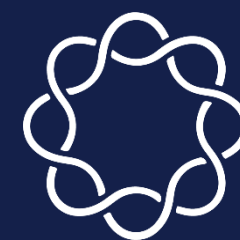


ΣYNTHETIX

Analysis of Listed Assets



DELPHI DIGITAL



Preface

There were several goals we were trying accomplish as part of this asset listing framework, but the most important one was to ensure that all assets on the platform are tamper resistant. We think of tamper resistance as a spectrum, and built our parameters accordingly. Since this framework applies to both existing and new assets, we initiated the analysis with the existing assets. Another objective was to target assets that would be value accretive to the network. That will be a larger focus in the ongoing monitoring portion, but we'll expand on the type of criteria we believe are important.

Our assessment of existing assets centered around understanding how manipulation prone they were. The recently released SIP's have limited the main oracle-based attack vector to pure oracle manipulation. In general, oracle manipulation is a function of liquidity. The higher the liquidity, the costlier it would be to manipulate it. We analyzed the liquidity of every crypto asset currently live on the platform. Specifically, we tracked orderbook depth over time for each asset on both a cumulative basis (across all exchanges) and an exchange-based breakout. The goal was to get a realistic understanding of how much it would cost to move the price up or down a certain percent. We present our findings throughout this report and have included all the supporting data within the Appendix.

Assets Covered





An Open Interest Cap Based On Liquidity

The “Dumping” Manipulation (Bid) values below the first .10% to 10% set indicate how much it would cost to move the price down by the specific %. The “Pumping” Manipulation (Ask) values below the second .10% to 10% set indicate how much it would cost to move the price up by that %.

This is where the concept of tamper resistance being a spectrum comes into play. Rather than allow or remove a certain asset because it was previously manipulated, it makes more sense to cap the potential open interest on the asset based on its liquidity. This ensures there’s no economically viable attack vector to manipulate the asset since you would spend far more capital moving the price than you can potentially make in profit from doing so. More specifically, we conservatively recommend limiting the open interest of certain assets to the amount of capital it would take to move the price 10%. This appears conservative, but that’s intentional because the dollar value that would lead to a 10% move is an average. Since liquidity depth is always changing, having a constantly updating open interest tracker would be ideal, but the amount of monitoring and data that would require doesn’t justify the benefit. That’s why we went with an average. While using the average makes sense, attacks can happen very quickly as traders will look to exploit at the most opportune moments. That means the oracle is only as strong as its most illiquid moments. This risk is offset by the conservative 10% threshold.



Asset:	Binance Coin
Ticker:	BNB
Exchanges:	1
Trading Pairs:	2

Exchange: Binance
Pairs: BNB-USDT, BNB-BTC

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$40,830	\$110,699	\$152,011	\$189,049	\$235,682	\$300,289	\$379,601	\$455,589	\$514,668	\$565,922	\$833,568	\$1,102,623	\$2,312,369	\$2,963,878	\$3,003,460	\$3,003,468
Median	\$37,021	\$104,266	\$142,845	\$175,054	\$213,857	\$275,749	\$352,255	\$422,146	\$476,415	\$523,970	\$750,516	\$982,671	\$2,052,015	\$2,753,982	\$2,780,279	\$2,780,279
STDEV	\$17,101	\$32,862	\$42,374	\$51,967	\$68,781	\$91,728	\$122,140	\$148,925	\$164,397	\$174,994	\$258,926	\$378,350	\$845,273	\$819,920	\$789,035	\$789,023
MAD	\$11,092	\$22,639	\$30,766	\$39,788	\$53,729	\$73,357	\$96,886	\$115,300	\$124,456	\$131,542	\$200,278	\$288,589	\$703,613	\$711,005	\$684,078	\$684,071

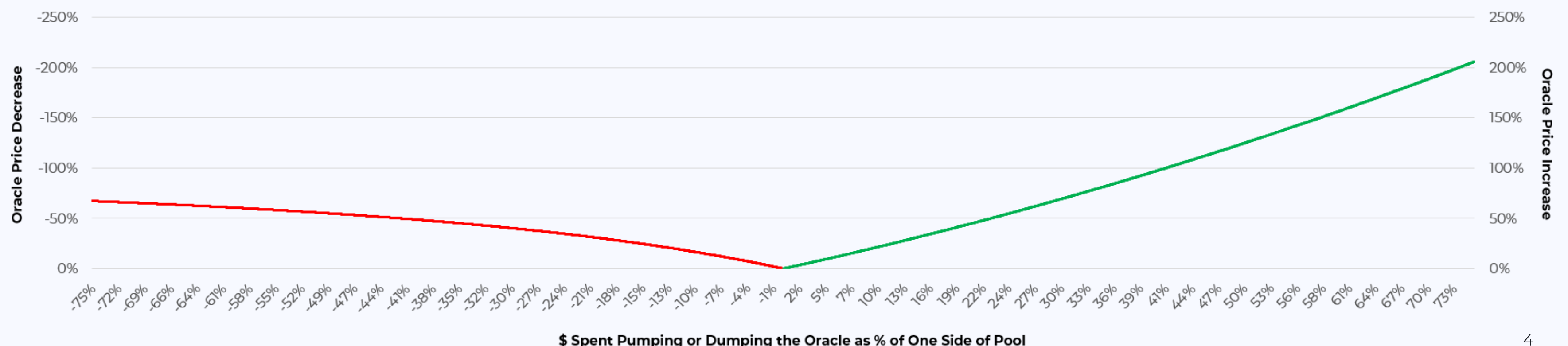
"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$47,088	\$127,537	\$174,988	\$224,289	\$289,497	\$368,791	\$453,541	\$526,648	\$595,043	\$657,058	\$985,525	\$1,345,106	\$2,844,274	\$3,673,165	\$3,721,471	\$3,723,131
Median	\$43,821	\$124,133	\$161,999	\$209,339	\$272,845	\$342,442	\$419,055	\$495,076	\$552,629	\$622,717	\$898,418	\$1,276,569	\$2,763,492	\$3,694,366	\$3,700,696	\$3,700,696
STDEV	\$15,767	\$34,195	\$52,612	\$78,029	\$108,382	\$140,746	\$170,989	\$191,182	\$215,102	\$237,946	\$374,276	\$490,010	\$776,135	\$806,615	\$788,843	\$788,194
MAD	\$12,400	\$26,215	\$38,159	\$56,453	\$81,301	\$108,299	\$133,627	\$149,101	\$168,775	\$187,110	\$305,681	\$391,678	\$614,144	\$663,970	\$645,951	\$644,348



Uniswap As An Oracle

The logic behind providing exchange-based breakouts, rather than a specific trading pair, is because of how quickly arbitrage opportunities are closed between trading pairs on an exchange. When a token is trading against both USDT and BTC on an exchange, the dollar prices of both trading pairs usually move in lockstep. When they deviate, arbitrage traders (usually bots) can immediately capture the price difference and bring them back to parity.

Certain assets, like MKR, don't have liquid exchange pairs. Their most liquid pair is on Uniswap. As we've seen already, that oracle can certainly be prone to manipulation in its current state. We analyzed Uniswap to understand the amount of capital that would be needed to manipulate the price oracle up or down, and we made it a function of the amount of liquidity in the pool. The thought process there was to allow a seamless integration for active monitoring. By just plugging in the size of the pool, you're able to understand the amount of capital it would take to manipulate the oracle up or down, and then adjust the open interest cap accordingly. The relationship below isn't indicating the exchange rate that the trader pays, but rather the new exchange rate that Uniswap would output as an oracle. It's evident that it's a lot cheaper to manipulate the oracle price up rather than down, which is a function of how the AMM mechanism works and because its lower bound is capped at -100% (exchange rate can't drop more than 100%) while the upper bound is effectively infinite. This is certainly important to keep in mind when using this as an oracle, particularly when setting open interest. Open interest on regular synths would have to be much lower than open interest on inverse synths for the same asset when using Uniswap as the oracle.





Final Outcome: Only MKR needs to be removed

Our analysis of the existing assets was fairly conclusive. The only currently listed asset that's worth removing is Maker.

Maker's exchange-based liquidity is abysmal, evidenced by how little capital it takes to actually move the price. On average it would take less than \$100,000 to drop the price by 10% and about \$150,000 to raise the price 10% over the period we tracked¹.



