



Preferring stablecoin over dollar: Evidence from a survey of Ethereum platform traders

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ABSTRACT

In a survey to a random group of anonymous participants of Ethereum trading market, one of the most active cryptocurrency trading markets, 60% of the respondents prefer stablecoin over the U.S. dollar despite that stablecoin and dollar are believed to share many similarities in terms of functions of money. Further investigations demonstrate that this preference cannot be explained from the perspective of standard asset pricing arguments including risk-return trade-off and portfolio diversification. We show that the expected return of holding stablecoin is almost zero while the variance of return is significantly larger than that of the dollar. Stablecoin also cannot help improve the efficiency of the portfolio which already includes the U.S. dollar as a financial asset. We find the psychological factors such as the interest in new technology and the preference for political liberty might help explain this preference.

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1. Introduction

Stablecoin, a special class of cryptocurrency designed to maintain a stable value, is believed to share many similarities to the U.S. dollar (dollar below). Nowadays, major stablecoins are denominated in the dollar to enhance their acceptance worldwide.¹ In fact, stablecoin has shown growing popularity since 2019. For instance, in America, the well-regulated dollar-pegged stablecoin (stablecoin below) is regarded as a useful, efficient, consumer-serving part of the financial system,² which is believed to be a good substitute for the dollar. Consequently, the U.S. government is also considering adopting well-regulated stablecoins and canceling out the need for a U.S. dollar CBDC (Central bank digital currency).³

In recent years, the market capitalization of stablecoins has been growing much faster than the stock of the dollar in circulation. This might indicate a sharply increasing demand for stablecoins marketwide. Take USDT, the most popular stablecoin, for an example. Data from CoinMarketCap show that the market capitalization of USDT increased nearly 35-fold from

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¹ According to the data from coinmarketcap (<https://coinmarketcap.com/view/stablecoin/>, access date: 2022.03.25), the U.S. dollar denominated stablecoins account for about 99% of the total market value of stablecoins.

² <https://news.yahoo.com/stablecoins-useful-regulation-fed-chair-powell-135649685.html>, access date: 2022.03.25.

³ <https://www.globalriskregulator.com/Subjects/Financial-Markets/Well-regulated-dollar-stablecoins-may-cancel-out-need-for-CBDCs>, access date: 2022.03.25.

January 2019 to June 2022.⁴ However, the M2 in U.S. has risen by 50.15 % in the same period.⁵ Furthermore, this sharp increase in the market capitalization of the stablecoins cannot be only interpreted as a fast increase in the overall cryptocurrency market demand either. The growth rate of USDT market capitalization is four times that of the overall cryptocurrency market. Therefore, we argue that this huge increase in the market capitalization of the stablecoins might indicate that demand for stablecoin increases sharply compared to the demand for the U.S. dollar and the demand for other cryptocurrencies.

The huge demand for stablecoin as a payment method is also increasing greatly in recent years. A survey named “Merchant Adoption of Digital Currency Payments Survey”, which polled 2000 senior executives at retail organizations across the United States in December 2021,⁶ shows that a large percentage of retailers are willing to accept stablecoins as a form of payment. The survey documents that “more than 85 % of the organizations are giving high or very high priority to enabling cryptocurrency payments, while roughly 83 % are doing the same for stablecoins.” And “nearly 75 % reported plans to accept stablecoin payments ... within the next 24 months”. The inclination of retailers to accept stablecoins might also indicate that they see a huge demand for stablecoins in their customers. The increase in customers' demand for stablecoins may in turn reinforce the retailers' needs for stablecoins as a part of the payment systems.

To formally investigate people's preferences for stablecoins and the dollar and the possible determinations, we conducted a questionnaire survey to a random group of Ethereum market participants. We find that more than half of the respondents prefer stablecoin over dollar. Data from our online survey show that about 60 % of the respondents prefer stablecoin⁷ (e.g., USDT) over the dollar, which we call PSOD below. This PSOD preference remains robust across different groups in terms of age, gender, job and other demographic characteristics.

In this paper, we try to explore the source of the PSOD phenomenon. To start, we try to compare stablecoins and the dollar from an economic perspective. In Section 3.1 we discuss the difference between stablecoins and the dollar when treating stablecoins as a currency and confirm that they share the similarity in terms of functions of money. Thus, the explanations based on “the functions of money” cannot be the deterministic factor to the PSOD phenomenon. We then continue to investigate the explanations from the perspective of asset pricing. Specifically, in Section 3.2, we treat stablecoin and dollar as assets and analyze their returns and risks. We find holding stablecoin does not generate positive returns while the variance of return is significantly larger than that of the dollar. In Section 3.3, we further investigate whether the inclusion of stablecoin can improve the efficiency of optimal portfolio when dollar is already included. We demonstrate that stablecoin is a dominated asset when the U.S. dollar is already used in traditional asset pricing models. As a result, the conclusion of the economic analysis is completely opposite to the PSOD phenomenon, making it a puzzle. In summary, we find no strong answer to the PSOD puzzle from the perspective of economics.

To solve this puzzle, in Section 4, we turn to psychological factors, as previous studies show that the adoption of bitcoin can also be motivated by psychological factors (Gagarina et al., 2019; Steinmetz et al., 2021). Among others, two typical factors are discussed in this paper: one is people's curiosity and interest in new technology and the other one is political attitudes, including disappointment on government or central bank, advocacy of personal liberty and libertarianism.

We construct the measures of two factors using survey questions about attitudes towards technology and political liberty, following Sobhanifard and Sadatfarizani (2019). Then we test if the two factors can help explain the PSOD puzzle using a Logit model. Our results show that respondents with a higher interest in technology and more tendency towards political liberty prefer stablecoin over the dollar. We further demonstrate that under-regulated by the government and anonymity characteristic of stablecoin may become the potential channels to promote the preference for stablecoin over the dollar.

The main focuses of many works are on non-stablecoin cryptocurrencies such as bitcoin, and stablecoins have just begun to attract attention. Existing literature on stablecoin has mainly focused on the functions and their impact on Bitcoin or cryptocurrency markets (Wei, 2018). For example, Ante et al. (2021a) find that there are positive abnormal returns in the cryptocurrency market around the stablecoin issuance and stablecoin issuance can contribute to price discovery and market efficiency of cryptocurrencies. In Ante et al. (2021b), they further discover that large stablecoin transfers are closely followed by abnormal trading volume and abnormal returns of bitcoin. But this may not hold for a long period. Kristoufek (2021) finds no evidence that stablecoin can boost other crypto asset prices. However, there has been no article formally discussing why the stablecoin market is growing so fast and what are the possible reasons that people use stablecoins. There is a strand of literature studying the adoption and preference of cryptocurrencies, which has close connections to our research (Yeong et al., 2022; Wei and Dukes, 2021; Koroma et al., 2022). However, they focus mostly on the non-stablecoin cryptocurrency (Alzahrani and Daim, 2019; Steinmetz et al., 2021) and the research on stablecoin adoption has just started (Catalini et al., 2021). Bojaj et al. (2022) study the effect of stablecoin adoption on key macroeconomic factors in Montenegro and they don't formally discuss the possible reasons and motivations for stablecoin adoption. To the best of our knowledge, we are the first to investigate the preference between stablecoin and dollar from the users' perspective. Our study also contributes to the existing literature by investigating whether stablecoin can diversify the portfolio risk when dollar is already used from

⁴ Data is obtained from <https://coinmarketcap.com/currencies/tether/>, the market capitalization of Tether is about 1.89 billion dollars on January 1, 2019 and about 66.34 billion dollars on June 30, 2022.

⁵ Data are retrieved from <https://fred.stlouisfed.org/series/M2SL>, access date: 2022.07.25.

⁶ The survey results can be found at <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/technology/us-cons-merchant-getting-ready-for-crypto.pdf>, access date: 2022.07.15.

⁷ Stablecoin is a cryptocurrency which is pegged to a “stable” reserve asset like the U.S. dollar or gold. It is designed to reduce volatility relative to unpegged cryptocurrencies like Bitcoin.

the asset pricing perspective. Existing studies seldom take dollar into account when studying the relationships or asset pricing issues of cryptocurrencies (Baur and Hoang, 2021; Demir et al., 2020; Liu et al., 2022; Zhang and Mani, 2021).

