Fair Value in Fragmented Markets: Cryptocurrency Valuation for Financial Reporting

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Abstract

Cryptocurrencies and blockchain technology are disruptive innovations at the vanguard of a new wave of the digital revolution. The far-reaching appeal, global reach, unprecedented mobility of capital and multitude of trading venues has created a marketplace like no other. The economic fundamentals underlying this market are yet to be fully comprehended, as evidenced by the often contradicting guidelines recommended by accounting firms, government agencies and standard setters. Many of the definitions and models used for classical markets cannot be applied directly to cryptocurrency. Basic concepts must be reinterpreted, and models must be modified to fit the mechanics of these markets. In this paper we focus on one such concept: that of *fair value.* We argue that in light of the fragmentation of cryptocurrency markets and the global dispersion of trading venues, a principal market may be difficult to identify. The primary objective of this paper is to present a methodology to dynamically designate principal markets and derive fair value prices for financial reporting using this designation.

Fair Value in Fragmented Markets:
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1. Introduction

The market for cryptocurrencies is significant and is expected to expand rapidly over the next few years. In early 2019, market capitalization of crypto assets was over $90 billion[1]. The expansion of cryptocurrency markets and exchanges, along with the sophistication of blockchain technology, creates the need for clear accounting and reporting guidance. However, as an economic phenomenon, cryptocurrency is not well understood, as evidenced by the guidance provided to the preparers of financial statements by public accounting firms and standard setters. One of the sources for this lack of clarity is tied to the valuation of and the proper accounting for cryptocurrency. The primary issue is whether to use fair value to measure and account for cryptocurrency held by an entity on its own behalf.

When fair value measurement was first used, the methodology was quite clear. Assets trading in a market would be valued by the closing price in the market at the measurement date. At the time, equities were tied to a single exchange and thus left little ambiguity as to the market price. The trade in foreign exchange and precious metals, which were also important carriers of value during this period, were dominated by a few large banks which basically set the market prices. As markets evolved and the trading of increasingly sophisticated assets increased, it became evident there was a need for clear guidance regarding fair value measurement. ASC 820 and IFRS 13, are the most recent guidelines designed to establish a uniform definition of "fair value" and provide a consistent framework for its application.

Today, as we move into cryptocurrency markets, we once again face a situation where the existing fair value guidelines may no longer reflect market realities. In particular, the *principal exchange* and *most advantageous markets* are difficult to establish in fragmented, globally dispersed markets. The objective of this paper is to offer a new justification for the fair value method in the context of cryptocurrency markets in a manner that would be consistent with current conceptual framework, and develop a methodology to identify principal markets to be used for proper measurement, classification, and disclosure of investments in cryptocurrencies.

This paper is organized as follows. Following the Introduction, Section 2 reviews the relevant literature on fair value accounting. Section 3 examines the current guidance available from public accounting firms and standard setters and justify the use of the fair value model. Our proposed model is developed and discussed in Section 4 and explicitly illustrated in the Appendix.[1]

[1] See European Central Bank (ECB) Occasional Paper No. 223 *Crypto-Assets: Implications for financial stability, monetary policy, and payments and market infrastructures*, May 2019. Available at: https://www.ecb.europa.eu/pub/pdf/scpops/ecb.op223-3ce14e986c.en.pdf?a31360223fb32f0e50a82ce649a8b7fc

2. Literature Review

Fair value measures can enhance decision usefulness regardless of the type of asset being measured. Barth and Landsman (1995) state that "the most important attribute of an asset as it relates to fair value accounting is whether an estimate of its value is easily obtainable, either because active markets exist for it or there are accepted techniques for estimating its fair value, and not whether it is a financial or non-financial asset."

In her paper discussing standard-setting measurement issues, Barth (2007) provides an overview and the theoretical arguments for and against three accounting measurement bases; fair value, historical cost and value in use. The theoretical arguments were developed by referring to the FASB and IASBs conceptual frameworks. The qualitative characteristics of useful accounting information included in the discussion were relevance, faithful representation, comparability, and understandability. Regarding the use of fair value, Barth (2007) concluded that fair values are relevant because they better reflect present economic conditions relating to resources and obligations. In addition, fair values can faithfully represent the measurement of assets and obligations as defined in the framework because they reflect risks and probability-weighted assessments of future cash flows.

Landsman (2007) reviewed the extant capital market literature discussing the usefulness of fair value accounting information to investors. The author indicated that much of the US-based research mainly focused on the value relevance of fair value information: relevance and reliability. Conversely, international research concentrated on the value relevance of asset revaluations from the use of the IFRS revaluation model as an alternative to the cost model. The author concluded that disclosure and recognition of fair value measures are informative to investors, but that the level of informativeness is affected by the amount of measurement error and source of the estimates. External observable inputs are most reliable. Therefore, fair value measures provided by external appraisers are more reliable than fair values developed by management models. Fair values are most useful for the reader of financial statements when there are Level 1 measures determined by using quoted market prices[2].

Hitz (2007) provided a comprehensive economic analysis and discussion on the selection of a measurement basis. Support for fair value accounting rests on the decision usefulness model. Decision usefulness is the objective of financial reporting under FASB Concepts Statement No. 8 (FASB 2010b). Under the conceptual framework, information is provided to users to enable them to assess the amount, timing, and uncertainty of future cash flows from an investment. The use of fair values better incorporates future cash flows and better aligns financial statements with the future than the use of historical costs. Fair values are believed to give an unbiased assessment of the present values of cash flow forecasts in an efficient manner. This attribute of fair value accounting makes the financial information reported in the statements more relevant (Singh 2017).

The most current revisions found in the conceptual frameworks of both the FASB and[2]

[2] The fair value hierarchy will be discussed briefly in Section 3.1 of this paper.

IASB increased the importance of faithful representation as a quality of useful accounting information[3]. Singh (2017) notes that faithful representation replaced reliability in the conceptual framework and there is a difference in emphasis. Barth (2007) goes on to say that reliability is now incorporated in the concept of relevance. Barth (2007) also states that "just because an amount can be calculated precisely, it is not necessarily a faithful representation of the real-world economic phenomena it purports to represent." Therefore, with the current conceptual framework, we first obtain a valuation that faithfully represents the economic phenomenon we are attempting to measure. Then, we assess the reliability of the inputs used to value the asset or liability and the level of reliability is disclosed in the fair value hierarchy[4].

Faithful representation results if fair values are based on the economic behavior of market participants rather than entity specific models. We expect faithful representation to exist in markets that are efficient and complete[5]. Power (2010) noted that usefulness of fair value comes from the collective actions of the market rather than the views of the management.

Additional support for the use of fair value results from the fact that income recognition based on market values is more timely information and can limit opportunities for earnings management (e.g., CFA 2007; Barlev and Haddad 2003). Landsman (2007) also noted that the use of fair value accounting significantly reduces incentives for firms to time asset sales to manage earnings. If gains and losses are recognized in income when assets are revalued and gains on sale are based on fair value rather than historical cost, then the incentive to time asset sales for earnings management purposes is reduced or eliminated. Fair values also eliminate hidden reserves for recognized assets and bring an entity's book value closer to its market value (Hitz 2007). Hitz (2007) adds that fair value income incorporates more information than transaction-based income, whose stability may be deceptive. According to Hitz (2007), the persistence of historical cost income may appear far more "artificial" than the "volatility" of fair value income.

