The Crumbling Wall Between Crypto and Non-Crypto Markets:Risk Transmission Through Stablecoins

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Outline

1. Introduction

Figure:

- **The crypto market used to be isolated.**
  - Independent of central banks and driven by cryptocurrency-specific factors
  - Do not commove with traditional financial markets (Liu and Tsyvinski , 2020)

A recent link between crypto and non-crypto markets

- On June 21, 2021, the overall crypto market fell soon after the Federal Reserve Board announced plans to increase interest rates.
- **What explains the recent link between crypto and non-crypto markets?**
- **Stablecoins** have bridged the gap.

Figure:

Stablecoins relate to both crypto and non-crypto markets

- **Pegging to non-crypto assets**
  - Stablecoins are a special type of cryptocurrency pegged to non-crypto assets (mostly US dollars) to maintain relatively stable price ranges, thus naturally bonding them to the non-crypto market.
- **Digital fiat for crypto trading**
  - Stablecoins now facilitate more than 60% of cryptocurrency trading (Cermak, 2021) and have reached a trading volume of over 700 billion dollars, which is even larger than PayPal (Kristoufek, 2021).

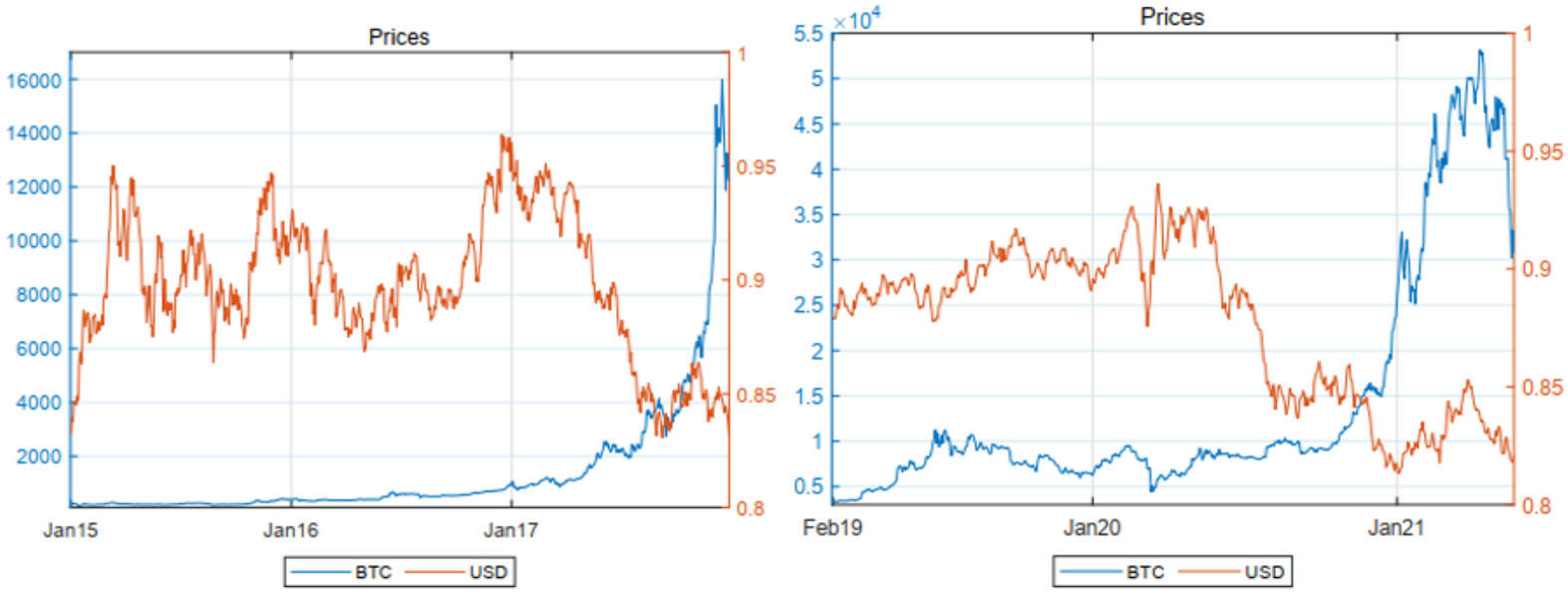
Summary of this paper

- We investigate the risk spillovers among three asset categories: stablecoins, traditional cryptocurrencies such as Bitcoin, and non-crypto assets.
- There are bidirectional risk spillovers between stablecoins and non-crypto markets (mainly US dollars), and between stablecoins and crypto markets.
- The dominant risk spillover direction is from US dollars to traditional cryptocurrencies through stablecoins.