Figuring out what factors are at work behind PSOD is also meaningful to central banks and regulators (Eichengreen and Viswanath-Natraj, 2022). The development of stablecoins has been affecting the nerve of central banks of major economies, which may concern that it will bring adverse impacts on one country's economy and monetary sovereignty. The Diem project (formerly known as Libra) of Facebook, for example, has been blocked in Europe just several months after the release of its whitepaper.⁸ Many economies are engaged in developing their own CBDC to counter the impacts of stablecoins. Therefore, understanding the motivation of PSOD can help guide the development of CBDC and deal with the potential risks brought by stablecoin properly. Moreover, the insufficient regulation of stablecoin could lead to the proliferation of illegal transactions and the accumulation of risks in the economy. The analysis of PSOD is helpful to identify stablecoin users and take proper regulatory measures.

The rest of the paper is organized as follows. Section 2 introduces the survey data. Section 3 tries to explain the PSOD from the economic perspective and proposes the PSOD puzzle. Section 4 investigates the PSOD puzzle based on psychological factors. Section 5 discusses the implications and limitations of our research. Section 6 concludes.

2. The survey data

The online questionnaire survey is issued to Ethereum participants in August 2021. It is distributed through anonymous social media including Telegram and Discord. Telegram and Discord are two mainstream communities for cryptocurrency traders to exchange information and communicate. The users of the two communities cover most of the countries in the world. We further limited the interviewee group to users of the Ethereum platform. Hence, the potential respondents of our survey are a random group of anonymous participants of Ethereum trading market and our sample is representative. To rule out the possible noise brought by non-cryptocurrency market participants, we require respondents to log into their Metamask⁹ wallets before they can access the questionnaire. A cryptographic signature¹⁰ is also needed before they can submit their answers.

In order to induce the true thoughts of the respondents, we have taken several approaches in our questionnaire design. First, we have included the "prefer not to answer" option in our survey questions, allowing the respondents to avoid questions they don't want to answer. The data show that about 25 % of the respondents select this option on certain questions. Second, the respondents can use a new wallet address when finishing the questionnaire, which is completely anonymous. A new wallet address can further protect privacy and prevent the disclosure of the transaction history of respondents. We also promise respondents that their answers will only be used for academic analysis and the information will not be leaked to others. The survey results show that all the respondents chose to do so. Third, we offer \$10 worth of ether as a reward to each respondent. We distributed the reward based on some verifiable information to prevent repeated or random answers. We believe that the above approaches can help us obtain their true thoughts. More details on the questionnaire are introduced in Appendix A.

The survey includes demographic information questions, including gender, age, marital status, employment status, annual household income, education, risk preference, investment knowledge and investment experience of the respondents, as shown in Table 1. We collected a total of 501 valid questionnaires. Young people account for a large proportion of the respondents. Only about one fifth of the respondents pass the age of 35. Most of them are males and more than two thirds are unmarried. Over 60 % of the respondents are employed and about 55 % of them are in the high-income class. In terms of education, about one in five respondents is illiterate and more than half have received college education or higher. Nearly three fourths of them are risk takers and about 18 % are risk averse. Most people have some investment knowledge, but not many have real investment experience. The regions where the respondents are located cover all continents in the world.

In the questionnaire, we measure the PSOD by asking: "For the same face value (e.g. \$1,000) of stablecoin (e.g. USDT) and dollar, which would you rather have first?". We argue the respondent is PSOD if he/she chooses to have stablecoin first. The data show that nearly 60 % of respondents are PSOD. We also divide the whole sample into groups according to their demographic characteristics and calculate this proportion within each group and find most of the subgroups show the same results as the full sample.

In Table 2, we make a comparison between people who are PSOD and who are not. The results show that there is no significant difference in age, gender, marriage, job, annual household income, risk preference and investment knowledge. But people who are PSOD have lower educational backgrounds and higher investment experience on average than those who are not. Nevertheless, for the groups with the highest education and lowest investment experience, the proportions of their preference for stablecoin over dollar are 56.36 % and 57.33 %, which are still greater than 50 %.

The above finding motivates us to further study the reasons behind the PSOD. It is a surprising result because the stablecoin is designed to be pegged to the dollar to maintain price stability. It is an alternative to the dollar in the cryptocurrency

⁸ <https://cointelegraph.com/news/five-european-union-countries-team-up-to-block-libra-report>, access date: 2022.03.25.

⁹ Metamask is the most widely used Ethereum wallet and it has over 30 million monthly active users according to the data from CoinDesk (<https://www.coindesk.com/business/2022/03/15/450m-raise-values-ethereum-builder-consensus-at-7b-as-metamask-tops-30m-users/>), access date: 2022.03.25).

¹⁰ In the Ethereum ecosystem, the cryptographic signature is usually used to verify the ownership, payments and authorization. In our survey, the signature is used to verify that the message is submitted by the respondent instead of a robot.

Table 1
Demographic information from respondents.

Variable	Categories	Number (%)	Variable	Categories	Number (%)
Age	(1) Below 20	25 (4.99 %)	Risk preference	(1) Risk loving	368 (73.45 %)
	(2) 20–35	368 (73.45 %)		(2) Risk neutral	41 (8.18 %)
	(3) Above 35	108 (21.56 %)		(3) Risk averse	92 (18.36 %)
Gender	(1) Male	439 (87.62 %)	Investment knowledge	(1) Limited	45 (8.98 %)
	(2) Female	62 (12.38 %)		(2) General	370 (73.85 %)
Marriage	(1) Married	159 (31.74 %)		(3) Rich	86 (17.17 %)
	(2) Unmarried	342 (68.26 %)	Investment experience	(1) Limited	382 (76.25 %)
Job	(1) Employed	316 (63.07 %)		(2) General	69 (13.77 %)
	(2) Not employed	185 (36.93 %)		(3) Rich	50 (9.98 %)
Annual household income	(1) Low income (below \$10,000)	68 (13.57 %)	Location	(1) America	190 (37.92 %)
	(2) Middle income (\$10,001–\$40,000)	159 (31.74 %)		(2) Europe	26 (5.19 %)
	(3) High income (Above \$40,000)	274 (54.69 %)		(3) Africa	86 (17.17 %)
Education	(1) No formal education	108 (21.56 %)	(4) Asia	13 (2.59 %)	
	(2) Primary or secondary school	102 (20.36 %)	(5) Oceania	57 (11.38 %)	
	(3) Bachelor's degree or higher	291 (58.08 %)	(6) Others	129 (25.75 %)	

This table reports the demographic information of the respondents in the questionnaire.

Table 2
PSOD statistics.

Variable	Category	PSOD	PSOD		
			Yes	No	Yes minus No (t-statistic)
Total sample	–	59.88 %	–	–	–
Age	Below 20	64.00 %	2.1467	2.1940	–0.0474 (–0.2878)
	21–35	60.87 %			
	Above 35	55.56 %			
Gender	Male	59.68 %	0.8733	0.8806	–0.0073 (–0.2427)
	Female	45.16 %			
Marriage	Married	56.60 %	0.3000	0.3433	–0.0433 (–1.0119)
	Unmarried	61.40 %			
Job	Employed	58.23 %	0.6133	0.6567	–0.0434 (–0.9900)
	Not employed	62.70 %			
Annual household income	Low income	55.88 %	2.4300	2.3831	0.0469 (0.7121)
	Middle income	59.75 %			
	High income	60.95 %			
Education	No formal education	67.59 %	2.3033	2.4577	–0.1544** (–2.1172)
	Primary or secondary school	61.76 %			
	Bachelor's degree or higher	56.36 %			
Risk preference	Risk loving	59.51 %	1.4667	1.4229	0.0438 (0.6185)
	Risk neutral	53.66 %			
	Risk averse	64.13 %			
Investment knowledge	Limited	60.00 %	2.0767	2.0896	–0.0129 (–0.2784)
	General	60.27 %			
	Rich	58.14 %			
Investment experience	Limited	57.33 %	1.4033	1.2388	0.1645*** (2.9535)
	General	59.42 %			
	Rich	80.00 %			

This table reports the PSOD of the whole sample and subsamples. PSOD represents the percentage of the respondents that prefers stablecoin over dollar. The average of each variable in the PSOD and non-PSOD groups, and their differences are reported.

world. Intuitively, we should not have observed a significant preference for stablecoin over dollar for the cryptocurrency market participants. In the following sections, we try to explain this PSOD phenomenon.

