

Prediction Markets

MGT 4074 Fintech & Crypto Tokens, Fall 2025

Joseph Hall

Georgia Institute of Technology

October 22, 2025

Welcome! Today is Wednesday 10/22/2025

The final project proposal deadline has been delayed to **tomorrow at noon**. Stay tuned for feedback and the presentation schedule, which will be released by Monday 10/27.

I will also clarify the **AI Policy for Final Projects**: yes you may use AI! You are responsible, however, for understanding every part of your final submission from the code to the presentation. If I ask you how or why you did something in a certain way, “I don’t know, that was AI” is **NOT** an acceptable answer.

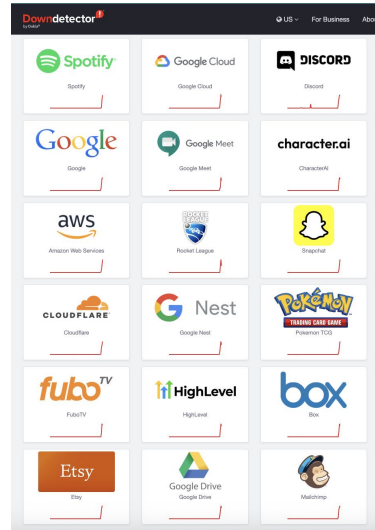
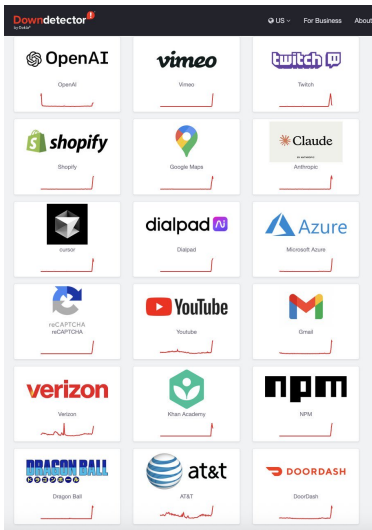
Roadmap

- 1 In the News
- 2 Prediction Platforms
- 3 Gambler's Math
- 4 Decentralized Prediction Markets

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AWS Outage Breaks the Internet



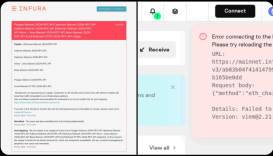
Impact of Cloud Service Outage on DeFi

Lefteris Karapetsas @LefterisJP · 6h
AWS is down and then the internet stops working.

But the blockchain, it never goes ... wait a minute. Scratch that.

This sector is a joke.

Everyone preaching decentralization and censorship resistance but in reality ... it's all 100% reliant on the cloud.



514 773 4.8K 320K

Lefteris Karapetsas @LefterisJP

Then you will say ... but Lefteris you can still run your own node, connect to it and do it all without relying on the cloud.

Good. Do you do this? Really? Come on be honest.

If your entire ecosystem is built on top of cloud services, this is what you teach new users, and 99.99% of your users are just using the cloud then ... I am sorry but you have not built a censorship resistant decentralized system.

You have built a joke.

4:57 AM · Oct 20, 2025 · 23.7K Views

Pix @PixOnChain · Oct 20

okay so

- > aws is down
- > half the I2s went with it

only one question we should have is:

who's building the decentralized aws?

760 216 2.1K 311K

palai kilon @KilonPalai

The real question isn't just "who's building decentralized AWS", but "who's building something people will actually USE instead of AWS". Decentralization can't just be a checkbox – it has to be better, cheaper, or more reliable than the centralized alternative. Otherwise we're just building ideological infrastructure nobody adopts

1:01 PM · Oct 20, 2025 · 1,307 Views

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Definition

In a **Prediction Market**, bets are traded on binary outcomes: \$1 if prediction comes true, \$0 if prediction does not.

