# Election Prediction Markets: Evidence from Polymarket, Kalshi, and Robinhood

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May 2025

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# A New Era in Prediction Markets ⚖️

1. **Informative:** Predicted the 2024 US Presidential Elections for Trump.
2. **New:** Prediction Markets were federally legalized in 2024.

⚠️ No prior large-sample, transaction-level studies exist.

✅ We provide an analysis using granular trade data.


1930s
2024
The New York Tim
BID-ASK OD
IN ELECTION
Bid
Ask
Prediction Market
Candidate A
$0.82
Candidate B
$0.28
Are DCMs gambling?

## Institutional Detail - Regulatory Classification ⚖️

- **Election prediction markets are classified as event-based Designated Contract Markets (DCMs)** ⚖️— federally regulated under CFTC oversight.
- DCMs must follow strict rules to prevent manipulation ⚠️.
- **Notable precedents:**
  - *HedgeStreet (2004)* — contracts on housing and economic indicators 📈
  - *Cantor Exchange (2010)* — box office futures; later forex and weather 📄
  - *Iowa Electronic Markets (IEM)* — CFTC no-action letter allows small-stakes academic trading, with $500 per trader limit
- **2024 marks a regulatory turning point**, with widespread trading in federally approved election markets ✅

## Institutional Detail — Regulatory Classification ⚖️

- **Election prediction markets are classified as event-based Designated Contract Markets (DCMs)** ⚖️— federally regulated under CFTC oversight.
- DCMs must follow strict rules to prevent manipulation and ensure market integrity ⚠️.
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  - *Iowa Electronic Markets (IEM)* — CFTC no-action letter allows academic use with $500 cap per trader
- **2024 marks a regulatory turning point** — first federally approved election markets for public use ✅

## Our Data

- ✅ **Kalshi** (US only): CFTC-approved exchange. Prediction market active from **10/4/2024** to **1/20/2025**. **Transaction-level data** collected.
- ✅ **Polymarket** (Global ex-US): Crypto-native platform. Market ran from **1/5/2024** to **11/6/2024**. **Transaction-level data** collected.
- ✅ **PredictIt** (US only): Legacy political betting site. Market ran from **9/2/2022** to **12/17/2024**. Data ends **11/6/2024**. No **Transaction-level data** available
- ✅ **Robinhood** (US/UK/EU/AU): Entered late on **10/28/2024**. Market resolved **1/6/2025**. Limited **transaction-level data**.

# Our Data

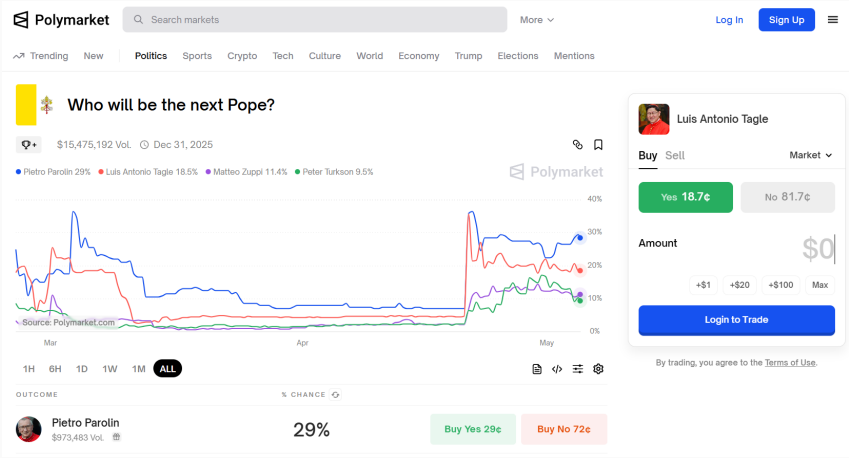
Table 2: Market Trade Activity

| | Average Number of Trades Per Hour | Average Volume of Trades Per Hour | Average User Transaction Size Per Hour |
|---|---|---|---|
| Kalshi-DJT | 726 | 557746 | 454 |
| | (1273) | (918992) | (491) |
| Kalshi-KH | 622 | 678142 | 595 |
| | (1689) | (1767271) | (778) |
| Polymarket-DJT | 4372 | 2424842 | 460 |
| | (2757) | (2844623) | (1052) |
| Polymarket-KH | 2357 | 1750205 | 500 |
| | (2179) | (3354280) | (984) |
| Robinhood-DJT | | 3334875 | |
| | | (3236792) | |
| Robinhood-KH | | 5225077 | |
| | | (7530043) | |

