UNIVERSITY of NICOSIA

Week 3, Session 5

Launching a Token: Part 2

BLOC 528: Token Economics

Today's Overview

- Objective #1: Background and Context on Valuation
- Objective #2: Fundamentals of Tokens and Layer 1 v. Layer 2 Tokens
- Objective #3: Initial Coin Offerings

Overview of Token Valuation

Think of tokens like a stock, which builds value from…

- Dividends
- Buybacks
- Price appreciation

Price appreciation

- Size of the market
- Number of tokens
- Momentum and price dynamics

Discounted cash flow approaches to valuation aren't going to fare as well because many tokens do not return a steady stream of income – nor are peer comparisons reliable since there are so many idiosyncratic factors.

Helpful Context – Discounted Cash Flow

Many assets (and organizations) would be valued using DCF analysis where you think about the world in terms of zero-coupon bonds (and other financial instruments) where there is a fixed cash flow.

- Subscription services
- Other regular purchases

Then, you would choose a discount rate and compute:

$$df(T) = \left(1 + r(T)\right)^{-T}$$

Increasing the discount rate makes the discount factors smaller and lowers the price.

Perpetuities assume that the payment will go on forever, so:

$$PV = CF_0/(r - g)$$

Helpful Context – Quantity Theory of Money

The basic insight is that…

$$M \times V = P \times Q$$

where M = total value of tokens, V = velocity (e.g., number of times traded), P = price, Q = quantity.

Think of $P \times Q$ as the exchange value in the ecosystem (e.g., "gross domestic product), so if we can find that product, we can plug in the velocity (number of transactions) and back out M.

Velocity = total volume of transactions / average volume of transactions.

We will get to a case study on valuation for tokens in the next lecture.

Token Fundamentals

Liu and Tsyvinski (2020) wrote an important paper.

- Much higher volatility in the coin market.

Possible determinants of value:

- Network effects and utilization (e.g., # users)
- Electricity, computing power, and other production factors: "Overall, there is limited evidence that the computing factors are important drivers of cryptocurrency returns."

Table 1
Summary statistics

Panel A. Summary statistics of main variables

Daily	Mean	SD	*t*-Stat	Sharpe	Skewness	Kurtosis	% > 0
CMKT	0.46%	5.46%	4.60	0.08	0.74	15.52	54.04
Bitcoin	0.46%	5.44%	4.66	0.08	0.82	15.56	53.61
Ethereum	0.60%	7.39%	2.86	0.08	0.27	15.98	48.63
Ripple	0.53%	7.84%	2.66	0.07	6.06	100.37	46.08
Stock	0.05%	0.95%	2.21	0.05	–0.46	7.88	54.57
Weekly	**Mean**	**SD**	***t*-Stat**	**Sharpe**	**Skewness**	**Kurtosis**	**% > 0**
CMKT	3.44%	16.50%	4.25	0.21	1.74	10.22	57.31
Bitcoin	3.44%	16.29%	4.32	0.21	1.79	10.58	59.47
Ethereum	4.84%	24.33%	2.65	0.20	1.46	7.59	51.69
Ripple	5.72%	45.59%	2.11	0.13	7.77	80.58	46.45
Stock	0.22%	1.98%	2.28	0.11	–0.47	5.15	59.71
Monthly	**Mean**	**SD**	***t*-Stat**	**Sharpe**	**Skewness**	**Kurtosis**	**% > 0**
CMKT	20.44%	70.80%	2.83	0.29	4.37	26.54	58.33
Bitcoin	19.64%	66.66%	2.89	0.29	4.37	26.01	58.33
Ethereum	23.27%	65.03%	2.29	0.36	1.42	4.53	48.78
Ripple	32.68%	137.29%	1.92	0.24	4.01	20.49	38.46
Stock	0.94%	3.42%	2.70	0.27	–0.42	4.07	68.75

Panel B. Extreme events of daily CMKT returns

Disasters	Counts	%	Miracles	Counts	%
< –5 %	250	8.56%	> 5 %	318	10.88%
< –10 %	85	2.91%	> 10 %	107	3.66%
< –20 %	14	0.48%	> 20 %	26	0.89%
< –30 %	3	0.10%	> 30 %	10	0.34%