Asset:	MakerDAO
Ticker:	MKR
Exchanges:	3
Trading Pairs:	5

	"Dumping" Manipulation (Bid)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$76	\$294	\$645	\$1,797	\$2,598	\$3,146	\$4,087	\$5,445	\$7,577	\$9,461	\$16,792	\$20,759	\$42,632	\$64,239	\$84,681	\$93,696
Median	\$1	\$16	\$139	\$1,083	\$1,924	\$2,317	\$2,713	\$3,625	\$6,264	\$7,324	\$14,142	\$18,728	\$44,324	\$63,328	\$88,391	\$94,479
STDEV	\$302	\$906	\$1,366	\$1,958	\$2,243	\$2,609	\$3,496	\$4,487	\$5,069	\$6,616	\$10,053	\$10,093	\$13,801	\$11,526	\$14,221	\$12,259
MAD	\$112	\$431	\$821	\$1,437	\$1,679	\$2,034	\$2,663	\$3,548	\$4,103	\$5,551	\$8,568	\$8,625	\$11,769	\$8,933	\$12,998	\$11,313

	"Pumping" Manipulation (Ask)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$495	\$530	\$605	\$959	\$1,276	\$1,713	\$2,600	\$3,688	\$7,467	\$8,350	\$15,681	\$26,270	\$76,816	\$116,384	\$138,843	\$154,937
Median	\$1	\$12	\$65	\$316	\$535	\$851	\$1,323	\$2,064	\$5,084	\$5,757	\$13,410	\$25,057	\$75,481	\$111,528	\$127,861	\$149,707
STDEV	\$3,254	\$3,261	\$3,260	\$3,305	\$3,381	\$3,771	\$4,213	\$5,187	\$6,835	\$7,169	\$9,079	\$12,415	\$21,595	\$26,488	\$37,309	\$42,510
MAD	\$913	\$923	\$938	\$1,104	\$1,250	\$1,573	\$2,229	\$2,830	\$4,986	\$5,268	\$7,543	\$9,726	\$15,536	\$20,334	\$31,482	\$35,127

Uniswap also isn't the safest oracle at the moment either². For perspective, a 5 million dollar Uniswap pool that has \$2.5m in each asset implies that it costs \$135,00 to dump the price 10% or \$1.04m to dump the price 50%. That same pool would cost \$122,000 to pump 10% and \$563,000 to pump 50%. The point of this exercise is to show how susceptible this oracle is to manipulation.

Asset:	MakerDAO
Ticker:	MKR
Uniswap Pool	\$5,000,000
MKR in Pool	\$2,500,000

"Dumping" Manipulation (Bid)																		
0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1.00%	1.50%	2.00%	4.00%	6.00%	8.00%	10.00%	25.00%	50.00%	
\$1,250	\$2,500	\$3,775	\$5,025	\$6,275	\$7,550	\$8,800	\$10,075	\$11,350	\$12,625	\$19,000	\$25,425	\$51,625	\$78,675	\$106,600	\$135,425	\$387,325	\$1,037,100	

"Pumping" Manipulation (Ask)																		
0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1.00%	1.50%	2.00%	4.00%	6.00%	8.00%	10.00%	25.00%	50.00%	
\$1,250	\$2,500	\$3,750	\$5,000	\$6,250	\$7,500	\$8,750	\$10,000	\$11,250	\$12,500	\$18,700	\$24,925	\$49,575	\$74,025	\$98,225	\$122,200	\$295,525	\$562,700	

1: Period tracked for all data was from 2/1/2020 – 2/12/2020

2: Uniswap is expected to release more details on how v2 should bolster their oracle ability soon



Results

Conversely, if you think about the assets that currently exist on the platform, the liquidity of those assets shows how insulated they are from manipulation. We present more information on each additional asset in the appendix. In general, it would take several million dollars to move the price of any of those assets 10%. While this may still seem like a potential attack vector as it's not a huge sum of money, it needs to be thought of relative to the size of the synthetic position. When considering manipulation, we tend to think about it in a bit of a vacuum. "If X owns Y amount of synths, they only need to move the market by Z for it to be profitable." In reality, the difficulty in accumulating that amount of synthetic assets is highly understated. It's not as if you can easily issue them out of thin air. You need to accumulate a comparable amount of synths and then convert them to the targeted asset. The synths themselves are difficult to accumulate.

Assets Deemed Safe To Keep As of Now

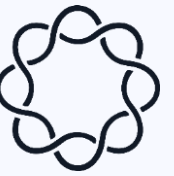


Assets Deemed Necessary To Remove



Appendix





Binance Coin (BNB)



Asset:	Binance Coin
Ticker:	BNB
Exchanges:	1
Trading Pairs:	2

Exchange: Binance

Pairs: BNB-USDT, BNB-BTC

	"Dumping" Manipulation (Bid)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$40,830	\$110,699	\$152,011	\$189,049	\$235,682	\$300,289	\$379,601	\$455,589	\$514,668	\$565,922	\$833,568	\$1,102,623	\$2,312,369	\$2,963,878	\$3,003,460	\$3,003,468
Median	\$37,021	\$104,266	\$142,845	\$175,054	\$213,857	\$275,749	\$352,255	\$422,146	\$476,415	\$523,970	\$750,516	\$982,671	\$2,052,015	\$2,753,982	\$2,780,279	\$2,780,279
STDEV	\$17,101	\$32,862	\$42,374	\$51,967	\$68,781	\$91,728	\$122,140	\$148,925	\$164,397	\$174,994	\$258,926	\$378,350	\$845,273	\$819,920	\$789,035	\$789,023
MAD	\$11,092	\$22,639	\$30,766	\$39,788	\$53,729	\$73,357	\$96,886	\$115,300	\$124,456	\$131,542	\$200,278	\$288,589	\$703,613	\$711,005	\$684,078	\$684,071

	"Pumping" Manipulation (Ask)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$47,088	\$127,537	\$174,988	\$224,289	\$289,497	\$368,791	\$453,541	\$526,648	\$595,043	\$657,058	\$985,525	\$1,345,106	\$2,844,274	\$3,673,165	\$3,721,471	\$3,723,131
Median	\$43,821	\$124,133	\$161,999	\$209,339	\$272,845	\$342,442	\$419,055	\$495,076	\$552,629	\$622,717	\$898,418	\$1,276,569	\$2,763,492	\$3,694,366	\$3,700,696	\$3,700,696
STDEV	\$15,767	\$34,195	\$52,612	\$78,029	\$108,382	\$140,746	\$170,989	\$191,182	\$215,102	\$237,946	\$374,276	\$490,010	\$776,135	\$806,615	\$788,843	\$788,194
MAD	\$12,400	\$26,215	\$38,159	\$56,453	\$81,301	\$108,299	\$133,627	\$149,101	\$168,775	\$187,110	\$305,681	\$391,678	\$614,144	\$663,970	\$645,951	\$644,348



Bitcoin (BTC)



Asset:	Bitcoin
Ticker:	BTC
Exchanges:	6
Trading Pairs:	8

Exchanges: Binance, Bitstamp, Coinbase, Kraken, Poloniex, Gemini

	"Dumping" Manipulation (Bid)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$1,400,631	\$3,029,495	\$4,578,890	\$5,979,362	\$7,418,086	\$8,995,042	\$10,548,024	\$12,021,793	\$13,386,953	\$14,714,701	\$19,841,500	\$23,245,885	\$34,774,322	\$41,856,603	\$46,679,732	\$51,212,675
Median	\$1,365,430	\$2,925,246	\$4,359,349	\$5,718,814	\$7,123,611	\$8,594,022	\$10,195,308	\$11,530,835	\$13,058,259	\$14,391,621	\$19,665,696	\$23,126,630	\$35,058,165	\$41,735,694	\$45,957,092	\$50,286,043
STDEV	\$282,456	\$558,753	\$829,070	\$1,021,721	\$1,300,587	\$1,594,938	\$1,861,310	\$2,100,239	\$2,275,986	\$2,445,995	\$2,844,622	\$3,209,254	\$5,438,284	\$5,744,158	\$5,775,521	\$5,967,825
MAD	\$209,908	\$432,572	\$650,729	\$795,768	\$1,007,954	\$1,278,489	\$1,530,938	\$1,762,282	\$1,918,005	\$2,072,652	\$2,312,989	\$2,622,018	\$4,335,892	\$4,512,311	\$4,724,239	\$4,936,710