The review of the extant literature primarily provides support for classifying cryptocurrencies held by an entity on its own behalf as an asset held for trading purposes. In addition, we find considerable support for the use of fair value in terms of enhanced decision usefulness. Fair values are more relevant in that they will provide more timely information to financial statement users making a more significant difference in decision making.

Previous research also provides support for the usefulness of fair value measures in the financial statements. Bratten, Causholli, and Khan (2016) examined whether the fair value adjustments included in other comprehensive income are useful for predicting the future performance of banks. The attributes related to the reliability of fair value are also considered in terms of their impact on predictive value.

[3] In its 2018 revision to the conceptual framework, the IASB indicates that faithful representation is enhanced by measurement consistency and comparability and is decreased by measurement uncertainty.
[4] We briefly discuss the fair value hierarchy in Section 3.1 of this paper.
[5] See Footnote 2 for the factors that have increased the efficiency of the Bitcoin exchanges.

The authors focused on the predictive ability of fair value measures to determine its decision usefulness as defined by the conceptual framework. Based on empirical analysis of public and private banks, the authors concluded that if fair value can be reliably measured, the predictive value of such measures embedded in other comprehensive income will be increased.

Koonce, Nelson and Shakespeare (2011) investigate whether and how investors' judgments of fair value relevance for financial instruments are sensitive to three contexts: if fair values lead to gains or losses; if fair values are applied to assets versus liabilities; and if management intends to dispose or settle or hold a financial instrument to maturity. The authors reported that investors found that the difference between historical cost and fair value had more relevance for the valuation of investments in debt rather than for measuring a debt obligation. In addition, investors indicated that fair values are more relevant when an asset is intended to be sold or a liability settled versus being held to maturity. In other words, the use of fair value was less relevant if investors are told that the debt investment is going to be held to maturity by the entity. Therefore, fair value is the more relevant basis of measurement for assets held for sale or exchange versus assets held for an extended period of time.

There are several studies discussing the need for accounting guidance for Bitcoin and other cryptocurrencies. In his paper, Prochazka (2018) suggests, compares and assesses several accounting models under IFRS. Specifically, Prochazka (2018) analyzed several possible accounting treatments for measuring and reporting cryptocurrencies: historical cost, fair value through profit and loss and fair value through other comprehensive income.

The fundamental argument is that the proper accounting treatment should be determined by considering managements' intention for holding the cryptocurrency, including holding as a means of payment, for profit-trading, or production (mining). The author stresses the importance of economic substance over legal form. This is inherent in the accounting quality of faithful representation. There are many possible financial statement classifications for cryptocurrency including cash, financial assets, non-financial investments, inventory, leases, and intangible assets. However, the most widely accepted classification of cryptocurrency as indefinite-lived intangible assets is not supported because cryptocurrencies cannot be utilized in operations as other intangibles such as patents, licenses, trademarks, etc. Mined rather than purchased cryptocurrencies would be treated as internally generated intangibles and should be expensed. Finally, Prochazka (2018) suggests that fair value accounting is the most relevant source of useful information for users of financial statements when cryptocurrencies are acquired for investment (profit-trading) purposes.

Tan and Low (2017) argue that the conceptual framework should provide the basis for accountants to make a judgement on appropriate accounting treatment for holdings of cryptocurrency on the basis of economic substance. The authors further argue that there are two cases to consider. Accountants must begin to understand the economics of money, Bitcoin and its ecosystem, and the accounting principle of faithful representation embodied

in the conceptual framework. Tan and Low (2017) classified Bitcoin owners into three categories: individuals, trading firms, and digital currency exchanges. They argue that in the trading firm environment, Bitcoin is used as an alternate mode of receiving payment and is quickly converted to local currencies through a digital currency exchange. As a result, these firms use Bitcoin as a medium of exchange and should only recognize revenues and expenses on the transaction date using the exchange rate (i.e., fair value) on that date. As a result, the authors propose that there is no need to recognize Bitcoin as assets on corporate balance sheets. Tan and Low continue the argument by indicating that whenever it becomes necessary for entities to report cryptocurrencies on their balance sheets, a temporary holding of Bitcoin should be classified as cash or cash equivalent. This conclusion is based on the economic substance assumption that cryptocurrencies primarily serve as a medium of exchange. For digital currency exchanges the authors indicate that the business model of a digital currency exchange is no different from a trader of goods and therefore, Bitcoin is a traded good. If cryptocurrency is viewed as a traded good for digital currency exchanges, then the asset should be accounted for as inventory. This treatment is consistent with tax reporting. The authors concluded that no new accounting standard is needed for the financial reporting of Bitcoin. However, Tan and Low (2017) call for an authoritative interpretation be issued by the IASB's Interpretations Committee[6].

Raiborn and Sivitanides (2015) identified six issues to be addressed when accounting for Bitcoin, including asset classification, mining activity, investment holdings, exchanges, merger and acquisition transactions, and disclosure. The authors noted that cryptocurrencies should not be classified as cash. Moreover, cryptocurrencies could not be classified as cash equivalents because some cryptocurrencies may neither have a highly liquid transaction market nor be converted into a known amount of cash. The authors also concluded that an intangible asset classification is also not relevant for cryptocurrencies even though they do not have physical substance and therefore, possess an intangible quality. Furthermore, the scope of intangible assets excludes financial assets (IASB 2001c). However, Raiborn and Sivitanides (2015) state that cryptocurrencies cannot be ignored as a financial exchange medium. The authors concluded that the only reasonable asset classification for cryptocurrency holdings is either a short- or long-term investment.

[6] The IASB's Interpretations Committee released its position on accounting for cryptocurrencies in March 2019. The position continues to support the classification of cryptocurrency as an indefinite-lived intangible asset (IASB 2019).

3. An Economic-based Approach to the Valuation and Accounting for Cryptocurrencies: A Fair Value Proposal

The Conceptual Framework

The objective of financial reporting and the qualitative characteristics of useful accounting information are articulated in the FASB's Concepts Statement No. 8, *Conceptual Framework for Financial Reporting* (FASB 2010b)[7] Under the conceptual framework, the fundamental qualitative characteristics that make accounting information useful are *relevance* and *faithful representation*.

Accounting information is relevant if it is capable of making a difference in a decision. For information to be relevant, it should have predictive value (critical for the concept of earnings quality), confirmatory value and it must be material to the entity's financial position, operating results and cash flows[8].

Faithful representation exists when there is an agreement between accounting information and the economic event or events that the accounting information purports to represent. For accounting information to have faithful representation, it should be complete, neutral and free from material error.

In addition to the fundamental qualitative characteristics, there are enhancing qualitative characteristics. The enhancing qualitative characteristics are comparability, verifiability, timeliness, and understandability.

