

**The Impact of Complex Accounting Estimates and Fair-Valued
Cryptocurrencies on Audit Effort – Working Paper**

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and Fair-Valued Cryptocurrencies on Audit
Effort – Working Paper**

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Abstract

The increasing uncertainties and risks associated with complex accounting estimates, such as fair-value measurements (FVMs) have made no clear-cut line between facts and assumptions. Thus, users perceive complex accounting estimates as less reliable, in comparison to other financial statements' items, which puts a strain on auditors to provide reasonable assurance regarding the appropriateness of these estimates. Additionally, the technological advances witnessed in the current internet era have led to the emergence of new digital assets such as cryptocurrencies. However, the lack of solid specific accounting and auditing standards concerned with the fair-valued cryptocurrencies' issues is putting an extra burden on auditors. Which in turn shows an increase in the nature, timing, extent of risk assessment and audit procedures, compelling auditors to exert additional audit effort. These incremental audit efforts and risks associated are reflected in the auditor's command of fee premium. Accordingly, this paper aims to identify the complex accounting estimates definition and characteristics, emphasizing on FVMs. Moving from this aspect towards the emergence of crypto-assets, such as bitcoins and other fair-valued cryptocurrencies induced by a distributed ledger relying on cryptographic blockchain technology and its effect on auditors' effort indicated by higher audit fees.

Keywords Complex Accounting Estimates, Fair Value Measurements, Digital Assets, Cryptocurrencies, Bitcoin, Audit Effort, Audit Fees

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ملخص

زيادة الخطر و عدم التأكد المصاحبين للتقديرات المحاسبية المعقدة، مثل تقديرات القيمة العادلة، أدت إلى عدم وجود خط فاصل واضح بين الحقائق و الافتراضات. بالتالي، يعتبر المستخدمون أن التقديرات المحاسبية المعقدة هي أقل موثوقية بالمقارنة بغيرها من بنود القوائم المالية، مما يشكل عبئاً على مراقبي الحسابات لتقديم معقول بشأن مدى ملاءمة تلك التقديرات. إضافة إلى ذلك، فإن التطورات التكنولوجية التي نشاهدها في عصر الإنترنت الحالي أدت إلى ظهور أصول رقمية جديدة مثل العملات المشفرة. لكن غياب معايير راسخة للمحاسبة و المراجعة المعنية بالعملات المشفرة ذات القيمة العادلة تشكل عبئاً إضافياً على مراقبي الحسابات. الأمر الذي ينعكس بالضرورة في زيادة طبيعة، توقيت، و نطاق إجراءات تقييم المخاطر و إجراءات المراجعة الأخرى، مما يرغم مراقب الحسابات على بذل جهود مراجعة إضافية. تلك الجهود و المخاطر الإضافية تنعكس في شكل علاوة لأتعاب المراجعة التي يتقاضاها مراقب الحسابات. وفقاً لذلك، تهدف هذه الورقة لتعريف التقديرات المحاسبية و تحديد خصائصها، تركيزاً على تقديرات القيمة العادلة. انتقالاً من هذه النقطة نحو ظهور الأصول المشفرة، مثل البيتكوين و غيرها من العملات المشفرة ذات القيمة العادلة الناجمة عن دفتر الأستاذ الموزع الذي يعتمد على تقنية البلوك تشين المشفرة، و تأثيرها على جهود مراقبي الحسابات التي يتم الدلالة عنها من خلال زيادة أتعاب المراجعة.

الكلمات المفتاحية: التقديرات المحاسبية المعقدة، تقديرات القيمة العادلة، الأصول الرقمية، العملات المشفرة، البيتكوين، جهد المراجعة، أتعاب المراجعة

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1- Introduction

As per the “*Conceptual Framework for Financial Reporting*”, financial reporting primarily focusses on providing high-quality useful financial information about the entity, for decision making purposes (IASB, 2018). Thus, providing reliable and objective accounting information is a prerequisite to serve the essential informational needs of users and to help them in making numerous strategic, tactical, and operational effective decisions (Okafor & Egiyi, 2023). Given that financial reports are portrayed as the main inevitable source of providing information regarding financial position and business performance of an entity, thus items represented should be measured and disclosed according to established international or national financial reporting standards (Sacer, et al., 2016). However, some items are more or less subject to managements’ own judgements, evaluations, and estimates. Even the International Accounting Standards Board (IASB), as a standards-setter, admits that “*to a large extent, financial reports are based on estimates, judgements and models rather than being exact depictions.*” (IASB, 2018, para. 1-11).

