Producing financial metrics for a virtual company, such as Bitcoin

Ruzaiq Omar

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Abstract. Bitcoin and many other virtual currencies exist. Here we argue that it is more accurate and useful to view Bitcoin and other services built on the blockchain as virtual companies rather than currencies. When analysing Bitcoin as a company we are able to calculate financial metrics which can be used to evaluate the company. These financial metrics were found to be useful for gaining an understanding of the financial health of Bitcoin.

Introduction

The Bitcoin speculator must rely on qualitative and very basic quantitative information to base her decisions on and is unable to analyse Bitcoin in the same way as she would analyse a listed company. However informed investment decisions are never made without the relevant quantitative information. Bitcoin and other virtual currencies can be more accurately described as virtual unmanned companies which utilize the blockchain to maintain their records [1]. Currencies are passive representations of value and provide no services whereas Bitcoin is not a passive representation of value but is a service provider. Bitcoin provides time stamping, auditing, records keeping, value storage and value transmission services for a fee.

When viewing Bitcoin as a company we are able to use information contained within the blockchain (along with price information from centralized exchanges) to calculate useful financial metrics. The metrics provide information on how well utilized the virtual currency is, its efficiency, how much

'utility' is being provided per unit price and its financial health. These metrics allow one to conduct financial analyses on a virtual company and can be used to quantitatively compare one virtual company to another, something that has previously been very difficult. While these metrics are somewhat useful for the analysis of Bitcoin, such metrics may proof to be even more useful when analysing other virtual companies, which were designed to be financially sustainable, such as those produced by the Bitshares community.

Speculators and users

Here we differentiate between two different types of people who interact with Bitcoin. The *user*, being a person who makes use of the services Bitcoin provides and the *speculator*, being a person who trades Bitcoins hoping to increase her total value. At times a person can be both a user and a speculator.

Tokens and shares

Users purchase Bitcoins in order to gain access to the services the company provides. When Bitcoins are specifically used to gain access to the services we shall call the Bitcoins *tokens* [2]. The demand for tokens will depend on the utility the tokens can provide. The utility will be affected by factors such as user adoption, integration and supporting infrastructure of the company to name a few. Because the tokens are limited in supply, a higher demand for Bitcoin services will increase the price of each individual token. It is important to note that the same amount of value may be required to purchase tokens that provide access to the same amount of utility irrespective of the price of each token[1]. Thus a user of the service should theoretically not be affected by the fluctuations in the price of each token[2].

For speculators the Bitcoins are not being used to gain access to the services but are used to buy/own or sell a piece of the company and are thus affected by the fluctuations in the price of each Bitcoin. For speculators Bitcoins function as shares[3] in the company [3]. Thus when we are referring to the specific use of Bitcoins for speculating/investing we shall call them *shares*. Holders of Bitcoins thus become the shareholders and users of Bitcoin where the issued shares form the shareholder's equity.

From this we can see that Bitcoins can be thought of as access tokens or shares in a virtual company depending on the observer [4].

Liabilities, assets and equity

While other virtual companies may employ a different business model, Bitcoin does not make use of any form of liabilities. The company also owns no assets (all assets used to run the network are owned by the workers (see below)). The company only has equity on its balance sheet. This equity is divided into shareholder's equity (from issued shares) and equity held by company (unissued

[1] For example, if I want to transfer $100 to a friend using Bitcoin, I would purchase $100 worth of Bitcoin tokens (irrespective of the price of an individual token) and transfer them.
[2] Persons who use Bitcoin for value storage services will be affected by fluctuations in the price.
[3] The term shares is used here simply as an analogy to help one understand the system and does not infer shares in the legal sense.

shares). Equity is transferred peer to peer in order for the worker to receive income and the users to pay fees. Equity is also transferred from the company to the workers to pay expenses. The shareholder's equity is calculated as the product of the number of issued shares and the market price per share at a particular point in time. The equity held by the company is similarly calculated. Here we take the product of the number of *unissued* shares and the market price per share at a particular point in time.

Income, expenses and dividends

As mentioned above, a virtual company can provide services. The virtual company is also able to charge fees for the service. For example, users of Bitcoin's tokens can pay the company a transaction fee for processing transactions. The fees paid by users are recorded as an income to the company[4]. A company that is being used more and provides more in services will have a higher income. Thus recording transaction fees as income provides for useful measure for evaluating the company.

Another way a virtual company can charge fees is through destroying percentages of tokens. For example, a percentage of a transaction can be destroyed, a percentage of inactive tokens can be destroyed as an inactivity fee (as done in the virtual company BitsharesX) and other token destruction fees may be applicable depending on the business model. Destruction of tokens also functions as a way to pay dividends to shareholders (as destruction of tokens increased the value of the remaining tokens/shares, thus there is a transfer of value from the users to the shareholders). Fees charged through destruction of tokens by a virtual company are recorded as an income as the value remains within the company (as opposed to traditional companies where a dividend payment results a removal of value from the company).

