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The Influence of Stablecoin Issuances on Cryptocurrency Markets

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Abstract: Stablecoins are digital currencies whose value is pegged to fiat currencies like the dollar or other assets. They were created as a more flexible alternative to fiat currencies for cryptocurrency exchanges and constitute an increasingly important aspect of cryptocurrency markets and alternative finance. We analyze the influence of stablecoin issuances on the returns of major cryptocurrencies across 565 issuance events of $1 million or more for seven different stablecoins on four different blockchains between April 2019 and March 2020. Our event study reveals cryptocurrency market downturns in the week before a stablecoin issuance and positive abnormal returns for major cryptocurrencies in the twenty-four hours before and after the issuance. Effect sizes differ across stablecoins. Counterintuitively, we find that issuance size does not significantly affect the abnormal returns. We conclude that stablecoin issuances contribute to price discovery and market efficiency of cryptocurrencies.

Keywords: Market efficiency, Informational efficiency, Price discovery, Asset pricing, Event study, Transaction activity, Tether, Bitcoin, Ethereum

1 Introduction

While Bitcoin and other cryptocurrencies offer fast and immutable transactions, their use as a medium of exchange is severely limited by their price volatility (Dyhrberg, 2016; Katsiampa, 2017). An alternative to volatile cryptocurrencies are stablecoins, which are pegged to less volatile assets or currencies. Stablecoins are supposed to combine the advantages of cryptocurrency with the broad acceptance and price stability of fiat currency. Yet stablecoins face common challenges of cryptocurrencies, for example hacking risks, and issuer moral hazard.

Tether is arguably the most important stablecoin. It was launched in 2014. It gained importance in 2017 when cryptocurrency exchanges found it increasingly difficult or even impossible to maintain traditional banking relationships and started using Tether as a substitute for traditional currency (Bitfinex, 2017). During 2017, the amount of Tether issued increased from about $10 million to over $2 billion (Wei, 2018). Motivated by this success, many new stablecoin projects have launched since 2018. By now, Tether is the fourth largest cryptocurrency in terms of market capitalization, valued at $9.4 billion in June 2020.

Recently, stablecoins have received attention beyond the realm of cryptocurrency markets, with Facebook announcing its Libra project (Libra Association, 2020), China launching a central bank digital currency (CBDC) initiative (Forbes, 2020) and J.P Morgan introducing its JPM Coin (J.P. Morgan, 2019). The estimated market value of stablecoins increased by 70% throughout March and April 2020 (Voell, 2020).

The most common stablecoin peg mechanism is to deposit one dollar in a bank account for every stablecoin token issued. When tokens are redeemed, they are burned, i.e. deleted, and dollars from the bank account are paid out to the redeemer. In this approach, stablecoins are not mined like other cryptocurrencies but issued on blockchains by companies. Other approaches exist, including crypto-collateralization like DAI (MakerDAO, 2017) and algorithmic methods like seigniorage shares (Sams, 2015).

Issuances of stablecoins are irregular events that can be tracked on the associated blockchains, which allows to analyze how markets behave before and after such events. Wei (2018) studies Tether issuances and shows that they affect the trading volume but not the returns of Bitcoin. He further reports that Bitcoin price drops raise Tether trading volume, which suggests that the stablecoin is used as a safe haven – an explanation also suggested by other studies (Baur and Hoang, 2020; Wang et al., 2020). Griffin and Shams (2018) find that Tether issuances are followed by large purchases of Bitcoin. The authors even suggest that the Bitcoin price may be manipulated by Tether through unbacked issuances. Lyons and Viswanath-Natraj (2020a) find no systematic evidence that the prices of Bitcoin and Ethereum are affected by Tether issuances but show that Tether issuances are related to arbitrage opportunities: When stablecoin prices on cryptocurrency exchanges are above parity, profits can be made by issuing new stablecoins at the pegged rate and selling them on secondary markets (Lyons and Viswanath-Natraj, 2020b).