According to the International Accounting Standard (IAS) 8 “*Accounting Policies, Changes in Accounting Estimates and Errors*”, accounting estimates are defined as the monetary amounts that are subject to high measurement uncertainty (IASB, 2021), representing a critical part of the financial reports (Knechel & Leiby, 2016; Lev, et al., 2010). The inherent lack of measurement precision of accounting estimates involving high level of management subjectivity makes the dividing line between facts and conjectures is unequivocally unknown (Lev, et al., 2010). Two distinct estimations of the same item would result in different accounting information, hence, providing no clear-cut financial performance of an entity (Sacer, et al., 2016). Consistently, financial statements’ users perceive accounting estimates as less reliable, in comparison to other financial statements items (Lev, et al., 2010).

Different point of views concerning the accounting estimate, makes it very difficult to exercise a fair judgement in presenting the economic reality of an item (Sacer, et al., 2016). For this reason, auditors face significant difficulty in auditing and concluding the reasonableness of an accounting estimate, putting the audit quality in question. Auditors often fail to adequately test the underlying data and assumptions of managements’ estimates, not only that, but auditors also fail to analyze the inconsistencies among assumptions, other internal data, and external conditions (Griffith, et al., 2015a). Auditors typically choose to rely on managements’ model, implying management bias, rather than using other

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independent method to audit the estimate (Griffith, et al., 2015b). Accordingly, standards-setters, such as Public Company Accounting Oversight Board (PCAOB) and IASB analyze the accounting estimates as the most frequently cited items for audit errors, even though other audit deficiencies have decreased over time (Glover, et al., 2019; PCAOB, 2018)

In line with the revised International Standards on Auditing (ISA) 540, “*Auditing Accounting Estimates and Related Disclosures*”, accounting estimates vary widely in nature based on the degree to which the estimate is subject to substantial estimation uncertainty (IAASB, 2018). Estimation uncertainty in return depends on the nature, subjectivity and complexity involved in making the accounting estimate. Complexity refers to the complexity inherent in the process of making an accounting estimate, such as when multiple data sets or assumptions are required (IAASB, 2018). Hence, accounting estimates are classified into simple (easy-to-estimate) and complex (difficult-to-estimate) accounting estimates. Simple accounting estimates, represented by those items related to revenue-recognition, and cost and expense-related items, mostly depend on transactions data offering less reliance on estimation (Salavei, 2010), such as provision on inventory impairment (IAASB, 2020b). While complex accounting estimates are those represented by items that are not based on factual data, instead they are entirely based on management judgements, such as fair value measurements (FVMs), impairment of property, plant and equipment (PP&E), in-process research and development costs, impairment of intangible assets, securities-related items including the accounting for derivatives, warranties, stock options, etc. (IAASB, 2020b; Glover, et al., 2019; Salavei, 2010).

Focusing on complex accounting estimates, especially FVMs that lead the way recently (Oyewo, et al., 2020), since the historical cost approach has lately been considered as a disconnecter of economic realities (Volha, 2010) and a provider of profit-smoothing opportunities through hidden and excess reserves (Enahoro & Jayeoba, 2013). However, aside from providing a better reflection of economic values when using FVMs in financial reports (Oyewo, et al., 2020), obtaining reliable information relevant to FVMs audits and testing the appropriateness of valuation methods and assumptions are of the greatest challenges faced by auditors (Oyewo, et al., 2020; Joe, et al., 2017). In this manner, auditors will need to extend the nature, timing and extent of risk assessment and further audit procedures in response to the extensive related risks of material misstatements (IAASB, 2018). Thereby, auditors are expected to increase their effort by conducting extensive substantive audit tests, investing

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more in technology, hiring knowledgeable experienced in-house personnel, and relying on the work of external specialists (Ghosh, et al., 2016; Griffith, et al., 2015a), which in return reflects the auditors command of fee-premium (Ettredge, et al., 2014).

