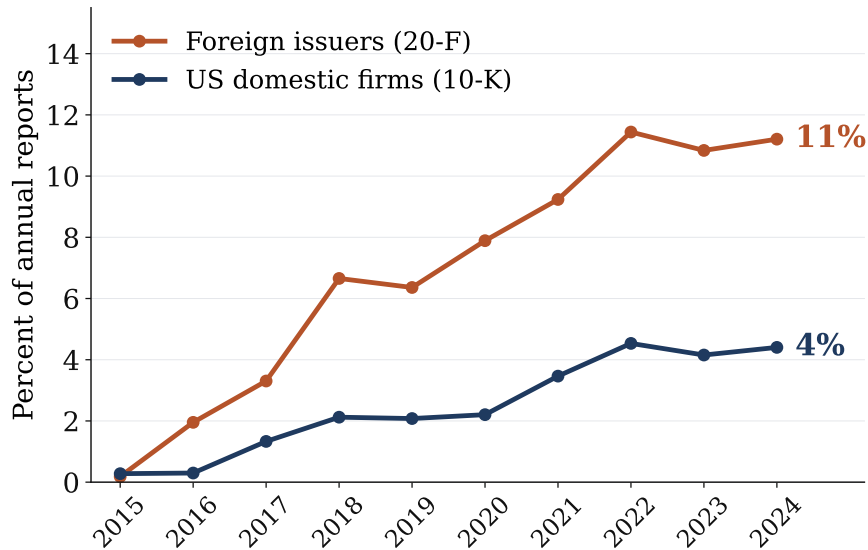


Stablecoin passages skew to payments, issuance and collateral; non-stablecoins to operations.

JMP Figure 2. Denominator: issuer-years naming each asset class; shares overlap.

Foreign issuers report crypto activity more often than US firms

Share reporting crypto activity, 2015-2024



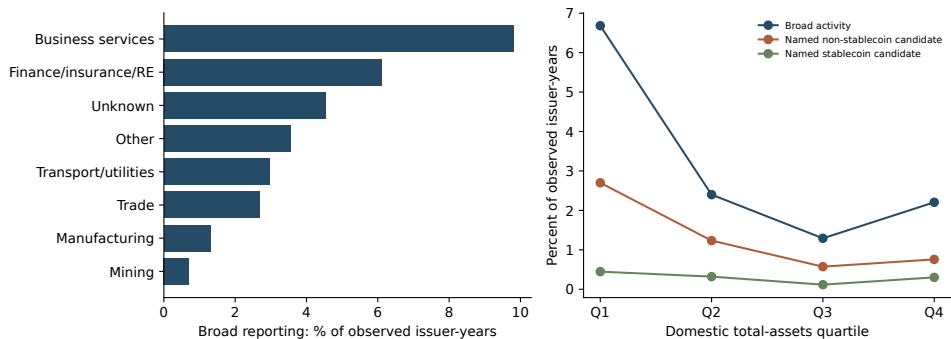
Backup: number of firms by crypto role

Role	What it covers	10-K census		Regression
		Firm-years	Firms	Firms
Holds crypto	Own crypto on the balance sheet	232	135	42
Operations	Mining, payments, staking, blockchain	1,044	377	184
Intermediation	Trading, custody, stablecoin distribution	523	193	101
Risk discussion	Firm-specific crypto risk	–	–	284
Any own activity	At least one activity	1,310	454	
Sample size		41,910	4,897	3,879

Roles overlap: a firm can hold crypto and run a crypto business at the same time, so rows do not sum to the total. 56 activity firm-years carry none of the three narrower roles.

JMP Section 3, Tables 5 and 12. Census: domestic 10-K filers, pooled vehicles excluded. Role regression: full daily sample (as in Table 9), 7,050,425 firm-days; roles from the latest annual filing within 365 days.

Backup: participation by industry and size



JMP Figure 3. Left: broad reporting by industry, both annual forms. Right: domestic size quartiles.