3. Economic analysis and the PSOD puzzle

In this section, we try to investigate the PSOD phenomenon. Intuitively, PSOD phenomenon may be due to that there exist stablecoins' economic advantages over the dollar. To name a few, stablecoin might be preferred to dollar if it can serve as a new form of money better. In addition, if holding stablecoins as financial assets can generate a higher risk-adjusted return compared to holding dollars, then stablecoin can also be preferred to dollar. Furthermore, it might be optimal for the inves-

tors to hold stablecoins to improve the efficiency of the portfolio in equilibrium from the perspective of standard asset pricing model.

Next, we will investigate all the three candidate explanations in following section in more details.

3.1. Stablecoin as a new form of money

If we treat the stablecoin as a currency, what makes it differ from the dollar? There still exist arguments about whether bitcoin and other cryptocurrencies can be seen as a new form of currency. In fact, stablecoin is different from general cryptocurrencies such as Bitcoin and Ethereum, which are believed to be more like speculative assets because the high volatility of the price prevents it from performing functions of money. It is designed to peg its value to fiat currency such as the dollar, or to commodities such as gold. In addition, the collateralization mechanism or the built-in algorithm of stablecoin can ensure that one unit of stablecoin is equal to one dollar, which makes stablecoin a valid candidate currency to perform the functions of money, at least in the crypto world.

Generally, money has three core functions: unit of account, medium of exchange and store of value. The “unit of account” function requires that money should reveal the value relations between two goods or services, and the “medium of exchange” function requires money to act as an intermediary between goods and services to facilitate trading. On the one hand, the stablecoin can exchange with the dollar at a 1:1 exchange rate, which ensures a clear and steady face value. The trading price of stablecoins is generally equal to one dollar. Here we take Tether (USDT) as an example. We can see from Fig. 1 that the daily closing price is equal to one dollar most of the time and very stable in the sample period, especially in August 2021 when we issued the questionnaire. On the other hand, stablecoins have become an essential intermediary for transactions in the cryptocurrency market. The USDT, for example, can be exchanged for more than 300 cryptocurrencies, covering nearly all the major cryptocurrencies.¹¹

As for the “store of value” function, it requires money to maintain the purchasing power and keep its value stable over a long period. For cryptocurrency users, there is no difference between using dollar to buy cryptocurrencies and using stablecoins to buy cryptocurrencies. Therefore, stablecoins are equivalent to the US dollar in terms of purchasing power. In terms of use, stablecoins and the dollar are also basically equivalent. Stablecoin act as the currency in the cryptocurrency world. It provides a practical and cheap way for cryptocurrency traders to enter and exit the market, and it has become a bridge connecting the traditional fiat currency and crypto world and a safe haven (Baur and Hoang, 2021).

Immediacy may be a major concern in the use of stablecoins. An active trader may be willing to hold stablecoins to facilitate trading other cryptocurrencies. Unfortunately, we do not have enough data to test whether and how liquidity motive contributes to PSOD in this survey since we cannot observe their trading behaviors. However, the liquidity motive may not have a very big influence on the PSOD because there is little liquidity constraint on stablecoins.

First, the exchange between stablecoins and dollar can be instant and with few transaction fees. Take USDT as an example, the purchase and withdrawal of USDT can be finished within seconds in many crypto exchanges and with few transaction fees. Therefore, cryptocurrency traders do not have strong incentives to hold stablecoin to avoid liquidity risk. Second, there are multiple ways to convert between stablecoins and dollar. For popular stablecoins, the exchange can be made through cryptocurrency wallets, online exchanges, financial services and ATMs almost worldwide. USDC, for example, is supported by more than 190 countries.¹²

In short, stablecoin and dollar seem to share many similarities from the perspective of functions of money, at least to the market participant in the crypto world. It seems to us that any explanations centering on the differences between stablecoin and USD in terms of functions of money are not promising to solve PSOD.

3.2. Is stablecoin a financial asset dominating dollar?

Then, what if we regard stablecoin as an asset? Standard portfolio theory argues that people's asset choice depends on the trade-off between return and risk of the candidate asset. The differences in return and risk between stablecoin and dollar might help to explain the PSOD phenomena.

We start by investigating whether stablecoins differ from dollar in return. As shown in Table 3, for the top five stablecoins by market capitalization, holding stablecoin brings zero average return. The average range (daily high price minus low price) is also small. Therefore, it seems that holding stablecoin is not economically profitable.

Furthermore, in Fig. 2, we cannot observe obvious increases in the trading volume of USDT when the market is in good times (The daily return is higher than 95 % of the daily return, blue area), which is the same for the other four stablecoins. This indicates that the positive returns of stablecoins do not promote stablecoin holdings. In some unreported regression analyses, we study the relationship between stablecoin market share and its excess return, and we do not find a significant relationship between them. Thus, it seems that the holdings of stablecoin are not strongly linked to the changes in returns of stablecoin.

¹¹ The Binance exchange, the most famous cryptocurrency exchange, claims that traders can exchange more than 300 cryptocurrencies for USDT on its website (<https://www.binance.com/en/buy-tetherus>, access date: 2022.03.11).

¹² <https://www.circle.com/en/usdc>, access date: 2022.12.02.



Fig. 1. The daily closing price of USDT. This figure presents the daily closing price of USDT from March 25, 2015 to July 24, 2022. The daily closing price is equal to one dollar at most of the time and very stable in August 2021, when we conduct our questionnaire.

Table 3

The return of representative stablecoins.

Stablecoins	Ticker	Period	Average return (<i>t</i> -statistics)	Share	Range
Tether	USDT	2015.03.25–2022.07.24	−0.0000 (−0.0000)	57.73 %	0.0096
USD coin	USDC	2018.11.08–2022.07.24	−0.0000 (−0.0000)	25.58 %	0.0097
Binance USD	BUSD	2019.10.20–2022.07.24	−0.0000 (−0.0792)	11.40 %	0.0070
Dai	DAI	2019.12.22–2022.07.24	−0.0000 (−0.0398)	5.29 %	0.0150

This table reports the statistics of four representative stablecoins. The average return is the average of the daily return in the whole period and the share is the market share calculated by the market capitalization on July 24, 2022. The range is the average of the daily high price minus the low price.

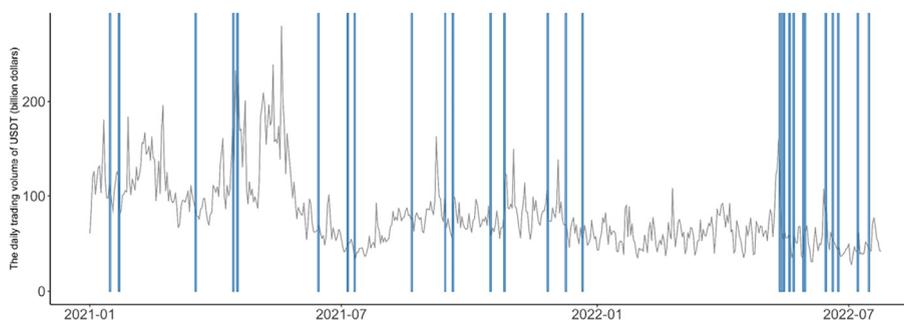


Fig. 2. USDT trading volume. This figure presents the daily trading volume of USDT from January 1, 2021 to July 24, 2022. The blue areas denote the days when return of USDT is higher than 95% of the daily return. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

In addition, we also consider the possibility of interests associated with them. Compared with stablecoins, the dollar can be saved in bank accounts and generate interest. Although some CeFi and DeFi platforms provide cryptocurrency lending services and allow traders to earn yield by lending their stablecoins, it is the same as lending someone dollars and charging interests in essence. Overall, we believe there are no significant differences in terms of interests earned (if any) on stablecoin and dollar. In summary, holding stablecoin generates no superior return compared to holding dollar.

Therefore, holding stablecoin faces a bigger risk than holding the dollar. On the one hand, a single unit of stablecoin pegs to 1 dollar, but the volatilities of stablecoins do not equal zero (Grobys et al., 2021; Hoang and Baur, 2021). It may bring potential loss to traders, maybe not very much, when they exchange one for another. On the other hand, the centralized institution, which manages stablecoins' reserve assets, may not be as reliable as the central bank.¹³ In short, given the nearly zero return and positive risk of stablecoin, the standard portfolio theory suggests the opposite of the observed PSOD phenomenon. That is, a rational investor should not invest in stablecoin as a financial asset.

