ChainArgos.com

Better blockchain intelligence.

Stablecoin Un-Tethered

A CASE STUDY ON DIFFERENCES IN TETHER'S TRANSACTION BEHAVIOR ON THE ETHEREUM VS TRON BLOCKCHAINS

OCTOBER 30, 2024

Contents.

info@chainargos.com

Introduction

From concerns over whether Tether maintains adequate backing for its dollar-based stablecoin USDT, to allegations of its use by criminals, money launderers and scammers,[1] Tether and USDT are no strangers to controversy.

In February 2021, Tether agreed to pay $18.5 million in penalties to the New York Attorney General (NYAG), and cease any further trading activity with New Yorkers[2]. The NYAG alleged that Tether and its related entities made "false statements about the backing of the "tether" stablecoin and about the movement of hundreds of millions of dollars."

As if that wasn't enough, the Wall Street Journal now reports that Tether is under investigation for possible violations of sanctions and anti-money laundering rules[3].

This case study will examine the difference in transaction behavior of Tether's USDT on different blockchains, and suggest that authorities need to pay attention to these differences in combating illicit flows.

For clarity, this case study will use "Tether" to refer to Tether, the company that issues the stablecoin, and "USDT" to refer to Tether's dollar-based stablecoin.

[1] https://www.unodc.org/roseap/uploads/documents/Publications/2024/Casino_Underground_Banking_Report_2024.pdf
[2] https://ag.ny.gov/press-release/2021/attorney-general-james-ends-virtual-currency-trading-platform-bitfinexs-illegal
[3] https://www.wsj.com/finance/currencies/federal-investigators-probe-cryptocurrency-firm-tether-a13804e5

info@chainargos.com

What is Tether's USDT?

Tether's USDT is a prominent stablecoin, a type of crypto-asset designed to maintain a stable value, typically pegged to a fiat currency like the US dollar.

Introduced in 2014 as Realcoin, it was rebranded to Tether, with the token symbol USDT, the following year. The core concept behind USDT is to offer a more stable alternative to volatile crypto-assets, making it easier for traders and investors to navigate the often turbulent crypto-asset market. By maintaining a 1:1 peg with the US dollar, Tether aims to provide a reliable store of value and a medium of exchange within the crypto-asset ecosystem.

However, Tether's history has been intertwined with controversy and scrutiny. Questions have been raised about the transparency of its operations, particularly regarding the composition and adequacy of its reserves. Critics have also expressed concerns about the potential for market manipulation and the impact of any potential instability at Tether on the broader crypto-asset market. While Tether has made efforts to address these concerns and increase transparency, the lingering doubts have led to regulatory scrutiny and legal challenges.

Despite the controversies, USDT remains one of the most widely used stablecoins.

USDT plays a significant role in facilitating trading and transactions within the crypto-asset market, which is why USDT is available on a multitude of blockchains, including Ethereum, Tron and EOS.

However, the transaction behavior of USDT on different blockchains varies significantly, such that USDT ought to be treated as different products on different blockchains when examining transactions through a regulatory lens.

info@chainargos.com

USDT Transaction Behavior on Ethereum

While most analysis of USDT transaction behavior tends to focus on volume, because transaction costs can vary significantly across blockchains, it is more useful to examine the number of transfers to evaluate blockchain transaction activity.

For instance, on the TRON blockchain, transaction costs are minimal, whereas transactions on the Ethereum blockchain can be very high, especially during periods of strong demand.

One way to determine if transaction activity on a given blockchain is organic is by use of a measure known as the R^2 or the R-squared number, which is also known as the coefficient of determination.

The R-squared number basically tells us how much one variable determines the other. For example, the effect of time on the number of transfers of a crypto-asset.

Generally, we would not expect time to be a strong determinant of the number of transfers of crypto-assets if such transactions were organic, or performed by human actors. In life, we don't generally expect that the number of financial transfers a person makes increases simply as time passes.