We contribute to the literature by analysing hourly returns of cryptocurrencies before and after the issuance of seven different stablecoins (rather than only Tether) using event study methodology that is based on hourly data instead of daily data. Data on the issuance of stablecoins was collected via block explorers of the respective public blockchain infrastructures. Newly issued stablecoins need not (immediately) be used to buy cryptocurrency. However, given that the main use case for stablecoins is trading on cryptocurrency exchanges, we hypothesize that demand for stablecoins is driven by demand for cryptocurrencies – be it regular investments or arbitrage opportunities[1] – and/or the market

[1] As the markets for direct exchange between fiat currencies and stablecoins are comparatively illiquid, cross arbitrage is likely to occur via the Bitcoin market.

regards the issuance of stablecoins as a positive signal regarding the demand for cryptocurrency.

Against this background, we formulate five hypotheses:

(1) There are positive abnormal returns before the issuance of stablecoins.
(2) There are positive abnormal returns with the issuance of stablecoins.
(3) Effects (1) and (2) increase with the amount of stablecoins issued.
(4) Effects (1) and (2) are the same across different stablecoins.
(5) Effects (1) and (2) are the same across different cryptocurrencies.

2 Methods and data

Data on the issuance of stablecoins is collected by means of block explorers of the four blockchains Bitcoin/Omni (omniexplorer.info), Ethereum (etherscan.io), TRON (tronscan.org) and EOS (bloks.com), which are relevant stablecoin blockchain infrastructures in the period under consideration. We identify 566 stablecoin issuances of at least $1 million[2] for seven different stablecoins between April 2019 and March 2020.[3] Based on market capitalization, these seven stablecoins account for a market share of 98% in June 2020, where Tether alone has a market share of 85%. Table 1 shows summary statistics on the issuances. Additional information on the individual stablecoins is provided in Table A.1 in the appendix.

Table 1. Stablecoin issuances of at least $1 million between April 2019 and March 2020.

			Value in million USD				
Stablecoin	Count	Share	Mean	SD	Median	Min	Max
USD Coin (USDC)	191	21.1%	5.69	7.33	2.01	1.00	34.92
Huobi USD (HUSD)	110	19.5%	1.52	1.11	1.05	1.00	8.92
Tether USD (USDT)	104	18.4%	41.45	56.62	22.55	1.49	302.28
Paxos Standard (PAX)	83	14.7%	4.40	3.81	2.76	1.06	22.12
Binance USD (BUSD)	51	9.0%	4.93	3.01	4.73	1.15	12.00
DAI (DAI)	11	1.9%	1.24	0.28	1.11	1.00	1.77
Gemini USD (GUSD)	6	1.1%	1.22	0.25	1.18	1.03	1.71
All	565	100%	11.01	28.62	2.02	1.00	302.28

USDC was issued most often, followed by HUSD, while USDT issuances are the largest on average because Tether regularly creates large amounts of USDT in its own blockchain treasury

[2] The choice of $1 million as cut-off value allows us to filter out small and presumably irrelevant transactions. For example, the decentralized stablecoin DAI can be issued in small quantities by any user of the Ethereum blockchain. Additionally, DAI can be created using the stablecoin USDC as collateral (MakerDAO, 2020).

[3] One transaction is excluded from the dataset. On July 13, 2019, 5 billion USDT were mistakenly issued on the TRON blockchain and burned shortly afterwards. These tokens never went into circulation. The hash of the issuance transaction is baa094deb9cfc3535dfd5bce27574d58cbae3ee75ec406c484a7aeeaead12ea7.

to be able to serve customers at short notice.[4] 60% of USDT issuances occur on the TRON blockchain (mean issuance size $18 million), 38% on Ethereum (mean issuance size $72 million) and 1% each on Bitcoin/Omni and EOS. The other stablecoins are solely issued on Ethereum. Note that stablecoin purchases are not limited to the cryptocurrency of the blockchain on which they were issued: USDT issued on Ethereum can be used to buy BTC, ETH or any other cryptocurrency.

Hourly close prices for the cryptocurrencies Bitcoin, Ethereum, Ripple and Litecoin from the Bitstamp exchange were obtained from cryptodatadownload.com. We chose the twenty-four hours before and after issuances as our event window, while the estimation window covers the period of -150 to -30 hours before an event. As long as an estimation window exceeds 100 time intervals, the results are usually not sensitive to window size (Armitage, 1995). The mean return over the estimation period constitutes our expected return. We calculate abnormal returns, as the difference between expected and observed returns over the event window. Since the returns are skewed (sk=1.17), we use log returns (sk=0.09).

