Research Report

Competitive Forces in the Cryptocurrency Exchange Landscape

THIS EXPLORATORY STUDY INVESTIGATES DRIVERS OF THE CRYPTOCURRENCY EXCHANGE COMPETITION. WE EXAMINE THE IMPACT OF MARKET-RELATED AND COMMUNITY-RELATED ASPECTS OF CRYPTOCURRENCY EXCHANGES ON TWO DISTINCT TYPES OF COMPETITION. OUR EMPIRICAL ANALYSIS OF THREE DATASETS INDICATES THAT THE COMPETITION FOR TRADING FREQUENCY IS DRIVEN BY BOTH THE MARKET AS WELL AS THE COMMUNITY WHEREAS THE COMPETITION FOR TRADING QUANTITY IS DRIVEN SOLELY BY THE MARKET.

Christian Janze

Ilya Gvozdevskiy

Introduction

Pseudonymous cryptocurrencies, such as Bitcoin (Nakamoto, 2008), represent a paradigm shift away from centrally controlled fiat currencies towards a self-regulating decentralized peer-to-peer system. However, similarly to traditional central bank controlled currencies, they are traded against other crypto- and fiat currencies on exchanges.

While numerous studies examine the competition between different cryptocurrencies, little research on the competition of cryptocurrency exchanges exists and is limited to an analysis of Gandal and Hałaburda (2014). In light of the exponential growth in both the number of cryptocurrencies as well as their total market capitalization, an understanding of the competition among

cryptocurrency exchanges is important. For example, in a recent study, Gandal et al. (2017) examine suspicious trading activities on the now defunct cryptocurrency exchange Mt. Gox. They find that the actions of a single rogue trader resulted in a tanking Bitcoin price, which took three years to recover. During that time, Mt. Gox was handling around 70% of the entire Bitcoin trading volume on exchanges.

This example fosters our assumption that a healthy competition between cryptocurrency exchanges (i.e., a high level of market fragmentation) is beneficial – particularly to ensure that no single venue is "too big to fail". Gandal et al. (2017) argue that "regulators may want to begin taking an active oversight role as the Bitcoin ecosystem becomes more integrated into international

finance and payment systems". To regulate cryptocurrencies and cryptocurrency exchanges, it is necessary to gain an understanding of ways to measure competition in the first place. Then, a thorough analysis of driving forces behind competition metrics can help to guide regulatory efforts. However, it is important to recognize that regulations targeting cryptocurrencies directly cannot be efficiently enforced due to their inherently decentralized nature. Thus, any potential regulation of the cryptocurrency market must address more centralized components of the Bitcoin ecosystem – such as cryptocurrency exchanges. Based on these considerations, we formulate the following research question (Janze and Gvozdevskiy, 2017): *How does the market and community influence the competition of cryptocurrency exchanges?*

Methodology

To address our research question, we design an exploratory research model taking both market-related and community-related aspects of two different types of cryptocurrency exchange competition into account: First, the competition regarding *trading frequency* (fragmentation of the total daily transactions), and second, regarding the *trading quantity* (fragmentation of the total daily traded quantity), both measured by means of the Herfindahl-Hirschman-Index (HHI).

We operationalize our research models by formulating five sets of testable hypotheses (H) related to the market (H1, H2) and the community (H3, H4, H5), which we derived from previous theoretical considerations and empirical observations. To test our hypotheses, we compile a

data set from three data sources. Our final data set comprises daily data regarding 24 Bitcoin-fiat currency pairs traded on 79 cryptocurrency exchanges covering the time frame from 2011 to 2015. Furthermore, the data includes posts discussing the 79 exchanges on Reddit, which we extracted from a corpus of 2.13 billion posts. We further preprocess the data and create new features via natural language processing and Latent Dirichlet Allocation (LDA). Furthermore, our data set entails Wikipedia search query statistics. The following equation explicitly formalizes our panel regression specifications.

$$HHI_{t,ccy}^{v} = \sum_{k=1}^{K} \beta_k X_{t,ccy,k} + \sum_{d=1}^{D} \lambda_d C_{t,ccy,d} + \varepsilon_{t,ccy}$$

where v is the type of competition (model 1: trading frequency, model 2: trading quantity) and $X_{t,ccy}$ is a set of K independent market- and community-related variables clustered by time t and currency pair ccy. C denotes a set of D controls and ε an error term.

Empirical Findings

Table 1 summarizes our OLS estimation of both panel regression specifications. Within hypotheses set H1, we investigate the influence of market participants' trading activity on the level of competition: H1a posits that an increased level of trading activity (total number of executed trades) is associated with an increased level of competition. We accept this hypothesis for both models. This implies that an increase in trading activity results in a more competitive market. H1b states that an increased average execution size results in an increased level of competition. We accept this hypothesis for model 2.

