Can Maker make Bank on Bitcoin?
DeFi Dynamics & Trading Profitability

By: Anuradha Biswas

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Background

- **Crypto markets are inefficient:** Delayed price responses (Berg et al., 2022)

- **Tokens :** Just beginning to be researched (Ji et al., 2019), (Corbet et al., 2020)

- **Delayed Price Adjustments:** Create trading windows

- **Research Gap:** Can these dynamics be used in trading strategies?

Research Question

Do purchases of Maker tokens have a predictable influence on Bitcoin prices that can be arbitraged?
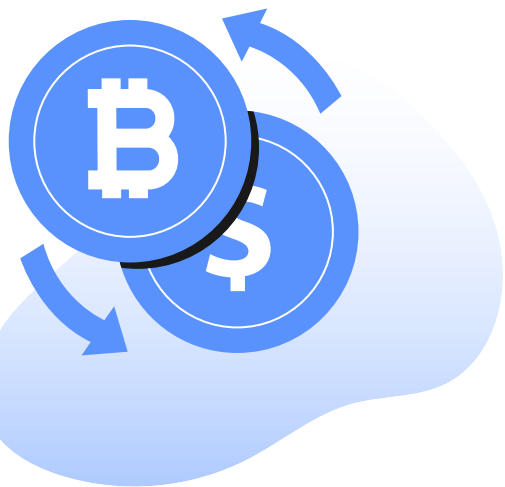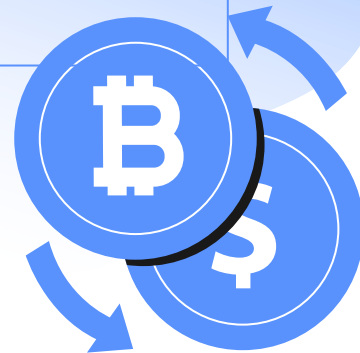
Method

Step 1: In-Sample Testing

- Bivariate VAR
- Granger Predictability

Step 2: Real-Time Out-of-Sample Forecasts

- Model 0: Random Walk with Drift
- Model 1: Bitcoin AR(5)
- Model 2: LRM with Maker
- Model 3: VAR

Step 3: Statistical Forecast Criteria

- MSFE Ratio (Relative to No-Change)
- Directional Accuracy (Direction of Change)

Step 4: Examine trading strategies

- Buy-and-Hold $\quad R_1 = \sum_{t=1}^{T} y_t \qquad R_3 = \sum_{t=1}^{T} \text{sign}(\hat{y}_t) * y_t \quad$ where
- Long-and-Short

$$\text{sign}(\hat{y}_t) = \begin{cases} 1 & \text{if } \Delta\hat{y}_t > 0 \\ -1 & \text{if } \Delta\hat{y}_t < 0 \end{cases}.$$

Step 5: Evaluate profitability

- Cumulative Returns
- Sharpe Ratio

Data

- **DeFi Token:** Maker (MKR)
- **Bitcoin Markets:** Spot & Futures Prices
- **Source:** Bloomberg
- **Frequency:** Daily
- **Full Sample Range:** December 21, 2018 to March 02, 2025
- **Forecast Range:** January 01, 2024 - January 01, 2025

Motivation

- Futures → market expectations of future spot prices
- Maker → one of the earliest DeFi tokens with high market cap ($1.15B)
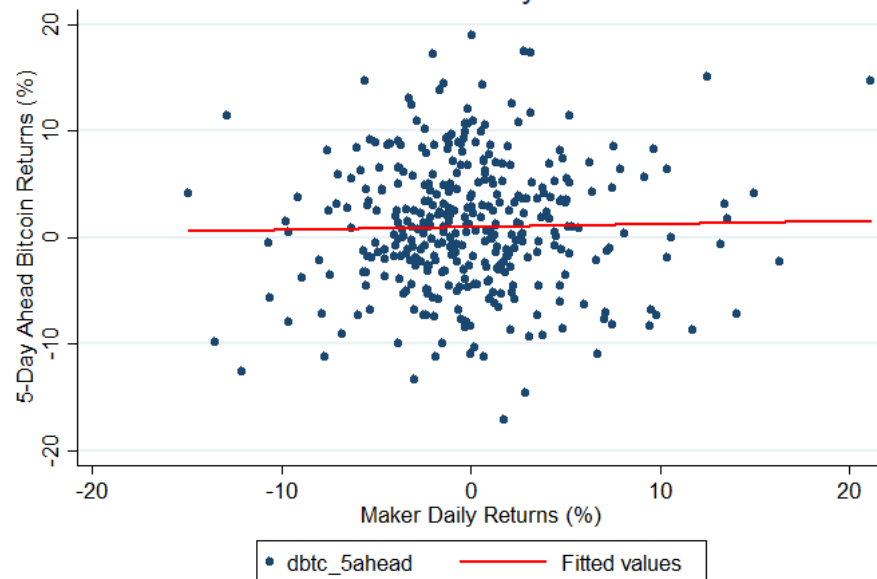- Frequency → daily to be consistent with literature

