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How the Cryptocurrency and Financial Markets Are Connected

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Research and Insights

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Executive Summary

With the blooming demand for cryptocurrency, there have been analyses on the connection between the cryptocurrency market and the traditional financial market. This article summarises the key findings of the research paper titled "How the Cryptocurrency Market Is Connected to the Financial Market", authored by Yale University Ph.D. candidate Sang Rae Kim:

- **Stablecoins, particularly reserve-backed stablecoins, are the medium** where both cryptocurrency and traditional financial markets are linked.
- Reserve-backed stablecoin issuers manage short-term money-like safe assets such as commercial paper and Treasuries in their reserve to maintain price stability.
- It is found that up until November 2021, a one standard deviation increase in stablecoin issuance on any given day resulted in:
    - **More commercial paper issuance** – an increase in commercial paper issuance by 10.7%,
    - **More purchases on commercial paper** – a decrease in commercial paper yields by 20 basis points (across different maturities),
    - **More purchases on Treasuries** – a decrease in Treasuries yields by 15 basis points.
- Conversely, a one standard deviation of market capitalisation growth in coins[1] (BTC, ETH, and BNB were studied in the paper) on any given day led to:
    - **Less commercial paper issuance – a decrease in commercial paper issuance by 11.9%**
    - **Fewer purchases of commercial paper – an increase in commercial paper yields,**
    - **Fewer purchases of Treasuries – an increase in Treasuries yields by approximately 18 basis points.**
- Since the reduction of commercial paper holding in USDT's reserve, stablecoin issuance did not have a significant effect on the commercial paper issuance, while still having a positive effect on commercial paper yields. This suggests a decrease in commercial paper purchases thereafter.

[1] According to the definition from ledger.com, Coins refer to any cryptocurrency that has a standalone, independent blockchain, such as BTC, ETH, and CRO.

1. Introduction

In this article, we introduce the key points of the paper "How the Cryptocurrency Market Is Connected to the Financial Market" (referred to as 'the paper' in this article) by Sang Rae Kim (referred to as 'the author' in this article), Department of Economics, Yale University.

1.1 Background

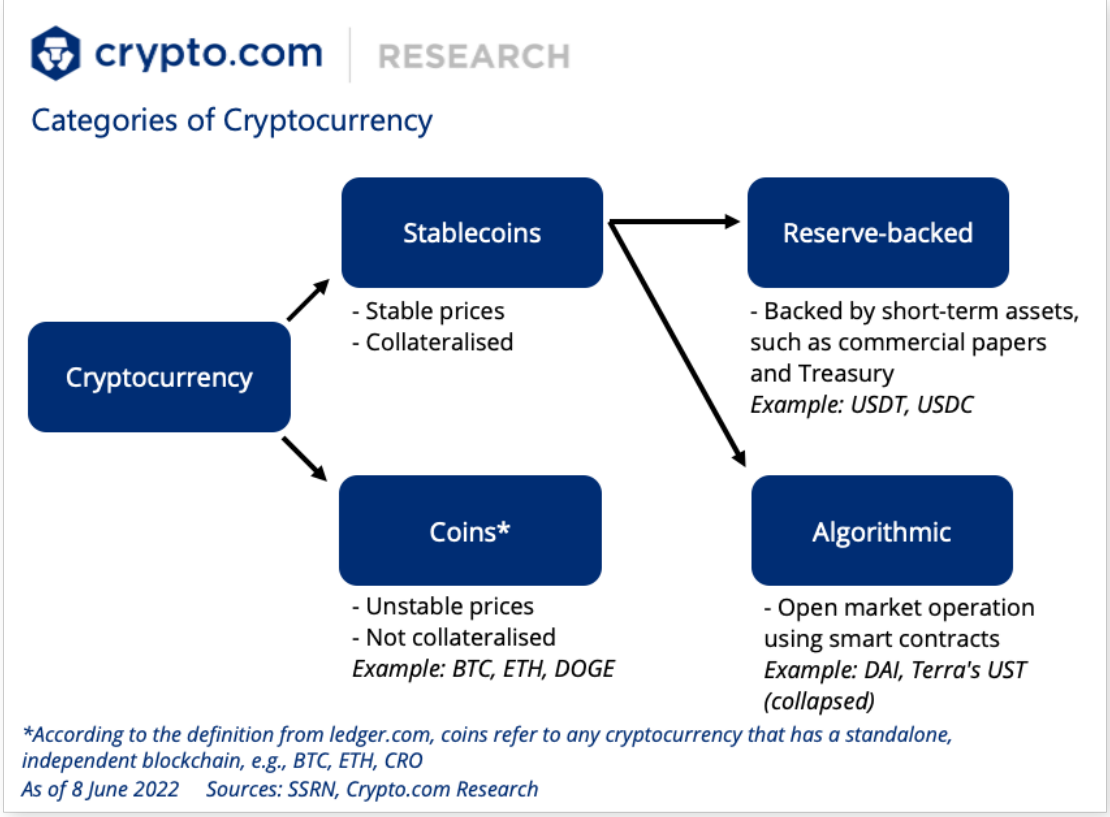
Checking accounts that individuals hold in commercial banks, and short-term assets such as a repurchase agreement (repo) or commercial paper (CP), and shares issued by money market mutual funds are all different forms of private money. According to previous studies, **these traditional private money markets were interconnected as distress migrated from one to another** during the Global Financial Crisis in 2008.

