

Investigating the Impact of Financial Reporting for Cryptocurrencies on Company Value

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Abstract

This research focuses on investigating the impact of cryptocurrency accounting reports on company value (measured by financial performance) before and during the COVID 19 epidemic. Analyzing publicly listed companies' data in firms' 10-K filings, we find that there is no significant relation with the company's profits while a company holds cryptocurrency positions. Although the issue of cryptocurrency accounting is an emerging topic, prior literature is mostly focused on cryptocurrency investment and is a rare investigation coping with the accounting treatment of crypto-assets. This paper seeks to contribute to the knowledge of fresh issues surrounding the accounting practices and standards tied to cryptocurrency for the company's holding of crypto-assets. Taken together, the observed findings obtained from the test of the second hypothesis show that there is no significant relationship with the company's stock returns while a company holds cryptocurrency positions. This result can be interpreted to determine whether the general investors take a more positive or negative attitude towards companies involved in cryptocurrency holding. Crucially, research findings unveil that cryptocurrency holdings have a significant impact on a company's liabilities. Our empirical evidence could be beneficial to public authorities and firms in decision-making situations related to cryptocurrency holdings of companies.

JEL classification numbers: G10, G18, M14, M41.

Keywords: Cryptocurrency accounting reports, Crypto-asset holdings, Firm value.

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1. Introduction

The rapid development of financial technology is Bitcoin's emergence, which began to be transacted in 2009. Bitcoin is a Crypto-asset. *Cryptocurrency* was introduced by Satoshi Nakamoto in 2008. Bitcoin uses technology *peer-to-peer*, making it possible to operate without a central bank such as transaction management and money issuers (central authority). Everything is done collectively by the network.² No authority in the Bitcoin system that distinguishes it from electronic money (*e-money*). Since then, as of 11 November 2021, the total market cap of all crypto-assets including stablecoins and tokens hit a record high of \$2.973 trillion during the COVID-19 pandemic. Apart from Bitcoin, other names such as Ethereum, XRP, Tether, Bitcoin Cash, Lite Coin, and present more than 21,000 types of cryptocurrencies with a global crypto market capitalization value reaching \$792.12B on December 30, 2022³. Bitcoin is the best-known representative of cryptocurrencies and accounts for over half of the market value. In addition, according to CoinMarketCap, the largest cryptocurrency (Bitcoin) exhibits with a market capitalization of \$317,217,878,970 as of December ,30 2022. Unfortunately, there is scarce legal or generally accepted definition regarding the definition of crypto-assets and rare official instructions for accountants on Bitcoin reporting requirements. Crypto assets are transferable digital representations designed to prevent duplication and copying according to **PwC**. (2019). The technologies facilitate the transfer of crypto-assets known as Blockchain or technology ledger distributed. Blockchain is a ledger decentralized that keeps records of all transactions over the peer-to-peer network and allows encrypting (encoding). Motivations underpinning the IASB (International Accounting Standards Board) final decision to issue an agenda decision include controversial guidance (Cryptocurrencies Holdings, June 2019). Accordingly, authoritative guidance of reporting/disclosure for crypto-assets holdings required timely construction and some problems naturally appeared themselves:

Contextualizing the above consideration of these issues, this study intends to respond to the following research questions:

How to evaluate and disclose the crypto-assets after they are recorded?

In recent years, many companies have purchased cryptocurrency as part of their broader financial management system, and this ought to be adequately recorded in their financial reporting (Luo and Yu,2022). Regarding the subsequent evaluation after the crypto-assets are recorded, according to IFRS13 "Fair value measurement".

² https://en.bitcoin.it/wiki/Main_Page in a paper entitled Bitcoin: A Peer-to-Peer Electronic Cash System. Bitcoin is a decentralized digital currency that allows direct payments to anyone, anywhere in the world.

³ <https://coinmarketcap.com/charts/> , In the study, we use interactively both cryptocurrency and crypto-assets.

Fair value is based on the evaluation model, the first step in considering the fair value of a crypto asset is to determine whether there is an active market for cryptocurrency at the measurement date.

1.1 Risk disclosure for crypto assets

Given the complexity and dynamic volatility associated with cryptocurrency, entities should provide accounting information about their financial position and consider whether additional disclosures about their cryptocurrency holdings are required. (CPA, 2018, P.12).

IAS 1.17 states that an entity is required to “provide additional disclosures of accounting information when it must comply with the specific requirements in IFRS is insufficient to enable publicly users to comprehend the impact of specific transactions activity, other conditions, and events on the entity’s financial position and performance.” It may also be relevant not only to the disclosures required by a specific IFRS Standard, among others but also to the following disclosures are necessary:

- The fair value evaluation for the Bitcoins coping with the appropriate IFRS 13 disclosures if the cost model is adopted.