Backup: first disclosure, 8-K versus 10-K

Census firms ever crypto-active	Firms
Active in both forms	312
8-K signal in an earlier fiscal year	33
same fiscal year	184
8-K signal in a later fiscal year	95
Active in the 10-K only	144
Active in the 8-K only	129
Median lead of 8-K, earlier group (fiscal years)	2

JMP Table 74; 8-Ks mapped to the firm's 10-K fiscal calendar.

Backup: foreign private issuers, all outcomes

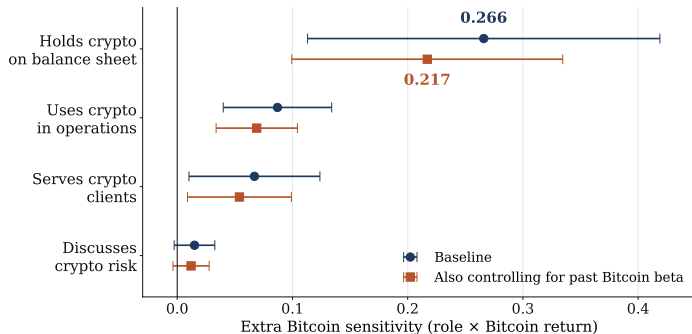
Reporting category	Raw gap (pp)	Adjusted gap (pp)	Holm p
Broad activity	5.085	4.543*** (0.755)	<0.001
Named non-stablecoin	1.638	1.203* (0.458)	0.052
Named stablecoin	0.999	0.982*** (0.260)	0.001
Proprietary/treasury	0.980	0.658 (0.345)	0.147
Operations	4.805	4.335*** (0.709)	<0.001
Intermediation	1.400	1.033* (0.397)	0.052
Payment/transfer	0.599	0.549* (0.239)	0.087
Issuance/distribution	0.065	0.097 (0.103)	0.348
Collateral/financing	0.446	0.315 (0.160)	0.147

JMP Table 3: 42,018 issuer-years, 5,726 issuers, 482 SIC2-year cells; issuer-clustered CRV1.

Backup: crypto holders are three times as sensitive to Bitcoin

$$r_{it} = \sum_k \beta_k \cdot \underbrace{\text{Role}_i^k \times r_t^{BTC}}_{\substack{\text{each role} \\ \times \text{Bitcoin return}}} + \sum_k \rho_k \text{Role}_i^k + \underbrace{\alpha_i + \lambda_t + \text{controls}}_{\text{as in baseline}} + \varepsilon_{it}$$

Roles k : holds crypto, operations, crypto clients, risk discussion; entered together.

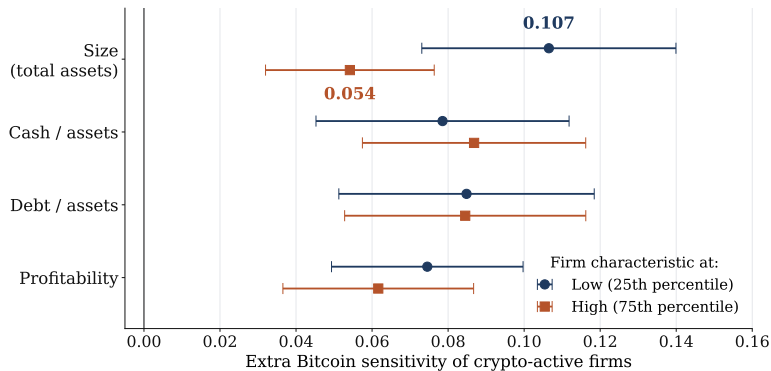


Blue: baseline. Orange: also controls for each firm's past Bitcoin beta (previous 250 trading days).

