Is Bitcoin Really Untethered?

John M. Griffin and Amin Shams
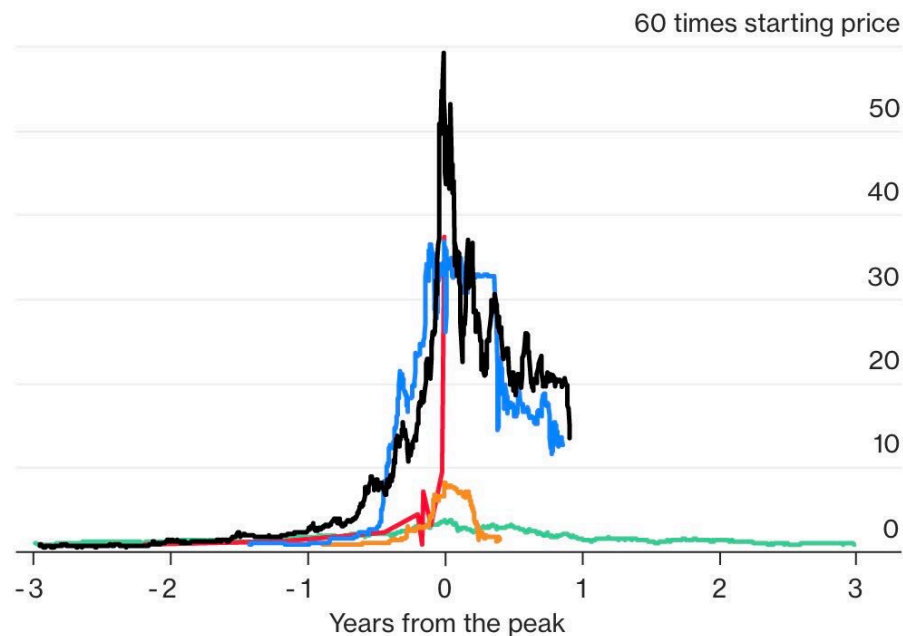
The Journal of Finance: Vol. LXXV, No. 4

Bitcoin: The Greatest Bubble in Human History…

How Bitcoin Stacks Up to Other Asset Bubbles

/ Bitcoin   / Mississippi   / Tulips   / South Sea   / Nasdaq Composite

60 times starting price

50

40

30

20

10

0

-3   -2   -1   0   1   2   3
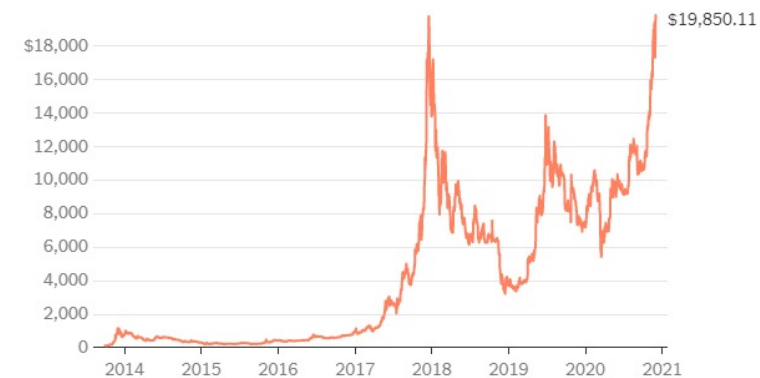
Years from the peak

Sources: Bloomberg, International Center for Finance at Yale School of Management, Peter Garber

Bitcoin Hits New Record, This Time With Less Talk of a Bubble

The crazy cousin of traditional currencies, which fell below $4,000 in March, passed $19,783. More investors now are buying it for the long term.
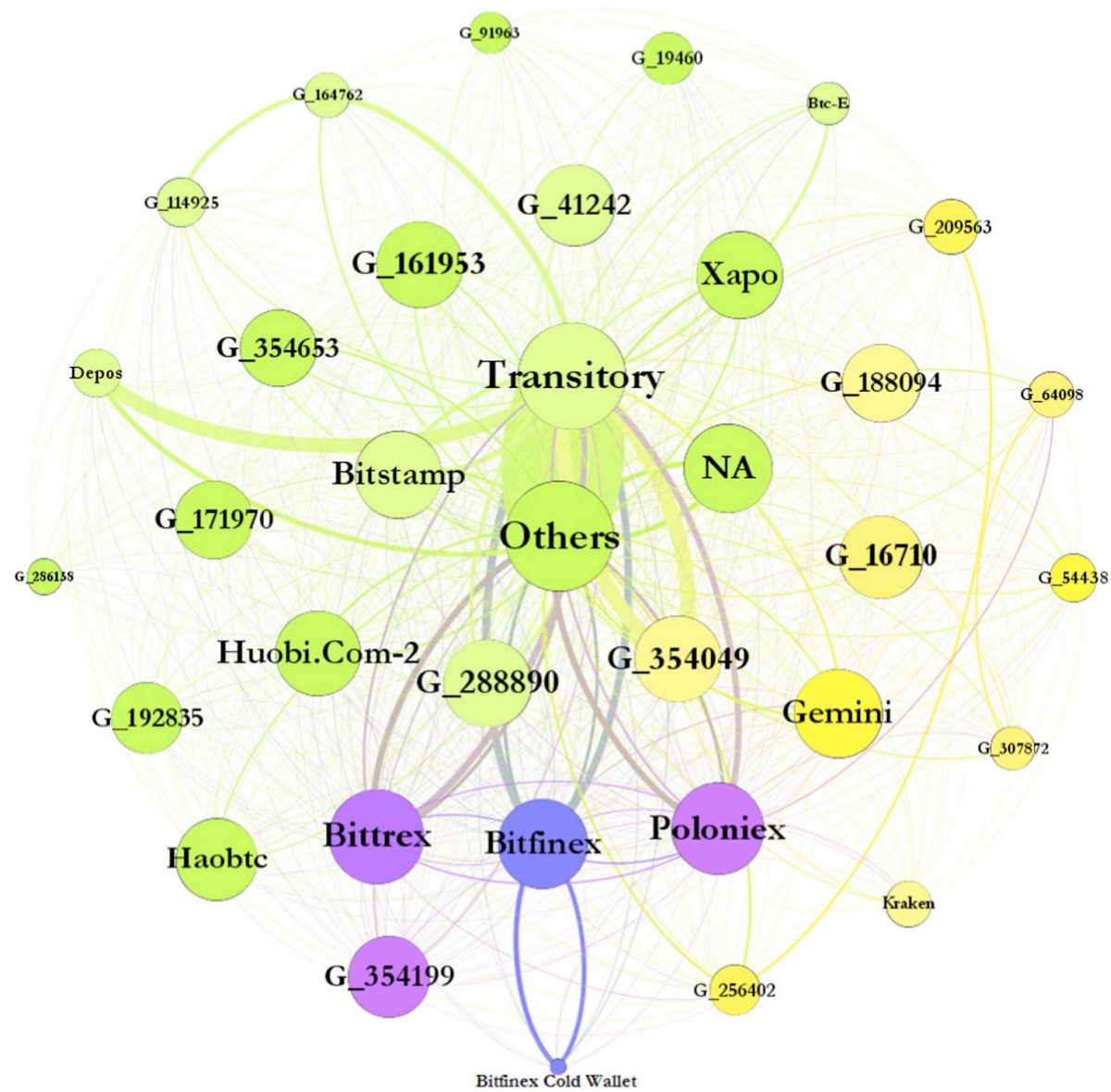
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Daily Highs for Price of Bitcoin