	"Pumping" Manipulation (Ask)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$1,504,640	\$3,432,476	\$5,459,431	\$7,420,517	\$9,464,655	\$11,573,301	\$13,431,640	\$15,010,848	\$16,453,152	\$17,722,886	\$22,632,057	\$26,546,985	\$38,090,211	\$45,679,787	\$52,352,193	\$55,960,365
Median	\$1,462,935	\$3,282,726	\$5,299,936	\$7,167,367	\$9,345,108	\$11,462,345	\$13,643,582	\$15,220,759	\$16,684,538	\$17,900,735	\$22,440,000	\$26,238,520	\$35,859,729	\$46,984,268	\$56,118,117	\$58,953,608
STDEV	\$316,510	\$692,894	\$1,070,330	\$1,428,362	\$1,848,985	\$2,295,753	\$2,668,054	\$2,922,661	\$3,108,446	\$3,241,778	\$3,686,817	\$4,599,257	\$6,732,747	\$7,194,576	\$8,038,974	\$8,426,183
MAD	\$227,355	\$552,790	\$866,395	\$1,189,412	\$1,515,172	\$1,887,724	\$2,210,238	\$2,445,576	\$2,594,834	\$2,674,216	\$3,116,011	\$3,879,340	\$5,971,451	\$6,428,586	\$7,250,605	\$7,642,777



Asset:	Bitcoin
Ticker:	BTC
Exchange:	Binance
Trading Pairs:	3

Pairs: BTC-USDT, BTC-BUSD, BTC-USDC

	"Dumping" Manipulation (Bid)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$531,034	\$1,089,449	\$1,619,070	\$2,099,581	\$2,656,341	\$3,301,414	\$3,992,274	\$4,696,951	\$5,388,948	\$6,068,092	\$8,105,007	\$8,526,728	\$9,284,811	\$9,833,654	\$10,195,404	\$10,510,144
Median	\$479,632	\$1,004,974	\$1,506,496	\$1,909,873	\$2,415,904	\$3,008,941	\$3,793,728	\$4,497,437	\$5,147,806	\$5,816,625	\$7,627,069	\$8,023,538	\$8,818,664	\$9,483,104	\$9,841,008	\$10,107,544
STDEV	\$200,918	\$371,900	\$566,195	\$726,082	\$937,804	\$1,154,056	\$1,359,225	\$1,535,226	\$1,660,858	\$1,754,667	\$1,956,872	\$1,979,339	\$1,995,271	\$2,012,833	\$2,002,078	\$1,981,759
MAD	\$139,375	\$264,786	\$419,238	\$560,934	\$737,457	\$921,493	\$1,104,587	\$1,261,289	\$1,372,640	\$1,445,817	\$1,556,191	\$1,575,231	\$1,608,647	\$1,641,977	\$1,651,986	\$1,625,834

	"Pumping" Manipulation (Ask)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$579,765	\$1,345,865	\$2,136,269	\$2,897,209	\$3,733,042	\$4,627,246	\$5,463,252	\$6,218,670	\$6,911,192	\$7,464,291	\$8,858,848	\$9,165,079	\$9,904,402	\$10,145,131	\$10,422,754	\$10,616,163
Median	\$498,794	\$1,195,792	\$1,962,156	\$2,759,947	\$3,675,279	\$4,619,661	\$5,459,940	\$6,075,866	\$6,566,939	\$7,217,407	\$8,211,027	\$8,441,838	\$9,222,760	\$9,408,577	\$9,625,107	\$9,797,350
STDEV	\$267,086	\$583,615	\$897,737	\$1,178,140	\$1,447,501	\$1,714,129	\$1,952,762	\$2,143,484	\$2,284,757	\$2,379,283	\$2,408,356	\$2,376,206	\$2,409,675	\$2,410,438	\$2,469,236	\$2,459,633
MAD	\$173,272	\$420,309	\$686,101	\$924,084	\$1,146,543	\$1,363,299	\$1,560,630	\$1,703,794	\$1,827,927	\$1,888,110	\$2,022,647	\$1,998,871	\$2,039,940	\$2,052,922	\$2,107,279	\$2,102,082

Chainlink (LINK)



Asset:	Chainlink
Ticker:	LINK
Exchanges:	4
Trading Pairs:	5

Exchanges: Binance, Coinbase,
Huobi, Okex



Asset:	Chainlink
Ticker:	LINK
Exchange:	Binance
Trading Pairs:	2

Pairs: LINK-USDT, LINK-BTC



Asset:	Chainlink
Ticker:	LINK
Exchange:	Coinbase
Trading Pairs:	1

Pairs: LINK-USD

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$23,562	\$80,376	\$146,113	\$210,534	\$284,216	\$370,956	\$471,844	\$577,162	\$669,017	\$752,709	\$1,076,850	\$1,251,353	\$1,930,442	\$2,502,288	\$2,930,306	\$3,195,334
Median	\$22,939	\$77,626	\$143,466	\$208,642	\$280,198	\$363,898	\$465,994	\$588,070	\$681,374	\$766,391	\$1,056,989	\$1,222,136	\$1,867,749	\$2,430,774	\$2,892,850	\$3,161,067
STDEV	\$6,339	\$14,121	\$23,356	\$34,117	\$48,781	\$70,807	\$92,559	\$105,154	\$110,170	\$112,121	\$177,124	\$223,138	\$408,997	\$550,848	\$627,160	\$678,282
MAD	\$4,869	\$11,687	\$19,478	\$28,568	\$40,429	\$57,873	\$77,374	\$89,965	\$92,244	\$92,058	\$127,991	\$169,064	\$330,888	\$454,421	\$533,134	\$569,881

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$28,812	\$91,124	\$161,566	\$234,256	\$318,959	\$412,271	\$510,970	\$602,768	\$678,098	\$738,545	\$956,550	\$1,128,907	\$1,957,281	\$2,662,632	\$3,275,292	\$3,699,294
Median	\$25,552	\$85,437	\$151,503	\$225,805	\$307,107	\$403,208	\$496,005	\$602,544	\$680,910	\$747,408	\$936,567	\$1,113,276	\$1,876,247	\$2,522,294	\$3,136,362	\$3,702,963
STDEV	\$15,421	\$31,769	\$43,260	\$56,838	\$80,360	\$103,921	\$117,811	\$123,023	\$123,626	\$124,784	\$154,299	\$208,348	\$421,189	\$563,110	\$719,263	\$809,556
MAD	\$8,527	\$16,900	\$25,393	\$37,624	\$57,192	\$77,018	\$90,176	\$94,070	\$95,043	\$98,227	\$125,596	\$166,687	\$348,611	\$486,575	\$624,983	\$728,531

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$13,915	\$46,588	\$87,992	\$123,105	\$155,197	\$184,151	\$213,883	\$246,855	\$276,258	\$307,918	\$465,868	\$588,422	\$1,072,863	\$1,496,108	\$1,806,643	\$1,998,186
Median	\$13,151	\$45,163	\$86,491	\$121,562	\$152,010	\$181,125	\$206,723	\$241,502	\$273,572	\$303,717	\$443,799	\$550,302	\$1,002,050	\$1,409,704	\$1,644,159	\$1,869,015
STDEV	\$4,106	\$9,130	\$15,297	\$21,632	\$29,926	\$39,442	\$47,780	\$53,759	\$59,009	\$64,261	\$129,266	\$171,202	\$325,376	\$446,040	\$486,312	\$508,833
MAD	\$2,986	\$7,213	\$12,128	\$16,361	\$21,928	\$28,661	\$35,294	\$39,785	\$42,415	\$45,913	\$83,712	\$119,452	\$252,877	\$362,198	\$426,422	\$448,059

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$17,981	\$56,367	\$99,931	\$136,376	\$170,076	\$196,492	\$223,259	\$251,384	\$279,830	\$308,987	\$442,840	\$566,839	\$1,179,298	\$1,725,222	\$2,209,077	\$2,494,820
Median	\$14,898	\$50,802	\$92,334	\$130,640	\$161,422	\$186,507	\$212,302	\$240,920	\$265,210	\$294,744	\$429,465	\$545,016	\$1,141,124	\$1,664,356	\$2,203,412	\$2,608,765
STDEV	\$13,902	\$28,457	\$35,280	\$38,219	\$43,451	\$48,700	\$56,424	\$62,692	\$68,810	\$73,376	\$100,632	\$146,228	\$314,209	\$414,838	\$542,913	\$614,968
MAD	\$6,336	\$12,640	\$17,495	\$20,690	\$25,749	\$31,332	\$37,738	\$43,211	\$48,941	\$53,753	\$80,515	\$116,027	\$258,576	\$357,470	\$470,885	\$555,386