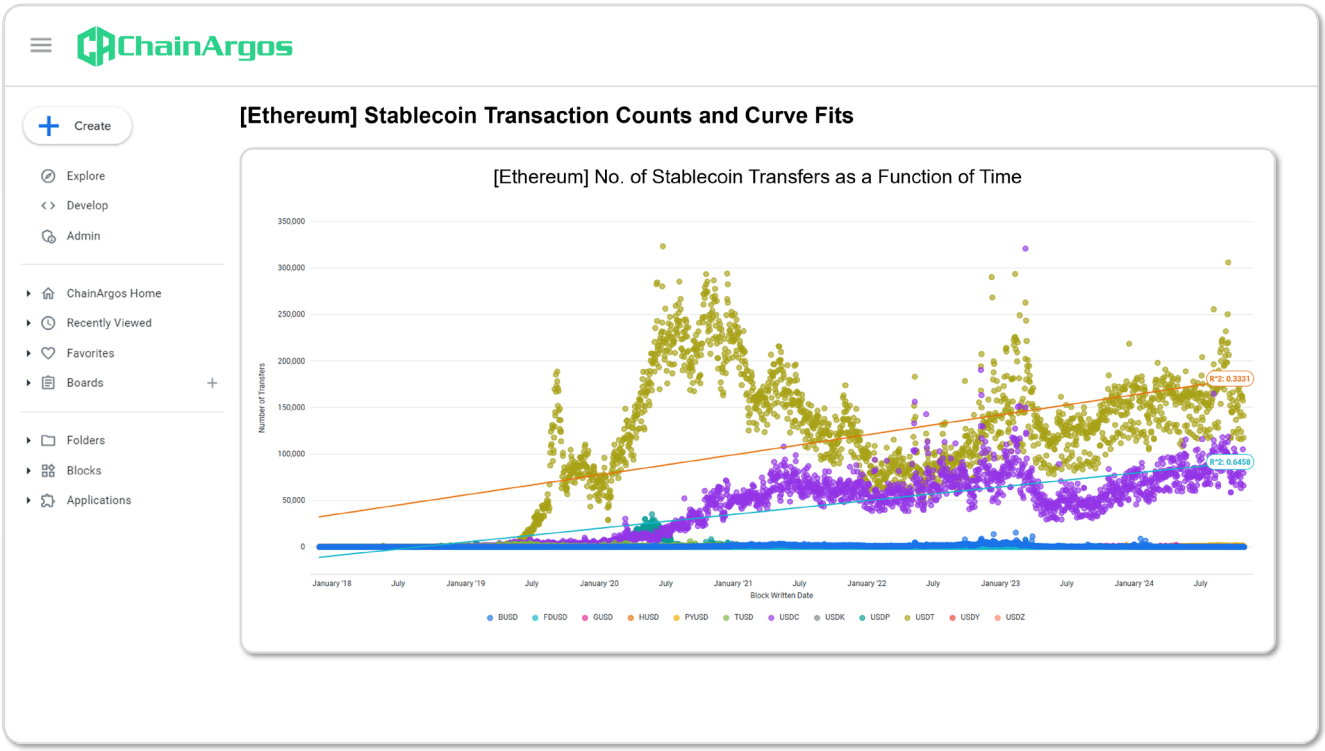


Figure 1. Number of stablecoin transfers for various stablecoins on the Ethereum blockchain as a function of time, with USDT in gold and with an R^2 number of 0.3331.

info@chainargos.com

In Figure 1. the number of transfers of dollar-based stablecoins issued by centralized stablecoin issuers are plotted against time, to determine if time is a strong determinant of the number of transfers.

The closer the R-squared number is to 1, the more time is a determinant of the number of transfers. As we can see in Figure 1. the number of transfers of USDT on the Ethereum blockchain is not strongly influenced by time, with an R-squared number of 0.3331.

This would suggest that USDT transfers on the Ethereum blockchain are determined by something other than just time.