As **cryptocurrency is one of the latest forms of private money**, this paper explores the connection between the cryptocurrency market, commercial paper market, and Treasuries market.

1.2 Classification of Cryptocurrencies

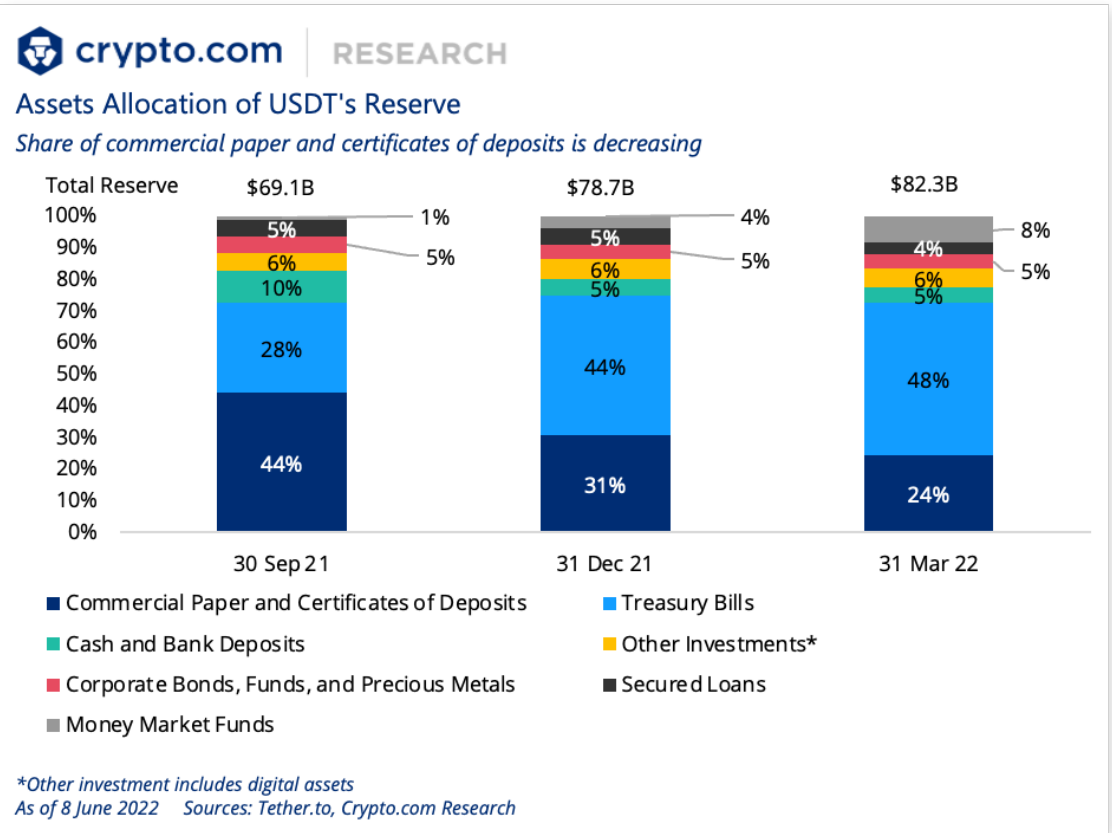
In the paper, the author categorises cryptocurrency as shown in the chart below. Stablecoins are divided into groups based on their price stability mechanisms, according to Liao and Caramichael's paper:

