

Competition in Crypto Staking

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A long-standing puzzle in finance

- Why do financial intermediaries, in particular banks earn **substantial and persistent rents** despite a century of advances in information technology?
- Philippon (2015): the *unit cost* of US financial intermediation has been roughly unchanged for over 100 years.
- Candidate explanations for the persistence of rents:
 - local concentration / market power in banking (Drechsler et al 2017),
 - consumer inattention (Usenko 2025),
 - search and switching costs (Klemperer 1995; Hortaçsu–Syverson 2004),
 - shrouded or obfuscated prices (Gabaix–Laibson 2006),
 - regulatory constraints.

The challenge of digitalization

- Many changes are starting to transform this market
 - Introduction of stable coins
 - Tokenized deposits
 - CBDCs
 - Online and digital banking
- Significant questions how these changes will affect heterogeneous consumers and franchise value of financial institutions
- To get insights about the impact of the transition, we study a market that is already fully digital.

Crypto staking as a laboratory

We focus on **Cardano**, one of the oldest and largest Proof-of-Stake blockchains

- In Proof-of-Stake blockchains, token holders earn rewards for helping secure the network — but doing so directly needs validator infrastructure and scale.
- This creates a **delegation market**: holders delegate their staking rights to validators (pool operators) for a fee.
- Validators (pools) are close analogues of **money-market and index funds**: pool capital from many investors, generate a return, charge a fee.
- The blockchain provides an ability to trace individual decisions and investor heterogeneity.

Main Results

- Investor inattention is **widespread** yet it sustains **far smaller rents**.
 - Fees are around **10–20bp** with little dispersion, most rewards are passed through.
 - **More than 60%** of delegators never switch pools.
 - A small attentive minority ($\approx 10\%$ of delegators, $\approx 30\%$ of capital) **disciplines fees for everyone**.
 - Delegators react to the *salient* features of the fees.

Contribution to the literature

- **Competition & market power in deposit / fund markets** (Hortaçsu–Syverson 2004; Egan–Hortaçsu–Matvos 2017; Drechsler–Savov–Schnabl 2017; Brown et al. 2023; Carletti–Leonello–Marquez 2024).
- **Economics of blockchains & financial architecture** (Kogan–Fanti–Viswanath; Cong–He–Tang; John et al.; Halaburda–He–Li; Makarov and Schoar 2022; Budish 2022; Allen and Walther 2024).
- **Behavioral finance** (Dela Vigna and Malmendier 2003; Ru and Schoar 2016); **shrouded prices** and strategic obfuscation (Gabaix–Laibson 2006).

How Cardano staking works

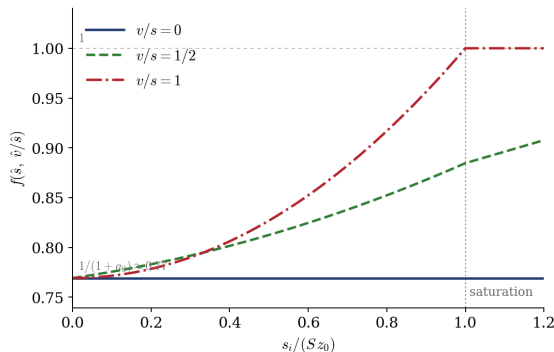
Delegated Proof-of-Stake. A validator runs a *stake pool*; an *epoch* lasts five days.



Pool rewards

Each epoch the reward pot (block rewards + tx fees), is split across pools $\sim$ to capped pool size $\hat{s}_{it}$, a **pledge factor** $f(\cdot)$ that rewards the operator's own stake, and a block-to-stake quality term b_{it} .

$$R_{it} = \bar{R}_t \hat{s}_{it} f(\hat{s}_{it}, \hat{v}_{it}/\hat{s}_{it}) b_{it}$$