$19,850.11

$18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0

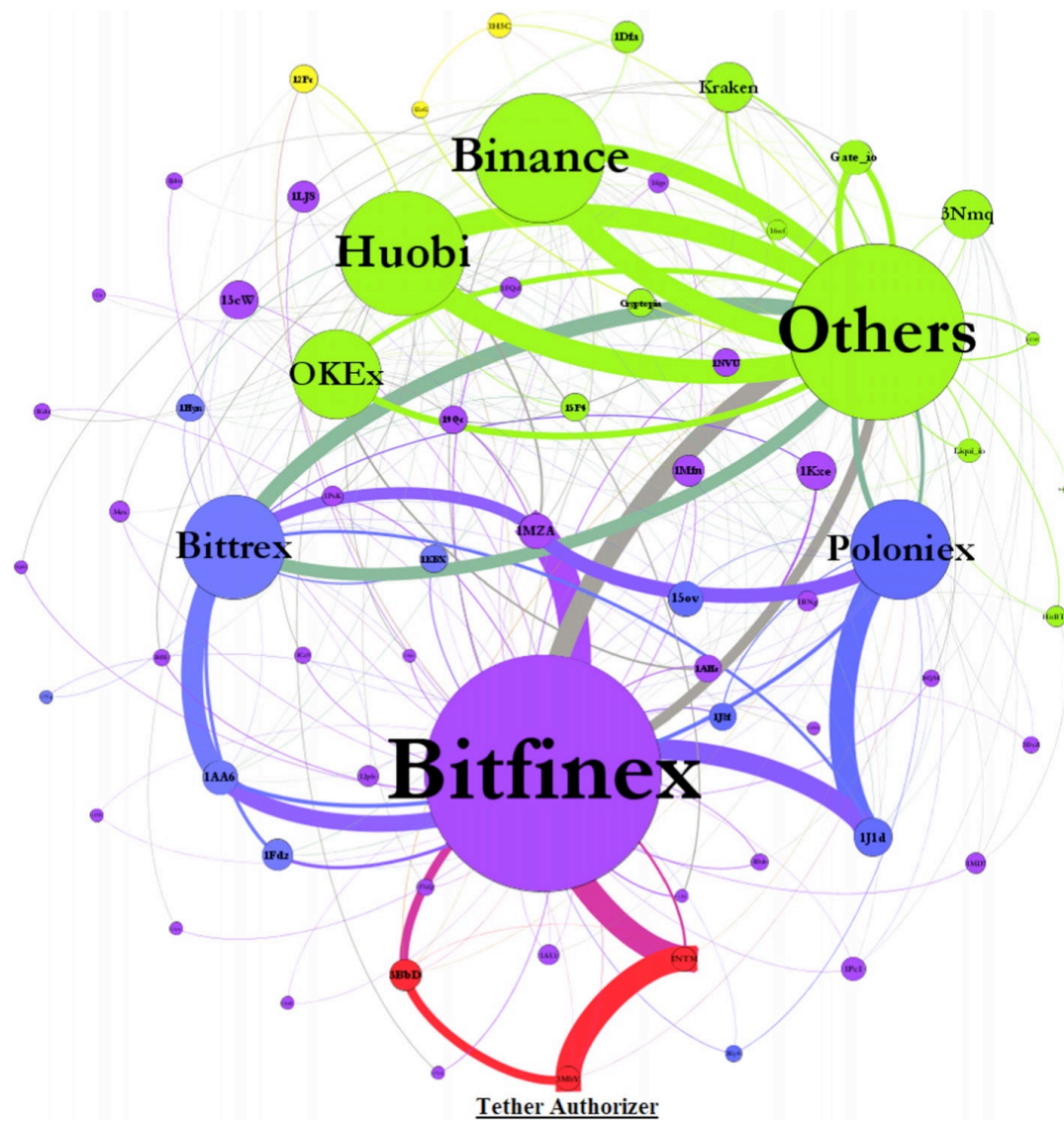2014   2015   2016   2017   2018   2019   2020   2021

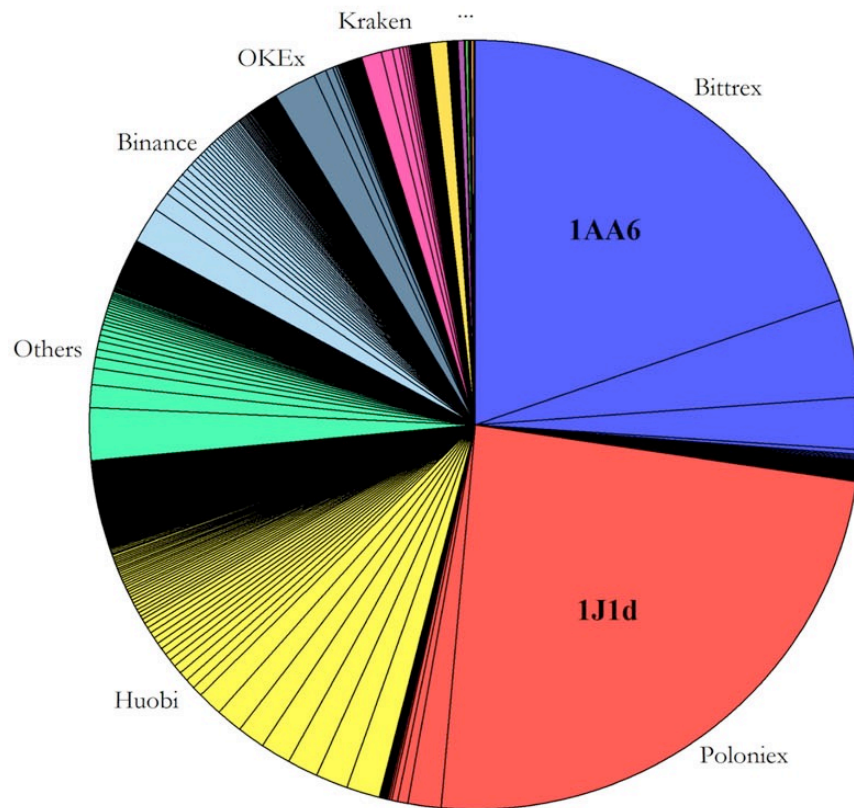Source: CoinDesk, as of Monday morning Eastern time • The New York Times