There are two major market structures of prediction markets:

- In **Proprietary** markets, one entity (“the house”) lists odds unilaterally and takes the opposite side of every customer’s bet.
 - These are often called “sportsbooks”, “bookies”, “oddsmakers” or just “Vegas”.
 - The prices offered for complementary predictions add up to much more than \$1 - there is a “house edge” which is called a “vig” or “juice”
 - The house usually tries to match its book (sell equal quantities of yes and no) – “the house always wins”

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 - The house usually tries to match its book (sell equal quantities of yes and no) – “the house always wins”
- In **Peer to Peer** markets, opposite sides of the bet must match exactly and agree on a market price to create a bet.
 - Kalshi uses a P2P structure despite being a centralized platform; it takes a transparent fee instead of a house edge

Behavior in Prediction Markets

From [Matt Brown Econ](#):

- The average sports bettor is *highly overconfident*: They expect to break even (and enjoy the variance) but in fact lose 7.5 cents on the dollar:
- Overoptimism is worse among bettors who prefer **parlays**: compound bets that all of several (usually uncorrelated) events (“legs” of the parlay) will all occur successfully with no failures
- Summarizing bettors’ historical performance does nothing to correct their bias, but allowing them to set limits in advance reduces gambling by a modest amount

Worldwide, about 60% of gambling losses (aka gambling industry profits) come from gambling addicts [per the World Health Organization](#).

Popular Prediction Markets

Popular prediction markets include:

- **Kalshi**, a centralized and regulated for-profit all-purpose prediction market
- **Polymarket**, a decentralized and unregulated all-purpose prediction market
- **Predictit**, a centralized and regulated non-profit prediction market focused on political outcomes
 - I dabbled in Predictit in college, but it was impossible to make money after fees
- Several other exchanges, mostly sportsbooks (**ESPNBet**, **DraftKings**), have grown rapidly since the Supreme Court legalized sports gambling in 2018

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Economists love prediction markets for the same reason we love stock markets: they incentivize people to *gather and reveal information* that the rest of us get *for free*!

Polymarket Growth

Polymarket Monthly Volume

- Since Polymarket is on-chain, Dune can make an easy dashboard!
- Dune uses Structured Query Language (SQL), which you should learn if you haven't already (it's incredibly easy)
- [TPan on Substack](#)

Illegal Event Categories

A prediction is a type of derivative. Many derivative markets are *per se*¹ illegal!

¹Legal term: “Without determination by or involvement of extraneous factors; by its very nature.”

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 - A popular financial product was once the **Tontine**: a group pools funding, and each receives annuity payouts until they die. Payouts increase as one outlives their peers
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- **Motion Picture Box Office Receipts**: Swept up in 2008 Dodd-Frank ([story](#))
- **Onion Futures**, banned by Congress in 1958 in response to the Great Onion Corner of 1955 where one man came to own every onion in Chicago and was able to extort wholesalers

Prediction markets are not regulated by the SEC, but rather the **Commodities Futures Trading Commission (CFTC)**. Predictions (about things that aren't securities) are considered "Arrow Securities" by academics, but ironically are not considered "securities" by U.S. law! (who remembers the *Howey Test*?)

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CFTC Signals Support for Decentralized Markets

Innovation Exemptions and Decentralized Finance

Today's decentralized finance (DeFi) protocols enable direct peer-to-peer trading without the need for intermediaries. We reaffirm that both agencies are prepared to consider "innovation exemptions" to create safe harbors or exemptions that allow market participants to engage in peer-to-peer trading of spot, leveraged, margined, or other transactions in spot crypto assets, including derivatives such as perpetual contracts, over DeFi protocols. These safe harbors and exemptions would allow market participants to build commercially viable models while the agencies advance longer-term rulemaking.

The right to self-custody one's assets is a core American value. While market participants have paths under current law to trade spot crypto on federally regulated venues, the path remains open for peer-to-peer spot crypto trading as well. We encourage market participants to meet with our respective staffs as entrepreneurs onshore trading activity and innovate.

