

On Prices of Privacy Coins and Bitcoin



Source (space rocket pict.): Nasa (2022), <https://www.nasa.gov/apollo11-gallery>

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My Own Journey with Crypto Related Research



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2. Tsiulin, Sergey, Reinau, Kristian Hegner, Hilmola, Olli-Pekka & Goryaev, Nikolay (2020). Blockchain in maritime port management: Defining key conceptual framework. *Review of International Business and Strategy*, 30:2, pp. 201-224, <https://doi.org/10.1108/RIBS-04-2019-0051>.
3. Hilmola, Olli-Pekka (2021). On prices of privacy coins and Bitcoin. *Journal of Risk and Financial Management*, 14:8, 361. <https://doi.org/10.3390/jrfm14080361>
4. Tsiulin, Sergey, Reinau, Kristian Hegner & Hilmola, Olli-Pekka (2022). The key challenges of blockchain implementation in maritime sector: summary from literature and previous research findings. *4th International Conference on Industry 4.0 and Smart Manufacturing* (to be published as article in Elsevier within *Procedia, Computer Science*).

Short Introduction to Research Environment



- Based on Wayback Machine (2021) and CoinMarketCap (2021) listings, in 2013, there were well below 100 cryptocurrencies listed in exchange.
- In time of making this journal publication, CoinMarketCap (2021) listed 5,380 different tokens, and portal mentions that in the world exist 10,557 cryptocurrencies.
- Before the first crypto "hype period" of 2017, listed crypto coins were below 2000, but the spike in prices of 2017–18 caused many new projects to be initiated. This development led to the current high level as in 2020 there were already more than 8000 cryptocurrencies available for sale.
- Currently, CoinMarketCap (2022) says that there exist 21,273 cryptocurrencies, and lists 9,390.

Short Introduction to Research Environment (cont.)



- In the beginning, there were very few cryptocurrencies available, and Bitcoin was the first very serious and functional coin. However, during the evolution of Bitcoin, some other derivative currencies have been established from it such as Bitcoin Cash and Bitcoin SV. Therefore, investing in original Bitcoin, these could have been treated as dividends or as new divested businesses as each Bitcoin holder received same amount of Bitcoin Cash in the 2017 split (Bitcoin SV in turn is originally based on ownership of Bitcoin Cash, and the split took place in 2018).
- Bitcoin has been one of the best investments in the history of the world for those getting in roughly decade ago (even today's prices).
- Bitcoin is a public open ledger blockchain coin (and it is totally transparent) – concerns over anonymity and privacy have aroused
- The objective of this study is to examine established privacy coins and compare their price development over Bitcoin. Research uses earlier research findings in spotting suitable privacy coins; however, some of the past news and privacy coin successes are also included (in total, 23).



Cryptocurrencies & valuation

Crypto	Market cap	11.Oct.2022
BTC	640.2	365.4
ETH	246.2	156.9
USDT	62.7	68.4
BNB	50.1	43.7
ADA	43.9	13.6
DOGE	34.5	7.8
XRP	33.6	24.4
USDC	24.4	46.0
DOT	18.5	7.0
UNI	11.1	4.8
BCH	10.0	2.1
LTC	9.8	3.7
BUSD	9.7	21.6
SOL	9.0	11.3
LINK	8.8	3.5
MATIC	8.5	7.0
THETA	8.3	1.0
XLM	6.6	3.1
WBTC	6.5	4.7
VET	6.0	1.6

2 largest	886.4	522.3
Share	62 %	57 %
10 largest	1165.4	738.0
Share	82 %	80 %
20 largest	1248.5	797.7
Share	88 %	87 %

Total market cap:	1420.0	918.7
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- Valuation is highly concentrated, and crypto-world could be seen as an environment of BTC+ETH (first mover advantage)
- TOP20 take most of the value in cryptos (do note that 11.Oct.22 data concerns article TOP20 (from 21.Jun.2021), but it has changed and is not anymore the same).
- In general year 2022 has been very harsh for cryptocurrencies ("winter"), but you may note that some stable coins have even increased in market cap (USDT, USDC, and BUSD) together with SOL
- Stable cryptos are typically tied to US dollar, which has been "the king" in 2022