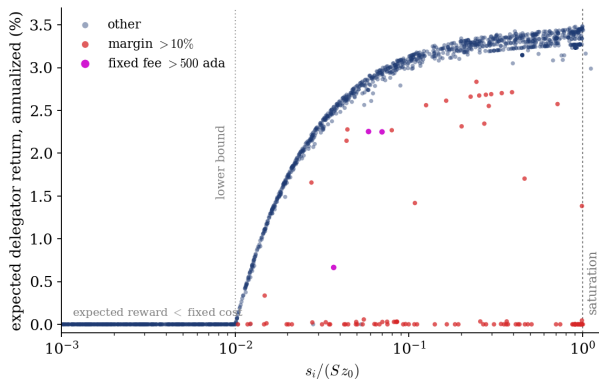


Delegator's return

- The protocol requires pool operators to charge a fixed fee c_{it} and set the minimum floor and also allows to charge the margin fee m_{it}
- The delegator's realized return per ada is:

$$r_{it} = \underbrace{(1 - m_{it})}_{\text{margin fee}} \max \left\{ \underbrace{\bar{R}_t \frac{\hat{s}_{it}}{s_{it}} f(\hat{s}_{it}, \hat{v}_{it}/\hat{s}_{it}) b_{it}}_{\text{gross pool return per ada}} - \underbrace{\frac{c_{it}}{s_{it}}}_{\text{fixed fee per ada}}, 0 \right\}.$$

Returns to scale



- Mandatory fixed fee and capped size introduce returns to scale.

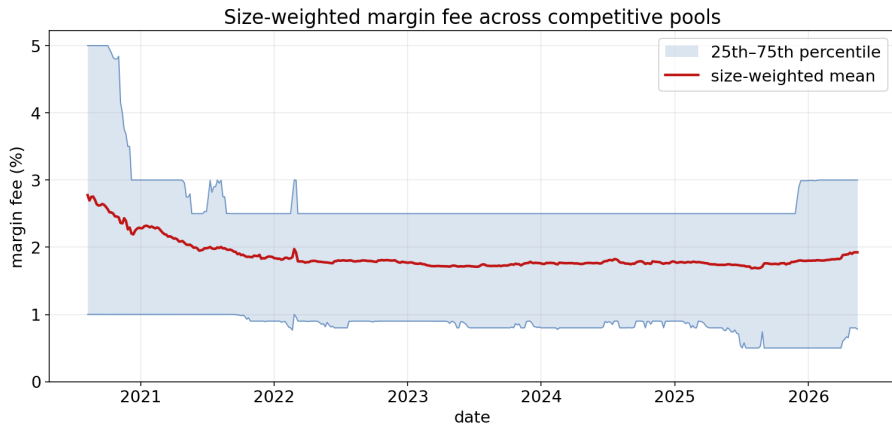
Data

- Full Cardano chain via the BlockFrost API:
 - ~**1.8M delegators**, **5,857 pools**,
 - Aug 2020 – May 2026.

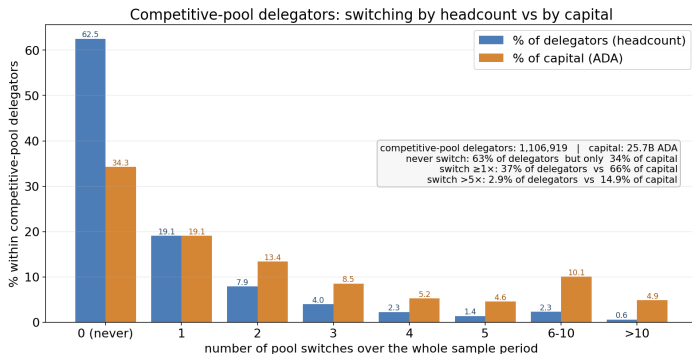
Sample funnel		
Screen	Remaining	
	Pools	Delegators
Full sample	5,857	1.76M
– small / few-delegator pools	1,101	1.70M
– high-fee / insider / exchange / intermediary	947	1.15M
– ISPO / CRA; pre-Epoch 260	867	1.09M

Counts are pools / delegators *remaining* after each screen. Two size groups: *small* (<20% of saturation) vs. *large* (>20%).

Result 1: Fees are low

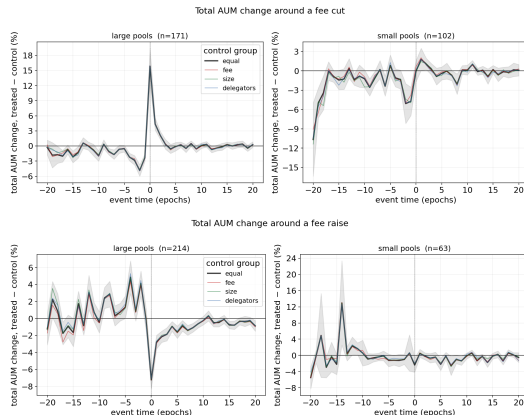


Result 2: Capital mobility is uneven



- By **headcount**: 62.5% never switch, a further 19.1% switch once.
- By **capital**: non-switchers are 34.3% of capital; switchers (≥ 1) are 37% of delegators but **66% of capital**.