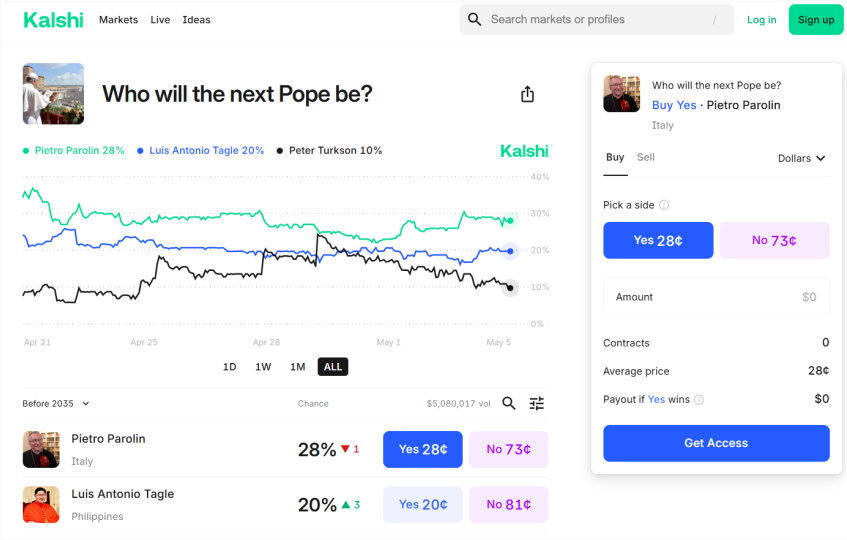
This table reports trading activity across three election prediction platforms—Kalshi, Polymarket, and Robinhood—for DJT-win and KH-win contracts. It presents three key metrics: the average number of trades per hour, the average volume of trades per hour, and the average user transaction size per hour. For Kalshi and Polymarket, data are aggregated over the period from October 23rd to November 6th. The total size of trades is calculated by multiplying price by volume for each trade and summing across the dataset. Polymarket exhibits the highest trade

## Four Betting Platforms Analyzed

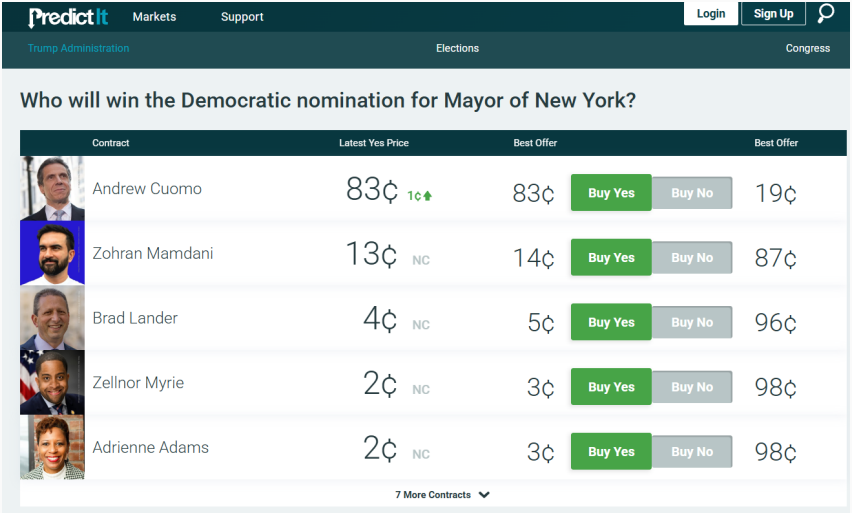
- **Kalshi** — Founded in 2018, Kalshi became the first federally approved exchange for real-money event contracts.
- **Polymarket** — Launched in 2020, Polymarket is a crypto-native platform built on the Polygon blockchain. Though banned for U.S. users after a 2022 CFTC settlement, it offered early access to 2024 election markets globally and reached over $3.2 billion in bets.
- **Robinhood** — Popular mobile trading app. Entered the election market late on October 28. Limited to mobile-only trading during study period.
- **PredictIt** — Long-running U.S. political betting platform. Does not release detailed trade data. Legal troubles with the CFTC.