Price development of Bitcoin and privacy coins from the beginning of different years to 18 June 2021

	2015	2016	2017	2018	2019	2020	2021	11.Oct.2022
BTC	11823.4%	8526.8%	3653.2%	174.4%	874.9%	420.4%	27.6%	-49.18 %
ZEN				47.1%	1464.6%	886.4%	602.0%	-84.48 %
XMR	59730.5%	55872.1%	1894.4%	-22.4%	476.1%	509.1%	104.8%	-48.79 %
CVC				-73.5%	340.6%	1235.7%	179.6%	-48.67 %
ZEC			185.9%	-76.0%	131.9%	394.0%	144.0%	-62.48 %
XVG	670350.0%	178686.7%	121800.0%	-82.8%	280.2%	649.9%	265.9%	-87.88 %
Dash	8226.9%	4691.7%	1341.0%	-84.6%	99.6%	286.5%	83.4%	-74.51 %
ARK				-86.3%	166.5%	642.2%	167.1%	-64.70 %
NAV	51060.2%	21492.5%	974.0%	-89.1%	152.7%	356.3%	211.5%	-85.06 %
XDN	3207.4%	3414.1%	2642.7%	-89.2%	82.4%	290.5%	155.3%	-96.37 %
QRL				-89.8%	46.4%	308.8%	52.8%	-44.20 %
KMD				-90.7%	12.0%	80.6%	84.8%	-72.80 %
PART				-91.0%	8.1%	254.7%	239.0%	-76.48 %
BCN	5462.5%	1335.5%	667.2%	-92.5%	-37.8%	57.8%	171.3%	-92.56 %
PIVX			10279.0%	-93.2%	-14.2%	230.6%	130.6%	-72.18 %
SKY				-96.8%	25.4%	199.0%	131.0%	-91.76 %
AION				-96.9%	13.9%	217.0%	145.1%	-79.22 %
ARRR						13935.8%	2688.5%	-90.44 %
BAT							225.4%	-56.14 %
IOTX					174.4%	537.8%	228.3%	25.84 %
NIX					12.1%	304.1%	212.4%	-97.91 %
STORJ							204.0%	-51.24 %
WAN					102.4%	303.9%	124.1%	-75.05 %
XSN					115.2%	296.0%	0.2%	

- 11.Oct.2022 compares change from 18.Jun.2021 to this date
- Only positive performance in 2022 is that of IoTeX (IOTX)
- On a class of its own is Verge (XVG) with investment yield starting 2015 (even today)



Correlations: Longer term

Table 3. Correlation coefficients of analyzed cryptocurrencies in the time period from 17 September 2014 to 18 June 2021 (apart of QRL and SKY, all other privacy coins did have a statistically significant correlation with BTC, which had a p value of <0.05 in AION and <0.01 in the rest of the cryptos).

