From launch to success

The Pump.fun case

Predicting the success of new crypto-tokens

Giulio Marino

(Università di Pisa, INFN)

DeFI & Crypto at SNS | 2026

***GM**, Naviglio, Tarantelli, Lillo (In preparation)*

INFN PISA

Istituto Nazionale di Fisica Nucleare

Sezione di Pisa

IN SUPREMÆ DIGNITATIS 1343

UNIVERSITÀ DI PISA

SCUOLA NORMALE SUPERIORE

Introduction

The main goal

"Identification of meaningful predictors of success in decentralized token markets"

1. **No standardization of the smart contracts.**[*]
   Economic behavior and contract design intertwining makes the prediction harder
2. **The definition of success is ambiguous.**
   Arbitrary time horizons or price thresholds
3. **The rate of success is very low.**
   The discrimination is statistically challenging

[*] *[1] M. Naviglio, F. Tarantelli, and F. Lillo, EPJ Data Science (2025), in press, **arXiv:2502.10512** [q-fin.CP]*
[2] K. Qin, L. Zhou, and A. Gervais, 2022 IEEE Symposium on Security and Privacy (SP) , 198 (2021).
[3] C. F. Torres, M. Steichen, and R. State (USENIX Association, Santa Clara, CA, 2019) pp. 1591–1607.
[4] D. Sun, W. Ma, L. Nie, and Y. Liu, ArXiv abs/2403.16082 (2024)

Introduction

The main goal

"Identification of meaningful predictors of success in decentralized token markets"

1) **Environment that limits heterogeneity unrelated to market dynamics**
2) **A non arbitrary definition of success that is encoded in the platform mechanism**

Pump.fun platform

A natural laboratory to predict the success

The pump.fun case

SOLANA-BASED LAUNCHPAD THAT SATISFIES ALL REQUIREMENTS

1. **Same safe smart contract**
   No Honeypots, same init. cond. and same bonding curve

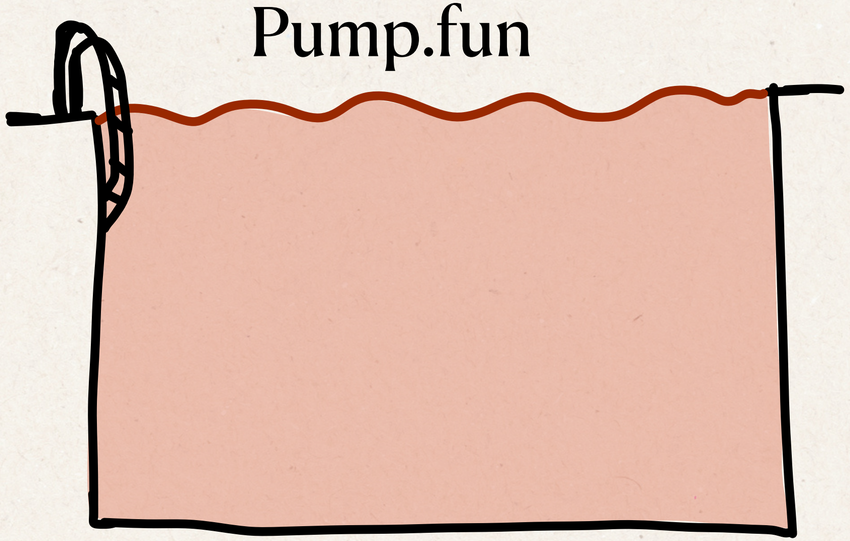
2. **Protocol-level notion of early success**
   Initial bonding curve till a deterministic threshold is achieved

3. **Large daily token creation**
   Well suited for statistical analysis

vBC and rBC

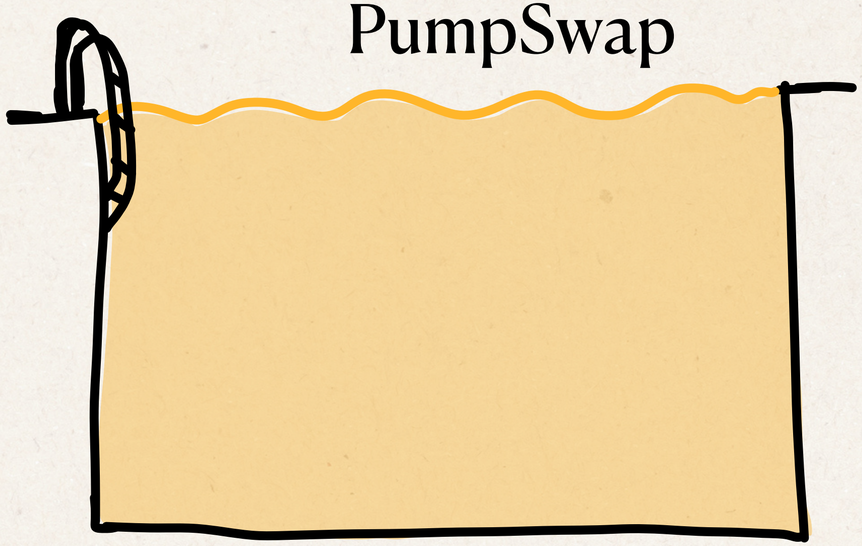
Two sequential AMMs, both based on constant product pricing rule

Pump.fun



Graduation

PumpSwap

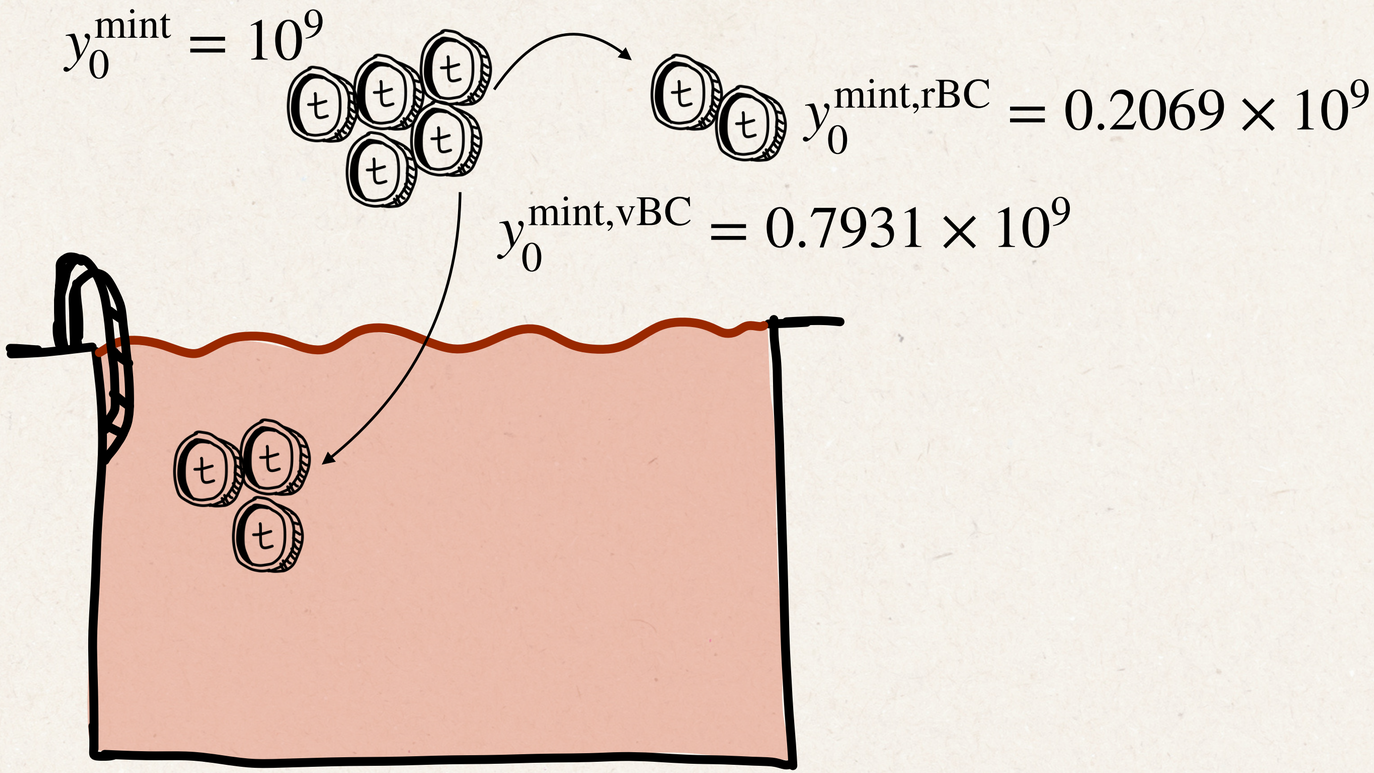


Virtual Bonding Curve (vBC)

Real Bonding Curve (rBC)

[1] "Pump.fun: Solana token launchpad," https://pump.fun

The pump.fun case



(vBC)

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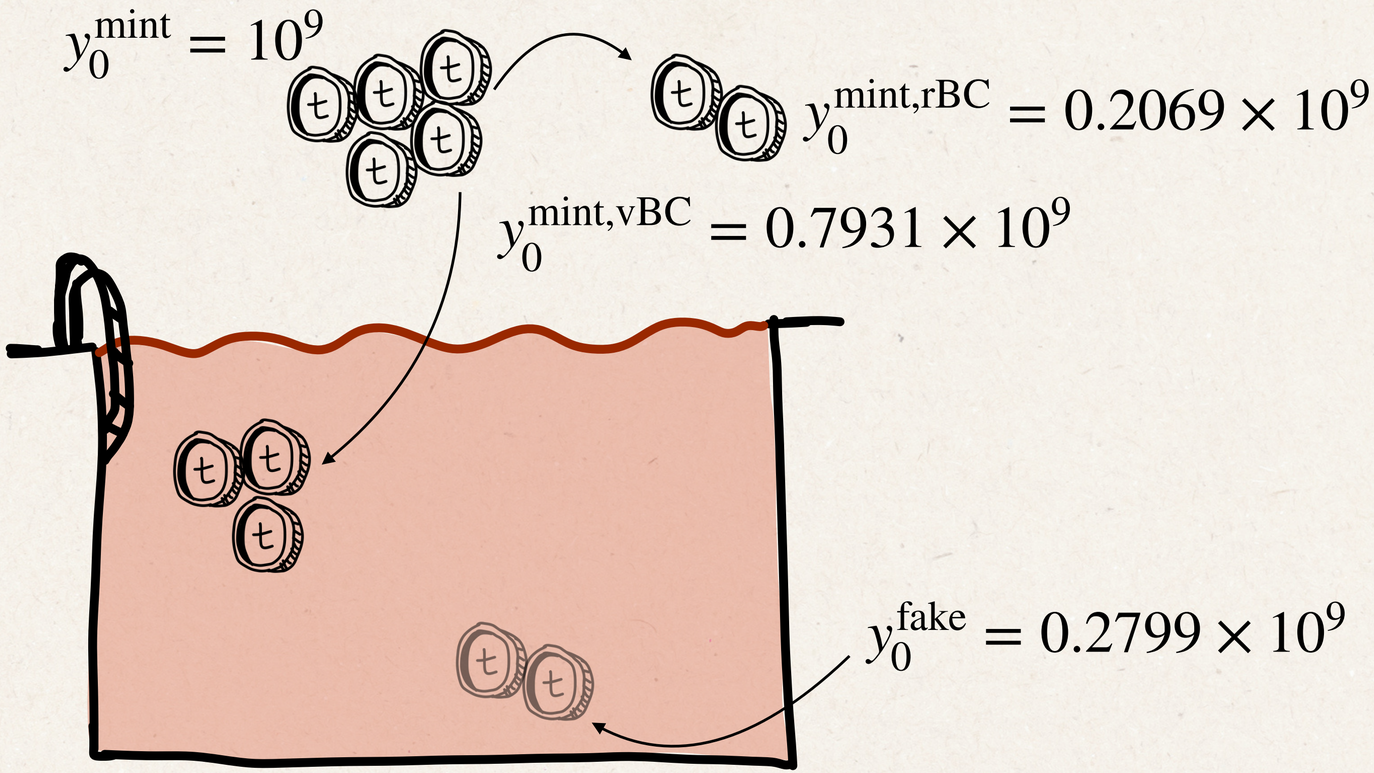