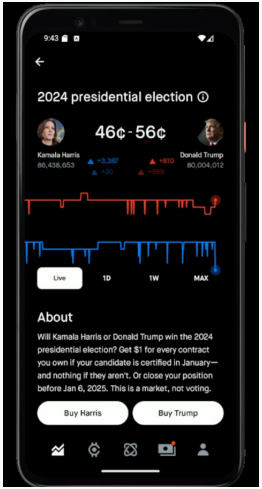

*Polymarket's interface*



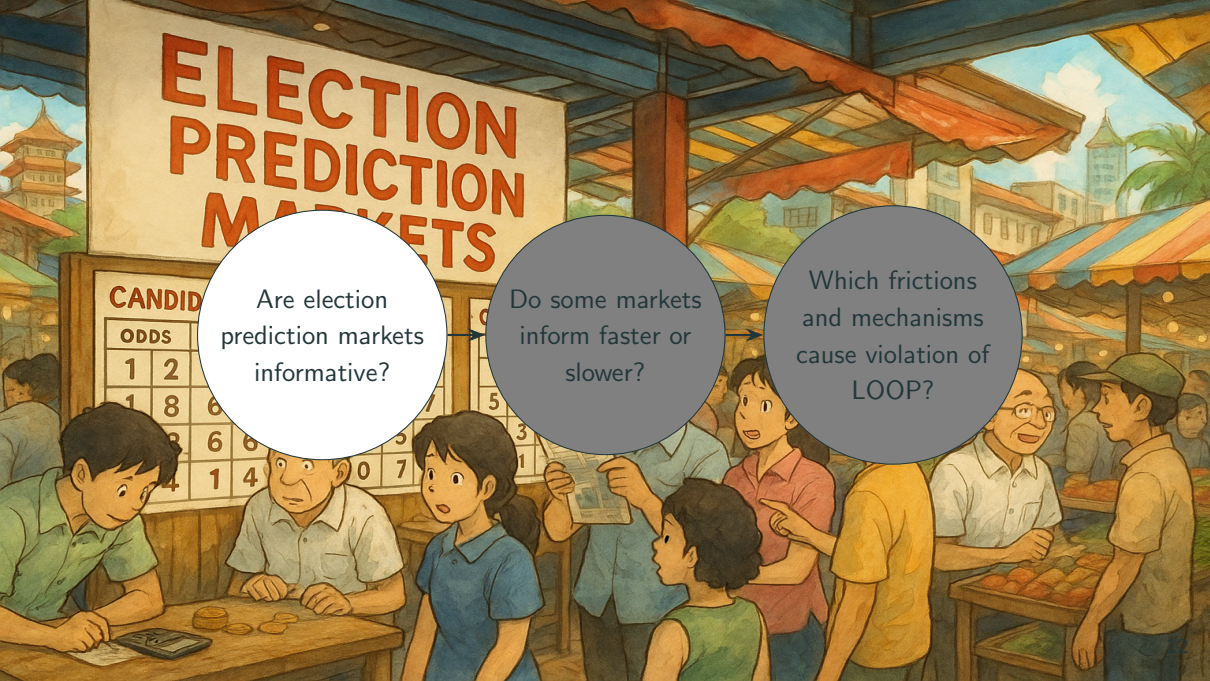

*Kalshi's interface*



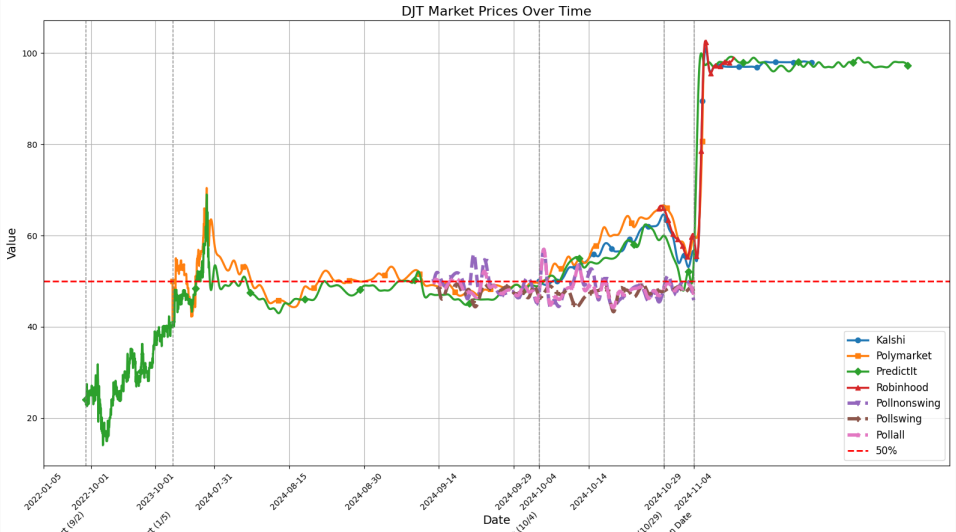

*Predictit's interface*




*Robinhood's interface*


ELECTION
PREDICTION
CANDID
ODDS
Are election prediction markets informative?
Do some markets inform faster or slower?
Which frictions and mechanisms cause violation of LOOP?

# Prediction Markets Vs Polls



# How prediction markets saw something the polls and pundits didn't

Analysis by Allison Morrow, CNN

4 minute read · Published 5:00 AM EST, Fri November 8, 2024



The New York Times

# *Betting Markets Favor Trump. But Their Record of Accuracy Is Mixed.*

Proponents believe that having real money on the line, and a large crowd of investors, encourages a more accurate election forecast than polling data can provide.



By Kaleigh Rogers
Kaleigh Rogers has been covering election polling since 2019.

Oct. 25, 2024

THE WALL STREET JOURNAL.

*By Niall Ferguson and Manny Rincon-Cruz*
Nov. 15, 2024 11:27 am ET



The 2024 election was a resounding victory not only for Donald J. Trump but also for prediction markets like the crypto-based Polymarket, which allow users to trade contracts that pay out based on the outcome of future events.

By the morning of the election, Polymarket showed $1.8 billion in trading volume on who would win the presidency (Trump at 62%) and an additional half billion on who would win the popular vote (Harris at 73%). The biggest bet on a Trump victory was placed by an enigmatic "whale" known only as Théo.

Trump's victory was even more decisive than the prediction markets foresaw. Even on Polymarket, few shared Théo's conviction that Trump would win the popular vote. But the prediction markets were still a lot closer than most opinion polls and political pundits, nearly all of which clustered around a neck-and-neck result.