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Odds and Prices

Sports books list prices using **Moneyline Odds**:

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- **Minus odds** are prices above 50 cents: “-300” means bet \$300 to win \$100, which corresponds to a price of 75 cents
 - Use the formula $\frac{X}{100+X}$ to convert odds of $-X$ to a price

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The **Moneyline** is contrasted with the **Spread**, which is an equal-odds bet on the margin of victory. When two teams are unevenly matched, the “line” can be “drawn” in probability space (the “moneyline”) or in margin-of-victory space (the “spread”)³

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Example: ATL vs. MIA, Oct 26 2025

What is the implied probability that the Atlanta Falcons defeat the Miami Dolphins?


ESPN BET SPORTSBOOK
^

GAME ODDS

1:00 PM

	OPEN	SPREAD	TOTAL	ML
Miami Dolphins (1-6)	o45.5 -105	+7.5 -120	o44.5 -120	+320
Atlanta Falcons (3-3)	-7.5 -105	-7.5 EVEN	u44.5 EVEN	-425

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Use the odds-price formula:

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Q: Why do they list it this way?

A: To confuse you and hide the house edge.

Kelly Criterion

The **Kelly Criterion** is a formula, derived using basic statistics and calculus, to determine how large of a wager to make (“**bet sizing**”)

The Kelly Criterion *assumes* you have an **edge**: you know that the true probability is different from the market-implied probability

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E.g. You are offered 5-to-1 odds (wager \$1 to win \$5 (collect \$1+\$5=\$6)), but you know the event has a 50% true probability. On average, you collect $50\% \times \$6 = \3 for an “edge” of $\$3 - \$1 = \$2$. The formula is therefore $2/5 = 40\%$: you should wager 40% of your wealth on that bet.

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It maximizes expected wealth over many **independent (uncorrelated) bets**

Prices and Probabilities

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While accurate for petty gambling, this can be incorrect for two reasons:

- **Time Value of Money** – the asset is traded today but the payoff of the bet might be a long time from now (e.g. 2028 Presidential Election), necessitating an adjustment for time value of money.

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- **Time Value of Money** – the asset is traded today but the payoff of the bet might be a long time from now (e.g. 2028 Presidential Election), necessitating an adjustment for time value of money.
- **State Prices** – Predictions strongly correlated with macroeconomics can trade above or below probability because of **state prices**: a dollar in the state of the world where we have a recession becomes especially valuable. Therefore that prediction will trade above true probability.

The second term is not generally possible to calculate without strong assumptions. The first term is easy – just inflate the price by the time value (e.g. maturity-matched treasuries) between the trade date and the settlement date to get the probability. **For bets resolving in the near future and uncorrelated with the macroeconomy, prices in a frictionless competitive market should trade to true probability**

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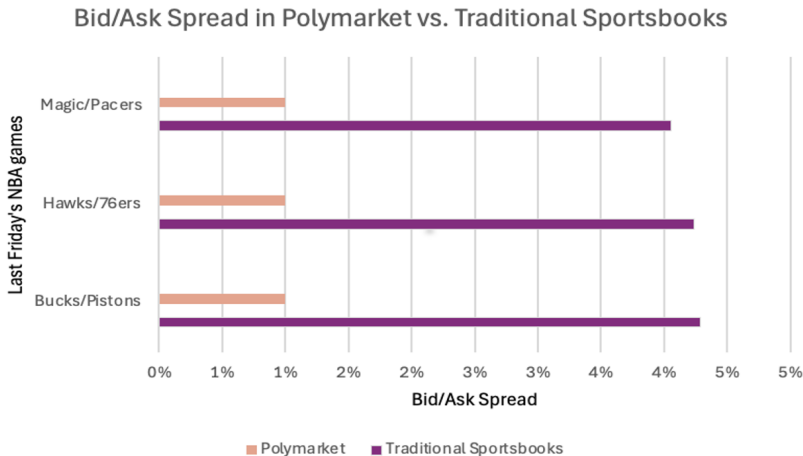
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Polymarket