USDT Transaction Behavior on TRON

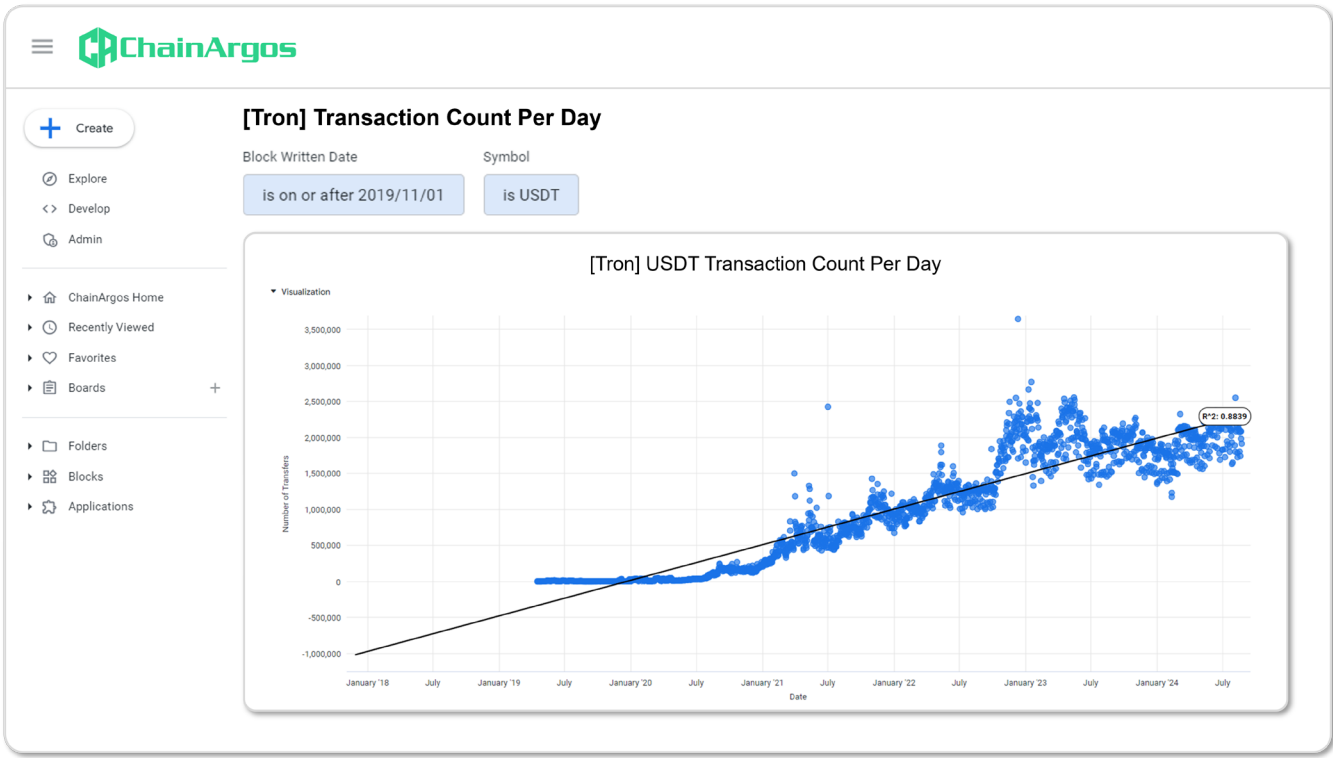


Figure 2. Number of USDT transfers on the TRON blockchain as a function of time.

Figure 2. shows the number of USDT transfers on the TRON blockchain as a function of time. We can immediately observe that time is a strong determinant of the number of USDT transfers on the TRON blockchain, with an R-squared number of 0.8839.

In other words, the number of transfers of USDT on the TRON blockchain increases in an almost linear manner as a function of time, which is strange to say the least.

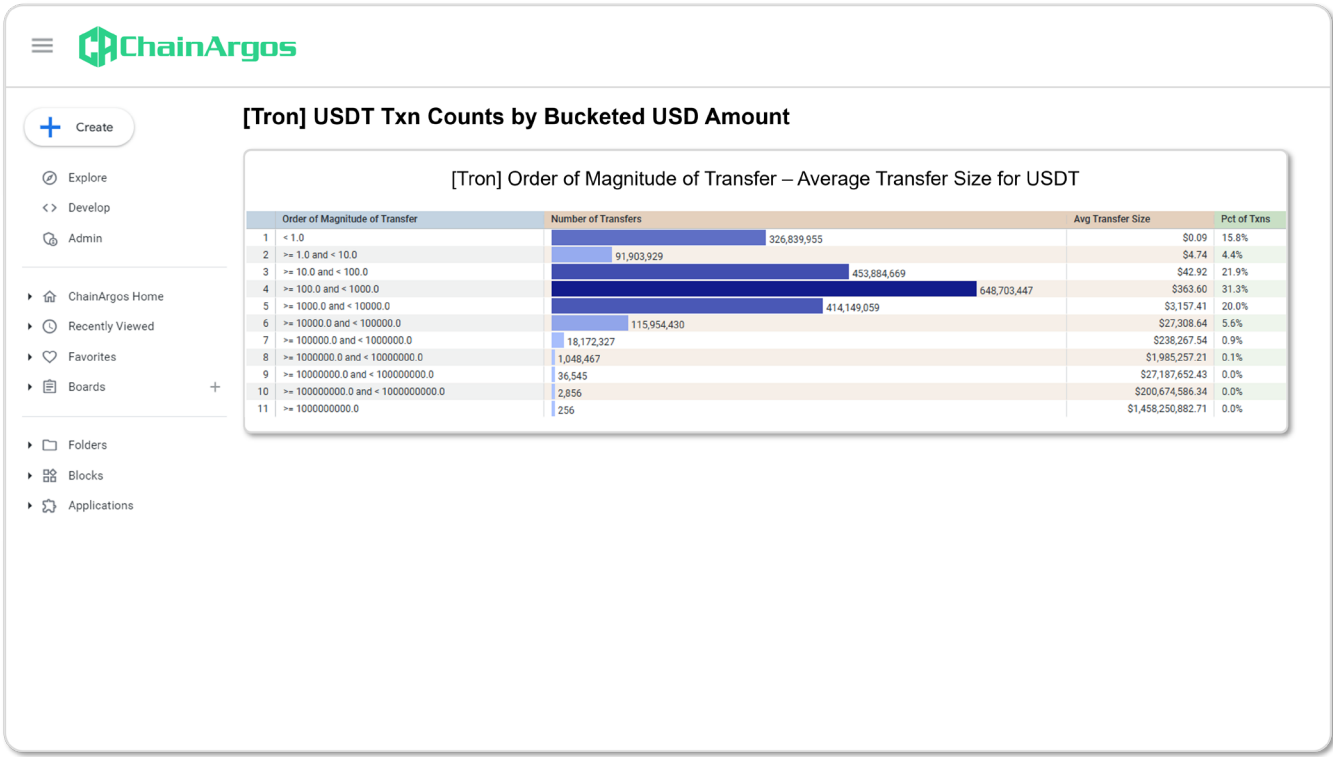
info@chainargos.com

In typical economic life, we expect there to be a seasonality when it comes to the number of transfers of money. For instance, we would expect to see a spike in payments just before the peak Christmas shopping season, around Black Friday sales, and just ahead of a new school term.