Result 3: Capital responds to fee changes



- Matched event study: treated pool (fee change) vs. 10 nearest control pools matched at $\tau = -1$.
- Fee cut $\rightarrow$ large pools *gain* $\approx 15\%$ AUM at the event; fee raise $\rightarrow$ *lose* $\approx 7-8\%$. Small pools barely move.

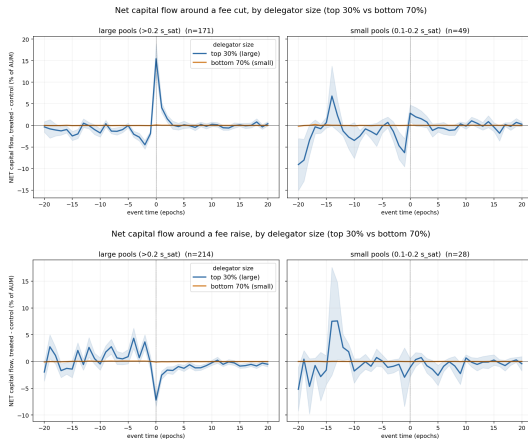
Result 4: Switchers drive capital mobility

	Entry	Switch in	Switch out	Exit
<i>Fee cut</i>				
Full	0.16***	1.19***	-0.50***	0.00
Large	0.17***	1.68***	-0.52**	-0.01
Small	0.13***	0.98***	-0.54**	0.00
<i>Fee raise</i>				
Full	-0.13***	-2.00***	0.17	0.00
Large	-0.19***	-1.86***	0.12	0.00
Small	0.04	-1.35**	0.88***	-0.03*

Treated – control flow rates (%). */**/***: 10/5/1%. *t*-stats in the paper.

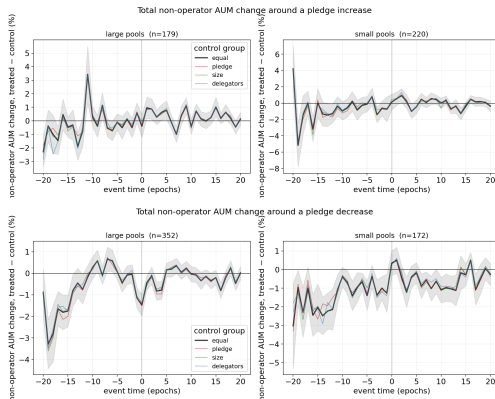
- The reaction is almost entirely driven by entry and switching margins.
- Exit is insignificant throughout

Result 5: Large delegators drive flows



Net flow of treated vs. matched controls, split into the **top 30%** of delegators by stake (blue) and the **bottom 70%** (orange).

Result 6: Response to pledge changes



Same set up of matched event study for pledge changes ($\geq 5\%$); outcome variable is non-operator AUM, captures delegators' response.

Takeaway. No systematic response even though pledge is payoff-relevant (it enters $f(\cdot)$).

Result 7: "Elasticity of demand"

$\Delta \log \text{AUM} \times 100$	(1) Full	(2) Large	(3) Small	(4) Pre-ISPO	(5) Post-ISPO
$\Delta \text{Margin fee (pp)}$	-1.72*** (0.33)	-2.48*** (0.35)	-0.10 (0.31)	-2.33*** (0.45)	-1.09*** (0.36)
$\Delta r_{it}/(1 - m) \text{ (ann. pp)}$	0.029*** (0.007)	0.014 (0.011)	0.039*** (0.010)	0.049*** (0.013)	0.014* (0.008)
Time & validator FE	Yes	Yes	Yes	Yes	Yes
N	154,528	99,080	53,319	37,586	116,942