This table documents the summary statistics of the coin market returns (CMKT). Panel A reports the daily, weekly, and monthly summary statistics of the coin market index and compares them with returns for Bitcoin, Ethereum, Ripple, and the stock market. The mean, standard deviation, *t*-statistics, Sharpe ratio, skewness, kurtosis, and the percentage of obervations that are positive are reported. Panel B reports the percentage of extreme events based on the daily coin market index returns. The coin market returns, the Bitcoin returns, and the stock market returns are from January 1, 2011, to December 31, 2018. The Ethereum returns are from August 8, 2015, to December 31, 2018. The Ripple returns are from August 5, 2013 to December 31, 2018.

Token Fundamentals (Cont.)

Word of mouth and momentum matter a lot.

- Momentum refers to how much force is already going in a particular direction.
- Proxy for investor attention using Google searches.
- Negative news matters even more (e.g., breaches).
- "For example, a one-standard-deviation increase in the ratio leads to a 2% decrease of coin market returns in the next week."

Table 6
Time-series momentum

Panel A. Regression results

Weekly	$R_{t,t+1}$ (1)	$R_{t,t+2}$ (2)	$R_{t,t+3}$ (3)	$R_{t,t+4}$ (4)	$R_{t,t+6}$ (5)	$R_{t,t+8}$ (6)
R_t	0.20**	0.49***	0.81***	1.07***	1.55*	1.62*
	(2.53)	(2.73)	(3.01)	(2.65)	(1.94)	(1.75)
R^2	0.04	0.08	0.09	0.08	0.06	0.02

Google searches

Panel A. Regression results

Weekly	$R_{t,t+1}$ (1)	$R_{t,t+2}$ (2)	$R_{t,t+3}$ (3)	$R_{t,t+4}$ (4)	$R_{t,t+6}$ (5)	$R_{t,t+8}$ (6)
$Google_t$	0.03***	0.05***	0.07***	0.10***	0.09**	0.07
	(3.92)	(4.33)	(4.23)	(3.99)	(1.98)	(1.30)
R^2	0.03	0.04	0.03	0.02	0.01	0.00

Table 9
Bitcoin hack

Panel A. Regression results

Weekly	$R_{t,t+1}$ (1)	$R_{t,t+2}$ (2)	$R_{t,t+3}$ (3)	$R_{t,t+4}$ (4)	$R_{t,t+6}$ (5)	$R_{t,t+8}$ (6)
$Hack_t$	−0.02***	−0.05***	−0.08**	−0.11**	−0.20*	−0.32
	(−3.05)	(−2.93)	(−2.39)	(−2.02)	(−1.67)	(−1.45)
R^2	0.02	0.03	0.03	0.03	0.04	0.03

Tokens v. Equity

Although tokens share many similarities to equity, they have some important differences: the utility value.

- In a traditional startup, the founders and venture capitalists have equity → power is centralized
- In the Web3 economy, token holders have "equity" → power is decentralized

Moreover, token holders can influence the protocol's development if it is also a governance token, and the utility has great non-pecuniary benefits (in addition to cash flow).

