

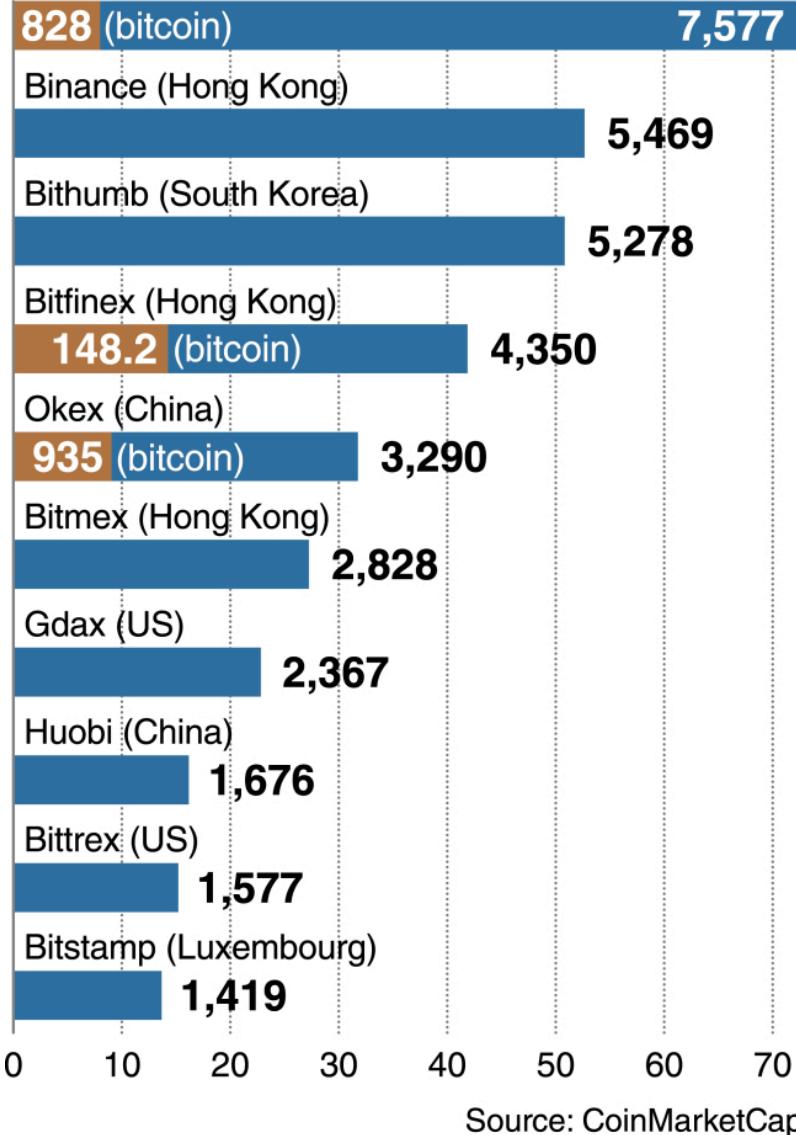
Stablecoins as cross-border settlement remittance: Evidence from Kimchi Premium

Ranking of cryptocurrency exchanges by trade volume

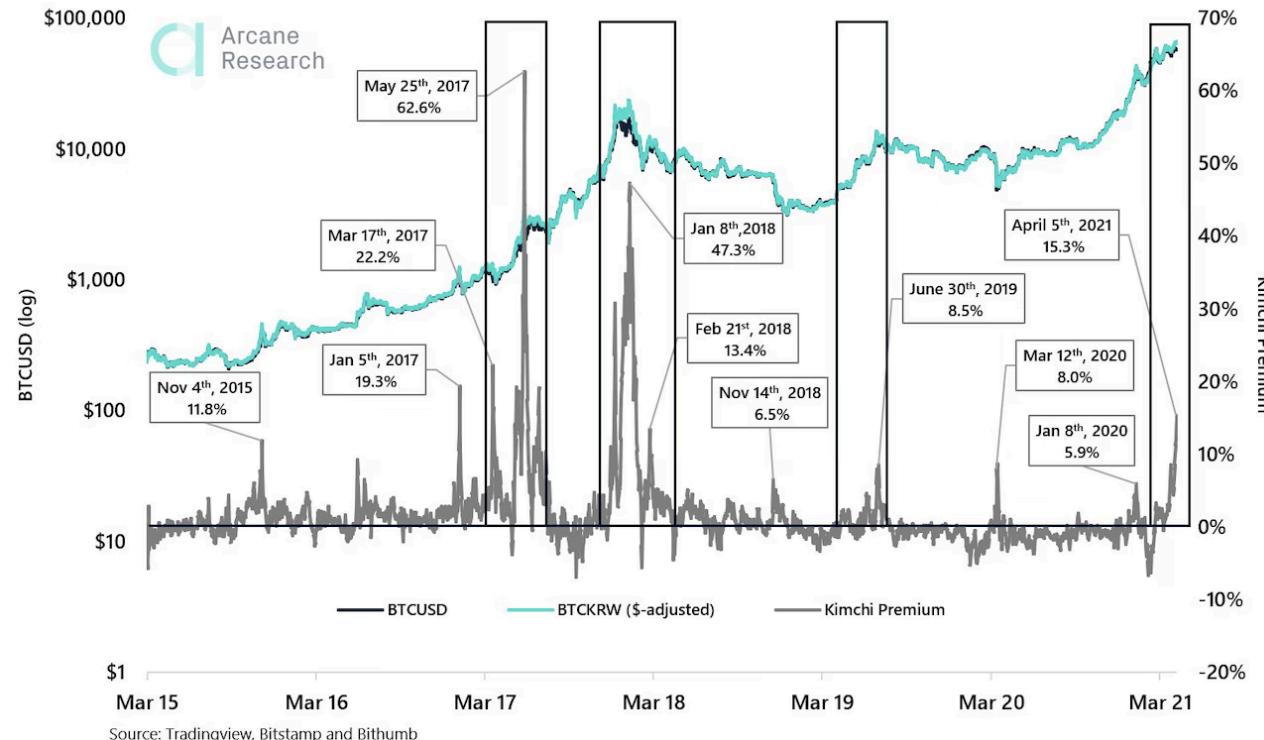
As of Jan. 18 10:40 a.m.