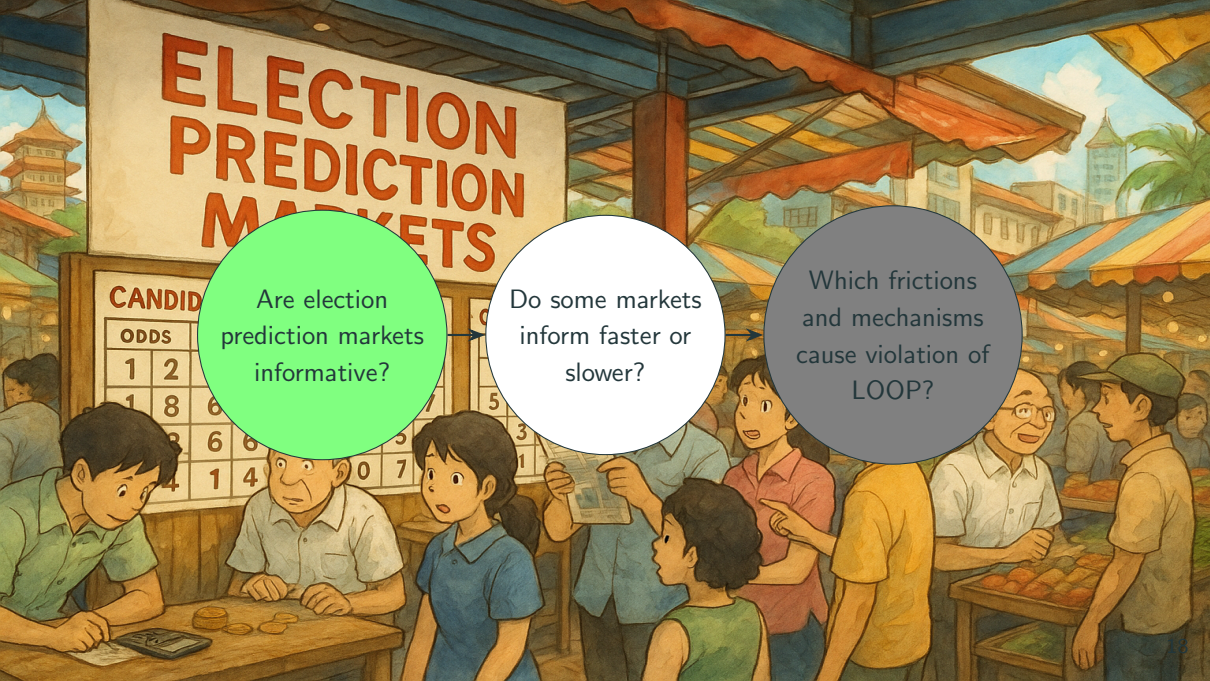
The Wall Street Journal reported on Election Day that "Prediction Markets Point to Likely Trump Victory," giving the former president a chance of success between 57% and 62%. But most polls showed the election as headed for a tie. Renowned election forecaster Nate Silver wrote on election morning: "We ran 80,000 simulations tonight. Harris won in 40,012," thereby giving the sitting vice president a 50.015% chance of winning the election.

THE WALL STREET JOURNAL.

POLITICS | ELECTIONS | THE SATURDAY ESSAY

# How the Trump Whale and Prediction Markets Beat the Pollsters in 2024

e success of Polymarket and other betting platforms in calling the election will bring an end to the era of political forecasting as we know it.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## Our Analysis

- There are eight positions traders can potentially take
  - Buy Trump win
  - Sell Harris loss
- No within-platform arbitrage opportunity
- We collapse the eight trading directions into two:
  - Trump wins
  - Harris wins

# Substantial Disagreement Across Prediction Markets

Table 7: Cross-Platform Arbitrage on Kalshi and Polymarket from 23rd Oct to 5th Nov 2024 without 2% transction fee.

| | Direction of Arbitrage | Total Times-tamps | Violated Times-tamps | Observed Proportion | Total Violation Value |
|---|---|---|---|---|---|
| DJT-Win vs DJT-Lose/KH-Win (Kalshi → Polymarket) | Kalshi to Polymarket | 124278 | 7660 | 0.101 | 108073.65 |
| KH-Lose vs DJT-Lose/KH-Win (Kalshi → Polymarket) | Kalshi to Polymarket | 116618 | 278 | 0.005 | 230008.23 |
| DJT-Win vs DJT-Lose/KH-Win (Polymarket → Kalshi) | Polymarket to Kalshi | 365976 | 3 | 0.000 | 0 |
| KH-Lose vs DJT-Lose/KH-Win (Polymarket → Kalshi) | Polymarket to Kalshi | 365973 | 4786 | 0.022 | 1951015.27 |

This table reports instances of cross-platform arbitrage between Kalshi and Polymarket from October 23rd to November 5th, 2024, focusing on logically linked positions such as DJT-win versus the combination of DJT-lose and KH-win. Unlike within-platform pricing, where violations were virtually nonexistent, cross-platform comparisons reveal frequent and economically meaningful arbitrage opportunities.

# Substantial Disagreement Across Prediction Markets - With 2% Transaction Fee

Table 6: Cross-Platform Arbitrage on Kalshi and Polymarket from 23rd Oct to 5th Nov 2024.

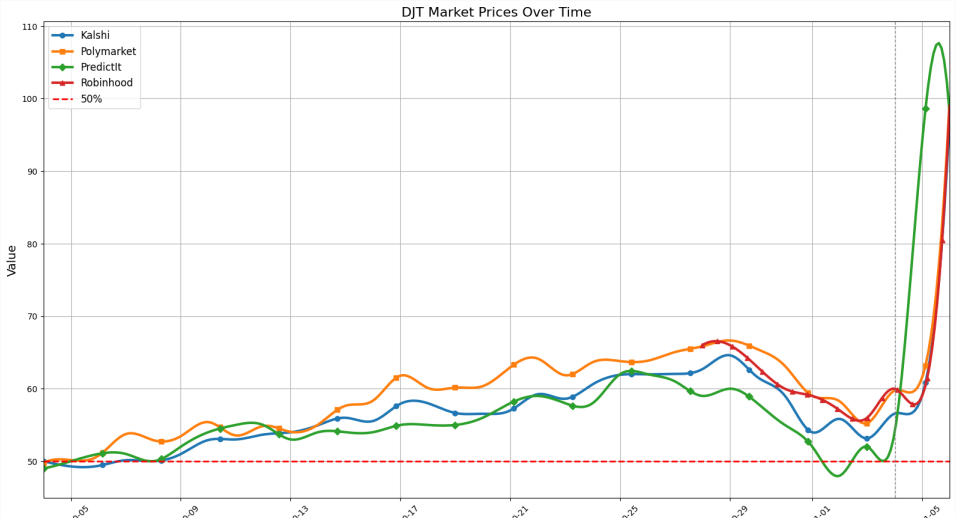
| | Direction of Arbitrage | Total Timestamps | Violated Timestamps | Observed Proportion | Total Violation Value |
|---|---|---|---|---|---|
| DJT-Win vs DJT-Lose/KH-Win (Kalshi → Polymarket) | Kalshi to Polymarket | 124278 | 6509 | 0.086 | 80175.65 |
| KH-Lose vs DJT-Lose/KH-Win (Kalshi → Polymarket) | Kalshi to Polymarket | 117769 | 242 | 0.004 | 198320.90 |
| DJT-Win vs DJT-Lose/KH-Win (Polymarket → Kalshi) | Polymarket to Kalshi | 365976 | 0 | 0 | 0 |
| KH-Lose vs DJT-Lose/KH-Win (Polymarket → Kalshi) | Polymarket to Kalshi | 365976 | 4756 | 0.022 | 1770115.40 |

