

Bitcoin Exchanges

Jeremy Choquette
Clemson University

Gerald P. Dwyer
Clemson University

Kyle Rechard
Clemson University

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Abstract

Besides being an innovation in itself, Bitcoin has resulted in the creation of well over 100 exchanges on which Bitcoins can be traded for various currencies. These exchanges often make it possible to exchange bitcoins for multiple currencies, which makes it possible for exchange participants to exchange currencies. This is difficult to do elsewhere. Trading on these exchanges is not limited to parties such as brokers or dealers, with anyone allowed to participate after the identity checks necessary in some countries. Trading is open 24/7 every day of the year. One purpose of this paper is to examine this innovative market structure compared to the use of brokers and dealers. We also will examine the markets' efficiency at reflecting information and at executing trades.

Bitcoin exchanges also are different from typical exchanges such as stock exchanges because they are not regulated in the same way that stock exchanges are regulated. The regulations that apply have more in common with eBay than with stock exchanges. Nonetheless, Bitcoin exchanges are asset exchanges. One purpose of this paper is examine the costs and benefits of this unregulated structure.

We have downloaded data on all trades including price and volume information for all exchanges available at <http://api.bitcoincharts.com/v1/csv/>. A basic summary of these data is presented in Table 1 for the 223 exchanges available there. We will update these data after 1/1/2018. These data go through January 12, 2017. We are supplementing this with additional information. Some exchanges stopped reporting prices and trades to this source but continued in operation and we are organizing that information. In addition, there is some information available for some other exchanges and we are collecting that.

Second, these "exchanges" include LocalBitcoins, which are more similar to Craigslist than an exchange. The exchanges operate as one might expect. A person who wants to trade on an exchange transfers currency (possibly including cryptocurrency) to the exchange's accounts. Then the trader can buy and sell based on the value of various assets at the exchange. These exchanges are initiated over the

Internet and require no physical presence in any particular location to trade. There is little short selling possible on these exchanges.

On LocalBitcoins, buyers and sellers advertise bid and ask prices at various locations around the world. Often a person will be both a buyer and a seller, and we call these people “traders.” A purchase from a trader can be executed in person or can be executed by a deposit into a bank account controlled by the trades which is followed by the trader transferring cryptocurrency to the buyer. Sales generally are in person because execution without personal contact would require the seller to transfer the cryptocurrency to the trader and then provide bank information to make a transfer of funds to the seller. This would require an extraordinary level of trust in a stranger.

Table 1 shows the volume and number of trades on the exchanges and the dates for which we have data on prices. Bid-ask spreads differ across exchanges and especially between LocalBitcoins and the exchanges. We will summarize these data. Furthermore, prices differ across exchanges and we will examine the relationship between these prices. While there are reports of arbitrage by some agents, especially given the level of prices now over \$10,000, the prevalence and importance of it is not apparent.

Table 2 shows the currencies and cryptocurrencies traded on each of the exchanges plus LocalBitcoins and the number of exchanges that traded a currency for some period. (We apologize for only having ISO codes in the table but we are in the process of organizing the data.)

We are putting together graphs for the exchanges which will show the development of the exchanges.

A natural question is the informational efficiency of these exchanges. We did some preliminary calculations using an index of daily prices from the online publication CoinDesk (<https://www.coindesk.com/api/>) and found that daily prices are well approximated by a random walk. Figure 1 shows these daily prices from July 18, 2010 to December 25, 2017 on a linear and a log scale. Both are informative.

A related question to efficiency is the volatility of prices. Much has been made of Bitcoin’s volatility. When prices change from \$.05 to \$16,000, volatility inevitably will be high. In fact, the variance of the log level is simply the squared difference between the log of the price at the end and the start of the period divided by the length of the period and variance inevitably partly reflects the increase in the level over the whole period or a sub-period.

A local level model (J. Durbin and S. J. Koopman, *Time Series Analysis by State Space Methods*) is one possible route to separating variance due to changes in the level of prices and variance due to trading and transitory information. We are pursuing this and a comparison with a Beveridge-Nelson decomposition.