Cryptocurrencies, the emerging virtual money that no longer has a “*physical*” currency unit account, instead they are expressed in an independent digital form (Bal, 2013). Acting as a alphanumeric mean of exchange and a financial asset, whose mechanism is induced a distributed ledger that permits them to function outside the conventional banking system domain, relying on the Blockchain encryption techniques (Giudici, et al., 2020; Makarov & Schoar, 2020; Neves, 2020). The fair-value approach is indicated to be suitable for such type of digital assets, as it provides more relevant information to financial statements’ users, consistent with the suggestions of (Smith, 2023; Chou, et al., 2022). However, the lack of applicable accounting and auditing standards regarding the fair-valued cryptocurrencies makes it difficult for auditors to provide reasonable assurance on the appropriateness of these management estimates (Vincent & Wilkins, 2020).

Thus, consistent with the prior studies, this paper aims to critically analyze the relationship between fair-valued complex accounting estimates, so-called cryptocurrencies, on auditors’ efforts, proxied by audit fees pricing. Regarding this objective, the remainder of the paper will proceed as follows: section 2 complex accounting estimates and FVMs, section 3 digital assets: cryptocurrencies, section 4 the relation between complex accounting estimates, fair-valued cryptocurrencies and audit effort and finally, section 5 conclusions and future research areas proposed.

2- Complex Accounting Estimates and FVMs

2.1 IFRS as a framework for accounting estimates

Seeking for higher comparability and consistency among entities, US. Generally Accepted Accounting Principles (US. GAAP), the rules-based accounting principles that provides detailed specific accounting treatments for each transaction (SEC, 2003). Giving nearly no room for any judgements and disagreements between different parties about the recognition and disclosure of accounting items, despite the fact that US GAAP may not reflect the fickle underlying economics of entities through time (Chung & Kim, 2023). Paradoxically, the principles-based globally accepted International Financial Reporting Standards (IFRS) allow for a greater extent of inherent flexibility, permitting management exercise of judgements in its application (Ahmed, et al.,

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2013). These broad-guidance standards, including more than 140 individual jurisdictional application, with many aligned national accounting standards reforms, may be more practical in particular circumstances showing better reflection of the entity's position and performance (Sacer, et al., 2016). However, this gives rise to various criticisms, as principles-based standards provides great opportunities for managers to manage earnings and exercise bias on a silver platter, sacrificing financial reporting quality (Ahmed, et al., 2013). Thereby, IFRS principle-based framework is considered as a cornerstone of presenting accounting estimates in financial reports (Sacer, et al., 2016).

Accordingly, the researchers conclude that IFRS principles-based framework's flexibility and variety of methods permitted to be used by entities, makes it more difficult to reinforce specific requirements and accounting treatments for all financial statements' items. Thus, managers have greater opportunities to exercise judgements to apply the standard to their particular circumstances. In contrast to the rule-based US. GAAPs containing specific "bright line" rules and requirements for each item to be recognized in the financial statements, thereby limiting the exercise of judgements and subjectivity.

IAS 8, as a part of IFRS, defined the accounting estimates as the monetary amounts that are subject to high measurement uncertainty (IASB, 2021, para.5). These estimates, judgements and models are established according to the underlying concepts govern by the Conceptual Framework for Financial Reporting (IASB, 2018). Challenges in making an appropriate accounting estimate arise from the degree of inherent risk factors associated, so-called estimation uncertainty, subjectivity, complexity, and their interrelationships (IAASB, 2018). Estimation uncertainty is defined by ISA 540, as the susceptibility of the item to the inherent lack of measurement precision (IAASB, 2018, para.12). However, estimates subjective to high level of uncertainty are not deterrents for providing irrelevant information. Nevertheless, high measurement uncertainty estimates are less relevant in comparison to those estimates subject to less measurement uncertainty (IASB, 2018). Complexity inherent in the process of making an estimate may arise when multiple data sets and assumptions are required or when there is a difficulty in the computational process, or the model used to make the estimate. This classifies the accounting estimates to broad types, simple (easy-to-estimate) and complex (difficult-to-estimate) accounting estimates (IAASB, 2018; Salavei, 2010). Complex accounting estimates are those items that are not based on factual data, instead they are entirely based on management judgements, such as FVMs, impairment

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of PP&E, in-process research and development costs, impairment of intangible assets, securities-related items including the accounting for derivatives, warranties, stock options, etc. (IAASB, 2020b; Glover, et al., 2019; Salavei, 2010).