Backup: small firms are more sensitive to Bitcoin

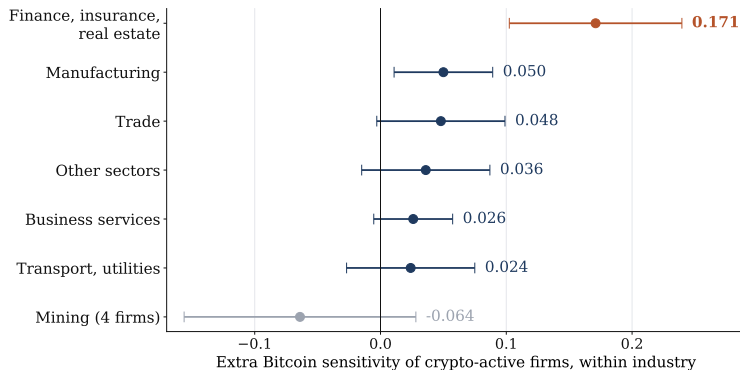
$$r_{it} = \beta \cdot \text{Crypto}_i \times r_t^{BTC} + \theta \cdot Z_i \times \text{Crypto}_i \times r_t^{BTC} + \underbrace{\alpha_i + \lambda_t + \text{controls}}_{\text{as in baseline}} + \varepsilon_{it}$$

Z_i : size, cash, debt or profitability, one per model; points at its 25th and 75th percentiles.



Backup: financial firms are most exposed to Bitcoin

$$r_{it} = \sum_j \beta_j \cdot \text{Crypto}_i \times \text{Ind}_i^j \times r_t^{BTC} + \underbrace{\sum_j \rho_j \text{Crypto}_i \text{Ind}_i^j}_{\text{lower-order}} + \underbrace{\alpha_i + \lambda_{j,t} + \text{controls}}_{\text{industry} \times \text{day effects}} + \varepsilon_{it}$$



Backup: industry slopes

Sector	Disclosure–BTC slope	Effective exposed firms
Finance/insurance/RE	0.171*** (0.035)	62.7
Manufacturing	0.050** (0.020)	28.7
Trade	0.048* (0.026)	9.2
Other sectors	0.036 (0.026)	17.9
Business services	0.026* (0.016)	44.8
Transport/utilities	0.024 (0.026)	16.2
Mining (SIC 10–14)	−0.064 (0.047)	3.5

Equality Wald 21.6 on 6 df, $p = 0.0014$. Finance minus business services 0.144 (Holm $p = 0.0034$); minus manufacturing 0.120 ($p = 0.041$). Common role sample (492 firms): finance 0.162 → 0.130 with roles.

JMP Tables 10 and 203; firm and SIC-group×date FE; firm/date CRV1.

Backup: characteristic interactions and foreign revenue

Characteristic (per s.d.)	$D \times z \times \text{BTC}$	Holm p
Log assets	-0.039*** (0.009)	<0.001
Cash/assets	0.008 (0.012)	1.000
Debt/assets	-0.000 (0.012)	1.000
Profitability	-0.035*** (0.010)	<0.001

Foreign revenue (ω), 2,865 firms	(1)	(2)
$D \times r^{\text{BTC}}$	0.056*** (0.012)	0.044*** (0.017)
$D \times \omega \times r^{\text{BTC}}$		0.027 (0.038)

Joint characteristic model: Wald $p = 0.0004$; size -0.030, profitability -0.020.

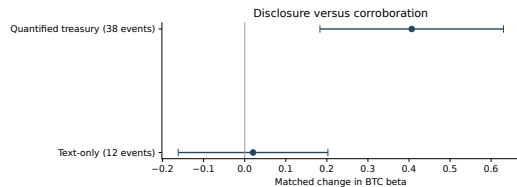
JMP Tables 11 and 13; firm/date FE, full risk controls; firm/date CRV1.

Backup: dynamic sensitivity

Horizon h	0	1	2	3	5
$D \times r^{BTC}$	0.086*** (0.010)	0.098*** (0.014)	0.095*** (0.015)	0.124*** (0.019)	0.127*** (0.023)
Later increment, sessions 1–5				0.040** (0.018)	
Sessions 0–5, controlling 5 future BTC returns				0.126*** (0.022)	
Next-5-day BTC on current BTC (date level)				0.045 (0.045)	

JMP Tables 16–17: 6,987,145 firm-days, 3,879 firms, 2,637 dates; date-score Bartlett HAC(20).