Some emphasize the use of Bitcoin for illegal purchase of drugs and similar activities such as avoidance of capital controls. We have data on the physical locations of exchanges in most cases and will use this in conjunction with data on data we have on money laundering rules in different countries to see if there are any general effects of such rules on the exchanges.

Related Literature

A review of the literature is in progress. The pertinent papers include

Brandvold, Morten, Peter Molnár, Kristian Vagstad and Ole Christian Andreas Valstad. 2015. "Price Discovery on Bitcoin Exchanges." *Journal of International Financial Markets, Institutions and Money* 36, 18-35.

Ciaian, Pavel, Miroslava Rajcaniova and d'Artis Kancs. 2016. "The Economics of Bitcoin Price Formation." *Applied Economics* 48 (19), 1799-1815.

Garcia, David and Frank Schweitzer. 2015. "Social Signals and Algorithmic Trading of Bitcoins." *Royal Society Open Science*.

Gronwald, Marc. 2014. "The Economics of Bitcoins – Market Characteristics and Price Jumps."

Moore, Tyler and Nicolas Cristin, 2013. Beware the Middleman: Empirical Analysis of Bitcoin-exchange Risk. In *Financial Cryptography*, volume 7859 of *Lecture Notes in Computer Science*, edited by Ahmad Reza Sadeghi, pp. 25-33. Berlin: Springer.

Pieters, Gina, and Sofia Vivanco. 2017. "Financial Regulations and Price Inconsistencies across Bitcoin Markets."

Reiffen, David, and Michel Robe. 2011. "Demutualization and Consumer Protection at Self-Regulatory Financial Exchanges." *Journal of Futures Markets*.

Table 1
Exchanges, Currency and Trading

Exchange Name and Currency	Currency	Volume of Trading	Number of Trades	Trades per Day	Trades per Hour	Date First Trade	Date Last Trade	Days of Available Prices
1coinUSD	USD	231758.3	764732	1954.7	8.145	3/9/2014	4/4/2015	391
anxhkAUD	AUD	456813.6	634515	1013.2	4.222	1/22/2014	10/10/2015	626
anxhkCAD	CAD	456591.7	634351	1156.7	4.819	4/10/2014	10/10/2015	548
anxhkCHF	CHF	245976.7	142530	411.0	1.713	3/6/2014	2/16/2015	347
anxhkCNY	CNY	462761.2	636952	885.0	3.688	10/20/2013	10/10/2015	720
anxhkEUR	EUR	457111.3	634811	1050.6	4.377	2/13/2014	10/10/2015	604