Tether-Bitcoin Manipulation

- Tether (USDT): "stable coin" issued by *Tether Limited*

- Each Tether is backed by 1 USD in reserve

- Tether is issued on demand: 1 USD for 1 USDT

- Tether facilitates transactions between cryptocurrency exchanges

- Tether accounts for 80% of bitcoin trading volume

- *Bitfinex* and *Tether Ltd.* are owned by the same board

- Tether could be printed by Tether Ltd. and distributed through Bitfinex

- Tether Ltd. could print Tether to support Bitcoin price

Binance

Huobi

Kraken

Gate_io

3Nmq

OKEx

Others

Cryptopia

1NVU

15F4

1MBn

1Kxe

Bittrex

1MZA

Poloniex

15ov

Liqui_io

HitBTC

1ABo

1JM

Bitfinex

1J1d

1AA6

1Fdz

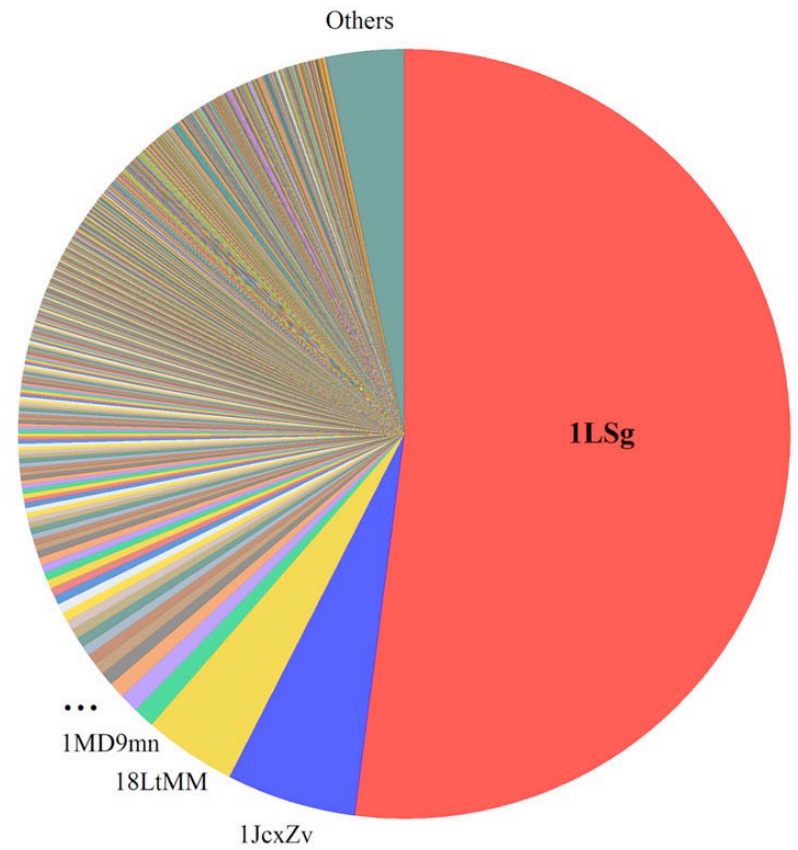1NYM

5BbD

Tether Authorizer

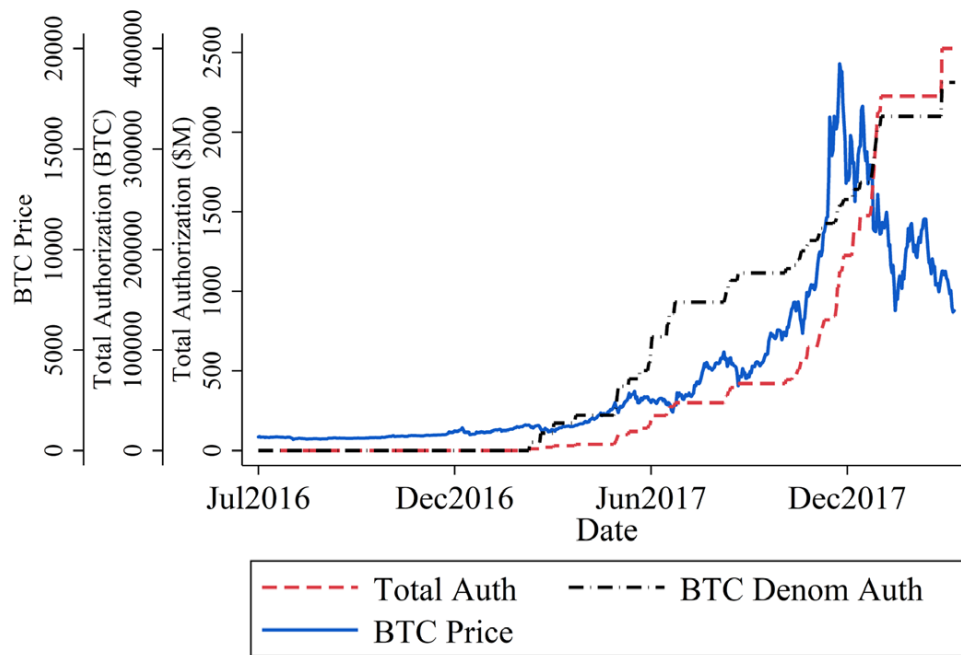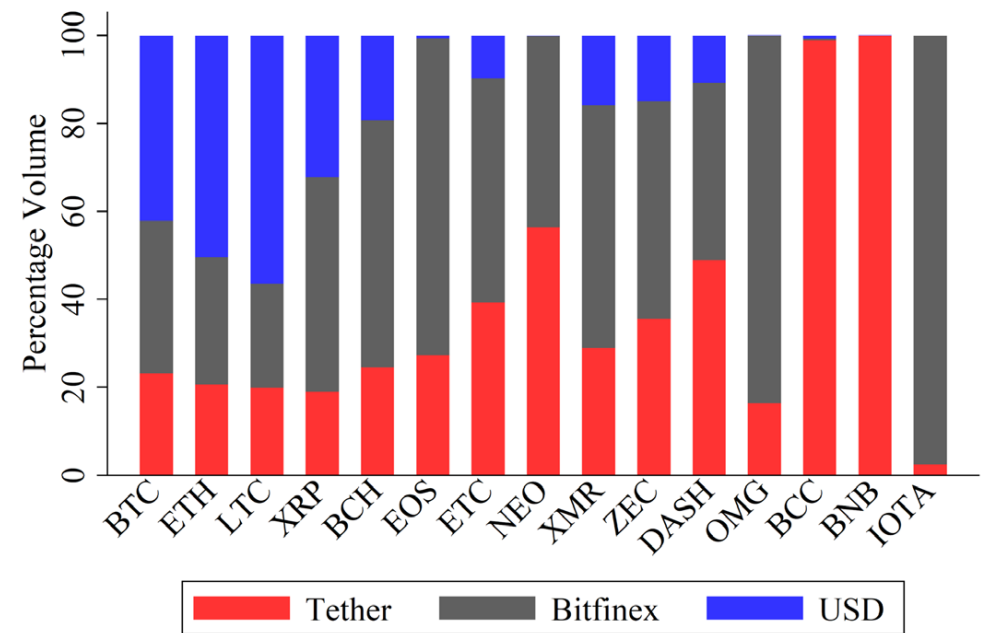Panel A. Tether Blockchain