On December 13, 2023.FASB has issued standards to enhance the accounting for and disclosure of cryptocurrencies. The amendments in the accounting standards update (ASU) enhance the accounting for cryptocurrencies by an entity requirement to measure those cryptocurrencies at fair value each reporting period with changes in fair value identified in net income, available at the FASB website:

<https://www.fasb.org/page/PageContent?pageId=/projects/recentlycompleted/accounting-for-and-disclosure-of-crypto-assets.html>

- Accounting information on the market risk associated with the Bitcoins such as historical volatility disclosures required by a specific IFRS Standard, may also be relevant. Additionally, there may be disclosures outside of financial statements that are necessary to securities regulators. Entities should consider what disclosures might be necessary for meaningful management’s analysis and decisions and other documents filed as continuous disclosure under securities rules.

Our paper contributes to the growing empirical literature on crypto-asset holdings of publicly listed companies as threefold. First, our study is one of the first to provide fresh evidence that the cryptocurrency holdings of the top six listed companies have a weak performance of the company’s profits. The above findings are thus evidence that whether holding cryptocurrency or not will affect the company's profitability.

Second, the observed findings obtained from the test of the second hypothesis show that there is no significant relationship with the company’s stock returns while a company holds cryptocurrency positions. Finally, evidence findings unveil that cryptocurrency holdings have a significant impact on a company’s liabilities.

On this account, extensive disclosures about the potential risks of Bitcoin such as historical volatility and their impact estimation under potential scenarios of future financial growth should be reported. (Procházka., 2018, P.185).

The remainder of the study is organized as follows: Section 2 presents relevant literature and hypotheses. Section 3 provides a detailed overview of current accounting practices for Bitcoins. Section 4 provides the data and the methodological approach. Section 5 reports and discusses the empirical findings. Finally, Section 6 draws a conclusion.

2. Relevant literature and hypotheses

2.1 Prior literature

Regarding this fresh ecosystem of blockchains and cryptocurrencies, academic articles are scarce on the accounting treatment, additional financial statement disclosures, and auditing. A recent article by Luo and Yu (2022) shows the annual filings of 40 global companies in 2020 with famous crypto-exposed firms to exhibit how companies' crypto-asset accounting treatment under IFRS differs from those under U.S. GAAP. Several previous literatures discuss preliminarily how blockchain technology adoption could raise the efficiency of accounting information systems (AIS) and the external auditing quality, for instance, Yu et al. (2019); Desplebin, et al., (2021); Garanina et al. (2021); Han et al. (2023). More specially, Yatsyk, T. (2018) and Hampl et al. (2021) discuss the accounting information issue of cryptocurrency holdings. Concerning the economics studies in financial markets, most previous literature on blockchain technologies concentrate on FinTech innovations resulting from practice perspectives such as crypto mining, token adoption, initial coin offerings (ICO), and decentralization (e.g. Li et al. 2019; Biais et al. 2019; Howell et al. 2020).

On the ICO issue, Bourveau et al. (2022) explore the role of disclosure and the surrounding new information intermediaries in the unregulated ICO fund issuing procedure, see also Lyandres et al. (2022). In addition, numerous researchers consider cryptocurrency on key features, such as jump dynamics (e.g., Dyhrberg, 2016; Gronwald, 2019; Hou et al., 2020; Chen et al., 2021), blockchains technologies adoption, and cryptocurrency price prediction in the crypto market (e.g., Yermack 2017; Easley et al., 2019). A growing literature on cryptocurrency specifically discusses modeling volatility dynamics and portfolio management on cryptocurrencies, such as Mensi et al. (2020), Makarov and Schoar (2020), and Liu and Tsyvinski (2020); Chen et al. (2024). To sum up, prior literature has not investigated the risk exposure of firms' accounting on cryptocurrency holdings and the extent of fair value disclosures. Our paper not only focuses on the financial statement implications of digital assets but also investigates how global firms uncover their cryptocurrency activities in financial filings.

2.2 Hypotheses development

This study aims at the accounting treatment of crypto-assets, exploring how to use existing International Financial Accounting Standards (IFRS), and then analyzing which conditions of IFRS can be applied to the nature and conditions of crypto-asset disclosure. As a whole, investors respond more to firm's stocks with higher readability disclosures of cryptocurrency accounting reports. To uncover the impact

of holding crypto assets on enterprises, which leads us to our next assumption and further establish the following three hypotheses:

H₁: Cryptocurrency-related disclosures are related to company value.

H₂: Disclosure of cryptocurrency holdings is associated with corporate stock returns.

H₃: If a company holds cryptocurrency, the risk factor will increase.