anxhkGBP	GBP	456478.0	634428	986.7	4.111	1/5/2014	10/10/2015	643
anxhkHKD	HKD	588219.9	661315	837.0	3.487	8/11/2013	10/10/2015	790
anxhkJPY	JPY	456448.6	634377	1092.1	4.550	3/8/2014	10/10/2015	581
anxhkNZD	NZD	458497.7	641374	1082.4	4.510	2/27/2014	10/13/2015	593
anxhkSGD	SGD	456403.5	634280	995.4	4.147	1/11/2014	10/10/2015	637
anxhkUSD	USD	460121.8	640825	820.4	3.418	8/20/2013	10/10/2015	781
aqoinEUR	EUR	862.7	205	2.7	0.011	9/2/2011	11/17/2011	76
b2cUSD	USD	5177.9	366	1.2	0.005	4/1/2011	1/21/2012	295
b7BGN	BGN	53009.5	5492	48.5	0.202	6/14/2011	10/5/2011	113
b7EUR	EUR	6688.6	1997	17.7	0.074	6/14/2011	10/5/2011	113
b7PLN	PLN	53009.5	5492	48.5	0.202	6/14/2011	10/5/2011	113
b7SAR	SAR	53009.5	5492	48.5	0.202	6/14/2011	10/5/2011	113
b7USD	USD	53009.5	5492	48.5	0.202	6/14/2011	10/5/2011	113
bbmBRL	BRL	11.6	15	0.2	0.001	9/10/2011	11/10/2011	61
bcEUR	EUR	244356.3	125983	79.4	0.331	1/6/2011	5/11/2015	1586
bcGBP	GBP	4942.8	627	3.4	0.014	10/24/2012	4/24/2013	182
bcLREUR	EUR	4219.8	93	0.4	0.002	1/4/2011	8/19/2011	227
bcLRUSD	USD	18754.2	437	1.9	0.008	12/31/2010	8/19/2011	231
bcmBMGAU	GAU	18.3	1	Inf	Inf	8/1/2011	8/1/2011	0
bcmBMUSD	USD	1410.4	230	1.3	0.005	2/4/2011	8/6/2011	183
bcmLRUSD	USD	356950.2	373	0.9	0.004	6/4/2010	8/3/2011	425
bcmMBUSD	USD	631.2	136	1.5	0.006	5/21/2011	8/19/2011	90
bcmPPUSD	USD	745915.7	2889	7.1	0.030	4/25/2010	6/5/2011	406
bcmPXGAU	GAU	75410.0	85	0.2	0.001	6/3/2010	8/15/2011	438
bcPGAU	GAU	3551.7	35	0.3	0.001	2/2/2011	6/13/2011	131
bidxtrmPLN	PLN	540.5	2104	21.5	0.089	8/12/2013	11/18/2013	98
bit121GBP	GBP	591.2	994	6.6	0.027	10/26/2013	3/26/2014	151
bit2cILS	ILS	24651.8	38116	27.2	0.114	3/15/2013	1/12/2017	1399
bitaloEUR	EUR	206.5	332	0.8	0.003	11/30/2013	1/29/2015	425
bitaloGBP	GBP	0.6	5	0.0	0.000	12/25/2013	7/15/2014	202
bitaloPLN	PLN	1.6	12	0.1	0.000	12/5/2013	3/21/2014	106
bitaloUSD	USD	2.4	7	0.0	0.000	3/3/2014	8/5/2014	155
bitbayEUR	EUR	3221.1	13302	20.0	0.083	3/17/2015	1/12/2017	667
bitbayPLN	PLN	484091.8	905855	888.1	3.701	3/29/2014	1/12/2017	1020
bitbayUSD	USD	9386.8	76969	79.2	0.330	5/16/2014	1/12/2017	972
bitboxUSD	USD	2751.5	1125	8.0	0.033	5/7/2013	9/25/2013	141