3 Results and discussion

3.1 Stablecoin issuances and (abnormal) returns of cryptocurrencies

Table 2 shows summary statistics of log returns for the four cryptocurrencies over the entire period from April 2019 to March 2020 and various periods around stablecoin issuance events. The average hourly Bitcoin return over the estimation period is -0.018%, which corresponds to a cumulative return of -2.2% over the 121-hour period. The average hourly returns of the other three cryptocurrencies are also significantly negative, with Litecoin showing the greatest effect, with a cumulative return of -3.4%. For the 49-hour event window, we obtain negative returns for all cryptocurrencies, which are however smaller than those found during the estimation period. We do not observe significant returns for the hour of the issuance and the next 24 hours. Thus, stablecoin issuances do not coincide with significant market returns of cryptocurrencies, as already shown in the literature (Lyons and Viswanath-Natraj, 2020a; Wei, 2018). Yet they may still be associated with positive abnormal returns, as issuances are preceded by strongly negative returns.

Figure 2 shows abnormal returns and 95%-confidence intervals for the four cryptocurrencies around stablecoin issuances. Specifically, it displays average abnormal returns (AAR) per hour, as well as cumulative average abnormal returns (CAAR) from -24 to -1 hours and from 0 to 24 hours. Significance tests, results for alternative time windows and robustness checks for different estimation periods are reported in Table A.2 in the appendix.

[4] USDT are thus created but do not immediately come into circulation. In Tether's list of current balances (https://wallet.tether.to/transparency) these are displayed as "authorized but not issued".

Table 2. Summary statistics of hourly log returns for the full sample and specific time periods around issuance events of stablecoins.

Sample / window	Bitcoin		Ethereum		Ripple		Litecoin	
	Mean (SD)	t-statistic	Mean (SD)	t-statistic	Mean (SD)	t-statistic	Mean (SD)	t-statistic
Overall returns (Apr 19 – Mar 20)	0.000023 (0.000043)	0.54	-0.000001 (0.000047)	-0.01	-0.000027 (0.000044)	-0.60	-0.000021 (0.000052)	-0.39
-150 to -30 (estimation window)	-0.000184 (0.000025)	-7.28***	-0.00028 (0.000030)	-9.18***	-0.000232 (0.000022)	-10.56***	-0.000285 (0.000026)	-10.79***
-24 to 24	-0.000020 (0.000037)	-0.54	-0.000080 (0.000039)	-2.05**	-0.000081 (0.000030)	-2.71***	-0.00006 (0.000035)	-1.81*
-24 to -1	-0.000076 (0.000061)	-1.25	-0.000139 (0.000064)	-2.17**	-0.000115 (0.000049)	-2.33**	-0.000105 (0.000062)	-1.70*
0 (event hour)	0.000002 (0.000015)	0.10	-0.000004 (0.000014)	-0.31	-0.000016 (0.000012)	-1.32	-0.000010 (0.000014)	-0.71
0 to 24	0.000047 (0.000048)	0.97	0.000007 (0.000051)	0.13	-0.000035 (0.000042)	-0.84	-0.000006 (0.000051)	-0.12

*, **, *** indicate significance at the 10%, 5% and 1% level.

