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Helder Sebastião
António Portugal Duarte
Gabriel Guerreiro

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ABSTRACT
This paper analyses the price discovery in the USD/Bitcoin market since Mar-2014 to Nov-2016. The results show a positive relationship between the informational relevance of exchanges and their market shares. Information is mostly transmitted between exchanges within an hour, at least for the main exchanges, although lagged feedbacks occur from the major exchanges. Minor exchanges are merely satellite ones and react to price information with some delay. Bitfinex is the most important exchange: the lagged feedback from this exchange to the market is 18.3%, while the reverse feedback accounts only for 0.6% of the total feedback. Volatility in the major exchanges is the main factor explaining the feedback measures, which sustains the claim that the relative importance of the information-based component of volatility increases with the relative dimension of the exchange.

Keywords: Bitcoin; price discovery; high frequency; Geweke feedback measures; volume; volatility.

JEL Classification: F13; G12; G14; G15.
1. Introduction

Bitcoin is a decentralised open source peer-to-peer (P2P) crypto-currency protocol, firstly presented in a self-published paper by the mysterious Satoshi Nakamoto on 31-Oct-2008. Nakamoto (2008) describes a mathematical system that can be used to produce and manage a virtual currency, mainly designed for supporting online transactions. Its main merit, which is the basis for its success in relation to other virtual currencies, is to solve the double spending problem (when an individual, conducting an online transaction, sends the same money to two counterparts at the same time) without the need for a third trusted intermediary. Moreover, while other online payment systems, such as PayPal and eBay, still have impediments in cross-border transactions, Bitcoin allows its holders to trade across borders, in an increasingly global marketplace (ECB, 2012; Lancelot and Tatar, 2013; Pagliery, 2014; Pieters, 2016).

As a crypto-currency, Bitcoin is digital, without physical existence nor country of origin. Bitcoin is issued and controlled by its users and is accepted among the members of an increasing virtual community, therefore is not subjected to any regulation or supervision from a monetary authority. Bitcoins are created by solving a complex mathematical algorithm in a process known as “mining”, which is transparent, decentralised, and overseen by the Bitcoin protocol users. The winning miner is awarded a given amount of new Bitcoins, while the losers get nothing. Hence, this activity is characterized as a “competitive bookkeeping” by Harvey (2016). Bitcoins are sent and received via Bitcoin addresses. However, because there is no central processing authority, transactions between users must be confirmed by consensus: a private Bitcoin key of one user has to match the public Bitcoin key of another user. This is made possible through the Bitcoin’s “blockchain”, which is essentially a public chronological log of every confirmed Bitcoin transaction (ECB, 2012). The Bitcoin supply has increased at a predictable rate, depending on the number of “miners” and traders, technological advances and energy costs.

Bitcoin tends to be subjected to a deflationary process as the demand becomes higher than the supply (Nakamoto, 2008; Fink and Johann, 2014). The historical appreciation of Bitcoin has been impressive. Some anecdotal evidence can grasp this: the first product bought using Bitcoins was two pizzas on 21-May-2010, for a price of 10000 BTC, roughly 25 USD at that time (Fink and Johann, 2014). At the time of writing, the price for one Bitcoin is around 1188.46 USD; so, at the actual prices, this is probably the most expensive meal in the history of mankind! The exponential appreciation of Bitcoin seems to be behind the increasing interest that Bitcoin is gaining in the online trading community.

Since its online creation in 2009, Bitcoin has grown from a new digital currency traded essentially between enthusiasts, to a booming payment system receiving substantial media attention for its conceptual merits. The market capitalisation of Bitcoin surpassed 25 billion USD recently, and the transaction volume keeps growing in a more global and diversified scale. By now, approximately 16.9 million Bitcoins are in circulation (the absolute maximum is 21 million BTC) and there are more than fifty Bitcoin exchanges offering trades against different currencies, with USD and CNY being the most important ones (data on 3-May-2017).