Panel B. Bitcoin Blockchain

Panel A. Tether and Bitcoin Price over Time

Panel B. Percentage of Trade Volume in USD and Tether

Bitcoin Price Manipulation?
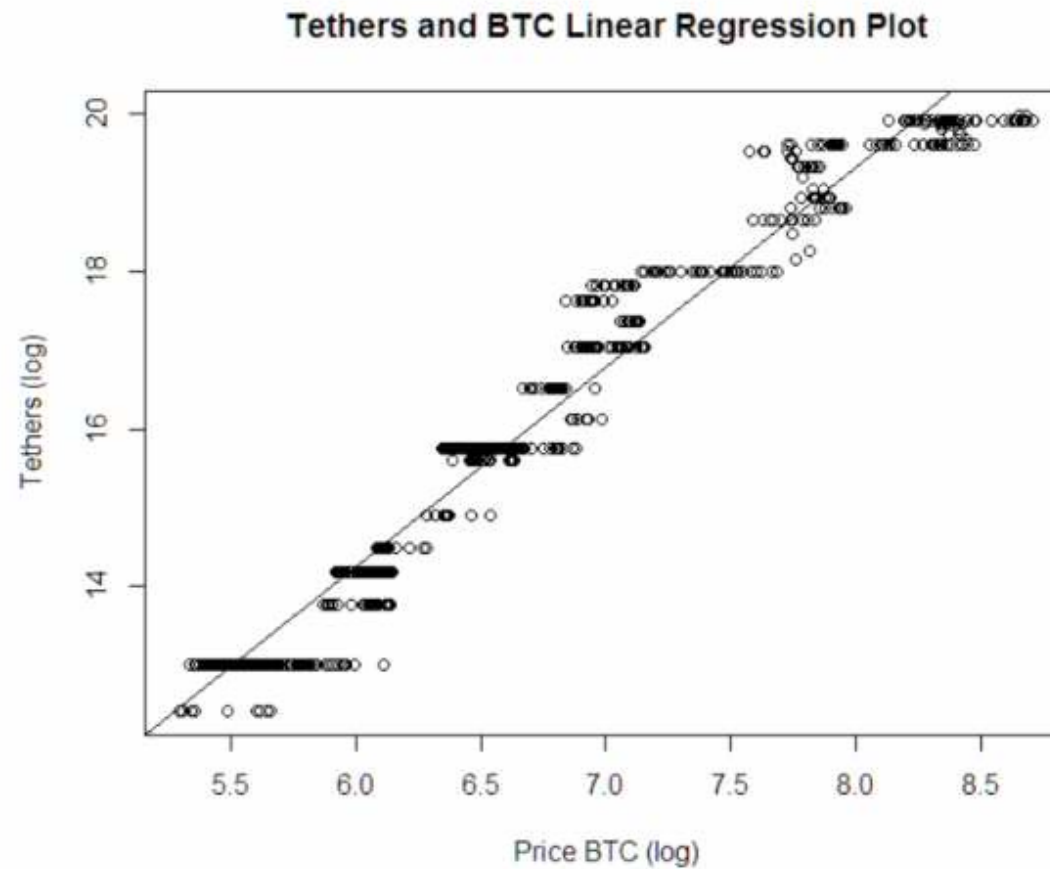
Figure 1: Linear regression plot of Tethers in circulation vs BTC price (USD) log transformed showing a linear relationship between tethers and bitcoin price $R^2 = 0.9655$, $F(1,1016) = 2.932e+04$, $p < .001$

"Pulled" vs "Pushed" Hypotheses

- "Pulled" Hypothesis
  - Tether issuance is driven by legitimate demand from investors by exchanging fiat money for Tether

- "Pushed" Hypothesis
  - Tether is created out of thin air (unbacked by fiat dollar) by the creator to purchase Bitcoin

"Pulled" vs "Pushed" Hypotheses

- **"Pulled" Hypothesis**
  - H1A: Tether flows should be accompanied by changes in Tether/USD exchange rate
  - H1B: If Tether is demanded to facilitate cross-exchange arbitrage, Tether flows should correspond to arbitrage spread

- **"Pushed" Hypothesis**
  - H2A: Tether outflows should follow periods of negative Bitcoin returns
  - H2B: Bitcoin price should go up after Tether flows into the market
  - H2C: Bitcoin returns may show a return reversal after Tether flows in
  - H2D: Tether authorization should be more pronounced at round-number thresholds
  - H2E: To show adequate reserves in EOM accounting statements, Tether creators may liquidate Bitcoins into USD, and thus causes negative returns in Bitcoin at the EOM