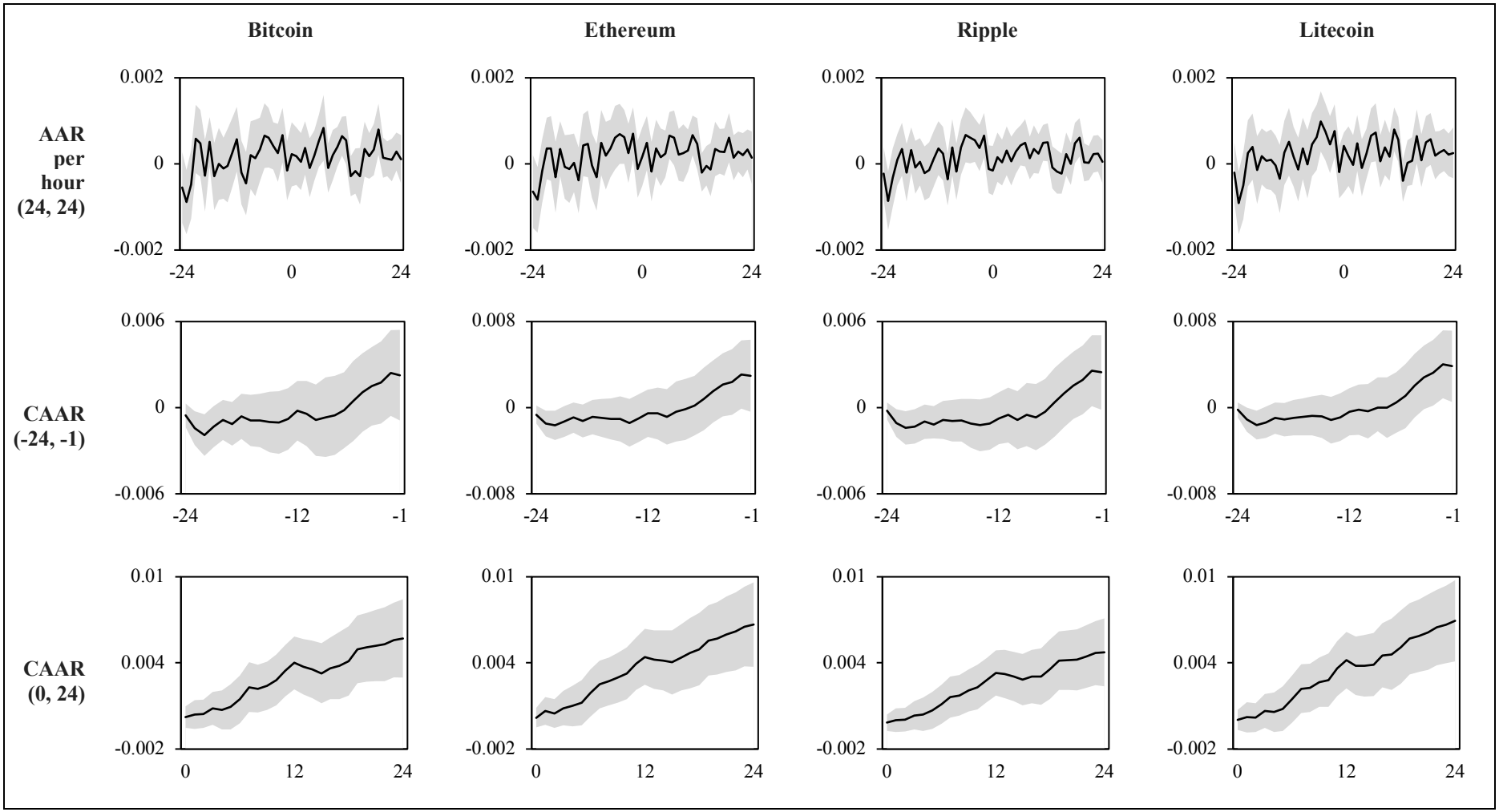

Figure 2. Hourly and cumulative abnormal log returns and 95%-confidence intervals of major cryptocurrencies in the twenty-four hours before and after 565 stablecoin issuance events.

We identify highly significant positive CAARs of between 0.31% and 0.47% for -12 to -1 hours and between 0.25% and 0.34% for -6 to -1 hours before an issuance, but fail to find significant abnormal returns immediately after the issuances, from 0 to 2 hours. Note that the price at 0 hours is the close price at the first full hour after the issuance. However, highly significant abnormal returns occur for all four cryptocurrencies during the time span from 0 to 12 hours (0.33% to 0.44%) and from 0 to 24 hours (0.47 to 0.69%). Abnormal returns accumulate to between 0.72% (Ripple) and 1.1% (Litecoin) over the full event window. An explanation could be that the additional supply in stablecoins is used to purchase cryptocurrencies, so the demand for cryptocurrencies triggers the issuance of stablecoins in the first place. The test statistics and significance levels of the abnormal returns are very similar for the four examined cryptocurrencies, even though the size of the abnormal returns varies. This also applies to different time windows and robustness checks, both in terms of the size and significance of the abnormal returns (cf. Table A.2). We therefore accept Hypothesis 5: Effects are the same across different cryptocurrencies. The similarity in the findings is not surprising given the strong correlation among the returns of these cryptocurrencies (between 0.70 and 0.81 for all combinations). For this reason and for the sake of brevity, we limit the following analyses to Bitcoin returns.