bitcashCZK	CZK	1754.5	1058	10.1	0.042	7/29/2013	11/11/2013	105
bitchangePLN	PLN	31533.4	8508	101.5	0.423	8/6/2011	10/28/2011	83
bitcurexEUR	EUR	123030.2	544187	350.8	1.462	7/16/2012	10/14/2016	1551
bitcurexPLN	PLN	599055.7	1490768	1010.1	4.209	7/24/2012	8/8/2016	1476
bitcurexUSD	USD	2580.4	3281	18.5	0.077	4/20/2016	10/14/2016	177
bitfinexUSD	USD	25621078.8	10096252	7510.5	31.294	3/31/2013	12/5/2016	1345
bitfloorUSD	USD	417028.6	200213	607.9	2.533	5/23/2012	4/17/2013	329
bitkonanUSD	USD	11943.3	107554	83.4	0.347	7/2/2013	1/12/2017	1290
bitmarketAUD	AUD	998.5	116	0.2	0.001	6/18/2011	10/3/2012	473
bitmarketEUR	EUR	154218.8	14355	NA	NA	4/6/2011	NA	NA
bitmarketGBP	GBP	2537.5	614	4.1	0.017	4/6/2011	9/2/2011	149
bitmarketPLN	PLN	3758.5	310	0.5	0.002	4/5/2011	2/16/2013	683
bitmarketpIPLN	PLN	348697.7	855171	816.1	3.400	3/1/2014	1/12/2017	1048
bitmarketRUB	RUB	17.0	6	0.0	0.000	6/22/2011	10/24/2011	124
bitmarketUSD	USD	18055.8	2867	4.9	0.020	5/18/2011	12/20/2012	582
bitmeLTC	LTC	2.0	13	0.5	0.002	10/31/2013	11/28/2013	28
bitmeUSD	USD	23981.1	3736	14.2	0.059	7/8/2012	3/28/2013	263
bitnzNZD	NZD	32063.9	31125	16.0	0.067	9/12/2011	1/12/2017	1949
bitomatPLN	PLN	100065.7	36968	280.1	1.167	4/1/2011	8/11/2011	132
bitstampUSD	USD	18350466.6	10379674	5328.4	22.202	9/13/2011	1/12/2017	1948
bitstockCZK	CZK	2401.8	6171	12.2	0.051	12/23/2013	5/11/2015	504
bitxZAR	ZAR	64103.4	366674	300.0	1.250	9/8/2013	1/12/2017	1222
britcoinGBP	GBP	91350.9	14417	83.7	0.349	3/30/2011	9/19/2011	173
btc24EUR	EUR	806175.3	240871	284.2	1.184	5/9/2012	9/4/2014	848
btc24USD	USD	15950.8	5661	17.0	0.071	5/14/2012	4/13/2013	334
btc2uBRL	BRL	9977.5	27443	58.6	0.244	10/21/2013	2/2/2015	469
btcdeEUR	EUR	1612550.3	703033	357.5	1.490	8/26/2011	1/12/2017	1966
btceEUR	EUR	212076.9	845753	552.1	2.300	11/2/2012	1/12/2017	1532
btceRUR	RUR	622099.2	1792342	1113.8	4.641	8/17/2012	1/12/2017	1609
btceurEUR	EUR	2414.8	44003	171.4	0.714	1/4/2014	9/18/2014	257
btceUSD	USD	13959353.6	28996679	14659.7	61.082	8/14/2011	1/12/2017	1978
btcesxEUR	EUR	2293.8	93	0.8	0.003	1/18/2011	5/11/2011	113
btcesxJPY	JPY	33.1	20	0.2	0.001	12/1/2010	3/5/2011	94
btcesxRUB	RUB	60525.8	479	2.0	0.008	9/14/2010	5/12/2011	240
btcesxUSD	USD	261262.1	10280	19.3	0.080	2/4/2011	7/22/2012	534
btcesxWMR	WMR	8625.4	468	2.5	0.010	11/12/2010	5/22/2011	191
btcesxWMZ	WMZ	3343.8	360	2.6	0.011	12/23/2010	5/11/2011	139
btcesxYAD	YAD	21579.4	993	6.6	0.028	12/13/2010	5/12/2011	150
btchkexHKD	HKD	121.0	228	5.8	0.024	6/1/2013	7/10/2013	39
btcmarketsAUD	AUD	177647.0	204848	166.4	0.693	8/30/2013	1/12/2017	1231
btcnCNY	CNY	243847571.6	107000249	52441.6	218.507	6/13/2011	1/12/2017	2040
btcoiIDR	IDR	447274.8	1565189	1466.1	6.109	2/9/2014	1/12/2017	1068
btctreeUSD	USD	5231.5	578	8.3	0.034	5/2/2012	7/11/2012	70