This seasonality in transfers means that while we would expect there to be peaks and troughs in the number of transfers over a year, unless population growth was linear, we generally wouldn't expect the number of transfers to increase primarily due to teh passage of time.

This bizarre transaction behavior comes to light when examining the number of transfers as opposed to the volume of transfers. The number of transfers looks simply at how many transactions were made, so a transfer for $1 and a transfer for $100,000 count as one transfer each.

Of course a hundred thousand transfers of $1 each and one transfer for $100,000 have very different implications. This is why we also need to analyze the average USDT transfer size for USDT transactions on the TRON blockchain.



	Order of Magnitude of Transfer	Number of Transfers	Avg Transfer Size	Pct of Txns
1	< 1.0	326,839,955	$0.09	15.8%
2	>= 1.0 and < 10.0	91,903,929	$4.74	4.4%
3	>= 10.0 and < 100.0	453,884,669	$42.92	21.9%
4	>= 100.0 and < 1000.0	648,703,447	$363.60	31.3%
5	>= 1000.0 and < 10000.0	414,149,059	$3,157.41	20.0%
6	>= 10000.0 and < 100000.0	115,954,430	$27,308.64	5.6%
7	>= 100000.0 and < 1000000.0	18,172,327	$238,267.54	0.9%
8	>= 1000000.0 and < 10000000.0	1,048,467	$1,985,257.21	0.1%
9	>= 10000000.0 and < 100000000.0	36,545	$27,187,652.43	0.0%
10	>= 100000000.0 and < 1000000000.0	2,856	$200,674,586.34	0.0%
11	>= 1000000000.0	256	$1,458,250,882.71	0.0%

Figure 3. USDT transaction counts on the TRON blockchain, bucketed according to size.

info@chainargos.com

Figure 3. buckets the sizes of USDT transfers on the TRON blockchain in orders of magnitude and what stands out immediately is that a whopping 15.8% of USDT transfers on the TRON blockchain are for less than $1.

In fact, the average USDT transfer size for transactions less than a $1 is for just 9 cents on the TRON blockchain.

If a regular bank customer made repeated transactions worth 9 cents every single day at all hours of the day, in the time it took you to read this paragraph, that person's bank account would in all likelihood have already have been frozen.

But the TRON blockchain can support a flurry of economically meaningless USDT transactions because of its very low transaction fees, which are sometimes zero thanks to the TRON Energy and Bandwidth features which support free transfers.

Applying Benford's Law to USDT

We can also apply Benford's law to USDT transactions on TRON, to show that these aren't organically-occurring transactions.

Benford's Law, or the law of anomalous numbers, or the first-digit law, is an observation that in real-life sets of numerical data, the leading digit is likely to be small.

Benford's Law is often used to detect fraud, for instance in accounting reports.

In real-life numbers, the number 1 appears as the leading significant digit about 30% of the time, while 0 appears as the leading significant digit less than 5% of the time. For any given set of numbers generated by real life, we would expect them to obey Benford's Law.

If the USDT transactions on TRON were the result of organic, economically-motivated real-life transfers, then we would expect to see that they obey Benford's Law, even for transactions worth less than a dollar.

So let's look at the transactions below $1 for USDT on Tron and see whether they conform to Benford's Law.