3.2 Individual stablecoin issuances and their effect on Bitcoin returns

Table 3 shows summary statistics per stablecoin on log returns around issuances. We identify significantly negative Bitcoin returns over the estimation period for four of the seven stablecoins. HUSD and BUSD in particular stand out with highly significant results, amounting to cumulative returns of -5.5% and -3.9%. While in the 24 hours before HUSD issuances, Bitcoin returns are significantly negative on average (-1.4% in total), returns before USDT issues are significantly positive (0.5% in total). No returns are significant at the hour of the event or in the period from 0 to 24 hours.

Figure 3 reports the AAR per hour and the CAARs for the periods -24 to -1 hours and 0 to 24 hours for the individual stablecoins. For the CAARs, we additionally show 95%-confidence intervals. Significance tests for different time windows are shown in Table A.3 in the appendix.

In light of the results we reject Hypothesis 4: Effects are not the same across different stablecoins. USDT, PAX and BUSD exhibit significantly positive cumulative abnormal returns before the issuance event. The abnormal return of BTC in the 24 hours prior to USDT issuances is 0.88%, and 0.43% in the 12 hours before issuances. In the 12-hour window prior to PAX and BUSD issuances, the corresponding abnormal returns are 0.54% and 0.47%. This is consistent with Hypothesis 1: We observe positive abnormal returns in the hours before stablecoin issuances.

Table 3. Summary statistics of hourly Bitcoin log returns around issuances of stablecoins.

Period	-150 to -30 (estimation window)		-24 to 24		-24 to -1		0		0 to 24	
Sample	Mean (SD)	t-statistic	Mean (SD)	t-statistic	Mean (SD)	t-statistic	Mean (SD)	t-statistic	Mean (SD)	t-statistic
USDC	-0.000052 (0.000039)	-1.34	0.000006 (0.000052)	0.11	0.000048 (0.000080)	0.59	0.0000004 (0.000017)	0.02	-0.000010 (0.000068)	-0.15
HUSD	-0.000457 (0.000069)	-6.60***	-0.000289 (0.000106)	-2.73***	-0.000641 (0.000194)	-3.30***	0.000042 (0.000058)	0.73	0.000148 (0.000156)	0.95
USDT	-0.000090 (0.000044)	-2.03**	0.000216 (0.000994)	2.18**	0.000225 (0.000126)	1.78*	-0.000015 (0.000034)	-0.45	0.000166 (0.000129)	1.28
PAX	-0.000127 (0.000057)	-2.24**	-0.000028 (0.000076)	-0.50	0.000020 (0.000110)	0.18	-0.000016 (0.000022)	-0.72	-0.000115 (0.000095)	-1.22
BUSD	-0.000321 (0.000091)	-3.52***	-0.000032 (0.000093)	-0.35	-0.000155 (0.000170)	-0.92	-0.000040 (0.000044)	-0.91	0.000054 (0.000116)	0.47
DAI	-0.000099 (0.000091)	-1.09	0.000101 (0.000086)	1.17	0.000318 (0.000201)	1.58	0.000040 (0.000024)	1.66	-0.000077 (0.000061)	-1.27
GUSD	-0.000394 (0.000230)	-1.71	0.000505 (0.000239)	2.11*	0.000616 (0.000713)	0.86	0.000055 (0.000067)	0.82	0.000371 (0.000378)	0.98

*, **, *** indicate significance at the 10%, 5% and 1% level.