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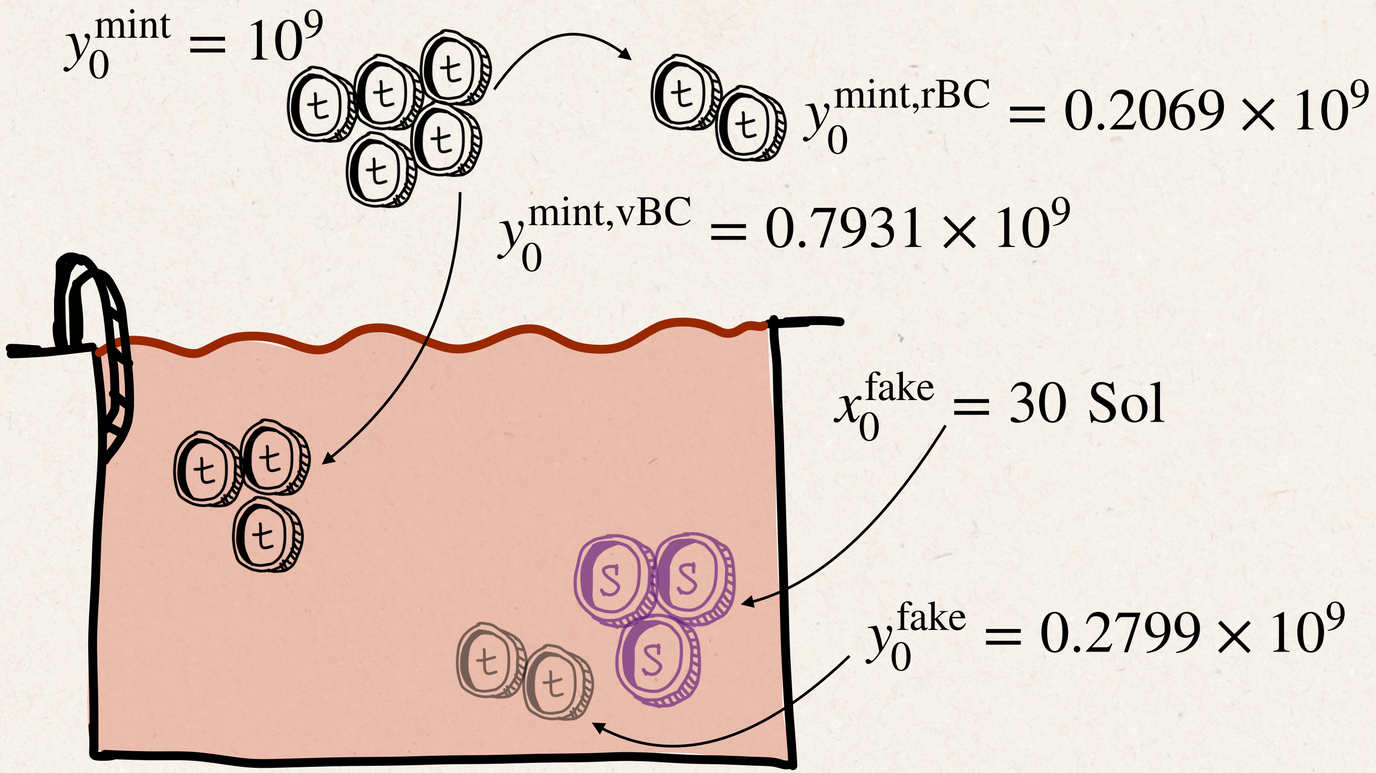
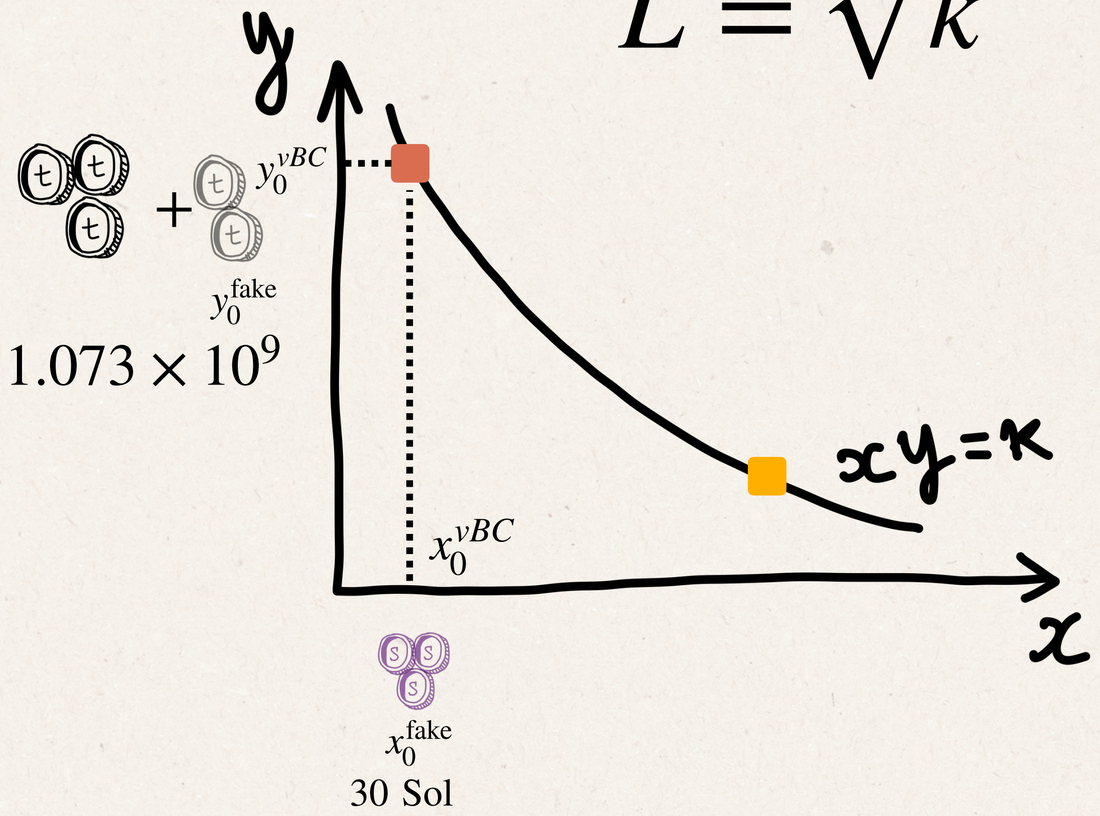


(vBC)

$$L = \sqrt{k}$$



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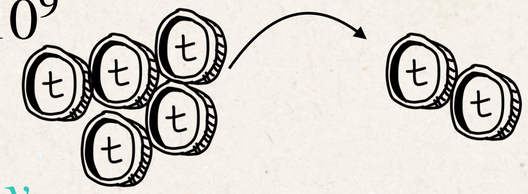
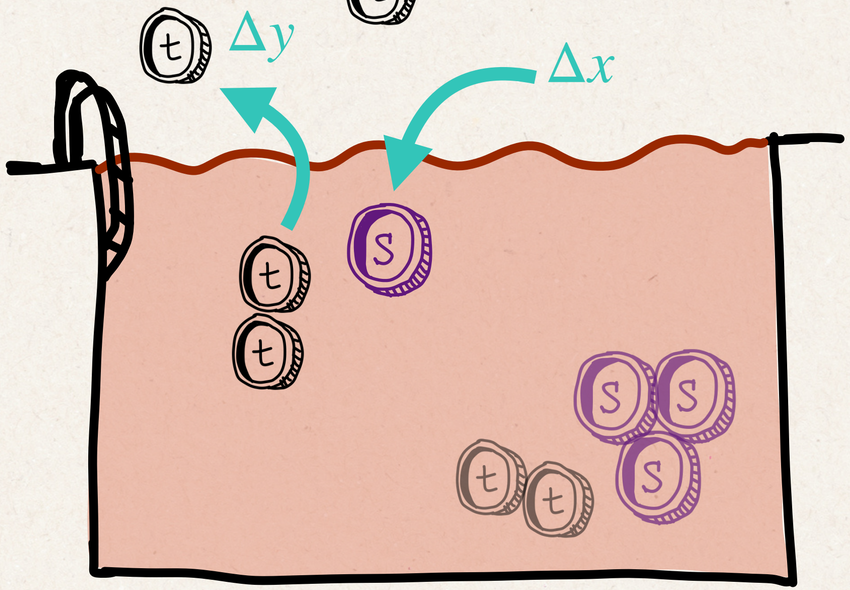
The pump.fun case

$y_0^{\text{mint}} = 10^9$

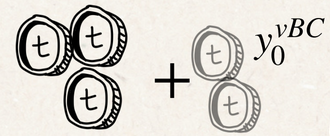


$y_0^{\text{mint,rBC}} = 0.2069 \times 10^9$



(vBC)

