Decrypting Crypto: How to Estimate International Stablecoin Flows Marco Reuter

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April 3, 2025

The views expressed are those of the presenter and do not necessarily represent those of Circle.

Summary of Contributions

- Novel methodology to estimate international stablecoin flows by geographic region
- Finds distinct regional patterns in stablecoin usage (USDT in emerging markets, USDC in advanced economies)
- Highlights exchanges' role in facilitating flows into emerging economies
- Provides quantitative evidence for stablecoins as a medium of cross-border settlements

Comment 1: Methodological Innovation

Typical approach (used by most industry participants):

- 1. Trace wallet addresses to exchange on-ramps/off-ramps
- 2. Attribute exchange geographic location proportional to geo-identified IP address activities
- 3. Probabilistic attribution of wallet holdings to geographic regions based on on-ramp/off-ramp exchange

Limitations:

- Wallets can use multiple exchanges
- Exchange location attribution based on IP address is imperfect
- Probabilistic in assuming that wallet holdings are proportional to exchange volume

Comment 1: Methodological Innovation

Newly proposed approach in this paper:

- 1. Classify some wallets (training set) into geographic regions by using:
 - self-registered domain names using ChatGPT
 - wallet interaction with regional exchanges (typically small exchanges)
- Apply ML (Gradient Boosted Decision Trees) to classify other wallets (testing set) without domain names or clear regional exchange interaction
- 3. Validate using patterns such as regional intra-day activity peaks
- 4. Map wallet holdings and **flows** to geographic regions

Comment 1: Methodological Innovation

Training set classification is reasonable but not flawless (activities roughly halve in the middle of the night)



Figure 3: Activity profile by region for ChatGPT classified domain names

Comment 2: Methodological Limitations: small training set

Blockchain	Genesis Block	Latest Block	#Wallets	#Transactions
Ethereum	2015, Jul 30	$21,\!525,\!890$	216,376,711	2,639,611,278
Binance Smart Chain	2020, Aug 29	45,369,482	214,081,622	6,523,262,103
Optimism	2021, Jan 14	$130,\!045,\!411$	13,562,366	432,212,106
Arbitrum	2021, May 28	$290,\!687,\!173$	39,852,439	1,222,934,534
Base	2023, Jun 15	$24,\!450,\!126$	106,582,545	1,419,068,646
Linea	2023, Jul 06	14,022,234	6,317,923	240,821,235
Total			545,267,859	12,477,909,902

Table 1: Overview of Blockchain Data

Region	Domain	Regional CEX	Total	% of Total
Africa and Middle East	19,159	10,466	29,625	8.6%
Asia and Pacific	124,727	49,988	174,715	50.5%
Europe	90,509	2,291	92,800	26.8%
Latin America and Caribbean	3,723	2,090	5,813	1.7%
North America	22,537	20,711	43,248	12.5%
Total	$260,\!655$	85,546	(346, 201)	100.0%

Table 5: Overview of Training Data with Percentage of Total

Comment 2: Methodological Limitations: potential biases

ChatGPT prompt:

"You are trained to classify ENS domain names by country, language, region, and provide a short reason for the classification. Consider references to culture, language, localities, memes. Be creative. Be mindful of the language commonly used in crypto and web3; and of languages that are spoken in many parts of the world, such as English, French and Spanish. If you cannot classify any of these, output 'unclassified' for that particular attribute. Classify the domain: domain name."

- Wallets that register domain names may differ systematically from those that do not
- Name-implied geography might be biased against being labeled as North America due to diverse heritage

Comment 2: Methodological Limitations: potential biases

Balances and transactions are skewed toward large wallets
Large wallets are less likely to register domain names

Wallet Size \$	Wallets	Total Balance (\$mm)	Median days since last txn
<100	1,501,300	22.0	252
100-10k	488,345	524.8	103
10k-100k	63,872	2,086.3	31
100k-1m	19,673	5,557.3	32
1m-10m	3,196	8,290.4	31
10m-100m	276	5,894.6	18
>100m	5	736.7	1

Table 2: Size distribution of wallets

Figure: Liao (2022)

Comment 3: Economic Interpretation

Stablecoins flows must be matched by opposite flows of other financial assets, goods or services, or fiat currencies. The opposite flows matter for economic interpretation.



(a) Regional Stablecoin Gross Flows

(b) Regional Stablecoin Net Flows

Figure 9: Regional Stablecoin Gross and Net Flows (in billion dollars)

Comment 3: Economic Interpretation

Different stablecoins have different uses.

Average ratio of daily trading volume to circulation or balances (2021-2023)



Figure: Liao, Hadeed, and Zeng (2023)

Additional comments

- Would be valuable to compare this method with typical IP address-based attribution
- Consider separate analysis of institutional vs. retail stablecoin usage by wallet size and/or add size as a feature
- Provide economic magnitude of regression results for better context
- Include more details on ML model selection and hyperparameter tuning; consider testing simpler random forest without extensive tuning

Conclusion

- Significant step forward in mapping international stablecoin flows.
- Important tool for policymakers and regulators to monitor crypto's macroeconomic impact.
- Encourages further refinement and complementary analyses to deepen understanding.