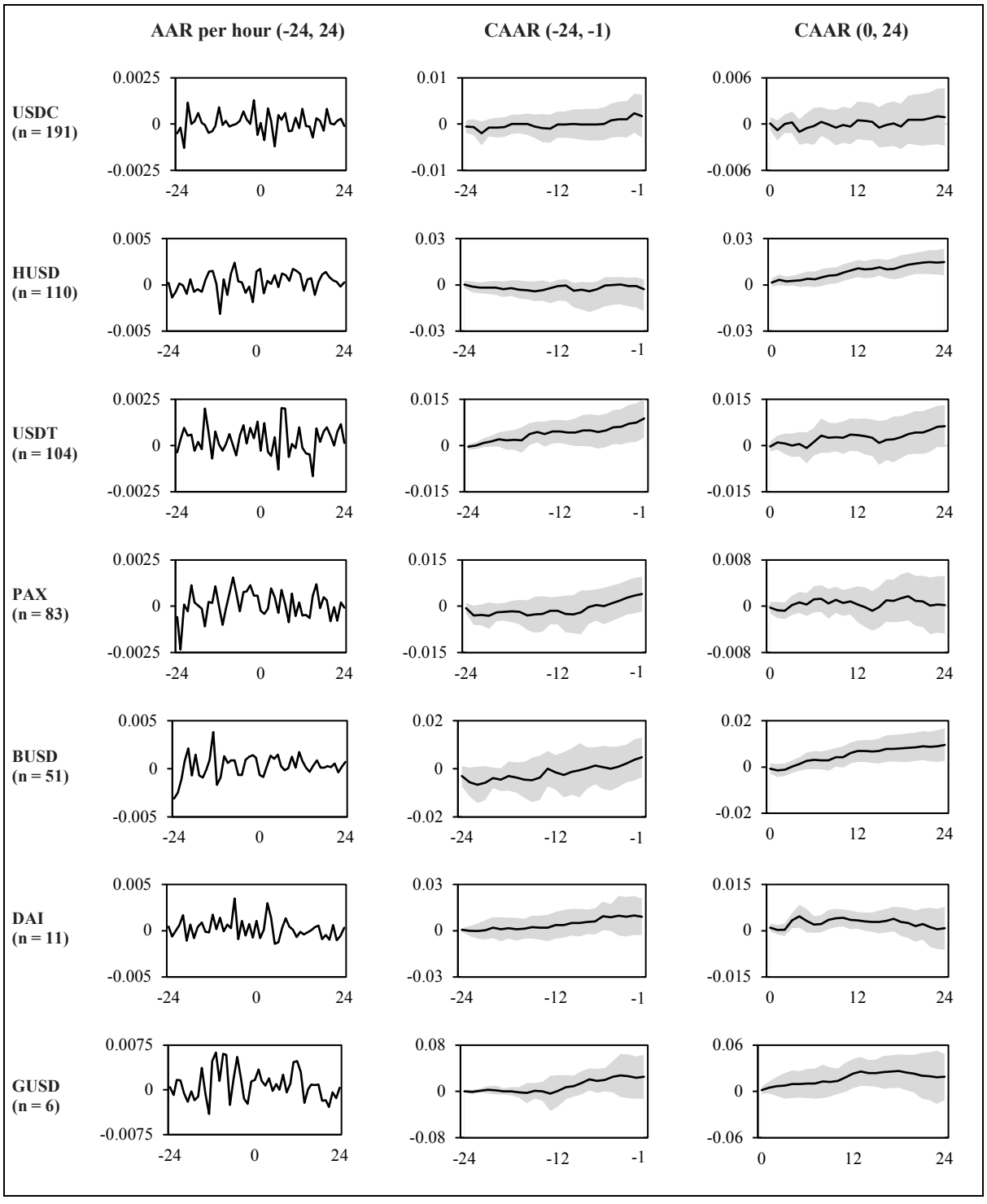

Figure 2. Hourly and cumulative abnormal log returns of Bitcoin in the twenty-four hours before and after issuance events of different stablecoins.

For the period after the issuance, we find significantly positive abnormal returns for four of the seven stablecoins: HUSD and BUSD show highly significant abnormal returns for both 0 to 12 hours (HUSD: 1.1% and BUSD: 0.68%) and 0 to 24 hours (HUSD:1.48% and BUSD: 0.97%). For USDT, we find a significant CAAR only for the period 0 to 24 hours (0.63%). We see a significant effect for DAI and GUSD despite the small sample size (11 and 6 events,

respectively) for the twelve-hour window after the issuances (DAI: 0.34% and GUSD: 2.3%). This supports Hypothesis 2: We observe positive abnormal returns in the hours after stablecoin issuances. The lack of significant effects for USDC and GUSD could be explained by the lower importance of these coins for cryptocurrency trading.