info@chainargos.com

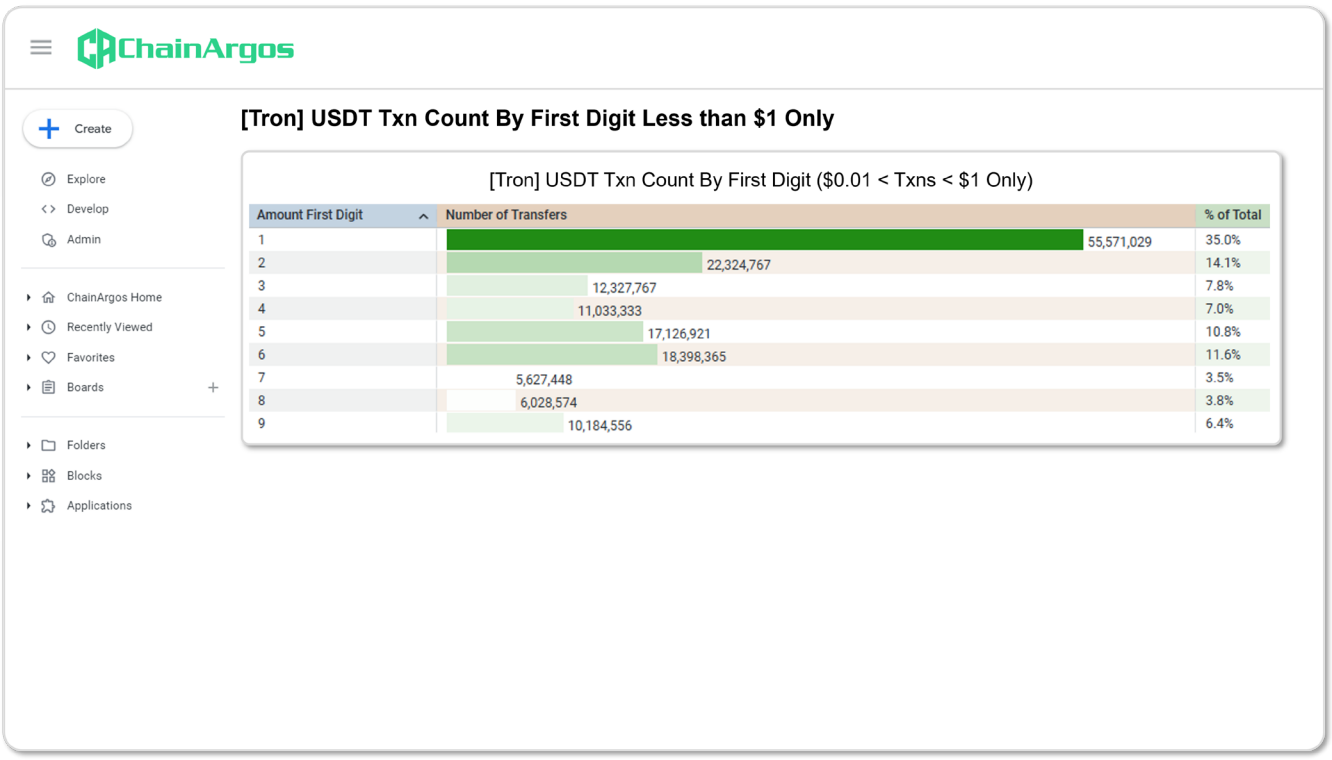


Figure 4. USDT transaction count on the TRON blockchain by first digit for transfers.

Visually the difference between USDT transactions on TRON that are less than $1 and more than $0.01 and the normal Benford distribution is quite stark.

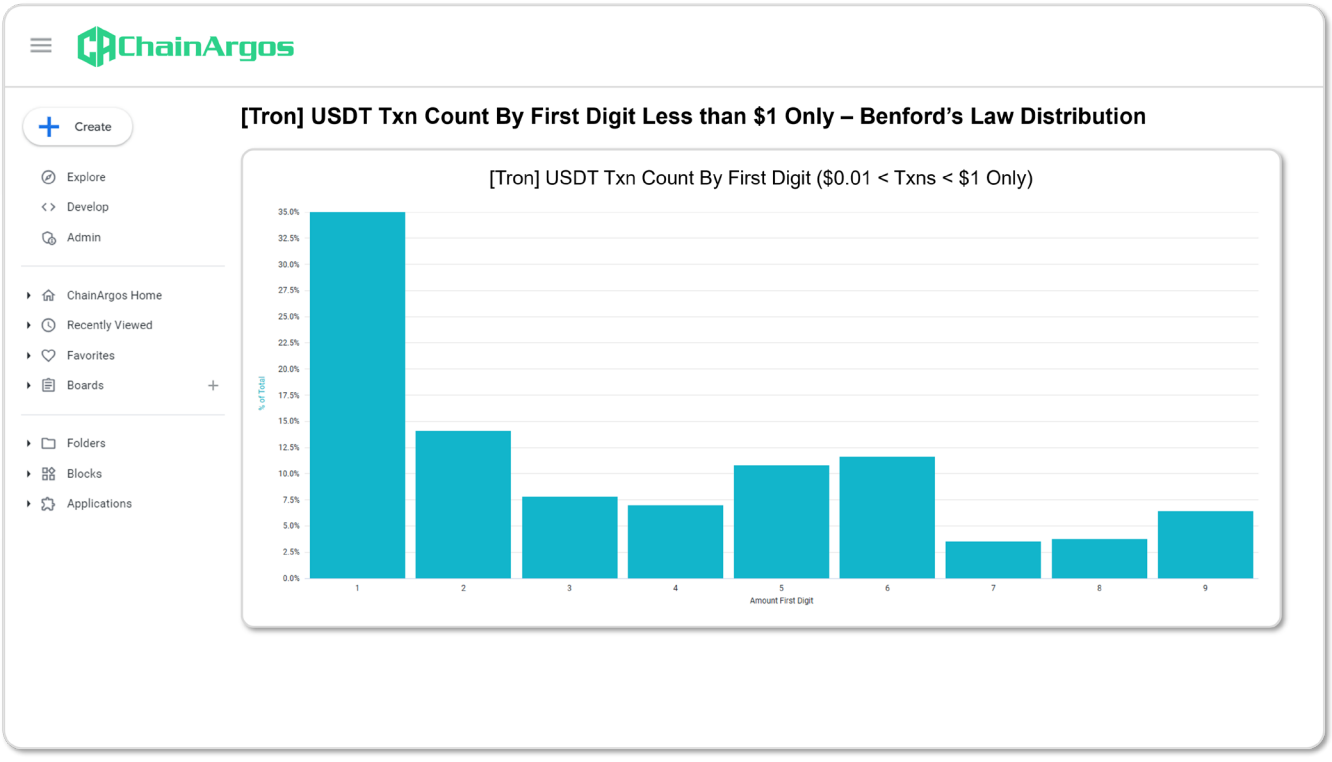


Figure 5. USDT transaction count by first digit for less than $1 and above 1 cent as a percentage of the total.

info@chainargos.com

Figure 5. displays the percentage of the first digit of the transaction count for USDT on the TRON blockchain between $1 and above 1 cent.