btcxchangeRON	RON	5297.1	8908	20.6	0.086	12/17/2013	2/23/2015	433
cbxUSD	USD	666796.2	290495	150.3	0.626	7/5/2011	10/19/2016	1933
coinbaseCAD	CAD	34493.1	152873	459.1	1.913	8/31/2015	7/29/2016	333
coinbaseEUR	EUR	271487.7	1302825	2196.4	9.151	4/23/2015	12/6/2016	593
coinbaseGBP	GBP	67289.4	301472	507.3	2.114	4/21/2015	12/6/2016	595
coinbaseUSD	USD	5065942.7	11991811	16292.9	67.887	12/1/2014	12/6/2016	736
coincheckJPY	JPY	1647553.4	1441034	1791.6	7.465	10/31/2014	1/12/2017	804
coinfloorGBP	GBP	252569.9	115961	113.7	0.474	3/29/2014	1/12/2017	1020
cotrUSD	USD	28866.8	25836	33.5	0.140	12/21/2013	1/31/2016	771
cryptoxAUD	AUD	105671.5	6809	18.4	0.077	11/15/2011	11/19/2012	370
cryptoxUSD	USD	222165.9	19950	53.2	0.222	11/10/2011	11/19/2012	375
crytrEUR	EUR	505.1	2329	5.8	0.024	6/8/2013	7/15/2014	402
crytrUSD	USD	5476.5	19388	46.7	0.195	5/27/2013	7/16/2014	415
exchbUSD	USD	67798.1	31824	258.2	1.076	6/15/2011	10/16/2011	123
exmoEUR	EUR	3334.3	6155	25.7	0.107	4/19/2016	12/14/2016	239
exmoRUB	RUB	9406.5	79992	335.6	1.399	4/20/2016	12/14/2016	238
exmoUSD	USD	5963.9	33061	135.2	0.563	4/14/2016	12/14/2016	244
fbtcEUR	EUR	9007.6	2236	18.7	0.078	6/23/2013	10/21/2013	120
fbtcUSD	USD	3986.5	1049	8.9	0.037	6/25/2013	10/20/2013	117
freshPLN	PLN	78.9	125	5.4	0.022	8/11/2011	9/3/2011	23
fybseSEK	SEK	14971.1	50046	39.2	0.163	7/15/2013	1/13/2017	1278
fybsgSGD	SGD	14363.1	18545	12.6	0.053	1/7/2013	1/12/2017	1466
globalEUR	EUR	37.0	3	0.3	0.001	9/26/2011	10/5/2011	9
globalGBP	GBP	62.0	12	0.3	0.001	9/26/2011	11/2/2011	37
globalPLN	PLN	202.0	29	0.3	0.001	9/26/2011	1/1/2012	97
globalUSD	USD	1031.9	136	11.9	0.050	9/26/2011	10/7/2011	11
hitbtcEUR	EUR	259599.6	600981	545.8	2.274	1/7/2014	1/12/2017	1101
hitbtcUSD	USD	400188.1	1016170	913.7	3.807	12/27/2013	1/12/2017	1112
ibwtEUR	EUR	0.6	12	0.0	0.000	10/20/2014	8/30/2015	314
ibwtGBP	GBP	122.3	191	0.3	0.001	5/23/2014	1/5/2016	592
ibwtLTC	LTC	-29.7	44	0.1	0.000	7/7/2014	8/30/2015	419
ibwtUSD	USD	-158.1	30	0.1	0.000	9/28/2014	11/4/2015	402
icbitUSD	USD	400086.4	7916	9.9	0.041	3/18/2012	5/23/2014	796
imcexEUR	EUR	65.1	174	0.4	0.002	7/9/2011	9/21/2012	440
imcexUSD	USD	908.1	781	1.7	0.007	7/17/2011	10/14/2012	455
intrsngEUR	EUR	460881.2	62375	64.8	0.270	7/14/2011	3/3/2014	963
intrsngGBP	GBP	876066.7	91025	101.2	0.422	9/16/2011	3/4/2014	900
intrsngPLN	PLN	54428.4	12084	20.1	0.084	10/26/2011	6/19/2013	602
intrsngUSD	USD	164133.7	23280	50.9	0.212	7/21/2011	10/20/2012	457
itbitEUR	EUR	560325.8	191904	166.6	0.694	11/17/2013	1/12/2017	1152
itbitSGD	SGD	414343.8	114292	99.3	0.414	11/18/2013	1/12/2017	1151
itbitUSD	USD	3766391.7	826775	668.7	2.786	8/25/2013	1/12/2017	1236
justEUR	EUR	8491.3	29635	67.2	0.280	8/14/2013	10/29/2014	441