Summary Statistics

- Daily growth rates for Maker and Bitcoin prices

- Stationarity confirmed using KPSS and ADF-GLS

Daily Percentage Change: Maker vs. Bitcoin Spot
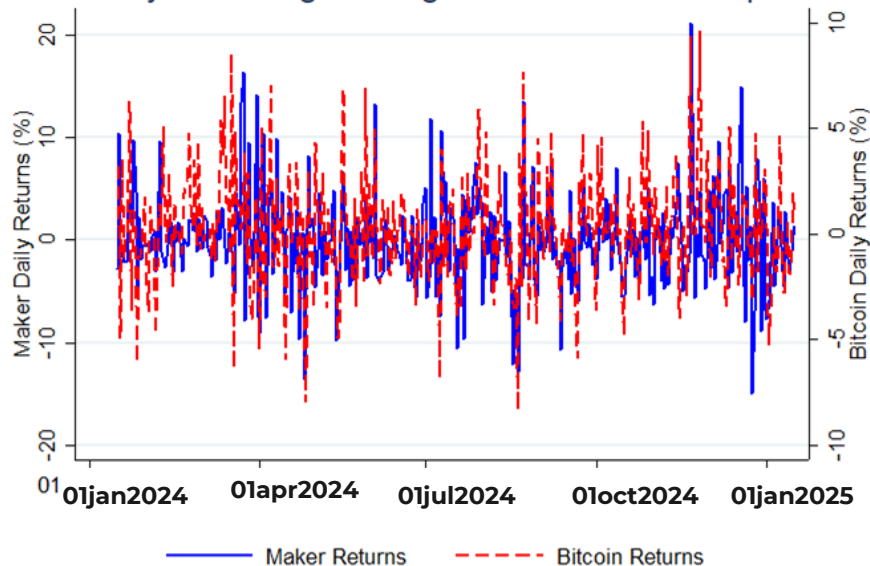
2024: Maker Returns vs. 5-Day Ahead Bitcoin Returns

In-Sample Granger Predictability

- Vector Autoregression (VAR) Model
$$\begin{bmatrix} dmkr_t \\ dbtc_t \end{bmatrix} = \alpha + \sum_{i=1}^{p} \begin{bmatrix} \phi_{11}^{(i)} & \phi_{12}^{(i)} \\ \phi_{21}^{(i)} & \phi_{22}^{(i)} \end{bmatrix} \begin{bmatrix} dmkr_{t-i} \\ dbtc_{t-i} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix}$$

- Granger Causality Hypotheses
  - Null Hypothesis: Past values of maker **do not** help predict bitcoin
  - Alternative Hypothesis: Past values of maker **do** help predict bitcoin

	Granger Causality Test Results (Lag 5)			
Dependent Variable	Excluded Variable	χ^2	p-value	Interpretation
Bitcoin Spot	Maker Token	16.55	0.002	Reject H_0 — predictability exists
Bitcoin Futures	Maker Token	5.94	0.203	No evidence at 10% level

Out of Sample Real-Time Forecasts

- Random Walk Model with Drift

$$dbtc_t = \alpha + \beta_i dbtc_{t-i} + \varepsilon_t$$

(i)

$$dbtc_t = \alpha + \sum_{i=1}^{5} \beta_i dbtc_{t-i} + \varepsilon_t$$

- Autoregressive Bitcoin (AR5)

....

$$dbtc_t = \alpha + \sum_{i=1}^{5} \gamma_i dmkr_{t-i} + \varepsilon_t$$

- LRM with Maker

$$dbtc_t = \alpha + \sum_{i=1}^{5} \beta_i dbtc_{t-i} + \sum_{i=1}^{5} \gamma_i dmkr_{t-i} + \varepsilon_t$$

- VAR

(iv)

Forecast Results (January 01, 2024 - January 01, 2025)