	AION	ARK	ARRR	BAT	BCN	BTC	CVC	Dash	IOTX	KMD	NAV	NIX	PART	PIVX	QRL	SKY	STORJ	WAN	XDN	XMR	XSN	XVG	ZEC	ZEN
AION	1.000																							
ARK	0.917	1.000																						
ARRR	0.661	0.604	1.000																					
BAT	0.957	0.954	0.680	1.000																				
BCN	0.847	0.745	0.603	0.776	1.000																			
BTC	-0.062	0.139	0.551	0.851	0.103	1.000																		
CVC	0.776	0.878	0.619	0.936	0.627	0.419	1.000																	
Dash	0.883	0.956	0.703	0.921	0.769	0.332	0.835	1.000																
IOTX	0.586	0.949	0.681	0.963	0.496	0.682	0.924	0.889	1.000															
KMD	0.905	0.944	0.646	0.960	0.752	0.176	0.852	0.943	0.893	1.000														
NAV	0.944	0.967	0.575	0.952	0.795	0.260	0.835	0.951	0.928	0.946	1.000													
NIX	0.761	0.756	0.613	0.919	0.658	0.392	0.665	0.762	0.731	0.791	0.813	1.000												
PART	0.906	0.872	0.688	0.771	0.774	-0.143	0.690	0.826	0.409	0.830	0.885	0.494	1.000											
PIVX	0.956	0.960	0.644	0.960	0.826	0.101	0.818	0.943	0.796	0.938	0.968	0.861	0.914	1.000										
QRL	0.959	0.927	0.610	0.845	0.809	-0.001	0.817	0.912	0.769	0.913	0.946	0.770	0.923	0.956	1.000									
SKY	0.950	0.873	0.573	0.926	0.869	-0.023	0.734	0.856	0.586	0.882	0.905	0.836	0.859	0.924	0.908	1.000								
STORJ	0.913	0.940	0.508	0.907	0.678	0.730	0.867	0.770	0.869	0.928	0.872	0.860	0.598	0.886	0.724	0.870	1.000							
WAN	0.973	0.905	0.665	0.973	0.830	0.060	0.612	0.881	0.796	0.856	0.938	0.837	0.920	0.975	0.954	0.938	0.927	1.000						
XDN	0.921	0.815	0.769	0.919	0.835	0.184	0.717	0.789	0.827	0.836	0.870	0.791	0.828	0.855	0.867	0.864	0.851	0.970	1.000					
XMR	0.658	0.757	0.798	0.893	0.612	0.737	0.819	0.829	0.836	0.776	0.771	0.555	0.582	0.704	0.669	0.644	0.773	0.517	0.664	1.000				
XSN	0.548	0.745	0.371	0.636	0.461	0.515	0.732	0.708	0.764	0.659	0.723	0.479	0.426	0.636	0.662	0.572	0.519	0.620	0.669	0.673	1.000			
XVG	0.868	0.830	0.764	0.959	0.766	0.387	0.790	0.843	0.948	0.915	0.868	0.723	0.725	0.856	0.812	0.858	0.878	0.870	0.860	0.803	0.712	1.000		
ZEC	0.886	0.906	0.773	0.932	0.638	0.094	0.878	0.757	0.883	0.889	0.746	0.765	0.856	0.753	0.931	0.820	0.803	0.836	0.657	0.574	0.766	0.631	1.000	
ZEN	0.293	0.444	0.866	0.883	0.251	0.772	0.656	0.437	0.801	0.464	0.391	0.540	0.234	0.331	0.345	0.317	0.704	0.335	0.352	0.844	0.554	0.549	0.460	1.000

- Correlations of Bitcoin and 23 privacy coins are typically positive and statistically significant
- Aion (AION) and Particl (PART) had slightly negative correlations in the entire observation period.
- QRL and SKY had no relation at all with Bitcoin, positive or negative (and, of course, did not have statistical significance).



Correlations: Shorter term

Table 4. Correlation coefficients of analyzed cryptocurrencies in time period from 1 January 2019 to 18 June 2021 (all privacy coins have statistically significant correlation with BTC and this with p value of <0.01).