- **Reserve-backed stablecoins** maintain their peg to a specific fiat currency (e.g., U.S. dollar) by keeping a reserve of traditional assets such as commercial papers or Treasuries.
- **Algorithmic stablecoins** maintain their peg to a specific fiat currency by overcollateralized cryptocurrency and/or smart contracts that automatically defend the peg by buying or selling the stablecoin.



1.3 Attestation Report of USDT

The quarterly attestation reports of USDT are presented in the chart below. We can see that Tether holds different types of traditional private money to back USDT's price stability. A notable shift is observed in Tether's asset allocation strategy as the **share of commercial paper and certificates of deposit dropped from 44% to 24%** since 30 September 2021. Conversely, the proportion of Treasuries Bills increased from 28% to 48% over the same period. This strategy shift is actually aligned with Tether's effort to demolish investors' concerns over the quality of the commercial paper that Tether was holding.



1.4 Objective

The author aims to show that the cryptocurrency market is linked to the traditional financial market. Specifically, the paper **focuses on the relationship between the stablecoin market, commercial paper market, as well as Treasury market** because both commercial paper and Treasuries contribute significantly to the stablecoins' reserve. The following questions will be answered:

1. **How does the issuance of stablecoins affect the issuance and the yields of commercial paper and Treasuries?**
2. **How does the issuance of coins affect the issuance and the yields of commercial paper and Treasuries?**

2. Data and Methodology

2.1 Data Sources

The following data sources are used in the study:

Data Sources

Asset	Sources	Remarks
Stablecoins	CoinMarketCap	Daily data with time period ending in November 2021 to account for Tether's shift in asset allocation (Section 1.3)
Commercial Paper	Federal Reserve Board – Commercial Paper Rates and Outstanding Summary	Issuance quantity, ratings, maturities, types, etc.

As of 8 June 2022 *Source: Crypto.com Research*

As of 8 June 2022, Tether (USDT) and Circle (USDC) are the two largest reserve-backed stablecoins, making up 78% of the total stablecoins market capitalisation. The capitalisations of **both USDT and USDC are summed up as a single stablecoin**, and the daily issuance of this single stablecoin is defined as:

$$Stablecoin\ Issuance_t = Market\ Capitalisation_t - Market\ Capitalisation_{t-1}$$

Stablecoins are issued on a daily basis without any off days (i.e. seven days a week), while commercial paper data is only available during weekdays. Hence, the stablecoin issuance on Monday takes the market capitalisation change from a Friday to a Monday without considering the respective change on Saturday and Sunday.

The sources above provide summarised statistics over the period from January 2020 to November 2021. The issuances of both stablecoins and different types and maturities of commercial papers are reproduced in the table below. We can see that **on average, US$195 million worth of USDT and USDC were issued every day, with a standard deviation of about US$320 million.**

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Summary Statistics From January 2020 to November 2021

Variable	Mean	Standard Deviation	Min	Max
Stablecoin issuance	195	322	-312	2,081
Total CP Issuance	87,906	15,532	26,050	125,220
1 - 4 day CP Issuance	58,496	13,547	25	89,917
5 - 9 day CP Issuance	10,996	4,128	0	45,792
10 - 20 day CP Issuance	2,761	1,299	0	10,491
21 - 40 day CP Issuance	4,400	1,517	0	12,164
41 - 80 day CP Issuance	2,741	1,075	0	7,480
81 plus day CP Issuance	8,014	2.508	0	16,635
1 day ABCP rate	0.27	0.45	0.06	1.62
1 day AA financial CP rate	0.25	0.47	0.03	1.59
1 day AA non financial CP rate	0.22	0.44	0.02	1.61

Notes:
- Units for issuance numbers are in millions of U.S. dollars ('000,000)
- Units for yields rate are in percentage points (%)
- ABCP stands for asset-backed commercial paper