The wall is crumbling now...

- Prices of Bitcoin and US dollars are:
  - clearly uncorrelated in pre-stablecoin period (left).
  - negatively correlated in post-stablecoin period (right).

Figure:



(a) Pre-stablecoins period (b) Post-stablecoins period

Related Literature and potential contributions

- Studies on crypto currencies confirm the uniqueness and isolation of the crypto market (Makarov, 2020; Foley et al., 2019; Griffin, 2020; Liu and Tsyvinski, 2020), we instead provide new evidence on the recent integration of the crypto market to the traditional financial system.
- Concerns has been growing over the potential challenges stablecoins pose on regulation (Arner et al., 2020; FSB, 2020; PWG, 2020), but most existing literature only focuses on the stable nature of stablecoins (Gu et al., 2020; Lyons,2019a; Baur, 2021; Corbet, 2020; Baumohl, 2020). Our paper attempts to fill the gap by revealing a new aspect of stablecoins, that is, as a risk transmitter between the crypto and non-crypto markets.

2. Data and methodoloty

- Source: CoinAPI Cryptocompare
- Period: daily returns for two periods
  - post- stablecoin period from 2019 to 2021
  - pre- stablecoin period from 2015 to 2017.
- **Three types of assets**:
  - Non-crypto assets: US Dollars (Gold, SP500, MSCI)
  - Traditional cryptocurrencies: BTC ETH
  - Stablecoins: USDT DAI

Summary statistics

Figure:

Table 2: Summary Statistics

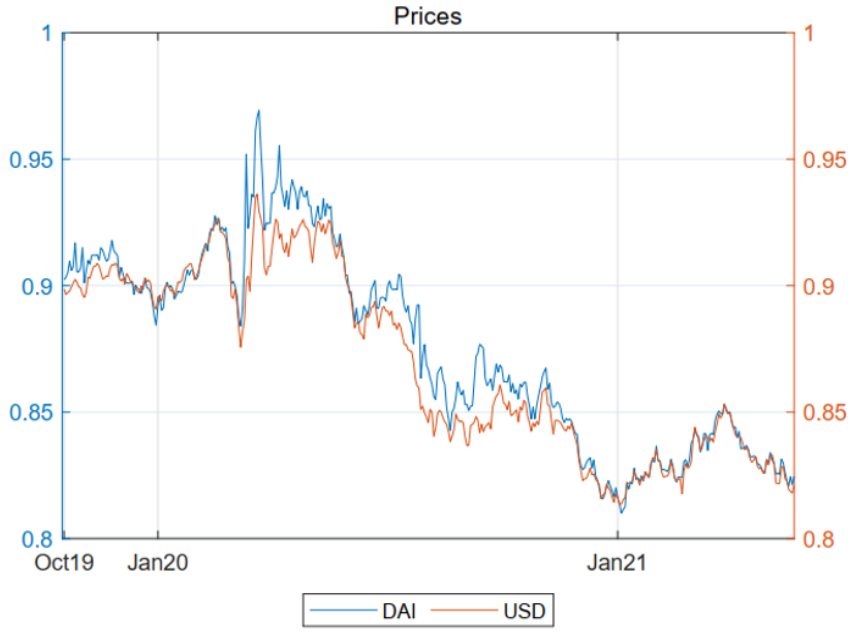
	USDT	DAI	BTC	ETH	USDEURO
Mean	-0.013	-0.015	0.272	0.347	-0.012
Std. Dev.	0.612	0.606	4.085	5.196	0.388
Skewness	0.571	0.55	-1.679	-1.798	0.171
Kurtosis	10.062	13.916	26.381	22.406	5.104
Jarque-Bera stat.	1747.7***	2944.3***	19028.7***	13285.4***	107.7***
ARCH-LM stat.	154.1***	129.5**	18.1	29.2**	107.9***
nObs	814	582	814	814	559

Notes: The asterisk ** and *** indicates rejection of the null hypothesis at the 5% level and 1% significance levels.