justLTC	LTC	1635.2	19349	35.3	0.147	4/29/2013	10/29/2014	548
justNOK	NOK	13097.6	37532	73.5	0.306	6/6/2013	10/29/2014	510
justUSD	USD	2083.8	20056	54.3	0.226	10/25/2013	10/29/2014	369
justXRP	XRP	6089.0	33188	59.5	0.248	4/19/2013	10/29/2014	558
korbitKRW	KRW	172338.3	147504	248.3	1.035	9/3/2013	4/20/2015	594
kptnSEK	SEK	96806.5	50957	60.5	0.252	4/19/2012	8/9/2014	842
krakenCAD	CAD	32606.1	47460	153.4	0.639	3/9/2016	1/12/2017	309
krakenEUR	EUR	3997788.0	4475025	4067.5	16.948	1/8/2014	1/12/2017	1100
krakenKRW	KRW	220.5	498	1.9	0.008	12/7/2013	8/30/2014	266
krakenLTC	LTC	27352.1	181523	196.5	0.819	1/7/2014	7/19/2016	924
krakenNMC	NMC	794.3	13641	15.7	0.065	1/2/2014	5/22/2016	871
krakenUSD	USD	516380.6	579060	526.0	2.192	1/7/2014	1/12/2017	1101
krakenXRP	XRP	15671.8	61365	66.2	0.276	1/4/2014	7/19/2016	927
lakeUSD	USD	2110322.5	3581327	7089.2	29.538	3/1/2014	7/19/2015	505
localbtcARS	ARS	13417.1	15629	11.5	0.048	4/19/2013	1/12/2017	1364
localbtcAUD	AUD	220235.2	155222	110.7	0.461	3/11/2013	1/12/2017	1403
localbtcBRL	BRL	9789.6	13118	9.4	0.039	3/18/2013	1/12/2017	1396
localbtcCAD	CAD	53112.5	70822	50.5	0.210	3/12/2013	1/12/2017	1402
localbtcCHF	CHF	11826.5	7593	5.5	0.023	4/7/2013	1/12/2017	1376
localbtcCZK	CZK	4738.7	6295	4.6	0.019	4/10/2013	1/12/2017	1373
localbtcDKK	DKK	1383.0	3898	2.9	0.012	4/19/2013	1/11/2017	1363
localbtcEUR	EUR	237018.2	248636	177.3	0.739	3/12/2013	1/12/2017	1402
localbtcGBP	GBP	641565.0	736208	524.9	2.187	3/11/2013	1/12/2017	1403
localbtcHKD	HKD	15690.1	4124	3.0	0.012	4/3/2013	1/12/2017	1380
localbtcILS	ILS	77.9	140	0.1	0.000	3/18/2013	1/10/2017	1394
localbtcINR	INR	29772.5	62382	44.7	0.186	3/20/2013	1/12/2017	1394
localbtcMXN	MXN	16812.5	40007	28.5	0.119	3/11/2013	1/12/2017	1403
localbtcNOK	NOK	16133.6	19825	14.1	0.059	3/12/2013	1/12/2017	1402
localbtcNZD	NZD	14874.7	18218	13.0	0.054	3/13/2013	1/12/2017	1401
localbtcPLN	PLN	7454.3	7241	5.6	0.023	6/24/2013	1/12/2017	1298
localbtcRUB	RUB	364822.2	1502895	1084.1	4.517	3/28/2013	1/12/2017	1386
localbtcSEK	SEK	52878.4	111822	79.8	0.332	3/12/2013	1/12/2017	1402
localbtcSGD	SGD	5495.1	6663	4.8	0.020	3/23/2013	1/12/2017	1391
localbtcTHB	THB	43394.4	26498	19.1	0.080	3/25/2013	1/12/2017	1389
localbtcUSD	USD	1819027.6	1873643	1336.0	5.567	3/11/2013	1/12/2017	1403
localbtcZAR	ZAR	91768.5	144343	108.6	0.453	5/24/2013	1/12/2017	1329
lybitCAD	CAD	9718.0	5580	41.6	0.173	1/27/2013	6/10/2013	134
lybitUSD	USD	346.7	83	0.6	0.003	1/29/2013	6/8/2013	130
mrcdBRL	BRL	162169.6	386106	193.5	0.806	7/28/2011	1/12/2017	1995
mtgoxAUD	AUD	561860.1	133394	147.1	0.613	9/2/2011	2/25/2014	907
mtgoxCAD	CAD	154268.0	36127	41.0	0.171	9/27/2011	2/25/2014	882
mtgoxCHF	CHF	27459.6	8670	9.6	0.040	9/3/2011	2/25/2014	906
mtgoxCNY	CNY	10547.7	5107	5.6	0.023	9/2/2011	2/25/2014	907