3. Overview of recent accounting practices for Bitcoins

3.1 IFRS Interpretations Committee (IC)

Crypto assets are an alternative investment besides investing in stocks or other commodities. However, the absence of a governing authority has raised a debate on whether crypto assets is a safe place for investors. Various countries have allowed crypto asset transactions by providing legal certainty through regulations, both as an investment and a means of payment.

Seeing the potential for crypto assets as alternate commodities that can be purchased or owned by companies for investment purposes, it is necessary to have accounting standards governing the recording and disclosure of crypto assets in financial statements. There are no accounting rules or standards that regulate crypto assets related to recording reporting and disclosure obligations in financial reports, both in IFRS (*International Financial Reporting Standards*). The *Financial Accounting Standards Board* (FASB), through the *IFRS Interpretations Committee (IC)*, has conducted various discussions that discuss crypto assets, especially *cryptocurrencies*.

On 21 June 2019, the IFRS IC published the results of a debate about how IFRS standards are applied to the ownership of cryptocurrency.

In June 2019, the *IFRS Interpretations Committee Interpretation Committee* published a *Decision Agenda* on how IFRS standards are applied to accounting for holdings cryptocurrency. The Committee sees that the scope of crypto assets is extensive, so the discussion is directed at cryptocurrencies, which are part of crypto assets.

According to the IFRS IC, cryptocurrency has the following features:

- a. A digital or cryptocurrency that is recorded on a ledger distributed that utilizes cryptography for security.
- b. Jurisdictional authorities or other parties do not issue it.
- c. It does not give rise to a contract between the holder and other parties.

The Committee concluded that IAS 2 on inventory could be applied to accounting for *cryptocurrencies* when held for sale in the ordinary business course. If only to be owned/held, an entity can apply IAS 38 regarding intangible assets.

In determining whether a cryptocurrency be considered an intangible asset, the holders apply IAS 38. The Committee determines whether the cryptocurrency meets the definition of a financial asset in IAS 32 or falls within the range stipulated in other standards. The Committee argued that crypto-assets are not financial assets. This is because crypto-assets do not conform to the definition of financial assets in

IAS 32. Thus, crypto assets are not cash equivalents and not equity instruments in other entities.

Apart from the IFRS IC, various other institutions have tried to formulate or study how crypto assets' accounting treatment. *Pricewaterhouse Coopers* (PwC) published a study entitled *Cryptographic Assets and Related Transactions: Accounting Considerations under IFRS* in December 2019, which contains how accounting is treated and the application of accounting standards for Crypto Assets.

3.2 Assess whether individual crypto-stock returns and identifying cryptocurrencies volatility

After a review of relevant articles on accounting information guidance for financial report preparers, IFRS disclosures may be jointly significant factors in impacting investment decisions for report users which subsequently determine the market value and amount of shares traded by listed entities. If a U.S.-listed firm acquires Bitcoins as an acquisition cost, it recognizes the impairment loss but not the impairment recovery benefit. They are basically classified as intangible assets, but different firms use different items to present them on the financial report. For example, Tesla is presented as a digital asset, Block is classified as a non-current asset item, and Coinbase is classified as a crypto asset.

The work therefore favors the full disclosure of all accounting information in crypto assets to aid the financial reporting users to make wise decisions on their investments.

3.3 Case study for Tesla as an example

As of March 31, 2021, Tesla purchased a total of \$1.50 billion in Bitcoin and accepted Bitcoin as a payment for the specified product sales in certain regions, subject to applicable regulations. The cryptocurrencies ("digital assets") are recorded at cost initially and are subsequently revalued at cost on the consolidated balance sheet, net of any impairment losses incurred since the acquisition of crypto assets. In determining if impairment losses have occurred, Tesla's report considers the lowest price of crypto asset quoted prices on the active exchange(s) since obtaining the digital asset. If the then current carrying value of a crypto asset exceeds the fair value so determined, an impairment loss has occurred regarding those crypto assets in the amount that can be approximated by the difference between their carrying values and the price determined. The study synthesized the procedure of Tesla's accounting treatment related to Bitcoins as follows:

A. Indefinite-lived intangible assets

According to the FASB ASC Master Glossary, crypto-assets meet the definition of intangible assets that lack physical substance and are recorded in FASB ASC 350, Intangibles - Goodwill and Other. Therefore, if the enterprise has no inherent limit on the useful life of crypto-assets, they will be classified as indefinite-lived intangible assets.

B. Evaluation methodology: cost method**Purchasing**

indefinite-lived intangible assets, it is the subject where cryptocurrency is classified and should be recognized at the cost at the purchasing time.

Price fluctuation

The company needs to reduce its book value, while the price of the cryptocurrency decreases. However, even if the crypto-asset's price recovers or rises, the company cannot recognize gains and increase its book value.