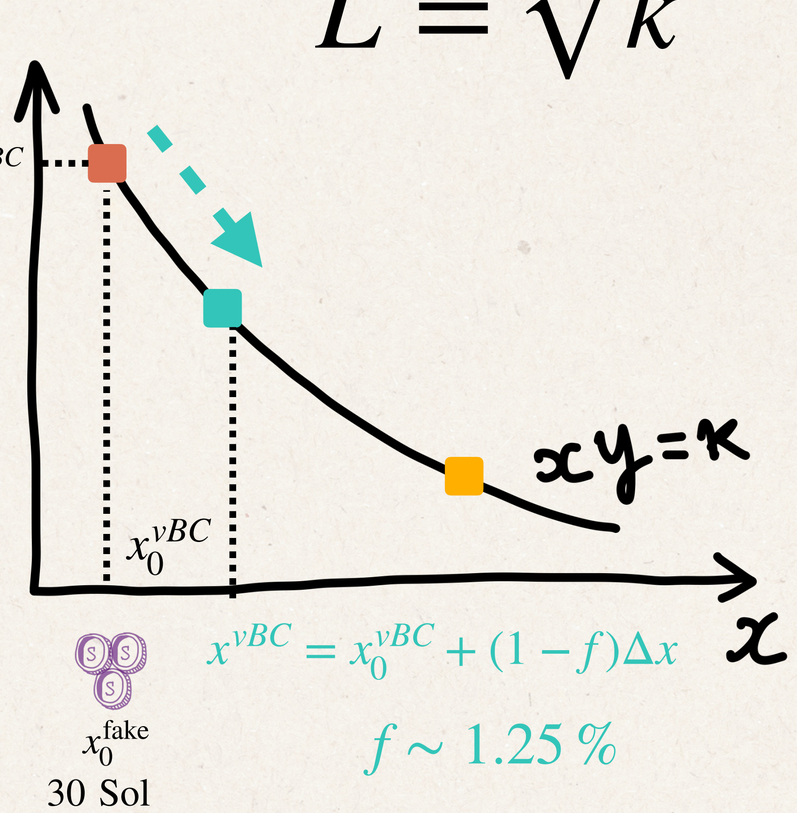
$L = \sqrt{k}$



y_0^{vBC}

y_0^{fake}

1.073×10^9



x_0^{vBC}

x_0^{fake}

30 Sol

$x^{vBC} = x_0^{vBC} + (1-f)\Delta x$

$f \sim 1.25\,\%$

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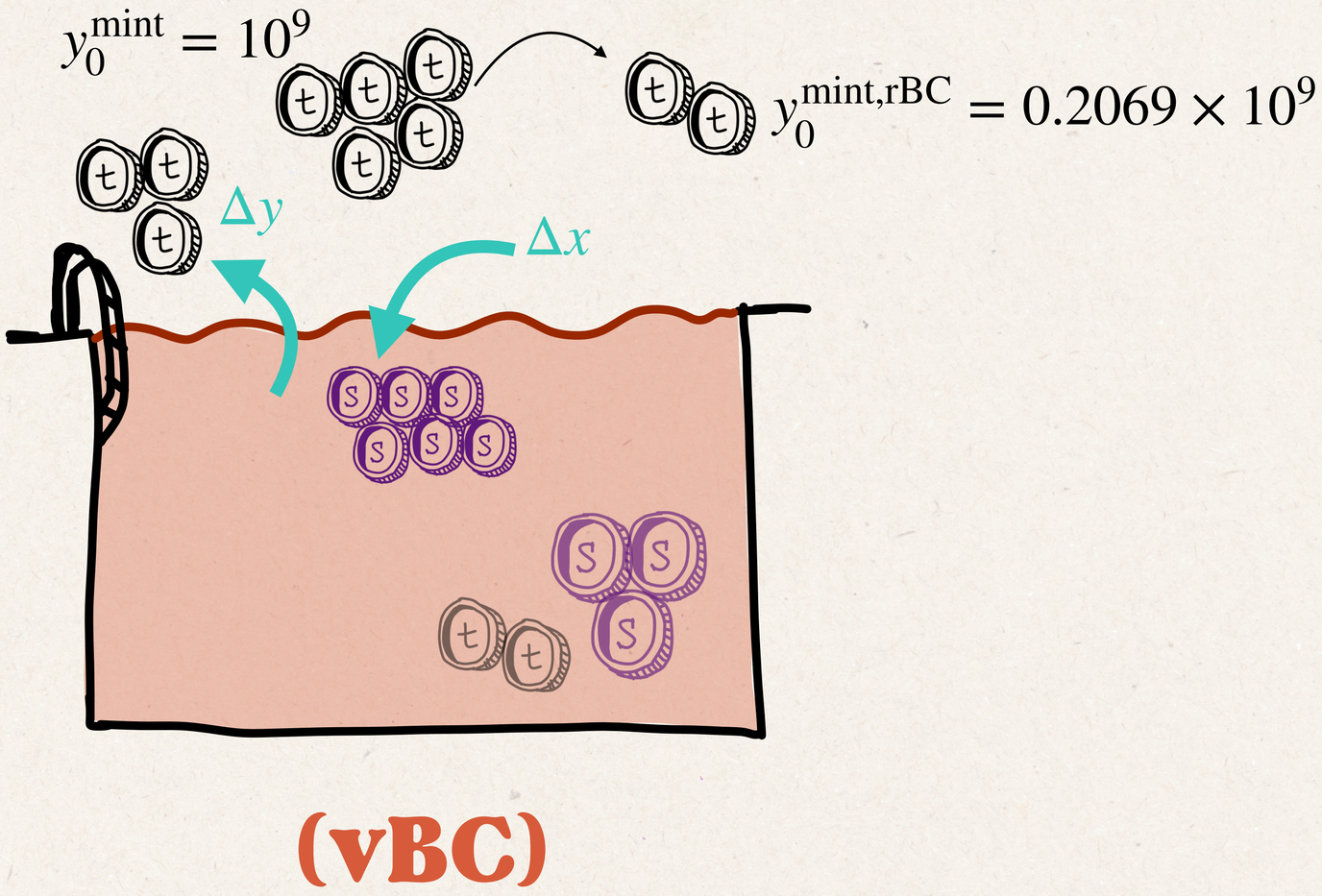
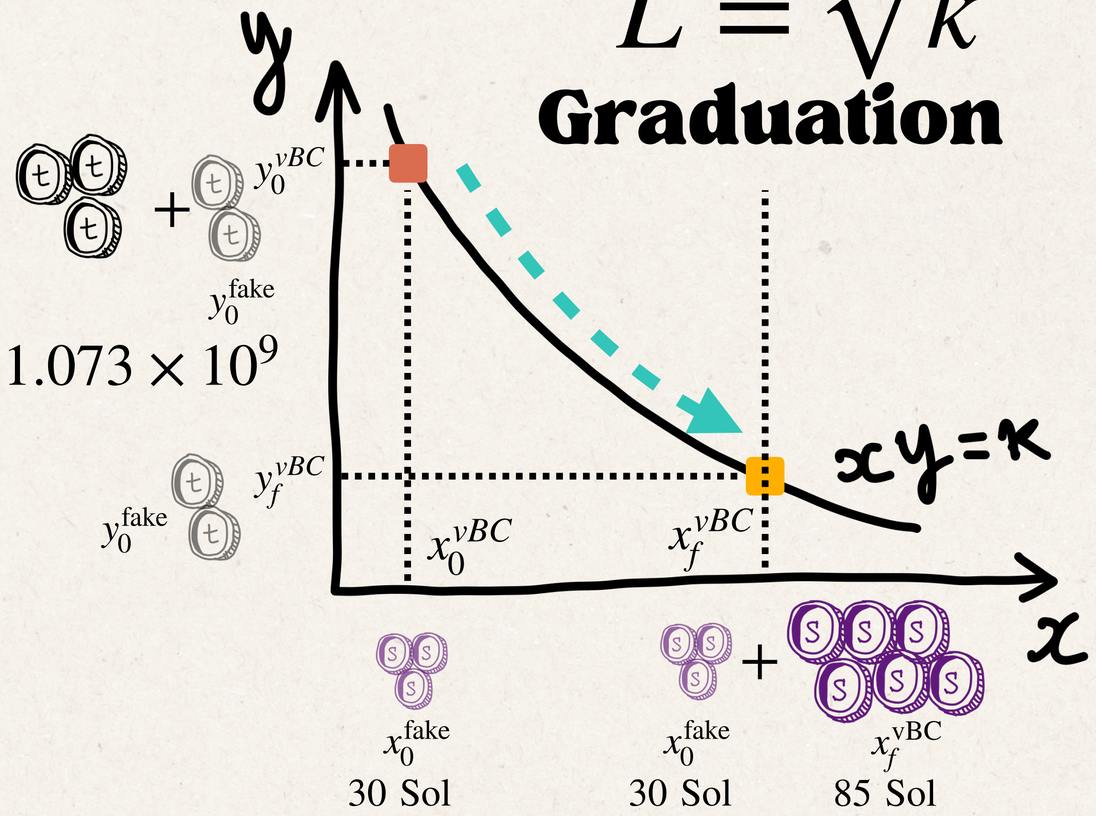
The pump.fun case



(vBC)

$$L = \sqrt{k}$$

Graduation



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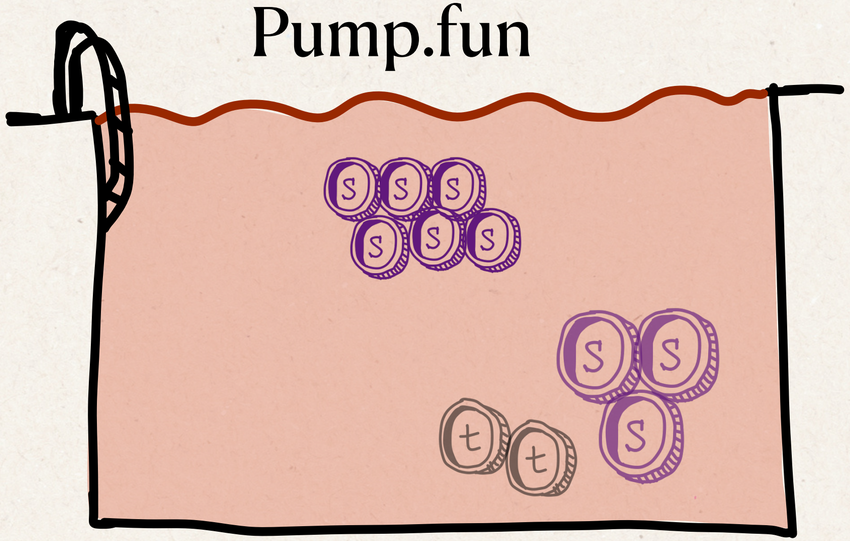
vBC and rBC

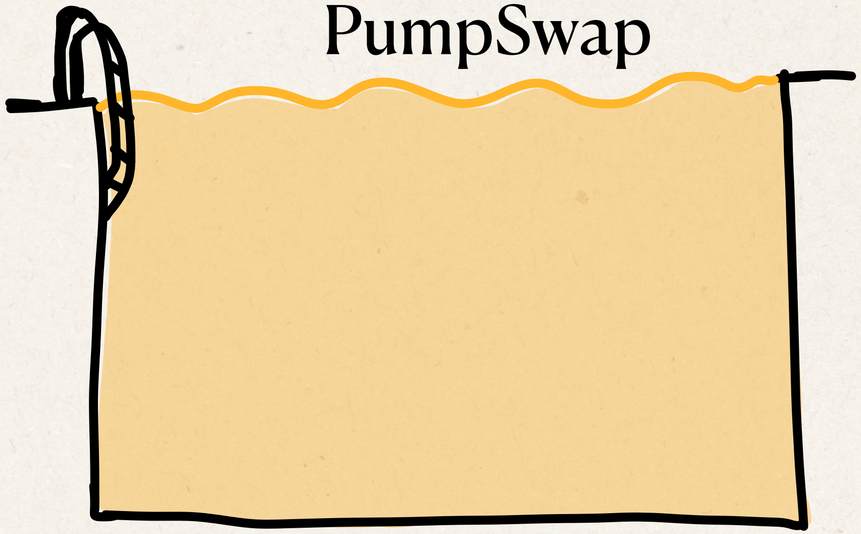
Graduation is achieved when $x_f^{\text{vBC}} = 30 \text{ Sol} + 85 \text{ Sol} = 115 \text{ Sol}$

Pump.fun



Graduation

PumpSwap



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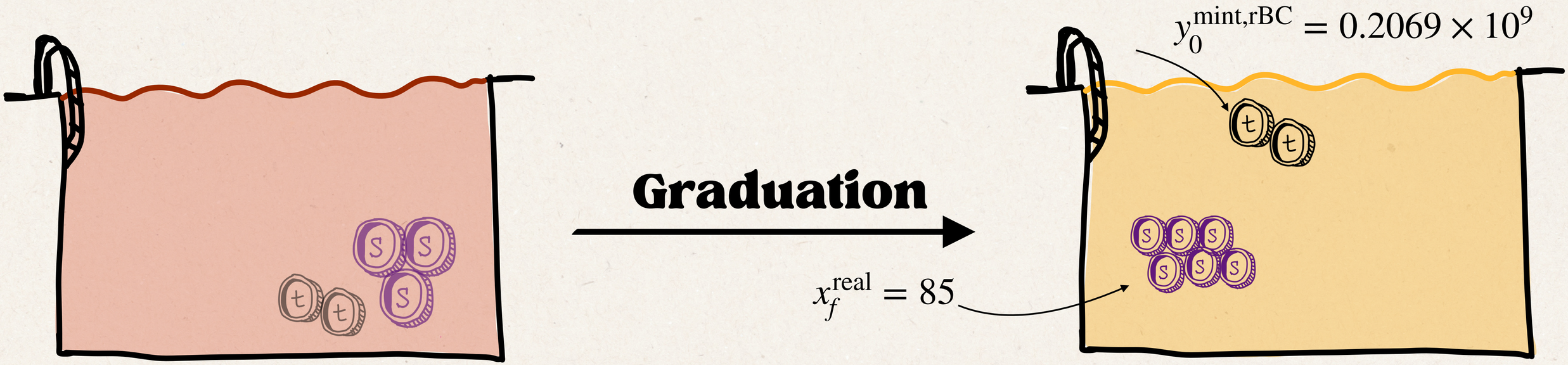

Virtual Bonding Curve (vBC)

Real Bonding Curve (rBC)

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Pump.fun

SUCCESS

naturally identified in the graduation threshold

The dataset

One month of data: September 2025

Token created: 6.5×10^5

Different creators: 2.4×10^5

Different traders: 2.6×10^6

Tokens graduated: 4338

0.63%

*[1] **GM**, Naviglio, Tarantelli, Lillo (In preparation)*

The dataset

- Parsing on-chain data from the Pump.fun and PumpSwap programs
- We track all newly created tokens across both vBC and rBC
- Each record in the dataset corresponds to a single on chain transaction

timestamp	trader	vTokInBondingCurve
signature	txType	solAmount
mint	inBondingCurve	tokenAmount
coin_creator	vSolInBondingCurve	isBot