Backup: holdings size and beta changes (unresolved)



Matched Δ BTC beta, 38 events	0.407***
in daily sample (18)	0.165*
Daily dose: holdings/equity $\times$ BTC	-0.017
holdings/equity ≤ 1	0.513*
position age ≤ 180 days	0.161

Quantified holders' betas rise; the daily dose is unstable in a 24-firm sample.

JMP Figure 31, Tables 85–86. Different estimands and samples; reported, not discarded.

Backup: crypto-origin news events (cyberthefts)

Event	Revised conventional (pp)	Exposed firms
Bitfinex 2016	-0.29 (0.95)	5
Coincheck 2018	-3.25 (3.04)	13
Binance 2019	-2.14 (1.61)	19
Upbit 2019	-1.02 (1.96)	14
KuCoin 2020	1.80 (4.36)	6
BitMart 2021	0.71 (1.35)	27
WazirX 2024	-0.01 (1.62)	33
Bybit 2025	0.75 (1.45)	38

All eight 95% intervals include zero: too few exposed firms for shock-level identification.

JMP Tables 21–22: two-session CAR minus normal CAR, industry FE, prior controls, HC3.

Backup: accounting results, all outcomes

	OI/A	OCF/A	$\Delta \ln \text{Sales}$	$\Delta \ln \text{Assets}$	Debt/A	Cash/A
Prior disclosure $\times$ BTC	0.0086* (0.0034)	-0.0009 (0.0016)	0.0197 (0.0098)	0.0256* (0.0104)	0.0041 (0.0040)	0.0076 (0.0044)
Observations	58,335	67,400	69,789	74,918	69,639	72,641
Prior-disclosure firms	255	286	269	292	290	278

Firm and calendar-quarter FE; predetermined controls and their BTC interactions; fiscal-window BTC main effect. Stars: Holm over six outcomes; OI and asset growth adjusted $p = 0.0996$. Outcome-specific timing: disclosure and controls public before the fiscal window.

JMP Table 14. Quarterly-score Bartlett HAC(4), t_{43} . Accounting-linked equity sample: 0.106 (0.019), 2,150 firms.

Backup: is the repricing driven by institutional investors reallocating?

- **Data:** SEC Form 13F holdings of institutional managers, 2015–2025, matched to CRSP.
 - ▶ In 2025, 80% of managers hold at least one crypto-active stock.
- **Test 1: Do shared owners pass Bitcoin risk on to other stocks?**
 - ▶ For each firm without crypto activity, I measure how much its institutional owners hold in crypto-active stocks.
 - ▶ Firms whose owners hold more crypto-active stocks are not more sensitive to Bitcoin: the coefficient is -0.001 , with 95% interval $[-0.004, 0.003]$.
- **Test 2: Do managers sell their other stocks after Bitcoin falls?**
 - ▶ I regress each manager's quarterly net trading in stocks without crypto activity on its crypto-active portfolio weight times the Bitcoin decline.
 - ▶ Managers with more crypto-active stocks do not sell more after Bitcoin falls: a 10% decline changes their trading by -1.3 bp of portfolio, with 95% interval $[-3.0, +0.4]$.

Institutional rebalancing does not explain the repricing.

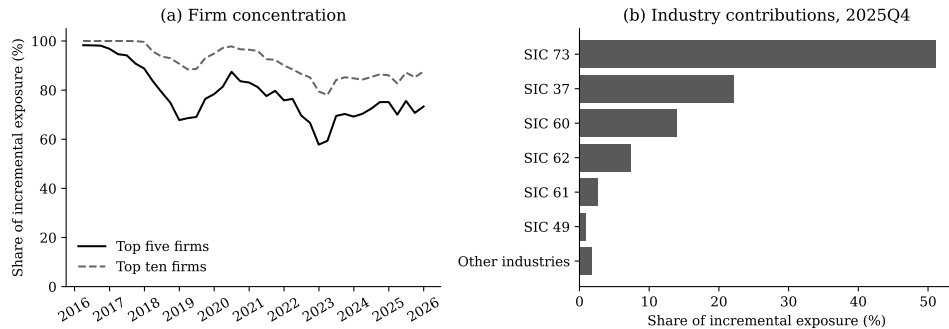
13F is quarterly and covers institutions with over \$100m in assets; it does not cover retail investors. Test 2 uses a 1 pp difference in crypto-active portfolio weight and excludes filings with reporting-unit errors.