Sold

Gain or loss on sale must be reported within net income (profit and loss), i.e., revenue less cost of purchase or adjusted book value Tesla uses "digital asset" as the accounting subject of cryptocurrency, and regards cryptocurrency as indefinite-lived intangible assets.

Purchasing cryptocurrency

Tesla will record the cost of purchase and list the cryptocurrency as a net amount in the digital asset category of the balance sheet. It is also recorded in the investment activities in the cash flow statement.

Table 1: Financial Statements of Tesla

Part I. Financial Information		Item 1. Financial Statements		
Tesla, Inc. Consolidated Balance Sheets(unaudited) (in millions, except per share data)				
		September 30, 2022		December 31, 2021
Assets				
Current assets				
Cash and cash equivalents	\$	19,532	\$	17,576
Short-term marketable securities		1,575		131
Accounts receivable, net		2,192		1,913
Inventory		10,327		5,757
Prepaid expenses and other current assets		2,364		1,723
Total current assets		35,990		27,100
Operating lease vehicles, net		4,824		4,511
Solar energy systems, net		5,562		5,765
Property, plant and equipment, net		21,926		18,884
Operating lease right-of-use assets		2,251		2,016
Digital assets, net		218		1,260
Intangible assets, net		228		257
Goodwill		191		200
Other non-current assets		3,236		2,138
Total assets	\$	74,426	\$	62,131

Notes

Source: The data is extracted from publicly available financial statements of Tesla Inc.

Table 1 depicts when as of September 30, 2022 and December 31, 2021, the carrying value of net digital assets holdings present \$218 million and \$1.26 billion, respectively.

Table 2: Consolidated Statements of Cash Flows of Tesla

Tesla, Inc. Consolidated Statements of Cash Flows (unaudited) (in millions)				
	Nine Months Ended September 30			
	2022		2021	
Cash Flows from Operating Activities				
Net income	\$	8,880	\$	3,301
Adjustments to reconcile net income to net cash provided by operating activities:				
Depreciation, amortization and impairment		2,758		2,063
Stock-based compensation		1,141		1,563
Inventory and purchase commitments write-downs		118		128
Foreign currency transaction net unrealized loss		1		8
Non-cash interest and other operating activities		159		213
Digital assets loss (gain), net		106		(27)
Changes in operating assets and liabilities:				
Accounts receivable		(426)		(148)
Inventory		(4,492)		(1,175)
Operating lease vehicles		(1,136)		(1,526)
Prepaid expenses and other current assets		(865)		(287)
Other non-current assets		(1,580)		(744)
Accounts payable and accrued liabilities		4,659		2,764
Deferred revenue		856		452
Customer deposits		251		80
Other long-term liabilities		1,016		247
Net cash provided by operating activities		11,446		6,912
Cash Flows from Investing Activities				
Purchases of property and equipment excluding finance leases, net of sales		(5,300)		(4,672)
Purchases of solar energy systems, net of sales		(5)		(28)
Purchases of digital assets		—		(1,500)
Proceeds from sales of digital assets		936		272
Purchase of intangible assets		(9)		—
Purchases of marketable securities		(1,467)		(30)
Proceeds from maturities of marketable securities		3		—
Receipt of government grants		—		6
Net cash used in investing activities		(5,842)		(5,952)

Notes

1. Source: The material is extracted from Tesla's public financial report.

2. Table 2 depicts digital asset purchases coping with cash outflow, as of September 30, 2022, and 2021, Tesla purchased and/or received an immaterial amount and \$1.50 billion, respectively, of digital assets.

Impairment losses are recognized if the digital assets and any subsequent decrease in fair value are lower than the cost price. At once they are recorded within restructuring and others in the consolidated operating statements in the period when the impairment expense is recognized. The impaired crypto assets are recorded downward to their fair value measurement at the impairment time and make no upward revisions for any increase in market price subsequently until assets are sold.

Table 3: Consolidated Statements of Operations of Tesla

Tesla, Inc. Consolidated Statements of Operations(unaudited) (in millions, except per share data)												
		Three Months Ended September 30,						Nine Months Ended September 30				
		2022		2021		2022		2021				
Revenues												
Automotive sales	\$	17,785	\$	11,393	\$	46,969	\$	29,100				
Automotive regulatory credits		286		279		1,309		1,151				
Automotive leasing		621		385		1,877		1,014				
Total automotive revenues		18,692		12,057		50,155		31,265				
Energy generation and storage		1,117		806		2,599		2,101				
Services and other		1,645		894		4,390		2,738				
Total revenues		21,454		13,757		57,144		36,104				
Cost of revenues												
Automotive sales		13,099		8,150		34,166		21,726				
Automotive leasing		381		234		1,157		582				
Total automotive cost of revenues		13,480		8,384		35,323		22,308				
Energy generation and storage		1,013		803		2,470		2,179				
Services and other		1,579		910		4,275		2,858				
Total cost of revenues		16,072		10,097		42,068		27,345				
Gross profit			5,382		3,660		15,076		8,759			
Operating expenses												
Research and development		733		611		2,265		1,853				
Selling, general and administrative		961		994		2,914		3,023				
Restructuring and other		—		51		142		(27)				
Total operating expenses		1,694		1,656		5,321		4,849				
		Three Months Ended September 30		Change			Nine Months Ended September 30				Change	
(Dollars in millions)		2022	2021	\$	%	2022	2021	\$	%	\$	%	
Restructuring and other	\$	-	\$ 51	\$ (51)	-100 %	\$ 142	\$ (27)	\$ 169				