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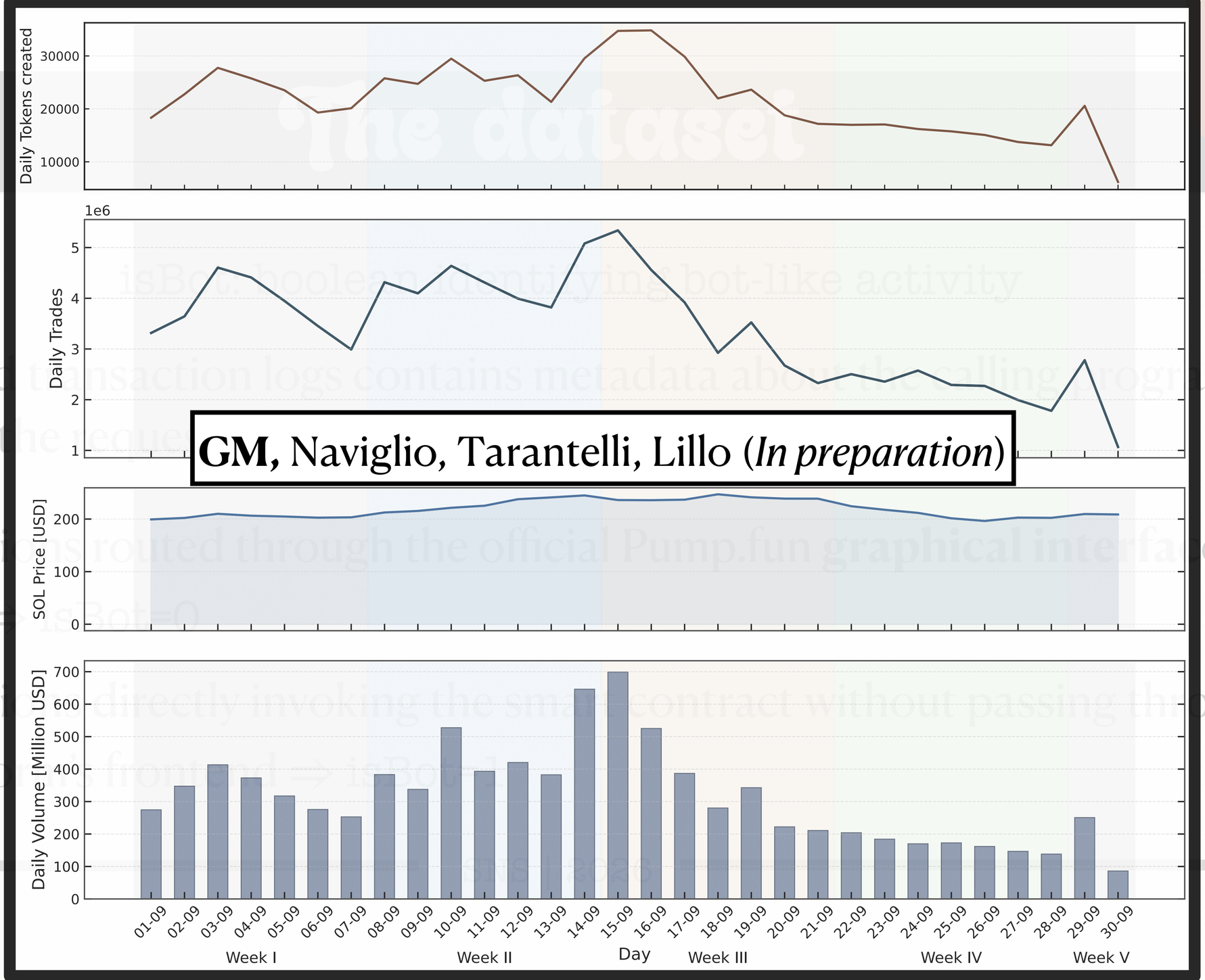

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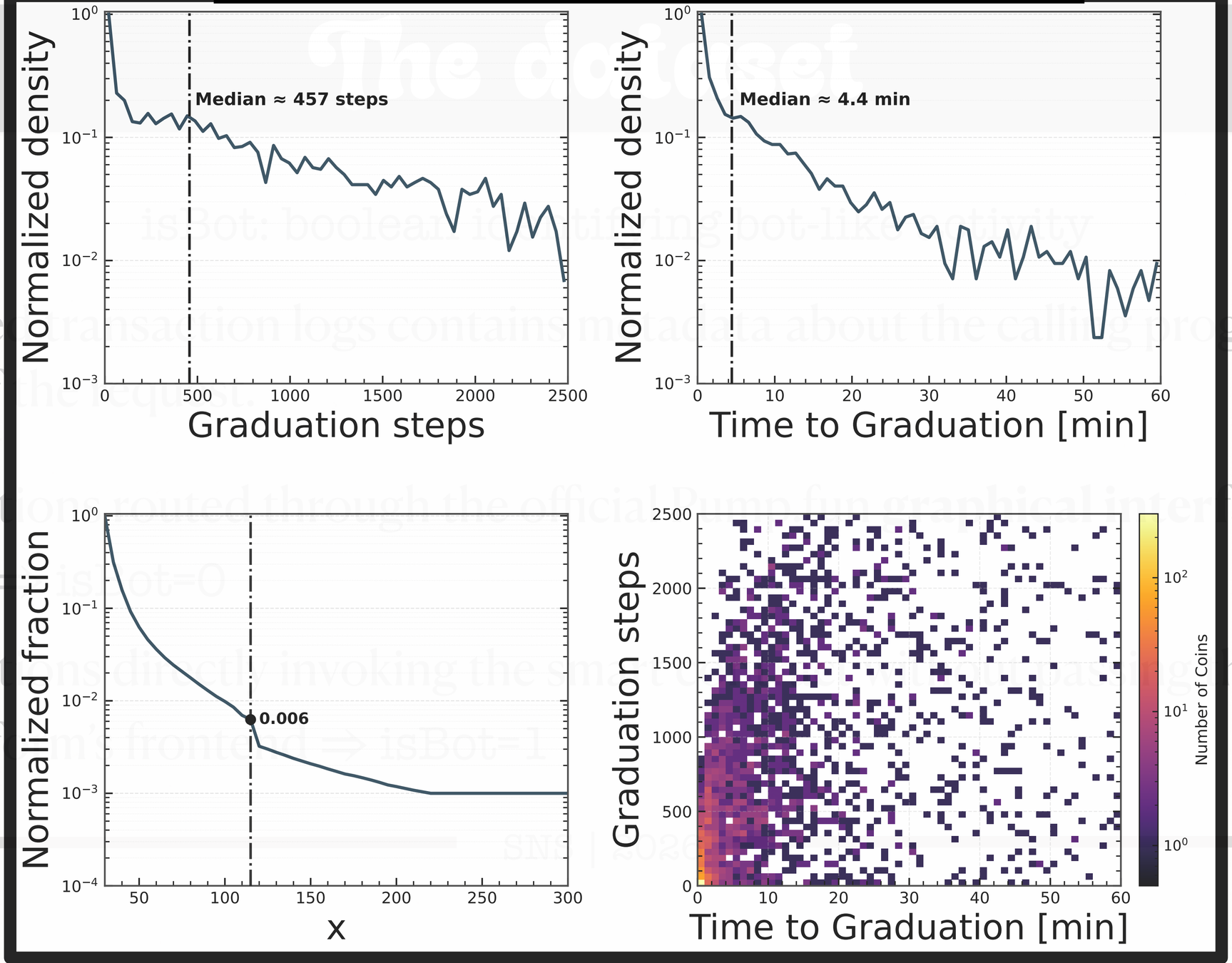
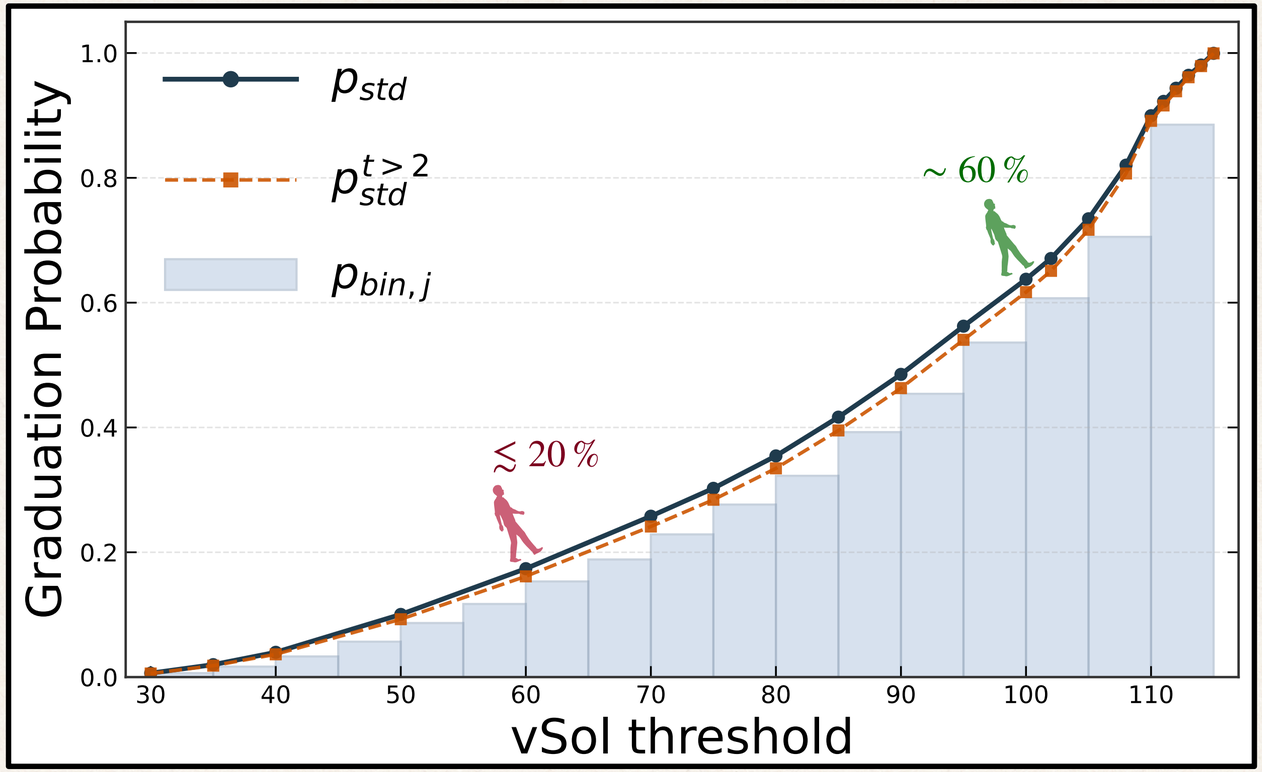


Conditional grad. prob.

"Identification of meaningful predictors of success in decentralized token markets"

$$p_{\text{std}}(\text{vSol}) = P(\text{grad} \mid \exists x : x > \text{vSol})$$

$$p_{\text{std}}^{t>2}(\text{vSol}) = P(\text{grad} \mid \exists x : x > \text{vSol}, t_{\text{grad}} > 2\text{s})$$



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Conditional grad. prob.

Can we identify some predictors in order to increase the conditioned graduation probability?

1. **Bot activity**
2. **Number of trades**
3. **Presence of successful traders**
4. **Presence of special token creators**

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Conditional grad. prob.

1 Bot activity

Transaction logs contains metadata about the origin of the request!

isBot: boolean identifying bot-like activity

1) Transactions through the official Pump.fun **graphical interface** website

   ⇒ isBot=0

2) Transactions directly invoking the smart contract without passing through the platform's frontend ⇒ isBot=1

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Conditional grad. prob.

