

Can we fix MEV?

Protocol MEV Capture

Jonah Burian

Blockchain Capital

X: @_JonahB_

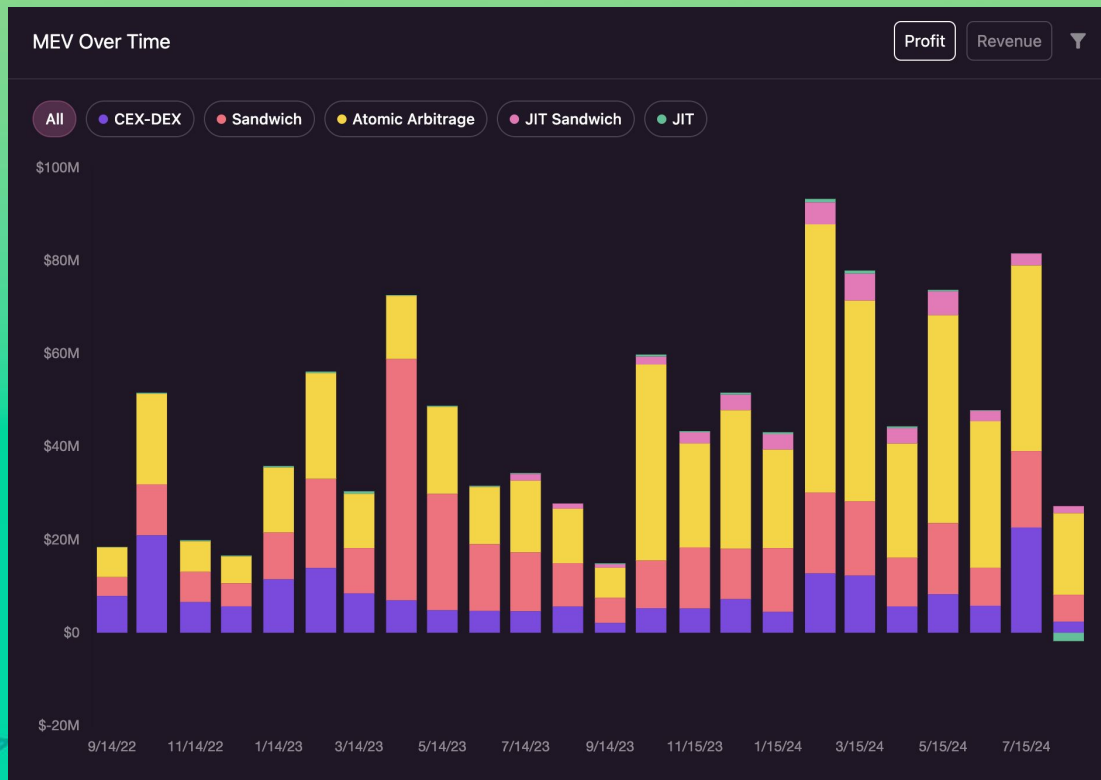




MEV is a problem...

Allocation Problem

Proposer accrue MEV not the protocol, apps.

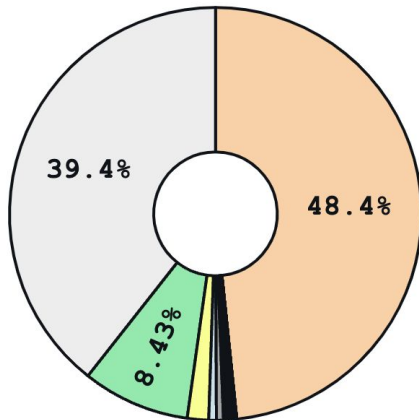


Centralization Problem

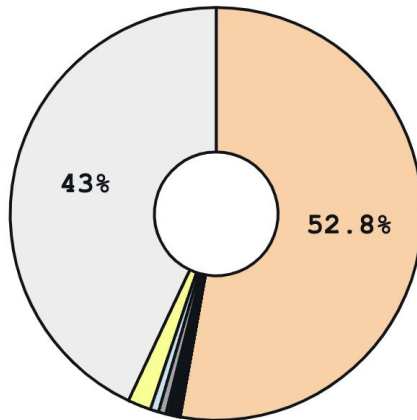
There is a builder oligopoly

MEV-Boost **builder** Market (last 14 days)