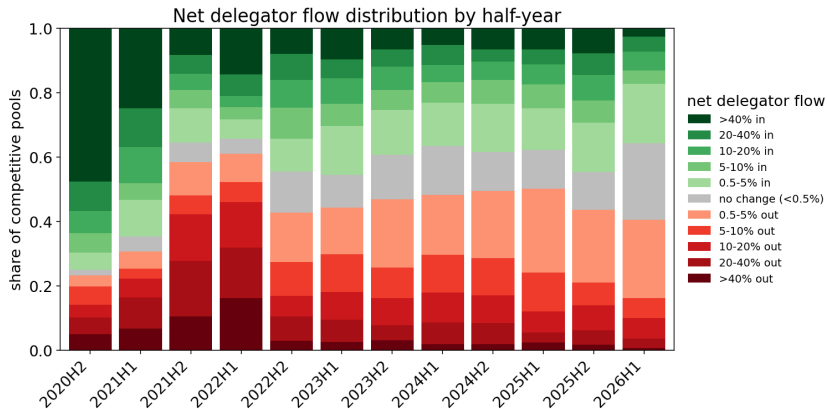
- AUM responds **strongly and negatively to fees** — concentrated in large pools, ≈ 0 in small pools.
- It responds *less* to expected returns net of fees; and the fee $\times$ return interaction is insignificant, i.e. effects are additive, with no “netting.”

Takeaways

- As traditional finance digitalizes and frictions are reduced **intermediary rents may compress substantially**, even if most investors remain inattentive.
- In a market where currently segmentation between different investors is limited, attentive investors provide a **positive externality** for the inattentive (or financially unsophisticated) investors.
- But the financial industry has shown to be creative. In the future increased segmentation or complexity of products might reduce these positive externalities.

Thank you!

Backup — capital mobility of pools



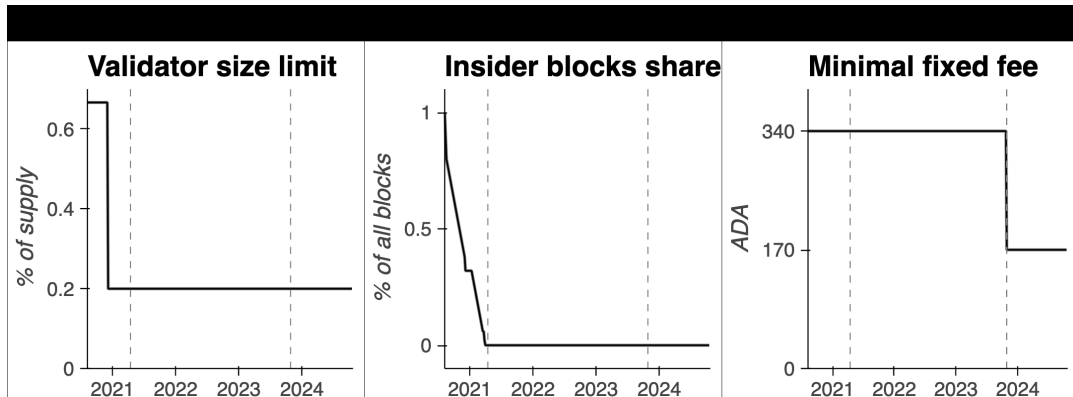
Net delegator flow per pool by half-year. Early sample: broad inflows (entry/growth). Late 2021–2022: pronounced outflows (saturation-cap cut and ISPO unwind). From 2022: roughly symmetric and concentrated in the small-flow bands — the typical mature pool sees only small net flows.

Backup — summary statistics

	N delegators	Validator AUM (M)	Margin fee (%)	Delegator stake
Mean	723	17.5	1.6	19,008
Std	1,215	17.4	1.4	331,508
p5	33	3.0	0.0	19
p25	95	4.7	0.7	157
p50	251	8.9	1.1	797
p75	791	26.3	2.2	3,589
p95	3,318	55.2	4.9	41,130
Count	867	867	867	1,088,069

Main competitive sample (Epoch 260–631). The median delegator stake (≈ 800 ada) is small; the mean ($\approx 19,000$) reflects a thin right tail of large, mobile accounts.

Backup — protocol parameter evolution



Validator size limit $\bar{s}$: $1/150 \rightarrow 1/500$ (Dec 2020), pushing delegators off newly over-the-limit pools. Insider block share: $1 \rightarrow 0$ over the first ~ 8 months (transition). Minimal fixed fee: $340 \rightarrow 170$ ada (late 2023), effective two epochs later.