When this distribution is measured against Benford's Law, it is apparent that the USDT transfers on the TRON blockchain don't conform with what we would expect to see in real-life, as shown in Figure 6.

First Digit	1	2	3	4	5	6	7	8	9
USDT on TRON ($0.01 < USDT < $1)	35.0%	14.1%	7.8%	7.0%	10.8%	11.6%	3.5%	3.8%	6.4%
Benford's Law	30.1%	17.6%	12.5%	9.7%	7.9%	6.7%	5.8%	5.1%	4.6%
Discrepancy	+4.9%	-3.5%	-4.7%	-2.7%	+2.9%	+4.9%	-2.3%	-1.3%	+1.8%

Figure 6. USDT on TRON first digit of number of transfers versus expected Benford's Law distribution.

Why make these transactions?

One of the challenges with permissionless transfers of value is that there are no intermediaries evaluating the economic motivation for making any particular transaction, and that opens such systems to abuse.

Blockchains like TRON can viably support tiny, economically meaningless transactions which actually serve two important functions - creating the impression there is significant transaction activity on the blockchain (to increase its perceived value), and providing enough signal noise in an attempt to mask illicit transfers.

Sending seemingly trivial amounts back and forth on a blockchain is not the most sophisticated way to obfuscate illicit transactions, but does make it slightly more challenging for authorities to determine which transactions were genuinely intended to transfer value.

Because the TRON blockchain does not charge meaningful transaction fees, it's no surprise that it has become the preferred blockchain network with which to conduct illicit transfers of USDT.[4]

USDT's transaction behavior on different blockchains suggests it's an entirely different product on different blockchains, with different users and different intentions.

[4] https://fortune.com/crypto/2024/10/25/tether-department-justice-probe-money-laundering-sanctions-binance-crypto/

info@chainargos.com

What are the risks?

One of the biggest risks for stablecoins and their users is when equivalent versions of the same stablecoin appear on different blockchains.

For instance, the BUSD dollar-based stablecoin was a product issued by Paxos Trust LLC, a New York-licensed trust company approved to issue the BUSD stablecoin on the Ethereum blockchain.

However, Paxos Trust LLC's BUSD launch partner Binance, was also creating a "wrapped version" of the BUSD stablecoin on the BSC blockchain.

The BUSD stablecoin on the BSC blockchain was not a regulated product, but was intended to have been backed by BUSD on the Ethereum blockchain ("wrapped") before being minted for use on the BSC blockchain.

In January 2023, Binance was revealed by ChainArgos to have minted over $1.4 billion worth of unbacked BUSD on its BSC blockchain[5].

By February 2023, the New York Department of Financial Services ordered Paxos Trust LLC, to stop minting BUSD for failing to properly supervise its relationship with its partner Binance.

From the perspective of an end-user, BUSD on the Ethereum blockchain was interchangeable with BUSD on the BSC blockchain, and that belief allowed Binance to mint over $1.4 billion worth of "free money" until ChainArgos exposed this gap.

Similarly, authorities are only just realizing that USDT on the TRON blockchain is functionally different from USDT on the Ethereum blockchain even though both versions of USDT are issued by the same company, Tether.

Without appreciating the difference between USDT on different blockchains, authorities may be misdirected by action such as "freezing" USDT on the Ethereum blockchain, without noticing that the vast majority of illicit USDT transactions occur on the TRON blockchain.

[5] https://www.bloomberg.com/news/articles/2023-01-10/binance-bnb-acknowledges-past-flaws-in-managing-busd-peg-stablecoin-reserves

info@chainargos.com

Who are we?

ChainArgos is the blockchain intelligence firm best known for uncovering crypto-asset exchange Binance's $1.4bn BUSD stablecoin undercollateralization, forcing the New York Department of Financial Services to take action.

We provide unparalleled blockchain intelligence by focusing on the financial drivers of transactions, facilitate investigations and analysis centered on the economic value of transfers, and provide insight into the motivation behind specific flows.

ChainArgos is recognized globally as a leader in blockchain intelligence.

We've tracked illicit flows funding terrorism and sanctions evasion, analyzed transaction patterns connecting global scams, and uncovered crypto-asset trading opportunities before the market.

Where else have you seen us?

ChainArgos works with the United Nations, governments, central banks, financial institutions, hedge funds, proprietary trading firms, regulators, law enforcement and intelligence agencies, research institutes, universities, and crypto-asset service providers globally.

We're trusted by top news outlets including the Wall Street Journal, Bloomberg, Forbes, Fortune, Thomson Reuters, and the South China Morning Post, for unimpeachable blockchain intelligence.