Total block market

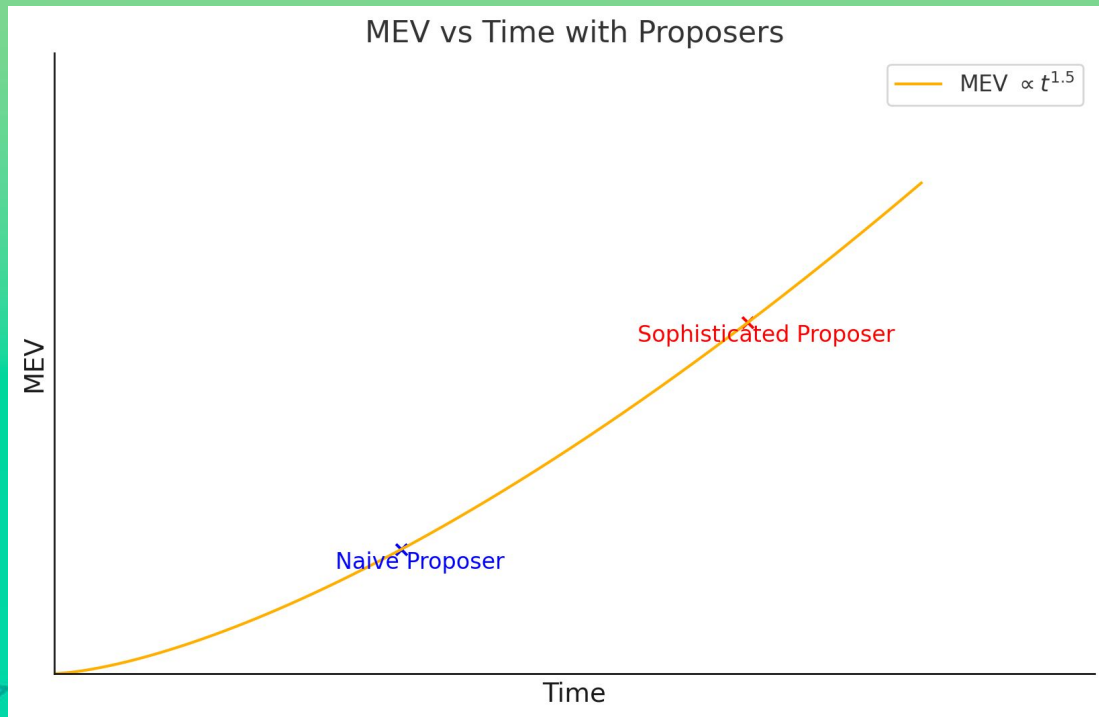


MEV-Boost block market



- beaverbuild.org
- Titan Builder
- Vanilla Builders
- rsync-builder.x
- Flashbots
- Flashbots Impos
- Flashbots SGX
- Builder+ www.bt
- jetbldr.xyz
- Bob the builder
- BloXroute
- boba-builder.co

There is an incentive to colocate because of timing games





How do we solve this?



**First let's understand
the source of MEV**



MEV originates from the
proposer monopoly on

**including
&
ordering**

transaction is a slot.





Ok... so how do we solve MEV?

Two schools of thought



```
graph TD; A[Two schools of thought] --> B[MEV is Intrinsic]; A --> C[MEV is Extrinsic];
```

MEV is Intrinsic

MEV is Extrinsic

Two schools of thought



```
graph TD; A[Two schools of thought] --> B[MEV is Intrinsic]; A --> C[MEV is Extrinsic]; B -- solution --> D[Sell the Monopoly]
```

MEV is Intrinsic



Sell the
Monopoly

MEV is Extrinsic

Two schools of thought



```
graph TD; A[Two schools of thought] --> B[MEV is Intrinsic]; A --> C[MEV is Extrinsic]; B -- "solution" --> D[Sell the Monopoly]; C -- "solution" --> E[Break the Monopoly]
```