¹³ In April 2019, the iFinex Inc., operator of the Bitfinex and Tether Limited, took Tether's reserve funds to cover a loss of 850 million dollars of Bitfinex. It violated the promise stated in the Tether white paper declaring "at any given time, the balance of fiat currency held in our reserves will be equal to (or greater than) the number of tethers in circulation".

3.3. Stablecoins for portfolio diversification

Another possible motivation for holding stablecoin is to diversify the portfolio risk in the cryptocurrency market. The volatilities of cryptocurrencies, such as Bitcoin and Ethereum, are much higher than traditional financial assets, which makes it very necessary for some investors to control and diversify the cryptocurrency portfolio risk. As the only type of asset that can maintain a stable value in the cryptocurrency world, stablecoin can be a potential asset to diversify the portfolio risks. In this subsection, we use the asset pricing methods and test whether the stablecoin is useful in portfolio risk diversification when dollar is already included in the portfolio.¹⁴

We start with the classic Modern Portfolio Theory proposed by Markowitz (1952), which is the mean–variance framework. Our analysis is similar to Kajtazi and Moro (2019), who test the ability of Bitcoin to diversify portfolio risks. In our analysis, we test the effect of adding USDT to a well-diversified portfolio and analyze whether it can be used to build a more efficient tangency portfolio. The tangency portfolio is the portfolio that maximizes the Sharpe ratio and all rational investors should hold the assets in the same proportion as the weight in this portfolio. Furthermore, given that the traditional mean–variance may be limited due to the highly abnormal return of cryptocurrencies, we also employ the mean–CVaR portfolio model, which uses Conditional Value at Risk (CVaR) as the risk measure. More technical details can be found from Würtz et al. (2009).

We selected the top three non-stablecoin cryptocurrencies by market capitalization to build the portfolio as they are the most welcomed crypto assets. For stablecoin, we also choose USDT as the representative stablecoin here. We collect their daily closing prices from the coinmarketcap.¹⁵ Then we calculate the return of each asset using $r_t = 100 * \ln(p_t/p_{t-1})$, where r_t is the return on day t and p_t is the daily closing price on day t . The details of these cryptocurrencies are reported in Table 4. Assets that are available to construct portfolios include three normal cryptocurrencies (BTC, ETH and BNB), USDT and the dollar.

Referring to Kajtazi and Moro (2019), we start by considering a portfolio with no constraints, denoted by $w_i \in \mathbb{R}^+ : \sum w_i = 1$ where w_i is the weight of asset i . This optimization process limits the asset weights to 100 % and allows no shorting. However, traders can choose to hold 100 % dollar or USDT in this case, which means they don't actually invest in the cryptocurrency market. More importantly, the efficient frontier will go through the origin point and the tangency portfolio no longer exists. Therefore, it is necessary to impose a weight constraint on dollar and stablecoin. We assume that there is an upper bound on the sum of the dollar and stablecoin weights, represented by \hat{w} . Then we have an additional constraint that $w_{dollar} + w_{USDT} \in [0, \hat{w}]$.

We first construct a portfolio including dollar but without USDT. There are four assets available, BTC, ETH, BNB and dollar. We set \hat{w} to 0.4, indicating that traders can hold up to 40 % of their budget in dollars.¹⁶ We calculate the efficient frontier and obtain the tangency portfolio, which is the optimal portfolio for rational traders. Fig. 3A shows the mean–variance efficient frontier without USDT. The x-axis is the target risk, represented by the standard deviation of the portfolio. The y-axis is the target return of the portfolio. The blue line is the capital market line (CML) and is tangent to the efficient frontier at the red point, which represents the tangency portfolio.

We then include USDT in the portfolio and redraw the mean–variance effective frontier, as shown in Fig. 3B. It can be found that the inclusion of USDT does not change the effective frontier and the tangency portfolio. Table 5 shows that the return of the optimal portfolio without USDT is 0.1231 and the standard deviation is 3.5244. Investors' best choice is to hold 40 % dollars and 60 % BNB. However, when USDT is available, it does not change the weight of the assets in the optimal portfolio. To further verify our findings, we divide the whole sample into two sub-periods and repeat the above analyses. We obtain the same finding that the inclusion of USDT cannot contribute to a better optimal portfolio when the dollar is already used. In other words, USDT is dominated by the dollar when constructing optimal portfolios. This finding is also consistent with economic intuition. USDT has zero mean return, which is the same as the dollar. However, the risk of USDT is not zero as it has a positive standard deviation. Assigning a non-zero weight to stablecoin merely increases the portfolio risk without generating any additional return.

We then turn to the mean–CVaR efficient frontier to check our results. The Conditional Value at Risk is used to measure the portfolio risk instead of the standard deviation. We calculate the CVaR at the 5 % confidence level. As shown in Fig. 4, we also find that including USDT in the portfolio with dollar can't bring benefits to the tangency portfolio. Table 6 indicates that the return of the optimal portfolio is 0.1231, with a CVaR of 7.8523 both with and without USDT. The results of subperiod samples also draw the same conclusion.¹⁷

To conclude, stablecoin is a dominated asset when dollar is already used in the portfolio. Intuitively, stablecoin only increases the portfolio risk without bringing additional returns. Therefore, there is no motivation for traders to hold stablecoin to diversify the cryptocurrency portfolio risk.

¹⁴ Some previous studies have demonstrated the ability of stablecoin to hedge risk. For instance, Xie et al. (2021) document that Tether functions as a safe-haven asset in traditional cryptocurrency portfolios, before and during the COVID-19 pandemic. However, they do not consider dollar when studying the diversification abilities of stablecoin.

¹⁵ <https://coinmarketcap.com/>, access date: 2022.07.25.

¹⁶ We have also tried other weights of \hat{w} and the results are robust.

¹⁷ To further mitigate the possible concern that our results may be affected by the performance of markets or big external shocks, we have provided additional empirical evidence in Appendix B. Specifically, we retest whether stablecoin can be a potential asset to diversify the portfolio risks before and during the COVID-19 period. The results of Table B1 and Table B2 still show that stablecoin is a dominated asset when dollar is already used in the portfolio.

Table 4
Cryptocurrencies for portfolio construction.

Name	Symbol	Market capitalization (Billion dollars)	Share	Mean	Std
Bitcoin	BTC	431.89	58.79 %	0.03	3.98
Ethereum	ETH	194.63	26.49 %	0.04	5.15
BNB	BNB	42.25	5.75 %	0.20	5.87
Tether	USDT	65.84	8.96 %	-0.00	0.48

This table shows the statistics of the Cryptocurrencies that are used to construct the portfolio. Data ranges from January 1, 2018 to July 24, 2022. The market capitalization is data on July 24, 2022 and the market share of each cryptocurrency is also calculated on July 24, 2022. The mean and standard deviation of return are also reported.