Backup: conditional financing

$$E_i \leq \mathcal{E}(N_i, f_t), \quad \chi = \frac{\partial \mathcal{E}}{\partial N_i}, \quad \frac{\partial I}{\partial P} = \frac{v}{b+v}(c - \kappa E)\chi H$$

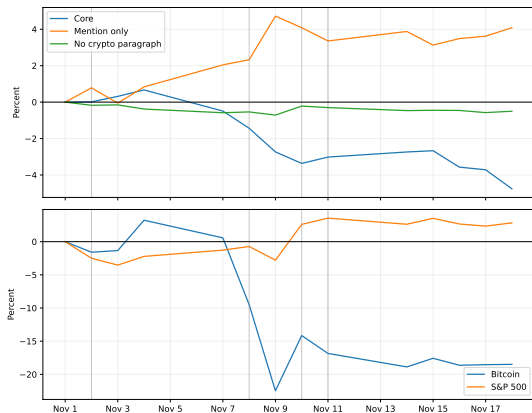
- Requires fixed holdings, a binding responsive capacity bound and interior investment.
- Liquidity, asset sales and substitute finance can interrupt the link.
- Financing and investment estimates are much less precise than the equity relation.

Backup: concentration of crypto-linked equity exposure



JMP Figure 59: top-five and top-ten shares over time; SIC2 contributions, 2025Q4.

An external shock: during FTX, the index rose while crypto firms fell



Top: cumulative abnormal returns (FF5 + momentum, value-weighted). Bottom: Bitcoin and S&P 500.

Why FTX is an external shock

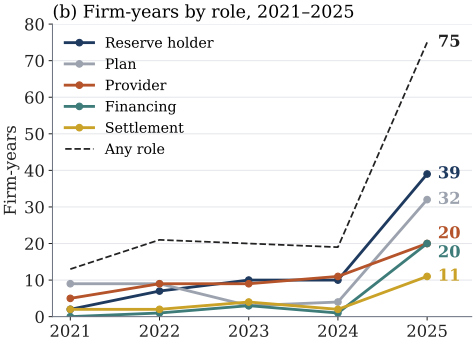
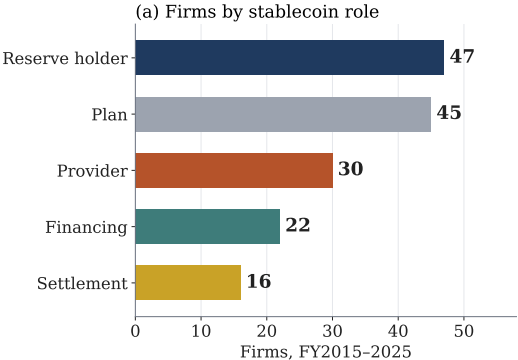
- **Born inside crypto:** fraud at a private offshore exchange
- **Unanticipated:** leak Nov 2, withdrawals halted Nov 8, bankruptcy Nov 11
- **Exposure set in advance:** groups fixed Nov 1 from prior filings
- **Macro went the other way:** soft CPI on Nov 10 lifted stocks