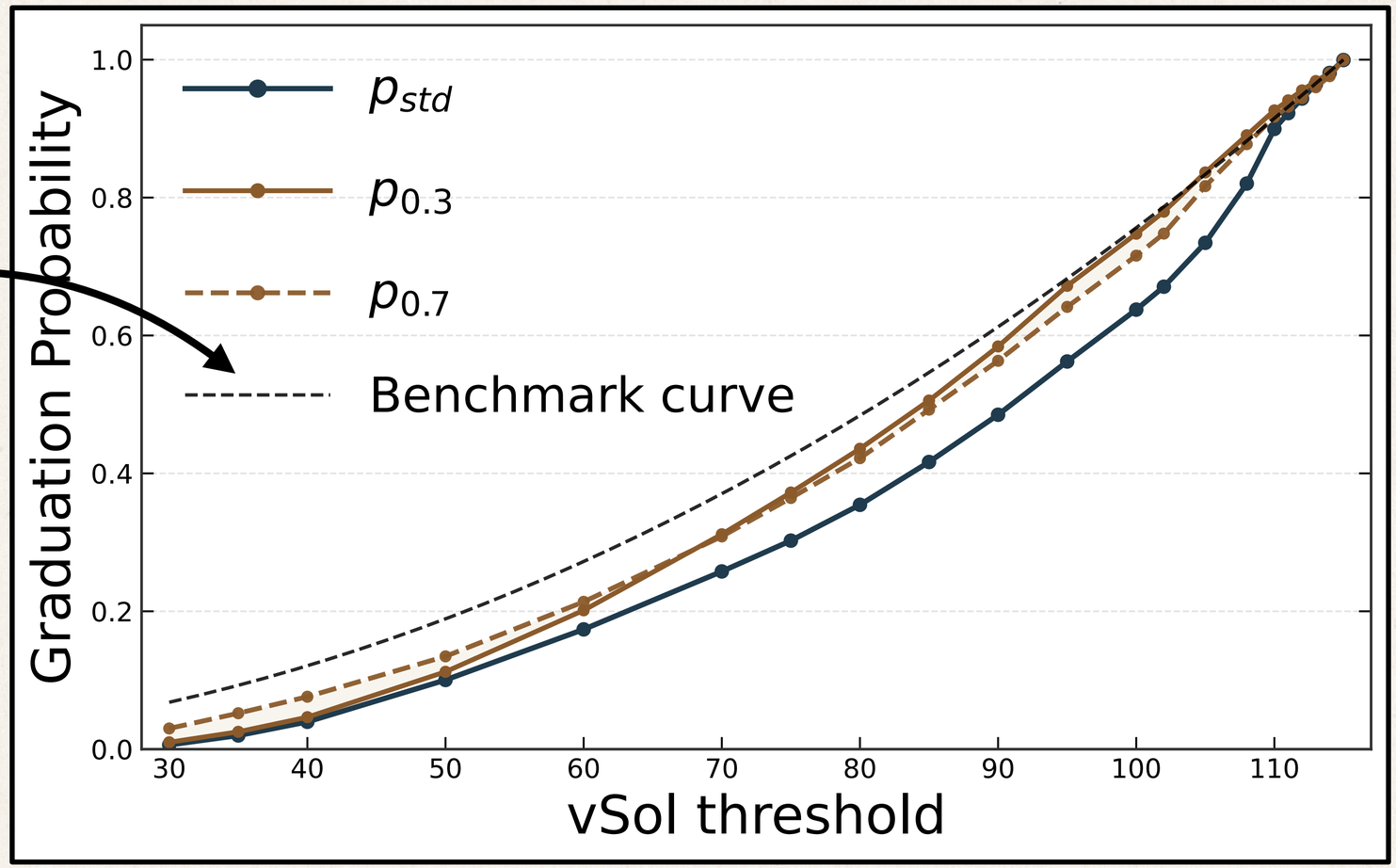
1 Bot activity

Buy at vSol and sell at 115 Sol

$$\mathrm{vSol}^2/115^2$$

$$p_\theta(\mathrm{vSol}) = P\big(\mathrm{grad} \mid \tau > \theta\big),$$

θ : is the fraction of non bot!



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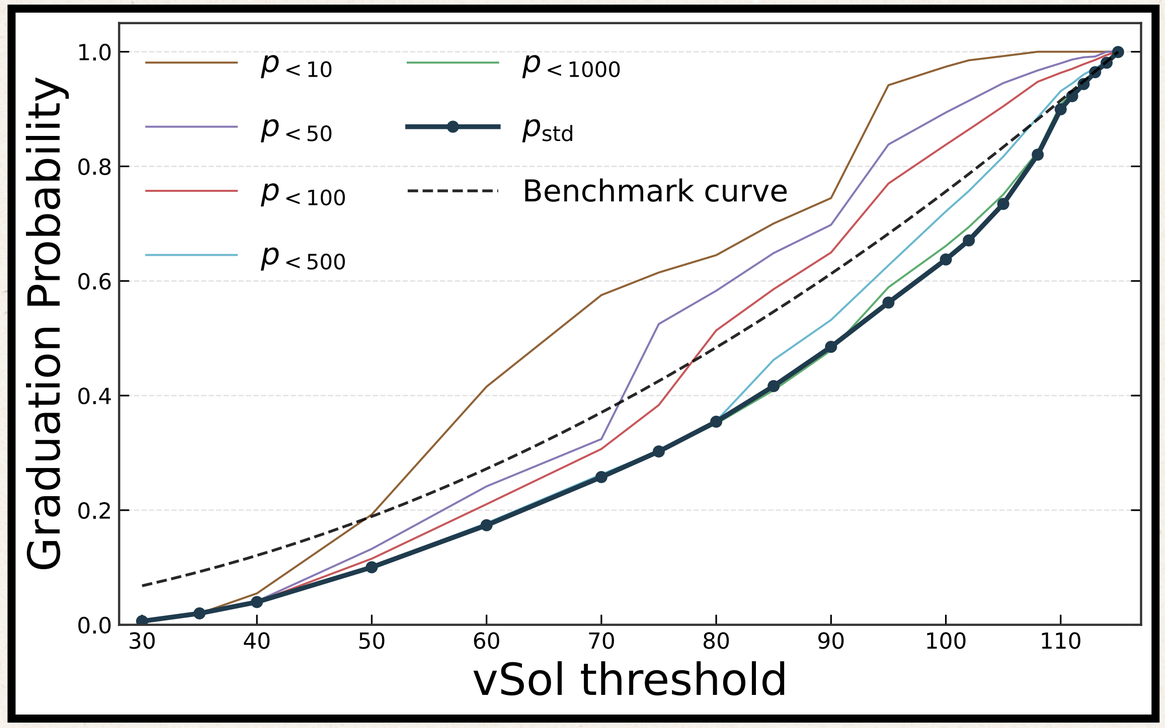
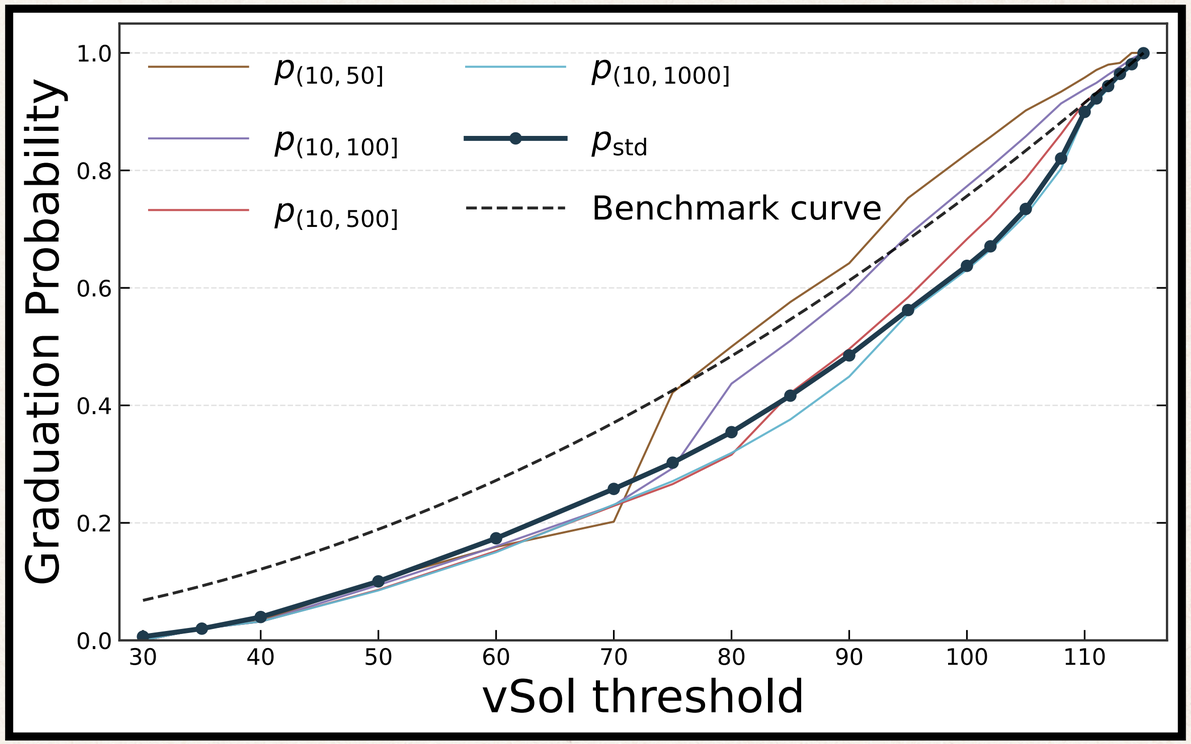
Conditional grad. prob.

2 Number of trades





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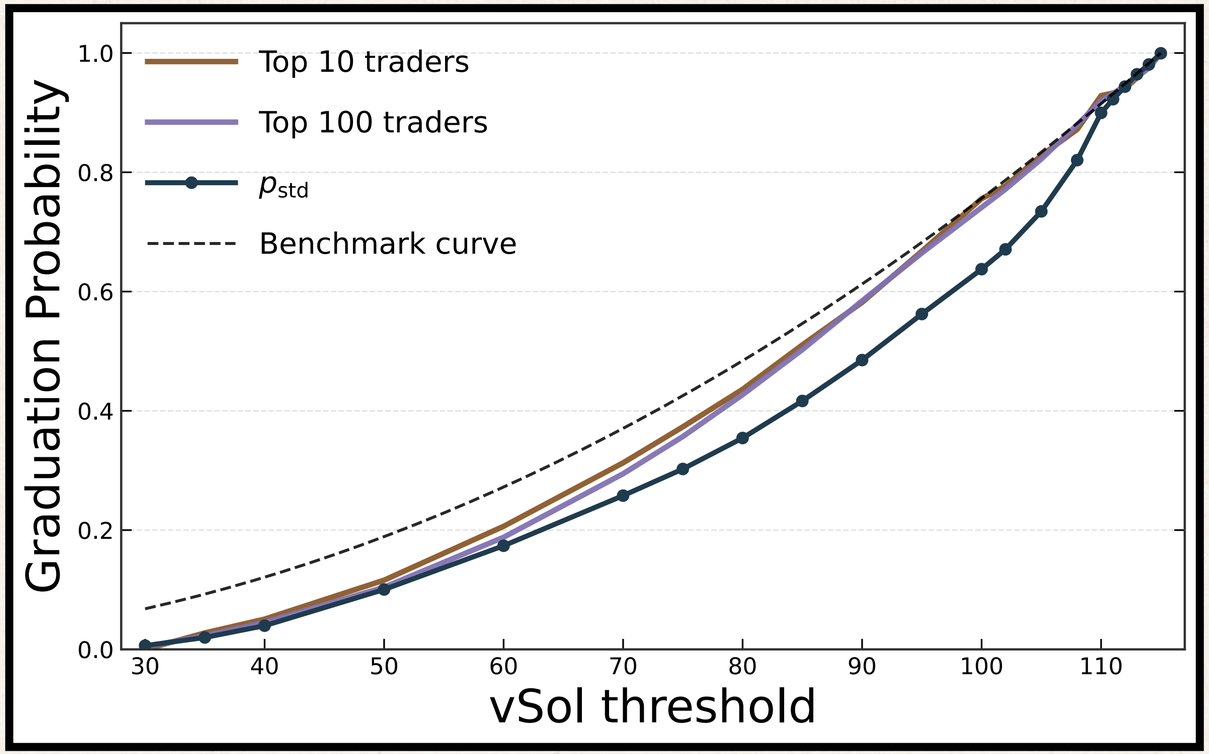
Conditional grad. prob.

3 Presence of successful traders (2 weeks + 2 weeks)

(b) First two weeks of the dataset

Rank	Wallet	PnL (SOL)	#Trades	#Buy	#Sell
1	GsbjKVpmusptbt5RwwQ6z7P4cEVhqXbhRMHPwQ4hfRp4	3017.655	476	415	61
2	24oimYpYTiChCRHXRkNZNqw5mEE6X8RWFEWXrsVLM8PP	2845.029	45	24	21
3	suqh5sHtr8HyJ7q8scBimULPkPpA557prMG47xCHQfK	2634.320	15220	10782	4438
4	CeAjiFBzgNb2oBM2v3nG8u8QnmLhtS1SiRJwqVPaSwqK	2512.679	493	0	493
5	niggerd597QYedtvjQDVHZTCCGyJrwHNm2i49dkm5zS	2492.898	1948	364	1584
6	jECNQy2tSeA9pZpq54eVE7WWEGSeZHpeJ1sj2RsxoR1	2441.683	101	1	100
7	5JewENBbfKu23TLEhfXxzL4VRHwJvcLf9BCPHAuB5Rmh	2247.917	568	0	568
8	Ho7pNj4ABqrVzdsN34aVPyHQ27eGbWMQHhnDp6QTFHW5	2002.581	61	35	26
9	j1oAbxxiDUWvoHxEDhWE7THLjEkDQW2cSHYn2vttxTF	1875.038	5111	1733	3378
10	Dsi8ntQziuCPt16TStjG4tgviracSryHsRcH72zbwRgu	1835.249	70672	35030	35642

Best wallet: GsbjKVpmusptbt5RwwQ6z7P4cEVhqXbhRMHPwQ4hfRp4
Expected profit: $603,531.00 (200 $/SOL)



Causal analysis

Top traders affect the graduation probability

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Conditional grad. prob.