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$7,386	\$20,753	\$34,444	\$53,055	\$81,717	\$120,166	\$168,530	\$218,564	\$262,856	\$299,723	\$399,598	\$433,499	\$597,038	\$727,438	\$839,884	\$910,480
Median	\$7,095	\$20,707	\$33,337	\$50,952	\$76,999	\$117,372	\$169,839	\$221,659	\$262,546	\$300,558	\$399,106	\$427,916	\$600,029	\$694,892	\$783,055	\$856,666
STDEV	\$3,108	\$6,205	\$9,748	\$15,767	\$24,628	\$33,532	\$41,106	\$44,275	\$45,532	\$44,935	\$47,568	\$54,021	\$86,582	\$140,541	\$210,454	\$234,394
MAD	\$2,538	\$5,029	\$8,141	\$12,738	\$19,893	\$27,070	\$33,703	\$37,135	\$38,560	\$37,569	\$38,366	\$43,859	\$68,178	\$106,493	\$159,849	\$181,274

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$8,444	\$22,510	\$39,487	\$64,589	\$101,181	\$147,055	\$194,981	\$236,563	\$267,323	\$287,710	\$340,996	\$377,581	\$572,434	\$720,469	\$846,525	\$982,244
Median	\$7,611	\$22,664	\$38,391	\$61,526	\$96,955	\$149,284	\$204,965	\$244,812	\$269,309	\$288,141	\$328,669	\$368,964	\$552,696	\$694,118	\$796,474	\$923,750
STDEV	\$4,220	\$7,141	\$11,820	\$22,143	\$37,368	\$52,611	\$60,010	\$62,142	\$62,598	\$62,594	\$71,097	\$79,516	\$116,949	\$155,030	\$189,010	\$212,777
MAD	\$2,896	\$5,346	\$8,800	\$17,557	\$30,898	\$43,939	\$50,011	\$50,671	\$50,175	\$50,630	\$59,339	\$64,646	\$95,524	\$128,521	\$158,521	\$178,212



Ethereum (ETH)



Asset:	Ethereum
Ticker:	ETH
Exchanges:	5
Trading Pairs:	8

Exchanges: Binance, Bitfinex,
Bitstamp, Coinbase, Kraken,

	"Dumping" Manipulation (Bid)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$389,156	\$959,543	\$1,505,384	\$2,018,180	\$2,493,292	\$2,993,259	\$3,551,322	\$4,118,623	\$4,650,721	\$5,358,659	\$7,410,577	\$8,864,105	\$13,408,707	\$16,105,396	\$18,152,826	\$19,918,746
Median	\$377,586	\$915,608	\$1,446,503	\$2,042,573	\$2,516,092	\$2,988,822	\$3,551,963	\$4,142,769	\$4,688,330	\$5,457,594	\$7,388,726	\$8,738,542	\$12,885,868	\$15,675,697	\$18,003,055	\$20,183,948
STDEV	\$99,449	\$206,278	\$287,207	\$320,866	\$352,734	\$432,578	\$533,344	\$598,270	\$616,491	\$663,646	\$928,281	\$1,194,813	\$2,054,163	\$2,273,625	\$2,368,538	\$2,526,038
MAD	\$70,663	\$166,799	\$238,395	\$266,291	\$290,439	\$359,553	\$448,167	\$497,209	\$509,603	\$552,150	\$703,947	\$867,662	\$1,506,388	\$1,717,331	\$1,805,968	\$2,033,032

	"Pumping" Manipulation (Ask)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$385,808	\$982,868	\$1,624,037	\$2,232,589	\$2,816,819	\$3,442,689	\$4,077,256	\$4,659,843	\$5,177,730	\$5,819,532	\$8,141,717	\$9,826,397	\$15,500,380	\$18,949,170	\$20,930,436	\$22,283,981
Median	\$383,380	\$984,634	\$1,595,561	\$2,233,091	\$2,784,536	\$3,378,260	\$4,050,935	\$4,618,292	\$5,238,702	\$5,877,359	\$8,279,111	\$9,915,298	\$15,681,127	\$19,465,191	\$21,748,547	\$23,111,546
STDEV	\$70,620	\$183,492	\$288,220	\$358,142	\$447,563	\$552,789	\$635,923	\$677,621	\$720,197	\$813,460	\$1,121,564	\$1,345,969	\$2,074,114	\$2,521,914	\$2,771,014	\$2,884,170
MAD	\$57,674	\$154,450	\$242,018	\$301,246	\$376,589	\$467,297	\$536,433	\$570,833	\$606,653	\$679,110	\$919,869	\$1,079,390	\$1,686,862	\$2,019,978	\$2,177,671	\$2,285,370



Asset:	Ethereum
Ticker:	ETH
Exchange:	Binance
Trading Pairs:	2

Pairs: ETH-USDT, ETH-BTC

	"Dumping" Manipulation (Bid)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$146,670	\$342,392	\$481,217	\$576,045	\$673,749	\$791,288	\$916,164	\$1,041,630	\$1,157,536	\$1,262,262	\$1,751,238	\$2,271,035	\$4,128,506	\$5,276,642	\$5,616,774	\$5,616,774
Median	\$140,825	\$331,627	\$477,405	\$567,981	\$654,367	\$762,686	\$886,765	\$1,000,606	\$1,100,378	\$1,180,804	\$1,641,639	\$2,085,836	\$3,798,644	\$4,948,415	\$5,336,738	\$5,336,738
STDEV	\$41,791	\$66,085	\$83,510	\$99,765	\$124,513	\$165,457	\$201,947	\$235,881	\$273,190	\$313,406	\$495,694	\$677,090	\$1,121,426	\$1,274,211	\$1,297,419	\$1,297,419
MAD	\$23,042	\$47,418	\$62,459	\$71,863	\$86,171	\$114,402	\$139,723	\$161,186	\$183,355	\$207,135	\$319,894	\$481,691	\$799,988	\$945,309	\$955,021	\$955,021

	"Pumping" Manipulation (Ask)															
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$154,978	\$353,384	\$510,112	\$622,475	\$726,616	\$844,787	\$984,186	\$1,133,071	\$1,266,818	\$1,390,199	\$1,939,789	\$2,460,447	\$4,540,756	\$5,821,891	\$6,246,032	\$6,390,727
Median	\$153,511	\$352,207	\$517,368	\$615,522	\$705,046	\$812,432	\$941,569	\$1,082,620	\$1,198,844	\$1,327,326	\$1,869,126	\$2,321,140	\$4,396,782	\$5,498,241	\$5,822,418	\$5,964,908
STDEV	\$29,641	\$63,537	\$96,860	\$121,242	\$152,069	\$187,375	\$226,014	\$261,252	\$290,829	\$318,055	\$518,149	\$623,697	\$937,869	\$1,258,363	\$1,382,672	\$1,369,560
MAD	\$24,107	\$52,989	\$79,051	\$94,613	\$116,342	\$146,280	\$177,178	\$203,993	\$228,713	\$252,313	\$379,197	\$449,029	\$768,559	\$1,022,455	\$1,164,454	\$1,188,269



Litecoin (LTC)



Asset:	Litecoin
Ticker:	LTC
Exchanges:	5
Trading Pairs:	7

Exchanges: Binance, Bitfinex,
Bitstamp, Coinbase, Kraken



Asset:	Litecoin
Ticker:	LTC
Exchange:	Binance
Trading Pairs:	2

Pairs: LTC-USDT, LTC-BTC



Asset:	Litecoin
Ticker:	LTC
Exchange:	Coinbase
Trading Pairs:	2

Pairs: LTC-USD, LTC-BTC

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$115,624	\$357,897	\$606,242	\$820,823	\$1,059,235	\$1,254,767	\$1,500,739	\$1,771,601	\$2,040,219	\$2,328,754	\$3,278,042	\$3,927,289	\$5,801,664	\$7,104,692	\$8,599,571	\$10,174,521
Median	\$116,113	\$350,911	\$611,105	\$832,609	\$1,068,495	\$1,263,194	\$1,501,582	\$1,775,688	\$2,040,759	\$2,324,699	\$3,262,752	\$3,906,158	\$5,712,727	\$6,988,526	\$8,495,580	\$10,259,252
STDEV	\$19,823	\$54,753	\$84,436	\$99,264	\$115,759	\$131,437	\$161,726	\$186,963	\$201,507	\$212,809	\$269,809	\$344,257	\$568,036	\$822,684	\$1,149,804	\$1,447,899
MAD	\$15,913	\$43,193	\$69,192	\$80,404	\$91,519	\$104,374	\$128,436	\$146,843	\$157,229	\$167,349	\$212,339	\$275,591	\$464,829	\$646,750	\$914,827	\$1,212,102