This table reports instances of cross-platform arbitrage between Kalshi and Polymarket from October 23rd to November 5th, 2024, focusing on logically linked positions such as DJT-win versus the combination of DJT-lose and KH-win. Unlike within-platform pricing, where violations were virtually nonexistent, cross-platform comparisons reveal frequent and economically meaningful arbitrage opportunities.

## Are Some Markets More Informative?

- We only have one event
  - Hard to assess the predictive accuracy in a statistically rigorous manner
- Our approach:
  - Analyze lead-lag between different prediction markets

# Are certain markets more informative? 📊



# Cross Correlation of Hourly and Daily Prices

**Appendix Table 1**

Cross-Correlation across the platforms using daily prices

| Market Pair | Observations | Best Lag (Days) | Best Correlation | Lead-Lag Relationship |
|---|---|---|---|---|
| Kalshi-DJT & Polymarket-DJT | 610 | -2 | 0.610 | Polymarket-DJT leads Kalshi-DJT by 2 days |
| Kalshi-DJT & PredictIt-DJT | 32 | -1 | 0.898 | PredictIt-DJT leads Kalshi-DJT by 1 day |
| Kalshi-DJT & Robinhood-DJT | 16 | -1 | 0.998 | Robinhood-DJT leads Kalshi-DJT by 1 day |
| Polymarket-DJT & PredictIt-DJT | 305 | 0 | 0.868 | No strong lead-lag relationship |
| Polymarket-DJT & Robinhood-DJT | 10 | -1 | 0.936 | Robinhood-DJT leads Polymarket-DJT by 1 day |
| PredictIt-DJT & Robinhood-DJT | 9 | -1 | 0.898 | Robinhood-DJT leads PredictIt-DJT by 1 day |

$$\rho_k = \frac{E\left[(X_t - \overline{X})(Y_t - \overline{Y})\right]}{\sigma_X \sigma_Y}$$

where $\rho_k$ is the correlation at lag $k$, $X_t$ and $Y_t$ are platform-platform time series,
and $k$ is the lag (up to 2 days).
The best lead-lag relationship is determined by the maximum absolute value of $\rho_k$.

# Is Polymarket or Kalshi Faster?

**Model Specification:**

$$Y_t = c + A_1 Y_{t-1} + \epsilon_t \qquad (1)$$

where:

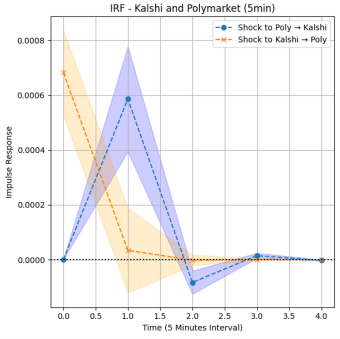
- $Y_t$: $2 \times 1$ vector of log returns at time $t$
- Platforms: **Polymarket** and **Kalshi**
- $c$: Constant intercept vector
- $A_1$: $2 \times 2$ matrix of autoregressive coefficients
- $\epsilon_t$: Shock vector

**Impulse Response Functions (IRFs):**

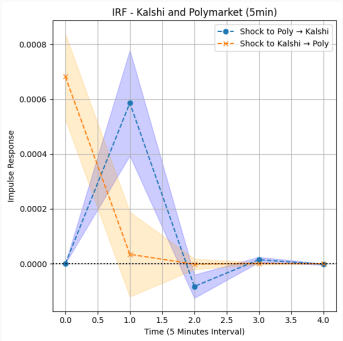
- Trace how a **shock to one market** affects future returns of both markets.
- IRFs derived from VAR capture *dynamic spillovers* and *information flow*.
- A 1 std. dev. shock to Polymarket — does Kalshi respond?
- Helps assess **lead-lag behavior** and price discovery.