Notes

1. Source: The data is extracted from Tesla's public financial report.

2. Table 3 presents restructuring and others, during the nine months of 2022 Q3, Tesla recorded \$169 (142+27) million of impairment losses on digital assets, and \$51 million and \$101 million during the three and nine months ended September 30, 2021, respectively.

Profits are not recognized until the gain is fully realized on the sale(s) for cryptocurrencies when they are shown net impairment losses for the crypto-assets holdings within restructuring and others. The determination of the realized gain to be recorded until the sale of assets, a gain or loss is recorded as the difference between the selling price and impaired value of the crypto assets sold.

Table 4: Consolidated Statements of Cash Flows of Tesla

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Purchase of intangible assets		(9)	—
Net cash used in investing activities		(5,842)	(5,952)

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1. Source: The material is extracted from Tesla's public financial report.

2. Table 4 depicts Proceeds from sales of digital assets, and net cash inflows related to sales of digital assets were \$936 million in the ended 2022, Q3.

C. Weaknesses of cryptocurrencies measured at cost

Using the above evaluation method to measure the value of cryptocurrencies may cause adverse effects on Tesla: For example, it may have a negative impact on its earnings while the value of Bitcoin holding falls. Since cryptocurrencies measured at cost prices are reported at fair valuation estimates, with the inclusion of unrealized gains and losses recorded in aggregate other comprehensive income components are included within shareholders' equity. Tesla's 2022 Q3 report presents:

Digital assets are regarded as indefinite-lived intangible assets under applicable accounting rules. Thus, any decrease in their fair values below our carrying values for such assets at any time after their acquisition will require us to identify impairment expense, whereas this new cost basis will make no upward revisions for any subsequent increase in fair value. For now, or in the future, this expense of any digital assets holdings may have a negative impact on our profitability during the periods when such impairments arise, even if the subsequent value increases.

In summary, they are initially recorded at cost and subsequent impairment testing is required for impairment losses. If impairment losses are identified, the balance of crypt assets could not make upward revisions, even though the overall market prices of digital assets rise.

4. Data and methodology

4.1 Data and sample

To empirically establish a sample of companies with reported crypto holdings, we collect the quarterly data of publicly listed firms during the sample period between 2018 Q1 and 2022 Q4. Then we select the financial statements of the sample companies extracted from financial reporting information in firms' 10-K filings accessed from the U.S. Securities and Exchange Commission (SEC). In addition, our sample firms account for cryptocurrencies and the representative symbols of the sample companies are expressed as follows:

MSTR is Microstrategy, MARA denotes Marathon Digital Holdings, TESLA represents Tesla, Hut represents Hut 8 Mining Corp, and Block is USBlock. Inc. and NTHOL denote TRNet Holding. source of sample data, available at U.S. SEC website <https://www.sec.gov/>.

4.2 Model Specifications

Drawing on Asien (2023) and Hsu and Chu (2023), we propose that the proxy variables for company value are measured by financial performance (dependent variables) including EPS, the return of the i -th stock, and operating performance. Next, we introduce that financial performance is a function of major control variables including cryptocurrency's returns, firm size, total assets, and return on assets/price-to-earnings ratio. Thus, this paper discusses the general functional relationship that captures the relationship as $\dot{Y} = f(X_1, X_2, X_3, \dots, X_n)$. The given functional relationship can be expressed as:

Financial performance = f (cryptocurrency's returns, firm size, total assets and return on assets/price-to-earnings ratio). (1)

where financial performance is regressed on the four control variables involving cryptocurrency's returns, firm size, total assets, and return on assets/price-to-earnings-ratio. The general models are formulated as:

$$EPS_{i,t} = \alpha_0 + \alpha_1 \text{crypto } r_{i,t} + \alpha_2 \text{Asset}_{i,t} + \alpha_3 \text{Size}_{i,t} + \alpha_4 \text{ROA}_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$R_{i,t} = \alpha_0 + \alpha_1 \text{crypto } r_{i,t} + \alpha_2 \text{Asset}_{i,t} + \alpha_3 \text{Size}_{i,t} + \alpha_4 \text{P/E}_{i,t} + \varepsilon_{i,t} \quad (3)$$

$$LEV_{i,t} = \alpha_0 + \alpha_1 \text{crypto } r_{i,t} + \alpha_2 \text{Asset}_{i,t} + \alpha_3 \text{Size}_{i,t} + \alpha_4 \text{P/E}_{i,t} + \varepsilon_{i,t} \quad (4)$$

where $\alpha_0, \alpha_1, \dots, \alpha_4$ are the estimated parameters, also called the regression coefficient, the subscript t represents the year, i represents the company, and $\varepsilon_{i,t}$ is a random disturbance term.