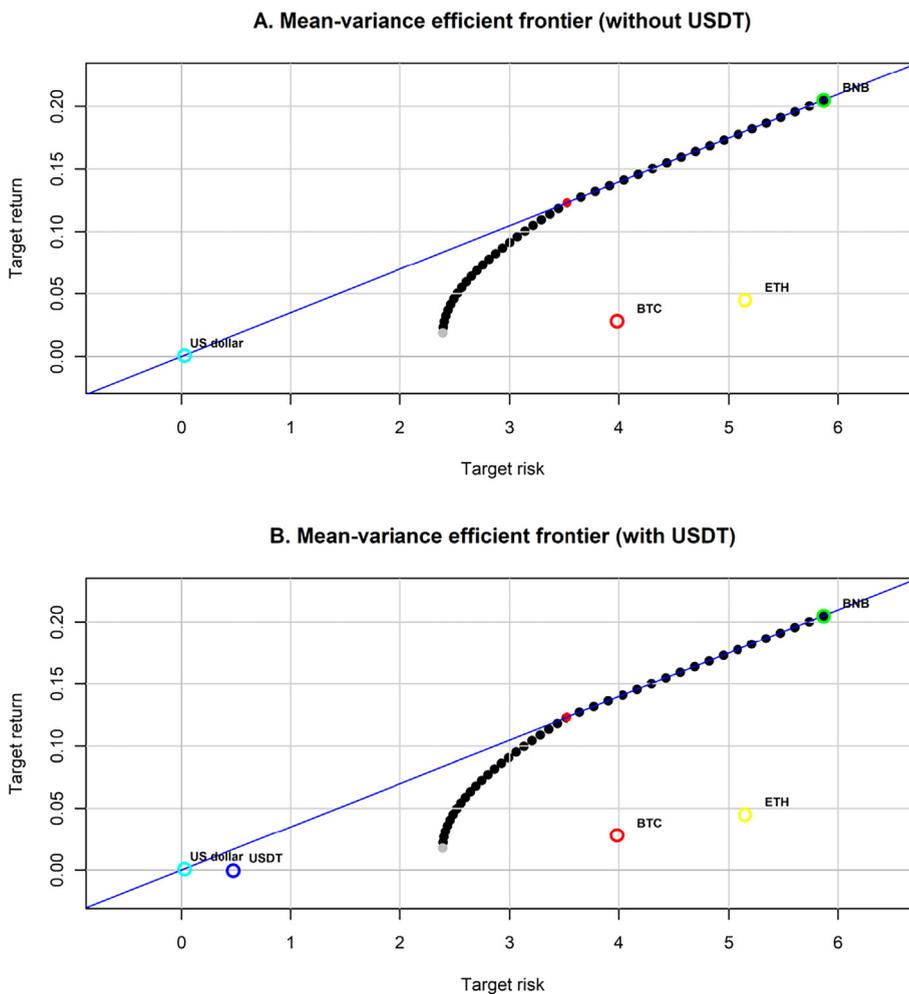


Fig. 3. Mean-variance efficient frontier and tangency portfolio (Whole period). The black dots in this figure shows the mean–variance efficient frontier of the portfolios without and with USDT. The blue line is the capital market line and the red point stands for the optimal portfolio. The x-axis is the target risk, represented by the standard deviation of the portfolio. The y-axis is the target return of the portfolio. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

These analyses above make PSOD a puzzle. First, the explanations centering on the differences between stablecoin and dollar in terms of functions of money don't help to explain the PSOD. The asset pricing analysis further shows that holding stablecoins or using stablecoins to diversify the portfolio risk is also not wise when dollar is available. Taking all aspects into consideration, a rational investor should be more likely to prefer dollar over stablecoins. However, this is completely opposite to the PSOD we have observed. Investors' behaviors are no longer consistent with the economic analysis. In other words, we failed to explain the PSOD puzzle from several economic perspectives.

Table 5
Tangency portfolios the mean–variance model.

Period	Portfolio	Return	Risk (std)	Asset weight				
				Dollar	USDT	BTC	ETH	BNB
Full period (2018.01.01–2022.07.24)	Without USDT	0.1231	3.5244	0.40	–	0	0	0.60
	With USDT	0.1231	3.5244	0.40	0	0	0	0.60
Sub period (2018.01.01–2020.03.31)	Without USDT	0.0280	3.6442	0.40	–	0	0	0.60
	With USDT	0.0280	3.6442	0.40	0	0	0	0.60
Sub period (2020.04.01–2022.07.24)	Without USDT	0.1984	2.9588	0.40	–	0	0.27	0.33
	With USDT	0.1984	2.9588	0.40	0	0	0.27	0.33

This table reports the details of the tangency portfolio of mean–variance model. Return is the target return of the optimal portfolio and risk is the standard deviation of the optimal portfolio. The weight of each asset in the optimal portfolio is also reported.

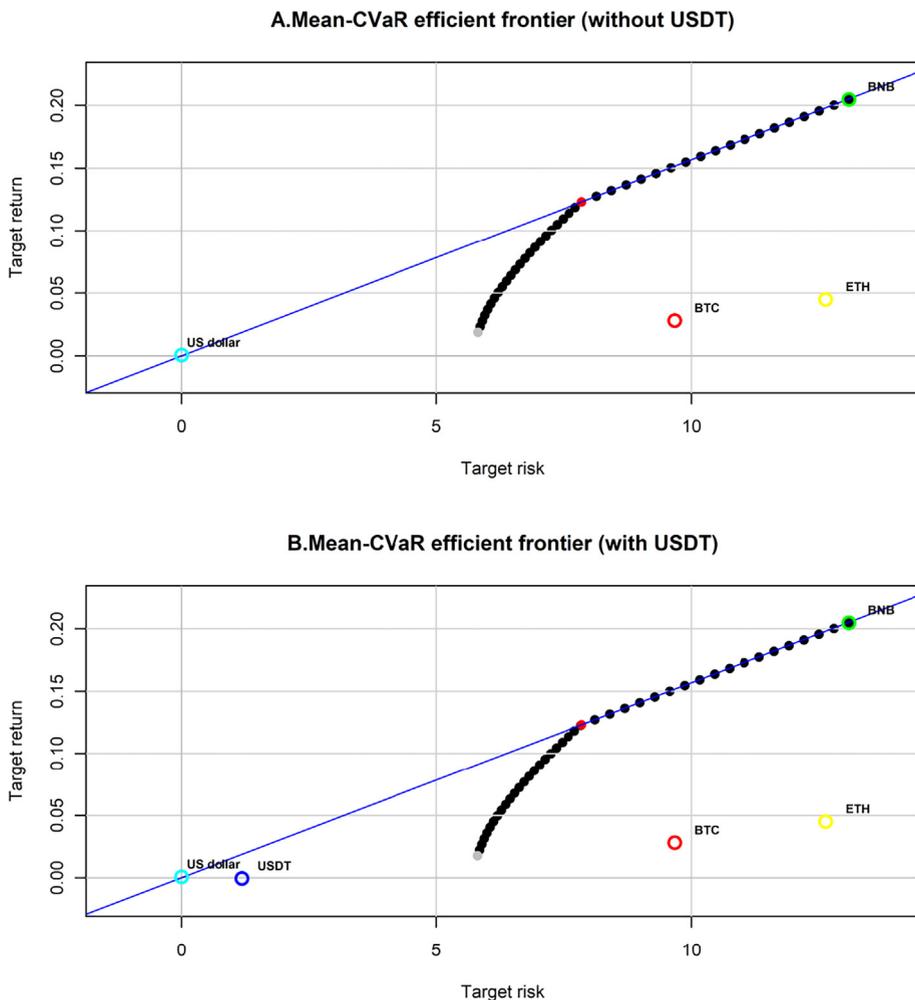


Fig. 4. Mean-CVaR efficient frontier and tangency portfolio (Whole period). The black dots in this figure shows the mean-CVaR efficient frontier of the portfolios without and with USDT. The blue line is the capital market line and the red point stands for the optimal portfolio. The x-axis is the target risk, represented by the CVaR of the portfolio. The y-axis is the target return of the portfolio. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Table 6
Tangency portfolios of the mean-CVaR model.

Period	Portfolio	Return	Risk (CVaR)	Asset weight				
				Dollar	USDT	BTC	ETH	BNB
Full period (2018.01.01–2022.07.24)	Without USDT	0.1231	7.8523	0.40	–	0	0	0.60
	With USDT	0.1231	7.8523	0.40	0	0	0	0.60
Sub period (2018.01.01–2020.03.31)	Without USDT	0.0280	8.2662	0.40	–	0	0	0.60
	With USDT	0.0280	8.2662	0.40	0	0	0	0.60
Sub period (2020.04.01–2022.07.24)	Without USDT	0.2131	7.3148	0.40	–	0	0.04	0.56
	With USDT	0.2131	7.3148	0.40	0	0	0.04	0.56

This table reports the details of the tangency portfolio of mean-CVaR model. Return is the target return of the optimal portfolio and risk is the CVaR of the optimal portfolio. The weight of each asset in the optimal portfolio is also reported.

4. Psychological factors

4.1. Hypotheses

Some studies on bitcoin have found that, besides economic factors, the adoption of bitcoin is also motivated by psychological factors (Gagarina et al., 2019). Economic factors mainly refer to the speculative opportunity and potential high returns that Bitcoin can bring. But it does not apply to stablecoin, as discussed in Section 3.2. Psychological factors refer to personal attitudes and intentions. Among them, two typical factors are discussed in this paper. One focuses on people's curiosity and interest in new technology. The innovative technology of bitcoin has attracted many technology enthusiasts. Presthus and O'Malley (2017) find that bitcoin users embrace bitcoin due to technological curiosity, supported by Krombholz et al. (2016) and Yelowitz and Wilson (2015). The other motivation factor is political reasons, including disappointment with the government or central bank, advocacy of personal liberty and libertarianism. Knauer and Mann (2019) find that one of the reasons for accepting blockchain is to keep independent from institutions. The anonymity, freedom and decentralization features of bitcoin attract the libertarian, even those who engage in illegal activities.¹⁸

Although these previous studies only focus on bitcoin, we believe these arguments can also be applied to the stablecoin, as it is essentially a type of cryptocurrency designed within the cryptocurrency framework, which shares many similarities in technology design and circulation with bitcoin. Therefore, we propose the following two hypotheses and test them:

H1: The PSOD is positively related to individual's interest in technology.