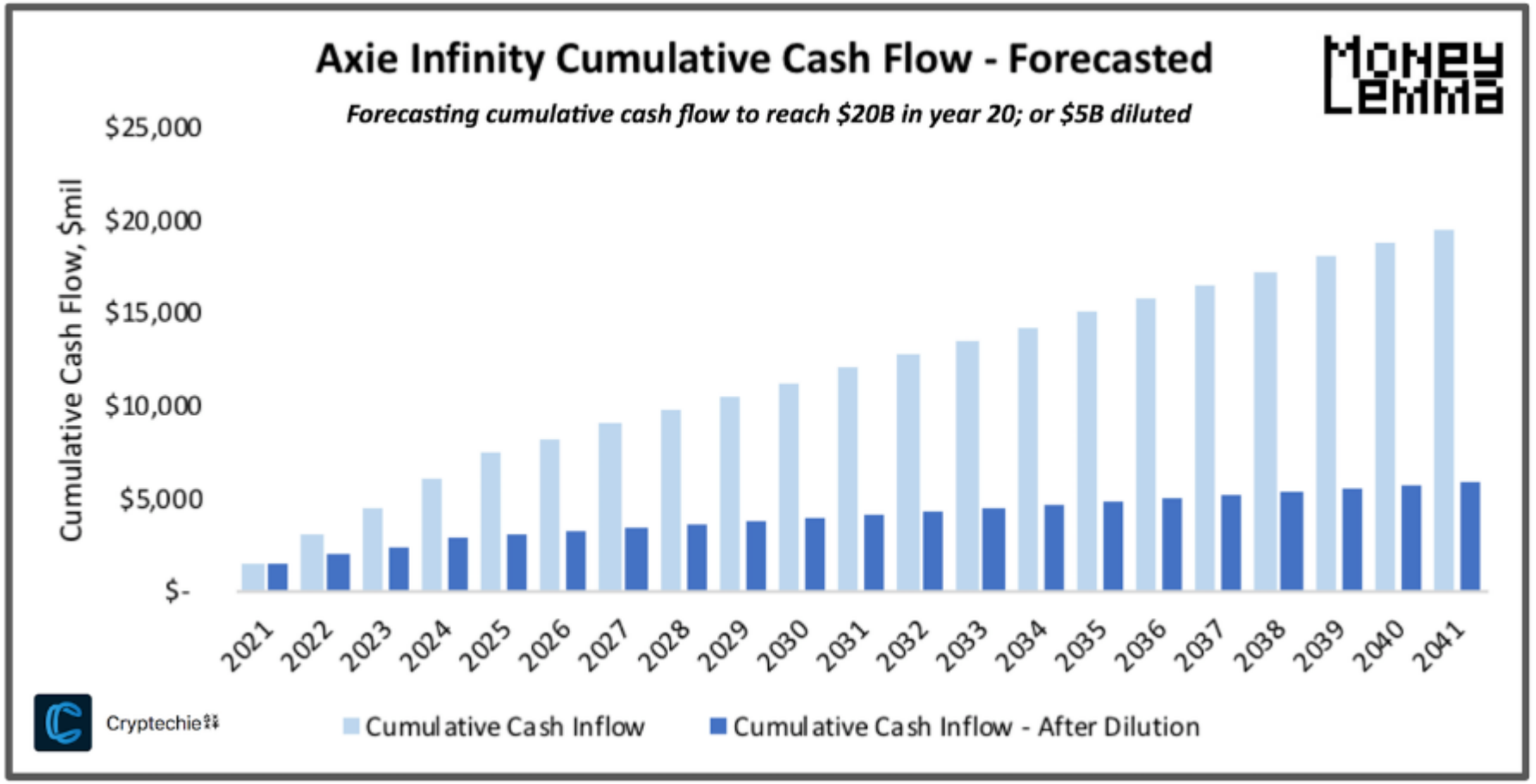
- NFT ticketing example with Living Opera
- NFT albums example with Royal.io

Tokens that are on an infrastructure technology (especially Layer 1) are especially valuable.

Token Inflation

Inflation is not necessarily bad – can use the supply of tokens to toggle how easy it is for new entrants in the platform to participate and climb the ladder versus how incumbents continue to thrive.

- What is the market for prospective users?
- How is the composition of new users changing?
- What are the incumbent users like?



An Aside – Layer 1 and Layer 2 Blockchains

Layer 1 technologies: core blockchain network with its own consensus mechanism.

- Bitcoin
- Ethereum
- Solana

Layer 2 technologies: third-party integrations that connect with a Layer-1 blockchain to improve its scalability and efficiency by shifting some of a blockchain protocol's transactional burden to another system using a similar architecture, which then handles all the processing.

- Nested blockchains: The main blockchain defines the parameter space for the network — that is, what is possible — and the nested blockchain does the computations and returns the results to the "parent" chain.
- State channels: This facilitates two-way communication between a blockchain and off-chain transactional channels. Unlike communication on the Layer-1 network, a state channel does not require validation by nodes of the network. Only the final "state" of the channel is recorded in the Layer-1 blockchain for record.
- Sidechains: Unlike nested blockchains that work with the parent chain or state channels that allow for private communication, these are an adjacent chain used for batching large sets of transactions off the core blockchain. They often use a different consensus mechanism than the original chain.