Data and Algorithms

- 200 GB blockchain data from March 2017 to March 2018
- Clustering Bitcoin wallets: connected components inputting into the same address are considered as a group of wallets controlled by the same entity
- Bitcoin and Tether net flows:

$$NetBTCFlow_t = \left(\sum_{t-1}^{t} BTC_{PLX \to BFX} - \sum_{t-1}^{t} BTC_{BFX \to PLX} \right)$$

$$+ \left(\sum_{t-1}^{t} BTC_{BTX \to BFX} - \sum_{t-1}^{t} BTC_{BFX \to BTX} \right), \qquad (1)$$

$$NetTetherFlow_t = \left(\sum_{t-1}^{t} Tether_{BFX \to PLX} - \sum_{t-1}^{t} Tether_{PLX \to BFX} \right)$$

$$+ \left(\sum_{t-1}^{t} Tether_{BFX \to BTX} - \sum_{t-1}^{t} Tether_{BTX \to BFX} \right), \qquad (2)$$

Tether Authorizer

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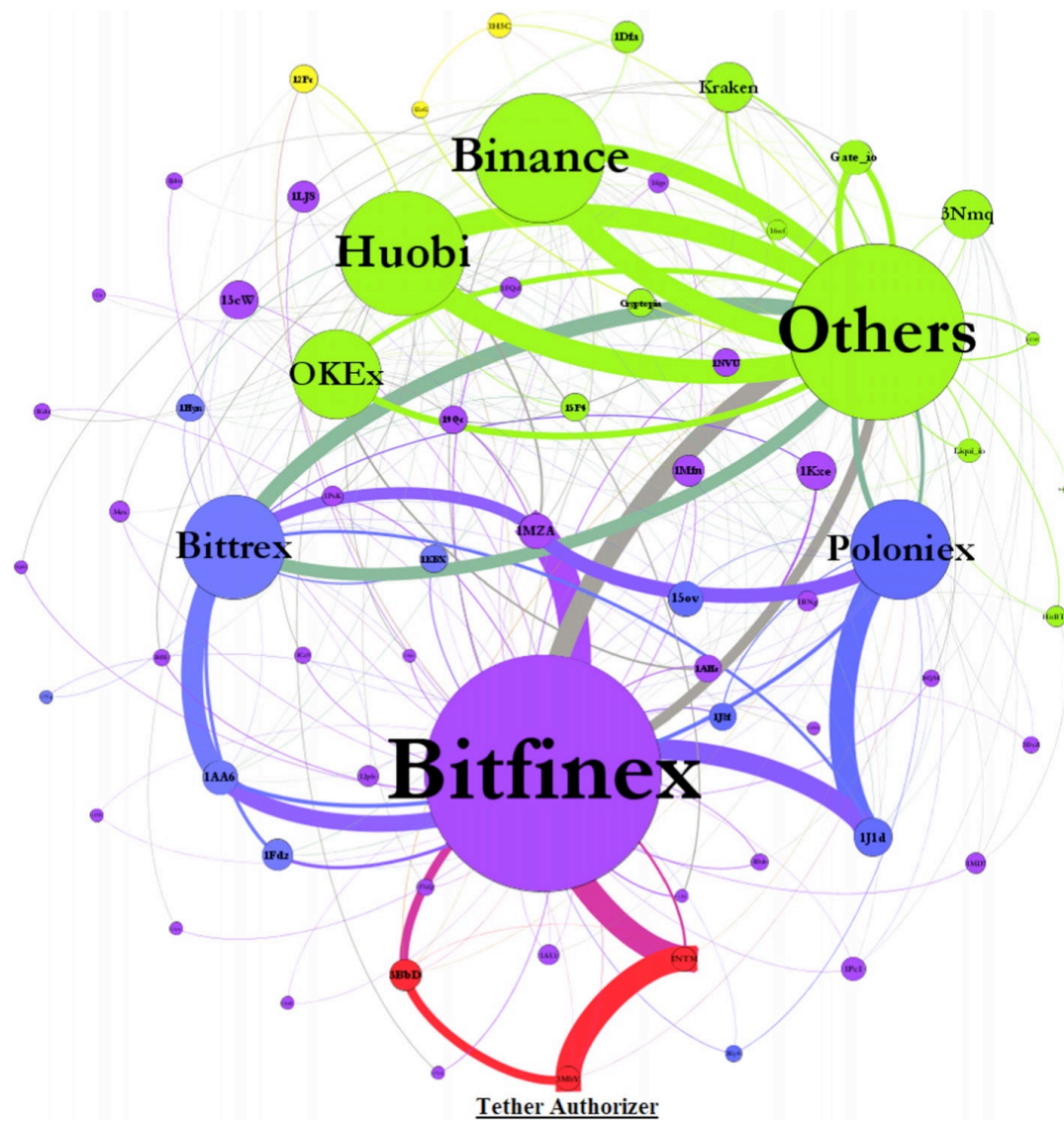
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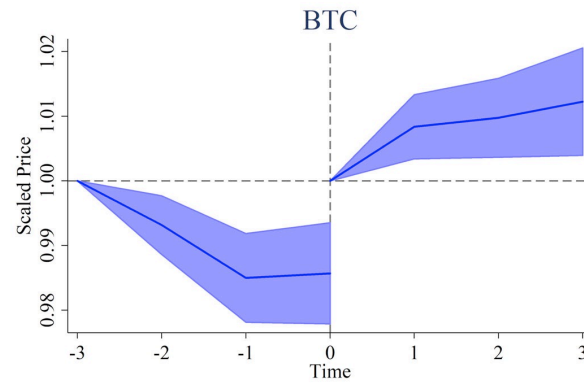
The Effect of Flow of Tether on Bitcoin Return

$$\frac{1}{3} \sum_{i=0}^{2} R_{t+i} = \beta_0 + \beta_1 Flow_{t-1} + Controls + \epsilon_t,$$