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4	CeAjiFBzgNb2oBM2v3nG8u8QnmLhtS1SiRJwqVPaSwqK	2512.679	493	0	493
5	niggerd597QYedtvjQDVHZTCCGyJrwHNm2i49dkm5zS	2492.898	1948	364	1584
6	jECNQy2tSeA9pZpq54eVE7WWEGSeZHpeJ1sj2RsxoR1	2441.683	101	1	100
7	5JewENBbfKu23TLEhfXxzL4VRHwJvcLf9BCPHAuB5Rmh	2247.917	568	0	568
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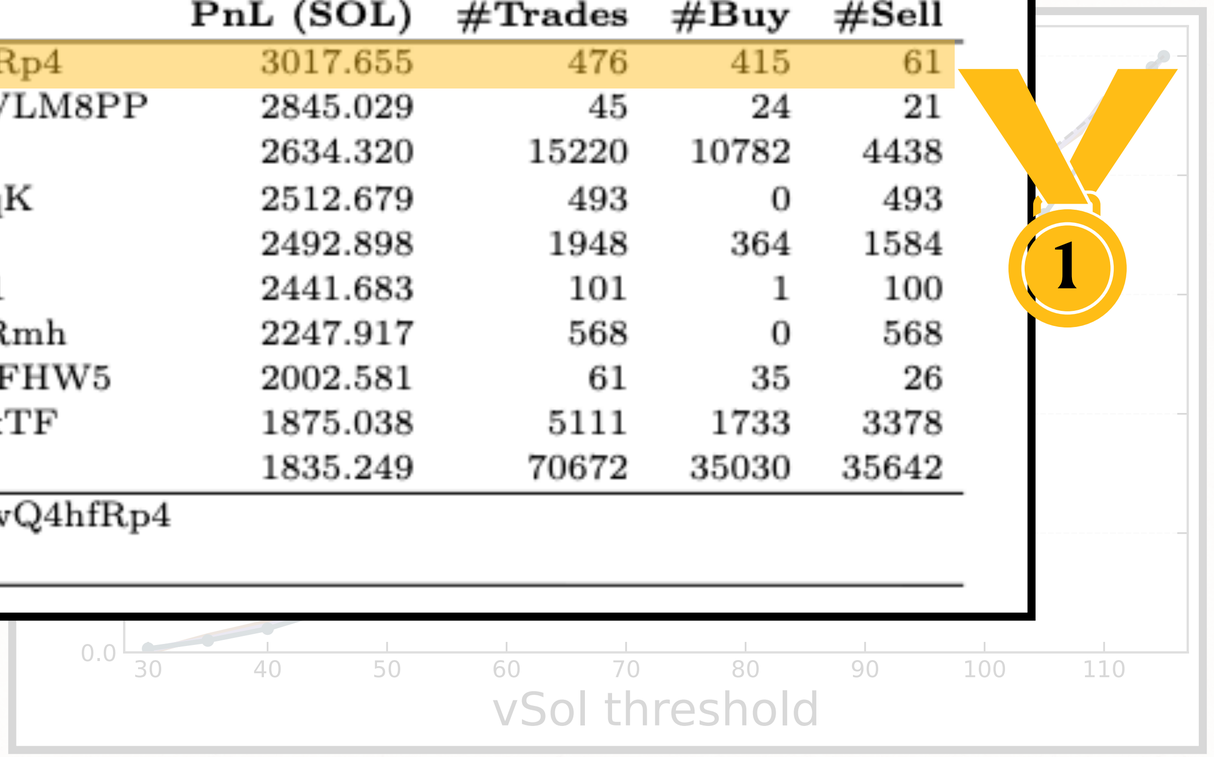


[1] *GM, Naviglio, Tarantelli, Lillo (In preparation)*

Conditional grad. prob.

4 Creators

The distribution of creator activity is extremely skewed

★ 74% of creators deploy only a single coin

About the 0.19% of the creators deployed 26.7% of all tokens

The more the better?

*[1] **GM**, Naviglio, Tarantelli, Lillo (In preparation)*

Conditional grad. prob.

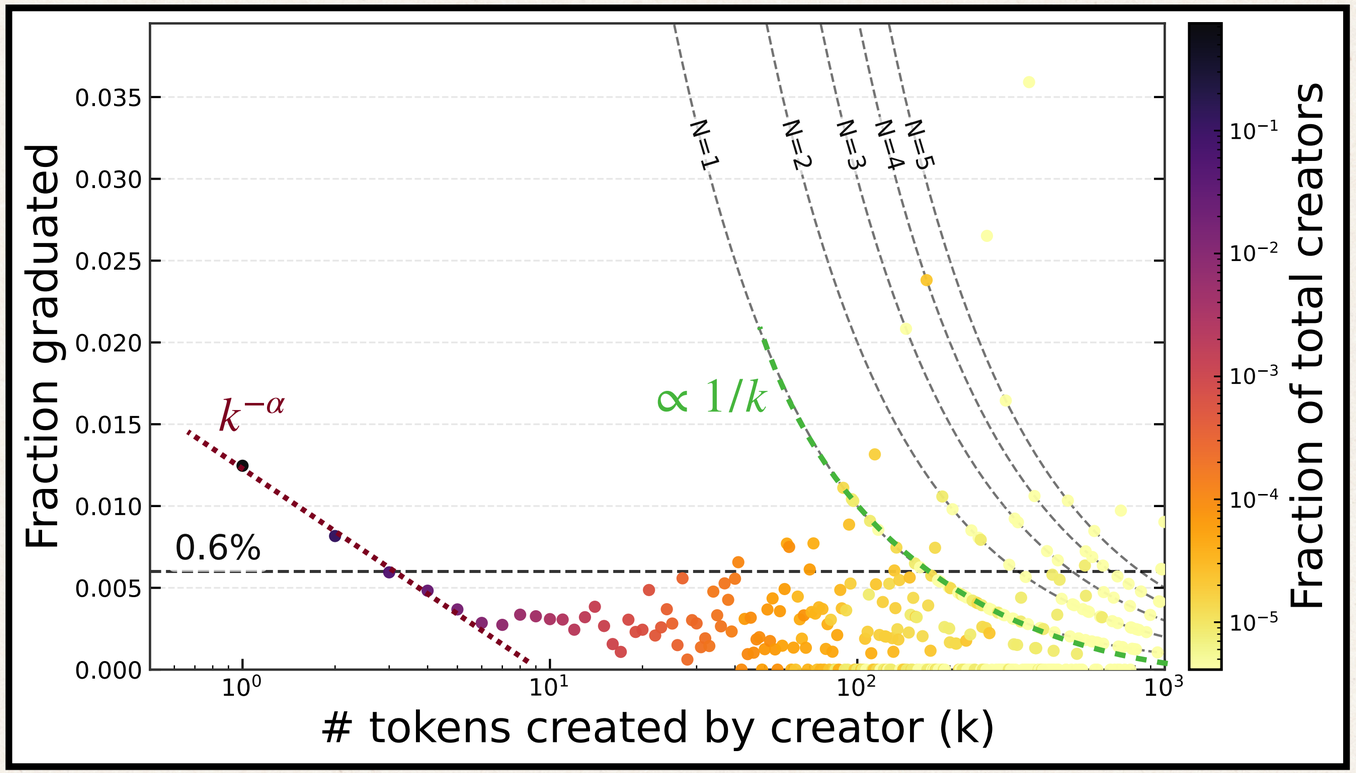
4 Creators

The distribution of creator activity is extremely skewed

★ 74% of creators deploy only a single coin

About the 0.19% of the creators deployed 26.7% of all tokens

The more the better? **NO!**



⇒We found that the probability of graduating saturates with the number of coins created

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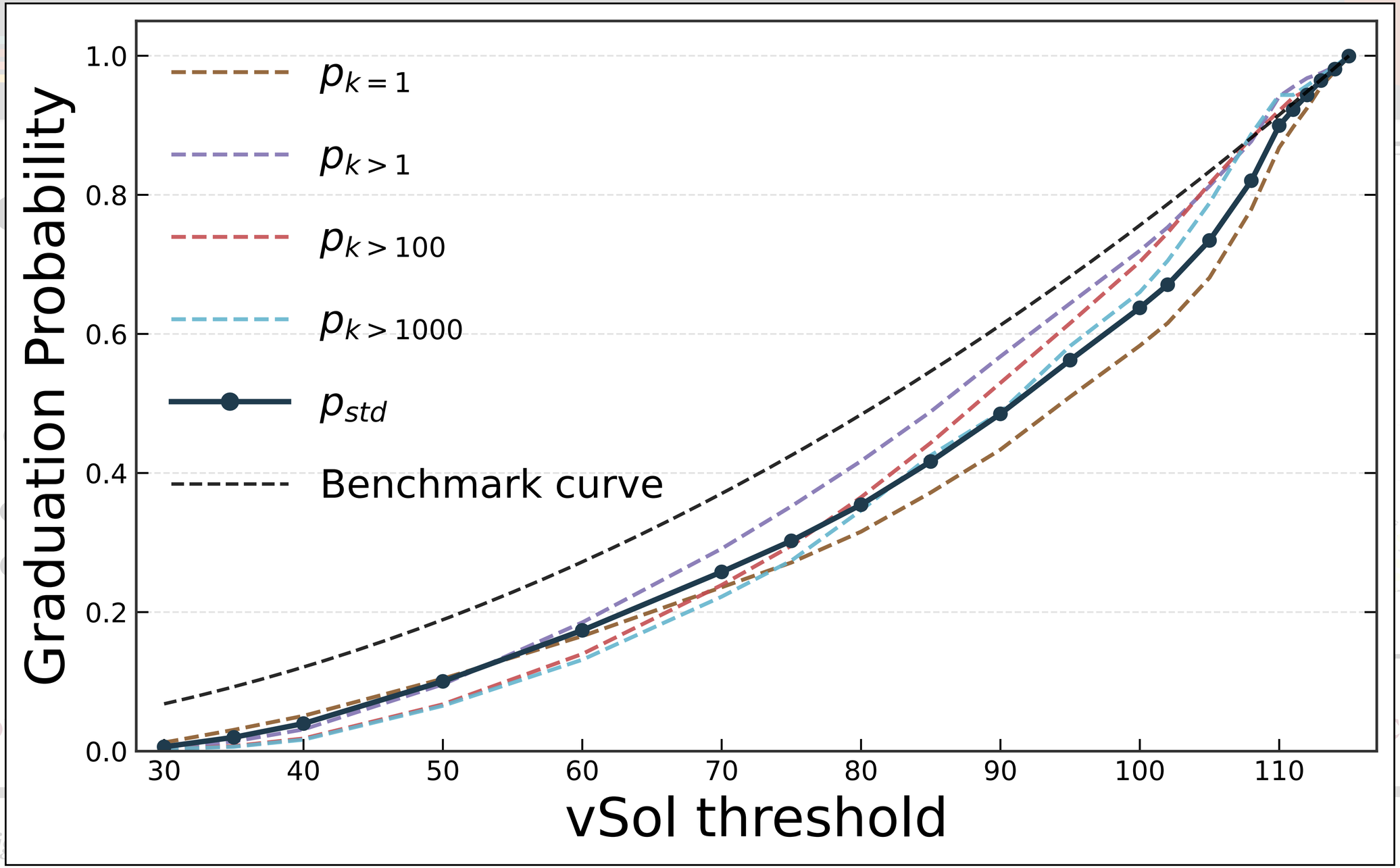

Graduation Probability
1.0
0.8
0.6
0.4
0.2
0.0
$p_{k=1}$
$p_{k>1}$
$p_{k>100}$
$p_{k>1000}$
p_{std}
Benchmark curve
30
40
50
60
70
80
90
100
110
vSol threshold

Conditional grad. prob.