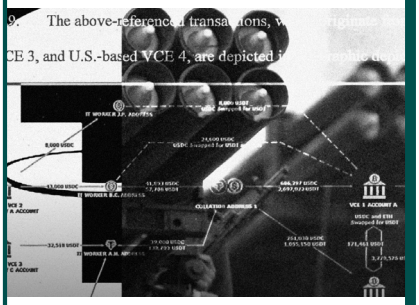
Here's just a selection of our blockchain intelligence that created news:

Bloomberg

Stablecoin Operator Moves $1 Billion in Reserves to Bahamas

- Move reflects worsening US banking conditions for crypto firms
- TrueUSD's circulation has more than doubled in the last month

THE WALL STREET JOURNAL.



From Hamas to North Korean Nukes, Cryptocurrency Tether Keeps Showing Up

Tether has allegedly been used by Hamas, drug dealers, North Korea and sanctioned Russians

South China Morning Post

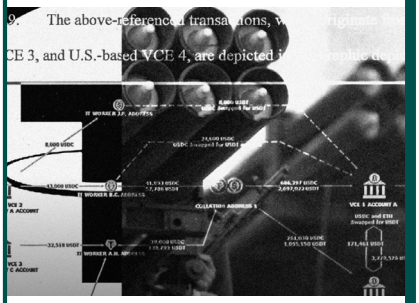
How crypto investigators uncover scammers' blockchain billions, scale of money laundering in Asia

THE WALL STREET JOURNAL.

The Shadow Dollar That's Fueling the Financial Underworld

Cryptocurrency Tether enables a parallel economy that operates beyond the reach of U.S. law enforcement

THOMSON REUTERS®



SPECIAL REPORT: Russian-owned, UK FCA-authorised payment firms show financial crime red flags; mule accounts for sale on dark web

Bloomberg

Binance Acknowledges Past Flaws in Maintaining Stablecoin Backing

- Blockchain analyst Reiter had flagged gaps in Binance-peg BUSD
- Binance says earlier 'operational delays' have now been fixed

info@chainargos.com

Who uses blockchain intelligence?

Finance and Banking

Compliance

Law Enforcement

Regulators and Policymakers

Finance and Banking

Assess the risks and opportunities in crypto-assets, stablecoins, and decentralized finance. Develop innovative products, explore tokenization opportunities, and generate new revenue streams.

Compliance

Fight money laundering, expand know-your-customer tools, and combat the financing of terrorism while expanding your customer base. Manage risk from customer crypto-assets and confidently verify sources of crypto-asset wealth.

Law Enforcement

Terrorists and criminals are using blockchain technology to avoid the banking system, launder money, and fund operations. Blockchain wallet analysis and transaction tracing fights crime, prosecutes criminals, and tracks illicit fund flows.

Regulators and Policymakers

Develop and implement effective crypto-asset and stablecoin supervisory, licensing tax, compliance, and regulatory frameworks to foster innovation, while managing threats to national security and the financial system.

How are we different?

We deliver actionable blockchain intelligence.

Say “no” to pseudo-science and “yes” to blockchain intelligence you can count on for commerce, compliance, and crime-fighting.

ChainArgos is built by finance, legal, and technology professionals to deliver actionable blockchain intelligence focused on financially-relevant analysis.

Whether you’re looking to on-board a customer, determine source of wealth, or ensure your evidence isn’t rejected on appeal, our blockchain intelligence is based on established principles of statistics, math, and forensic science.

Extreme Versatility

Create compliance and commercially-driven analysis in a single place and arrive at better business decisions faster.

No-Code Customization

Build any query or analysis without programming skills or coding.

Financially-Relevant

Standard financial measures combined with blockchain intelligence for actionable insight.

Data Integrity

ChainArgos runs its own blockchain nodes, and we never enrich our data with yours, so you can be sure of data integrity.

API Ready

Robust and resilient APIs with 99.99% uptime. Minimal code required for easy integration.

Automated Alerts

Schedule automated alerts and reports via Email, Webhook, Amazon S3 and SFTP so you’re always in the know when something happens.

info@chainargos.com

How do we do it?

Blockchain intelligence is a relatively new industry, and it's not uncommon to hear of methods which have little basis in finance, let alone forensic science.

Let's look at one example to understand the limitations of blockchain tracing.