	(1) Auth	(2) NoAuth	(3) L.Ret < 0	(4) L.Ret > 0	(5) L.Ret < 0_Auth
Panel A: Regression of Returns on Lagged Flows					
Lag PLX BTX Flow	3.855*	−0.354	2.694*	−1.100	8.134**
	(2.30)	(−0.48)	(2.18)	(−1.20)	(2.93)
LagRet	−0.00600	−0.00985	0.0634*	−0.0518	0.0897
	(−0.18)	(−0.57)	(1.97)	(−1.72)	(1.46)
Volatility	103.9	97.00	−52.33	−70.32	−102.3
	(1.17)	(1.38)	(−0.67)	(−0.89)	(−0.70)
Volatility*Lag Ret	−0.343	−0.289	−1.443***	0.609	−1.660**
	(−0.94)	(−1.14)	(−3.40)	(1.58)	(−2.85)
Constant	−8.071	−1.387	4.261	5.105	2.062
	(−1.44)	(−0.46)	(1.26)	(1.50)	(0.24)
Observations	2,645	6,856	4,488	5,009	1,258
Adjusted R^2	0.012	0.005	0.020	0.001	0.045

	(1) Auth	(2) NoAuth	(3) L.Ret < 0	(4) L.Ret > 0	(5) L.Ret < 0_Auth
Panel B: Regression of Returns on Lagged Decomposed Flows					
Lag 1LSg Flow	4.240*	−0.484	2.379*	−1.300	8.206***
	(2.37)	(−0.57)	(1.97)	(−1.24)	(3.61)
Lag Other PLX BTX Flow	5.531	−0.513	4.602	−0.372	12.22
	(1.20)	(−0.26)	(1.23)	(−0.16)	(1.32)
Lag Other Flow	−6.483*	1.599	−0.514	0.322	−8.328*
	(−2.36)	(1.43)	(−0.34)	(0.25)	(−2.38)
LagRet	−0.00562	−0.0108	0.0650*	−0.0523	0.0958
	(−0.17)	(−0.63)	(2.01)	(−1.73)	(1.57)

Prices of Bitcoin around High-Flow Events

Panel A. Bitcoin

Panel B. Other Major Cryptocurrencies

How Significant is the Price Effect?

Panel A. Bitcoin

Panel B. Other Major Cryptocurrencies
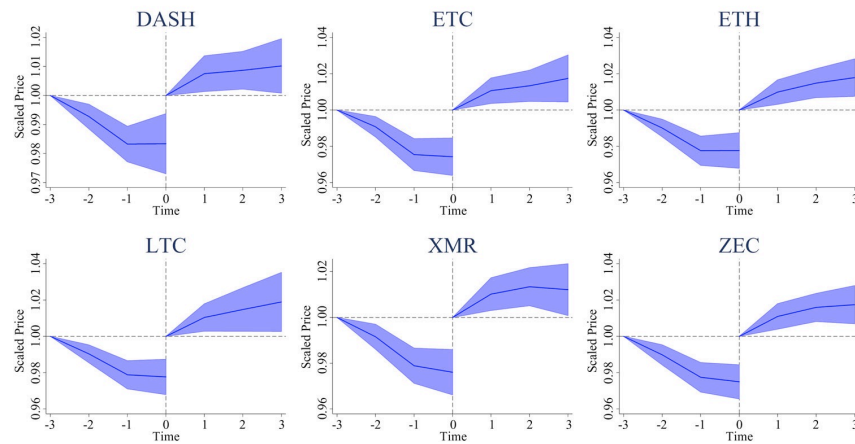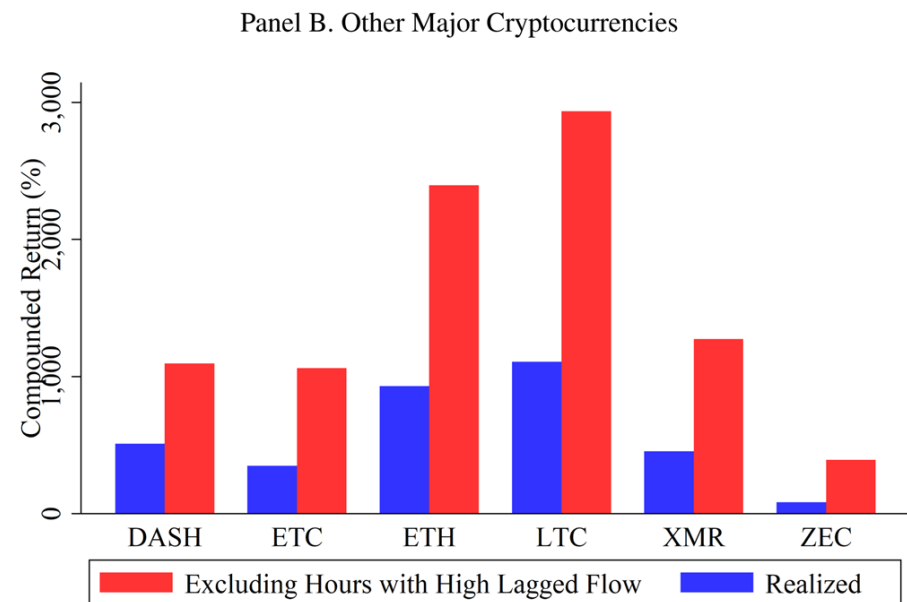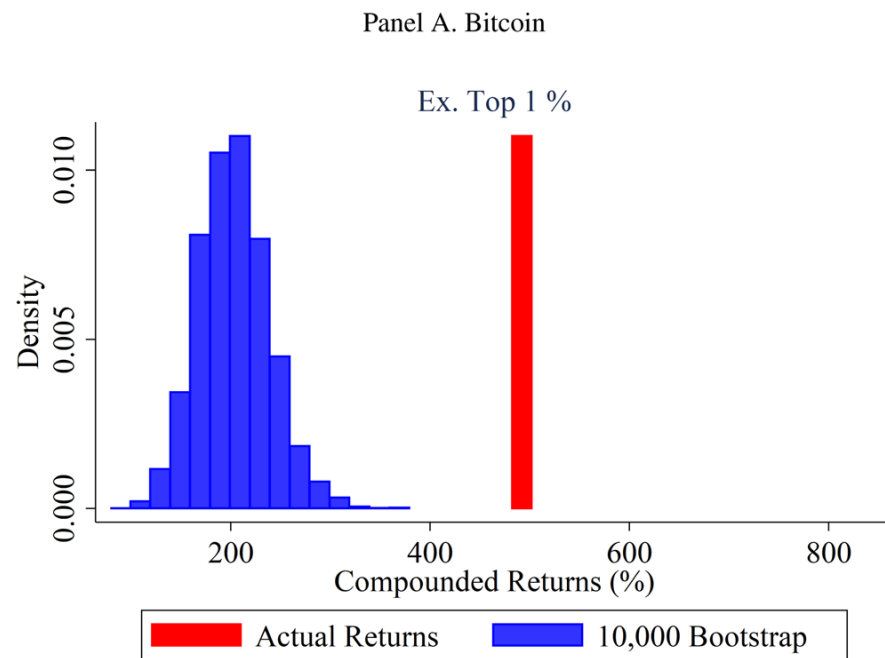
How Significant is the Price Effect?