Competitive Force		Hypothesis	Model 1: Frequency	Model 2: Quantity
A Market	Activity	H1a ↑ trading activity → exchange competition ↑	accept	accept
		H1b ↑ average execution size → exchange competition ↑		accept
	Uncertainty	H2a ↑ price entropy → exchange competition ↓		
		H2b ↑ trading entropy exchange competition ↑		accept
B Community	Engagement	H3a ↑ novice interest → exchange competition ↓	accept	
		H3b ↑ enthusiast coverage → exchange competition ↓		
		H3c ↑ enthusiast concentration → exchange competition ↓		
	Writing Style	H4a ↑ positive sentiment → exchange competition ↑		
		H4b ↑ depth → exchange competition ↓		
		H4c ↑ topical focus → exchange competition ↓	accept	
	Social Feedback	H5a ↑ grades → exchange competition ↓		
		H5b ↑ controversity → exchange competition ↑	accept	
		H5c ↑ donations → exchange competition ↓		

Note: the symbols ↑, ↓ and → represent an increase, decrease, and a hypothesized relationship, respectively.

Table 1: Drivers of the Cryptocurrency Exchange Competition

Hypotheses set H2 is concerned with the effects of uncertainty on the level of competition: H2a assumes that an increased level of price entropy (standard deviation of the mean execution prize on exchanges) is associated with a decreased level of competition between cryptocurrency exchanges. We reject this hypothesis for both types of competition examined. H2b states that an increased level of trading entropy (volatility of the number of trades) is associated with an increased competition between cryptocurrency exchanges. We accept this hypothesis for model 2.

Within hypotheses sets H3, H4, and H5, we examine the impact of the community on the level of competition.

Hypotheses set H3 is concerned with the engagement of the community: H3a suggests that an increased level of novice interest (page views of the English Wikipedia Bitcoin article) in cryptocurrencies is associated with decreased cryptocurrency exchange competition. We can confirm this hypothesis for model 1. H3b posits that an increased level of enthusiast coverage (number of Reddit posts) is associated with a decreased cryptocurrency exchange competition, whereas H3c assumes that an increased level of enthusiast concentration (number of Reddit posts per author) is associated with a decreased cryptocurrency exchange competition. We reject both hypotheses H3b and H3c for both models.

Hypotheses set H4 examines the impact of the writing style on the competition of cryptocurrency exchanges: H4a expects that an increased positive sentiment expressed by the community towards the overall cryptocurrency exchange market is associated with an increased competition. H4b assumes that an increased depth of community contributions regarding cryptocurrency exchanges (mean word count of Reddit posts) is associated with a decreased competition. We reject both H4a and H4b. H4c states that an increased topical focus of contributions regarding cryptocurrency exchanges (mean HHI of LDA-10 topic distribution of Reddit posts) is associated with a decreased competition between cryptocurrency exchanges. We confirm this hypothesis for model 1.

Hypotheses set H5 studies effects of social feedback on the competition of cryptocurrency exchanges: H5a posits that higher grades assigned by consumers of community contributions regarding cryptocurrency exchanges (Reddit score) are associated with a decreased competition between cryptocurrency exchanges. We reject this hypothesis for both model 1 and 2. H5b expects that an increase level of controversial votes on Reddit assigned by consumers of community contributions regarding cryptocurrency exchanges are associated with an increased competition between cryptocurrency exchanges. We confirm this hypothesis for model 1. H5c states that an increased level of donations by consumers of community contributions to the creators of the contributions is associated with a decreased competition between cryptocurrency exchanges. We reject this hypothesis for both model 1 and 2.

Conclusion

Within our study, we examine two potential driving forces of the cryptocurrency exchange competition. The first driver covers the market itself. The second driving force covers the surrounding user community, i.e., discussions around the cryptocurrency exchanges on user-generated content (UGC) platforms. We focus on these two types of drivers since they are observable on both cryptocurrency exchanges as well as UGC platforms, which both are mostly centralized. This makes the enforcement of regulations aiming at improving and sustaining a healthy level of competition viable.

We find that the competition for transaction frequency between cryptocurrency exchanges is both driven by the market as well as the surrounding community. Furthermore, we find that the competition for quantity is only driven by the market. Future studies should conduct Granger tests to identify cause and effect relationships among the competitive forces.

References

Gandal, N.; Hałaburda, H.:
Competition in the Cryptocurrency Market. Bank of Canada Working Paper No. 2014-33, https://www.bankofcanada.ca/wp-content/uploads/2014/08/wp2014-33.pdf, 2014.

Gandal, N.; Hamrick, J. T.; Moore, T.; Oberman, T.:
Price Manipulation in the Bitcoin Ecosystem. CEPR Discussion Paper No. DP12061, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2977479, 2017.

Janze, C.; Gvozdevskiy, I. :
What Drives the Competition of Cryptocurrency Exchanges? Examining the Role of the Market and Community.
Proceedings of the 38th International Conference on Information Systems (ICIS 2017), Seoul, Korea, 2017.

Nakamoto, S.:
Bitcoin: A Peer-to-Peer Electronic Cash System, https://bitcoin.org/bitcoin.pdf, 2008.