MEV is Intrinsic



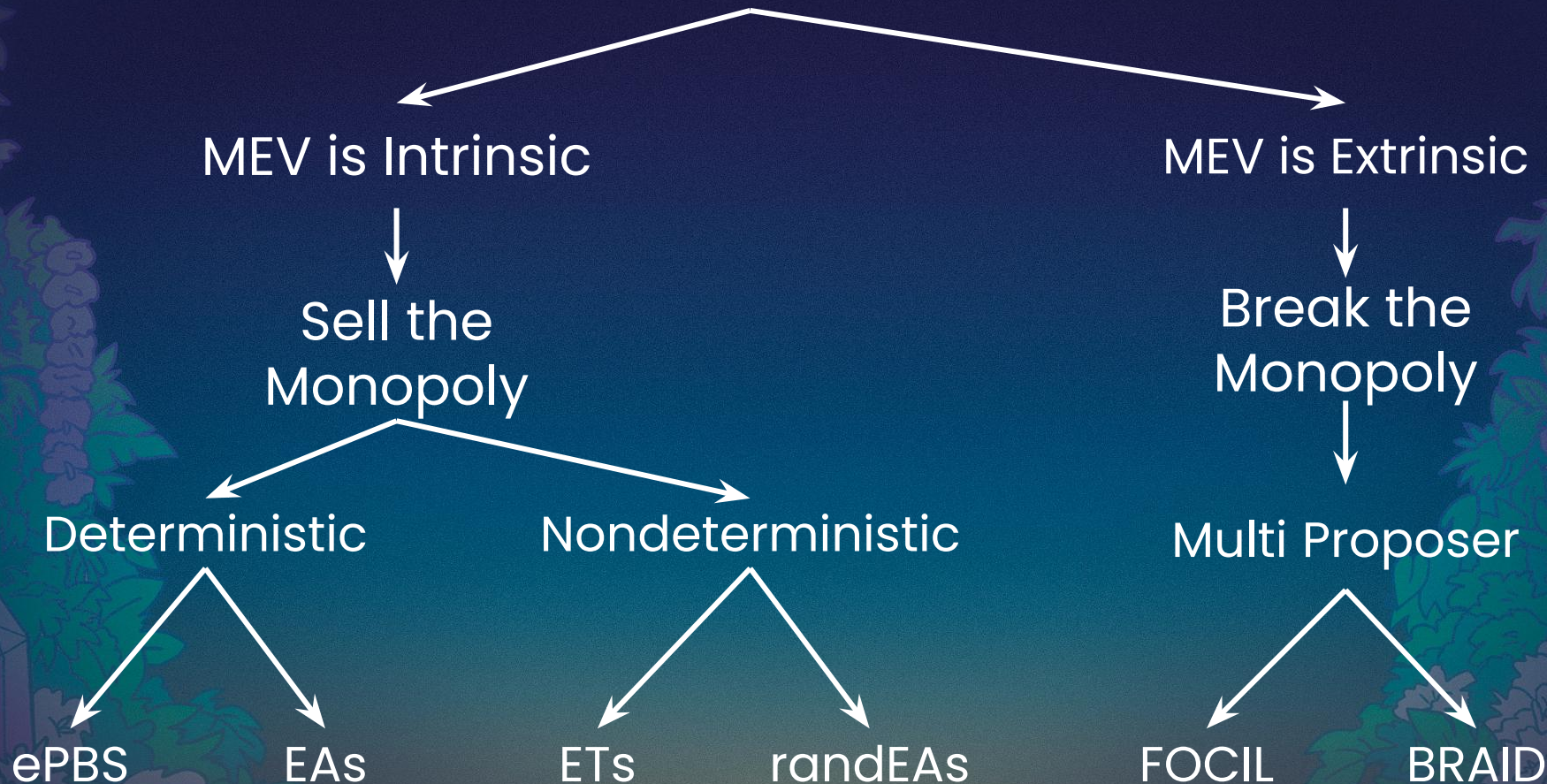
Sell the
Monopoly

MEV is Extrinsic



Break the
Monopoly

Two schools of thought



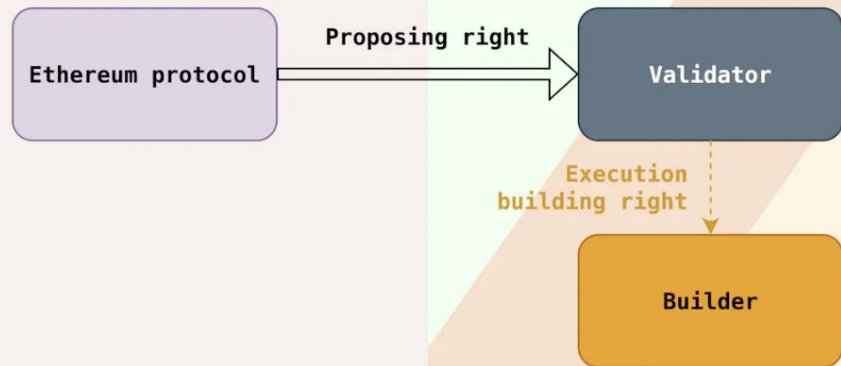
The slide features a vertical gradient background transitioning from a light yellow-orange at the top to a deep purple at the bottom. On the left and right sides, there are decorative borders of stylized, colorful flowers and foliage in shades of pink, blue, and green. In the bottom-left corner, a small, stylized pink and white geometric structure, resembling a tent or a small building, is partially visible.

One quick pitstop...

Today's MEV Pipeline

We sell the monopoly

MEV-Boost: Validators call upon builders



1. Combined beacon-exec proposing + delivery slot

⌚ **Timing games**
Beacon block ☒

Validator commits off-chain to builder block.