(Unit: \$ million)

Upbit (South Korea)

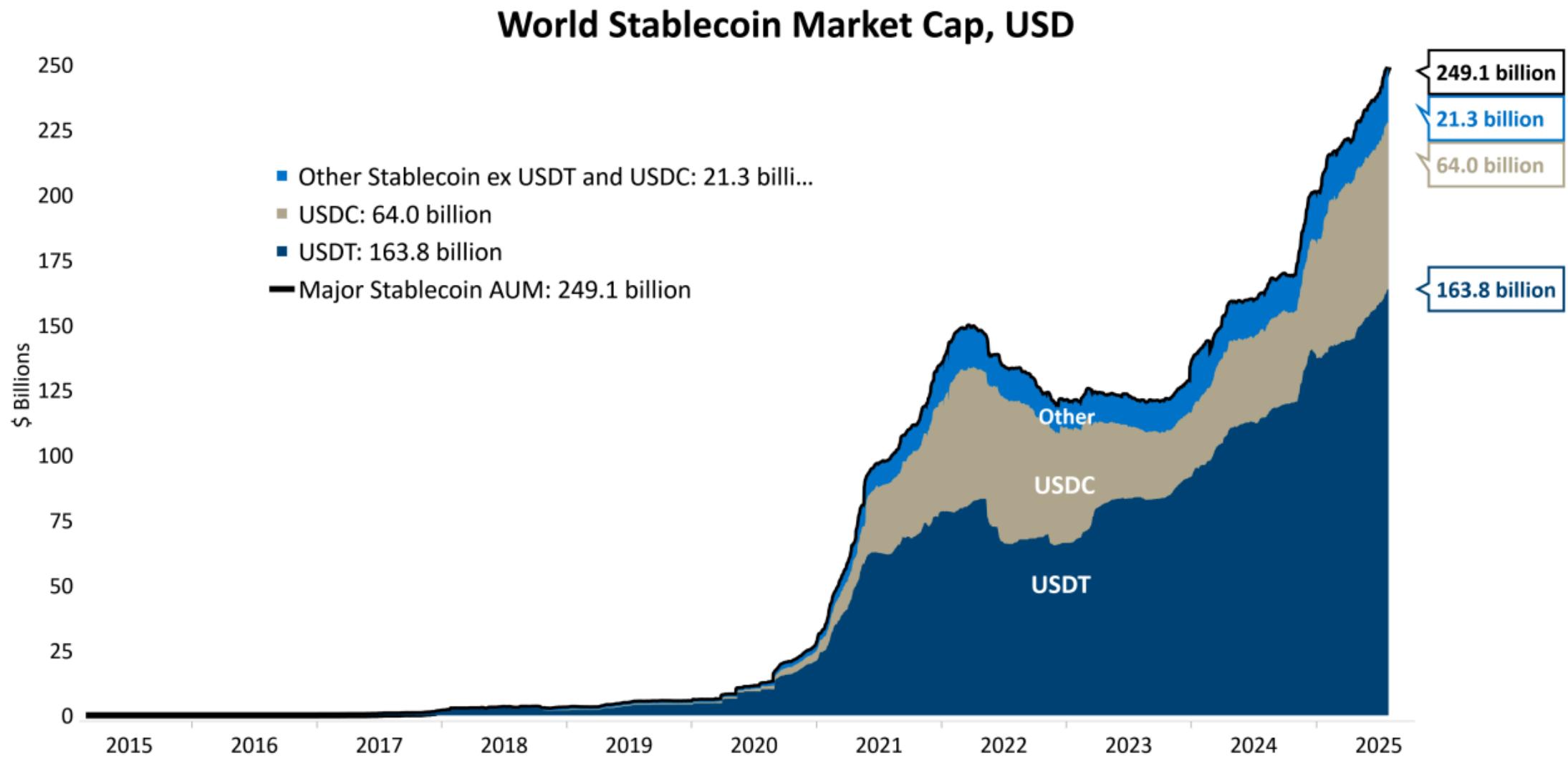


BTCCUSD (Bitstamp) vs BTCKRW dollar adjusted (Bithumb)



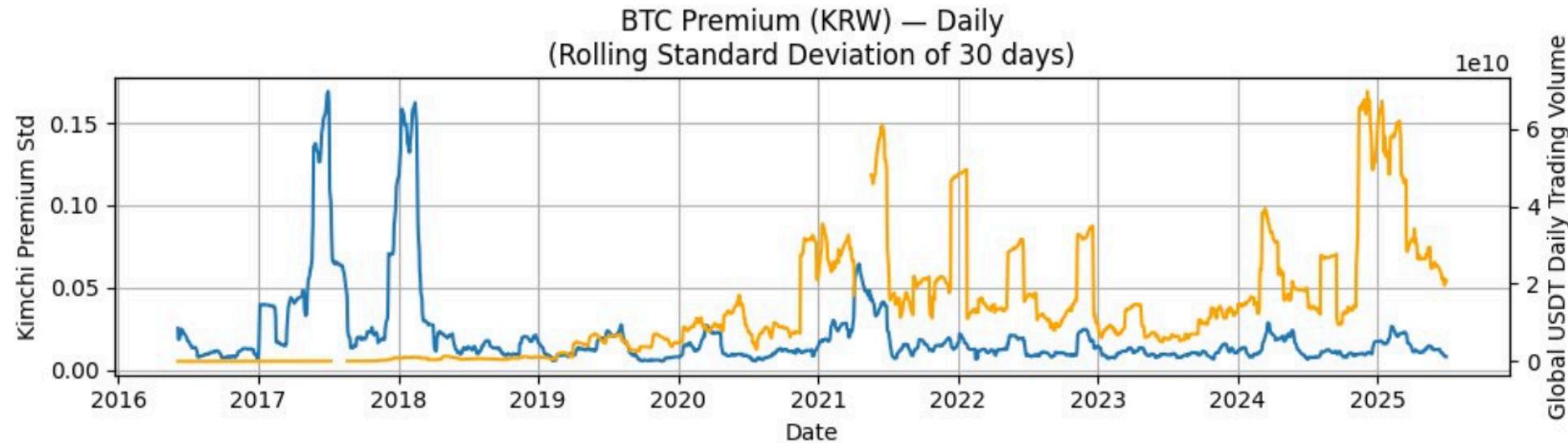
Source: Tradingview, Bitstamp and Bithumb