Issuance sizes differ strongly across the seven stablecoins. USDT issuances are by far the largest, at $41.5 million on average, while the average HUSD issuance only amounts to $1.52 million (see Table 1). Contrary to Hypothesis 3, we do not find any significant effects when regressing abnormal Bitcoin returns on issuance size, neither before nor after the issuance event. This might be due to Tether's large treasury issuances blurring any effect, while the other stablecoin issuances do not differ enough in size to reveal an effect.

In line with Lyons and Viswanath-Natraj (2020a), we suggest that price effects around stablecoin issuances could also be explained by an arbitrage opportunity at the time of issuance: In 57% of all issuances, the stablecoins were valued above their pegged value, for an average premium of 0.19% (see Table A.4). It is thus feasible to assume that some issuances of stablecoins (especially of USDC, USDT or DAI) could be triggered by demand from arbitrageurs who step in to exploit a deviation from the price peg.

4 Concluding remarks

Stablecoins are blockchain-based tokens with limited price risk and a vital part of today's cryptocurrency markets. We analyze the effect of 565 issuance events of $1 million or more on the returns of major cryptocurrencies based on seven different stablecoins between April 2019 and March 2020.

Cryptocurrency returns are significantly negative in the periods before stablecoin issuances, while they stabilize with the issuance events – a finding similar to Griffin and Shams (2018). In general, this result accords with existing studies that find no price effect of Tether issuances, although these studies partly focus on different periods and time intervals (Lyons and Viswanath-Natraj, 2020a; Wei, 2018). The negative price trend stops on the day before the issuance: We identify significantly positive abnormal returns in the 24 hours before and after issuances. This suggests that the demand for stablecoins is driven by short-term investor demand for cryptocurrencies, and newly minted stablecoins are used to purchase cryptocurrencies, potentially to profit from arbitrage opportunities. Surprisingly, we do not find any significant effect of the size of stablecoin issuances.

We find that pre-issuance Bitcoin returns differ across stablecoins, suggesting that the motives for issuances vary or that the market interprets issuances differently. For example, we find positive abnormal returns for issuances of Tether in the 24 hours before the event, while issuances of HUSD and BUSD are associated with significant positive abnormal returns after the event. These differences may be due to arbitrage opportunities or the use of stablecoins as a safe haven and suggest that stablecoins are not perfect substitutes to each other.

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Appendix

Table A.1. Overview of different stablecoins that peg to the US dollar.

Stablecoin	Ticker	Collateral	Market capitalization ($ million)	24h trading volume ($ million)	Blockchain	Launch	Short description
USD Coin	USDC	US dollar	736	314	Ethereum	2018	Initiated by Coinbase and crypto finance firm Circle.
Huobi USD	HUSD	US dollar	123	28	Ethereum	2019	Initiated by Huobi and operated by Paxos.
Tether Dollar	USDT	Currencies and other financial assets	9,491	37,481	Bitcoin (Omni), Ethereum, TRON, EOS, Bitcoin (Liquid), Algorand, OmiseGo	2014	Operated by Tether Ltd., which is owned by the same holding company as Bitfinex.
Paxos Standard	PAX	US dollar	247	211	Ethereum	2018	Initiated by ItBit.
Binance USD	BUSD	US dollar	164	149	Ethereum	2019	Initiated by Binance and operated by Paxos.
DAI	DAI	Cryptocurrencies	124	28	Ethereum	2017	Decentralized stablecoin owned by Maker token holders and operated by a non-profit foundation in Denmark.
Gemini USD	GUSD	US dollar	9	19	Ethereum	2018	Initiated by Gemini.

Market data was collected in June 2020, from coingecko.com. Some of the Tether Dollar blockchains were introduced after our period of investigation.

Table A.2. Cumulative average abnormal log returns (CAARs) of major cryptocurrencies in the twenty-four hours before and after 565 stablecoin issuance events.