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$122,034	\$372,461	\$672,849	\$966,314	\$1,272,891	\$1,523,453	\$1,825,814	\$2,106,858	\$2,351,526	\$2,590,813	\$3,445,415	\$4,124,163	\$6,430,484	\$8,177,864	\$9,808,793	\$11,285,868
Median	\$118,582	\$369,023	\$674,774	\$960,656	\$1,270,227	\$1,508,094	\$1,817,464	\$2,102,332	\$2,350,773	\$2,600,027	\$3,487,539	\$4,212,809	\$6,568,663	\$8,349,535	\$9,884,552	\$11,390,579
STDEV	\$21,227	\$57,385	\$96,624	\$130,229	\$166,984	\$189,736	\$221,621	\$245,198	\$263,709	\$284,317	\$353,809	\$457,092	\$756,996	\$947,195	\$1,032,284	\$1,064,311
MAD	\$17,237	\$46,431	\$79,686	\$106,768	\$137,403	\$156,125	\$181,576	\$200,757	\$218,093	\$236,297	\$298,126	\$391,473	\$619,896	\$751,554	\$804,999	\$811,253

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$47,275	\$146,114	\$225,080	\$281,041	\$331,303	\$384,627	\$452,165	\$520,929	\$574,744	\$618,993	\$825,650	\$988,560	\$1,638,646	\$2,239,180	\$2,982,541	\$3,644,361
Median	\$46,652	\$147,733	\$227,807	\$284,843	\$331,990	\$386,323	\$454,575	\$523,557	\$579,756	\$625,381	\$830,376	\$988,583	\$1,648,078	\$2,186,035	\$2,883,818	\$3,616,379
STDEV	\$7,566	\$18,560	\$30,981	\$38,769	\$43,599	\$49,319	\$58,129	\$67,028	\$72,219	\$75,573	\$100,332	\$121,527	\$201,884	\$374,595	\$559,200	\$715,963
MAD	\$6,064	\$14,921	\$25,228	\$31,511	\$35,110	\$38,760	\$44,510	\$51,317	\$55,988	\$58,883	\$79,676	\$97,988	\$155,348	\$272,190	\$428,159	\$567,396

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$49,399	\$149,474	\$229,955	\$290,550	\$346,761	\$403,402	\$477,400	\$547,625	\$602,441	\$647,666	\$846,157	\$1,051,944	\$1,929,050	\$2,600,330	\$3,250,371	\$3,824,898
Median	\$49,195	\$147,016	\$227,025	\$289,979	\$341,964	\$393,541	\$468,454	\$543,345	\$595,795	\$635,162	\$820,091	\$1,019,524	\$1,842,605	\$2,495,221	\$3,172,669	\$3,865,141
STDEV	\$9,694	\$22,925	\$34,997	\$43,790	\$52,796	\$63,980	\$75,559	\$85,743	\$94,573	\$103,108	\$144,239	\$195,736	\$367,653	\$439,075	\$539,868	\$621,958
MAD	\$7,288	\$17,244	\$26,891	\$34,279	\$41,987	\$50,184	\$59,630	\$66,710	\$73,184	\$80,367	\$113,391	\$155,882	\$296,715	\$354,425	\$420,862	\$484,228

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$40,019	\$106,239	\$172,555	\$242,122	\$335,173	\$400,231	\$483,529	\$575,658	\$672,096	\$757,798	\$1,005,010	\$1,164,944	\$1,691,946	\$2,062,023	\$2,465,924	\$2,870,471
Median	\$38,570	\$105,218	\$178,423	\$243,441	\$335,628	\$402,387	\$464,985	\$557,067	\$653,040	\$747,338	\$991,152	\$1,144,022	\$1,657,164	\$2,068,770	\$2,468,105	\$2,887,010
STDEV	\$11,296	\$31,096	\$43,000	\$52,602	\$77,623	\$93,927	\$116,670	\$131,448	\$134,040	\$131,246	\$156,346	\$212,052	\$320,950	\$353,362	\$386,501	\$398,919
MAD	\$8,474	\$24,077	\$34,104	\$41,533	\$62,060	\$75,163	\$95,843	\$106,292	\$107,217	\$105,328	\$123,772	\$162,426	\$258,946	\$290,643	\$303,673	\$310,079

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$39,669	\$100,310	\$200,157	\$326,897	\$465,107	\$560,017	\$667,418	\$753,974	\$821,150	\$871,446	\$1,036,029	\$1,165,342	\$1,750,868	\$2,254,956	\$2,725,213	\$3,149,769
Median	\$39,329	\$98,289	\$201,536	\$320,602	\$459,002	\$557,349	\$672,610	\$752,026	\$820,365	\$870,115	\$1,038,224	\$1,151,534	\$1,830,784	\$2,304,498	\$2,749,151	\$3,095,571
STDEV	\$9,350	\$24,679	\$40,741	\$67,817	\$109,298	\$116,196	\$124,550	\$129,993	\$132,946	\$136,567	\$160,001	\$204,927	\$320,741	\$350,734	\$321,740	\$313,043
MAD	\$7,279	\$20,281	\$33,081	\$58,088	\$90,864	\$95,212	\$101,385	\$106,347	\$108,286	\$109,796	\$129,692	\$171,342	\$278,777	\$276,740	\$243,904	\$247,475



MakerDAO (MKR)



Asset:	MakerDAO
Ticker:	MKR
Exchanges:	3
Trading Pairs:	5

Exchanges: Bitfinex, OkEx, Uniswap

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$76	\$294	\$645	\$1,797	\$2,598	\$3,146	\$4,087	\$5,445	\$7,577	\$9,461	\$16,792	\$20,759	\$42,632	\$64,239	\$84,681	\$93,696
Median	\$1	\$16	\$139	\$1,083	\$1,924	\$2,317	\$2,713	\$3,625	\$6,264	\$7,324	\$14,142	\$18,728	\$44,324	\$63,328	\$88,391	\$94,479
STDEV	\$302	\$906	\$1,366	\$1,958	\$2,243	\$2,609	\$3,496	\$4,487	\$5,069	\$6,616	\$10,053	\$10,093	\$13,801	\$11,526	\$14,221	\$12,259
MAD	\$112	\$431	\$821	\$1,437	\$1,679	\$2,034	\$2,663	\$3,548	\$4,103	\$5,551	\$8,568	\$8,625	\$11,769	\$8,933	\$12,998	\$11,313

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$495	\$530	\$605	\$959	\$1,276	\$1,713	\$2,600	\$3,688	\$7,467	\$8,350	\$15,681	\$26,270	\$76,816	\$116,384	\$138,843	\$154,937
Median	\$1	\$12	\$65	\$316	\$535	\$851	\$1,323	\$2,064	\$5,084	\$5,757	\$13,410	\$25,057	\$75,481	\$111,528	\$127,861	\$149,707
STDEV	\$3,254	\$3,261	\$3,260	\$3,305	\$3,381	\$3,771	\$4,213	\$5,187	\$6,835	\$7,169	\$9,079	\$12,415	\$21,595	\$26,488	\$37,309	\$42,510
MAD	\$913	\$923	\$938	\$1,104	\$1,250	\$1,573	\$2,229	\$2,830	\$4,986	\$5,268	\$7,543	\$9,726	\$15,536	\$20,334	\$31,482	\$35,127