Stablecoin boom after 2020



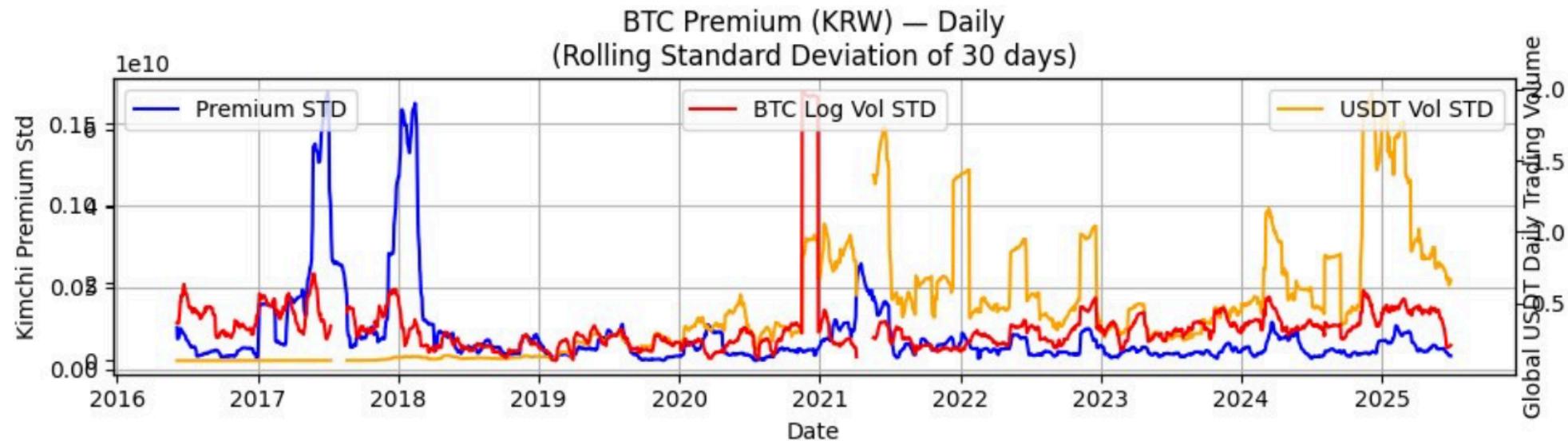
Correlation between Kimchi Premium and ...

| | Tether (USDT) | Bitcoin (BTC) |
|-------------|---------------|---------------|
| before 2020 | -0.3882 | 0.3500 |
| after 2020 | 0.5239 | -0.0341 |



Correlation between Kimchi Premium and ...

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Research Question

Do stablecoins function as effective cross-border settlement remittance that reduce price segmentation in cryptocurrency markets across countries?

Economic Implication

1. Stablecoins circumvent traditional capital controls, enabling rapid cross-border liquidity movements without banks, SWIFT, or FX desks.
2. Stablecoins shift how arbitrage operates globally, altering market segmentation and price discovery

Literature: Cryptocurrency Market and Stablecoin

- *Regulatory Design*
 - ***Comparison to MMF - Flight to safety***
Anadu et al. (2023, Fed); Arner, Auer, and Frost (2020, BIS)
- [v] *Global Interconnectedness*
 - ***Systematic component in Cryptocurrency Market***
Liu and Tsyvinski et al. (2022, JF); Makarov and Schoare (2020, JFE)
 - [v] ***On-chain Transaction Analysis***
Griffin and Shams (2020, JF); Auer, Lewrick and Paulic (2025, BIS);
<https://tronscan.org/#/address/TV6MuMXfmLbBqPZvBHdwFsDnQeVfnmiuSi>

Literature: Limits to Arbitrage

Stream of 'Mispricing(Anomaly)' Theories

1. [v] ***Rational structural uncertainty***: Coexistence of multiple "rational" models
2. ***Behavioral theories***: Irrationality of investors' psychological bias (Barberis et al., 1998; Daniel et al., 1998; Hong and Stein, 1999; Barberis and Shleifer, 2003)

Several factors of limits of arbitrage

1. ***Fundamental risk***: He and Xiong (2008)
2. ***Implementation costs***, e.g., short-sales: Tuckman & Vila (1992, 1993), Miller (1977)
3. [v] ***Constraints in raising equity capital***: Gromb & Vayanos (2002, 2009a), Brunnermeier & Pedersen (2009), Kondor (2009), Shleifer & Vishny (1997)

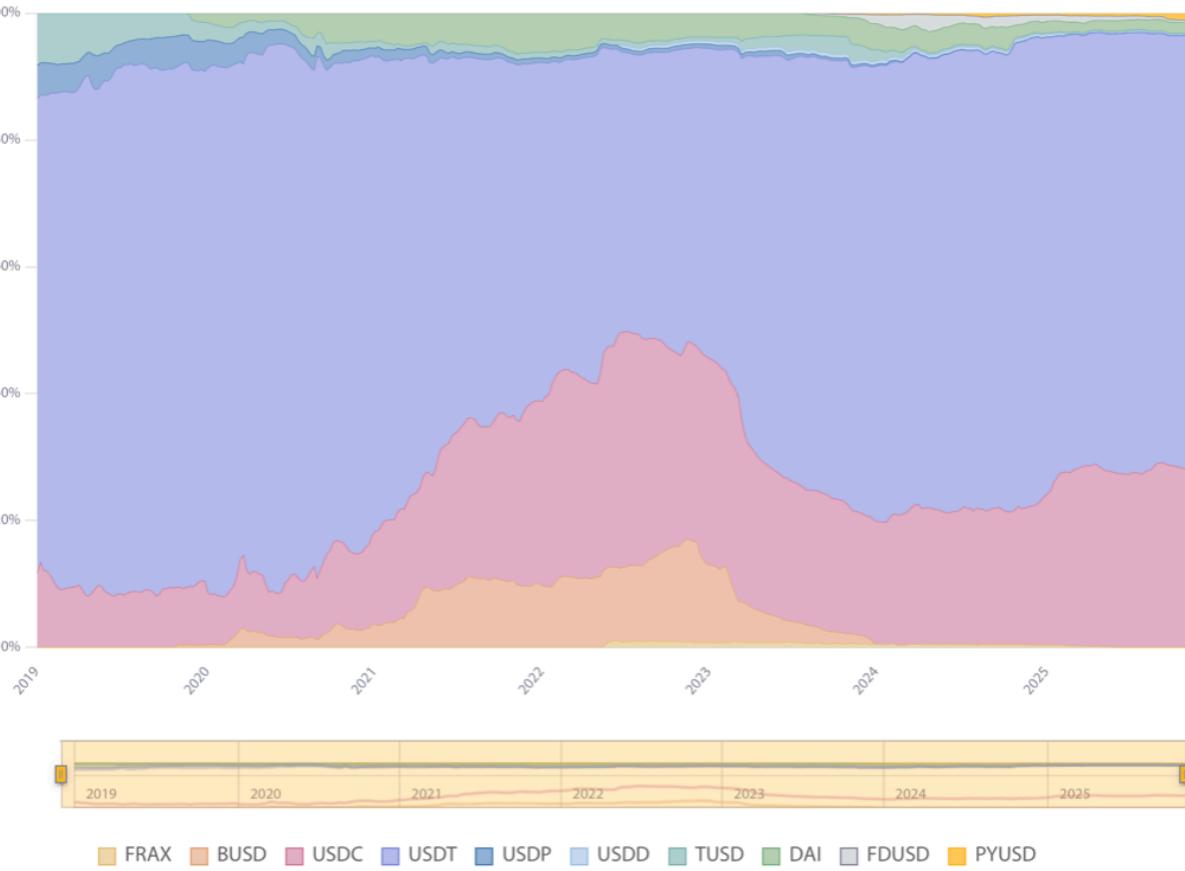
Missing in the Literature

1. **Correct empirical object** for cross-border crypto arbitrage-**only Tether** (USDT)
2. **Transaction-level on-chain flows**, avoiding opaque vendor-aggregated datasets that blur addresses, merge flows, or lose directionality.
3. Tether flows on the **Tron network**—the asset and chain where **actual transaction occurs**.