A trade off exists when deciding on the appropriate basis of measurement to employ in financial reporting: historical cost, fair value or a mixed attributes model. In most cases, and as noted in our literature review, there is agreement that the use of fair values in the financial statements better reflects the economic value of an entity's resources and obligations. In addition, fair value measures are generally more relevant than historical cost for financial statement users. The IASB's revised conceptual framework adds that useful information enhances shareholder ability to assess management stewardship[9]. However, the use of fair value may be viewed as having less faithful representation than historical cost. As a result, the disclosure of the fair value hierarchy is a critical disclosure under both the FASB and IAS fair value standards.

The disclosure of the fair value hierarchy provides the reader of the financial statements some additional assurance regarding the reliability of the inputs used in the fair value measurement process. Enhanced disclosures of fair value measures will increase user confidence in the information provided. Here, the emphasis is on observable inputs, which enhance faithful representation.

The fair value hierarchy ranks the inputs used in measuring fair value from the most to the least reliable. Level 1 inputs are the most reliable and represent the use of observable inputs in an

[7] The IASB's objective and qualitative characteristics are identical to U.S. GAAP. However, they differ in the descriptions of elements of financial reporting and principles of recognition and measurement in financial reporting.
[8] We anticipate that holdings of crypto assets will become significant and more material in the near future.
[9] Barth, Gomez-Biscarri and Lopez-Espinoza (2012) also argue that fair value accounting improves monitoring of the stewardship function.

active market. This includes quoted market prices in an active market. Level 2 inputs, the next most reliable, include market comparable prices or prices obtained for the asset in a market that is not active. Level 3 inputs, or the least reliable, are primarily unobservable inputs and include managements' valuation models. Clearly, a Level 1 measure of fair value can have significant faithful representation, comparable to historical cost. However, fair value would be of greater relevance in the economic valuation of an asset than historical cost. The reliability of the fair value estimates declines as these estimates become more dependent on managerial assumptions. In these cases, the fair value information may possess decreased usefulness[1010].

Applicability to Cryptocurrencies

The conceptual framework supports the use of fair value through profit and loss for cryptocurrencies because these are assets that are quite sensitive to market risk and experience significant volatility in fair value. Fair value accounting is more relevant and provides more useful information than historical cost based or mixed attributes models used in accounting for investments in intangible assets. Historical cost information is not current (not timely) and the information provided by mixed attributes models is asymmetrical with respect to the treatment of unrealized gains and losses and is inconsistent. Comparability among firms is diminished under IFRS if one entity accounts for cryptocurrencies using the cost-based indefinite-lived intangible approach and another employs the revaluation model[11].

We also believe that the trade-off between relevance and faithful representation is not as significant as some may perceive. This is because the fair value of a cryptocurrency can generally be measured on exchanges and produce observable quoted prices[12]. So, the use of observable inputs can enhance the faithful representation and usefulness of the fair value measures used for cryptocurrencies. In addition, the fair value hierarchy provides the financial statement user with sufficient information to assess the reliability of the inputs used to determine the fair value of the cryptocurrency reported in the financial statements. Given the existence of cryptocurrency exchanges, the valuation of cryptocurrencies may possibly be based on inputs classified as either Level 1 or Level 2 reliability. However, in the event that management assumptions are used in the valuation of cryptocurrency, the Level 3 disclosures will still provide useful information for the reader of the financial statements[13]. Not only will the fundamental qualitative characteristics of relevance and faithful representation be satisfied by the use of fair value accounting, but the enhancing characteristics will also be better reflected in this valuation model.

The use of fair value accounting will improve comparability because, with the use of fair values obtained from digital currency exchanges, the financial statement user will be able to better compare the results of operations, financial position and cash flows of different firms. Here, the fair values are based on transactions executed by market participants. The valuation methodology used to measure fair value should be comparable across all firms rather than using measures tied

[10] It should be noted if a valuation model employs multiple inputs, the level of the input with the lowest reliability drives the entire ranking in the disclosure of the hierarchy. For example, the Black-Scholes model uses the risk-free interest rate and management's estimate of expected stock price volatility and dividend yield. The risk-free rate is observable and is a Level 1 input. The inputs estimated by management are Level 3 inputs. Therefore, the entire fair value of the employee option is considered as Level 3.

[11] Current guidance for accounting for cryptocurrencies is briefly discussed in Appendix B.

[12] See Footnote 2 for the factors that have increased the efficiency of the Bitcoin exchanges.

[13] We realize that the importance of fair value hierarchy disclosures will increase with economic downturns.

to a specific entity. The inputs used to measure these fair values used can be observable and verifiable when obtained from a reliable exchange. The fact that the financial statement user has the knowledge that the fair values are observable and verifiable makes the reported results more understandable.

Finally, the use of current fair values is more timely than historical cost or a mixed attributes model. In both the historical cost and mixed attributes models, income effects are often deferred until the cryptocurrency is sold or otherwise disposed of. Therefore, increased comparability among entities, and the verifiability and timeliness of the fair value measurements will improve understandability and enhance the relevance and faithful representation of the information provided by preparers of financial statements. Overall, improving these characteristics result in more useful information for decision making. The use of fair value accounting is also supported by a current trend in financial reporting: the use of the asset/liability approach[14].

Valuation Model for Financial Reporting

The definition of fair value for financial reporting is based on an exit price concept. The exit or exchange price is defined as the price that can be obtained on the disposal of an asset or the amount paid for the transfer of an obligation in an orderly transaction between market participants at the measurement date. The concept of an orderly transaction assumes that the hypothetical transaction used to measure fair value will be one in which the seller of an asset or the transferor of an obligation has the usual access to markets would not assume a forced sale as in the case of a liquidation or bankruptcy.

When measuring assets to be used in exchange at fair value, we must identify the *principal market* (FASB 2011; IASB 2011). Only if a principal market cannot be identified, then the most advantageous market should be used. As is the case of cryptocurrencies, assets may be traded in different, active markets at different prices. If an entity enters into transactions in multiple markets and can access prices in those markets for the asset at the measurement date, then those markets can be assessed in terms of volume and level of activity.

According to current accounting standards, the principal market is the market with the greatest volume and level of activity for the asset (FASB 2011; IASB 2011). The fair value of the asset would be measured using the price that would be received in that market. The main objective of our model is to dynamically identify the principal market and once that market is obtained, source all price information employed either as a spot or as a benchmark from that exchange[15].

[14] The use of fair value accounting finds support from the shift to an asset/liability approach from an income statement focus. The asset/liability approach is a balance sheet focused method placing emphasis on proper asset and liability measurement when developing and implementing accounting standards. This trades off the prior income smoothing emphasis of the standard setters. Previously, the focus was on proper revenue and expense recognition. The goal of facilitating projections was achieved by smoothing income. This mindset allows for more earnings volatility on the income statement. Earnings volatility is primarily due to the recognition of unrealized gains and losses (Singh 2017; Gwilliam & Jackson 2008; Benston 2006). Power (2010) noted that with the move to the asset/liability approach, the notion of transactions-based income realization no longer has the prominence it once had. This increases the support for measuring unrealized gains and losses on fair value fluctuations for assets or liabilities held. Our proposed use of fair value accounting for cryptocurrencies is consistent with and supported by the asset/liability approach.