Two schools of thought

```
graph TD; A[Two schools of thought] --> B[MEV is Intrinsic]; B --> C[Sell the Monopoly]; C --> D[Deterministic]
```

MEV is Intrinsic

Sell the
Monopoly

Deterministic

Two schools of thought

MEV is Intrinsic



Sell the
Monopoly



Deterministic



ePBS

Two schools of thought

MEV is Intrinsic



Sell the
Monopoly



Deterministic



ePBS

EAs

Centralization in Attester–Proposer Separation

Mallesh Pai, Max Resnick

We show that Execution Tickets and Execution Auctions dramatically increase centralization in the market for block proposals, even without multi-block MEV concerns. Previous analyses have insufficiently or incorrectly modeled the interaction between ahead-of-time auctions and just-in-time (JIT) auctions. We study a model where bidders compete in an execution auction ahead of time, and then the winner holds a JIT auction to resell the proposal rights when the slot arrives. During the execution auction, bidders only know the distribution of their valuations. Bidders then draw values from their distributions and compete in the JIT auction. We show that a bidder who wins the execution auction is substantially advantaged in the JIT auction since they can set a reserve price higher than their own realized value for the slot to increase their revenue. As a result, there is a strong centralizing force in the execution auction, which allows the ex-ante strongest bidder to win the execution auction every time, and similarly gives them the strongest incentive to buy up all the tickets. Similar results trivially apply if the resale market is imperfect, since that only reinforces the advantages of the ex-ante strong buyer. To reiterate, these results do not require the bidders to employ multi-block MEV strategies, although if they did, it would likely amplify the centralizing effects.

Subjects: **Theoretical Economics (econ.TH)**; Computer Science and Game Theory (cs.GT)

Cite as: [arXiv:2408.03116](https://arxiv.org/abs/2408.03116) [econ.TH]

(or [arXiv:2408.03116v1](https://arxiv.org/abs/2408.03116v1) [econ.TH] for this version)