Stablecoins do not always follow their pegs

Figure:

(a) USDT and USDEURO



(b) DAI and USDEURO

Stablecoins are different from traditional cryptocurrencies

Figure:

(c) USDT and BTC

(d) USDT and ETH

Methodology: how to measure risk spillovers

- **Comparing VaR(value at risk) and CoVaR(conditional VaR)**
- Example: risk spillover from US dollars to stablecoins
  - Stablecoins drop 8% when they are at risk$\rightarrow$ VaR $=$8%
  - Conditional on US dollars dropping, Stablecoins drop 15% at risk. $\rightarrow$ Covar$=$15%
- CoVar $\neq$Var, significant risk spillovers.
- CoVar $=$Var, no risk spillovers.

Methodology Roadmap

- **Marginal distribution** for asset returns ARMA-GARCH
- **Joint distribution** Copula
  - Patton(2006) Greal et al.(2013)
- **Risk spillovers** Copula→CoVar
  - Girardi and Ergün (2013) Adrian and Brunnermeier (2016) Reboredo et al.(2016)
- **Tests** CoVaR vs VaR
  - Abadie (2002) Reboredo et al.(2016) Jin(2018)

3. Main results and robusness checks

- Stablecoins' **bridging effects**
  - Bidirectional risk spillovers between stablecoins and US dollars
  - Bidirectional risk spillovers between stablecoins and traditional cryptocurrencies
- **Asymmetric effects**
  - The risk spillovers from US dollars to cryptocurrencies through stablecoins are stronger than the other direction.

VaR and CoVaR for stablecoins and the non-crypto market

Table: Descriptive statistics and tests for VaR and CoVaR for stablecoins and U.S. Dollar

	Down-to-down Spillover			Up-to-up Spillover		
	VaR	CoVaR	$H_0 : CoVaR = VaR$ $H_1 : CoVaR < VaR$	VaR	CoVaR	$H_0 : CoVaR = VaR$ $H_1 : CoVaR > VaR$
Panel I: Spillovers from U.S. Dollar to stablecoins						
USD ⇒ USDT	-0.847	-1.468	0.726	0.804	1.426	0.735
	(0.429)	(0.552)	[0.000]	(0.408)	(0.532)	[0.000]
USD ⇒ DAI	-0.82	-1.617	0.914	0.776	1.572	0.912
	(0.280)	(0.529)	[0.000]	(0.283)	(0.529)	[0.000]
Panel II: Spillovers from stablecoins to U.S. Dollar						
USDT ⇒ USD	-0.524	-0.949	0.741	0.5	0.924	0.751
	(0.137)	(0.290)	[0.000]	(0.140)	(0.293)	[0.000]
DAI ⇒ USD	-0.597	-1.129	0.887	0.552	1.083	0.882
	(0.150)	(0.267)	[0.000]	(0.163)	(0.276)	[0.000]

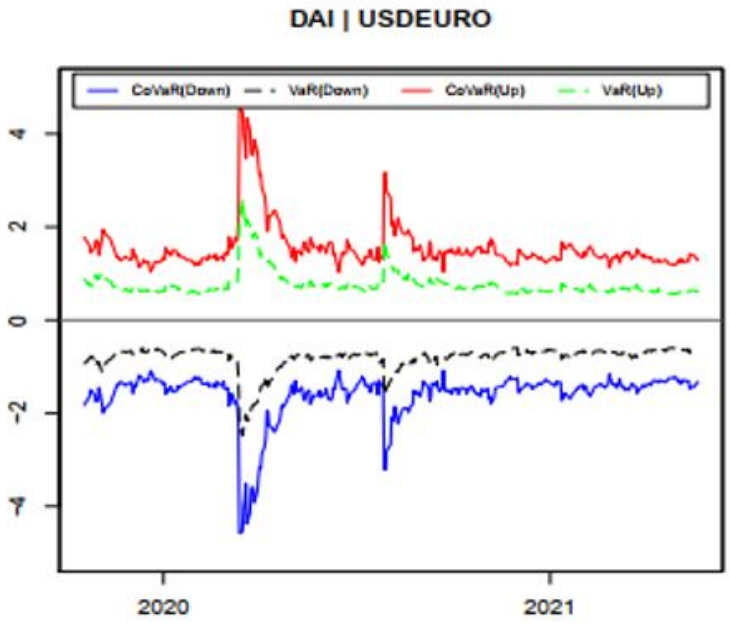
Asymmetric effect for stablecoins and the non-crypto market