[15] We use a spot price in our illustration found in Section 4 of this paper. However, benchmarking or an averaging technique could also be employed after we designate the principal exchange.

Specifically, ASC 820 (FASB 2011) indicates that if there is a principal market for the asset or liability, the fair value measurement shall represent the price in that market (whether that price is directly observable or estimated using another valuation technique), even if the price in a different market is potentially more advantageous at the measurement date. Moreover, in order to be relevant, the benchmark price should be at least approximately tradable on an accessible market.

4. The Fair Value Model for Financial Reporting: An Application of FASB ASC 820

The fair value model for financial reporting requires that we follow several steps in determining the fair value of an asset or obligation. In the case of cryptocurrency, the unit of account is simply one unit of the digital currency measured as either a single digital coin or a fraction of a digital coin. In addition, because cryptocurrencies cannot be used in production or in conjunction with other assets, the highest and best use is in exchange. The valuation technique used in the case of cryptocurrencies is the market approach.

As a result, our first valuation issue is to determine the principal or most advantageous market at a specific point in time. When we identify a principal or most advantageous market, we will use a market approach that identifies quoted exchange prices at that moment. However, we will ultimately need to justify the level of reliability of the inputs used in our fair value measure for disclosure in the fair value hierarchy.

Determining the Principal Market and Fair Value

A primary purpose of this paper is to develop methodology that first, identifies the principal market and second, extracts a fair value for financial reporting purposes from that principal market. As will be discussed, the markets for cryptocurrencies are fragmented and may have limited and / or inaccurate measures of volume. In addition, the reliability of the data extracted from certain exchanges may have to be used with caution. However, we believe that there are several factors that can be considered to improve the reliability of the volume and price information obtained from the cryptocurrency exchanges. These factors include the level of exchange oversight, the microstructure efficiency, transparency and data integrity. Our proposed methodology will take these and other factors into account and allow for the efficient identification of the principal market and the determination of the fair value of the cryptocurrency at the measurement date[16].

Market Fragmentation and the Challenge of Identifying the Principal Market

One of the key characteristics of the cryptocurrency market is its high level of fragmentation. The main cryptocurrencies, Bitcoin and Ethereum, are traded on over 100 exchanges worldwide, with a large variety of underlying mechanisms. As such, the possibility exists that there may be no single exchange that is dominant in terms of volume, price discovery, or any other attribute that would make it an obvious principal market.

Moreover, either due to the difference in trading rules, and/or to the lack of active arbitrageurs at the current phase of market development for many exchanges, there can be significant differences in the prices between the exchanges, and due to geographic disparity, a constant shift in the volume prominence throughout the day. Some of the less-liquid currencies are traded over one or two exchanges, in particular the currencies that are issued by the exchanges themselves. Most of the liquid currencies are likewise traded over several different exchanges with a likelihood that no single exchange can be designated as the principal market.

Several other exchange-traded assets have either a designated principal exchange or a de facto principal exchange that dominates all other exchanges in terms of volume or visibility and serves as a focal point in the price discovery process. The situation is quite different for

[16] The same approach to determine a principal market can be used for both financial reporting and tax purposes.

cryptocurrency where there may not exist a single dominant exchange in terms of volume.

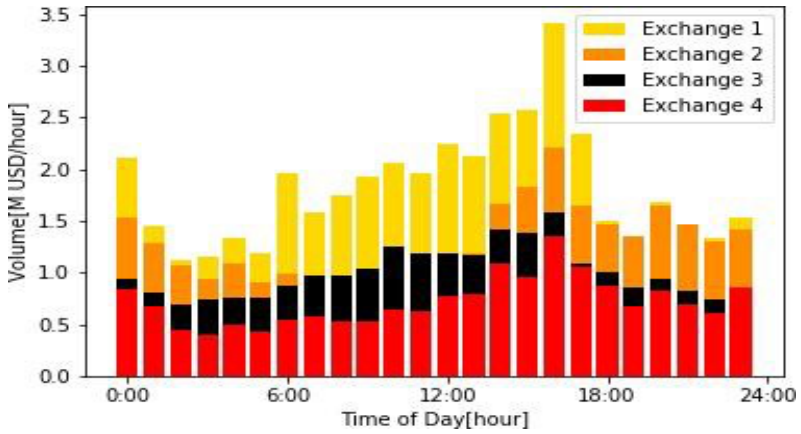
To illustrate, Table 1 shows the average daily volume over the first quarter of 2019, on four hypothetical exchanges. As we can see, none of these exchanges clearly dominates the market. Assuming that only four exchanges exist, Exchange 1 controls less than 50% of the market and that level may not be considered significant enough to dominate the entire market. Moreover, the volume reporting does not follow any standard, and it has long been suspected that some of the numbers reported by some of the exchanges do not reflect real volume[17].

Table 1: Bitcoin-US Dollar Average Daily Volumes (in millions of US Dollars)

Average Daily BTC-USD Volume (Millions of US Dollars) Q1 2019	
Exchange 1	78.6
Exchange 2	48.3
Exchange 3	36.5
Exchange 4	27.1

It is important to note that the time of day over which we measure fair value is also critical in determination of a principal exchange. Depending on time of day some exchanges may dominate in certain hours while other exchanges may be dominant at others. Figure 1 shows the average intra-day volume of Bitcoin-US Dollar trades in millions of dollars in trades per hour (time of day). The data presented in Figure 1 indicate that during certain hours Exchange 4 is clearly dominant while during other times during the day Exchanges 1 and 2 have more significant trades.

Figure 1: Intra-day Trading Volume by Hour
Bitcoin-US Dollars (in Millions of US Dollars)



Given the fragmented nature and variability noted on some of the cryptocurrency exchanges, it may be difficult to identify a principal market. So, careful attention must be given to the accounting guidelines for valuation at fair value, and proper interpretations must be made for this setting. Following both US GAAP and IASB requirements in such cases, when a

[17] Available at: https://coinmarketcap.com/exchanges/volume/24-hour/ However, as noted by Bitwise in their presentation to the SEC, there are currently 10 reliable exchanges for Bitcoin (Bitwise 2019).

principal market cannot be identified, we must consider the most advantageous market from the point of view of the holder of the assets (i.e., the market participant). Again, the most advantageous market is the market where the entity would yield the highest net amount received on sale, after deducting estimated transactions costs. Although transactions costs are used to determine the most advantageous market, they are not included in price used in determining the fair value.

There are various considerations as to what would be the principal or most advantageous exchange for a particular currency pair and a particular investor, including the jurisdiction under which an exchange operates, the level of regulation and other exchange oversight, as well as liquidity and mechanism details.

As noted earlier, our proposed fair value measurement methodology for cryptocurrencies is a valuation technique that utilizes observable inputs, quoted prices and other relevant transaction data directly from exchanges. Therefore, a critical step in the valuation process is to identify either the principal or the most advantageous market.

We believe that the use of a principal market is most appropriate because a fair value measurement generally assumes that transactions take place in a principal market. Only in the absence of a principal market should the most advantageous market be used[18].