<https://doi.org/10.48550/arXiv.2408.03116> 

MMEV Problem

Two schools of thought

MEV is Intrinsic



Sell the
Monopoly



Deterministic

Nondeterministic



ePBS

EAs

Two schools of thought

MEV is Intrinsic

Sell the
Monopoly

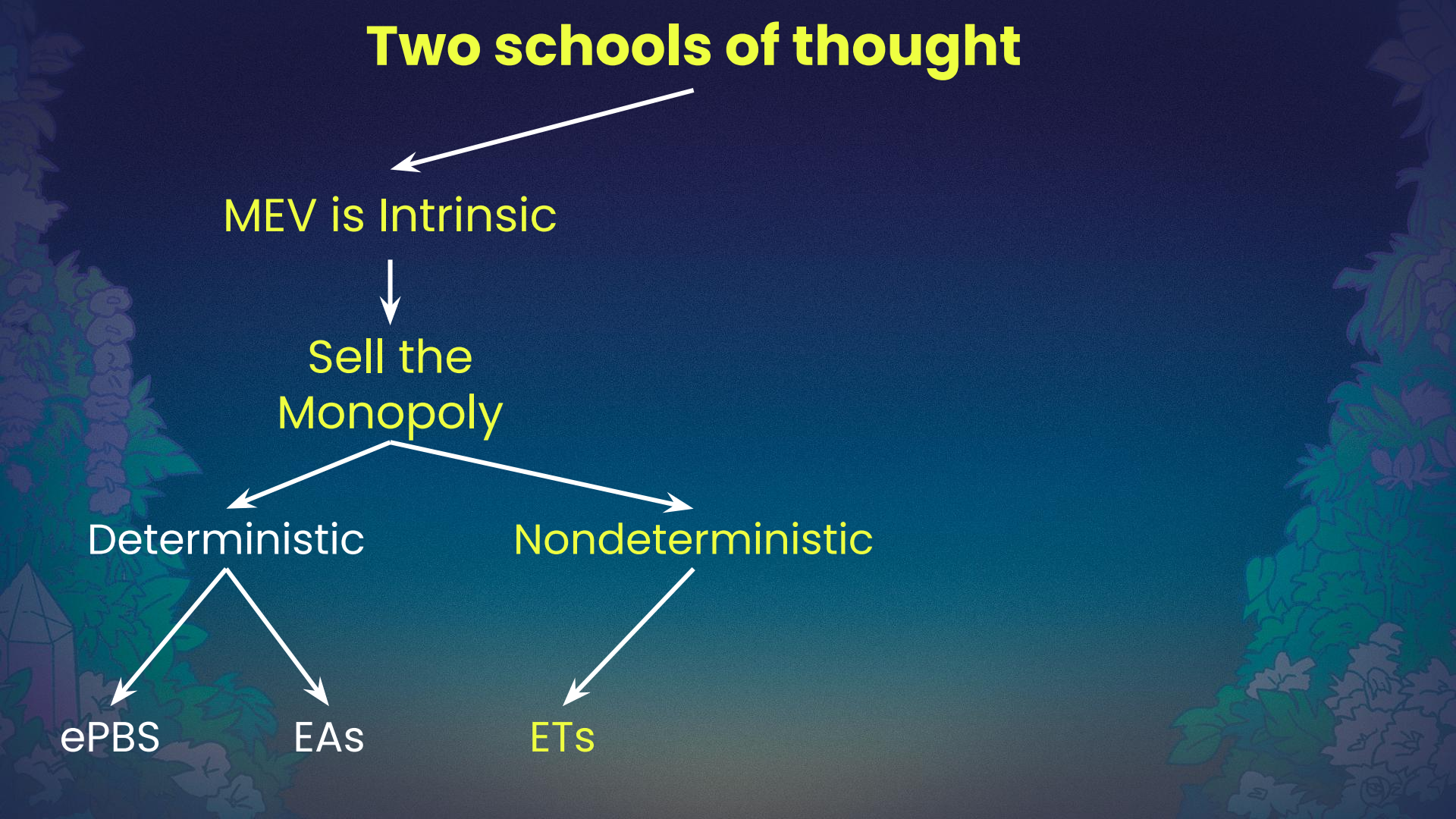
Deterministic

Nondeterministic

ePBS

EAs

ETs



MEV Capture and Decentralization in Execution Tickets

Jonah Burian, Davide Crapis, Fahad Saleh

We provide an economic model of Execution Tickets and use it to study the ability of the Ethereum protocol to capture MEV from block construction. We demonstrate that Execution Tickets extract all MEV when all buyers are homogeneous, risk neutral and face no capital costs. We also show that MEV capture decreases with risk aversion and capital costs. Moreover, when buyers are heterogeneous, MEV capture can be especially low and a single dominant buyer can extract much of the MEV. This adverse effect can be partially mitigated by the presence of a Proposer Builder Separation (PBS) mechanism, which gives ET buyers access to a market of specialized builders, but in practice centralization vectors still persist. With PBS, ETs are concentrated among those with the highest ex-ante MEV extraction ability and lowest cost of capital. We show how it is possible that large investors that are not builders but have substantial advantage in capital cost can come to dominate the ET market.

Comments: 15 pages, 1 figure. This paper was co-authored by researchers from Blockchain Capital, Ethereum Foundation (Robust Incentives Group), and the University of Florida

Subjects: **Computer Science and Game Theory (cs.GT)**; Trading and Market Microstructure (q-fin.TR)

Cite as: [arXiv:2408.11255](https://arxiv.org/abs/2408.11255) [cs.GT]

(or [arXiv:2408.11255v1](https://arxiv.org/abs/2408.11255v1) [cs.GT] for this version)

<https://doi.org/10.48550/arXiv.2408.11255> 

Regarding MEV Capture:

- **Risk Aversion, Capital Costs & Builder Heterogeneity** among builders **undermine the success** of **ETs internalizing all MEV**
- The **more competitive** the playing field, the **more MEV can be internalized**.

Regarding Centralization:

- **ET ownership is centralized** among buyers who balance low capital costs with high MEV extraction abilities.
- Even with ticket ownership concentration, the **block-building rights are likely sold ex-post via PBS**, and thus the **tickets** are likely **exercised by** builders with the **best ex-post MEV extraction ability** in a slot.

Model Extensions

Inelastic vs. Elastic Supply: Why Proof of Stake Could Be Less Centralizing Than Execution Tickets

■ Research execution-tickets



Christoph mate 🤖

5 ✎ 10d

TL;DR: *Oligopoly is better than Monopoly. Variable supply of execution rights can help achieving oligopoly in the proposer market.*

Thanks to @Quintus 🤖 for extensive feedback and to @jonahb for comments

[Execution tickets](#) ³ have been proposed as an alternative mechanism to Proof-of-Stake (PoS) to allocate proposer rights in Ethereum with the goal to separate [attestation from proposing](#) ³. As potential downsides of the execution tickets proposal, it has been argued that it could lead to [strong centralization in the proposer market](#) ⁶ and that this effect would be [exacerbated](#) ² if there is a secondary market for proposal rights, which would give performant builders a benefit from acquiring a substantial share of tickets.