mtgoxDKK	DKK	4555.5	2178	2.4	0.010	9/6/2011	2/24/2014	902
mtgoxEUR	EUR	3181047.3	953470	1044.6	4.353	8/27/2011	2/25/2014	913
mtgoxGBP	GBP	1221769.4	287183	318.1	1.325	9/6/2011	2/25/2014	903
mtgoxHKD	HKD	9030.3	2324	2.7	0.011	10/4/2011	2/25/2014	875
mtgoxJPY	JPY	665986.2	176211	193.1	0.804	8/27/2011	2/25/2014	913
mtgoxNZD	NZD	10634.2	3628	4.1	0.017	9/27/2011	2/25/2014	882
mtgoxPLN	PLN	350459.1	127115	140.2	0.584	9/2/2011	2/25/2014	907
mtgoxRUB	RUB	40306.8	5842	6.5	0.027	9/11/2011	2/24/2014	897
mtgoxSEK	SEK	32883.7	11188	12.4	0.052	9/4/2011	2/25/2014	905
mtgoxSGD	SGD	12439.0	3332	3.7	0.016	9/18/2011	2/24/2014	890
mtgoxTHB	THB	1826.8	958	1.1	0.005	10/13/2011	2/21/2014	862
mtgoxUSD	USD	55575353.1	8295809	6293.7	26.224	7/17/2010	2/25/2014	1319
okcoinCNY	CNY	337727036.1	993363534	758373.8	3159.891	6/12/2013	1/12/2017	1310
rippleEUR	EUR	14.8	223	0.4	0.002	2/28/2013	11/3/2014	613
rippleUSD	USD	7361.0	51701	81.8	0.341	2/10/2013	11/4/2014	632
rippleXRP	XRP	84897.5	333563	528.3	2.201	2/11/2013	11/4/2014	631
rmbtbCNY	CNY	102101.7	165399	795.1	3.313	5/22/2013	12/16/2013	208
rockEUR	EUR	237293.2	472795	250.0	1.042	11/9/2011	1/12/2017	1891
rockSLL	SLL	25599.5	3949	4.7	0.020	6/11/2011	9/23/2013	835
rockUSD	USD	25012.3	74258	39.3	0.164	11/12/2011	1/12/2017	1888
ruxumAUD	AUD	279.2	60	1.1	0.005	8/24/2011	10/16/2011	53
ruxumCHF	CHF	710.3	107	1.5	0.006	8/10/2011	10/19/2011	70
ruxumEUR	EUR	569.7	123	0.4	0.002	8/10/2011	6/1/2012	296
ruxumGBP	GBP	675.1	115	1.7	0.007	8/10/2011	10/16/2011	67
ruxumHKD	HKD	781.4	141	1.9	0.008	8/3/2011	10/16/2011	74
ruxumHUF	HUF	182.1	48	0.7	0.003	8/24/2011	10/28/2011	65
ruxumJPY	JPY	940.2	121	1.6	0.007	8/3/2011	10/19/2011	77
ruxumPLN	PLN	466.0	112	1.7	0.007	8/10/2011	10/14/2011	65
ruxumRUB	RUB	330.8	64	1.1	0.005	8/24/2011	10/21/2011	58
ruxumSEK	SEK	143.2	17	0.4	0.002	9/11/2011	10/19/2011	38
ruxumSGD	SGD	518.0	103	1.4	0.006	8/3/2011	10/16/2011	74
ruxumTHB	THB	810.0	121	1.7	0.007	8/4/2011	10/13/2011	70
ruxumUAH	UAH	112.0	16	0.5	0.002	9/11/2011	10/16/2011	35
ruxumUSD	USD	9564.5	2040	4.6	0.019	6/30/2011	9/12/2012	440
ruxumZAR	ZAR	151.8	23	0.6	0.002	9/10/2011	10/19/2011	39
snwcnXRP	XRP	27.6	50	2.7	0.011	4/19/2013	5/8/2013	19
thAUD	AUD	21174.0	2136	9.6	0.040	7/4/2011	2/12/2012	223
thCLP	CLP	2421.1	661	2.6	0.011	6/9/2011	2/13/2012	249
thEUR	EUR	46602.7	5839	28.2	0.118	7/21/2011	2/13/2012	207
thINR	INR	1397.9	376	1.7	0.007	6/22/2011	1/30/2012	222
thLRUSD	USD	14074.0	2337	9.4	0.039	6/10/2011	2/13/2012	248
thUSD	USD	1184918.0	159159	636.4	2.652	6/8/2011	2/13/2012	250
vcxEUR	EUR	694.2	5077	2.8	0.012	1/22/2012	1/6/2017	1811