4 Creators

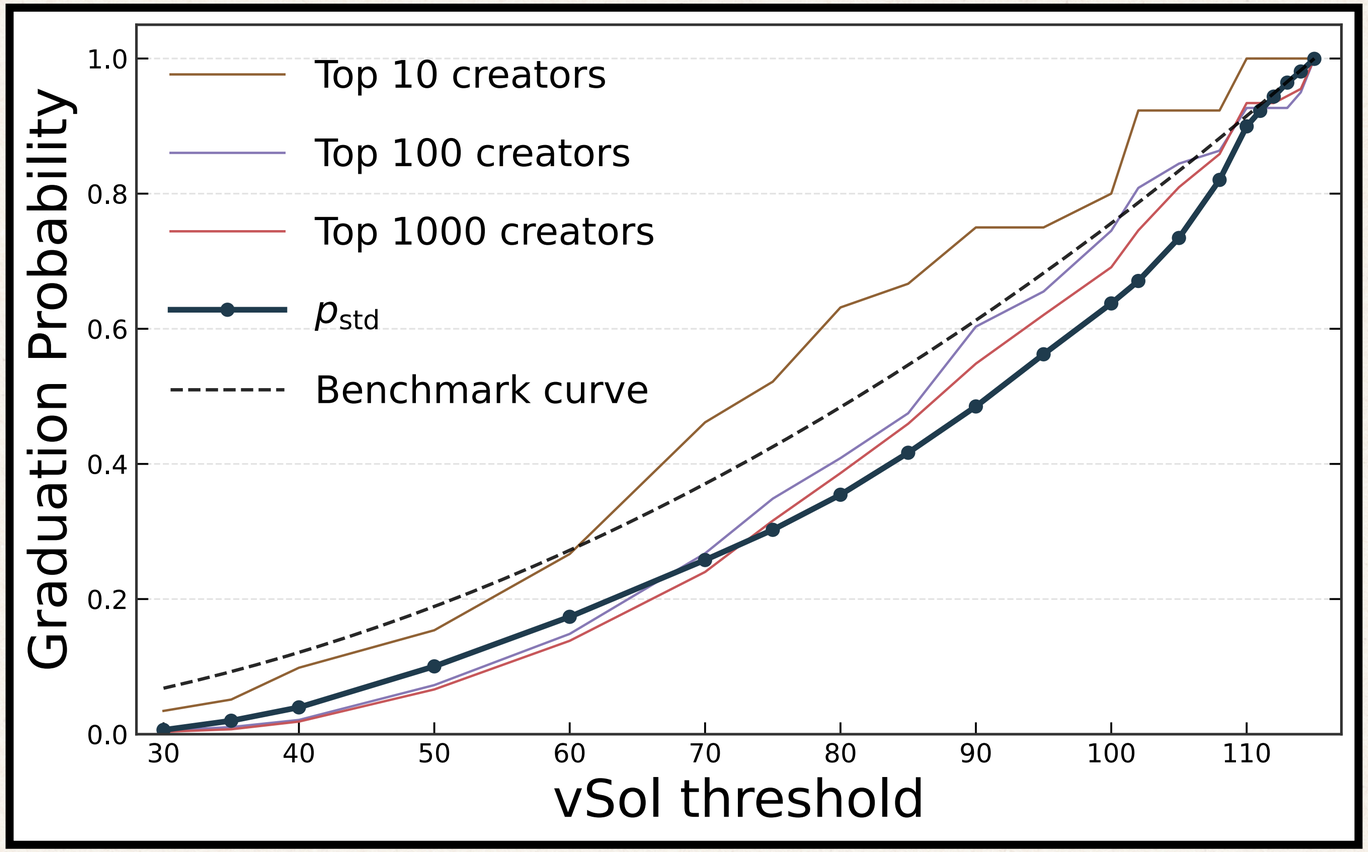
Causal analysis (2+2 weeks)

Top creator:

$$N^{\text{grad}}_{\text{created}} / N_{\text{created}} > 0.1\,\%\,, N_{\text{created}} > 50$$

Top 10 creators affects graduation

But statistics starts to be a problem!



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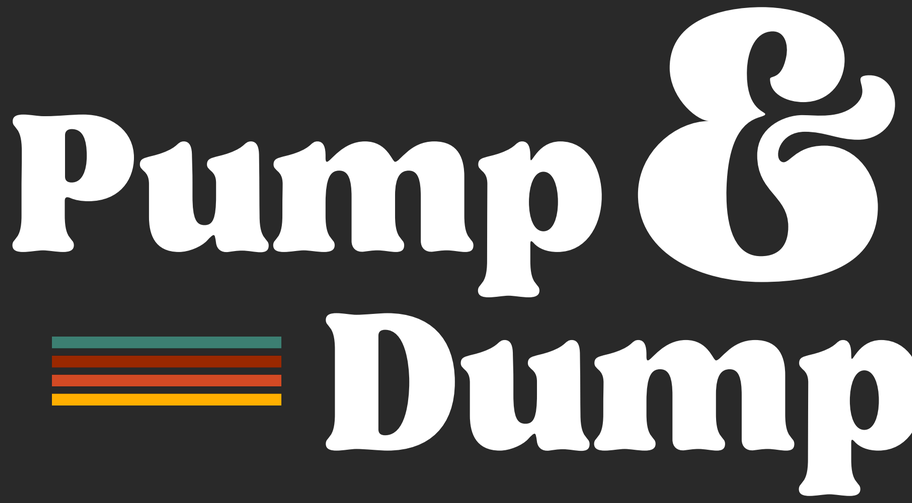
Pump &
Dump

Pumps and dumps

Shewhart-type rule for dump detection

$$r_{i,t} \equiv \log \frac{p_{i,t}}{p_{i,t-1}}$$

We define a statistically stable window of at least 100 trades

$$m_i \equiv \text{median}(r_{i,t}), \quad \text{MAD}_i \equiv \text{median}(|r_{i,t} - m_i|)$$

$$\sigma_{\text{MAD},i} \equiv \frac{1}{0.67449}\text{MAD}_i$$

$$\tau_i^D \equiv \inf\{t : r_{i,t} < -k\sigma_{\text{MAD},i}\}, \quad k = 4$$

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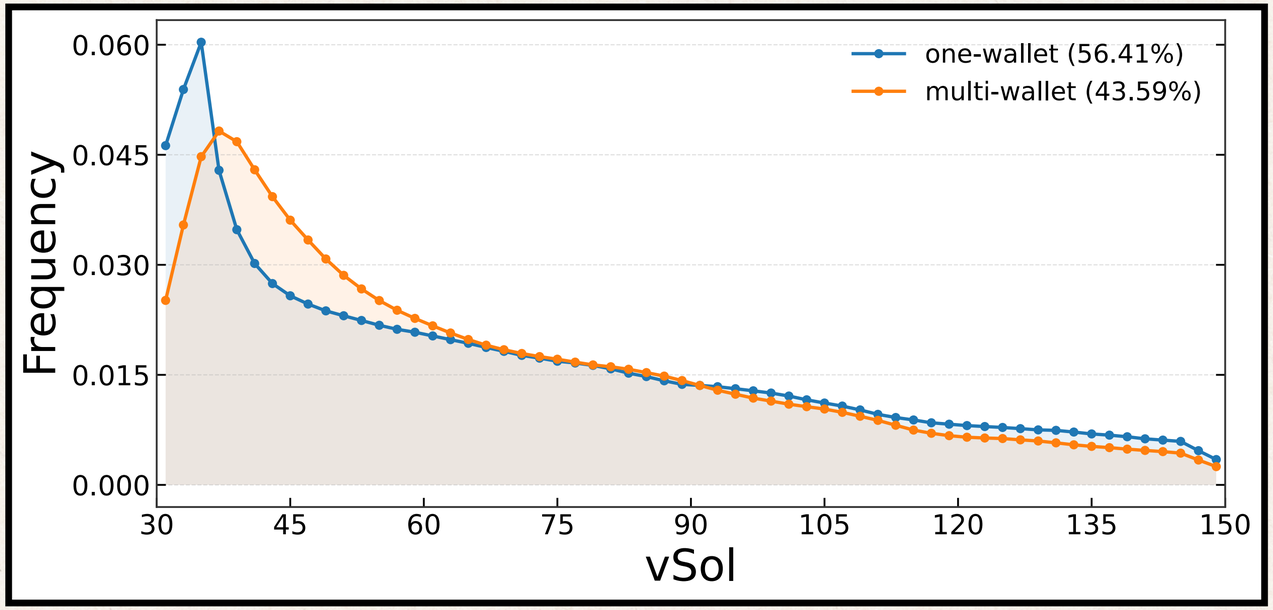
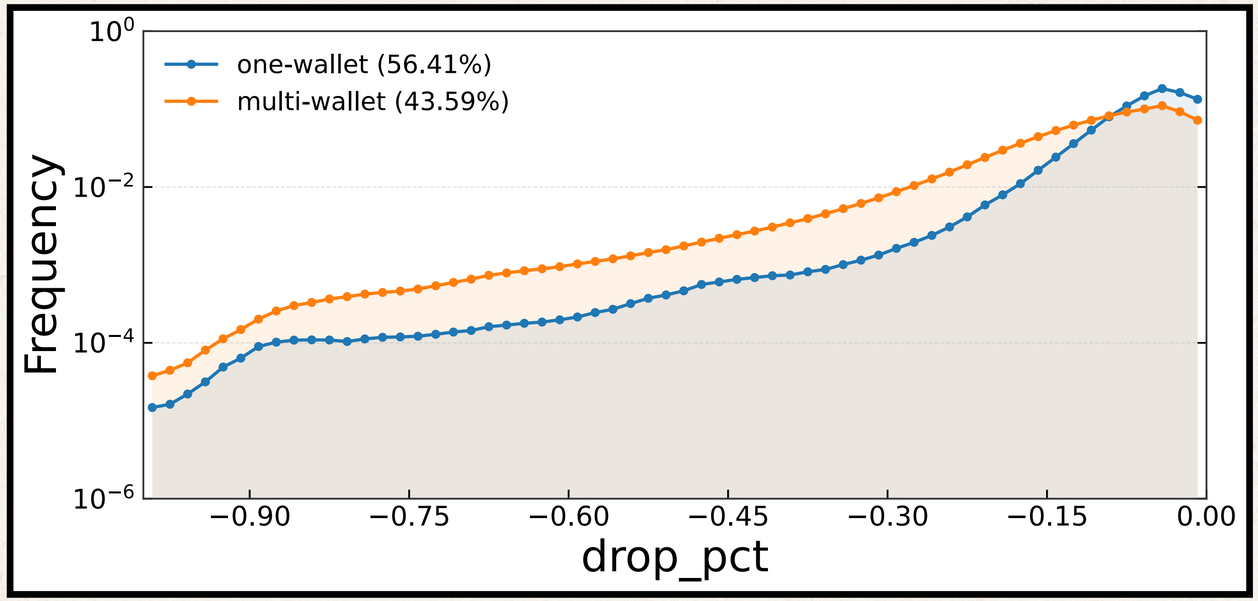
Pumps and dumps

Most of the P&D occur early
It's easier to go out of σ_{MAD}



Most likely big dumps occurs
with multi-wallet



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Pumps and dumps

Dumps affects more than 25% of the tokens

Single dump event per wallet

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Future directions {

Different wallets?

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Future directions

- Different wallets?
- Are those the token creators?

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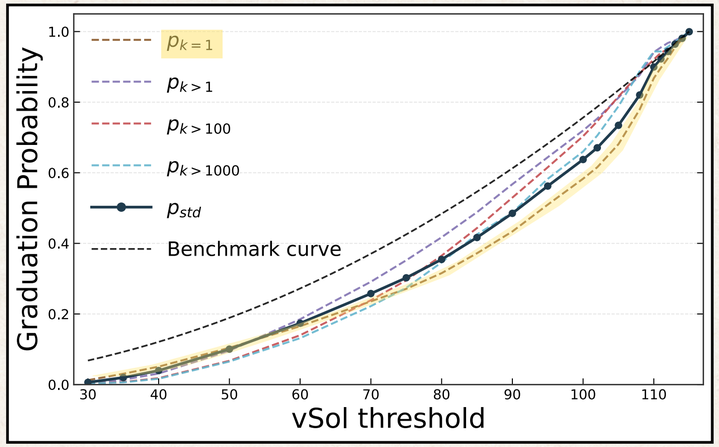
Pumps and dumps

Dumps affects more than 25% of the tokens

Single dump event per wallet

Future directions

- Different wallets?
- Are those the token creators?
- Is it linked to the low $p_{k=1}$?