Fixed v Variable Supply

Private Value

Conclusion, Further
Directions and Related
Work

📄 [Jump to end](#)

Two schools of thought

MEV is Intrinsic

Sell the
Monopoly

Deterministic

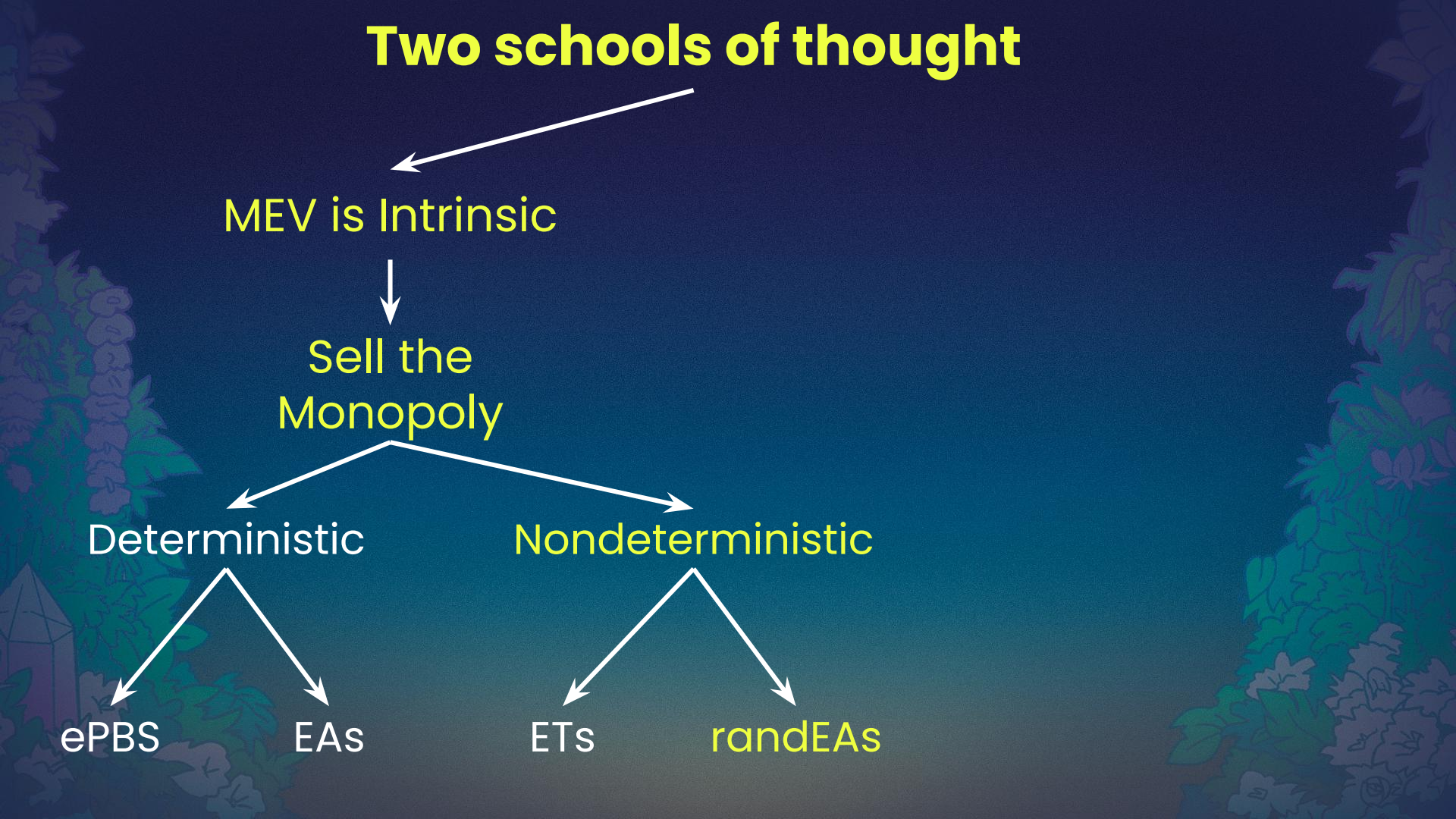
Nondeterministic

ePBS

EAs

ETs

randEAs



Two schools of thought

MEV is Intrinsic



Sell the
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MEV is Extrinsic