Why Layer 2 Protocols Are Useful

Even a good Layer-1 blockchain can benefit from a Layer-2 technology to improve its ability to scale as the network grows, which refers to the throughput rate — or, the number of transactions per second.

- Layer 2 protocols help with efficiency by taking transactions off chain, while the Layer 1 deals with security
- Sharing – or breaking up transactions into smaller bits – does not work well because there is no guarantee that the user will get the entire transaction in at the desired price.

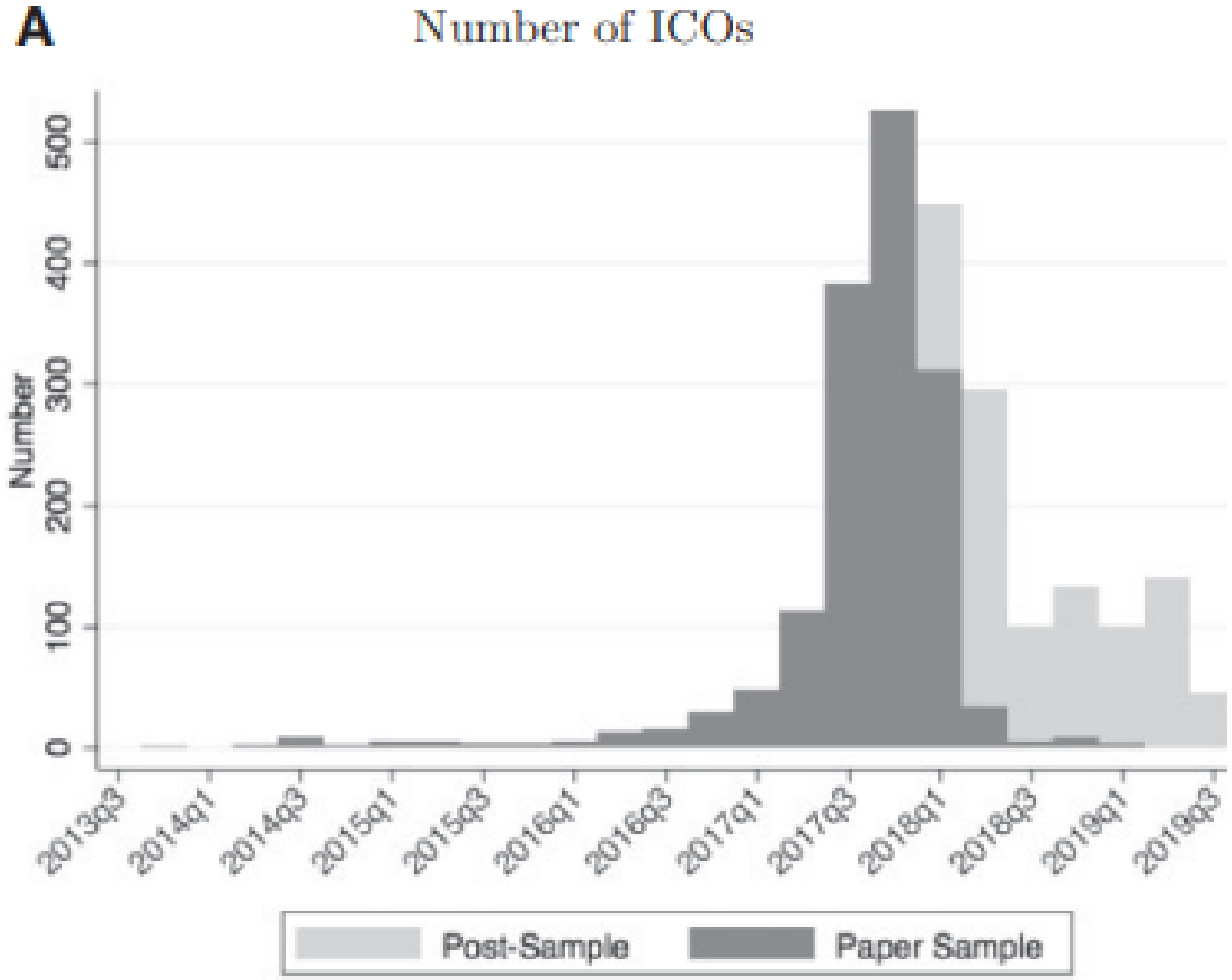
Polygon is a great example of a Layer 2 that has helped reduce gas fees for Ethereum users.