Table: Test results for symmetries in the risk spillovers from stablecoins to U.S. dollar and from U.S. dollar to stablecoins

	USDT-USD	DAI-USD
Panel I: H_0: $\text{CoVaR}^{normal}_{DN\|DN}(s\|d) = \text{CoVaR}^{normal}_{DN\|DN}(d\|s)$		
H_1: $\text{CoVaR}^{normal}_{DN\|DN}(s\|d) < \text{CoVaR}^{normal}_{DN\|DN}(d\|s)$	0.043	0.04
	[0.321]	[0.499]
H_1: $\text{CoVaR}^{normal}_{DN\|DN}(s\|d) > \text{CoVaR}^{normal}_{DN\|DN}(d\|s)$	0.057	0.38
	[0.144]	[0.000]
Panel II: H_0: $\text{CoVaR}^{normal}_{UP\|UP}(s\|d) = \text{CoVaR}^{normal}_{UP\|UP}(d\|s)$		
H_1: $\text{CoVaR}^{normal}_{UP\|UP}(s\|d) < \text{CoVaR}^{normal}_{UP\|UP}(d\|s)$	0.027	0.071
	[0.663]	[0.117]
H_1: $\text{CoVaR}^{normal}_{UP\|UP}(s\|d) > \text{CoVaR}^{normal}_{UP\|UP}(d\|s)$	0.077	0.267
	[0.033]	[0.000]

Risk spillovers between stablecoins and the non-crypto market

The risk spillovers from US dollar to stablecoins



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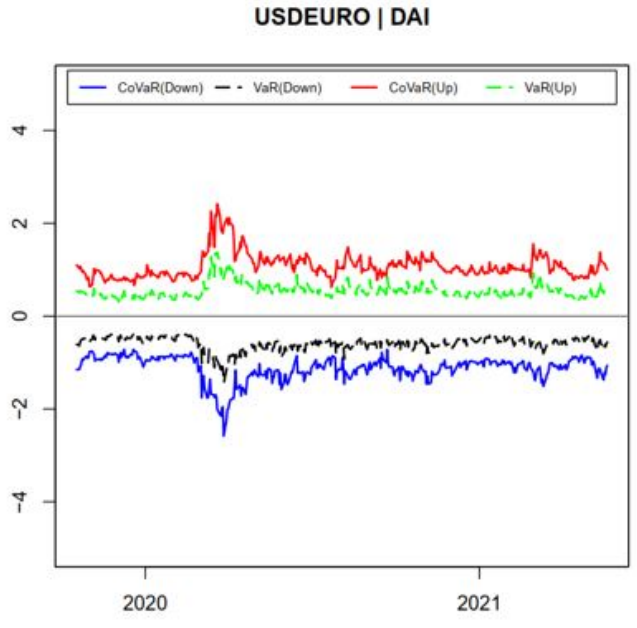
The risk spillovers from stablecoins to US dollar



VaR and CoVaR for stablecoins and the crypto market

Table: Descriptive statistics and tests for VaR and CoVaR for stablecoins and traditional cryptocurrencies