Therefore, I reconstruct the full settlement dynamics across exchanges on major stablecoin Tether, enabling us to observe **true signed flow, exchange-to-exchange settlement paths, and arbitrage-motivated liquidity movements** at the microstructure level.

Share of the aggregate stablecoin supply

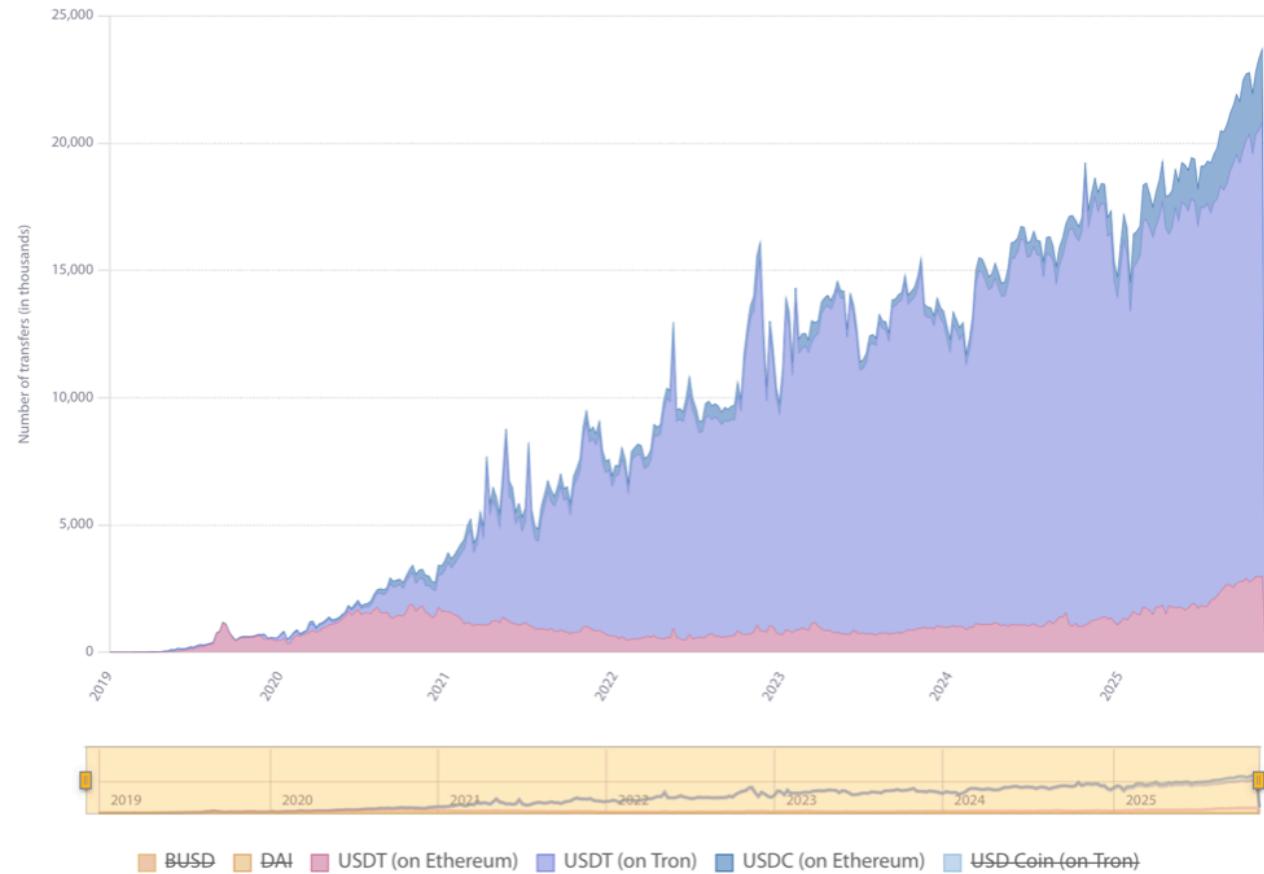
Zoom 1m 3m 6m 1y All



Transfer breakdown

Value of transfers Number of transfers

Zoom 1m 3m 6m 1y All



Research Limitation

Ours: settlement mechanics of Tether-based cross-border arbitrage in the post-2020 market environment