Quick Overview

- On Polymarket, you can buy and sell shares representing future event outcomes (i.e. "Will TikTok be banned in the U.S. this year?")
- Shares in event outcomes are always priced between 0.00 and 1.00 **USDC**, and every pair of event outcomes (i.e. each pair of "YES" + "NO" shares) is fully collateralized by \$1.00 USDC.
- Shares are created when opposing sides come to an agreement on odds, such that the sum of what each side is willing to pay is equal to \$1.00.
- The shares representing the *correct, final outcome* are paid out \$1.00 USDC each upon market resolution.
- Unlike sportsbooks, you are not betting against "the house" – the counterparty to each trade is another Polymarket user. As such:
 - Shares can be sold before the event outcome is known_ (i.e. to lock in profits or cut losses)
 - *There is no "house" to ban you for winning too much.*

Polymarket vs. Sportsbook “House Edge”



Source: Nils Bogner, MGT4074 Spring 2025 Final Project

Oracle Risk in Decentralized Markets

Just as in all other decentralized markets, decentralized prediction markets are heavily exposed to **Oracle Risk**: the chain has no eyes of its own and must be told what has occurred in the real world.

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- “Optimistic” means that users put down collateral to propose to resolve outcomes. The collateral is lost if their proposed resolution is successfully challenged.
- UMA is the governance token for the optimistic oracle. *Owners of UMA tokens comprise the “jury” in the case of any dispute*

If you own a majority of UMA Tokens, you can rig the oracle! The creators of UMA call this “profit-from-corruption” or “PFC” risk in their [whitepaper](#).

UMA Optimistic Oracle

How Are Prediction Markets Resolved?

Markets are resolved by the UMA Optimistic Oracle, a smart-contract based optimistic oracle.

Overview

- When the result of a market becomes clear, the market can be "resolved," or permanently finalized.
- Markets are resolved according to the market's pre-defined rules, which can be found under market's the order book.
- When a market is resolved, holders of winning shares receive \$1 per share, losing shares become worthless, and trading of shares is no longer possible.
- To resolve a market, an outcome must first be "proposed," which involves putting up a bond in USDC.e which will be forfeited if the proposal is unsuccessful.
- If the proposal is validated as accurate, the proposer will receive a reward for your proposal.

⚠ If you propose a market too early, or are unsuccessful in your proposal, you will lose all of your \$750 bond. Do not propose a resolution unless you understand the process and are confident in your view.

Polymarket Oracle Failure



Basil ❤️ ⚙️

@LinkofSunshine



Just a community warning about Polymarket

As far as I can tell, ppl successfully rigged the resolution process, falsely resolving yes

The resolution is done through a vote of owners of the crypto UMA, and one person purchased ~\$5mil of this coin, giving them near veto power

Polymarket Oracle Failure



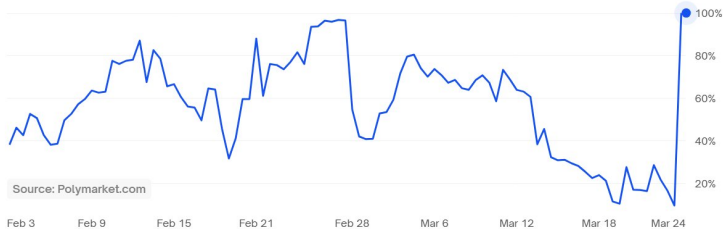
Ukraine agrees to Trump mineral deal before April?

\$7,079,947 Vol. ⌚ Mar 31, 2025



YES

100% chance ↑ 62%



Source: Polymarket.com

1H 6H 1D 1W 1M **ALL**



Polymarket Oracle Failure

March 25, 2023

 **Tanner | Polymarket** Yesterday at 8:24 PM

@everyone We are aware of the situation regarding the Ukraine Rare Earth Market. This market resolved against the expectations of our users and our clarification. Unfortunately, because this wasn't a market failure, we are not able to issue refunds.

This is an unprecedented situation, and we have been in war rooms all day internally and with the UMA team to make sure this won't happen again. This is not a part of the future we want to build: we will build up systems, monitoring, and more to make sure this doesn't repeat itself. More details to come as we better understand the situation and begin to build solutions for clearer rules, as well as a more defined and timely clarification system.