Determination of a principal market is based on independent analyses performed at the organizational level and can vary among entities and businesses within a single entity. So, the identification of a principal market is entity specific, and can vary among specific entities within a consolidated group.

The standards do not provide specific guidance regarding how an entity should designate a principal market. In addition, the entity is not required to engage in an extensive search of all markets and should incorporate readily available information such as volume. Overall, the principal market is typically presumed to be the market or markets that the entity will normally use to sell an asset or transfer a liability. It is likely, particularly in the case of cryptocurrencies, that an entity will need to reassess its designated principal market as events or activities change.

It is also important that we ensure that the data extracted from the designated principal market are as reliable as possible. Due to the rapid shifts in trading volume noted earlier and the fact that some exchanges lack proper oversight or are unregulated, the exchange data reported may not be highly reliable. As a result, we need to develop a systematic methodology that can be used to score and rank the exchanges and ultimately identify the principal market. Specifically, we propose a methodology to designate a principal market by considering characteristics such as exchange oversight, microstructure efficiency, transparency, data integrity, frequency of trades and overall volume. By taking these characteristics into account, the data extracted from the

[18] As noted earlier, the use of a principal market is preferred under GAAP and we also believe that a principal market should be identified in the case of the cryptocurrency exchanges. The use of the alternative, the most advantageous market, is questionable given the current stage of development of the cryptocurrency exchanges. Specifically, the exchange that yields the highest net amount on sale of a cryptocurrency could be an exchange that although active, could lack proper oversight or generate data that is uncertain as to quality or integrity. One would tend to question whether an exchange with these characteristics is in fact "most advantageous" from the standpoint of the market participant.

designated principal market will be more reliable.

The proposed methodology for determining a principal market is presented in the next section of this paper.

Proposed Methodology to Determine a Principal Market and Measure the Spot Fair Value[19]

Our proposed methodology to designate a principal market for fair value measurement uses a ranking approach that considers several exchange characteristics, including oversight, and the volume and frequency of trades. Specifically, in order to rank the credibility and quality of each exchange, we dynamically assign a score to the key characteristics for each exchange by employing a five-step process. The five-step weighting process for identifying a principal exchange and the last price on that exchange is presented below.

***Step 1*:** Assign each exchange for each pair of currencies a Base Exchange Score **(BES)** reflecting static exchange characteristics such as oversight, microstructure and technology.

***Step 2*:** Adjust the BES based on the relative monthly volume each exchange services. This new score is the Volume Adjusted Score **(VAS).**

***Step 3*:** Decay the adjusted score based on the time passed since last trade on exchange. Here, we are assessing the level of activity in the market by considering the frequency of trades. The decay factor reflects the time since the last trade on the exchange[20]. This is the final Decayed Volume Adjusted Score **(DVAS).**

Step 4*:** Rank the exchanges by the **DVAS** score and designate the highest-ranking exchange as the ***Principal Market for that point in time.

***Step 5*:** Designate the price of the last transaction on the principal market as the Lukka Prime spot price at that point of time.

That is, after we designate the principal market, the spot fair value assigned to the cryptocurrency is measured at the time and date of the financial report[21]. The mathematical specification of this process, along with illustrations, are presented in the following sections.

Base exchange score (BES).

The Base Exchange Score (BES) reflects the fundamentals of an exchange, given equal volume and equal decay. The BES will determine which exchange should be designated as the principal market at a given point of time. This score is determined by computing a weighted average of the values assigned to four different exchange characteristics. These characteristics are:

1. ***Exchange Oversight***
2. ***Microstructure Efficiency of the Exchange***
3. ***Data Transparency***
4. ***Data Integrity exchange oversight***

[19] We are using the spot price for illustrative purposes but other benchmarks or averaging techniques can be used to determine the price or fair value at the reporting date.

[20] We call this the "freshness" of the data.

[21] Because cryptocurrency markets do not close, we use midnight on the financial reporting date as our exchange "close."

This score reflects the rules in place to protect and to give access to the investor. The score assigned for exchange oversight will depend on parameters such as jurisdiction, regulation, "Know Your Customer and Anti-Money Laundering Compliance" (KYC/AML), etc. For example, we account for "jurisdiction" by using a basic hierarchy. Here, a Level 1 jurisdiction is assigned a score of 100 and that score is reduced by 20 points for each subsequent level[22]. A sample jurisdiction hierarchy is presented in Table 2.

Table 2: Exchange Oversight-Jurisdiction Hierarchy

Level	Jurisdiction	Oversight Score [s^{oi}]
Level 1:	US, EU, Japan, Switzerland, Australia, New Zealand, Singapore	100
Level 2:	UK, Israel, South Korea, Hong Kong	80
Level 3:	Latam, China, India, Russia, Eastern Europe	60
Level 4:	South Africa, South East Asia	40
Level 5:	Africa, Middle East	20

Microstructure efficiency of the exchange.

The second exchange characteristic is microstructure efficiency. Based on prior research (Roll, 1984), we take the effective bid ask spread as a proxy for efficiency. For each exchange and currency pair we take an estimate of the "effective spread"[23] relative to the price in "pips"[24]. The score for exchange $i = 0, \ldots, n$ is computed as:

$$s_i^{eff} = 100 * \frac{sp_i - \min_j(sp_j)}{\max_j(sp_j) - \min_j(sp_j)}$$

Where $sp_0, sp_1, \ldots, sp_n$ are the spreads of the relevant exchanges measured as pips (1/10,000) of the asset price.

[22] The hierarchy is based on the S&P Sovereign Foreign-Currency Ratings, S&P Institutional and Economic assessment and whether the local currency is restricted.

[23] As the ticker size is very small for most cryptocurrencies on most exchanges, the gap between best bid and best ask can also be very small. However, as is often the case, there are extremely low volumes on these quotes and, as such, the spreads do not reflect actual transactions costs or efficiency. A better measure would be the price obtained if you run the book in both directions on a reasonable size order (say 1 BTC for a BTC-USD transaction). We refer to this spread as the *effective spread*.

[24] Pip is the "percentage in points" and represents the smallest move possible based on exchange conventions.

Data transparency.

Transparency is the term used for a quality score that is determined by the level of detail of the data offered by an exchange and is based on the hierarchy provided in Table 3.

Table 3: Transparency Hierarchy

Level	Data Detail	Score [s^{tran}]
1	**Orders**	**100**
2	**Order Book / TAQ**	**80**
3	**Trades**	**60**
4	**Candles**	**40**
5	**None**	**20**

Similar to the jurisdiction hierarchy, Level 1, the highest level in the transparency hierarchy, is assigned 100 points and is reduced by 20 points for each subsequent lower level. Exchanges considered within the transparency hierarchy are also evaluated in terms of data integrity by computing a data integrity score that includes the impact of order reconstruction, minute volume matching and daily volume matching. The data integrity score is discussed below.

Data integrity.