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Take Home message

- **Pump.fun:** is the clearest environment for success predictions
- No honeypots, same initial conditions, **intrinsic** success definition
- Different agents may affect the graduation probability
  1. Low bot activity
  2. Few trades, but enough to interact with the market
  3. Presence of top traders
  4. Token creators must have "*experience*" ($k > 1$)
  5. Token creators must be smart!

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“Can we predict the success of new crypto assets?”

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Some guidances are available!

“Can we predict the success of new crypto assets?”

Some guidances are available!

NO CLEAR ANSWER YET⇒ NO $1M 🥲

thank you

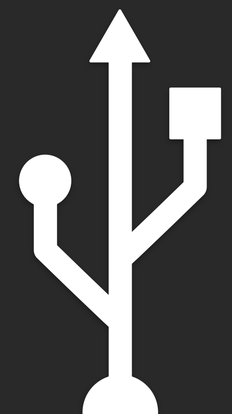
it was a pleasure!

Giulio Marino

Università di Pisa and INFN-Pisa

giulio.marino@phd.unipi.it

Backup Slides



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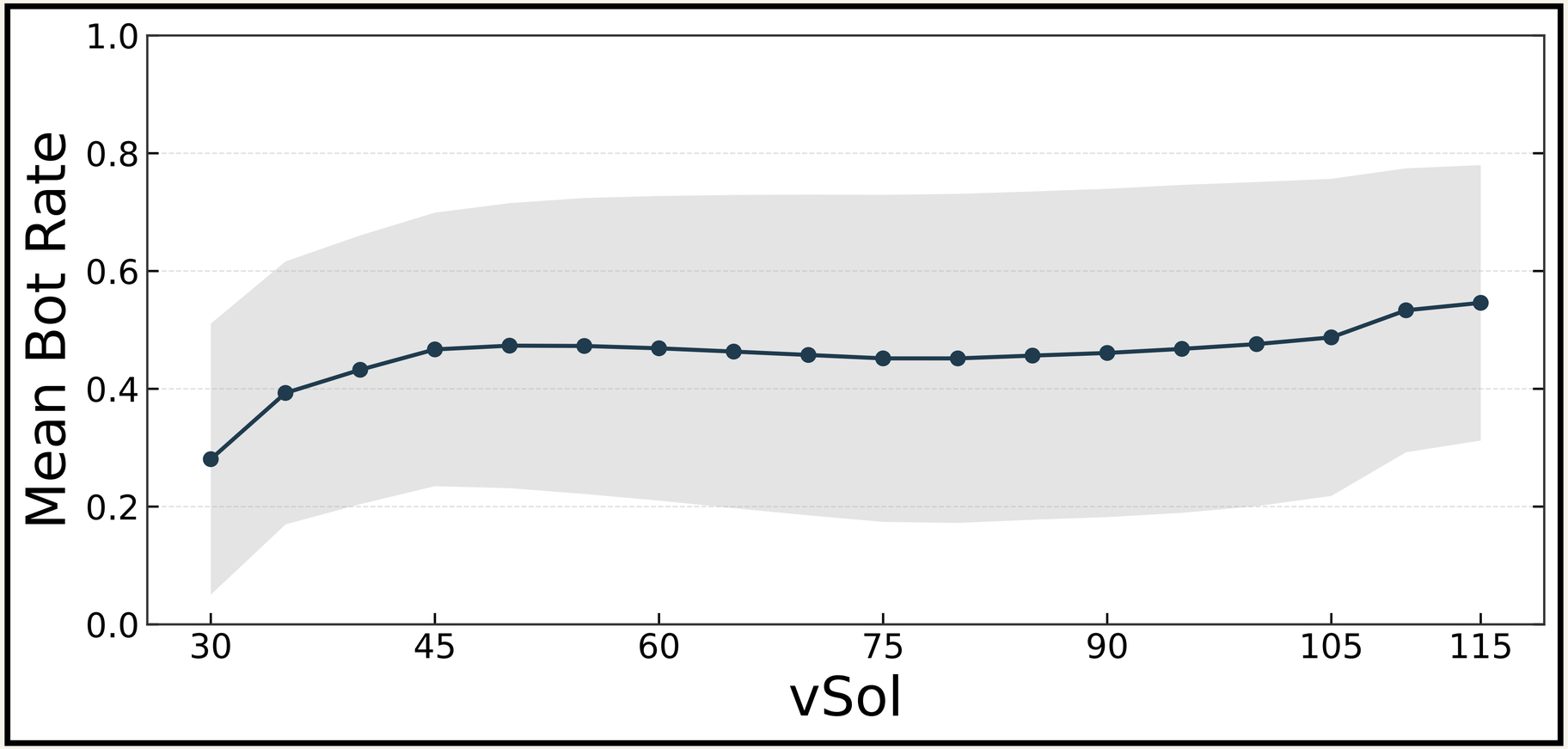
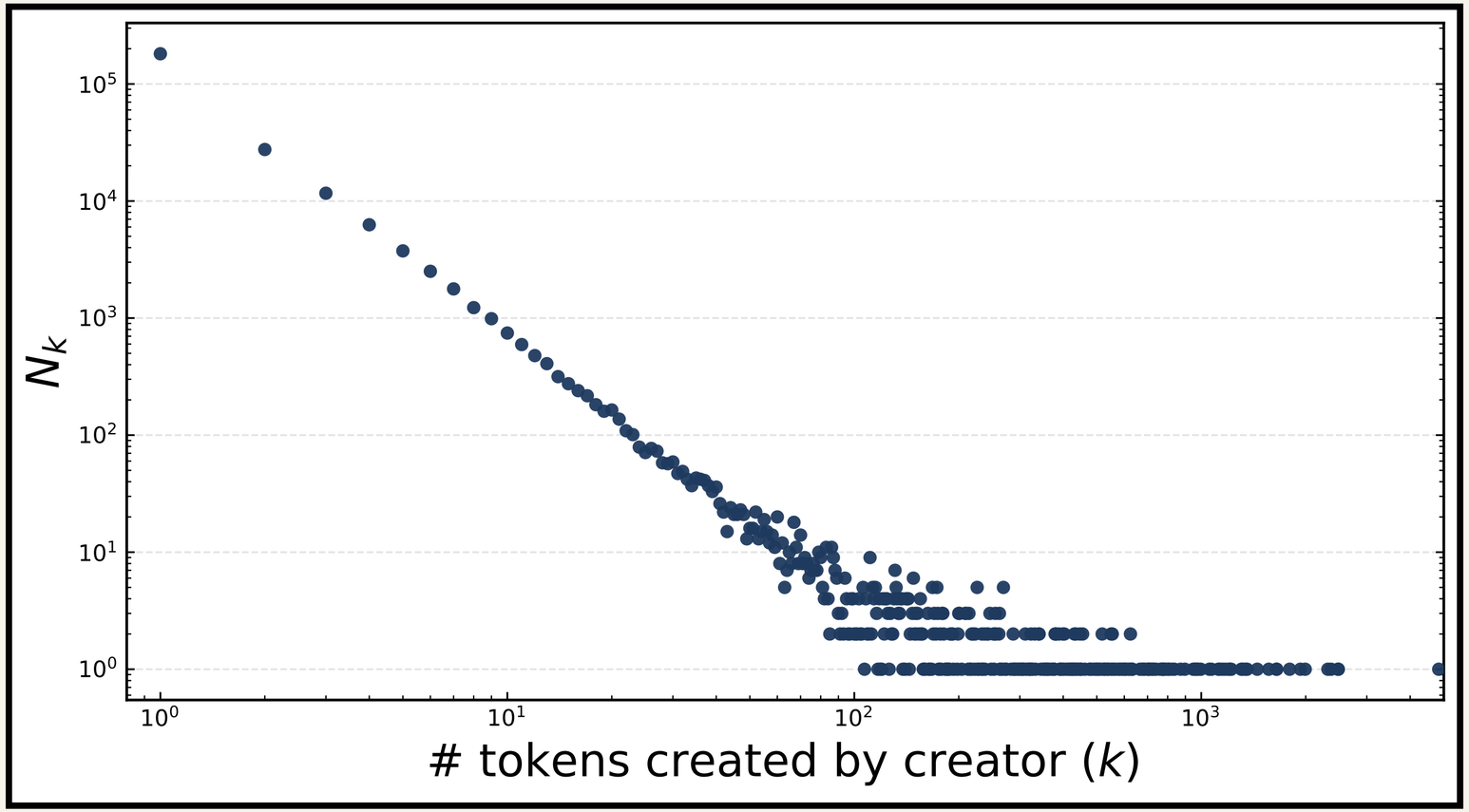


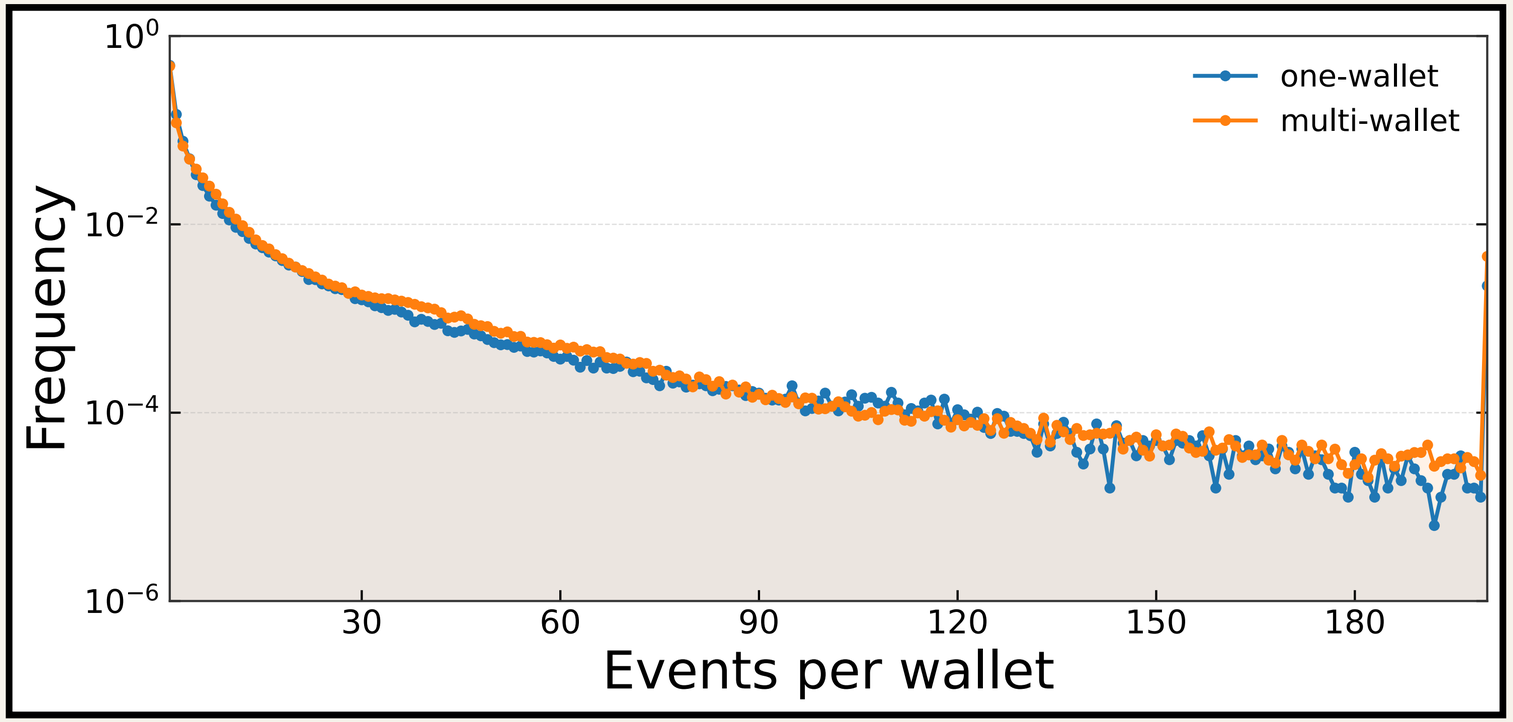
*[1] **GM**, Naviglio, Tarantelli, Lillo (In preparation)*

Token creators



*[1] **GM**, Naviglio, Tarantelli, Lillo (In preparation)*

Backup slides



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