# Is Polymarket or Kalshi Faster? 1-lag 📊

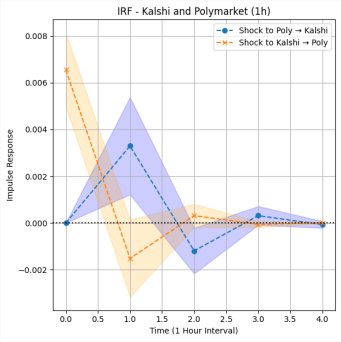
## Panel A: 5mins DJT IRF




## Panel B: 30mins DJT IRF



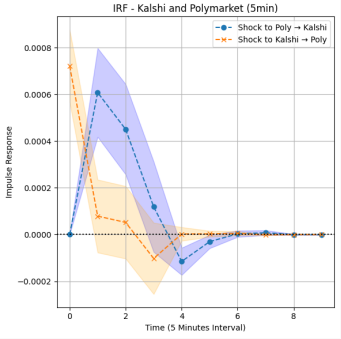

## Panel C: 1Hr DJT IRF



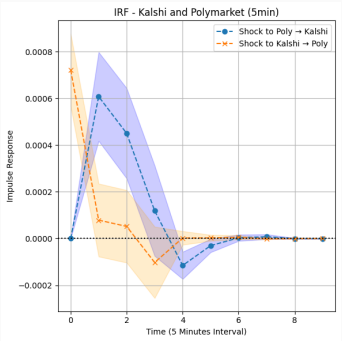

- Kalshi and Polymarket predict each other
- Polymarket leads more significantly

# Is Polymarket or Kalshi Faster? 3-lag 📊

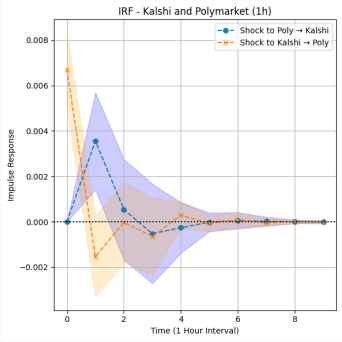
## Panel A: 5mins DJT IRF




## Panel B: 30mins DJT IRF

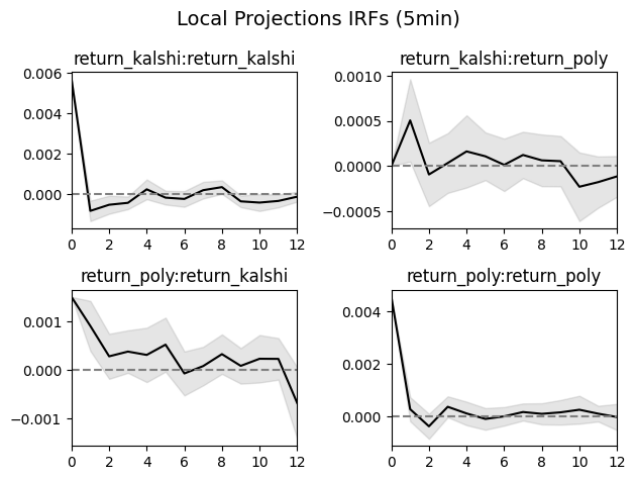


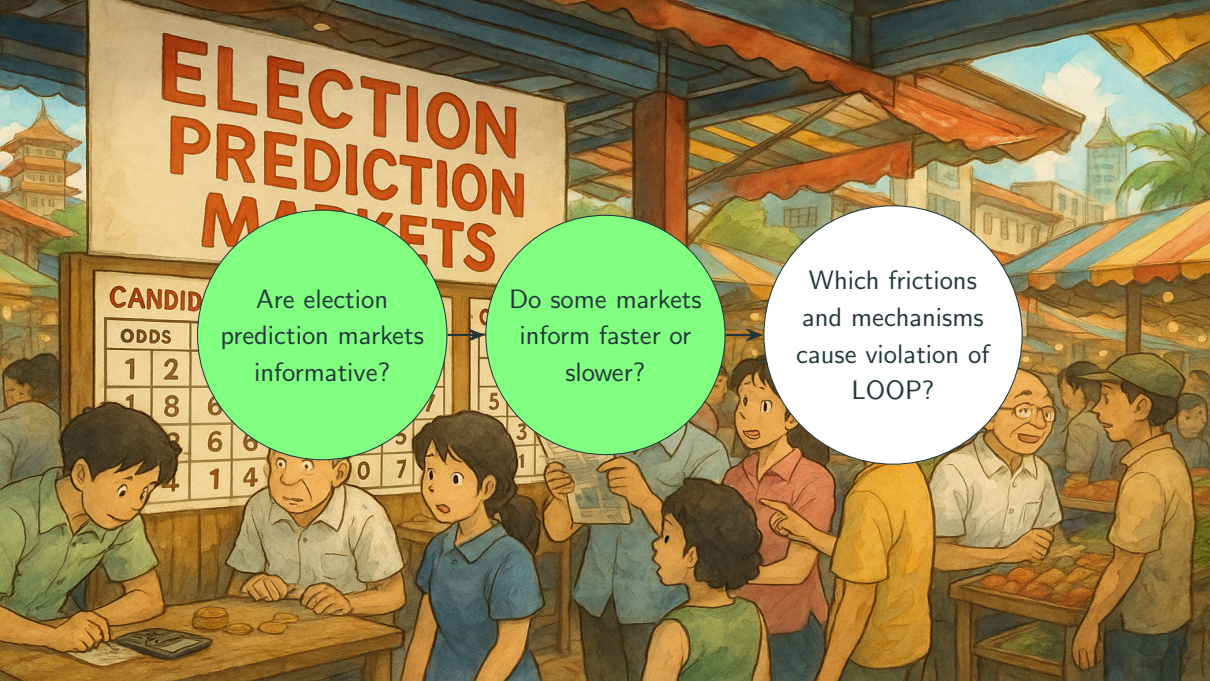

## Panel C: 1Hr DJT IRF




- Kalshi and Polymarket predict each other
- Polymarket leads more significantly

# Is Polymarket or Kalshi Faster? Local projectionss




ELECTION
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What we think causes these phenomena?