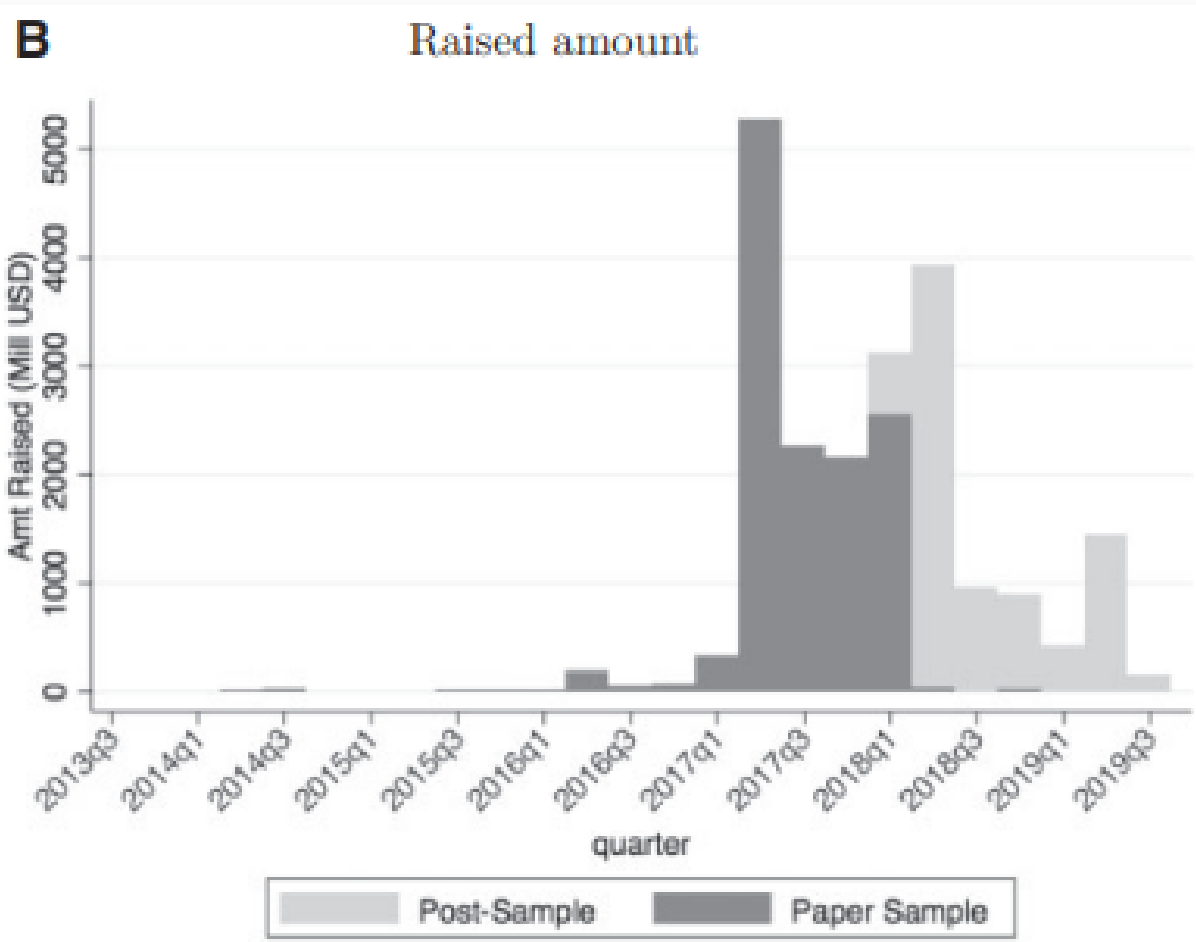
Disadvantages

- Security
- Liquidity – the user has the split their liquidity across two chains if the Layer 2 does not take off