While there are people paying to make use of the services a virtual company provides, there are also people who are being paid to do work for the company. The work done for Bitcoin involves processing transactions and providing security for the company. In the crypto-currency space, these workers are commonly known as miners. For Bitcoin, all transaction fees received by the company from users are paid out to workers for processing the transactions. In this situation there is a transfer of value from the users/shareholders of the company to the workers. The transfer of value from the company to the workers is recorded as an expense to the company as it pays its workers so that it may continue to provide services. Bitcoin also pays workers for contributing computational power to the network. Bitcoin does this because the greater the computational power contributed to the network the more theoretically secure the network becomes against an attack [5]. Bitcoin pays workers for security by transferring shares held by the company (unissued shares) to workers; this represents a transfer of value from the company to the workers and is thus recorded as an expense.

It may be argued that when a worker is paid by the company for processing transactions that worker becomes a shareholder and owns part of the company. Thus there has been a transfer of ownership from the user/shareholder (who paid the transaction fee) to another shareholder (the worker) and such a transfer of ownership should not be recorded as an income followed by an expense. Here we are making the assumption that the worker will sell the shares/tokens received in order to 'get paid'.

[4] Bitcoin speculators will also pay fees when trading their shares.

If fewer fees are then paid out to workers for processing transactions and providing security, then the rate at which tokens are sold in the market will decrease thereby increasing the value of the individual tokens. When greater fees are paid out to workers who then sell them, the supply of tokens is increased thus reducing their value.

We can thus see how a higher income increase the value of the company and increased expenses will decrease the value of the company. If however the worker does not sell the tokens then no income and expense should have been recorded. There is a high probability that not all tokens earned are sold thus the recorded income from transaction fees and transaction fee expense may be overestimated.

It may be argued that the worker, when receiving shares from the company for providing security, can be seen as a shareholder and thus there is simply a conversion of shares from being unissued shares to being issued shares which form part of the shareholder's equity. According to such an argument security would not be seen as an expense as the value stays within the company. However it is important to note that conversion of unissued shares to issued shares adds to the supply of shares in circulation and thus dilutes the value of each share in circulation. This is bad for shareholders if the company pays more for security than it needs to, as there will cause a downward pressure on the price of each share [6].

A profitable virtual company

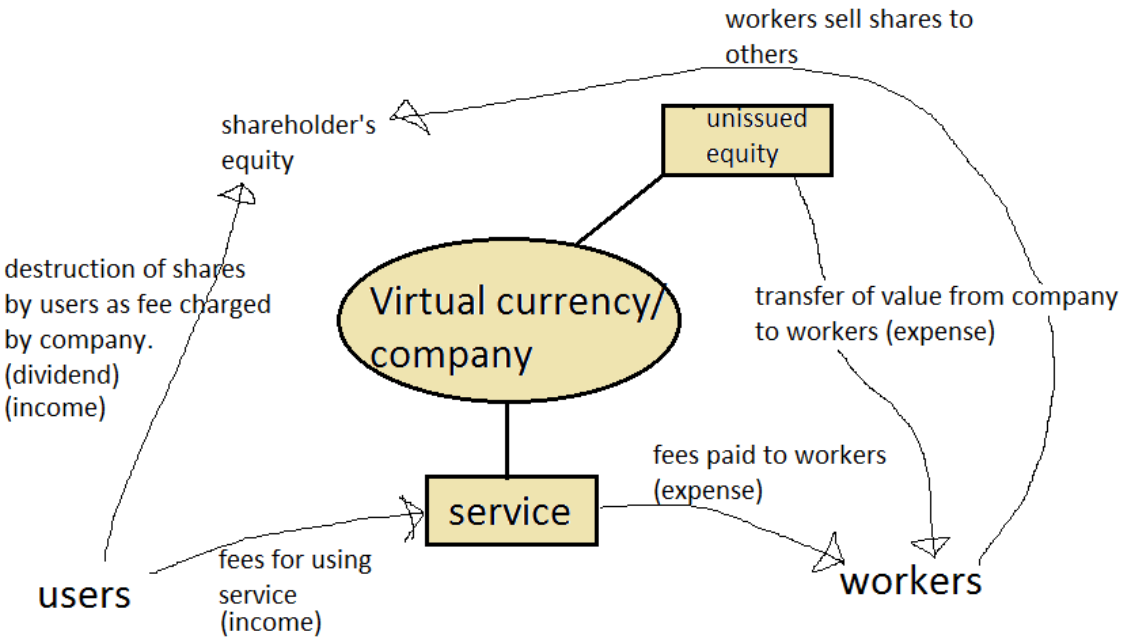
It quickly becomes clear that Bitcoin employs a highly unprofitable and a non-sustainable business model where the company pays more in fees than it brings in as income. It is however possible to produce a virtual company which is designed to be profitable for shareholders. Such a company would reduce its share issuance, incorporate a cheaper solution for providing company security, introduce various fee structures, find a more efficient method for processing transactions, incentivise transactions etc. For the future I would expect to see many profitable blockchain based virtual companies with appropriate earnings per share ratios competing in the market place. Financial analysts will soon start to analyse virtual companies, in the same way they analyse traditional companies, where financial metrics will play a crucial role in the speculation of these companies.