	Up-to-down Spillover			Down-to-Up Spillover		
	VaR	CoVaR	$H_0 : CoVaR = VaR$ $H_1 : CoVaR < VaR$	VaR	CoVaR	$H_0 : CoVaR = VaR$ $H_1 : CoVaR > VaR$
Panel I: Spillovers from traditional cryptocurrencies to stablecoins						
BTC ⇒ USDT	-0.825	-1.163	0.43	0.801	1.137	0.434
	(0.390)	(0.620)	[0.000]	(0.384)	(0.614)	[0.000]
ETH ⇒ USDT	-0.829	-1.209	0.445	0.801	1.183	0.451
	(0.392)	(0.657)	[0.000]	(0.381)	(0.651)	[0.000]
BTC ⇒ DAI	-0.834	-1.119	0.663	0.803	1.088	0.674
	(0.327)	(0.426)	[0.000]	(0.313)	(0.414)	[0.000]
ETH ⇒ DAI	-0.835	-1.156	0.703	0.803	1.125	0.72
	(0.326)	(0.440)	[0.000]	(0.316)	(0.427)	[0.000]
Panel II: Spillovers from stablecoins to traditional cryptocurrencies						
USDT ⇒ BTC	-6.761	-10.116	0.493	7.3	10.66	0.499
	(2.628)	(3.755)	[0.000]	(2.654)	(3.766)	[0.000]
DAI ⇒ BTC	-6.522	-9.216	0.469	7.023	9.711	0.464
	(2.828)	(3.874)	[0.000]	(2.763)	(3.834)	[0.000]
USDT ⇒ ETH	-8.214	-12.672	0.63	8.904	13.368	0.623
	(2.623)	(4.019)	[0.000]	(2.741)	(4.173)	[0.000]
DAI ⇒ ETH	-8.125	-11.829	0.641	8.975	12.701	0.696
	(3.041)	(4.212)	[0.000]	(3.140)	(4.378)	[0.000]

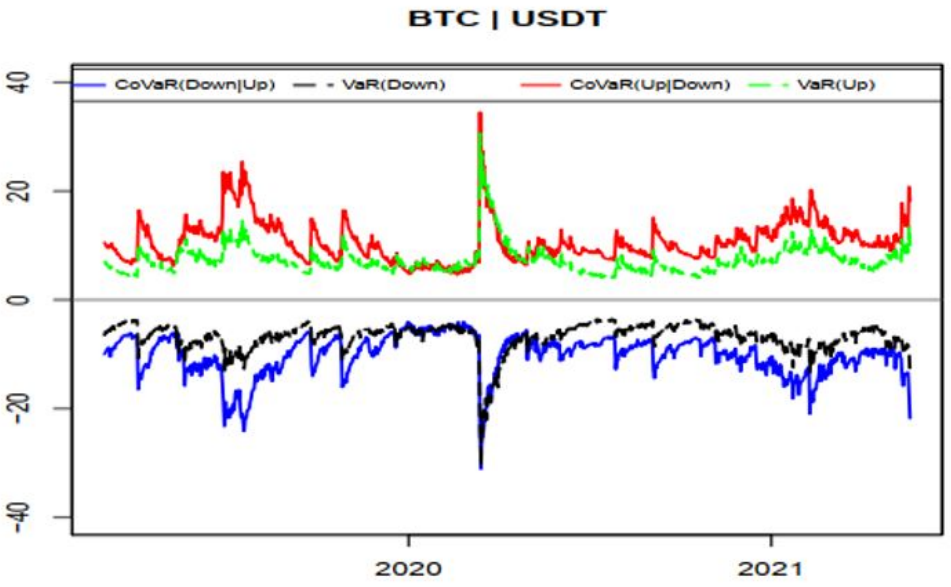
Asymmetric effect for stablecoins and the crypto market

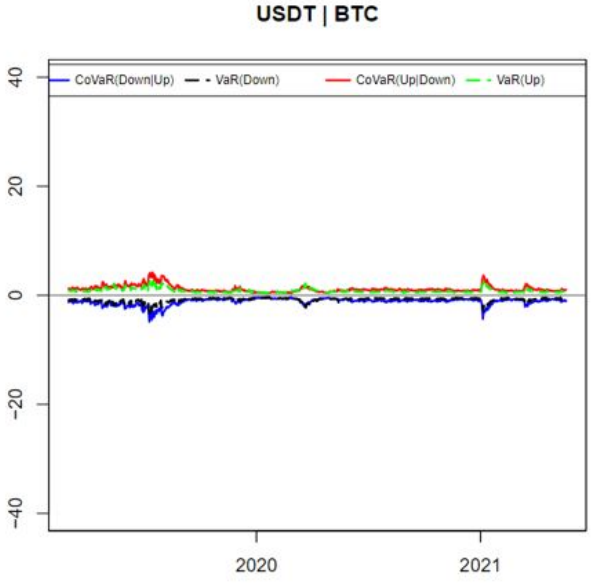
Table: Test results for symmetry in the risk spillovers between stablecoins and traditional cryptocurrencies