As of 8 June 2022 Sources: The paper, Crypto.com Research

2.2 Methodology

In general, the paper applied the **Two-Stage Least Squares model (2SLS)** to investigate the connection between the issuances of stablecoins and commercial paper. This model typically involves two linear regression equations as shown in the following form:

$$X = \delta + \eta Z$$

$$Y = \alpha + \beta \widehat{X}$$

Where,

Z is an instrumental variable, which is correlated with X but does not directly affect Y;
X is the endogenous variable;
$\widehat{X}$ is the predicted value of X (or explanatory variable), independent variable that has an effect on Y;
Y is the dependent variable (or response variable), which is the focus of the problem;
η and β are estimators;
α and δ are error terms.

Note that in the paper, X **is standardised such that the interpretation of the estimated** β **is the effect of one standard deviation increase in** X **on the variable** Y.

With reference to the work done by Gorton et. al., investors do not distinguish among different stablecoins. Hence, the **issuance of DAI (MakerDAO's stablecoin) is used as an instrumental variable** to establish the causal link between activities in the cryptocurrency market and the commercial paper market. Furthermore, DAI fulfils the condition as an instrument variable because it does not hold traditional assets in its reserve. Therefore, it can only affect the commercial paper market via its effect on the issuance of USDT and USDC. As a result, the first stage of the 2SLS is derived as:

$$Stablecoin\ Issuance_t = \delta + \eta DAI\ Issuance_t$$

Where $Stablecoin\ Issuance_t$ and $DAI\ Issuance_t$ are the changes of their corresponding market capitalisations from $t-1$ to t. On the other hand, the issuance of DAI is also used in the case of coins:

$$\Delta Coins\ Market\ Cap_t = \delta + \eta DAI\ Issuance_t$$

Where $\Delta Coins\ Market\ Cap_t$ considers the change in market capitalisations of the top three coins – BTC, ETH, and BNB. To keep this article concise, we encourage readers to refer to the original paper for the full 2SLS equations applied to each study in the paper.

3. Results

Based on the study, the author observed that the connection between the **cryptocurrency market and traditional private money markets is reserve-backed stablecoins** (USDT and USDC). They maintain a reserve of short-term money-like assets such as commercial paper, money market **mutual** fund shares, and Treasuries. **The rapid growth of USDT and USDC has created excess demand for traditional private money** because stablecoin issuers need to buy commercial paper and Treasuries to maintain price stability.

In addition, it is found that the demand for **coins indirectly affects traditional private money** as stablecoins play the role of a safe haven during cryptocurrency market declines. For instance, investors seek to reduce their exposure to regular coins in favour of stablecoins to avoid price volatility.

The key observations are outlined below, note that this result is **up to November 2021, before USDT changed its reserve management strategy**:

Connections Between Cryptocurrency and Traditional Private Money

Type of Cryptocurrency	Change in Commercial Paper Issuance	Change in Commercial Paper Yields	Change in Treasuries Yields
Stablecoins *(USDT, USDC)*	10.7% **increase** on the following day	20 basis points **decrease** across different types and maturities	15 basis points **decrease** across different maturities of Treasuries
Coins* *(Top 3 – BTC, ETH, BNB)*	11.9% **decrease** on the following day	An **increase** across different types and maturities**	17 to 18 basis points **increase** across different maturities of Treasuries

Note: Results are based on a one standard deviation increase (i.e., US$320 million for stablecoins issuance). The result shown here is up to November 2021.

**According to the definition from ledger.com, coins refer to any cryptocurrency that has a standalone, independent blockchain, e.g., BTC, ETH, BNB, CRO*