"Pulled" vs "Pushed" Hypotheses

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  - H1A: Tether flows should be accompanied by changes in Tether/USD exchange rate
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  - H2A: Tether outflows should follow periods of negative Bitcoin returns
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  - H2E: To show adequate reserves in EOM accounting statements, Tether creators may liquidate Bitcoins into USD, and thus causes negative returns in Bitcoin at the EOM

Bitcoin Return Reversals and Tether Flows

$$R_t = \beta_0 + \beta_1 R_{t-1} + \beta_2 Flow_{t-1} + \beta_3 R_{t-1} * Flow_{t-1} + Controls + \epsilon_t,$$

	Panel A: Using Aggregate Flows to PLX and BTX		
	Full Sample	Neg Lagged Returns	Pos Lagged Returns
Lag Ret	−0.0198	0.0004	−0.0420
	(−0.62)	(0.01)	(−0.69)
Lag Flow	0.0003	−0.0002	0.0001
	(1.68)	(−0.53)	(0.34)
Lag Flow × Lag Ret	−0.0326**	−0.0669**	−0.0073
	(−2.73)	(−2.67)	(−0.36)
Lag Volatility	0.0093	0.0060	0.0100
	(1.38)	(0.49)	(0.88)
Lag Volatility × Lag Ret	−0.3961	−0.5918	−0.2719
	(−0.98)	(−0.85)	(−0.37)
Constant	−0.0002	−0.0000	−0.0001
	(−0.67)	(−0.07)	(−0.29)
Observations	9,503	4,488	5,011
Adjusted R^2	0.007	0.011	0.001

	Panel B: Using Decomposed Flows		
	Full Sample	Neg Lagged Returns	Pos Lagged Returns
Lag Ret	−0.0125	0.0166	−0.0320
	(−0.38)	(0.27)	(−0.52)
Lag 1LSg Flow	0.0003	−0.0001	−0.0000
	(1.71)	(−0.19)	(−0.02)
Lag 1LSg Flow × Lag Ret	−0.0280*	−0.0545*	0.0050
	(−2.23)	(−2.17)	(0.22)
Lag Volatility	0.0094	0.0060	0.0110
	(1.40)	(0.49)	(0.97)
Lag Volatility × Lag Ret	−0.4986	−0.7798	−0.4123
	(−1.20)	(−1.11)	(−0.55)
Lag PLX BTX Flow × Lag Ret	−0.0200	−0.0272	−0.0153
	(−1.61)	(−1.41)	(−0.95)

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Flow of Tether around Round Thresholds of Bitcoin Price

$$Flow_t = \beta_0 + \beta_1 BelowRoundCutoff_{t-1} + \epsilon_t.$$

	Full	Auth	NoAuth
Panel A: Flows around Round Thresholds			
Below Round Cutoff	14.75*	60.83***	0.221
	(2.02)	(3.52)	(0.03)
Constant	36.26***	45.55***	31.93***
	(8.52)	(5.19)	(6.78)
Observations	1,603	464	1,139
Adjusted R^2	0.002	0.028	−0.001

	1LSg	Oth BTX	Oth PLX	Binance	HitBTC	Huobi	Kraken	OKEx
Panel B: Flows to Different Exchanges—Days Following Authorization								
Below Round Cutoff	52.60***	2.059	6.172	7.497	3.810	6.289	5.252	0.971
	(3.71)	(0.60)	(1.62)	(1.27)	(1.92)	(1.90)	(0.83)	(0.46)
Constant	34.75***	4.885***	5.915**	13.66***	0.564	3.766**	−1.071	3.841***
	(4.63)	(3.93)	(3.08)	(4.42)	(0.64)	(3.01)	(−0.38)	(3.52)
Observations	464	464	464	305	464	464	464	260
Adjusted R^2	0.030	−0.001	0.004	0.002	0.007	0.008	−0.000	−0.003

	1LSg	Oth BTX	Oth PLX	Binance	HitBTC	Huobi	Kraken	OKEx
Panel C: Flows to Different Exchanges—Other Days								
Below Round Cutoff	5.815	−2.825	−2.768	−1.085	−0.835	−0.476	0.207	2.043
	(0.89)	(−1.33)	(−1.47)	(−0.47)	(−1.23)	(−0.12)	(0.17)	(0.71)
Constant	19.93***	4.982***	7.015***	3.442*	0.761*	4.123	−0.00519	−0.542
	(4.99)	(3.43)	(5.43)	(2.01)	(2.29)	(1.32)	(−0.01)	(−0.22)
Observations	1,139	1,139	1,139	731	1,139	1,139	1,139	483
Adjusted R^2	−0.000	0.001	0.001	−0.001	0.001	−0.001	−0.001	−0.001

Price Effect of Flows around Round Threshold

$$\frac{1}{3}\sum_{i=0}^{2} R_{t+i} = \beta_0 + \beta_1 \hat{Flow}_{t-1} + \epsilon_t,$$

	Panel A: Returns around Round Thresholds			
	Auth	NoAuth	Auth_L.Ret < 0	Auth_L.Ret > 0
Below Round Cutoff	20.61*	−3.397	32.87*	11.91
	(2.42)	(−0.74)	(2.58)	(1.29)
Constant	1.765	5.466	11.75	−7.205
	(0.33)	(1.87)	(1.39)	(−1.15)
Observations	464	1,138	214	250
Adjusted R^2	0.012	0.000	0.025	0.002