Summary

Here we have argued that it is more accurate to describe Bitcoin using a company analogy as opposed to the virtual currency analogy. When viewing Bitcoin as a company we were able to derive a number of metrics which are useful for analysing the financial health of the company. Below is a summary of the ways in which Bitcoin can be viewed when using the virtual company analogy.

- The virtual currency is seen as a company.
- Each currency unit is seen as a share or token depending on the observer. Persons who trade shares are viewed as speculators and those who use tokens are viewed as users.
- The Bitcoin company has no assets or liabilities only equity and equity is transferred peer to peer and between company and peer in order to receive income and pay expenses.
- Transaction fees (and other fees) paid by users for the company's services are recorded as income.

- Miners/ transaction processors are seen as workers in the company.
- The company pays workers for processing transactions and providing security.
- Share issuance by company to workers for providing security is seen as a transfer of value from the company to the workers and thus is recorded as an expense.
- The company also pays workers for processing transaction fees; this too is recorded as an expense.
- Destruction of shares occurs in the form of fees charged to users and is seen as a transfer of value from users to the shareholders and is thus recorded as income. Shares can be destroyed in order to pay dividends to shareholders.
- Issued shares are recorded as belonging to the shareholders and form the shareholder's equity. Unissued shares are recorded as equity held by the company.
- Using this model Bitcoin is seen as an unprofitable and unsustainable company, however other profitable and more sustainable virtual companies can be created.



Flow of funds within the virtual company, Bitcoin.

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Calculating financial metrics for virtual companies

n = today

Transaction fees paid by users = TFusers

Transaction fees paid to workers = TFworkers

price per share = price

Number of shares destroyed = div

Income	
Transaction fees 365 (Turnover)	(TFusers n *price n) + (TFusers n-1 *price n-1) + (TFusers n-2 *price n-2)…. (TFusers n-365 *price n-365)
Dividend created through share number depreciation	(div n * price n) + (div n-1 * price n-1) + (div n-2 * price n-2)…. + (div n-365 * price n-365)
Expenses	
Security expense (share issuance to miners)	(shares issued n * price n) + (shares issued n-1 * price n-1) + (shares issued n-2 * price n-2)…. + (shares issued n-365 * price n-365)
cost of processing transactions	(TFworkers n *price n) + (TFworkers n-1 *price n-1) + (TFworkers n-2 *price n-2)…. (TFworkers n-365 *price n-365)

market cap	Issued shares*price
issued non-voting shares	Issued shares
Unissued non-voting shares	Authorised shares – issued shares
EPS	(Dividend created through share destruction + income from fees charged)/number of issued shares
P/E	price/EPS

Financial metrics for Bitcoin

All values are denominated in USD, year 2014 has been excluded from the analysis.

Cash flow statement

Income	2013	2012	2011	2010	2009
Turnover	2 189 662	66 334	33 033	2.7	0
% change YoY	3201	101	1 223 344	-	-
Expenses					
Security expense	307 187 949	21 554 265	18 907 748	219 121	0
% change YoY	1 325	14	8 529	-	-
Operating expense (transaction fees)	2 189 662	66 334	33 033	2.7	0
% change YoY	3201	101	1 223 344	-	-

Balance sheet (year-end)

	2013	2012	2011	2010	2009
Shareholder's equity	8 917 322 800	1 44 233 048	39 960 250	1 505 500	-
% change YoY	6 083	261	2 554	-	-
Equity held by company	6 433 677 200	1 41 156 952	64 934 750	4 794 479	-
% change YoY	4 458	117	1 254	-	-

Growth and Profitability

	2013	2012	2011	2010	2009
Share Price year end	713	13.59	4.9	0.29	0
% change YoY	5147	177	1590	-	-
EPS	0.18	0.0063	0.0041	5.3E-07	-
P/E	3961.11	2157.14	1195.12	547169.81	-
Operating expense ratio	141.2	325.9	573.4	81156.9	-