Introduction to Initial Coin Offerings

Howell et al. (2019) on ICOs





A. Sample summary

	N
Total sample	1,520
Completed ICO	1,266
Listed on exchange	672

B. ICO success measures

	N	Mean	SD	Min	Median	Max
Employment (as of November 2018)	1,520	12.56	35.22	0.00	3.00	716.00
Employment (as of July 2019)	1,520	14.27	42.15	0	4	1,096.00
Employment growth = $\log\left(\frac{\text{EmpNov2018}}{\text{EmpJuly2019}}\right)$	1,520	0.009	1.17	−3.97	0	5.6
Issuer failed (as of Nov 2018)	1,520	0.30				

C. Issuer characteristics

	N	Mean	SD	Min	Median	Max
Amount raised (USD millions)	580	22.17	176.87	0.00	7.42	4,234.28
Days from ICO start to first trading date	596	67.15	82.07	0.00	44.00	1,071
Token has apparent utility value	1,520	0.53				
Had a presale	1,520	0.43				
Had a white paper	1,520	0.86				
Incentive set aside	1,520	0.43				
Founder token vesting schedule	1,520	0.22				
Had a budget for use of proceeds	1,520	0.42				
Venture capital backed	1,520	0.09				
Stated goal to raise	1,520	0.51				

D. Issuer founder/CEO characteristics

	N	Mean
Male	1,017	0.96
Professional background in crypto	964	0.28
Professional background in financial services	964	0.33
Professional background in computer science	964	0.48
Professional background in entrepreneurship	964	0.57

E. Issuer GitHub and social media characteristics

	N	Mean	SD	Min	Median	Max
Has GitHub source code repository	1,520	0.52				
Number of repositories	812	17.00	36.86	0.00	5	610
Main repository: Number of commits (000s)	783	2.18	7.65	0.00	0.092	140.31
Main repository: Number of branches	783	11.94	51.32	1	2	946
Main repository: Number of releases	783	80.83	1410.97	0	0	39,214
Main repository: Number of contributors	783	44.93	138.15	0	3	2,224
Main repository: Months between last commit and July 10, 2019	783	15.73	14.07	0.03	15.87	122.93
Has Telegram group	451	0.83				
Number of Telegram group members (000s)	357	5.09	9.30	0.01	2.03	88.34
Has Twitter page	451	0.97				
Number of Twitter followers (000s)	451	22.21	53.40	0.01	6.76	741.00

This table shows overview statistics about our sample of 1,520 initial coin offerings. Panel A enumerates our whole sample, the number that were completed (i.e., ICO was not canceled midsale), and the number that listed on a cryptocurrency exchange. Subsequently, where the sample is smaller than 1,520, data were not available for the remaining ICOs. Panel B summarizes the proxies for ICO success. Employment is the number of people who identify themselves as employees on LinkedIn or the number of people listed as employees on the Web site where no LinkedIn profile was available. Employment growth is the difference in logs, specifically: log(EmpNov2018 / EmpJuly2019). We use this measure both because it linearized the raw difference and because we use log employment in the analysis. We classify an ICO as failed if the issuer does not have an active Web site, the token is not listed on CoinMarketCap, and Internet searches yield no other indication that it still exists. Panel C describes key characteristics we collected about issuers. For all panels, data were gathered from issuer Web sites, technical white papers, news articles, and LinkedIn.

Major Takeaways from their Sample

- Out of 1,520 ICOs, 1,266 were completed
- The mean ICO was $22 million (median = $7.4m)
- Roughly half of the ICOs eventually got listed on an exchange in Nov 2018
- 53% of the tokens have simply utility value (e.g., basic attention token)
- Factors influencing whether the token is legitimate… whitepapers, disclosures, etc

