Network Effects in Cryptocurrency Market: Speculative vs Transactional Demand

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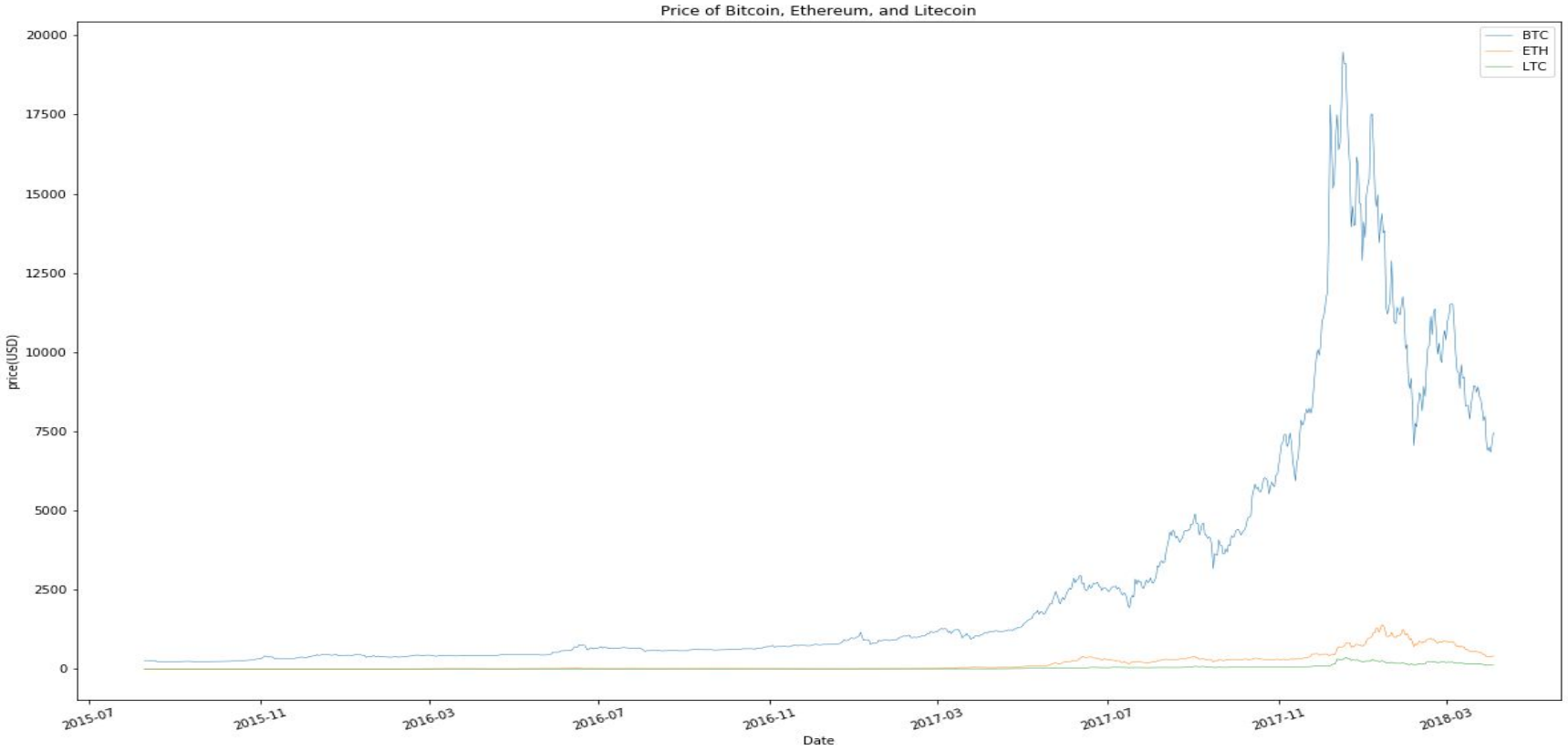
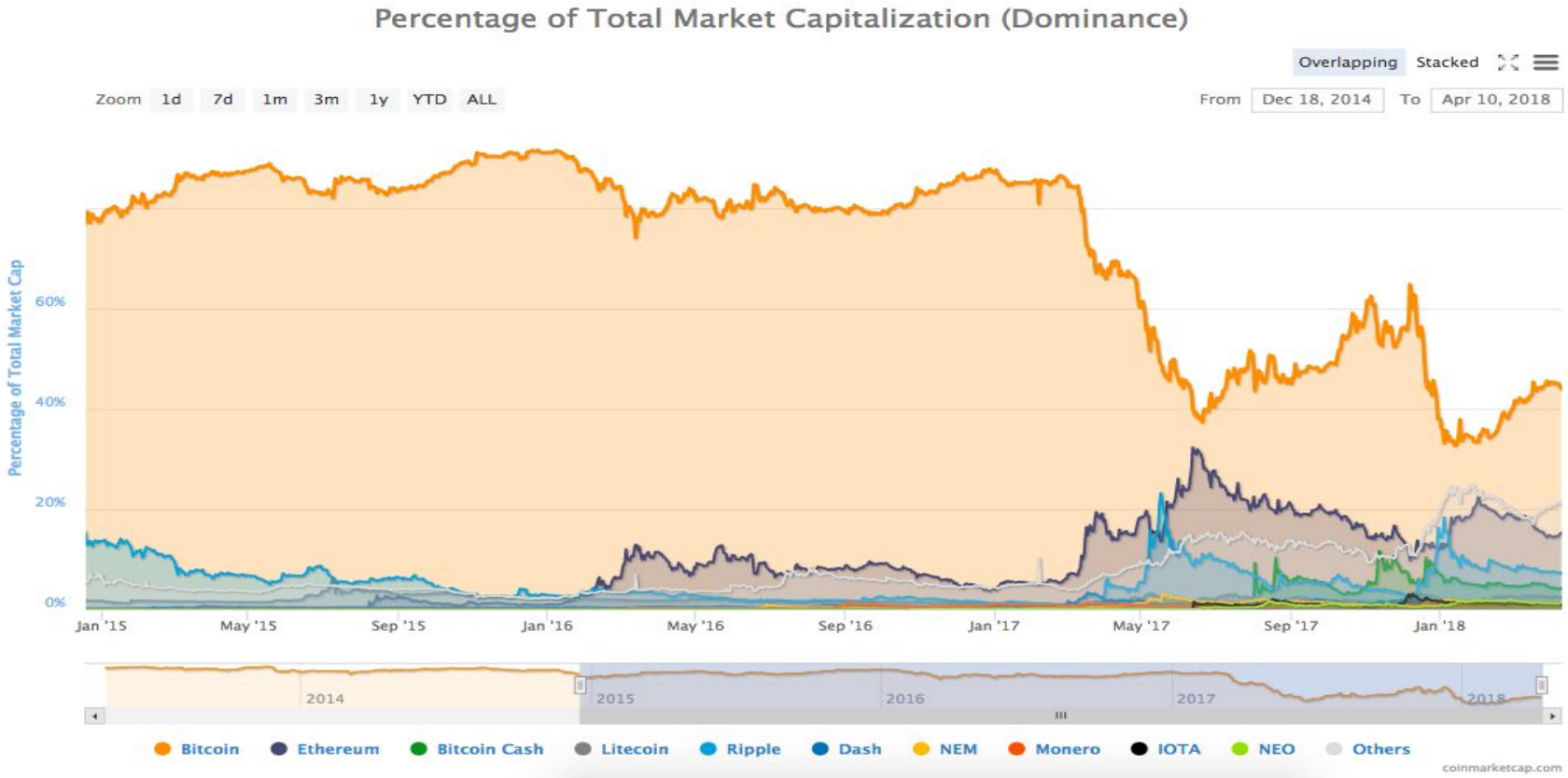
From Bitcoin to Cryptocurrencies