2.2 Fair-Value Measurements

Emphasizing on FVMs according to IFRS 13 “*Fair Value Measurement*”, the IASB defines fair value as “*the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date.*” (Palea & Maino, 2013; IASB, 2011, para.9). Hence, FVMs and historical cost approaches cannot be considered as two faces for the same coin, on the contrary, they represent two opposite ends of measurement spectrum (Hoogervorst, 2015). For the initial recognition, in historical cost approach, the entity-specific transaction price is used and depreciated over the useful lifetime of the asset, as the same manner as its benefits are expected to be consumed (Barker & Schulte, 2017). In such, historical cost has been considered as a disconnecter of economic realities (Volha, 2010) and a provider of profit-smoothing opportunities through hidden and excess reserves (Enahoro & Jayeoba, 2013). These drawbacks paved the way for FVMs, which is concerned with the current market perspective of an asset or a liability value, on the measurement date, ignoring the entity’s specific information such as the transaction price or the consumption nature (Barker & Schulte, 2017). Which in turn provides a better reflection of economic values in financial reports (Oyewo, et al., 2020).

IFRS 13, that became effective from January 2013 (IASB, 2011, para.C1), provides three-levels hierarchy to measure the fair value, based on the degrees of subjectivity, reliability, and inputs’ nature used in making the estimation (IASB, 2011). Level 1 inputs, the least subjective and most reliable estimate of FVMs, are quoted unadjusted prices for identical assets or liabilities in the active markets, which can be accessed at the measurement date. Level 2 inputs are observable inputs, other than quoted prices within level 1, for similar assets or liabilities, whether directly in active markets or indirectly in inactive markets (IASB, 2011, paras.76-85). For instance, Level 2 inputs required for FVMs of a building may be the price for a comparable building in a similar location (Brink, et al., 2016; IASB, 2011, para. B35). Finally, the least objective, Level 3 unobservable inputs for measuring assets or liabilities require some or complete reliance on assumptions, as inputs cannot be directly observed in the market (Ahn, et al., 2020; IASB, 2011, paras.86-90), such as the financial forecast for a cash-generating unit developed based on the entity’s own data as there is no

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reasonably available information (IASB, 2011, para.B35). These assumptions are extensively subjective and require significant judgments and discretions, so in turn, are hard to validate. In many cases minor changes to the model assumptions can significantly affect the assessed value of Level 3 assets or liabilities (Ahn, et al., 2020).

2.3 Auditing Fair-Valued Traditional Assets

Challenges faced by auditors during FVMs auditing are directly related to the degree of complexity, risks, and uncertainties that would result from the FVMs' subjective nature and sensitivity level to changes in assumptions used, mainly linked to Levels 2 and 3 inputs (Griffin, 2014). Prior audit studies indicated that some of these challenges are related to obtaining relevant information, appropriateness of valuation methods, reasonableness assessment of management estimate, establishment of management bias, expansion of audit scope and audit expectation gap, auditors' unawareness and lack of competence, etc. (Bucaro, 2019; Hux, 2017; Joe, et al., 2017; Griffith, et al., 2015a). Thus, deficiencies in FVMs auditing are inevitable end of these challenges (Glover, et al., 2017; Griffith, et al., 2015a; Ettredge, et al., 2014), especially in developing countries (Hassan, et al., 2020; Miah, et al., 2020). Auditors in developing countries suffer from lack of non-financial information often required for FVMs, which in turn has a hand in increasing risks and uncertainties of the estimation process. Accordingly, standards-setters require that auditors exert specific attention to FVMs issues (Kumarasiri & Fisher, 2011).

ISA 540, issued by the IAASB in 2008 to supersede ISA 545 “*Auditing Fair Value Measurements and Disclosures*”, outlines the general audit approach required for auditing a wide range of accounting estimates, including fair values (Kumarasiri & Fisher, 2011). This ISA has been reformed several times by the IAASB, to reach its current final pronouncement in 2018 effective for audits beginning on or after December 15, 2019, (IAASB, 2018). ISA 540 requires auditors to obtain an understanding of the underlying methodology adopted by managers to arrive at its estimates. Along with taking into account the relevant internal controls, valuation models employed, management's use of experts, and the assumptions underlying the estimate. Moreover, auditors have to consider the relevance of events subsequent to balance sheet date and develop an independent point or range of estimates to be compared with the corresponding values obtained by managers (Singh, 2015; Kumarasiri & Fisher, 2011).