Ethereum Dominated the ICO Process

Table 2
Token and ICO process characteristics

	N	Mean	SD	Min	Median	Max
Token on Ethereum blockchain	451	0.73				
Token on Waves blockchain	451	0.05				
Airdrop (token price was $0)	451	0.14				
Capped (limit on number tokens sold)	451	0.76				
U.S. investors barred	451	0.19				
Future token creation	451	0.14				
Dynamic pricing (price changes during ICO)	451	0.34				
Sensitive pricing (price changes during ICO reflect demand)	451	0.09				
Auction pricing	451	0.05				
Accepted USD as payment	451	0.10				
Accepted Euros as payment	451	0.03				
Accepted Bitcoin as payment	451	0.41				
Accepted Ether as payment	451	0.66				
Accepted XRP as payment	451	0.02				
Accepted Litecoin as payment	451	0.09				
Accepted Waves as payment	451	0.04				
Met goal if had stated goal	419	0.52				
Amount raised less stated goal, if any (USD mill)	419	−8.45	36	−279	0	160
Fraction total token supply sold in ICO	283	0.53	0.32	0.00	0.54	1.00
Duration of ICO in days	367	40.0	89.5	0.00	28.0	948
Number of currencies accepted	359	2.07	1.76	1.00	1.00	15.0

This table contains summary statistics about the token and ICO process. Data were gathered from issuer Web sites, technical white papers, news articles, and LinkedIn.

- 66% accept Eth as payment
- 73% of tokens use ERC20 smart contracts

Comparisons Between ICOs and VC-backed startups

Table 3
Exchange-traded ICO issuer sectors and VC-backed blockchain start-up sectors

	ICO issuers				VC-backed blockchain start-ups			
	Total #		Amount raised		Total #		Amount raised	
	N	Share	N	Ave $	N	Share	N	Ave $
Ads, rewards	51	0.05	31	18.6	20	0.03	16	4.45
Asset management & other crypto financial services	174	0.15	92	20.2	132	0.19	109	4.04
Data storage/computing	67	0.06	42	18.0	38	0.05	30	4.53
Enterprise, health, identity	73	0.06	26	12.3	112	0.16	83	3.52
Gaming, entertainment, messaging	153	0.14	66	9.12	31	0.04	23	15.2
New blockchain protocol	67	0.06	41	123	17	0.02	15	20.7
Noncrypto marketplace/service	206	0.18	103	11.7	41	0.06	27	6.69
Payments, wallets	106	0.09	50	18.6	194	0.28	165	4.85
Prediction markets and gambling	23	0.02	16	7.92	5	0.01	3	6.23
Smart contract creation	56	0.05	28	18.4	11	0.02	7	1.18
Tokenizing real assets	46	0.04	13	11.3	9	0.01	7	2.32
Trading and crypto exchanges	106	0.09	42	15.0	89	0.13	67	3.86
Unknown/Other	392	0.25	30	4.9	72	0.09	58	7.06
All	1520		580	22.2	771		610	5.40

Table 4
Relationship between issuer characteristics and employment

	Employment			Old employment	Employment growth	
Dependent variable:	(1)	(2)	(3)	(4)	(5)	(6)
Utility value	0.308***	0.341***	0.343***	0.184**	0.125*	0.146**
	(0.102)	(0.106)	(0.106)	(0.078)	(0.068)	(0.060)
White paper	0.185	0.200	0.210	0.341**	−0.156	−0.123
	(0.190)	(0.170)	(0.167)	(0.154)	(0.113)	(0.117)
Incentive pool	0.177*	0.148	0.192*	0.251***	−0.074	−0.050
	(0.088)	(0.094)	(0.093)	(0.077)	(0.094)	(0.095)
Insider vesting	0.230**	0.228**	0.230**	0.265***	−0.034	−0.062
	(0.105)	(0.104)	(0.096)	(0.081)	(0.056)	(0.060)
Budget	0.212*	0.219**	0.217***	0.198	0.014	0.024
	(0.102)	(0.092)	(0.072)	(0.117)	(0.058)	(0.084)
VC equity	0.854***	0.838***	0.809***	0.603***	0.251***	0.289***
	(0.125)	(0.134)	(0.130)	(0.129)	(0.080)	(0.085)
Male	−0.507**	−0.388	−0.440*	−0.051	−0.456	−0.448*
	(0.205)	(0.249)	(0.221)	(0.299)	(0.305)	(0.228)
Crypto experience	0.083	0.079	0.024	−0.109	0.192*	0.180**
	(0.111)	(0.122)	(0.106)	(0.118)	(0.092)	(0.082)
Finance experience	0.195**	0.183**	0.115	0.109	0.086	0.061
	(0.077)	(0.091)	(0.078)	(0.124)	(0.132)	(0.117)
Comp. sci. experience	0.252***	0.239***	0.238***	0.206***	0.046	0.071
	(0.031)	(0.082)	(0.040)	(0.047)	(0.055)	(0.068)
Entrep. experience	0.397***	0.387***	0.412***	0.281***	0.116	0.145
	(0.107)	(0.098)	(0.085)	(0.078)	(0.100)	(0.106)
Observations	961	961	940	961	961	940
R^2	.168	.244	.204	.185	.058	.089
Quarter start FE	Y		Y	Y	Y	Y
Sector & country FE			Y			Y
Week start FE		Y				