	USDT-BTC	USDT-ETH	DAI-BTC	DAI-ETH
Panel I: H_0: $\text{CoVaR}^{normal}_{UP\|DN}$ (s|c) = $\text{CoVaR}^{normal}_{DN\|UP}$ (c|s)				
H_1: $\text{CoVaR}^{normal}_{UP\|DN}$(s|c) < $\text{CoVaR}^{normal}_{DN\|UP}$ (c|s)	0.275	0.238	0.467	0.378
	[0.000]	[0.000]	[0.000]	[0.000]
H_1: $\text{CoVaR}^{normal}_{UP\|DN}$(s|c) > $\text{CoVaR}^{normal}_{DN\|UP}$(c|s)	0.015	0.007	0.002	0.002
	[0.849]	[0.952]	[0.997]	[0.998]
Panel II: H_0: $\text{CoVaR}^{normal}_{DN\|UP}$ (s|c) = $\text{CoVaR}^{normal}_{UP\|DN}$ (c|s)				
H_1: $\text{CoVaR}^{normal}_{DN\|UP}$(s|c) < $\text{CoVaR}^{normal}_{UP\|DN}$(c|s)	0.214	0.179	0.356	0.234
	[0.000]	[0.000]	[0.000]	[0.000]
H_1: $\text{CoVaR}^{normal}_{DN\|UP}$(s|c) > $\text{CoVaR}^{normal}_{UP\|DN}$(c|s)	0.016	0.007	0.002	0.003
	[0.808]	[0.949]	[0.999]	[0.990]

Risk spillovers for stablecoins and the crypto market

The risk spillovers from stablecoins to cryptocurrencies > The risk spillovers from cryptocurrencies to stablecoins





Directly chekcing for risk spillover between crypto and non-crypto markets

- **Pre-stablecoin period**
  - Insignificant risk spillover between Bitcoin and the US dollar
- **Post-stablecoin period**
  - Significant risk spillover between Bitcoin and the US dollar

The spillover between crypto and non-crypto markets only exist in post-stablecoin period

Table: Descriptive statistics and tests for VaR and CoVaR for Bitcoins and U.S. dollar in two subperiods

	Up-to-down Spillover			Down-to-up Spillover		
	VaR	CoVaR	$H_0 : CoVaR = VaR$ $H_1 : CoVaR < VaR$	VaR	CoVaR	$H_0 : CoVaR = VaR$ $H_1 : CoVaR > VaR$
Panel I: Pre-stablecoin period (January 1, 2015-December 31, 2017)						
USD ⇒ BTC	-6.25	-5.523	0	7.253	6.535	0
	(3.547)	(3.191)	[1.000]	(3.571)	(3.202)	[1.000]
BTC ⇒ USD	-1.001	-0.921	0.047	0.904	0.823	0.045
	(0.239)	(0.288)	[0.180]	(0.240)	(0.288)	[0.206]
Panel II: Post-stablecoin period (February 27, 2019-May 21, 2021)						
USD ⇒ BTC	-8.579	-12.733	0.533	9.351	10.5	0.222
	(3.275)	(4.874)	[0.000]	(3.205)	(3.626)	[0.000]
BTC ⇒ USD	-0.525	-0.692	0.485	0.5	0.549	0.181
	(0.137)	(0.185)	[0.000]	(0.140)	(0.156)	[0.000]

Other robustness checks

- Alternative proxies for the non-crypto market
  - S&P500, MSCI
  - Main results unchanged
- Chekcing for other types of stablecoins
  - PAXG,pegged to gold
  - Our story mainly apply to stablecoins pegged to US dollar, which enjoy more than 90 percent of stablecoins' total supply.

4. Conclusions

- We find significant **bidirectional risk spillovers**
  - betwen stablecoins and the non-crypto market,
  - and between stablecoins and traditioanl cryptocurrencies.
- The spillover effects are **stronger in the direction** from US dollar to traditional cryptocurrencies through stablecoins.

For stablecoins, further acceptance or more caution?

Risk transmission role of stablecoins suggests the cautious approach.

De-dollarization or re-dollrization of the crypto market?

With a majority of stablecoins pegged to the US dollar and the wide use of stablecoins in crypto trading, the crypto markets have a tendency toward "re-dollarization."

https://www.coindesk.com/fed-vice-chair-we-should-be-saying-yes-to-stablecoins

Any suggestions and comments are welcome!