Asset:	MakerDAO
Ticker:	MKR
Exchanges:	Uniswap
Trading Pairs:	-

"Dumping" Manipulation (Bid)																		
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1.00%	1.50%	2.00%	4.00%	6.00%	8.00%	10.00%	25.00%	50.00%
Mean	\$2,496	\$4,992	\$7,538	\$10,033	\$12,529	\$15,075	\$17,571	\$20,117	\$22,663	\$25,208	\$37,937	\$50,766	\$103,080	\$157,090	\$212,848	\$270,403	\$773,371	\$2,070,776
Median	\$2,611	\$5,222	\$7,885	\$10,496	\$13,107	\$15,770	\$18,381	\$21,044	\$23,707	\$26,370	\$39,686	\$53,106	\$107,830	\$164,330	\$222,658	\$282,865	\$809,013	\$2,166,212
STDEV	\$1,365	\$2,731	\$4,124	\$5,489	\$6,855	\$8,247	\$9,613	\$11,006	\$12,398	\$13,791	\$20,755	\$27,774	\$56,394	\$85,943	\$116,447	\$147,935	\$423,104	\$1,132,902
MAD	\$1,118	\$2,235	\$3,375	\$4,493	\$5,610	\$6,750	\$7,868	\$9,008	\$10,147	\$11,287	\$16,987	\$22,731	\$46,155	\$70,339	\$95,306	\$121,077	\$346,287	\$927,218

"Pumping" Manipulation (Ask)																		
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1.00%	1.50%	2.00%	4.00%	6.00%	8.00%	10.00%	25.00%	50.00%
Mean	\$2,496	\$4,992	\$7,488	\$9,983	\$12,479	\$14,975	\$17,471	\$19,967	\$22,463	\$24,959	\$37,338	\$49,768	\$98,986	\$147,806	\$196,126	\$243,997	\$590,074	\$1,123,542
Median	\$2,611	\$5,222	\$7,833	\$10,444	\$13,055	\$15,665	\$18,276	\$20,887	\$23,498	\$26,109	\$39,059	\$52,061	\$103,548	\$154,617	\$205,165	\$255,242	\$617,269	\$1,175,323
STDEV	\$1,365	\$2,731	\$4,096	\$5,462	\$6,827	\$8,193	\$9,558	\$10,924	\$12,289	\$13,655	\$20,427	\$27,227	\$54,154	\$80,863	\$107,299	\$133,488	\$322,824	\$614,679
MAD	\$1,118	\$2,235	\$3,353	\$4,470	\$5,588	\$6,705	\$7,823	\$8,940	\$10,058	\$11,176	\$16,719	\$22,284	\$44,322	\$66,182	\$87,818	\$109,253	\$264,214	\$503,081

TRON (TRX)



Asset:	TRON
Ticker:	TRX
Exchanges:	2
Trading Pairs:	8

Exchanges: Binance, Poloniex

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$18,017	\$61,695	\$205,618	\$246,268	\$274,184	\$306,274	\$436,219	\$536,273	\$581,538	\$619,630	\$907,402	\$1,101,489	\$1,734,373	\$2,247,143	\$2,694,297	\$3,067,865
Median	\$17,249	\$60,481	\$205,446	\$244,024	\$272,328	\$299,237	\$432,746	\$519,715	\$561,282	\$599,382	\$901,981	\$1,081,091	\$1,698,886	\$2,204,135	\$2,649,631	\$3,074,897
STDEV	\$4,743	\$10,256	\$35,413	\$38,744	\$43,924	\$52,914	\$59,374	\$105,945	\$108,886	\$108,124	\$131,483	\$159,044	\$247,761	\$349,674	\$372,014	\$357,776
MAD	\$3,972	\$8,540	\$26,953	\$29,600	\$33,977	\$42,793	\$45,922	\$86,777	\$89,280	\$88,532	\$107,835	\$134,764	\$208,544	\$299,219	\$316,713	\$303,926

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$17,575	\$433,480	\$451,090	\$496,809	\$654,171	\$692,833	\$719,281	\$749,696	\$873,816	\$959,412	\$997,152	\$1,031,749	\$1,298,543	\$1,485,667	\$2,140,815	\$2,608,173
Median	\$16,754	\$424,580	\$439,739	\$478,343	\$640,574	\$683,160	\$714,966	\$751,353	\$858,715	\$966,319	\$1,012,171	\$1,044,728	\$1,296,056	\$1,477,994	\$2,117,157	\$2,540,901
STDEV	\$4,398	\$106,369	\$105,541	\$102,995	\$107,774	\$106,697	\$105,918	\$106,519	\$137,722	\$120,944	\$122,157	\$122,617	\$141,893	\$165,400	\$302,284	\$412,574
MAD	\$3,588	\$91,510	\$91,125	\$89,149	\$92,097	\$91,338	\$90,612	\$91,184	\$118,359	\$100,562	\$101,136	\$101,666	\$116,806	\$137,035	\$236,999	\$330,195



Asset:	TRON
Ticker:	TRX
Exchange:	Binance
Trading Pairs:	6

Pairs: TRX-USDT, TRX-BTC, TRX-ETH, TRX-BNB, TRX-USDC, TRX-TUSD

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$11,771	\$50,658	\$186,084	\$223,466	\$243,798	\$264,751	\$365,065	\$441,838	\$470,421	\$492,029	\$717,009	\$889,066	\$1,418,319	\$1,895,990	\$2,316,794	\$2,675,523
Median	\$11,165	\$50,264	\$186,983	\$221,411	\$242,003	\$262,811	\$356,555	\$429,571	\$461,680	\$484,697	\$712,235	\$871,923	\$1,380,098	\$1,857,001	\$2,273,039	\$2,655,962
STDEV	\$2,790	\$8,368	\$32,478	\$35,272	\$38,078	\$42,234	\$52,288	\$87,105	\$90,295	\$91,449	\$119,526	\$143,343	\$224,450	\$319,726	\$341,683	\$327,109
MAD	\$2,245	\$6,625	\$24,426	\$26,338	\$28,405	\$32,198	\$40,806	\$70,416	\$72,781	\$73,035	\$97,119	\$122,297	\$191,240	\$276,376	\$293,199	\$279,075

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$12,285	\$411,669	\$423,979	\$467,153	\$618,489	\$656,251	\$680,074	\$707,733	\$820,221	\$891,238	\$913,975	\$932,624	\$1,137,108	\$1,313,687	\$1,938,806	\$2,386,329
Median	\$11,682	\$398,146	\$408,934	\$447,185	\$601,780	\$641,888	\$667,342	\$700,845	\$799,911	\$893,715	\$917,455	\$936,643	\$1,145,126	\$1,313,359	\$1,913,871	\$2,311,759
STDEV	\$3,195	\$104,441	\$104,532	\$101,805	\$106,756	\$105,719	\$104,995	\$105,259	\$134,647	\$115,958	\$116,739	\$116,354	\$131,579	\$155,503	\$288,766	\$399,551
MAD	\$2,410	\$89,642	\$89,876	\$87,831	\$91,394	\$90,915	\$90,324	\$90,612	\$117,296	\$99,083	\$99,691	\$99,361	\$110,771	\$129,615	\$226,740	\$316,753



Ripple (XRP)



Asset:	Ripple
Ticker:	XRP
Exchanges:	6
Trading Pairs:	12

Exchanges: Binance, Bitstamp, Bitfinex, Coinbase, Kraken, Poloniex



Asset:	Ripple
Ticker:	XRP
Exchange:	Binance
Trading Pairs:	4

Pairs: XRP-USDT, XRP-BTC, XRP-TUSD, XRP-ETH



Asset:	Ripple
Ticker:	XRP
Exchange:	Coinbase
Trading Pairs:	3

Pairs: XRP-USD, XRP-BTC, XRP-EUR

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$189,898	\$515,669	\$830,367	\$1,104,999	\$1,400,965	\$1,665,964	\$1,987,220	\$2,360,357	\$2,722,638	\$3,150,931	\$4,591,817	\$5,380,414	\$7,970,335	\$9,943,693	\$11,596,772	\$12,935,521
Median	\$185,214	\$508,743	\$825,840	\$1,105,230	\$1,391,565	\$1,665,787	\$1,983,751	\$2,342,203	\$2,716,831	\$3,137,095	\$4,565,347	\$5,353,496	\$7,977,355	\$9,961,158	\$11,643,457	\$13,100,947
STDEV	\$25,444	\$59,374	\$92,258	\$113,923	\$143,055	\$166,170	\$199,631	\$227,974	\$243,222	\$259,066	\$301,757	\$388,250	\$712,368	\$910,293	\$879,230	\$818,095
MAD	\$19,725	\$44,296	\$71,455	\$88,379	\$108,287	\$123,577	\$154,488	\$178,277	\$188,905	\$200,191	\$227,434	\$290,051	\$576,846	\$732,044	\$704,988	\$640,723