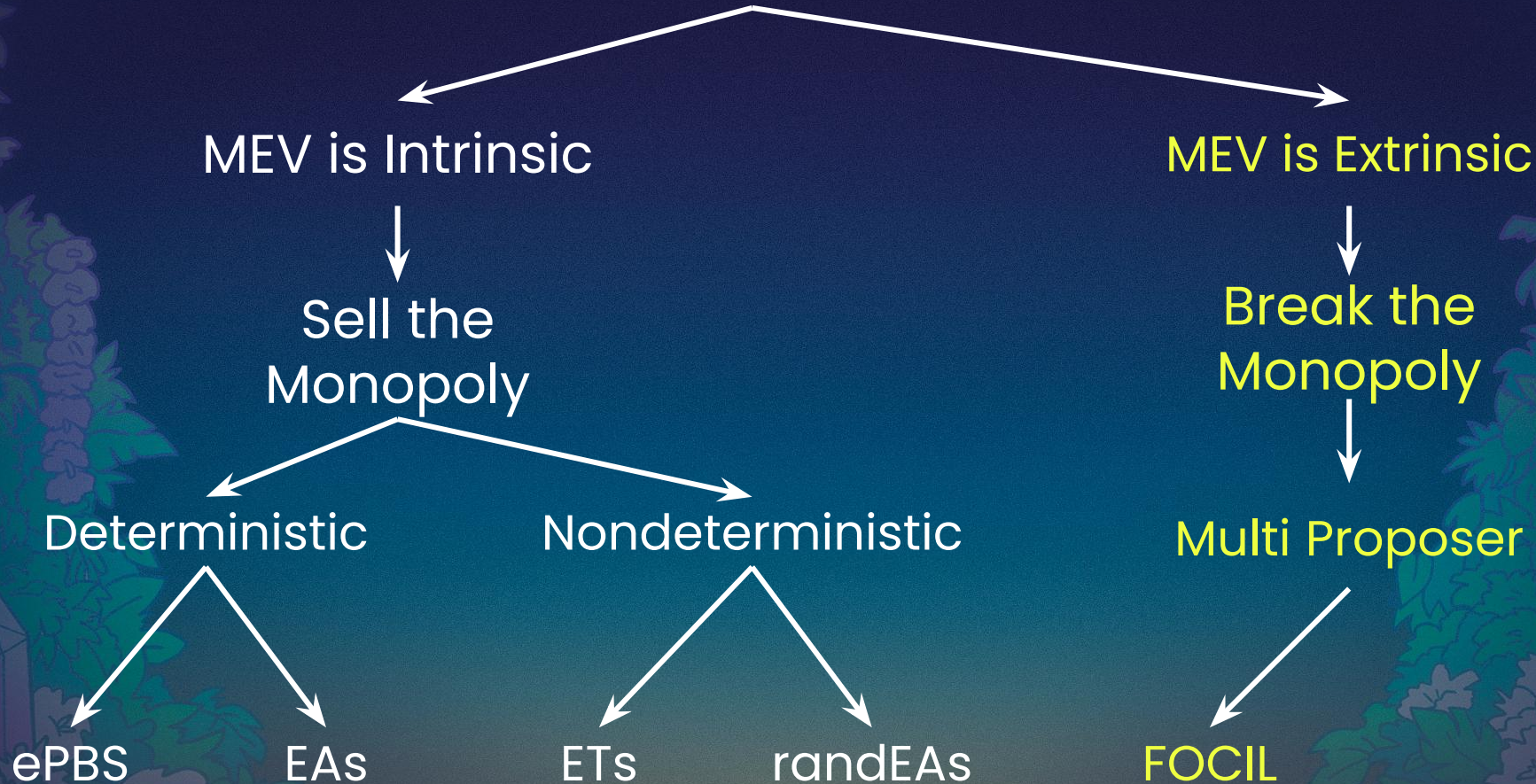


Break the
Monopoly



Multi Proposer

Two schools of thought



Two schools of thought

MEV is Intrinsic



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Monopoly

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MEV is Extrinsic



Break the
Monopoly



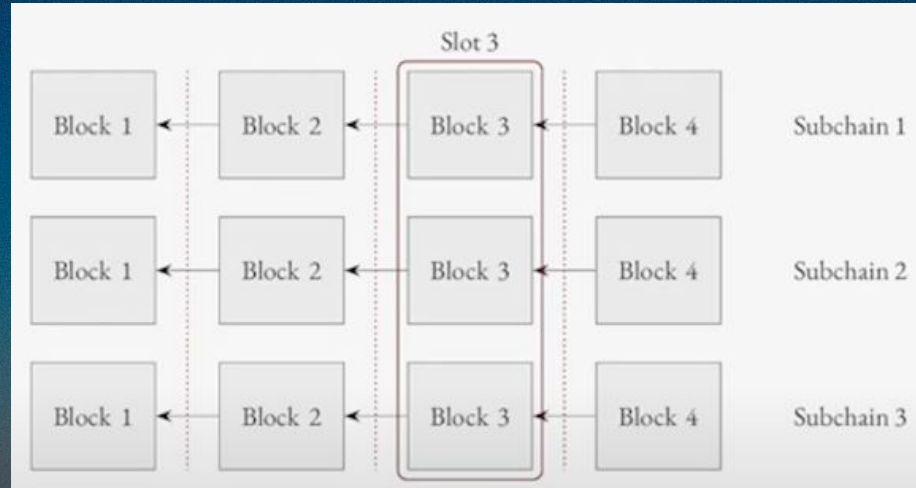