H2: The PSOD is positively related to individual's tendency towards political liberty.

4.2. Variables

In the questionnaire, we have a multiple-choice question to learn why respondents hold cryptocurrencies. If the respondent selects "Just for fun" or "To know more about cryptocurrencies", we believe he/she has an interest in technology of cryptocurrency. If one selects "I lost confidence in the government and its monetary system", we believe he/she has a tendency towards political liberty. Then we construct two dummy variables IT_{dummy} and TPL_{dummy} , which are equal to 1 if one chooses the corresponding option and 0 otherwise, for interest in technology and political attitude.

Acknowledging the dummies are too coarse, since a single question might not be able to measure people's attitudes towards technology and political liberty well, we also construct two additional proxies using the general questions of the questionnaire on attitudes towards technology and political liberty. The questions are in the form of a 7-point Likert scale, from "disagree completely" to "agree completely". The technology-related questions refer to Edison and Geissler (2003), and political-related questions refer to the Youth Poll of Harvard Institute of Politics, a national poll every half year aiming at investigating the political opinions of young people.

Following Sobhanifard and Sadatfarizani (2019), the exploratory factor analysis is used to deal with the questionnaire data. As a typical and standard statistical method for questionnaire analysis, the exploratory factor analysis aims to identify how indicators used empirically are configured in factors that are not directly observed. We start by demonstrating that this method is suitable for analyzing our questionnaire data. We first employ the KMO test, proposed by Kaiser (1970) and Kaiser and Rice (1974), to evaluate the adequacy of factor analysis and the measure of sampling adequacy. As reported in Table 7, the KMO measure for our study is 0.701, which is considered to be an adequate determination of sampling. We then perform Bartlett's Test of Sphericity, proposed by Bartlett (1950). The result is significant ($p < 0.001$) and supports conducting the exploratory factor analysis.

Then the exploratory factor analysis is conducted on the Likert scale questions. According to the Kaiser Criterion, we keep factors with eigenvalues greater than 1 and we obtain two factors. Then items with factor loadings below 0.5 are removed as their contributions to factors are small and there are 8 items (questions) left for the two factors. As shown in Table 8, the

¹⁸ <https://www.coindesk.com/markets/2016/10/08/live-free-or-mine-how-libertarians-fell-in-love-with-bitcoin/>, access date: 2022.03.10.

Table 7
KMO and Bartlett's test.

Kaiser-Meyer-Olkin measure of sampling adequacy	p-value	0.701
Bartlett's test of sphericity	Approx. Chi-Square p-value	1114.101 p < 0.001

This table reports the results of the KMO test and the Bartlett's test of sphericity for the questionnaire data.

Table 8
Exploratory factor analysis results.

Item	Factor loading (Observations = 501)	
	IT _{factor}	TPL _{factor}
1. I relate well to technology and machines.	0.844	
2. I feel as up-to-date on technology as my peers.	0.857	
3. Solving a technological problem seems like a fun challenge.	0.737	
4. I find most technology easy to learn.	0.634	
5. The government is liable to be transparent about all initiatives to the public		0.819
6. Elected officials seem to be motivated by selfish reasons.		0.861
7. All ethnicities should be integrated into society.		0.531
8. I don't believe my vote will make a real difference.		0.727
Cronbach's alpha	0.670	0.635
Variance Contribution Rate	31.92 %	26.25 %

This table shows the results of the exploratory factor analysis following Sobhanifard et al. (2019). There are 8 items left for the two factors. The factor loadings of each item are reported. The Cronbach's alpha and variance contribution rate of each factor are also calculated.

cumulative variance contribution reaches 58.17 %. Then, according to the contents of these questions, we named the two factors as IT_{factor} and TPL_{factor} respectively. The Cronbach's alpha coefficients of the three factors are all above 0.60, indicating the results have good internal consistency reliability. The summary statistics of the factors are reported in Table 9.

The logit model is used to analyze the respondents' preferences on stablecoins. The model is set as follows:

$$\text{Logit}(PSOD_i) = \alpha_0 + \alpha_1 IT + \text{Controls}_i \quad (17)$$

$$\text{Logit}(PSOD_i) = \alpha_0 + \alpha_1 TPL + \text{Controls}_i \quad (18)$$

PSOD is a dummy variable, which equals 1 if one is PSOD and 0 otherwise. IT is the variable representing respondents' interest in technology and TPL is the variable representing respondents' tendency towards political liberty. Controls represents the control variables, covering the gender, age, marital status, education, employment status, income, risk preference, investment knowledge and investment experience of the respondents. The subscript represents the individual i since it is a cross-sectional analysis. The summary statistics are reported in Table 9.

4.3. Empirical findings

The main results are reported in Table 10. Column (1) and (2) show that IT has a positive effect on PSOD, and the results are significant at the 1 % level for both IT_{dummy} and IT_{factor}. Similar results can be observed for TPL in columns (3) and (4), indicating that the TPL is also positively related to PSOD. For the control variables, we find that most control variables have no significant effect on PSOD, with the exception of education and investment experience. Respondents with lower education levels and more investment experience show more preference for stablecoin over dollar. The above results suggest that cryptocurrency market participants with more interest in technology and greater preference for political liberty show a PSOD inclination.

The data in our questionnaire allow us to further analyze what plays a role between PSOD and TPL. In the questionnaire, we ask which characteristic of stablecoins motivates the respondent to hold stablecoin. Among the options, two may be closely related to the TPL: one is "It is less regulated by the government" and the other one is "It has strong anonymity". Then we constructed two dummy variables *unregulated* and *anonymity* accordingly, which equals 1 if the respondent chooses the corresponding answer and 0 otherwise. Lack of government regulation and anonymity of stablecoin grant more freedom for the people with TPL. Therefore, we argue they might make it easier to attract the attention of people with TPL, thus becoming a channel between PSOD and TPL.

Referring to Alesina and Zhuravskaya (2011), we further test if these characteristics of stablecoin act as channels between PSOD and TPL:

$$\text{Logit}(\text{characteristic}_i) = \beta_0 + \beta_1 TPL_i + \text{Controls}_i \quad (3)$$

Table 9
Summary statistics of variables.

Variable	Definition	Obs	Mean	Sd	Min	Max
PSOD	Prefer stablecoin over dollar, 1 = "Yes", 0 = "No"	501	0.60	0.49	0	1
IT _{dummy}	Interest in technology, dummy variable	501	0.22	0.42	0	0
IT _{factor}	Interest in technology, factor variable	501	0	1	-1.58	2.35
TPL _{dummy}	Tendency towards political liberty, dummy variable	501	0.08	0.27	0	1
TPL _{factor}	Tendency towards political liberty, factor variable	501	0	1	-1.68	2.40
Male	1 = "Male", 0 = "Female"	501	0.88	0.33	0	1
Age	1 = "Below 20", 2 = "21-35", 3 = "Above 35"	501	2.17	0.49	1	3
Married	1 = "Married", 0 = "Female"	501	0.32	0.47	0	1
Education	1 = "No formal education", 2 = "Primary or secondary school", 3 = "Bachelor's degree or higher"	501	2.37	0.82	1	3
Job	1 = "Employed", 0 = "Not employed"	501	0.63	0.48	0	1
Income	1 = "Low income", 2 = "Middle income", 3 = "High income"	501	2.41	0.72	1	3
Risk pr	Risk preference, 1 = "Risk prefer", 2 = "Risk neutral", 3 = "Risk averse"	501	1.45	0.78	1	3
Invt knwl	Investment knowledge, 1 = "Limited", 2 = "General", 3 = "Rich"	501	2.02	0.44	1	3
Invt expc	Investment experience, 1 = "Limited", 2 = "General", 3 = "Rich"	501	1.34	0.65	1	3
Unregulated	The respondents believe stablecoin is unregulated or lacks government regulation, dummy variable	501	0.24	0.43	0	1
Anonymity	The respondents believe stablecoin has anonymity, dummy variable	501	0.37	0.48	0	1

This table reports the definitions and summary statistics of variables used for the Logit regressions.