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$187,457	\$491,155	\$790,028	\$1,066,487	\$1,352,179	\$1,606,635	\$1,914,572	\$2,280,702	\$2,636,346	\$3,013,801	\$4,165,312	\$4,912,366	\$7,619,730	\$9,920,474	\$12,152,484	\$13,583,328
Median	\$184,020	\$489,486	\$780,210	\$1,057,126	\$1,335,488	\$1,586,069	\$1,914,936	\$2,282,709	\$2,638,456	\$3,008,013	\$4,162,345	\$4,891,849	\$7,719,845	\$9,968,073	\$12,361,075	\$13,815,908
STDEV	\$25,277	\$57,486	\$89,194	\$118,598	\$152,833	\$168,668	\$190,675	\$211,999	\$210,015	\$208,619	\$240,063	\$327,680	\$656,328	\$860,513	\$1,016,602	\$1,025,367
MAD	\$20,560	\$45,019	\$71,150	\$90,429	\$114,539	\$128,605	\$146,043	\$163,481	\$162,948	\$164,889	\$200,643	\$283,185	\$537,649	\$688,071	\$865,955	\$867,749

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$71,201	\$207,462	\$317,893	\$383,367	\$430,118	\$477,643	\$537,362	\$608,470	\$673,873	\$736,596	\$985,568	\$1,182,265	\$2,062,462	\$2,874,229	\$3,695,008	\$4,383,389
Median	\$70,939	\$203,340	\$313,708	\$380,486	\$426,307	\$469,439	\$530,928	\$600,173	\$674,735	\$731,269	\$975,698	\$1,175,503	\$2,056,407	\$2,874,551	\$3,777,748	\$4,419,585
STDEV	\$11,687	\$27,792	\$42,141	\$49,298	\$56,626	\$65,656	\$72,853	\$79,812	\$86,757	\$92,763	\$129,409	\$184,254	\$372,049	\$423,260	\$411,317	\$381,213
MAD	\$9,053	\$21,916	\$34,905	\$40,196	\$44,848	\$50,650	\$56,543	\$61,878	\$66,473	\$70,576	\$101,587	\$145,990	\$299,992	\$349,149	\$339,009	\$312,886

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$71,319	\$203,932	\$305,310	\$369,150	\$415,650	\$463,136	\$525,055	\$598,411	\$664,417	\$719,033	\$929,304	\$1,142,451	\$2,163,579	\$3,247,869	\$4,429,266	\$5,113,968
Median	\$69,680	\$203,935	\$298,641	\$367,725	\$418,631	\$464,001	\$527,567	\$604,472	\$664,717	\$722,523	\$924,348	\$1,138,545	\$2,135,984	\$3,226,539	\$4,483,880	\$5,193,071
STDEV	\$12,663	\$29,571	\$45,485	\$54,387	\$61,814	\$68,765	\$80,177	\$89,672	\$94,681	\$98,167	\$137,917	\$184,263	\$363,527	\$490,113	\$570,472	\$567,570
MAD	\$9,578	\$23,483	\$37,788	\$43,681	\$49,302	\$52,562	\$59,542	\$67,310	\$72,422	\$75,719	\$108,796	\$141,973	\$288,647	\$416,215	\$483,313	\$479,021

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$45,138	\$110,875	\$179,596	\$249,173	\$343,795	\$394,763	\$462,458	\$542,686	\$633,038	\$729,419	\$953,635	\$1,027,816	\$1,311,242	\$1,497,347	\$1,681,522	\$1,849,102
Median	\$42,537	\$107,513	\$178,031	\$250,011	\$342,601	\$392,150	\$468,686	\$544,150	\$630,600	\$726,486	\$943,151	\$1,013,843	\$1,306,149	\$1,496,132	\$1,670,593	\$1,836,760
STDEV	\$14,808	\$30,210	\$43,732	\$62,592	\$91,586	\$96,596	\$105,816	\$115,773	\$121,530	\$123,033	\$118,803	\$122,150	\$172,845	\$187,829	\$225,391	\$211,842
MAD	\$9,779	\$23,791	\$35,094	\$47,779	\$73,217	\$75,177	\$79,529	\$85,795	\$90,816	\$92,088	\$93,450	\$98,933	\$138,624	\$152,189	\$170,051	\$163,330

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$47,287	\$107,807	\$162,683	\$227,570	\$311,456	\$355,050	\$416,464	\$483,132	\$546,505	\$605,007	\$735,395	\$785,910	\$1,029,539	\$1,195,080	\$1,436,754	\$1,648,190
Median	\$44,756	\$101,465	\$159,021	\$220,545	\$313,965	\$353,487	\$418,865	\$489,706	\$551,906	\$611,285	\$733,724	\$787,574	\$1,016,907	\$1,173,868	\$1,449,913	\$1,647,857
STDEV	\$17,780	\$31,190	\$41,389	\$60,277	\$95,159	\$101,652	\$106,352	\$109,455	\$105,788	\$99,796	\$96,824	\$99,932	\$128,110	\$150,172	\$179,746	\$161,712
MAD	\$11,346	\$23,108	\$31,397	\$47,817	\$79,211	\$84,352	\$87,292	\$89,442	\$85,865	\$79,765	\$77,851	\$81,754	\$99,554	\$116,357	\$145,961	\$129,172

Tezos (XTZ)



Asset:	Tezos
Ticker:	XTZ
Exchanges:	4
Trading Pairs:	8

Exchanges: Binance, Bitfinex, Coinbase, Kraken



Asset:	Tezos
Ticker:	XTZ
Exchange:	Binance
Trading Pairs:	3

Pairs: XTZ-USDT, XTZ-BTC, XTZ-BNB



Asset:	Tezos
Ticker:	XTZ
Exchange:	Coinbase
Trading Pairs:	2

Pairs: XTZ-USD, XTZ-BTC

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$15,409	\$47,939	\$89,967	\$136,074	\$187,961	\$245,630	\$312,256	\$390,824	\$470,871	\$548,775	\$988,739	\$1,160,371	\$1,634,447	\$2,042,739	\$2,391,779	\$2,776,116
Median	\$11,107	\$42,785	\$81,619	\$124,158	\$172,682	\$228,166	\$288,769	\$360,430	\$439,474	\$514,722	\$978,323	\$1,162,886	\$1,635,554	\$1,986,346	\$2,309,610	\$2,656,788
STDEV	\$14,680	\$23,115	\$31,386	\$39,785	\$49,100	\$61,752	\$75,972	\$90,416	\$99,315	\$107,848	\$140,884	\$153,690	\$255,934	\$389,870	\$483,214	\$608,570
MAD	\$7,702	\$14,097	\$21,395	\$27,855	\$36,312	\$46,828	\$59,472	\$72,707	\$80,207	\$87,578	\$113,626	\$128,485	\$204,826	\$289,543	\$350,150	\$438,738

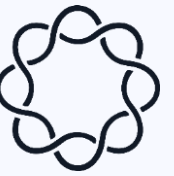
"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$15,280	\$45,180	\$79,262	\$117,695	\$162,866	\$213,395	\$273,147	\$341,055	\$412,216	\$480,256	\$807,822	\$956,556	\$1,512,019	\$2,073,326	\$2,600,989	\$3,060,771
Median	\$12,813	\$42,457	\$75,819	\$113,891	\$159,100	\$214,888	\$278,297	\$346,422	\$423,209	\$495,044	\$805,950	\$948,738	\$1,513,307	\$2,020,542	\$2,563,405	\$3,046,095
STDEV	\$8,479	\$15,017	\$22,365	\$29,053	\$38,466	\$49,082	\$62,068	\$77,353	\$90,758	\$101,407	\$129,366	\$140,005	\$235,742	\$257,899	\$274,931	\$312,171
MAD	\$6,449	\$11,717	\$16,697	\$22,013	\$29,643	\$37,477	\$48,251	\$60,961	\$72,002	\$79,865	\$99,286	\$108,866	\$183,847	\$208,290	\$219,217	\$242,265