Table 5
Relationship between issuer characteristics and issuer failure

	Failure			
Dependent variable:	(1)	(2)	(3)	(4)
Utility value	−0.070***	−0.755***	−0.049**	−0.097***
	(0.019)	(0.258)	(0.018)	(0.028)
White paper	−0.073**	−0.438	−0.091***	−0.081
	(0.029)	(0.277)	(0.027)	(0.053)
Incentive pool	−0.080***	−1.017***	−0.076***	−0.078***
	(0.017)	(0.350)	(0.018)	(0.023)
Insider vesting	−0.032**	−0.978**	−0.029**	−0.032**
	(0.015)	(0.423)	(0.012)	(0.013)
Budget	−0.058***	−0.770***	−0.050**	−0.062***
	(0.019)	(0.289)	(0.020)	(0.018)
VC equity	−0.079***		−0.063***	−0.067***
	(0.013)		(0.013)	(0.013)
Male	0.059*	0.661	0.036	0.051
	(0.030)	(0.617)	(0.036)	(0.041)
Crypto experience	−0.025*	−0.360	−0.029**	−0.024
	(0.014)	(0.245)	(0.013)	(0.017)
Finance experience	−0.019	−0.294	−0.002	−0.032*
	(0.014)	(0.233)	(0.014)	(0.018)
Comp. sci. experience	−0.046***	−0.770***	−0.049***	−0.050***
	(0.013)	(0.192)	(0.013)	(0.018)
Entrep. experience	−0.029	−0.397	−0.028	−0.042**
	(0.026)	(0.357)	(0.025)	(0.020)
Observations	961	954	940	961
R^2	.152		.179	.242
Pseudo R^2		.215		
Quarter start FE	Y	Y	Y	
Sector & country FE			Y	
Week start FE				Y

Table 9
Relationship between issuer GitHub, social media characteristics and outcomes

Dependent variable:	Employment	Employment growth	Employment			Failure			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Code on GitHub (GH)	1.098***	0.307***	0.937***			−0.114***	−0.085**		
	(0.165)	(0.056)	(0.229)			(0.039)	(0.031)		
Twitter account	0.156	−0.359	0.108			0.041	0.106		
	(0.323)	(0.369)	(0.322)			(0.104)	(0.091)		
Telegram group	0.729***	0.085	0.736***			−0.202***	−0.191***		
	(0.183)	(0.101)	(0.186)			(0.063)	(0.057)		
GH repositories (000s)				7.854***				−0.515**	
				(1.649)				(0.193)	
GH commits (000s)				0.018**				−0.001	
				(0.007)				(0.001)	
GH main rep branches (000s)				0.724				−0.350***	
				(1.709)				(0.102)	
GH main rep releases (000s)				−0.063***				−0.002	
				(0.005)				(0.004)	
GH main rep contrib. (000s)				0.103				−0.100*	
				(0.404)				(0.057)	
GH months from last commit				−0.024***	−0.031***			0.004**	0.004
				(0.004)	(0.005)			(0.001)	(0.003)
Telegram members (000s)					0.009				0.001
					(0.010)				(0.002)
Twitter followers (000s)					0.007***				−0.000
					(0.002)				(0.000)
Observations	451	451	433	780	274	451	433	780	274
R^2	.224	.074	.270	.173	.333	.210	.266	.081	.269
Quarter start FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sector & Country FE			Y				Y		

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Questions?

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