Limitation 1. Unable to recover intra-market trading behavior

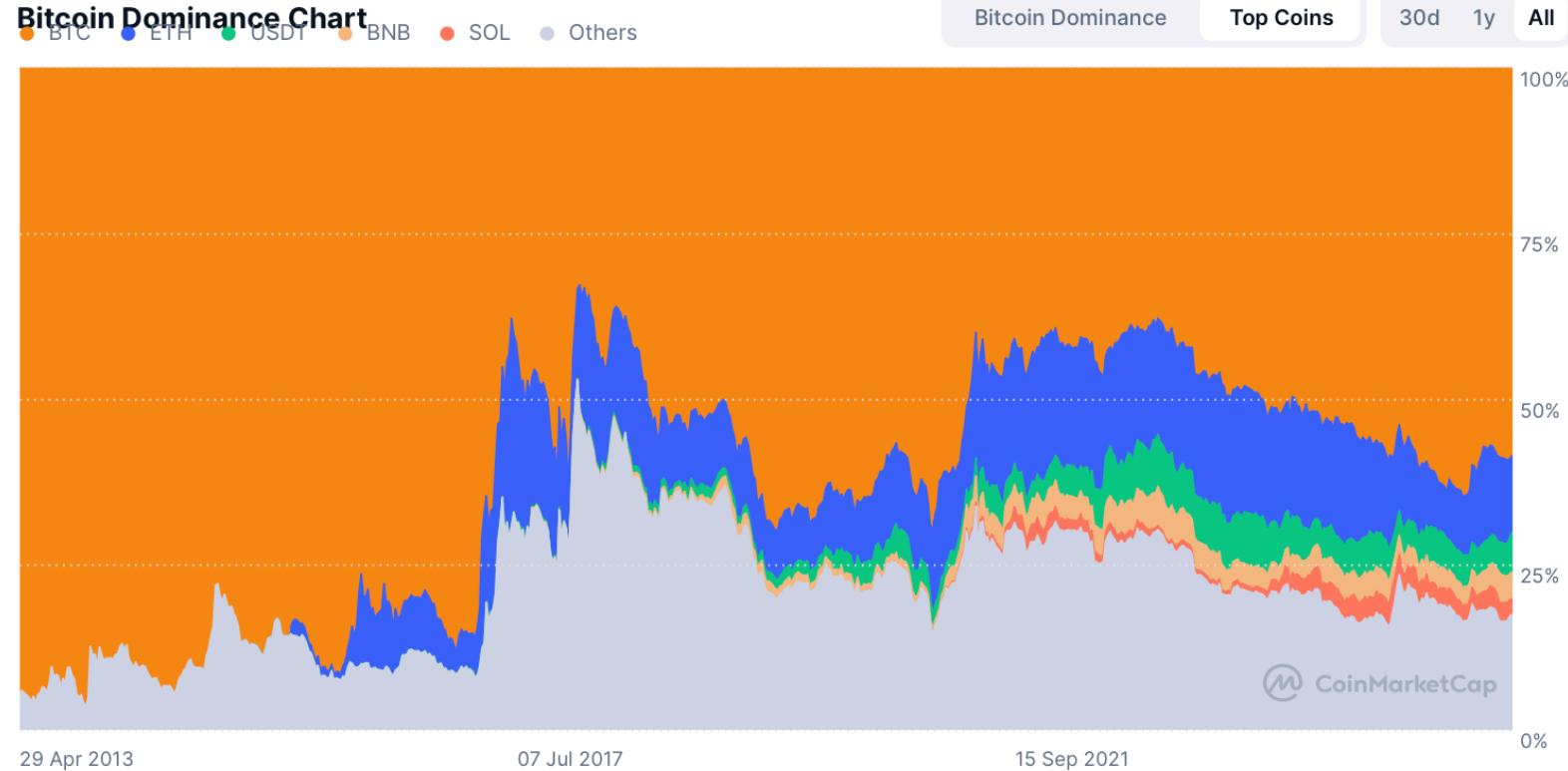
on-chain flows reveal only the settlement leg of arbitrage, not *the underlying trading action inside the exchange*

Limitation 2. Unable to explain pre-2020 through Tether flows

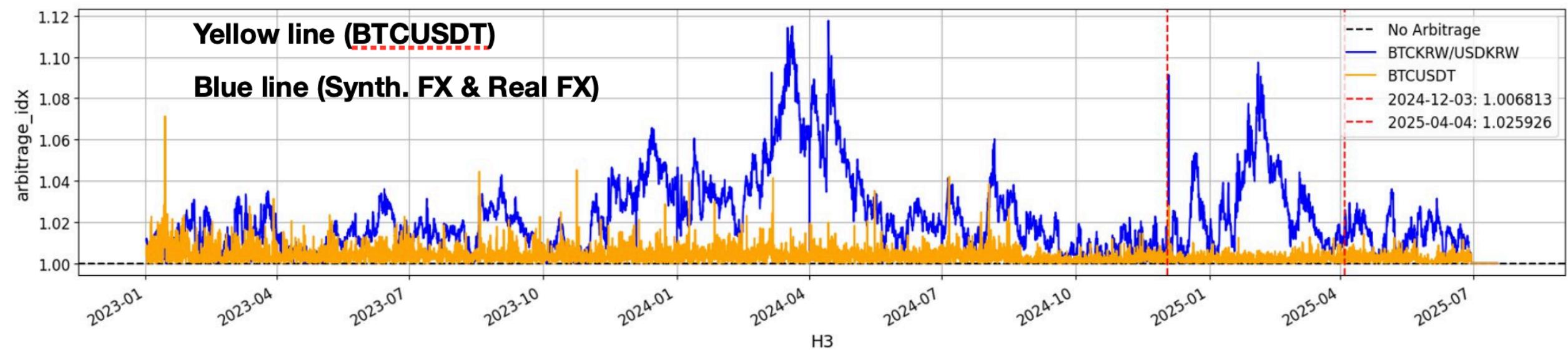
Tether's settlement infrastructure was *not yet established in earlier market cycles*. In pre-2020, cross-border crypto arbitrage relied on alternative assets (most notably XRP) and operated under fundamentally different frictions, fee structures, and liquidity patterns.

Justification

1. Bitcoin as the dominant benchmark asset
2. During martial law in Korea, arbitrage spreads within USDT market widened more than corresponding USDT–KRW price deviations
3. Focus on the post-2020 regime



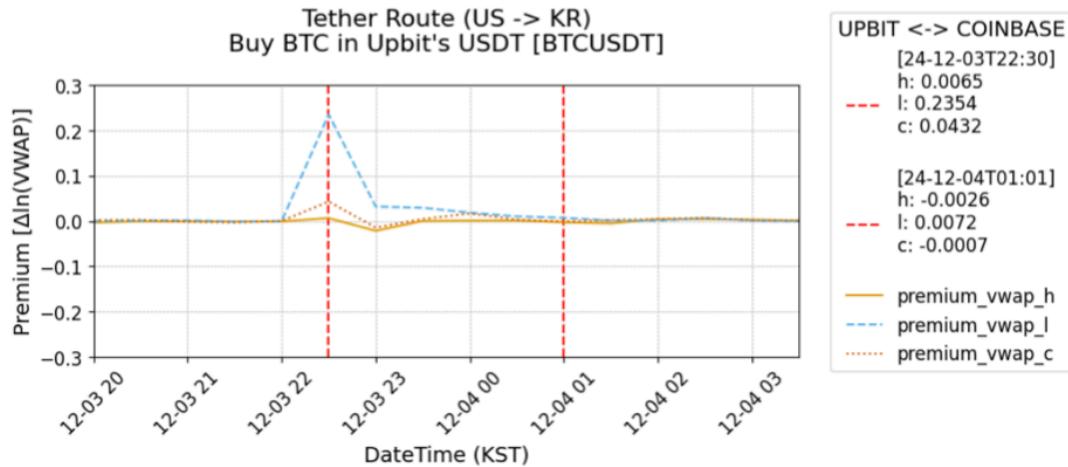
3H Agg Arbitrage Index for BTCKRW/USDKRW and BTCUSDT
(Coinbase & Upbit)