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Accordingly, the researchers conclude that auditing higher subjective FVMs mainly of Level 2 and Level 3 assets reflect greater challenges for auditors. Thus, auditors will have to obtain higher experience, competence, and knowledge of valuation methods to avoid being duped by evidence corroborating biased management's assumptions and adequately examine the appropriateness of these complex accounting estimates.

3- Digital Assets: Cryptocurrencies

3.1 Evolution of Cryptocurrencies

“*The FinTech Revolution*”, is what financial services industry is witnessing, since the information technology is playing a key role in modifying and replacing the traditional banking's functions (Othman, et al., 2020). Financial technology (fintech) as defined by Gomber, et al. (2018), it is the technology applied in an innovative system in the design and delivery of financial services, which makes them more accessible to the public (Gomber, et al., 2018). Thereby, these technologies such as mobile banking, internet banking, chatbots, application programming interface, etc. characterized by some or complete replacement ability, have been presenting serious exacerbated threats to the traditional banking system (Dermine, 2017). Despite the fact that these technologies originally depend on the available balances for customers' credit and deposits in the banking industries, putting the banking industry in circulation (Othman, et al., 2020). However, there are other fintech tools that are totally independent from the traditional banking and the current monetary systems, such as blockchain and cryptocurrencies system (Othman, et al., 2020).

Cryptocurrencies are the virtual money that no longer has a “physical” currency unit account, instead they are expressed in an independent digital form (Bal, 2013). According to Meiklejohn, et al. (2013), cryptocurrencies are more than just a currency as they offer appealing attributes over the traditional currencies. Cryptocurrencies act as an alphanumeric mean of exchange and a financial asset, whose mechanism is induced by a distributed ledger that permits them to function outside the conventional banking system domain (Giudici, et al., 2020; Makarov & Schoar, 2020; Neves, 2020). They rely on cryptographic encryption techniques, so-called the innovative decentralized blockchain technology, controlled by peer-to-peer network of nodes that enables the transaction between respective parties directly across the world with low transaction cost, high security level, easy to use and real-time settlement (Alexander, 2021; Aalborg, et al., 2019).

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Based on the prior studies, the researchers conclude that cryptocurrencies are intangible assets depending on the blockchain encoded technology. Cryptocurrencies meet the definition of assets as they are obtained as a result of past events from which future economic benefits are expected to flow to the entity.

Bitcoin, the first and most popular cryptocurrency, was introduced in October 2008 with a white paper entitled “*Bitcoin: A Peer-to-Peer Electronic Cash System*” by Satoshi Nakamoto (Ramassa & Leoni, 2022). The first digital issuance of bitcoins was in January 2009 with value of 1 USD each (approximately 5.5 EGP). Fast forward to nowadays, consequent to the high market demand and fast outspread in the global markets, despite its volatility bitcoins are now valued more than 27,900 USD (approximately 863,000 EGP) (CoinDesk, 2023; Ramassa & Leoni, 2022). Such success has resulted in the creation of many other cryptocurrencies, such as Litecoin, Ethereum, Tether, Zcash, Ripple, Mintchip, Dash, Doge-coin, Monero, Nxt, Bit-shares, Maidsafe-coin, Binance-coin and Byte-coin (Ramassa & Leoni, 2022; Hossain, 2021). Additionally, an exponential growth has been witnessed in the business market, as many companies began to adopt these digital currencies in their daily business (Prochazka, 2018). For instance, Tesla in 2021 bought \$1.5bn in bitcoin and plans to accept it as a payment method for its products (Patnaik, et al., 2021). In addition to El Salvador that became the first country to adopt the bitcoin as a legal tender (Renterla, et al., 2021).

3.2 Blockchain as a foundation for cryptocurrencies

Blockchain, the technology behind the cryptocurrencies (Garriga, et al., 2021), was first conceptualized in 2009 as a distributed decentralized digital public ledger shared by several peers in a network that facilitates recording, verifying, posting transactions, and making it available to all parties in the blockchain in a timely manner (Bonson & Bednarova, 2019; Rozario & Thomas, 2019). Approved transactions are aggregated into blocks and stored in a chronological chain-like data structure to be added to a previously validated block, using cryptographic signatures (Bonson & Bednarova, 2019; Rozario & Thomas, 2019). This leads to the impossibility of adulteration of the decentralized blockchain, as any attempt to adulterate a block would require the adulteration of the previously created block (Bonson & Bednarova, 2019).