## Historical Accuracy of Election Markets 📊

- **Prediction markets accurately forecasted 15 U.S. presidential elections** from 1884 to 1940 *(Rhode and Strumpf, 2004)* ✅
- **Arbitrage was minimal**, suggesting moderate market efficiency even without modern infrastructure. ✅

## Polymarket: Decentralized Prediction Market 📄

- Built on the Polygon blockchain (a fast, low-fee Layer 2 network over Ethereum).
- **USDC stablecoin** — pegged 1:1 to the U.S. dollar and issued by Circle.
- Banned in U.S. after a $1.4M CFTC settlement in 2022, but accessible globally.
- U.S. election markets started in Jan 2024 — reached **$3.2 billion in total bets**✅
- Largest market volume among all four platforms.

## Polymarket: Listed Order Book Model (LOB) 📊

- Uses a **listed order book** — each buy order must match a sell order (no central liquidity provider).
- Market positions are created when `Yes` and `No` bids sum to \$1 (e.g., \$0.40 Yes, \$0.60 No).
- No transaction or platform fees — users only pay Polygon network gas (usually ¡ \$0.01) ✅
- **LOB Bid-Ask Spread Function**:

$$P_t = \frac{A_t + B_t}{2}$$

*Where $A_t$ = best ask, $B_t$ = best bid*

## Kalshi's Pricing Model 💡

- Kalshi is the first federally approved U.S. platform for event contracts (CFTC-approved in Sept 2024).
- Uses an **Automated Market Maker (AMM)** — traders buy/sell "Yes" or "No" contracts instantly.
- AMM adjusts prices automatically in response to buying pressure — no need for matched buyers/sellers.
- **Example:** If many buy "Yes" contracts, the price rises (e.g., \$0.50 $\rightarrow$ \$0.60), reflecting increased belief in that outcome.

**Expected Price:**

$$P_t = \mathbb{E}_t[Y]$$

*Where $Y \in \{0, 1\}$ is the outcome and $P_t$ reflects the market's belief.*

## AMM Mechanics 🧠

**AMM uses some Market Scoring Rule (MSR):**

$$P_t = \frac{e^{q_t/b}}{e^{q_t/b} + e^{r_t/b}}$$

- $q_t$: demand for "Yes"; $r_t$: demand for "No"
- $b$: liquidity sensitivity parameter — higher $b$ = smoother prices

**Liquidity and Execution:**

- Institutional liquidity by Susquehanna.
- AMM absorbs imbalance — traders can always buy/sell.

## PredictIt: Legal Battles and Costly Trades ⚠️

- Launched in 2014 by Victoria University of Wellington (NZ), operated under a CFTC no-action letter.
- Restricted to 5,000 traders and $850 investment cap per market.
- Lost CFTC exemption in 2022 due to noncompliance
- **Fee structure:** 10% on profits and 5% on withdrawals — highest among all platforms 📉

## Robinhood: Retail-Friendly Binary Betting 📈

- Launched mobile-only election markets on Oct 28, 2024 — available in US, UK, EU, Australia.
- Known for attracting massive retail volume and "crowd wisdom" behavior.
- Only offered DJT-Win or KH-Win contracts — no selling.
- Trades executed via liquidity partner ForecastEx
- **Flat $0.01 fee per trade**, using a binary pair mechanism (e.g., $1.01 combined buy price) ✅

Table 3: Market activity of individual positions.

| | Platform | Count of Unique Trades | Total Size of Trades |
|---|---|---|---|
| DJT-Win | Kalshi | 171486 | 116112998 |
| DJT-Lose | Kalshi | 73733 | 83448042 |
| KH-Win | Kalshi | 152367 | 130572418 |
| KH-Lose | Kalshi | 47642 | 98691621 |
| DJT-Win | Polymarket | 883258 | 433030022 |
| DJT-Lose | Polymarket | 411002 | 284723219 |
| KH-Win | Polymarket | 389966 | 418712764 |
| KH-Lose | Polymarket | 314767 | 104598653 |

This table reports market activity for individual election positions—DJT-win, DJT-lose, KH-win, and KH-lose—on the Kalshi and Polymarket platforms. It presents the count of unique trades and the total size of trades for each position. Kalshi and Polymarket data are aggregated from October 23rd to November 6th, and total trade size is computed as the sum of price multiplied by volume for each individual trade. Polymarket exhibits significantly higher trading intensity across all positions compared to Kalshi, both in terms of trade count and total trade size. For instance, the DJT-win contract on Polymarket records over 883,000 unique trades and a total trade size exceeding 433 million, while the same position on Kalshi has approximately 171,000 trades and a total size of 116 million.).

Table 4: Moments of market hourly returns.

| | Std Dev | Skewness | Kurtosis | Autocorr Lag 1 | Autocorr Lag 2 | Autocorr Lag 3 |
|---|---|---|---|---|---|---|
| Kalshi-DJT | 0.011 | -1.271 | 7.740 | 0.049 | -0.032 | -0.054 |
| Kalshi-KH | 0.016 | 0.108 | 2.148 | 0.030 | -0.169 | 0.016 |
| Polymarket-DJT | 0.012 | -0.859 | 6.077 | -0.156 | 0.002 | -0.022 |
| Polymarket-KH | 0.018 | 0.905 | 5.501 | -0.109 | -0.041 | -0.034 |

This table reports the statistical moments of hourly returns for DJT and KH contracts on the Kalshi and Polymarket platforms. The reported metrics include standard deviation, skewness, kurtosis, and autocorrelations at lags 1 through 3. Hourly returns are calculated as $\log\left(\frac{p}{p_{t-1}}\right)$. Kalshi-DJT displays the lowest volatility with a standard deviation of 0.011 and exhibits strong negative skewness and high kurtosis, suggesting a return distribution with a long left tail and more frequent extreme events. Kalshi-KH shows higher volatility and a more symmetric distribution with lower kurtosis. Polymarket returns also exhibit fat tails and asymmetry, while KH contracts are positively skewed, indicating differing directional expectations among market participants.