Integrity is evaluated on three-time scales, on tick level, short term (minutes) and daily, with the following scores:

s_{ord} - order reconstruction
s_{minute} - minute volume matching
s_{day} - daily volume matching

A weighted average of these scores will give the data integrity score. The weights are based on the relative importance of each factor at a point in time as assessed by the entity.

$$s_{int} = w_{ord} \cdot s_{ord} + w_{minute} \cdot s_{minute} + w_{day} \cdot s_{day} \quad (2)$$

These scores, s_{ord} , s_{minute} s_{day} are defined as in the following sections.

[25] This is a limit order book or the aggregate inside quote for each exchange.

Order reconstruction.

Exchanges with Level 1 transparency will provide for each transaction a corresponding "Order ID" with size information on the order. An order for which we can identify all transactions that where completed as part of the order (including cancelation) is considered a "reconstructed order". Let the volume weighted fraction of reconstructed orders be $p_{ord} > 0$ then the corresponding score is:

$$s_{ord} = 100 * (1 - e^{-v.pord}) \text{ for } v > 0. \quad (3)$$

Minute volume matching.

Level 3 transparency will provide tick by tick data for trades, level 4 transparency will provide candle data. Let $p_{min} > 0$ be the fraction of the volume on the time bar accounted by individual trades, then the corresponding score is:

$$s_{minute} = 100 * (1 - e^{-v.pmin}) \text{ for } v > 0. \quad (4)$$

Daily volume matching.

Daily volume matching is the same as the minute volume matching except that it is determined for daily volume.

Mathematical Specification of the Principal Market Designation Process

The computations below are all done per currency and as a result, even the base exchange score (BES) could vary from one currency to another. Although top exchanges generally tend to be ranked high on all the currencies they service.

The mathematical specification of the principal market designation process is presented below.

Step 1: The base exchange scores (BES) for exchange $ex_1, \ldots, ex_n$ is computed as follows:

$$s_{ex_i}^{BES} = \omega_{ov} \cdot s_{ex_i}^{ov} + \omega_{eff} \cdot s_{ex_i}^{eff} + \omega_{tran} \cdot s_{ex_i}^{tran} + \omega_{int} \cdot s_{ex_i}^{int}$$

Again, the weights are based on the relative importance of each factor and their direct impact on the overall quality of the exchange based on managements' assessment. For example, it is likely that oversight and efficiency would typically have more weight than transparency and data integrity.

Step 2: For computing the volume adjusted scores (VAS) let $vol_0, \ldots, vol_n$ be the monthly volumes of these exchanges, the volume adjusted score is then:

$$s_{ex_i}^{VAS} = \frac{vol_{ex_i}}{\sum_j vol_{ex_j}} \cdot s_{ex_i}^{BES}$$

Step 3: For computing the decayed score (DVAS) at time T, let $\{p_t^{exi} : t > 0\}$ the time series of prices provided by exchange ex_i, and let t_{exi} the timestamp on the most recent trade coming from the exchange, namely $t_{exi} = \max \{ 0 < t < T : \{p_t^{exi} : t < r < T\}\ \mathrm{t}: \varnothing\}$, then the decayed weight is given by:

$$s_{T,ex_j}^{DVAS} = e^{-|T-\tilde{t}_{ex}|} \cdot s_{ex_i}^{VAS}$$

Step 4: The principal market is the exchange with the highest decayed score (DVAS),

$$ex^{principal} = argmax\{s_{T,ex_j}^{DVAS} : ex_1, \ldots, ex_n\}$$

Step 5: Lukka Prime spot price is the last price as of time T on the principal exchange:

$$p_T^{lukka} = p_{t_{ex^{principal}}}^{ex^{principal}}$$

5. Conclusion

This paper presents a theoretical model to support the use of fair value accounting for measuring and reporting cryptocurrencies held by an entity on its own behalf. Based on the theoretical model we develop a methodology to assess the quality of digital currency exchanges and determine a principal market. With a principal market identified, a fair value is obtained to price the investment in cryptocurrencies.

First, we provide a detailed discussion of the deficiencies of the common approach used in accounting for cryptocurrencies: classification as an indefinite life intangible asset. Then, we develop our argument for the use of fair value accounting by obtaining substantial support in the conceptual framework, accounting theory and precedent accounting practice.

Under the fair value model, cryptocurrencies are carried on the balance sheet at fair value with all unrealized gains and losses reported in current earnings. However, we acknowledge the difficulty of determining a principal exchange needed to extract a "true" price in a fragmented market. In response, we develop a dynamic system to assess the credibility of the exchange by considering characteristics such as jurisdiction, regulation, oversight, volume and frequency of trades. The methodology is structured as a balance between the ability to obtain data from reliable sources, typically the more highly credited exchanges, and the timeliness of the data.

We begin our assessment of the exchanges by assigning a base exchange score that includes values for the characteristics such as regulation, exchange microstructure, data quality, transparency, coverage, volatility and other mechanisms, such as trading rules. Then, we weight the base score for volume and finally, reduce the score for infrequent trades or decay.

Our weighting methodology operates on two-time scales. On the longer monthly time scale, we adjust a set of initial weights by the volume each exchange traded over the previous month, and on the shorter time scale we decay the initial weight based on the time passed since last trade.

With a final or "decay-weighted" score, the principal exchange is selected. The point in time price needed for financial reporting and tax can then be extracted from the principal exchange. Given that the price is observable and quoted on an exchange, the fair value will not only be relevant but will faithfully represent the assets economic value.

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Appendix A
Illustration: Identification of the Principal Market and Assigning a Fair Value

We demonstrate how to identify a principal exchange and assign a fair value for financial reporting by our methodology in this section.

We assume the market is made up of four exchanges operating in different locations worldwide. The numbers and scores attributed to these exchanges are for illustrative purposes only[26]. We also assume that we will measure a spot price of a cryptocurrency at the end of the first quarter. The following illustration will follow our five-step methodology using data created for the four hypothetical exchanges. The methodology will be used to determine the principal market and designate the spot price on the measurement date for financial reporting.

Step 1: Assign each exchange for each pair of currencies a Base Exchange Score (BES) reflecting static exchange characteristics such as oversight, microstructure and technology.

The BES measures for our hypothetical exchanges are presented in Table 4.

Table 4: Base Exchange Scores

Exchange	Location	1. Oversight 35%	Effective Spread	2. Efficiency 30%	Order Reconstruction			3. Integrity 25%	4. Transparency 10%		BES
					Tick	Minute	Day				
Exchange 1	Antwerp	100	18	0.00	73	92	100	84.19	order book	100	*66.05*
Exchange 2	Seoul	60	3	93.75	63	78	98	81.35	order book	100	*79.46*
Exchange 3	Tel Aviv	80	2	100.00	82	97	100	85.29	order book	100	**89.32**
Exchange 4	New York	100	9	56.25	81	98	100	85.33	order book	100	*83.21*

As noted in Table 4, the exchange with the highest BES is Exchange 3. The BES is the weighted average of the four, key exchange characteristics: Oversight, Efficiency, Data Integrity and Transparency The weights used in this computation are noted below the exchange characteristic column on the table. In our example, the BES for Exchange 1 would be computed as follows:

$BES_{Exchange\ 1} = (35\% \times 100) + (30\% \times 0) + (25\% \times 84.19) + (10\% \times 100) = \underline{66.05}$.