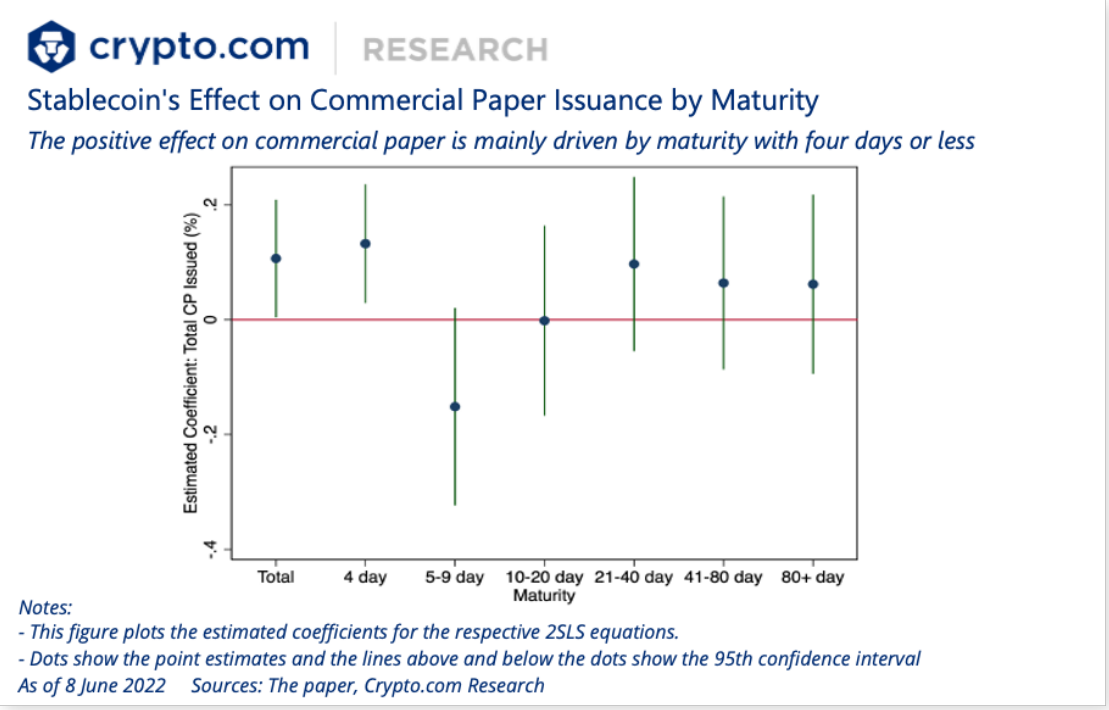
***The paper did not specify the basis points increased*

As of 8 June 2022 *Sources: The paper, Crypto.com Research*

3.1 Effect of Stablecoin Issuance on Commercial Paper Issuance by Maturity

The estimated coefficients for the 2SLS equations used in examining the connection between issuances of stablecoins and commercial paper are plotted in the chart. The coefficients are plotted across different maturities, which are represented by the dots, with respective 95th confidence intervals (i.e., the green line). Obviously, the author finds that **the positive effect of stablecoin issuance on commercial paper issuance is primarily driven by those with a maturity of four days or less**. Whereas the estimated coefficients for commercial paper with maturity of five days or more are statistically insignificant.

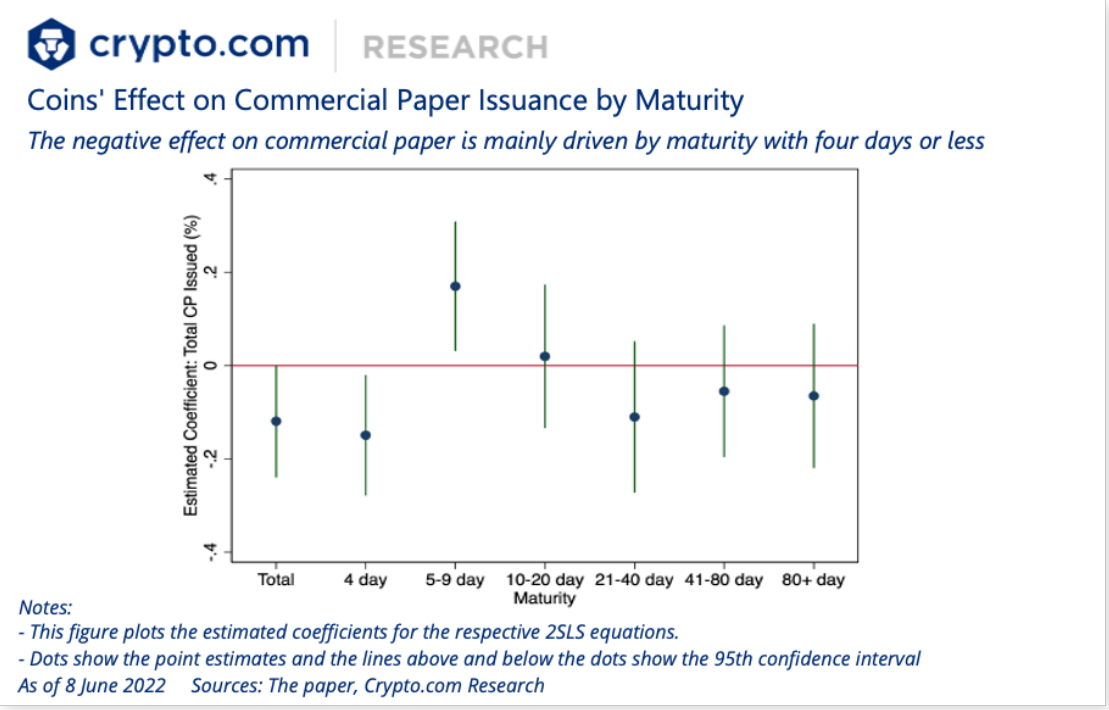
This result shows that a higher demand for stablecoins leads to higher amounts of commercial paper issuance. In addition, **the increase in commercial paper issuance with the shortest maturity (i.e., four days or less) suggests that stablecoin issuers are looking for liquidity.** Also, the effect of persistence is studied, where it is noticed that the positive effect of stablecoin issuance on commercial paper issuance decreases over time, and lasts about four to five days.