An overview of the BTC price



An overview of Bitcoin's market share



Literature Review

(Gandal et al, 2015)

- BTC will lose ground over other currencies because of its limited structure

(Cheah et al, 2014)

- BTC exhibits speculative bubbles and has zero fundamental value

(Ciaan et al, 2016)

- Market forces and BTC attractiveness for investors and users have a significant impact on BTC price (with variation over time)
- Macro financial developments are not driving BTC price in the long run

THE NEWS!

Factors: Speculative Demand

(Lee, 2014)

- Found evidence that positive and negative news generated high price cycles

=> Either increase or decrease BTC's price based on the type of news

=> we use the Google search term Index for BTC to capture attention to BTC

(Qadan & Yagil, 2012) Volatility Index (VIX)

- Connection between gold and the VIX: variation in investors' sentiment, measured by the VIX affect the price of gold between 1995 and 2010

=> we use the VIX index to capture investors' sentiment

Factors: Transactional Demand

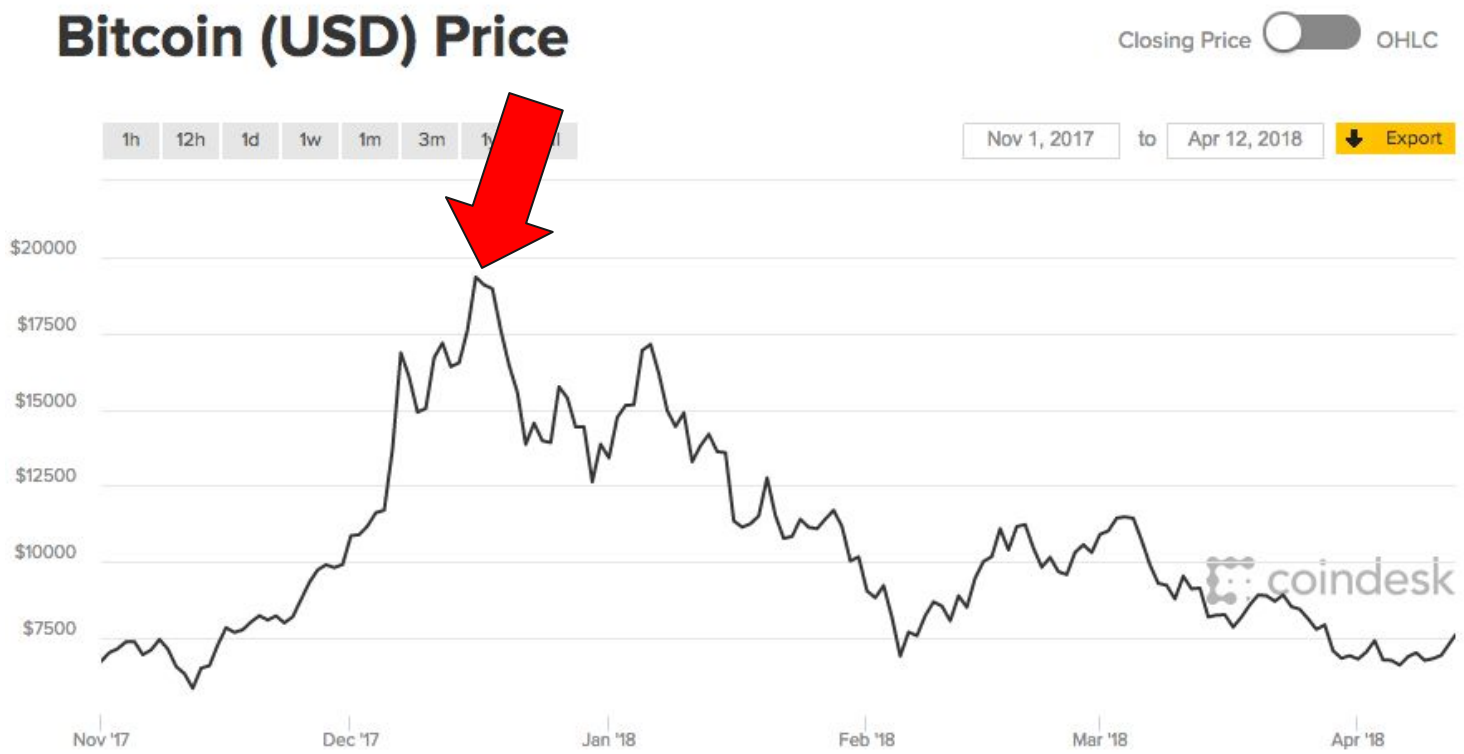
(Kari, 2015)

Liquidity
=> Hypothesis 1: the more vendors/companies that accept BTC, the more valuable it gets
=> Hypothesis 2: the more transactions made in BTC (BTC economy), the more valuable it gets

Trust
=> We used the Google search term of cyber attack to capture users' sentiments about this issue

Supply of BTC
- The traditional money supply/demand model (as supply gets higher, price decreases)

Structural break: Futures Exchange



Where does demand for Bitcoin come from?

$$P_{BTC} = f(P_{ATC}, ECO, S_{BTC}, GLE, VIX, VEN, D_{FUT})$$

P_{BTC} = the price of Bitcoin in time t

P_{ATC} = the price of Bitcoin's alternatives like Ethereum, Litecoin, Ripple…

ECO = the size of Bitcoin's economy (number of transactions) (+)

S_{BTC} = the supply of Bitcoin (number of coins in circulation) (-)

GLE = the number of BTC queries on Google (Bitcoin and Cyber Attack) (-)

VIX = the volatility index of the S&P 500 (-)

VEN = the number of vendors that accept Bitcoin as payment (+)

D_{FUT} = a dummy on when the future exchange of Bitcoin is introduced (-)

Methodology I: Dynamic Double-log Model

$$lnPBTC_t = \beta_0 + \beta_1 lnETH_t + \beta_2 lnLTC_t + \beta_3 lnECO_t + \beta_4 lnSBTC_t + \beta_5 lnSEARCH_t +$$

$$\beta_6 lnATTACK_t + \beta_7 VIX_t + \beta_8 VEN_t + \beta_9 DFUT_t + \beta_{10} lnPBTC\,(-1) + \epsilon_t$$