1. Dependent Variables

- 1) $EPS_{i,t}$ (earnings per share): net profit after tax \div number of outstanding shares.
- 2) $R_{i,t}$ (return): denotes the return of i -th stock;
- 3) $LEV_{i,t}$ Debt ratio: the debt ratio is represented as a proxy variable for corporate operating performance and measured as total liabilities divided by total assets.

2. Independent Variables

- 1) $\text{crypto } r_{i,t}$: denotes the return of the crypto assets held by the i -th company \circ
- 2) $\text{Size}_{i,t}$: denotes the stock value scale (market value) of the i -th company, The natural logarithm of the stock market value of firm i .
- 3) $\text{Asset}_{i,t}$: denotes the total assets of the i -th company and is measured as the natural logarithm of total assets (in millions of dollars) at the time t .
- 4) $\text{ROA}_{i,t}$ (Return on Assets): measured as = Recurring net profit after tax, before interest and depreciation \div Average book value of assets
- 5) $\text{P/E}_{i,t}$ (Price to Earnings Ratio): That is, Price to Earnings Ratio = Stock Price \div EPS Earnings per Share.

As a whole, to investigate the impact of holding crypto-assets on firm value, we follow the previous literature of Yen and Wang (2021) in quantitative research and proceed to conduct the following model.

To explore the impact of crypto assets on corporate performance, we perform the regression estimation commonly used in equation (2) as follows.

Model 1: To test hypothesis 1 and explore the correlation between holding crypto assets and corporate earnings performance, we conduct the preceding model (equation 2).

To identify the association of crypto assets holdings with corporate stock performance, we perform the regression estimation commonly used in equation (3) as follows.

Model 2: To achieve this hypothesis testing, we explore the correlation between holding crypto assets and the company's stock price. Therefore, we conduct the preceding regression model (equation 3).

Subsequently, to further investigate whether holding crypto assets increases corporate risks, we perform the regression estimation commonly used in equation (4).

Model 3: To test Hypothesis 3 and explore whether holding crypto-assets increases corporate risk factors, we conduct the preceding model (equation 4)

To respond to these questions, the study is conducted to examine how crypto assets' accounting treatment approached the existing Financial Accounting Standards Statement (IFAS). The analysis is carried out to determine which IFAS regarding crypto-assets' accounting treatment can be applied and the suitability of these IFASs with the nature and conditions of crypto assets for the crypto-asset (*holders*) in the relevant firms. The quarter returns as commonly computed by the following formula:

$$R_t = \ln \left(\frac{P_t}{P_{t-1}} \right) \quad (5)$$

where R_t denotes the logarithm (log) returns at time t , P_t denotes the underlying price on closing price at quarter t , P_{t-1} represents the underlying price at quarter immediately preceding quarter t .

If an entity holds Bitcoin investment for trading or speculative purposes, all price fluctuations in fair value should be identified within net income (profit and loss).

5. Empirical results and discussion

5.1 Descriptive statistics

From the descriptive statistics of the selected stocks under this study, as shown in Table 5, the earnings per share (EPS) of the considered firms ranged from a minimum value of -94.01 to a maximum value of 4.72, with an average of approximately -1.53. The price-to-earnings ratio (P/E) ranges from a minimum value of -6164.0 to a maximum value of 2522.78, with an average of approximately -35.42. Return on assets (ROA) ranges from a minimum of -0.87 to a maximum of 0.36, with an average of about -0.04. The company's total assets (millions of US dollars) have a minimum of 4.14 to a maximum of 82,338, with an average of 10,321.62. Therefore, Q3 corresponds to the 75th percentiles of crypto holding in the sample companies are depicted as follows. The company's earnings per share (EPS) is 0.28 dollars, the stock price is 138.11 dollars, the total assets are 7,963.27

(million US dollars), and the size (Size) is 23, the price-to-earnings ratio (P/E) is 67.28, and the return on assets (ROA) is 0.007. From the above preliminary statistics, evidence results report that Microstrategy., Marathon Digital Holdings, Tesla, Hut 8 Mining Corp, Block, and TR Net Holding, which are the top six companies holding cryptocurrency positions, have weak performance of company's profits. The above findings are thus evidence that whether holding cryptocurrency or not will affect the company's profitability and business performance is an important issue that must be investigated below.