	Model	Statistical Forecast Gains				Profitability			
		MSFE Ratio	p-value	Success Ratio	p-value	Cumulative Returns	p-value	Risk-Adjusted Returns	p-value
Bitcoin Spot	RW with Drift	0.617	0.184	0.529	-	320.380		93.857	
	Bitcoin AR (5)	0.615	0.202	0.530	0.249	314.040	0.569	92.000	0.569
	LRM with Maker	0.611	0.071	0.531	0.144	347.750	0.307	101.890	0.306
	VAR	0.612	0.138	0.530	0.175	347.580	0.315	101.840	0.314
Bitcoin Futures	RW with Drift	0.717	0.191	0.512		326.900		77.252	
	Bitcoin AR (5)	0.710	0.103	0.518	0.063	326.440	0.505	77.140	0.505
	LRM with Maker	0.720	0.448	0.513	0.317	305.790	0.624	72.250	0.624
	VAR	0.718	0.388	0.514	0.261	319.940	0.536	75.600	0.536

Long-and-Short Cumulative Returns
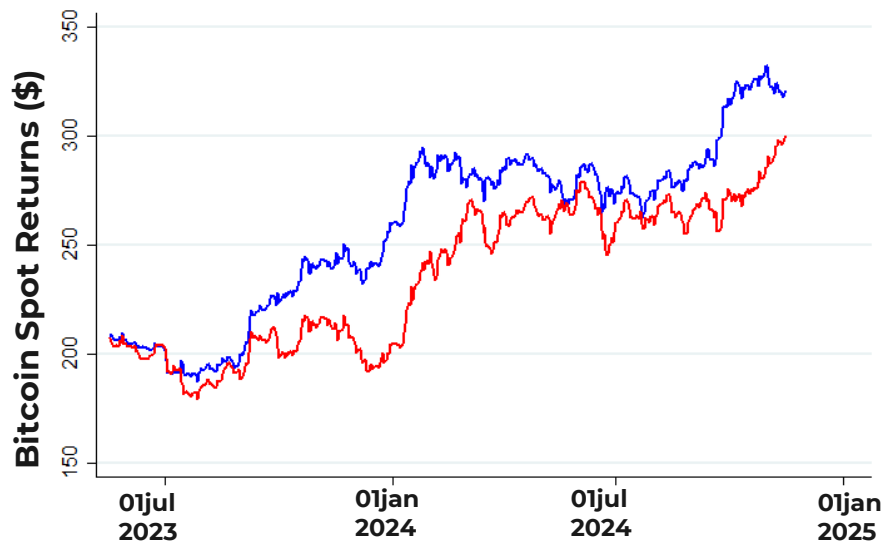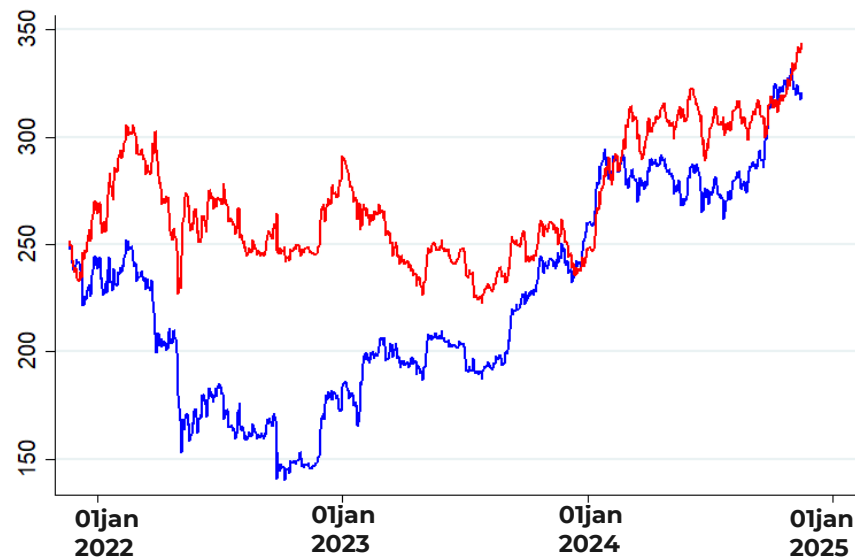# (January 01, 2024 - January 01, 2025)
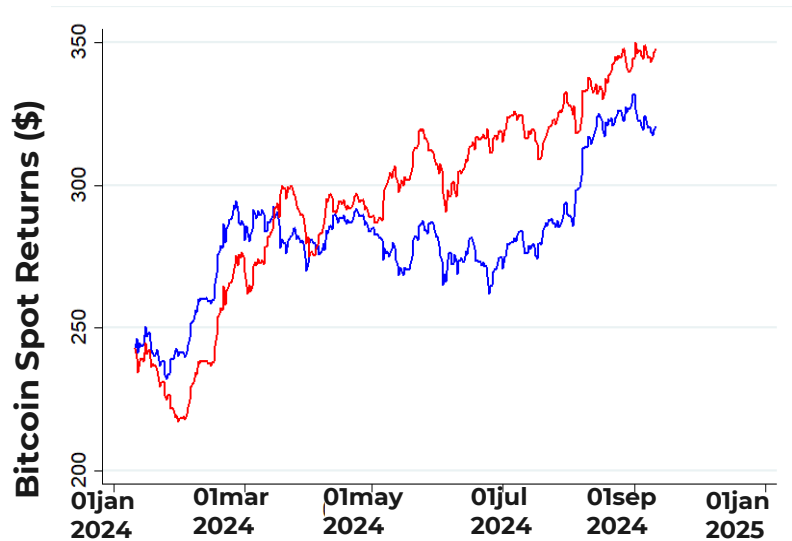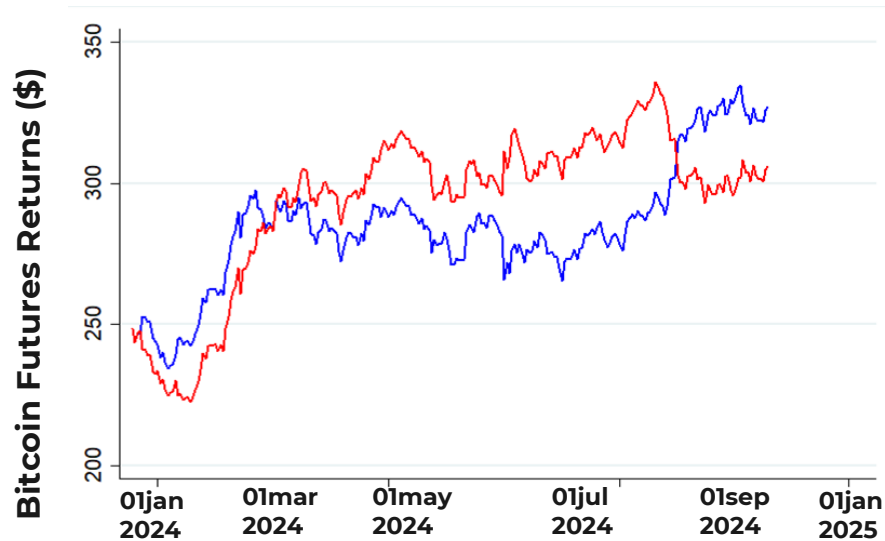
Buy-and-Hold   LRM with Maker