	AION	ARK	ARRR	BAT	BCN	BTC	CVC	Dash	IOTX	KMD	NAV	NIX	PART	PIVX	QRL	SKY	STORJ	WAN	XDN	XMR	XSN	XVG	ZEC	ZEN	
AION	1.000																								
ARK	0.908	1.000																							
ARRR	0.661	0.604	1.000																						
BAT	0.957	0.954	0.680	1.000																					
BCN	0.633	0.474	0.603	0.776	1.000																				
BTC	0.650	0.830	0.551	0.851	0.168	1.000																			
CVC	0.823	0.945	0.619	0.936	0.389	0.937	1.000																		
Dash	0.867	0.871	0.703	0.921	0.549	0.824	0.908	1.000																	
IOTX	0.887	0.956	0.681	0.963	0.446	0.867	0.956	0.901	1.000																
KMD	0.923	0.917	0.646	0.960	0.641	0.695	0.855	0.885	0.886	1.000															
NAV	0.887	0.963	0.575	0.952	0.475	0.861	0.952	0.887	0.956	0.902	1.000														
NIX	0.858	0.854	0.613	0.919	0.644	0.628	0.790	0.805	0.826	0.897	0.868	1.000													
PART	0.423	0.212	0.688	0.771	0.755	-0.106	0.107	0.304	0.179	0.383	0.209	0.430	1.000												
PIVX	0.929	0.934	0.644	0.960	0.606	0.699	0.865	0.858	0.905	0.905	0.921	0.876	0.398	1.000											
QRL	0.765	0.788	0.610	0.845	0.600	0.745	0.816	0.859	0.792	0.818	0.830	0.805	0.449	0.797	1.000										
SKY	0.891	0.912	0.573	0.926	0.641	0.729	0.886	0.903	0.888	0.933	0.921	0.895	0.416	0.916	0.871	1.000									
STORJ	0.913	0.940	0.508	0.907	0.678	0.730	0.867	0.770	0.869	0.928	0.872	0.860	0.598	0.886	0.724	0.870	1.000								
WAN	0.909	0.967	0.665	0.973	0.465	0.857	0.956	0.907	0.966	0.918	0.956	0.855	0.171	0.908	0.801	0.897	0.927	1.000							
XDN	0.872	0.904	0.769	0.919	0.532	0.786	0.889	0.906	0.929	0.877	0.890	0.806	0.294	0.877	0.809	0.864	0.851	0.929	1.000						
XMR	0.741	0.842	0.798	0.893	0.291	0.916	0.913	0.894	0.897	0.766	0.842	0.689	0.023	0.749	0.763	0.753	0.773	0.895	0.896	1.000					
XSN	0.570	0.712	0.371	0.636	0.101	0.811	0.746	0.638	0.724	0.568	0.738	0.562	-0.079	0.626	0.655	0.589	0.519	0.719	0.663	0.730	1.000				
XVG	0.869	0.926	0.764	0.959	0.440	0.870	0.947	0.918	0.953	0.878	0.930	0.823	0.168	0.869	0.803	0.863	0.878	0.961	0.944	0.934	0.709	1.000			
ZEC	0.850	0.881	0.773	0.932	0.456	0.848	0.909	0.956	0.917	0.864	0.883	0.797	0.193	0.849	0.828	0.848	0.803	0.929	0.938	0.948	0.730	0.953	1.000		
ZEN	0.761	0.823	0.866	0.883	0.361	0.846	0.891	0.875	0.883	0.769	0.819	0.687	0.078	0.754	0.714	0.738	0.704	0.875	0.881	0.947	0.648	0.937	0.926	1.000	

- In the shorter period of time (starting from 2019) all privacy coins apart of PART had a positive correlation (and statistically sign.)



Rolling Correlations

- In Tables 5 and 6 are shown results of rolling correlations of 100 days out of analyzed privacy coins and Bitcoin
- Interestingly, Bytecoin (BCN) had 31% out of time not being positively correlated with Bitcoin.
- Together with this, such privacy coins as Basic Attention Token (BAT), Navcoin (NAV), Particl (PART), DigitalNote (XDN), Stakenet (XSN) and Verge (XVG) all had 20% or higher number of observations in rolling correlations within the area of 0.1 to -1.
- In contrary to these, all highest market capitalization privacy coins (XMR, Dash and Zcash) in Tables 5 and 6 had an exceptionally low number of days in the area from 0.1 to -1, together with new entrants such as ARRR and STORJ.



Conclusions

- Bitcoin has numerous weaknesses, but it is still clearly the dominant one, and as this research showed, it is also leading in price movements. Nearly all other privacy coins of this study just followed Bitcoin price development.
- Development after this study, and during “crypto winter of 2022”, has shown that nearly all privacy coins have lost substantially value (like Bitcoin). This also concerned Particl (PART). Only positive yielding is IoTex (IOTX), and it did not show any out of the crowd difference in this research work.
- In rolling correlations, it was identified numerous potential contra Bitcoin price cycle coins, but these were not immune to “crypto winter of 2022”.
- Monero (XMR) was in study seen as potential for best sustaining its value. It still holds the case as during “crypto winter of 2022” it was able to resist extremely high valuation losses similar to BTC (“only” approx. 50 % lost from 21.Jun.2021 to 11.Oct.2022).
- Pirate Chain (ARRR) was really popular during the time of this study (2021), but in “crypto winter of 2022” it has clearly been on losing side (similar to Verge (XVG) and Horizen, (ZEN))