3.2 Effect of Coins on Commercial Paper Issuance by Maturity

The estimated coefficients for the 2SLS equations used in examining the connection between market capitalisation of coins and commercial paper issuance are depicted in the chart below. In contrast to the findings from Section 3.1, the author finds that **the negative effect of coins market capitalisation on commercial paper issuance is primarily driven by those with the shortest maturity (i.e., four days or less)**. The coefficient for commercial paper with maturity of five days to nine days shows positive, whereas for longer-maturity commercial paper, the results are statistically insignificant. With this, the effect of coins shows consistency with that shown in Section 3.1.

The effect of coins on commercial paper issuance is inverse to the effect of stablecoins on commercial paper. It is because when the coins grow, demand for stablecoins will be lower (i.e., Investors exchange their stablecoins for coins), which indirectly affects the commercial paper market.



3.3 Effect of USDT's shift in reserve management strategy

To this end, it is observed that stablecoin issuance had a significant impact on the commercial paper market, at least until November 2021. Since then, Tether (USDT) reduced its share of commercial paper in its reserve, as seen in Section 1.3. Hence, for results after November 2021, the impact of the change in its reserve management strategy is analysed in the paper.

The result showed that when Tether changed its strategy to hold more Treasury bills than commercial paper since November 2021, the effect of stablecoin issuance on the commercial paper market has been remarkably different from the results shown prior to this section. This means that **after the fourth quarter of 2021, an increase in stablecoin issuance did not affect commercial paper issuance, and had a positive effect on the yield of commercial paper.** The effect on commercial paper yields suggests that stablecoin issuers are indeed unloading commercial paper from their reserves. As a result, commercial papers have to increase their yields to attract alternative buyers.

4. Conclusion

This paper studied how the cryptocurrency market is connected with the traditional financial market. In particular, the commercial paper and Treasuries markets.

- Stablecoins, particularly reserve-backed stablecoins, are the medium where both cryptocurrency and traditional financial markets are linked.
- Reserve-backed stablecoin issuers manage short-term money-like safe assets such as commercial paper and Treasuries in their reserve to maintain price stability.
- Up until November 2021, issuing stablecoins created an excess demand for commercial paper. As a result, this increased the commercial paper issuance the following day, and decreased its yields.
- Conversely, the growth of market capitalisation of coins (BTC, ETH, and BNB were investigated in this paper) shows a different effect on the commercial paper market compared to that seen in stablecoins. The coins' market capitalisation growth decreases the commercial paper issuance the following day, and increases its yields.
- The reduction of commercial paper holdings in Tether's reserve has mitigated the effect of stablecoins issuance on the commercial paper market. Since the fourth quarter of 2021, it is observed that stablecoin issuance did not have a significant effect on commercial paper issuance, while having a positive effect on commercial paper yields.

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