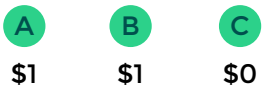


Fig. 1

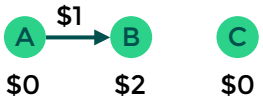


Fig. 2

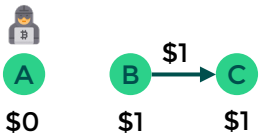


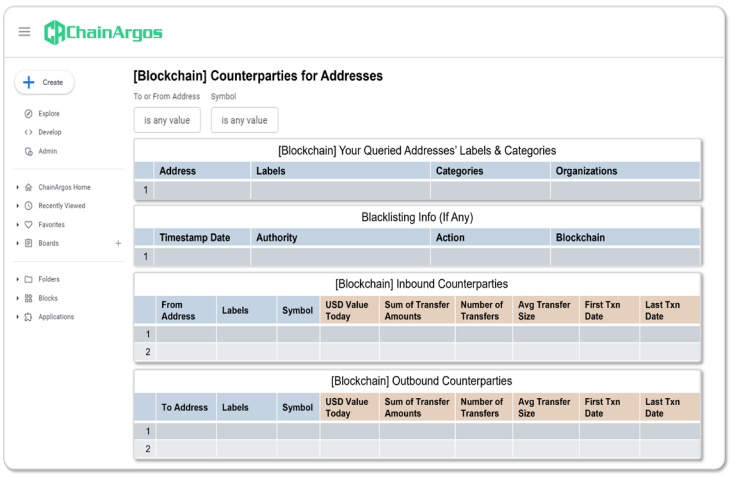
Fig. 3

In Fig. 1, A and B start with $1, while C starts with $0. In Fig. 2, A transfers their $1 to B who now has $2. Finally, in Fig. 3, B transfers $1 to C, who now has $1.

If it turns out A is an illicit actor, with what degree of confidence can we say that C has received $1 from illicit sources? 50-50?

Would you accept a "risk score" of 50%?

Follow the money.



Instead of passing off "risk scores" as "risk management" ChainArgos helps you follow the money.

Most blockchain transactions don't derive from a single source, and believing they do is what leads to poor outcomes.

Make better decisions by focusing on what matters - where the money went, where it came from, and where does it look like it's headed to?

How much does one address deal with another? What's the average transaction size? What's the frequency? What's the crypto-asset or stablecoin of choice? What's the transaction behavior? When did the transaction size change?

And so much more.

info@chainargos.com

Better attribution.

Don't risk critical legal, trading, and compliance decisions to questionable or subjective attribution methods. Trust math and science.

ChainArgos is the only blockchain intelligence firm that delivers programmatic address labels and wallet tags that are unassailable whether you're making business decisions or preparing to sue someone.

Blockchain addresses are automatically ranked and labeled based on a variety of factors including:

- **Transaction Count**: the number of transactions by an address. Sending $100,000 in one transaction may have very different implications from sending 10 transactions of $10,000 each. Either way, you'll know the difference.
- **Lifetime Sent/Received**: lists the biggest sender and/or receiver of any given crypto-asset or stablecoin currently. Markets are extremely dynamic. The biggest movers today may not be the same tomorrow.
- **Max. Historical / Current Balances**: helps you decide whether an address is participating in affiliated crypto-assets and/or stablecoins based on their maximum historical balance and who's stocking the highest current balances.
- **Recipient Number**: gives you a sense of whether they were an early adopter, or even possibly an insider of a crypto-asset or stablecoin. Recipients are ranked according to the date and time they received a crypto-asset or stablecoin.

Say "no" to dodgy wallet tagging and "yes" to attribution you can trust.

info@chainargos.com

Legal Disclaimers.

THE INFORMATION CONTAINED IN THESE MATERIALS IS FOR INFORMATION PURPOSES ONLY AND NOT INTENDED TO BE RELIED UPON.

The information contained herein is information regarding research and analysis performed by ChainArgos Pte. Ltd., a company incorporated with limited liability under the laws of the Republic of Singapore with registration number 202303560W ("the Company"). The information herein has not been independently verified or audited and is subject to change, and neither the Company or any other person, is under any duty to update or inform you of any changes to such information. No reliance may be placed for any purposes whatsoever on the information contained in this communication or its completeness. No representation or warranty, express or implied, is given by, or on behalf of the Company or any of their members, directors, officers, advisers, agents or employees or any other person as to the accuracy or completeness of the information or opinions contained in this communication and, to the fullest extent permitted by law, no liability whatsoever is accepted by the Company or any of their members, directors, officers, advisers, agents or employees nor any other person for any loss howsoever arising, directly or indirectly, from any use of such information or opinions or otherwise arising in connection therewith. In particular, no representation or warranty is given as to the reasonableness of, and no reliance should be placed on, any forecasts or proposals contained in this communication and nothing in this communication is or should be relied on as a promise or representation as to the future or any outcome in the future.

This document may contain opinions, which reflect current views with respect to, among other things, the information available when the document was prepared. Readers can identify these statements by the use of words such as "believes", "expects", "potential", "continues", "may", "will", "should", "could", "approximately", "assumed", "anticipates", or the negative version of those words or other comparable words. Any statements contained in this document are based, in part, upon historical data, estimates and expectations. The inclusion of any opinion should not be regarded as a representation by the Company or any other person. Such opinion statements are subject to various risks, uncertainties and assumptions and if one or more of these or other risks or uncertainties materialize, or if the underlying assumptions of the Company prove to be incorrect, projections, analysis, and forecasts may vary materially from those indicated in these statements. Accordingly, you should not place undue reliance on any opinion statements included in this document.

By accepting this communication you represent, warrant and undertake that you have read and agree to comply with the contents of this notice.

info@chainargos.com