	Panel B: Instrumenting the Flow using the Round Thresholds			
	All	Auth	Auth_L.Ret < 0	Auth_L.Ret > 0
Flow	26.42*	33.88*	45.34*	22.92
	(2.06)	(2.05)	(2.37)	(0.97)
Constant	−5.724	−13.67	−10.75	−16.81
	(−1.05)	(−1.27)	(−0.72)	(−1.23)
Observations	1,602	464	214	250
Wald F-statistic	19.44	12.03	8.217	5.264

|	Panel C: Instrumenting the 1LSg Flow using the Round Thresholds			
	All	Auth	Auth_L.Ret < 0	Auth_L.Ret > 0
1LSg Flow	38.52*	65.44*	89.35	47.27
	(2.09)	(2.03)	(1.79)	(1.11)
Oth PLX/BTX Flow	−21.19	−52.65	−76.91	−47.82
	(−1.78)	(−1.45)	(−1.08)	(−1.26)
Oth Flow	−10.18	−38.09*	−35.38	−40.03
	(−1.92)	(−2.10)	(−1.73)	(−1.21)
Constant	−3.364	−10.28	−8.653	−11.08
	(−0.75)	(−1.01)	(−0.53)	(−0.99)
Observations	1,602	464	214	250
Wald F-statistic	19.49	7.639	3.291	4.277

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EOM Bitcoin Returns and Tether Issuance
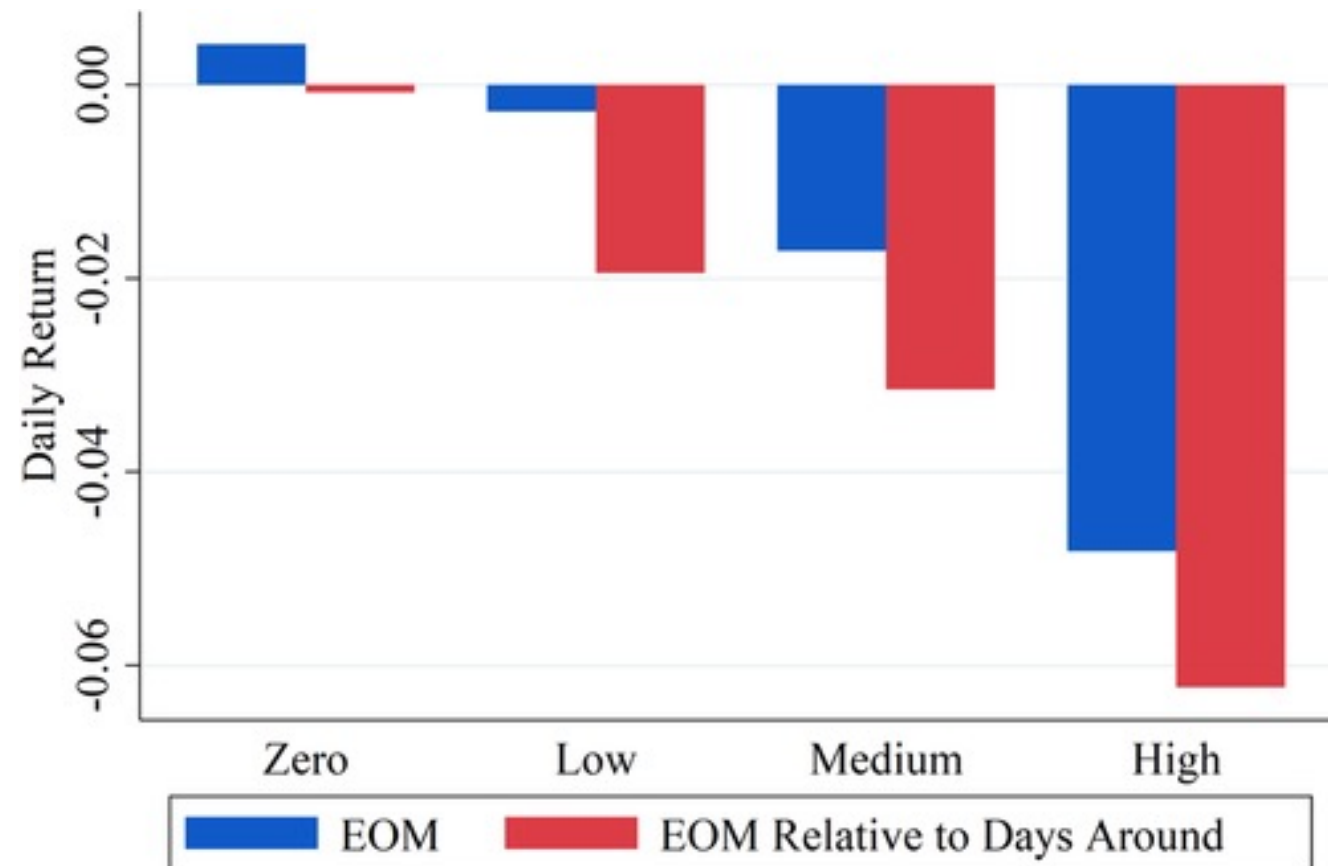
EOM Bitcoin Returns and Tether Issuance

$$R_t = \beta_0 + \beta_1 EOM_t + \beta_2 Issuance_t + \beta_3 EOM_t * Issuance_t + \epsilon_t,$$

	Panel A: Bitcoin Returns							
	Full Sample					Excluding 12/2017 and 1/2018		
	(1) All	(2) NoIssuance	(3) Issuance	(4) All	(5) All	(6) Issuance	(7) All	(8) All
EOM	−0.0230**	−0.000788	−0.0377***	−0.00669	−0.000788	−0.0251***	−0.00869	−0.000788
	(−3.24)	(−0.14)	(−3.65)	(−1.41)	(−0.14)	(−4.70)	(−1.84)	(−0.14)
Issuance				0.00123			0.00546	
				(0.39)			(1.63)	
EOM = 1 × Issuance				−0.0222**			−0.0107*	
				(−2.85)			(−2.04)	
Low × EOM					−0.0187*			−0.0187*
					(−2.27)			(−2.27)
Med × EOM					−0.0307**			−0.0307**
					(−2.71)			(−2.70)
High × EOM					−0.0615*			−0.0232*
					(−2.40)			(−1.98)
Low					0.0117*			0.0117*
					(2.08)			(2.08)
Med					0.00933			0.00933
					(1.33)			(1.32)
High					0.00908			0.0126
					(1.07)			(1.57)

Conclusions

- This paper examines whether Tether is primarily driven by investor demand or is supplied by its creator to inflate cryptocurrency prices.

- Evidence suggests that one large player on Bitfinex uses Tether to purchase large amounts of Bitcoin when prices are falling.

- The findings support the view that price manipulation can have substantial distortive effects in cryptocurrencies.

- Innovative technologies designed to bypass traditional banking systems have not eliminated the need for external regulatory framework as many had believed.