This score must now be adjusted for volume. This is done in Step 2.

Step 2: Adjust the BES based on the relative monthly volume each exchange services. This new score is the Volume Adjusted Score (VAS).

The volume adjusted BES amounts for sample exchanges are presented in Table 5.

[26] Any resemblance to existing exchanges is by coincidence.

Table 5: Volume Adjusted Scores (VAS)

Exchange	Monthly Volume (Millions of US Dollars)	Percent Volume Represented by Each Exchange	Base Exchange Scores (BES)	Volume Adjusted Score (VAS)
Exchange 1	48.6	26.9	66.05	17.77
Exchange 2	48.3	26.7	79.46	21.25
Exchange 3	36.5	20.2	89.32	18.08
Exchange 4	47.1	26.1	83.21	**21.70**
	180.5	100.0		

In our illustration, the VAS for Exchange 1 would be determined as follows:

$$\text{VAS} = (\%\ \text{Volume}\ X\ \text{BES}) = (26.9\% \times 66.05) = \underline{17.77}$$

At this point in implementing our methodology, Exchange 4 has the highest VAS at 21.70. This illustrates the fact that an exchange with a high BES can be less dominant due to lower volume. In this case, the principal exchange shifted from Exchange 3 to Exchange 4. However, that score is to be adjusted for the potential decay or time lag between trades. The decayed volume adjusted scores or DVAS are computed in Step 3.

Step 3: Decay the adjusted score based on the time passed since last trade on exchange. Here, we are assessing the level of activity in the market by considering the frequency of trades. The decay factor reflects the time since the last trade on the exchange. This is the final Decayed Volume Adjusted Score (DVAS).

We track the freshness of the data by tracking the most recent trades. An example is presented in Table 6.

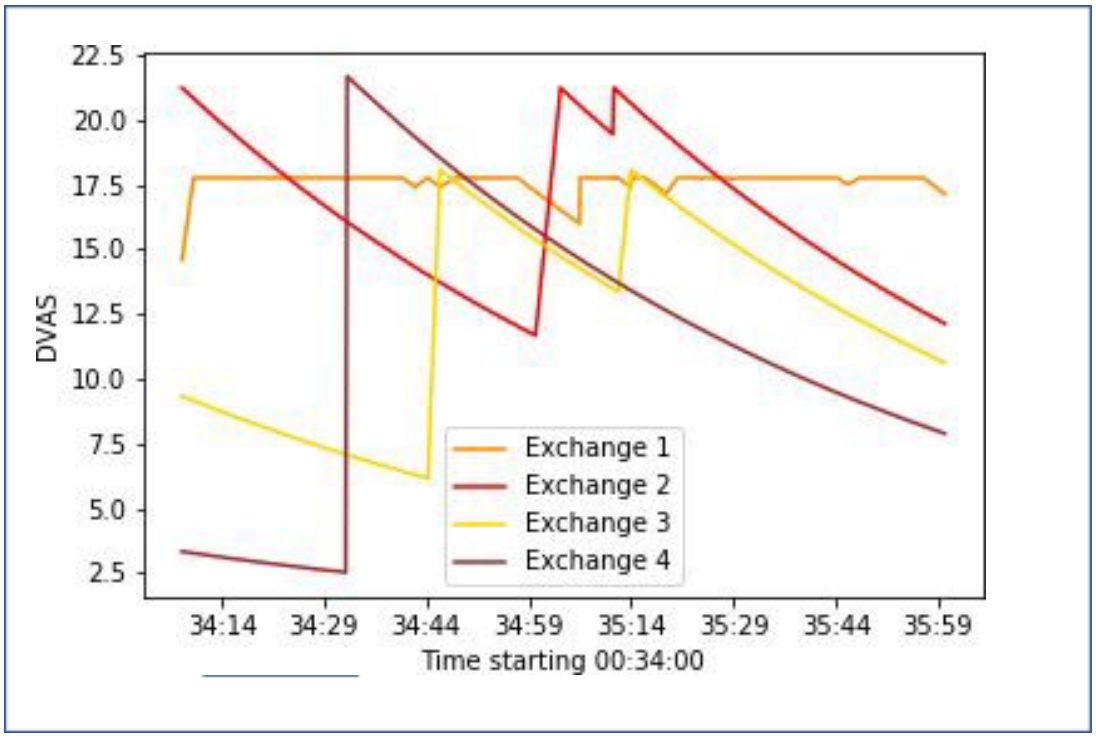
Table 6: Tracking Most Recent Trades

Time	Exchange 1	Exchange 2	Exchange 3	Exchange 4
00:34:26.370	00:34:26.370	00:34:08.183	00:33:11.000	00:31:25.701
00:34:29.184	00:34:29.184	00:34:08.183	00:33:11.000	00:31:25.701
00:34:30.410	00:34:30.410	00:34:08.183	00:33:11.000	00:31:25.701
00:34:32.167	00:34:32.167	00:34:08.183	00:33:11.000	00:31:25.701
00:34:32.382	00:34:32.167	00:34:08.183	00:33:11.000	00:34:32.382
00:34:33.510	00:34:33.510	00:34:08.183	00:33:11.000	00:34:32.382

We assume that we are measuring the spot price at a point in time, which could be the financial reporting date. In this example we observe the arrival of new trades from approximately 30 minutes after midnight. Therefore, at 00:34.32.167 minutes after midnight Exchange 1 had the most recent trade on line 4. Then, at 00:34.32.382, Exchange 4 had the most recent trade and therefore decayed less than the other exchanges at that point.

This is also seen in Figure 2 below. It shows a partial measurement period for the last minute considered from 34:00 minutes after midnight through 35:00 minutes after midnight.

Figure 2: Decayed Volume Adjusted Scores Over Five-Minute Window From 34:00 to 35:00 Minutes After Midnight



Vertical discontinuity indicates arrival of new data (i.e., a fresh trade) and resets the DVAS for that exchange. When there are no trades, the DVAS decays[27]. Exchange 4 shows the highest DVAS (between 20.0 and 22.5) at 34:33 and the least decay relative to the other exchanges at that point which was the freshest piece of data. This is due to the fact that no other trades arrived between that point and the "closing" time of 35:00 minutes after midnight.

step 4: Rank the exchanges by the DVAS score and designate the highest-ranking exchange as the *Principal Market* for that point in time. Table 7 provides the final rankings and the identification of the principal exchange.

Table 7: Principal Market Determination Based on Ranking of Decayed Volume Adjusted Scores

Time: Minutes after Midnight	Decayed Volume Adjusted Score*	Ranking: Principal Market
00:34:26.370	17.80	Exchange 1
00:34:29.184	17.80	Exchange 1
00:34:30.410	17.80	Exchange 1
00:34:32.167	17.80	Exchange 1
00:34:32.382	21.25	Exchange 4
00:34:33.510	**21.25**	**Exchange 4**

***Approximate DVAS amount from the graph in Figure 2.**

Exchange 4 is designated as the principal exchange based on the ranking of the DVAS amounts at the fair value measurement point. That is, at 34.33:510 minutes after midnight,

[27] These data were selected to illustrate changes in the principal exchange and therefore, we used high decay levels in our computations. The decay levels would not be as extreme in an actual setting.