Regression Results

	Model 1 (2015- now)		Model 2 (12/2017 - now)	
Variables	**Coefficients**	**t-statistic**	**Coefficients**	**t-statistic**
ln (BTC Price lagged)	0.9336308***	86.93	0.3706025***	6.09
ln (ETH Price)	-0.0053466*	-2.49	0.0904892***	3.86
ln (LTC Price)	0.0301228***	5.86	0.3312039***	7.56
ln (ECO)	0.0371186***	4.64	0.1363056**	3.34
ln (BTC Supply)	0.0073711	1.02	0.031797	0.66
ln (GG Search)	0.0021363	0.62	-0.092837***	-4.27
ln (GG Cyber attack)	0.0002732	0.27	-0.007032	-0.67
ln (VIX Index)	-0.0077911	-1.12	-0.0390209	-1.69
ln (Vendors)	0.307882***	4.75	-2.132243***	-4.26
Dummy Future	-0.036388***	-4.42	n/a	n/a
(Intercept)	-2.858057	-5.03	21.9851***	4.42
	Adj R-squared = 0.9990		Adj. R-squared = 0.9726	

Interpretation

Significant variables

- BTC lagged price (+)
- ETH price (-) changed to (+) in Model 2
- LTC price (+)
- ECO (+) Number of transaction
- Google Search term changed sign and got significant (-)
- VEN (+) Number of vendors accepting BTC
- Dummy Future (-) the Opening of BTC Futures

Diagnosing the Model

AIC - Model Fit
Durbin-Watson - Serial Autocorrelation
Ramsey RESET - Model misspecification
VIF - Multicollinearity

	Coefficients	
Test	**Model 1**	**Model 2**
AIC	-3473.849	-360.803
Durbin-Watson	1.934298	1.602912
RESET	5.44**	0.96

	VIF	
Variables	**Model 1**	**Model 2**
ln (BTC Price)	106.96	14.23
ln (ETH Price)	75.92	10.49
ln (LTC Price)	36.95	8.97
ln (ECO)	14.36	6.52
ln (BTC Supply)	4.14	5.67
ln (GG Search)	3.87	4.18
ln (GG Cyber attack)	3.1	1.91
ln (VIX Index)	2.54	1.52
ln (Vendors)	1.61	1.27
Dummy Future	1.29	n/a
Mean VIF	**25.07**	**6.08**

Methodology II: Cointegration Model

- Price of BTC, ETH, LTC are all non-stationary (as well as number of vendors,...)
- Time-series model
- Cointegration is vital in determining which variables affect BTC in the short/long run

Model Specification

Long-Run Elasticities

$$lnPBTC_t = \beta_0 + \beta_1 lnETH_t + \beta_2 lnLTC_t + \beta_3 lnECO_t + \beta_4 lnSBTC_t + \beta_5 lnSEARCH_t +$$

$$\beta_6 lnATTACK_t + \beta_7 VIX_t + \beta_8 VEN_t + \beta_9 DFUT_t + \beta_{10} lnPBTC\,(-1) + \epsilon_t$$

Results: Long-run Elasticities

	Model 1 (2015 - now)		Model 2 (12/2017 - now)	
Variable	*Coeff*	*t-stat*	*Coeff*	*t-stat*
(Intercept)	-30.09134	4.034759***	-4.368997	0.7274957
lnPETH	0.01338124	-0.4740603	0.07829279	-5.023982***
lnPLTC	0.2464411	-3.629001***	0.5075127	-14.73588***
lnSearch	0.1504677	4.357973***	-0.008123253	-0.620162
lnECO	0.4402868	3.159082**	0.3198337	8.758617***
lnSBTC	-0.0337608	-0.3885231	-0.07145884	-0.9149457
Vendors	3.396127	4.052805***	0.7969748	1.272654
lnATTACK	0.01933748	1.586761	-0.04998366	-7.309428***
lnVIX	-0.0850465	-0.9172684	-0.06864321	-5.617568***
lnDFUT	0.2039283	1.964805*		
	Adjusted R-squared: 0.3976	0.406	Adjusted R-squared: 0.9691	

Interpreting the Cointegration Model

Variables that changed sign:

- Log price of ETH (-) to (+) : Consistent with the Dynamic Double-log Model
- Google search term (+) to (-) : Positive vs Negative News?
- Vendors (+) to (-) : Decrease of Speculative

Variables that became significant:

- Log price of ETH
- Supply of BTC
- VIX

Speculative Demand Decreases ????

Future Research

1. Run the Short-run Error Correction Model element of the Cointegration test
2. Incorporate more data from Future Exchange price
3. Look more into other cryptocurrencies

Questions and Answers