Table 5: Descriptive statistics for the examined variables of sample companies

Hierarchy variables	EPS	Crypto	stock price	Assets (millions)	Size	P/E	ROA	LEV
mean	-1.53	19749.77	88.19	10321.62	21.08	-35.42	-0.04	0.514
Standard dev.	9.38	16754.19	138.45	18647.13	2.49	904.83	0.138	0.301
Skewness	-8.54	0.99	2.37	2.11	-0.52	-3.40	-2.63	2.048
kurtosis	81.45	-0.38	6.19	3.71	-0.008	21.57	13.24	12.19
100% Max	4.72	58926.56	678.81	82338	25	2522.78	0.36	1.1590
95%	1.72	52619.15	373.87	56490	25	872.46	0.08	0.9105
90%	1.08	45932.95	237.53	35779.56	24	436.36	0.046	0.793
75% Q3	0.28	32015.00	138.11	7963.27	23	67.28	0.007	0.700
50% median	0.07	10796.09	20.76	1169.91	21	-1.71	-0.009	0.463
25% Q1	-0.37	6811.46	1.19	541.78	20	-28.39	-0.05	0.383
10%	-2.35	5258.52	0.46	48.80	18	-201.17	-0.166	0.124
5%	-5.97	3926.04	0.35	8.27	16	-3626.5	-0.294	0.034
0% Mix	-94.01	3746.71	0.21	4.14	15	-6164.0	-0.87	0.004

Note:

Size =log (net sales: millions)

5.2 Regression results and discussion

In terms of independent variables, the firm size is measured by operating market value (Asset), the operating capability is measured by the price-to-earnings ratio (P/E), which is measured by retained earnings and stock price ratio, and the profitability is measured by the return on assets (ROA). Tables 6-7 successively report the regression parameter estimates of the returns of Bitcoin, the company's operating capabilities, and the size of the company on the company's earnings and profits. The empirical results show that the return on assets (ROA), the company's total assets (Asset), and firm size (Size) have a significant impact on the company's earnings per share (EPS), except for the Bitcoin's return, which does not reach a significant level ($p\text{-value} > 0.1$). This result implies that the return/price of Bitcoin has no significant impact on the company's earnings per share (EPS) and the company's profit. Accordingly, Hypothesis 1 is not supported. (H1: cryptocurrency-

related disclosures are related to company value). The finding confirms that whether the company holds cryptocurrency positions or not, the company's profits will not be affected.

Table 6: Regression estimates of the examined variables

Dependent variable: EPS		Parameter estimates		
Variable	DF	Estimates	t value	Pr > t
Intercept	1	27.558**	2.24	0.0271
BTC	1	-0.00005	-0.97	0.3330
Asset	1	0.00013*	1.74	0.0853
Size	1	-1.35215**	-2.23	0.0278
ROA	1	24.122***	3.79	0.0002

Note:

- 1.***, **, * indicate significance at 1% , 5%, 10% levels, respectively
2. The estimated results are based on the Model 1.
3. Panel regression model with random error component.
4. This table presents the regression estimates of Bitcoin return (BTC), the firm 's total assets (Asset), firm size (Size), and return on assets (ROA) on the stock return (EPS).

Table 7: Regression estimates of the examined variables

Dependent variable: EPS		Parameter estimates		
Variable	DF	Estimates	t value	Pr > t
Intercept	1	29.673	2.43	0.0168
Crypto	1	0.653	0.15	0.8795
Asset	1	0.0001*	1.72	0.0874
Size	1	-1.5012**	-2.53	0.0129
ROA	1	23.264***	3.66	0.0004

Note:

- 1.***, **, * indicate significance at 1% , 5%, 10% levels, respectively.
2. The produced results are based on the Model 1.
3. This table presents the regression estimates of Bitcoin price (CRYPTO), firm's assets (ASSET), scale (SIZE) and return on assets (ROA) on the stock return (EPS).

In addition, Table 8 shows the regression results of Bitcoin returns, company operating capabilities, and company size on company stock returns. The empirical results show that Bitcoin returns (BTC), the price-to-earnings ratio (P/E), and the company's total assets (Asset) have no significant impact on the company's stock return (R_t) (p-value >0.1), except for the firm size (Size), which has a significant level (p-value <0.1) Therefore, the Hypothesis 2 is not supported (H2: There is a correlation between the disclosure of cryptocurrency and company stock returns). The finding confirms that whether a company holds cryptocurrency positions or not, there is no significant relationship with the company's stock returns.