Exchange 4 is the principal exchange as it has the "freshest" data or the exchange with the least decay at the time. Note that higher volume at that time of day could be due to activity in the Asian markets at that time.

Step 5: Designate the price of the last transaction on the principal market as the Lukka Prime spot price at that point of time.

Table 8*: Determination of Lukka Prime Spot Price Reflecting the Price Shift as Result of Decay (In US Dollars)*

Time	Lukka Prime	Exchange 1	Exchange 2	Exchange 3	Exchange 4
00:34:26.370	**3811.47**	**3811.47**	3809.5	3808.52	3808.21
00:34:29.184	**3811.47**	**3811.47**	3809.5	3808.52	3808.21
00:34:30.410	**3811.47**	**3811.47**	3809.5	3808.52	3808.21
00:34:32.167	**3811.47**	**3811.47**	3809.5	3808.52	3808.21
00:34:32.382	**3810.00**	3811.47	3809.5	3808.52	**3810.00**
00:34:33.510	**3810.00**	3811.46	3809.5	3808.52	**3810.00**

The Lukka Prime spot price is $3,810 and represents the fair value of the cryptocurrency extracted from Exchange 4 at 34:33.510 minutes after midnight at the end of the first quarter. This valuation is used to measure the investment in cryptocurrencies on the quarterly report for the first quarter[28].

[28] After the valuation and reporting the investment in cryptocurrencies in the financial statements at fair value, the accountant will need to disclose the level of reliability of the inputs used to measure the fair value in the hierarchy. We understand that this can be debated. One could argue that if the observed, quoted spot price is extracted from the principal market (as we define it in this paper), then the fair value could be disclosed at Level 1. Conversely, if position is taken that this fair value is determined in a market that is less active, then a Level 2 disclosure could be used. It should be noted that management assumptions are used in determining the principal market and not the final fair value measurement. It is also important to recall that the standards do not provide strict guidance as to how the principal market is to be determined and also indicate that the entity does not need to engage in an extensive search to identify the principal market but should incorporate all available information.

Appendix B
Current Accounting Guidance for Cryptocurrency Investments

Presently, no formal accounting standards exist for cryptocurrencies under either U.S. GAAP or IFRS. As a result, accounting for cryptocurrencies is based on the manner in which preparers of financial statements "force fit" cryptocurrencies into existing valuation and reporting models. The accounting used by preparers of financial statements is generally based on the guidance provided by the accounting firms, or on the accounting treatment their auditors allow.

The conceptual frameworks of both the FASB and IASB clearly support the notion that a cryptocurrency is an asset (FASB 2010b; IASB 2010). However, transparent financial reporting requires that the economic substance of this resource be properly measured and disclosed. Under both U.S. GAAP and IFRS, cryptocurrencies do not meet the definition of cash, cash equivalents, property, or investments in financial assets. Current practice indicates that cryptocurrencies are generally considered inventory or a commodity for a broker-dealer and an indefinite-lived intangible asset for an entity investing in cryptocurrencies on its own behalf (CPA Canada 2018; Deloitte 2015; EY 2018a, 2018b; Grant Thornton 2018; KPMG 2018; PwC 2018).

We argue that cryptocurrencies held by firms on their own behalf and related transactions involving cryptocurrencies should be accounted for under a FV model. Cryptocurrency held by the entity should be carried at FV on the balance sheet and all unrealized gains and losses recognized in current earnings - this approach is not widely supported in current practice. Our argument for FV accounting begins with a discussion of current accounting guidance and the theoretical deficiencies inherent in current practice.

Accounting for Indefinite-lived intangible assets

The lack of formal and consistent accounting guidance regarding the proper measurement of cryptocurrencies raises significant questions regarding how holders of such assets should measure and report them in the financial statements. When reviewing the current definitions available under both U.S. GAAP and IFRS, we can conclude that cryptocurrencies are assets, but the type of asset is not as easy to determine. Because cryptocurrencies are assets that lack physical substance, they are generally classified as indefinite-lived intangible assets[29]. This classification results in the use of a mixed attributes model for valuation.

Under U.S. GAAP, indefinite-lived intangible assets are not amortized and are carried at acquisition cost (FASB 2010a) and the entity is required to review for impairment annually. Under IFRS, there are two options, the cost model and the revaluation model, to measure intangible assets after they are recognized (IASB 2001c). The cost model is similar to U.S. GAAP with the exception that recoveries up to original carrying value are permitted. Under the revaluation model, the entity can employ a full mark-to-market process to value the indefinite-lived intangible asset. Accounting for unrealized gains and losses depends on the direction of the first and subsequent revaluations with gains typically deferred in stockholders' equity in a revaluation surplus account (other comprehensive income) and moved to earnings if the gain is realized on disposal.

[29] This position is supported by the IASB's Interpretations Committee's recent release (IASB 2019).

Theoretical Deficiencies in the Classification as Indefinite-lived Intangible Assets

The current guidance described in the preceding section is flawed because it does not properly consider the fact that cryptocurrencies do not neatly fit into the definition of an intangible asset. Generally, an intangible is used directly by an entity to generate revenue and cash flow in operations - clearly not the case with a cryptocurrency. Although cryptocurrency lacks physical substance, and has an intangible quality, the purpose of holding the intangible asset is not for use in current operations to generate income but rather, it is held to create profit (loss) and cash flows from changes in FV. Cryptocurrencies possess intangible qualities, but they are clearly unique assets in that they can be held for trading and may also be used as a means of payment in transactions. Current accounting interpretations/guidance provided by accounting firms to their clients fail to recognize these unique economic characteristics of cryptocurrencies (IASB 2019; EY 2018a, 2018b; KPMG 2018).

This guidance classifies cryptocurrency as an indefinite-lived intangible asset under U.S. GAAP and does not recognize any upward movement in FV. This treatment is inconsistent with the economic rationale for holding the asset and improperly reflects the economic substance of the valuation in the financial statements. IFRS accounting for indefinite-lived intangible assets is the same when using the cost/impairment model with the exception that recoveries are permitted, up to the original carrying value. The use of the revaluation model for indefinite-lived intangible assets under IFRS permits upward revaluation above original carrying value but is often deferred until the asset is sold and is reported as other comprehensive income, not in current earnings.

We believe that accounting models currently used to account for intangible assets cannot properly accommodate what we consider to be an "intangible investment" from an economic perspective. As such, we advocate the use of FV accounting with all unrealized gains and losses recognized in earnings. The basis for our conclusion is grounded in the conceptual framework and precedent accounting guidance discussed in the following section.

We take the position that cryptocurrencies should be accounted for as a speculative, intangible investment asset. As such, we advocate the use of FV accounting with all unrealized gains and losses recognized in earnings. The use of FV accounting for cryptocurrencies is supported by both the conceptual framework and precedent accounting.