Table 10
The effect of IT and TPL on PSOD.

	(1)	(2)	(3)	(4)
	PSOD	PSOD	PSOD	PSOD
IT _{dummy}	0.7150*** (0.2385)			
IT _{factor}		0.5001*** (0.0999)		
TPL _{dummy}			2.1463*** (0.6110)	
TPL _{factor}				0.7972*** (0.1189)
Male	0.0506 (0.2895)	0.0497 (0.2839)	-0.0724 (0.2871)	0.2291 (0.3045)
Age	-0.1558 (0.1944)	-0.2433 (0.1963)	-0.2021 (0.1990)	-0.1859 (0.2106)
Married	-0.2408 (0.2064)	-0.2726 (0.2060)	-0.1801 (0.2061)	-0.0864 (0.2115)
Education	-0.2910** (0.1203)	-0.3770*** (0.1218)	-0.3099** (0.1207)	-0.3417*** (0.1223)
Job	-0.1150 (0.1997)	-0.2053 (0.2042)	-0.1380 (0.1992)	-0.0864 (0.2070)
Income	0.0875 (0.1319)	0.0951 (0.1319)	0.1223 (0.1330)	0.1421 (0.1379)
Risk pr	0.0322 (0.1244)	0.0114 (0.1255)	0.0044 (0.1258)	0.0010 (0.1324)
Invt knwl	-0.1009 (0.2260)	-0.1048 (0.2323)	-0.0704 (0.2286)	-0.0774 (0.2321)
Invt expc	0.4648*** (0.1616)	0.4623*** (0.1614)	0.4110** (0.1629)	0.3954** (0.1619)
Constants	0.7250 (0.8233)	1.3827* (0.8224)	0.9799 (0.8291)	0.8654 (0.8439)
Observations	501	501	501	501
Pseudo R ²	0.0398	0.0651	0.0560	0.1127

This table reports the Logit regressions that measure the effect of IT and TPL on PSOD. The dependent variable is PSOD, which is a dummy variable that measures whether the respondent prefer stablecoin over dollar. The independent variable is IT and TPL, which represent the interest in technology and tendency towards political liberty. Standard errors are provided in parentheses and ***, **, and * represent significance levels of 1%, 5% and 10%, respectively.

$$\text{Logit}(PSOD_i) = \gamma_0 + \gamma_1 TPL_i + \gamma_2 \text{characteristic}_i + \text{Controls}_i \tag{4}$$

In equation (3), we regress each characteristic of stablecoin on TPL. If β_1 is significant, we add this characteristic into the regression and perform the regression in equation (4). If γ_1 and γ_2 are both significant and the absolute value of γ_1 is smaller than that of the same factor in equation (2), we believe this characteristic may play a role in linking PSOD and TPL.

The results are reported in Table 11. We can observe a significant positive relation between unregulated and TPL in column (1). When unregulated is added into the regression, as shown in column (2), the coefficients of unregulated and TPL are

Table 11
Potential channels between PSOD and TPL.

	(1)	(2)	(3)	(4)
	Unregulated	PSOD	Anonymity	PSOD
Unregulated		3.6454*** (0.6088)		
Anonymity				2.2225*** (0.2672)
TPL _{factor}	0.5398*** (0.1096)	0.7079*** (0.1273)	1.0919*** (0.1317)	0.4159*** (0.1221)
Male	0.5911 (0.3621)	0.0453 (0.3186)	0.4063 (0.3185)	0.0937 (0.3510)
Age	-0.1012 (0.2270)	-0.1887 (0.2298)	0.1923 (0.2136)	-0.3103 (0.2310)
Married	0.0635 (0.2415)	-0.1218 (0.2310)	-0.2900 (0.2234)	0.0358 (0.2282)
Education	-0.2221* (0.1313)	-0.3040** (0.1327)	-0.0431 (0.1278)	-0.3668*** (0.1341)
Job	-0.2448 (0.2278)	-0.0656 (0.2314)	0.2947 (0.2161)	-0.2460 (0.2315)
Income	-0.0068 (0.1552)	0.1431 (0.1532)	0.2083 (0.1532)	0.0771 (0.1516)
Risk pr	0.2284* (0.1387)	-0.1063 (0.1521)	-0.1082 (0.1416)	0.0345 (0.1384)
Invt knwl	-0.0677 (0.2434)	-0.0202 (0.2470)	-0.0267 (0.2357)	-0.0698 (0.2548)
Invt expc	0.0824 (0.1720)	0.4407** (0.1769)	0.0758 (0.1615)	0.4229** (0.1729)
Constants	-1.1559 (0.9915)	0.4514 (0.9513)	-1.6985* (0.8796)	0.7191 (0.9469)
Observations	501	501	501	501
pseudo R ²	0.0634	0.2574	0.1724	0.2307

This table reports the regression results of potential channels between PSOD and TPL following [Alesina and Zhuravskaya \(2011\)](#). *Unregulated* is a dummy variable that equals 1 if the respondent believes stablecoin is unregulated or lacks government regulation. *Anonymity* is a dummy variable that equals 1 if the respondent believes stablecoin has anonymity. Standard errors are provided in parentheses and ***, **, and * represent significance levels of 1%, 5% and 10%, respectively.

both significant at 1 % level, and the coefficient of TPL (0.7079) is smaller than that (0.7972) in column (4) of [Table 8](#). Therefore, the lack of government regulation for stablecoins may play a role in promoting PSOD. Similarly, the anonymity may also increase the attractiveness of stablecoins for cryptocurrency participants.

What do these results indicate? It means stablecoins may provide an anonymous transaction channel free from government regulation. The TPL usually refers to dissatisfaction with government management and a tendency to break away from government regulation. Compared with dollar, stablecoins are relatively less regulated and their trading and circulation of stablecoins are difficult to be tracked, which satisfies their users' freedom requirement. Therefore, stablecoins are more likely to be favored by libertarians. However, we cannot deny the possibility that stablecoins may become tools for money laundering, illegal transactions and other activities prohibited by the government.

There could be alternative explanations for the PSOD. Among them, one might argue that stablecoin could be preferred over the U.S. dollar from the perspective of the transaction cost. For example, one may have a need to transfer money across borders. Cross-border transfers using stablecoin have faster speed and lower fees than the U.S. dollar. Alternatively, one might be a very active trader who trades cryptocurrencies pretty frequently. Holding stablecoins can save time converting U.S. dollars into stablecoins and bring more convenience. These might be the reasons in favor of stablecoin over the U.S. dollar.

However, this might not be a big concern because there are other certain scenarios where stablecoin is not advantageous to use compared with dollar. For instance, stablecoins cannot be used as a payment method in many offline transaction scenarios. We want to emphasize that the PSOD in our study is an unconditional choice. It means that one chooses stablecoin when he/she has access to both stablecoin and the U.S. dollar, regardless of which scenario is going to occur. People who have a need for cross-border transfers or frequent trading might prefer stablecoin. Those with other needs for scenarios where the U.S. dollar is better than stablecoin may prefer the U.S. dollar. Note that our survey is a random sample from a large group of cryptocurrency market traders who may have different needs for different scenarios. Therefore, their effects on PSOD may offset each other and only the common factors, such as psychological factors remain and become the first-order effect. Therefore, the transaction cost factors should not have a significant impact on our findings.

5. Further discussion

Our findings have some implications for practitioners and CBDC designers. First, we argue that our results can help practitioners understand and analyze the valuation of cryptocurrencies. Since certain psychological factors could contribute to the PSOD, they may also play a role in the valuation of cryptocurrencies. We notice that the non-fungible token (NFT) is another special crypto asset that has real value. NFT is a type of emerging crypto asset embedded in a blockchain to record and transfer ownership. NFT can represent a real estate property, a piece of artwork, or even game collectibles. NFT began to attract much public attention in early 2021 and the market continued to expand rapidly. The total market value of NFTs has passed 18 billion dollars in the 2022 Q2.¹⁹ The value of NFT may also have some connections with psychological factors such as personal interest. However, it is difficult to statistically measure how much psychological factors can influence the valuation and the influence may also not last long. The impact of psychological factors on the prices of crypto assets is worthy of further investigation.