Nov 8–11, 2022

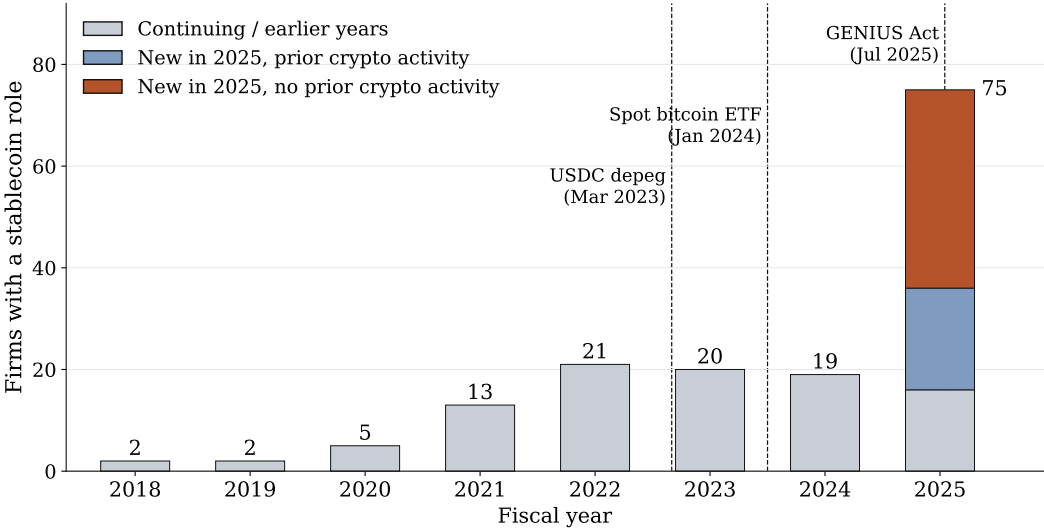
- Bitcoin **-17%**; S&P 500 **+5%**
- Core-activity firms **-3.7 pp** abnormal

A crypto-only crash in a rising market: only core crypto firms fell.

Stablecoin roles: most firms are using stablecoin as reserves and distribution, little settlement

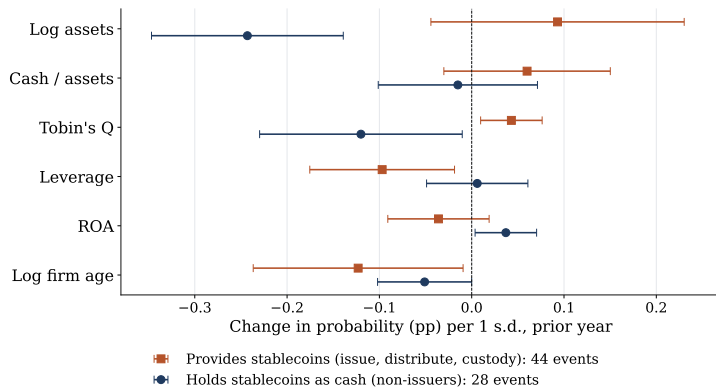


Stablecoin activity jumps in the GENIUS Act year



75 firms in 2025, up from 20 firms in 2024.

Stablecoin providers look like growth fintechs



Providers: valued well above their assets, low debt. Cash holders: small crypto firms.

Firth logits on prior-year characteristics (standardized), firm-clustered 95% intervals. Tobin's Q = market value / book assets: high Q means investors expect growth. Providers: JMP Table 136 (30,130 firm-years). Cash holders: JMP Table 128 (non-issuers, FY2021–25, 17,496 firm-years); a crypto treasury raises the probability by 0.56 pp. Conditional associations, not effects.

Backup: validation

Layer	Check	Establishes
Filing record	Accession, firm, publication date	Source and timing
Activity measure	Context, entity, role, overlap	Classified involvement
Classifier	Second model family, $\kappa = 0.831$ ($n = 138$)	Instrument stability
Stablecoin roles	Provider 83/100; settlement 10/20	Candidates, not verified use
Accounting line	Units, period, cumulative flows	Comparable outcomes

No human-coded gold set; failures recorded as missing, never as zero. 136,031 keyword-positive paragraphs across forms.

JMP Section 2.2, Appendix AI, Table 73.

Backup: sources

- SEC EDGAR API; CRSP; Compustat; Yahoo Finance BTC-USD.
- Tesla 2024 Form 10-K (0001628280-25-003063); Tesla 2025 Form 10-K (0001628280-26-003952).
- All figures reproduced from the paper; all numbers from its tables.