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$3,864	\$15,316	\$29,746	\$43,351	\$56,752	\$67,854	\$78,144	\$90,303	\$104,370	\$118,464	\$225,147	\$275,202	\$460,756	\$651,452	\$802,406	\$941,880
Median	\$3,231	\$14,238	\$27,076	\$39,464	\$52,510	\$62,514	\$71,507	\$82,527	\$97,670	\$109,497	\$215,686	\$260,779	\$450,776	\$623,878	\$741,300	\$843,369
STDEV	\$2,758	\$6,791	\$11,157	\$14,979	\$19,294	\$24,294	\$29,320	\$34,889	\$38,453	\$41,487	\$61,124	\$74,456	\$135,085	\$254,691	\$337,323	\$382,955
MAD	\$1,544	\$4,409	\$7,012	\$9,223	\$11,546	\$14,259	\$17,046	\$20,355	\$22,984	\$25,586	\$45,095	\$59,368	\$108,645	\$164,598	\$213,936	\$253,219

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$5,013	\$17,505	\$28,847	\$38,719	\$50,557	\$63,740	\$77,814	\$91,981	\$106,923	\$121,014	\$195,058	\$239,631	\$447,615	\$683,075	\$879,552	\$1,075,936
Median	\$3,753	\$15,729	\$26,978	\$34,809	\$45,061	\$57,418	\$70,590	\$85,423	\$97,740	\$109,481	\$182,485	\$227,832	\$420,310	\$647,778	\$865,943	\$1,063,703
STDEV	\$3,773	\$7,313	\$9,829	\$13,055	\$18,120	\$22,629	\$26,254	\$29,511	\$33,402	\$36,496	\$62,505	\$72,608	\$115,366	\$143,661	\$151,786	\$167,058
MAD	\$2,398	\$5,169	\$6,872	\$9,565	\$13,191	\$16,505	\$19,090	\$21,336	\$23,899	\$26,250	\$45,037	\$52,907	\$89,931	\$114,367	\$121,891	\$132,673

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$5,126	\$14,492	\$27,671	\$44,676	\$66,787	\$96,492	\$132,873	\$173,787	\$213,637	\$250,350	\$381,150	\$424,319	\$532,927	\$622,097	\$691,470	\$768,722
Median	\$3,252	\$12,019	\$23,368	\$38,768	\$57,933	\$87,090	\$118,893	\$160,678	\$205,113	\$240,237	\$364,981	\$407,784	\$512,582	\$592,703	\$652,860	\$732,868
STDEV	\$7,045	\$12,270	\$16,553	\$21,979	\$28,290	\$37,324	\$47,137	\$54,521	\$57,508	\$59,770	\$65,906	\$73,838	\$101,451	\$127,293	\$150,105	\$174,201
MAD	\$3,267	\$6,303	\$10,593	\$15,577	\$21,383	\$28,698	\$36,280	\$41,763	\$43,968	\$45,827	\$51,034	\$57,187	\$78,251	\$99,230	\$117,140	\$132,825

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$4,864	\$12,406	\$22,516	\$35,773	\$52,404	\$71,530	\$95,084	\$121,821	\$148,681	\$173,946	\$258,818	\$286,300	\$415,073	\$548,002	\$659,361	\$752,362
Median	\$3,667	\$12,065	\$22,253	\$35,112	\$52,556	\$73,927	\$99,931	\$126,819	\$159,092	\$186,070	\$280,266	\$303,617	\$409,409	\$548,174	\$663,277	\$756,830
STDEV	\$3,453	\$5,975	\$9,559	\$13,417	\$18,117	\$24,877	\$32,941	\$41,861	\$48,248	\$52,950	\$73,364	\$80,603	\$121,324	\$141,785	\$148,319	\$146,531
MAD	\$2,403	\$4,562	\$7,491	\$10,345	\$14,175	\$20,031	\$26,748	\$34,009	\$39,163	\$42,698	\$60,074	\$65,876	\$95,579	\$112,930	\$115,635	\$111,184



Tezos (XTZ) (Continued)



Asset:	Tezos
Ticker:	XTZ
Exchange:	Kraken
Trading Pairs:	2

Pairs: XTZ-USD, XTZ-BTC



Asset:	Tezos
Ticker:	XTZ
Exchange:	Bitfinex
Trading Pairs:	1

Pairs: XTZ-USD

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$5,299	\$14,634	\$26,144	\$38,421	\$50,338	\$61,628	\$74,902	\$91,899	\$108,714	\$124,489	\$223,170	\$258,351	\$327,572	\$386,825	\$433,985	\$509,661
Median	\$2,741	\$11,375	\$21,152	\$33,259	\$46,742	\$55,438	\$66,166	\$80,626	\$97,148	\$114,239	\$224,010	\$254,241	\$322,240	\$388,826	\$446,897	\$492,396
STDEV	\$11,071	\$13,017	\$16,084	\$19,656	\$23,407	\$27,668	\$32,166	\$35,807	\$38,006	\$39,696	\$38,622	\$36,059	\$54,275	\$62,656	\$65,410	\$107,844
MAD	\$4,614	\$6,995	\$9,895	\$12,612	\$14,737	\$17,811	\$21,807	\$25,957	\$28,311	\$29,931	\$29,822	\$28,447	\$45,368	\$51,579	\$54,094	\$81,498

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$3,927	\$11,559	\$21,624	\$33,945	\$46,241	\$58,152	\$71,877	\$87,858	\$105,343	\$122,051	\$198,636	\$226,763	\$301,410	\$394,361	\$494,079	\$585,175
Median	\$2,654	\$10,183	\$20,039	\$33,762	\$45,471	\$58,380	\$73,518	\$91,423	\$111,161	\$125,699	\$198,538	\$222,366	\$292,718	\$384,955	\$493,522	\$565,944
STDEV	\$5,174	\$6,439	\$9,051	\$11,507	\$14,420	\$18,141	\$22,492	\$27,237	\$31,238	\$33,748	\$35,632	\$38,204	\$69,020	\$92,403	\$101,186	\$116,135
MAD	\$2,574	\$4,080	\$6,019	\$8,235	\$10,904	\$13,819	\$17,586	\$21,585	\$24,847	\$26,540	\$28,693	\$31,276	\$53,812	\$73,159	\$74,921	\$84,897

"Dumping" Manipulation (Bid)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$1,120	\$3,497	\$6,405	\$9,625	\$14,085	\$19,656	\$26,337	\$34,835	\$44,149	\$55,473	\$159,272	\$202,499	\$313,193	\$382,366	\$463,918	\$555,853
Median	\$732	\$2,975	\$5,312	\$8,407	\$12,347	\$16,120	\$22,468	\$32,216	\$41,490	\$54,074	\$159,416	\$194,651	\$291,005	\$361,999	\$439,198	\$567,353
STDEV	\$1,518	\$2,875	\$4,997	\$5,792	\$7,526	\$10,199	\$12,990	\$15,806	\$18,614	\$20,669	\$28,183	\$37,158	\$73,258	\$80,508	\$96,449	\$115,053
MAD	\$793	\$1,564	\$2,619	\$3,348	\$4,363	\$6,180	\$8,285	\$10,680	\$13,150	\$15,148	\$21,930	\$28,099	\$55,206	\$63,135	\$81,867	\$102,906

"Pumping" Manipulation (Ask)																
	0.10%	0.20%	0.30%	0.40%	0.50%	0.60%	0.70%	0.80%	0.90%	1%	1.50%	2%	4%	6%	8%	10%
Mean	\$1,476	\$3,711	\$6,275	\$9,258	\$13,664	\$19,973	\$28,373	\$39,395	\$51,270	\$63,245	\$155,311	\$203,861	\$347,921	\$447,887	\$567,997	\$647,298
Median	\$818	\$2,761	\$5,014	\$7,242	\$11,219	\$16,963	\$25,237	\$37,340	\$49,592	\$63,793	\$153,344	\$187,908	\$324,716	\$438,867	\$566,666	\$615,104
STDEV	\$3,042	\$4,506	\$6,169	\$8,326	\$11,347	\$15,125	\$18,868	\$23,310	\$28,173	\$31,326	\$43,486	\$52,848	\$85,267	\$103,635	\$119,544	\$137,027
MAD	\$1,372	\$2,259	\$3,204	\$4,357	\$6,230	\$8,514	\$11,202	\$15,175	\$18,934	\$20,885	\$29,753	\$38,659	\$67,554	\$82,704	\$95,872	\$113,215



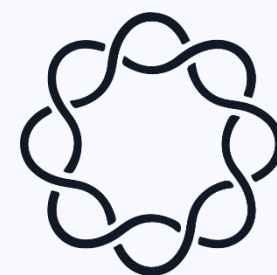
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