Long-and-Short Cumulative BTC Spot Returns

Robustness

- Alt Lag Choices: MSFE, DA, returns stable (lags 3–7)
- Sample Sensitivity: Performance varies by forecast window
- Tested:
  - Extended: Jul 2023 – Jan 2025, Jan 2022 - Jan 2025
- DA Patterns:
  - Higher when BTC ↑ & large Maker moves (> 1 SD)

Fig: Directional Accuracy under Different Market Conditions

DA for Model 2	Overall	BTC ↓	BTC ↑	Maker > 1 SD (large movements)	Maker ≤ 1 SD (normal/low movement)
DA (Spot)	0.530	0.029	0.976	0.685	0.515
DA (Futures)	0.518	0.040	0.974	0.659	0.505

Conclusion

- Puzzle: Maker predicts Bitcoin — violates EMH

- Out-of-sample gains: MSFE ↓, DA ↑, returns ≅ 350%

- Best model: LRM with Maker only (Bitcoin Spot Markets)

- Inefficiency persists: Not arbitraged away

- Consistent across: Spot & Futures, risk-adjusted returns

- Contribution: From in-sample predictability → out-of-sample arbitrage
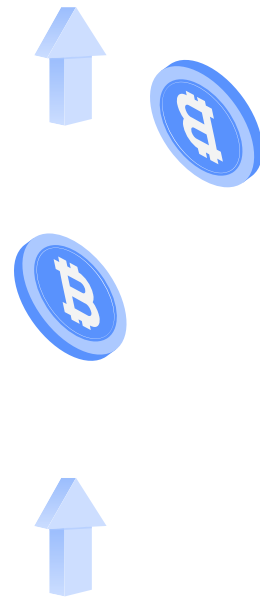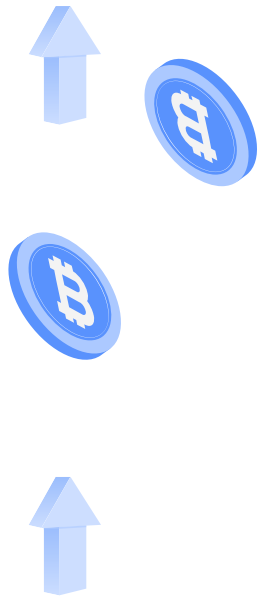
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