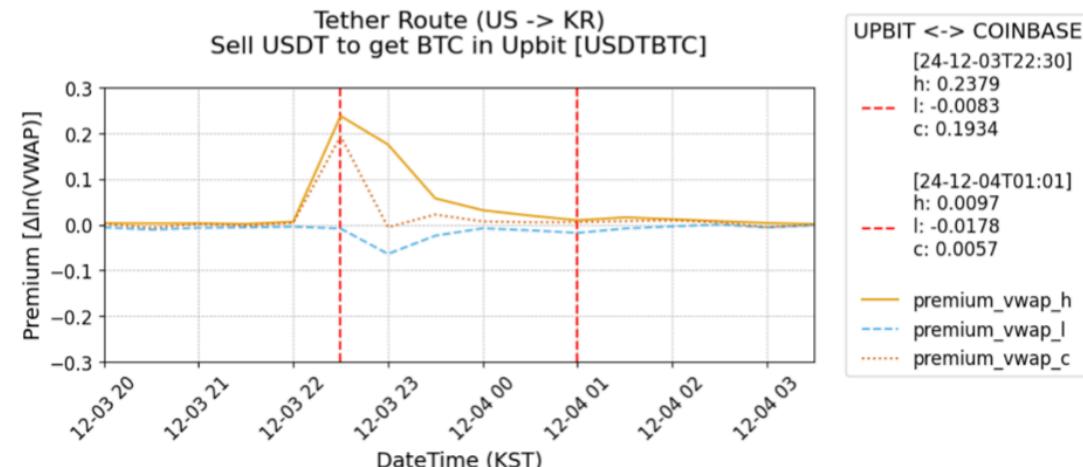
Upbit USDT market's scarce liquidity causes large arbitrage gaps.

1-1. BTC/USD (Tether)

- $\frac{\text{BTC}}{\text{USD}} = \left(\frac{\text{USDT}}{\text{USD}} \times \frac{\text{BTC}}{\text{USDT}} \right)$
- LHS: Coinbase (Offshore): Buy BTC with USD
- RHS
 - 1) Coinbase (Offshore): Buy USDT with USD
 - 2) Transfer USDT cross-border → Upbit (Onshore): Buy BTC with USDT

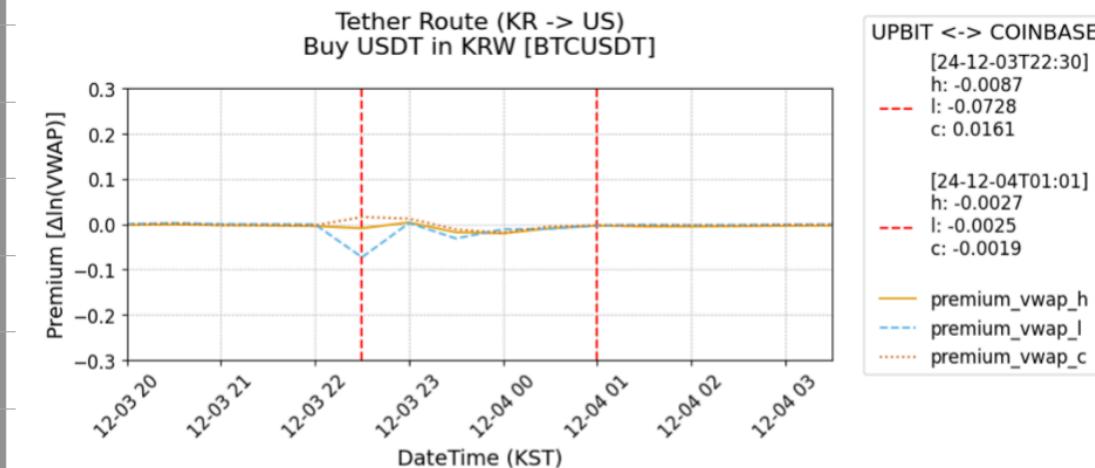


- $\frac{\text{BTC}}{\text{USD}} = \frac{\text{USDT}}{\text{USD}} \times \frac{\text{BTC}}{\text{USDT}}$



Upbit's KRW market has ample liquidity, thereby making arbitrage gaps much thinner.

- $\frac{\text{BTC}}{\text{KRW}} = \frac{\text{USDT}}{\text{KRW}} \times \frac{\text{BTC}}{\text{USDT}}$
- Similar pattern of Binance(US), Kraken



Hypothesis

1. Does on-chain stablecoin flow serve as a ***substitute for offline USD–KRW settlement***, relaxing binding KRW capital-control frictions and thereby accelerate the convergence of the Kimchi Premium?
2. Is the arbitrage-facilitating role of stablecoins ***externally valid in other markets*** characterized by tight capital controls and FX market frictions?
3. ***How*** a on-chain transaction reduces market segmentation under fiat frictions?

Data

- Global Crypto Benchmark: CoinMarketCap
- On-chain Flow Data: <https://tronscan.org/>
- Off-chain Market Data: OHLCV of BTC-Fiat and USDT-Fiat pair in any crypto centralized exchange
 - Daily, hourly, and 15 minutes frequency
 - Cryptocompare, TradingView

Table 9

Idiosyncratic signed volume.

This table reports the results from time-series regressions of the idiosyncratic component of the signed volume on each of the exchange list on the top of the column, regressed on the deviation of the price from the common price component and past three lags of the idiosyncratic component of the signed volume of the same exchange. The idiosyncratic components, \hat{s}_{it} and \hat{p}_{it} , are obtained as the residual values of signed volume and prices after taking out the common component from each.

$$\hat{s}_{it} = \gamma_i \hat{p}_{it-1} + b_{1i} \hat{s}_{it-1} + b_{2i} \hat{s}_{it-2} + b_{3i} \hat{s}_{it-3} + \varepsilon_{it}.$$

T-statistics are computed using the MacKinnon and White's (1985) heteroskedasticity robust standard errors and are given in parentheses.