Besides being linked to the status of bitcoins and cryptocurrencies’ foundation, today blockchain has increasingly attracted the public and institutional interest to extend the technology itself and its potential disruptive applications irrelevant to cryptocurrencies (Iansiti & Lakhani, 2017). Such that blockchain could be

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applied to decentralized finance (Chen & Bellavitis, 2020) or smart contracts (Hughes, et al., 2019). On the scope of such technological advances, the Big Four audit firms suggest that the significant effect of blockchain innovations will be witnessed by accountants, auditors and regulators (Deloitte, 2020; EY, 2020; PwC, 2020; KPMG, 2018), especially with regard to processing, recording, reconciling, auditing and reporting the transaction (Ferri, et al., 2020).

3.3 Accounting for Cryptocurrencies

The increasing incursion of cryptocurrencies in the business market has drawn the attention of various stakeholders such as regulators, standards-setters, practitioners and academics (EFRAG, 2020). The Australian Accounting Standards Board (AASB), in December 2016, analyzed the current IFRS literature on digital currencies and formed an opinion suggesting that cryptocurrencies should be accounted for as inventory (i.e., according to IAS 2 – *Inventories*) or an intangible asset (i.e. following IAS 38 – *Intangible Assets*) (AASB, 2016). However, the staff paper identified the lack of sufficient measurement guidance provided by the underlying accounting standards (Chou, et al., 2022). In June 2019, the International Financial Reporting Interpretations Committee (IFRIC) issued “*Holdings of Cryptocurrencies – Agenda Paper 4*”, in which it determined that the use of IAS 2 – *Inventories* for recognizing cryptocurrencies may depend on its intended use (i.e., sale in ordinary course of business or held as broker-trader). Other than that, the agenda suggests the use of IAS 38 – *Intangible Assets* for holdings cryptocurrencies (IFRIC, 2019).

Hence, there is a huge reliance on principles-based accounting, concept statements and non-authoritative information such as white papers and other accounting publications for recognizing cryptocurrencies. Since that neither the Financial Accounting Standards Board (FASB), nor the PCAOB have issued a formal guidance for treating cryptocurrencies (Smith, 2023; Vincent & Wilkins, 2020). Consequently, in 2020, EFRAG published a discussion paper that raised concerns about measurement of cryptocurrencies according to IAS 2 and IAS 38, suggesting that this may not always reflect the economic circumstances of the cryptocurrency. In a nutshell, the paper indicated that cryptocurrencies’ wide range of functions and economic characteristics make it difficult to develop a single specific classification criterion applicable for all cryptocurrencies at all circumstances (EFRAG, 2020).

Emphasizing on measurement basis for cryptocurrencies, Chou, et al. (2022) conducted an exploratory study examining different perspectives of various stakeholders, concerned with the accounting of cryptocurrencies, such as academics, professional bodies, accounting practitioners and standard setters in

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Australia. The results indicated that most research participants agree that the suitable measurement model to be applied to cryptocurrencies is the fair value approach, instead of historical cost, as it provides more relevant information to financial statements' users, consistent with the suggestions of (Smith, 2023; Chou, et al., 2022). Normally, there are several steps taken to determine the fair value for an asset or liability, however in the case of cryptocurrency the unit of account is simply one unit of the cryptocurrency, measured as either a single or a fraction of a cryptocoin (Beigman, et al., 2021). Additionally, cryptocurrencies' highest and best use is in exchange, since it cannot be used in production or in conjunction with other assets. Thus, the suitable valuation technique for cryptocurrencies is the market approach. Market approach as identified in IFRS 13 as the usage of prices and other relevant information generated by market transactions for identical or comparable assets or liabilities (IASB, 2011).

The researchers conclude that even though cryptocurrencies market is vastly growing all over the world, the lack of specific accounting guidance around these assets makes it difficult to provide reliable information to users. Thus, standard-setting activities are needed to provide clear guidance on the suitable accounting treatment for each of the recognition, measurement, presentation and disclosure issues of these digital currencies.