## What Explains These Phenomena? 💡

✅ **Liquidity explains lead-lag dynamics:**

- Platforms with deeper liquidity respond faster to new information.
- This helps explain why Polymarket often **leads** Kalshi in price discovery.

📊 **Design differences: Limit Order Book (LOB) vs. AMM**

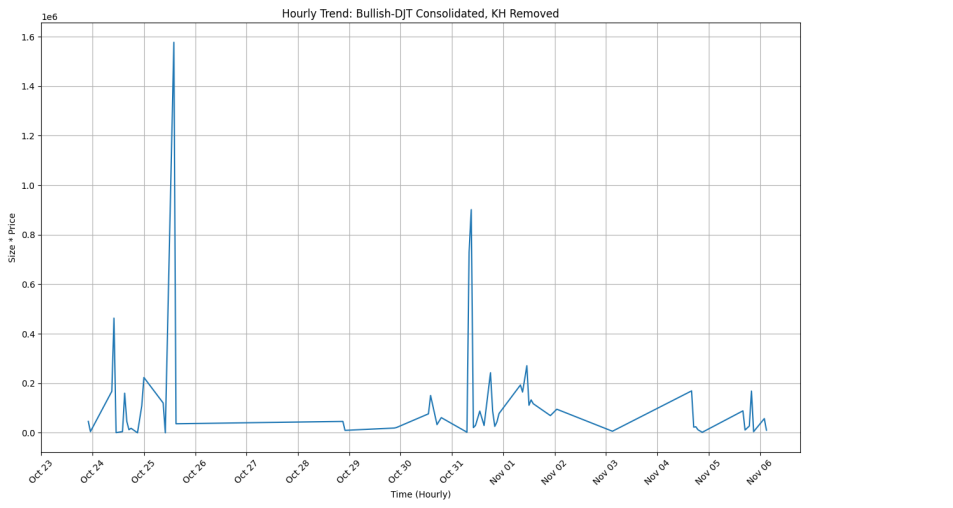
- **Polymarket** uses a LOB — allows faster information incorporation. The LOB reflects many opinions at once — not just the last trade. Price updates can occur even without a transaction, as orders get revised.
- **Kalshi** uses an AMM — slower, especially in thin markets. Traders on AMMs often wait to snipe stale prices after news.


THEO
POLYMARK
Am I alone in this ocean?

## Théo's Whale Trades on Polymarket 🐋

- On Oct 18, 2024, **WSJ identified "Théo"**, a French trader, holding pro-Trump bets on Polymarket. His estimated total gains were **$80M**.
- On Nov 1, Théo **confirmed to WSJ he controlled 4 whale accounts**, citing personal polling
- Post-election, **Chainalysis linked 11 addresses** with similar patterns; 9 were publicly named.
- In our dataset, from Oct 23–Nov 6, Théo traded $7M in our dataset

# Théo's Consolidated Trades Bullish DJT on Polymarket



## Impact of Théo's Trades on Market Imbalance 🐋

- **Setup:** 2-variable VAR at 5-minute intervals.
  - $Y_t = \begin{bmatrix} \text{NOI}_{\text{Non-Theo},t} \\ \text{NOI}_{\text{Theo},t} \end{bmatrix}$
  - Assesses how Théo's trades shift others' order flows.
- **Figure 13a – DJT-Win Market:**
  - Initial drop (market provides liquidity) followed by delayed herding.
  - Peaks at 15 minutes, fades by 40 — suggests *signal extraction*.
- **Figure 13b – KH-Lose Market:**
  - Traders react *against* Théo — reduce net buying or sell more.
  - Interpreted as *liquidity provision*, not informational signal.
- **Insights:**
  - **Market response is asymmetric and contract-dependent.**
  - DJT-Win $\rightarrow$ herding; KH-Lose $\rightarrow$ opposition.

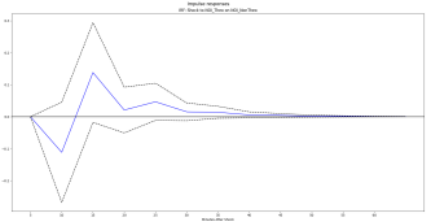


**Figure 13a:** Theo's DJT-Win NOI IRF

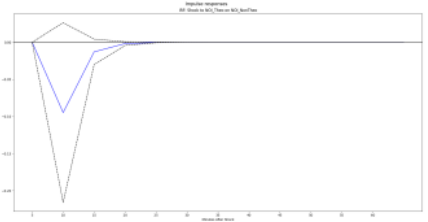


**Figure 13b:** Theo's KH-Lose NOI IRF

**Figure 13: Theo NOI IRF** This figure presents IRFs from a two-variable VAR model estimating the response of non-Théo net order imbalance (NOI) to shocks in Théo's trading activity, computed at 5-minute intervals. Panel A shows the response in the DJT-Win contract, where initial liquidity provision is followed by delayed herding behavior. Panel B shows the response in the KH-Lose contract, where Théo's purchases elicit immediate and opposing reactions from other traders. All responses are based on standardized shocks, with confidence bands derived via bootstrapped standard errors.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Thank you