| | Bitfinex | Coinbase | Bitstamp | Gemini | Kraken | Kraken | Coinbase | Bitstamp | bitFlyer | Quoine | Zaif | Bithumb | Poloniex | Bittrex |
|------------------------|-----------------|-----------------|-----------------|------------------|-------------------|------------------|----------------|------------------|------------------|-----------------|------------------|-----------------|----------------|------------------|
| | USD | USD | USD | USD | USD | EUR | EUR | EUR | | | | | | |
| 5-min frequency | | | | | | | | | | | | | | |
| $\gamma_i \times 10^3$ | -1.12 (-2.1) | 0.86 (4.12) | -1.29 (-4.9) | -0.45 (-2.66) | -1.61 (-15.41) | -0.42 (-1.54) | 0.04 (1.27) | -0.22 (-5.16) | -0.49 (-7.78) | 0.27 (2.92) | -0.15 (-7.23) | 0.05 (7.12) | 0.14 (3.18) | -0.23 (-5.35) |
| b_{1i} | 0.09 (5.57) | 0.17 (17.72) | 0.08 (6.1) | 0.06 (6.18) | 0.07 (6.58) | 0.09 (8.39) | 0.13 (11.6) | 0.15 (11.73) | 0.15 (17.55) | 0.22 (16.83) | 0.23 (21.31) | 0.21 (32.29) | 0.13 (9.9) | 0.15 (13.42) |
| b_{2i} | 0.06 (6.52) | 0.08 (9.24) | 0.07 (6.15) | 0.02 (2.85) | 0.03 (2.74) | 0.05 (4.64) | 0.05 (5.35) | 0.04 (3.91) | 0.05 (6.76) | 0.08 (7.52) | 0.07 (8) | 0.09 (14.23) | 0.06 (4.67) | 0.04 (4.71) |
| b_{3i} | 0.05 (5.19) | 0.08 (9.82) | 0.04 (5.13) | 0.02 (3.04) | 0.02 (2.32) | 0.03 (3.7) | 0.08 (8.8) | 0.04 (5.34) | 0.06 (7.9) | 0.09 (8.18) | 0.07 (7.87) | 0.08 (12.34) | 0.03 (2.52) | 0.06 (7.01) |
| R^2 | 0.02 | 0.05 | 0.01 | 0 | 0.01 | 0.01 | 0.03 | 0.03 | 0.04 | 0.09 | 0.08 | 0.08 | 0.02 | 0.03 |

exchanges. The price pressure is particularly high on smaller and less liquid exchanges, for example, Zaif or Coinbase EUR. Bitfinex and Bitstamp are the two exchanges where the estimated coefficient on the idiosyncratic price impact are lower than the one on the common component. These are two of the largest and most liquid exchanges.

Note that one should be careful with the interpretation of the exchange-specific price pressure. When prices on one exchange are either very high or low, traders might adjust which exchanges they trade and how they trade. Hence, the idiosyncratic part of signed volume might change endogenously, and this can lead to non-linearity in the relation between price and signed volume, which is not picked up in our model. Nevertheless, our results show that the exchange-specific part of signed volume plays an important role at explaining the deviation of prices on an exchange from the common component.

Figure 3. [Scatter] Coverage of Fiat supported in Exchange

| Exchange (Fiat) | Upbit | Bithumb | bitFlyer | Zaif | Bitfinex (USDT) | Bitstamp (USD) | Coinbase (EUR) | Coinbase (USD) | Gemini (USD) | Kraken | Poloniex |
|---|---------------|---------------|---------------|---------------|---|---|----------------|----------------|---|----------------|----------|
| Panel A. Idiosyncratic Signed Flow | | | | | | | | | | | |
| 5 minutes frequency | | | | | | | | | | | |
| Lambda | - 0.01 (sell) | -0.001 (sell) | -0.001 (sell) | -0.001 (sell) | -1.4 (short?!) | -1.4 (short?!) | +0.7 (long) | +1.1 (long) | -0.04 (short?!) | -1.6 (short?!) | 0.14 |
| # = 1 | KRW | KRW | JPY | JPY | | | | | | | |
| # < 10 | | | | | USD EUR GBP CNH TRY AUD JPY | USD EUR GBP CHF AUD CAD SGD NOK? | | | USD EUR GBP AUD CAD SGD HKD | | |
| # >= 10 | | | | | 64 fiats | 64 fiats | | | 37 fiats | | |

김도연 Fri 01:25

Fortunately?, the 'sign' of transaction volume is consistent with the extent of fiat coverage of each exchange in paper.

Accordingly, I replaced the capital-control index with the negative count of supported fiat currencies—what I refer to as the fiat-control index—where a high FC value denotes a more restricted exchange, and a low FC value denotes a more open one.

Top Cryptocurrency Spot Exchanges

CoinMarketCap ranks and scores exchanges based on traffic, liquidity, trading volumes, and confidence in the legitimacy of trading volumes reported.

[Read More](#)

| | Spot | Derivatives | DEX (spot) | DEX (derivatives) | Deposit/Withdrawal | Fiat Supported | |
|-----|-------------------|---------------------|----------------|-------------------|--------------------|----------------|------------------------------|
| # ▾ | Exchange | Trading volume(24h) | Avg. Liquidity | Weekly Visits | # Markets | # Coins | |
| 1 | Binance | \$26,664,196,047 | 897 | 10,992,352 | 2239 | 610 | ARS, AUD, BRL and +86 more ⓘ |
| 2 | Coinbase Exchange | \$4,524,033,326 | 799 | 37,251 | 479 | 348 | USD, AED, ARS and +61 more ⓘ |
| 3 | Upbit | \$2,276,122,816 | 601 | 1,780,385 | 659 | 300 | KRW |
| 4 | Bybit | \$4,653,361,637 | 709 | 3,298,429 | 1252 | 721 | BRL, CHF, CZK and +72 more ⓘ |
| 5 | OKX | \$3,823,269,448 | 782 | 4,617,692 | 988 | 357 | EUR, BRL, AUD and +3 more ⓘ |
| 6 | Bitget | \$2,168,384,821 | 731 | 3,720,748 | 1325 | 750 | EUR, MXN, ZAR and +12 more ⓘ |
| 7 | Gate | \$4,059,774,398 | 704 | 4,052,022 | 2829 | 2080 | EUR, BRL, KES and +61 more ⓘ |
| 8 | KuCoin | \$4,732,740,453 | 777 | 4,348,477 | 1731 | 1054 | CHF, HRK, MXN and +67 more ⓘ |
| 9 | MEXC | \$4,967,127,831 | 717 | 5,074,365 | 2989 | 1958 | EUR, GBP, CHF and +2 more ⓘ |