Second, our findings also have implications for the designers of CBDC. CBDC and stablecoin both belong to digital assets with stable value. But CBDC is backed by government credit and is generally more reliable than stablecoin. In recent years, more than four-fifth of the central banks turned to the CBDC projects (Boar and Wehrli, 2021). In our study, we show that some psychological factors contribute to the preference for stablecoin such as the tendency towards political liberty. Therefore, if the CBDC designers want to increase the attractiveness of CBDC and promote its use, they can provide more freedom to users such as the anonymity.

Our analysis relies on the data from a questionnaire survey, which may have some limitations. First, we are also unable to check whether the words and actions of the respondents are really consistent. In order to protect their privacy and induce their true willingness, we advise each respondent to use a new address to answer the questionnaire. However, this makes it difficult for us to test the consistency of their words and actions. We argue that under the protection of such strong anonymity, respondents do not have enough motivations to express a contrary preference deliberately.

Actually, we have tried to keep track of the addresses after the survey, but we find that only less than 1 % of the respondents use their addresses for subsequent trading. Among these people, we don't find inconsistencies between their trading behaviors and their answers. However, such a small subsample is far from drawing a conclusion that respondents' behaviors are consistent with their words. Even if a small percentage of people did this for some unknown reasons, their influences on the PSOD might cancel out each other since our questionnaire is a random sampling of representative Ethereum market traders. Therefore, we believe the consistency between words and actions is not likely to have a significant impact on our findings.

Second, the random answers in the questionnaire cannot be completely ruled out. Respondents may fill in the questionnaire randomly and one may worry that this will make PSOD a spurious phenomenon that can only be observed in our questionnaire. However, this may also not be a big concern. We have shown that the PSOD is not limited to our survey but can hold in a broader range. In addition, we also have a verification program in our questionnaire to prevent random and repeated answers. Therefore, we argue that the problem of random answers may not have a great impact on our analysis.

Third, the reliability of this mechanism is an important precondition for our analysis. Once the peg relationship is broken, stablecoin will become risky and economically distinct from the dollar in value. Under this circumstance, the preference between stablecoin and the dollar may change unpredictably. At the time the survey was conducted, the peg between stablecoin and the dollar was stable, which rules out this concern. Nowadays, popular stablecoins, such as the USDT and USDC, are fully backed to maintain a stable peg to the dollar, as promised by their issuers. Although people's concerns about the reliability of stablecoin reserve assets have not stopped, popular stablecoins, such as USDT and USDC, are still able to maintain the stability of their value.

Nevertheless, stablecoins are still in their infancy and lack regulations, which make them be easily followed by a crash. In May 2022, Terra's LUNA token, once ranked top ten cryptocurrencies by market capitalization in December 2021,²⁰ crashed only within several days and wiped out billions of its value.²¹ It is known as the Terra's UST and LUNA²² crisis, which has been viewed as one of the worst crypto crashes ever. The plunge has raised concerns about the reliability of stablecoin once again.

Indeed, we are the first to study the preference between stablecoin and dollar. There is still much room for future investigation, such as the government policy. However, to protect the privacy of the respondents, we don't ask which country they come from. Our survey also doesn't include related questions asking whether the stablecoin is regulated or forbidden in their countries. If we can collect more specific data in the future, such as the data from retail stores or the data we can keep tracking their following behaviors, we can directly observe their behaviors and compare their preferences between stablecoins and the U.S. dollar. However, the data limitations only allow us to generally discuss this topic in this paper. This may be left for the future study.

¹⁹ <https://coinmarketcap.com/view/collectibles-nfts/>, access date: 2022.07.14.

²⁰ <https://www.forbes.com/sites/roberthart/2021/12/06/terras-luna-becomes-top-ten-cryptocurrency-as-market-selloff-sends-bitcoin-down/?sh=60d6c6ac72dc>, access date: 2022.07.14.

²¹ <https://www.ft.com/content/48d82c7a-495f-4d5e-a87a-a56bea58e760>, access date: 2022.07.21.

²² LUNA is a token of Terra blockchain used to power the stablecoin TerraUSD (UST) and help it maintain a 1-to-1 peg with the US dollar.

6. Conclusion

This paper tries to explain a puzzle, observed in a survey to a random group of anonymous participants of Ethereum trading market, that the Ethereum trading market participants prefer stablecoin over dollar. We find stablecoin and the U.S. dollar share many similarities in terms of functions of money, including unit of account, medium of exchange and store of value. This puzzling preference also cannot be explained from the perspective of asset pricing, since the expected return of holding stablecoin is almost zero while the variance of return is significantly larger than that of the dollar. Stablecoin is dominated by dollar from the perspective of the traditional asset pricing model. Further analysis results show that the psychological factors such as the interest in technology and tendency towards political liberty help to explain this puzzle. Besides, our results also show that the lack of government regulation and anonymity of stablecoins become the potential channels to promote the preference for stablecoins.

CRedit authorship contribution statement

Feng Jin: Methodology, Investigation, Data curation, Software, Writing – original draft. **Jingwei Li:** Data curation, Software, Writing – original draft. **Yi Xue:** Conceptualization, Methodology, Investigation, Writing – review & editing, Validation, Supervision, Funding acquisition.

Data availability

Data will be made available on request.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. The details of the questionnaire

A1. Questionnaire distribution details

The survey is conducted through the online questionnaire. We compiled the online questionnaire web page using R software and uploaded it onto the shinyapp website (<https://www.shinyapps.io/>), which is an online platform to deploy the webpages. The survey started on August 1, 2021 and lasted for three days. We send the questionnaire URLs through the anonymous social media including Telegram and Discord. We ask the respondents to log into their Metamask wallets before accessing the questionnaire, which ensures that the respondents are Ethereum platform traders. Considering that some respondents do not want to disclose their transaction records, we recommend respondents with high privacy preference to use the newly applied wallet address. After finishing the questionnaire, a cryptographic signature is required to confirm the answers. The answers and wallet address of the respondent will be sent to a database developed to collect the data. When the survey ends, we send \$10 worth of ether as a reward to each wallet address.

A2. Prevent repeated and inconsistent answers to the survey

We offer rewards to those who participate in the questionnaire. Therefore, respondents may have the incentive to finish the questionnaire as soon as possible and participate repeatedly, which may lead to random answers in the questionnaire. To prevent this, we added a verification program in our questionnaire. If there are too many duplicate options or exist apparently contradictory answers, the respondent will not be able to submit the questionnaire. They will be asked to revise their answers instead. We also check if there are questionnaires with the same answers. If yes, we only adopt the first delivered answer.

Appendix B. Tangency portfolios before and during the COVID-19 period

This table reports the details of the tangency portfolio of mean-variance model. Return is the target return of the optimal portfolio and risk is the standard deviation of the optimal portfolio. The weight of each asset in the optimal portfolio is also reported (see Table B1).

This table reports the details of the tangency portfolio of mean-CVaR model. Return is the target return of the optimal portfolio and risk is the CVaR of the optimal portfolio. The weight of each asset in the optimal portfolio is also reported (see Table B2).

Table B1

Tangency portfolios the mean-variance model.

Period	Portfolio	Return	Risk (std)	Asset weight				
				Dollar	USDT	BTC	ETH	BNB
Full period (2018.01.01–2022.07.24)	Without USDT	0.1231	3.5244	0.40	–	0	0	0.60
	With USDT	0.1231	3.5244	0.40	0	0	0	0.60
Before COVID-19 (2018.01.01–2019.12.31)	Without USDT	0.0387	3.5036	0.40	–	0	0	0.60
	With USDT	0.0387	3.5036	0.40	0	0	0	0.60
During COVID-19 (2020.01.01–2022.07.24)	Without USDT	0.1783	3.1549	0.40	–	0	0.27	0.33
	With USDT	0.1783	3.1549	0.40	0	0	0.27	0.33

Table B2

Tangency portfolios of the mean-CVaR model.

Period	Portfolio	Return	Risk (CVaR)	Asset weight				
				Dollar	USDT	BTC	ETH	BNB
Full period (2018.01.01–2022.07.24)	Without USDT	0.1231	7.8523	0.40	–	0	0	0.60
	With USDT	0.1231	7.8523	0.40	0	0	0	0.60
Before COVID-19 (2018.01.01–2019.12.31)	Without USDT	0.0387	7.7400	0.40	–	0	0	0.60
	With USDT	0.0387	7.7400	0.40	0	0	0	0.60
During COVID-19 (2020.01.01–2022.07.24)	Without USDT	0.1889	7.8418	0.40	–	0	0.04	0.56
	With USDT	0.1889	7.8418	0.40	0	0	0.04	0.56

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