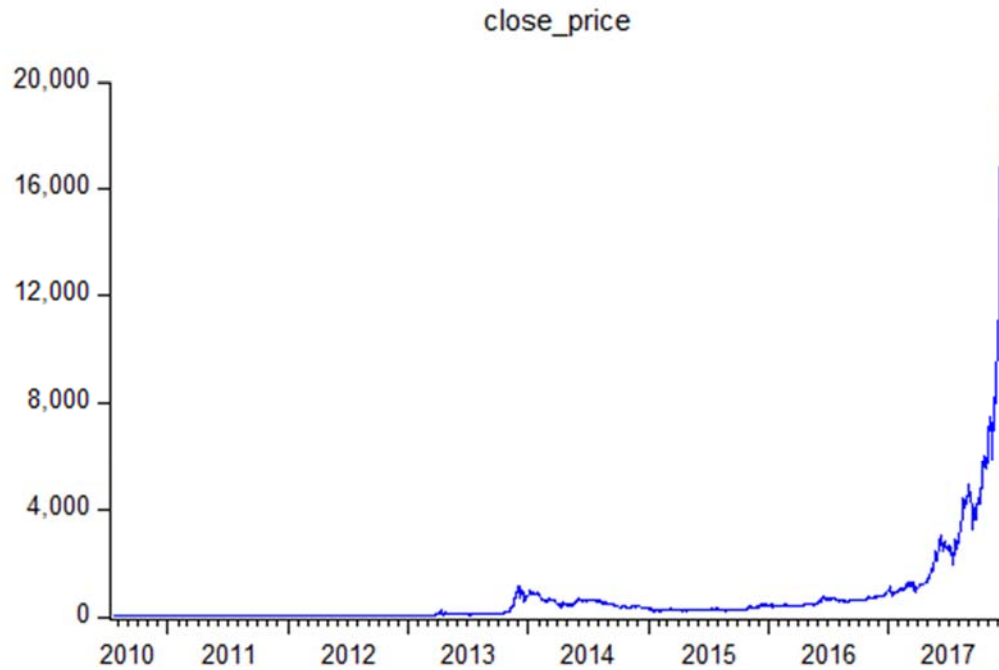
vcxUSD	USD	8485.6	74765	40.6	0.169	12/25/2011	1/10/2017	1843
virtexCAD	CAD	965734.1	257780	152.1	0.634	6/8/2011	1/27/2016	1694
virwoxSLL	SLL	1413251.9	1368333	657.1	2.738	4/27/2011	1/7/2017	2082
wbxAUD	AUD	41806.6	1800	1.9	0.008	8/15/2011	2/25/2014	925
weexAUD	AUD	1883.7	639	0.8	0.003	10/27/2011	11/27/2013	762
weexCAD	CAD	169.3	30	0.1	0.000	10/9/2012	11/19/2013	406
weexUSD	USD	569.3	163	0.3	0.001	6/1/2012	11/26/2013	543
zyadoEUR	EUR	471179.5	3027791	3054.3	12.726	4/24/2014	1/10/2017	992

Table 2
Currencies and Number of Exchanges

Currency	Number of Exchanges
USD	51
CNY	5
EUR	34
AUD	10
GBP	14
HKD	5
JPY	5
NZD	4
SGD	6
BGN	1
PLN	15
SAR	1
BRL	4
GAU	3
ILS	2
CZK	3
LTC	4
ZAR	3
RUR	1
RUB	6
WMR	1
WMZ	1
YAD	1
IDR	1
RON	1
SEK	5
NOK	2
KRW	2
NMC	1
XRP	4
ARS	1
DKK	2
INR	2
MXN	1
THB	3
SLL	2
HUF	1
UAH	1
CLP	1
CAD	8
CHF	4
SLL	2

This table shows the ISO-3 codes for the currencies and the agreed 3-letter codes for the cryptocurrencies traded with the number exchanges trading the currency or cryptocurrency.

Figure 1
Daily Bitcoin Price Index
July 18, 2010 to December 25, 2017
Linear



Logarithm