Methodology

Table 5. Bitcoin Price Discrepancy and Onchain Tether Flow

| | | 15 minutes market data (2024.12.01~) | Y. Tradable Volume Price Discrepancy | | | | | | |
|------------------|-------------------------|---|--------------------------------------|---------|---------|---------------|---|---------------|---------------|
| | | Lag length | t - 5 | | | t - 15 | t - 5 | t - 15 | |
| | | Panel A: HighFC Receiver & LowFC Sender | | | | | Panel B: LowFC Receiver & HighFC Sender | | |
| Objective | X Category | Y. TVPD_ijt | | | | | | | |
| | Traditional Finance | LN(FxRate_ijt) | 1.25*** | 1.25*** | 1.25*** | 1.25*** | 1.2** | 0.7** | 0.9** |
| | Onchain Transaction | SenderInflowShare_ijt | 0.3*** | 0.8*** | 0.8*** | 0.8*** | 0.7* | 0.001*** | 0.001*** |
| | | Flow_ijt | +*** | ** | * | Insignificant | Insignificant | *** | * |
| | | Flow_ijt X BanShort_i | | +** | | * | * | Insignificant | Insignificant |
| | | Flow_ijt X Lending_j | | | +*** | *** | *** | | |
| | Onchain Transaction | LN(SumOfTotalFlow_it) | | | | | | | |
| Control Variable | Offchain Market | Tether TVPD_ijt | | | | | | | |
| | Other global factor... | | | | | | | | |
| | Global Factor in Crypto | WAvgUSDTVol_t | | | | | | | |
| | WAvgBTCVol_t | | | | | | | | |
| | | N trading | 60480 | 60480 | 60480 | 60480 | 20160 | 60480 | 20160 |
| | | R^2 | 0.7 | 0.73 | 0.80 | 0.90 | 0.80 | 0.4 | 0.3 |
| FE | Currency | Receiver & Sender | YES | YES | YES | YES | YES | YES | YES |

This table reports panel regressions of tradable volume price discrepancy variables on on-chain Tether flows and control variables at three off-chain data frequencies (15-minute). Tradable volume price discrepancy, $TVPD_{ijt}$, defined as a volume-constrained

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Panel A: Kimchi Premium
-> Positive Crypto FX Premia

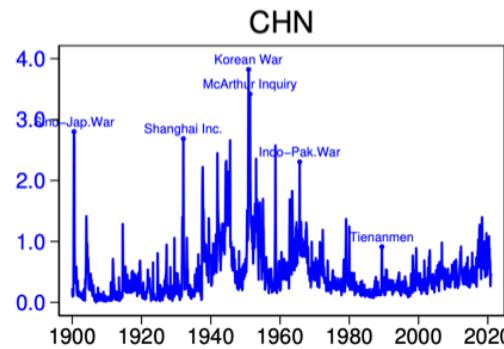
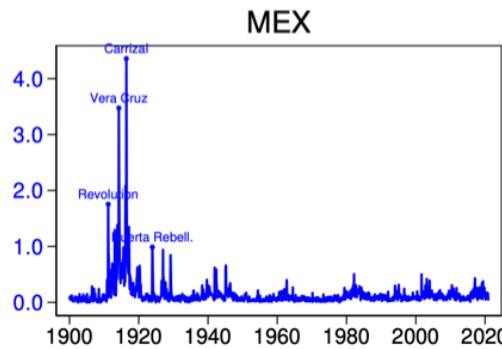
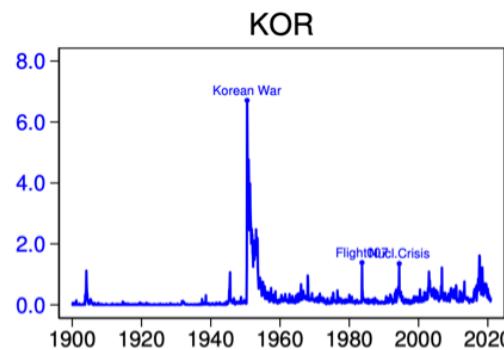
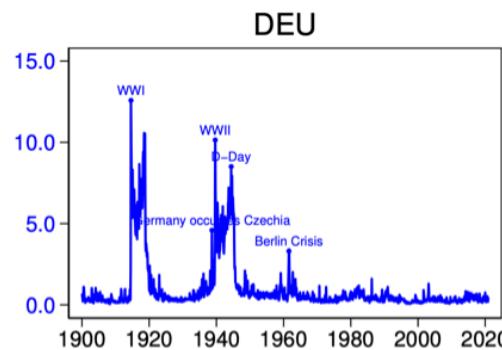
Panel B: Inverse Kimchi Premium
-> Negative Crypto FX Premia

김도연 Fri 15:23

Lending markets with the lowest and most immediate borrowing costs are likely to attract most arbitrageurs, generating a flow concentration.

Further toward Geopolitical Risk Events...

https://www.matteoiacoviello.com/gpr_country.htm



B. Search words

| Topic Bags | Exact Phrases |
|------------------------|--|
| War_words | war OR conflict OR hostilities OR revolution* OR insurrection OR uprising OR revolt OR coup OR geopolitical |
| Peace_words | peace OR truce OR armistice OR treaty OR parley |
| Military_words | military OR troops OR missile* OR "arms" OR weapon* OR bomb* OR warhead* |
| Nuke_bigrams | "nuclear war*" OR "atomic war*" OR "nuclear missile*" OR "nuclear bomb*" OR "atomic bomb*" OR "h-bomb*" OR "hydrogen bomb*" OR "nuclear test" |
| Terrorism_words | terror* OR guerrilla* OR hostage* |
| Actor_words | allie* OR enim* OR insurgen* OR foe* OR army OR navy OR serial OR troops OR rebels |
| Risk/Act Bags | Exact Phrases |
| Risk_words | risk* OR warn* OR fear* OR threat* OR concern* OR danger* OR doubt* OR crisis OR trouble* OR disrupt* OR tension* OR imminent* OR inevitable OR footing OR menace* OR brink OR scare OR peril* |
| Peace_disruption_words | threat* OR menace* OR reject* OR peril* OR boycott* OR disrupt* |
| Buildup_words | buildup* OR build-up* OR sanction* OR blockade* OR embargo OR quarantine OR ultimatum OR mobilize* |
| War_begin_words | begin* OR start* OR declar* OR begun OR began OR outbreak OR "broke out" OR breakout OR proclamation OR launch* OR wage* |
| Actor_fight_words | advance* OR attack* OR strike* OR drive* OR shell* OR offensive OR invasion OR invad* OR clash* OR raid* OR launch* |
| Terrorism_act_words | attack OR act OR bomb* OR kill* OR strike* OR hijack* |

FIN

4. Rational bubble

- ◆ Even if irrationality generates financial anomalies, their disappearance still may hinge on rational learning, that is, on the ability of rational arbitrageurs (Brav/Heaton, 2002, RFS)

Capital Immobility and segmentation from 'agency friction' (He and Xiong, 2008)

- Short-selling costs: Tuckman & Vila (1992, 1993), Miller (1977)
- Leverage and Margin Constraints: Gromb & Vayanos (2002, 2009a), Brunnermeier & Pedersen (2009), and Kondor (2009) Vayanos & Woolley (2008)