Multi Proposer

FOCIL

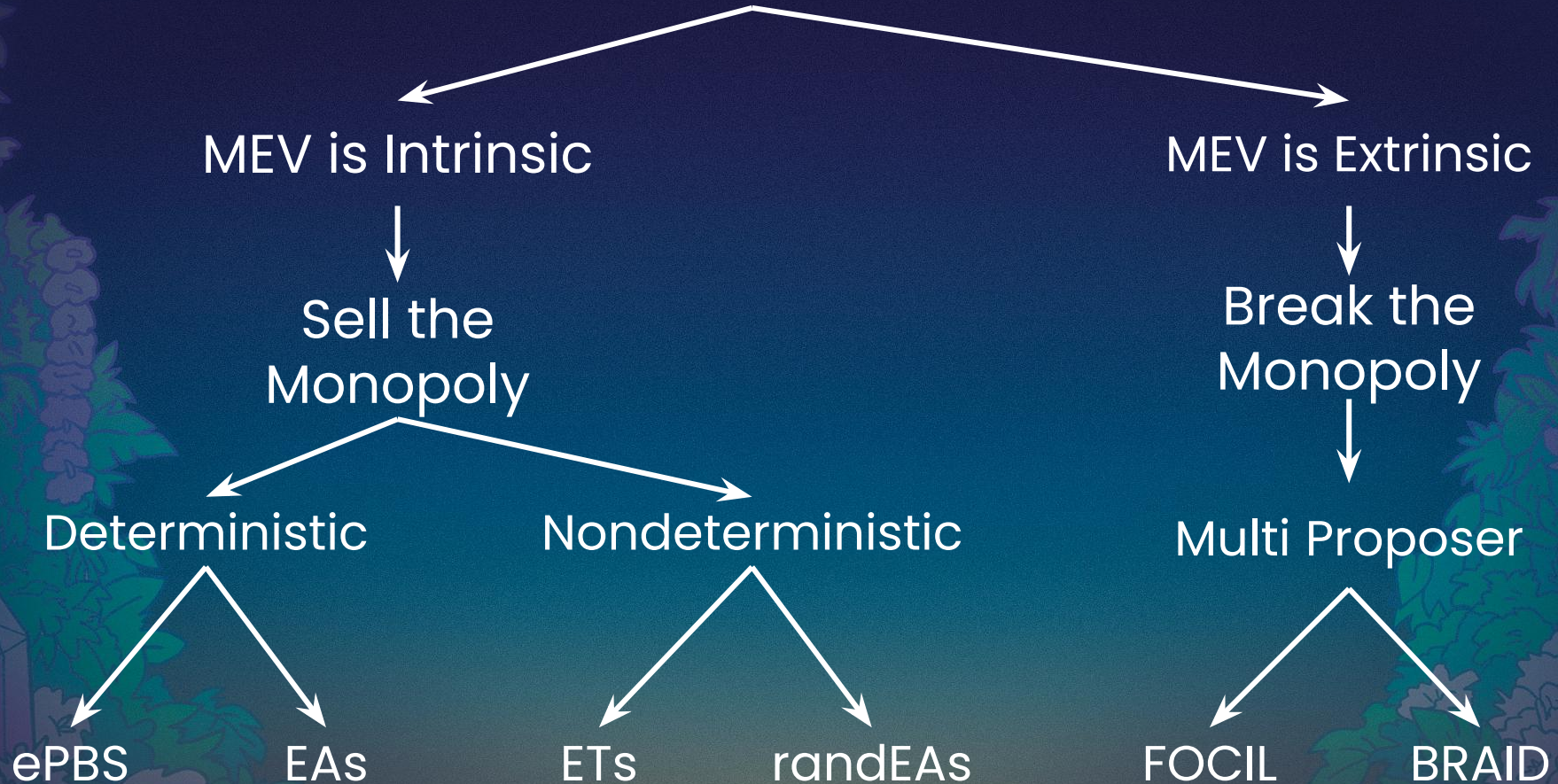
BRAID

Open Questions...

- Last-mover arbitrage aka simultaneous release problem
- Exclusive order flow: incentive to send transactions directly to one single proposer
- How do gas limits work?
- etc...



Two schools of thought



Questions?

Thank you!

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