In addition, Table 9 reports the regression results for Bitcoin's returns and the company's operating capabilities and company size to the company's debt ratio

(LEV). The empirical results show that Bitcoin returns (BTC), firm size (Size) and the company's total assets (Asset) have a significant impact on the company's debt ratio (LEV), reaching a significant level of 5% ($p < 0.05$). Apart from the price-to-earnings ratio (P/E), which does not reach the 5% significant level ($p > 0.05$). Therefore, Hypothesis 3 is supported (H3: If a company holds cryptocurrency, the risk factor will increase.). The finding infers that the cryptocurrency holding could have a significant impact on the company's liabilities. This empirical result confirms a great deal of the prior research by Yen and Wang (2021) who concluded that Bitcoin transactions and cryptocurrency disclosures have negative value relevance.

Table 8: Regression estimates of the examined variables

Dependent variable: R_t		Parameter estimates		
Variable	DF	Estimates	t value	Pr > t
Intercept	1	-3.28685	-1.56	0.1211
BTC	1	0.689227	1.64	0.1028
Asset	1	9.082E-6	0.90	0.3676
Size	1	0.151668**	2.14	0.0345
P_E	1	0.000039	0.44	0.6619

Note : 1.***, **, * indicate significance at 1%, 5%, 10% levels, respectively.

2. The estimated results are based on the Model 2.

3. This table presents the regression estimates of Bitcoin return (BTC), firm's size (SIZE), price-to-earnings ratio (P/E), and total assets (ASSET) on the stock return (Rt)

Table 9: Regression estimates of the examined variables

Dependent variable: debt ratio (LEV)		Parameter estimates		
variable	DF	Estimates	t value	Pr > t
Intercept	1	-0.11266	-0.30	0.7656
BTC	1	-0.3110**	-2.46	0.0154
Asset	1	-2.47E-6***	13.88	<.0001
Size	1	0.03106*	1.70	0.0922
P_E	1	-4.52E-6	-0.17	0.8656

Note : 1.***, **, * indicate significance at 1%, 5%, 10% levels, respectively.

2. The produced results are based on the Model 3.

3. Panel regression model with random error component.

4. This table presents the regression estimates of Bitcoin's return (BTC), firm's size (SIZE), price-to-earnings ratio (P/E), and total assets (ASSET) on the debt ratio (LEV).

6. Conclusion

Recently, the amendments of ASU improved the accounting information offered to investors about an entity's cryptocurrency holdings by disclosure requirements of considerable holdings and changes during the reporting period. Indeed, volatile prices of the cryptocurrency market can lead to the complexity of valuation and create difficulties for timely and reliable evaluation. When cryptocurrencies are accounted for at fair value, deciding which exchange and when must be utilized to

evaluate the crypto-assets at the reporting date calls for judgment from the accountants, as cryptos are trading 24/7 across numerous exchange rates with highly volatile fluctuations (Luo and Yu,2022).

Although holdings of cryptocurrencies are increasing, the role of disclosure requirements and authoritative accounting rules play key guidance for corporations to record cryptocurrency holdings. A critical issue in the risk exposure disclosure for crypto-asset holdings under the full-disclosure accounting principle is necessary to investigate accordingly.

At present, cryptocurrency investment is an emerging investment tool. This article uses cryptocurrency disclosures in their 10-K filings on the listed companies such as MicroStrategy, Tesla, Marathon Digital Holdings, Hut 8 Mining Corp, Block, and TR Net Holding. The profitability evidenced from the selected companies reflects low performance among these sample companies which the top six corporate stocks hold in cryptocurrency positions. The above findings are thus consistent with the view that whether holding cryptocurrency or not will affect the company's profitability. Accordingly, business performance is an important issue to be investigated in the study.

The specific aims of the study are to fill the additional disclosures or notes to consolidated financial statements on the holdings of cryptocurrency and document the firm value relevance of corporate risk disclosure for crypto asset holdings. While this study draws on previous literature and the relevance and importance of accounting principles for cryptocurrencies, the expected results of this study can be summarized as follows:

First, currently, the prior literature on crypto-asset holdings is quite rare. This study is considered as pioneering research of the cryptocurrency accounting issue.

Second, to examine whether disclosure of Bitcoin transactions is negative for company value. Also, risk factors related to cryptocurrency holdings are correlated with the company's liabilities.

Third, our finding is in accordance with the prior research of Yen and Wang (2021) and cryptocurrency holdings have a significant impact on the company's liabilities.

Fourth, owing to cryptocurrency risks and conversions based on given current blockchain technology, this study recommends that cryptocurrency should not be treated as equivalent to cash.

The empirical results of this work are subject to several limitations. Regarding the robustness of the findings, we will need a longer period of information, and they are part of our research agenda, but they will have to wait for a future study. Moreover, future research may shed light on the choice of accounting policy, the influence of cryptocurrency-related disclosures, and changes in accounting fashion over time.

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