	BTC	ETH	XRP	LTC
Window (hours)	CAAR	CAAR	CAAR	CAAR
Main panel: estimation window -150 to -30				
-24 to -1	0.00227	0.00296*	0.00246*	0.00384**
-12 to -1	0.00305***	0.00394***	0.00356***	0.00473***
-6 to -1	0.00246***	0.00276***	0.00274***	0.00338***
-3 to -1	0.00077	0.00083	0.00091*	0.00103*
-2	0.00067**	0.00070**	0.00066**	0.00077**
-1	-0.00015	-0.00012	-0.00012	-0.00019
0	0.00022	0.00017	-0.00016	0.00003
1	0.00018	0.00049	0.00016	0.00018
2	0.00050	-0.00018	0.00003	-0.00003
0 to 3	0.00083	0.00085	0.00035	0.00066
0 to 6	0.00147*	0.00190**	0.00112	0.00147*
0 to 12	0.00401***	0.00441***	0.00331***	0.00418***
0 to 24	0.00570***	0.00668***	0.00474***	0.00694***
Robustness check A: estimation window -120 to -30				
-24 to -1	0.00198	0.00279*	0.00213*	0.00355**
-12 to -1	0.00290***	0.00385***	0.03402***	0.00458***
0 to 12	0.00385***	0.00432***	0.00314***	0.00402***
0 to 24	0.00540***	0.00649***	0.00440***	0.00625***
Robustness check B: estimation window -90 to -30				
-24 to -1	0.00169	0.00278	0.00215*	0.00341*
-12 to -1	0.00276**	0.00384***	0.00341***	0.00451***
0 to 12	0.00369***	0.00431***	0.00314***	0.00395***
0 to 24	0.00510***	0.00648***	0.00442***	0.00648***

N = 565. *, **, *** indicates significance at the 10%, 5% and 1% level.

Table A.3. Cumulative average abnormal log returns (CAARs) of Bitcoin in the twenty-four hours before and after 565 stablecoin issuance events.

		(-24 to -1)		(-12 to -1)		(0 to 12)		(0 to 24)	
	Obs.	CAAR	pos	CAAR	pos	CAAR	pos	CAAR	pos
USDC	191	0.00178	53%	0.00275	55%	0.00052	55%	0.00093	49%
HUSD	119	-0.00672	51%	-0.00163	46%	0.01061***	70%	0.01476***	69%
USDT	104	0.00878***	62%	0.00429*	60%	0.00340	52%	0.00627*	50%
PAX	83	0.00397	61%	0.00541***	59%	0.00033	48%	0.00028	47%
BUSD	51	0.00483	55%	0.00472*	57%	0.00680***	63%	0.00973***	63%
DAI	11	0.00914	72%	0.00727	55%	0.00337**	91%	0.00088	64%
GUSD	6	0.02529	67%	0.02905	83%	0.02300**	83%	0.01873	67%

”pos“ is the share of positive AARs in the sample. *, **, *** indicate significance at the 10%, 5% and 1% level.

Table A.4. Arbitrage opportunities at the minute of stablecoin issuances.

		Issuance (million)		Deviation from peg (%)				Parity	
	Obs.	Amount	Value in USD	Mean	SD	Min	Max	Above peg	Below peg
All	446	13.50	13.53	0.187	0.589	-1.556	4.385	57%	27%
USDC	191	5.69	5.69	0.239	0.708	-1.556	4.385	54%	25%
USDT	104	41.32	41.44	0.245	0.472	-0.846	1.352	70%	29%
PAX	83	4.40	4.41	0.061	0.429	-1.100	0.937	59%	41%
BUSD	51	4.93	4.93	0.000	0.000	-0.000	0.000	33%	12%
DAI	11	1.23	1.24	0.613	0.561	-0.157	1.466	91%	9%
GUSD	6	1.22	1.22	0.079	1.528	-1.382	2.681	50%	50%

HUSD is missing due to lack of data.

Declarations

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on request.

Conflicts of interest

Not applicable.

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Not applicable.

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About the Blockchain Research Lab

The Blockchain Research Lab promotes independent science and research on blockchain technologies and the publication of the results in the form of scientific papers and contributions to conferences and other media. The BRL is a non-profit organization aiming, on the one hand, to further the general understanding of the blockchain technology and, on the other hand, to analyze the resulting challenges and opportunities as well as their socio-economic consequences.

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