3.4 Cryptocurrencies in the Egyptian Market

Despite that Egypt was a leader among other Arab countries in terms of the number of cryptocurrencies dealers in 2022, at more than 1.7 million, followed by Morocco, Saudi Arabia, and Iraq (Sheet & Mahmood, 2022). But also, the authority trading market released that there is a growing cryptocurrencies adoption in Egypt (Diaa, 2018), in which new users registrations, especially from the millennial young generations (Handagama, 2021), increased by 100% between the period from 2019 to 2020 (Galal, 2022). Cryptocurrency market in Egypt is characterized by being a clandestine activity, in which the Central Bank of Egypt (CBE) continuously renews its warning of dealing with all types of cryptocurrencies whether through regional or international platforms, as it is regarded as a threat to the national security (State Information Service, 2022). Hence, regardless of its trading and exchange illegality and prohibition, an informal cryptocurrency market in Egypt exists, especially on social networks (Galal, 2022). On another note, the CBE announced in 2019 that there is a project about launching a digital currency market in the country, nonetheless, this decision is far from being finalized until now (Galal, 2022).

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Accordingly, the researchers conclude that until now cryptocurrencies are not fully accepted by the Egyptian government, as using any of these digital currencies as a monetary exchange substance is banned, considering it an illegal act.

3.5 Auditing Fair-Valued Cryptocurrencies

Auditing is a series of professional judgements made by auditors to express an overall opinion upon the reliability of financial statements (Gierbl, 2021), including all types of assets, whether traditional or digital. However, the inadequacy of relevant guidance required to deal with cryptocurrencies' emerging issues represent a major challenge for auditors (Vincent & Wilkins, 2020). In other words, the status-quo of auditing fair-valued cryptocurrencies and the lack of standardized accounting or auditing standards are two sides of the same coin (Smith, 2023). As a result of crypto-specific accounts' guidance absence, auditors and managers focus on interpreting existing rules for this emerging asset class, not on specific accounting and auditing codifications and standards (Sheldon, 2021).

Starting from the requirements of ISA 220 "*Quality Management for an Audit Financial Statements*" regarding the acceptance and continuance of client relationships in audit engagements, in which audit firms should provide a reasonable assurance that the firm has the sufficient competence to perform the engagement (IAASB, 2020a, paras. 22-24). However, the lack of standards' guidance is a clear defiance for auditors to determine whether they have the required competence. For instance, auditors' lack of prior technical experience with the digital assets and its associated risks can hinder their ability to determine the adequate resources required for the engagement (Vincent & Wilkins, 2020). Additionally, doubts have arisen about whether the auditor has the sufficient competence, knowledge, and ability to identify and avoid independence threats that may occur when the auditor obtains the key accessing of the client's cryptocurrencies during the audit tests (Vincent & Wilkins, 2020).

Accordingly, the researchers conclude that there is a major challenge for auditors to acquire the sufficient ability and experience to audit such complex emerging digital assets.

Sequentially, designing audit procedures while planning for the audit engagement after considering audit objectives, scope, approach, and risks to gather sufficient appropriate evidence regarding the appropriateness of the financial reporting managements' assertions are significantly affected by the client's ownership of cryptocurrencies (Vincent & Wilkins, 2020). These assertions include existence, rights and obligations, completeness, valuation, and

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accuracy. According to Dyball & Seethamraju (2021), and Vincent & Wilkins (2020), cryptocurrencies' digital nature compromises the efficient testing for each of the mentioned assertions, testing for their existence using the traditional methods of inventory inspection would be insufficient. Apart from the fact that successful cyberattacks may result in a complete loss of cryptocurrencies, which increases the assessed risk of material misstatements concerning the cryptocurrencies account (Dyball & Seethamraju, 2021). The lack of third-party confirmation of the asset makes testing tasks for the existence and completeness assertions more difficult.

Moreover, scarcity of comparable assets and inactive markets has led to additional burdens on auditing the appropriate valuation of cryptocurrencies. As a result of this unique nature of cryptocurrencies, auditors may have no choice but to rely on indirect entity-level evidence, shifting audit approach from primarily substantive-based approach to a business risk approach (Dyball & Seethamraju, 2021). As described by van Buuren, et al. (2014), primarily substantive-based audit approach focuses on the identification and assessment of inherent risks using direct evidence related to the management assertions gathered through substantive audit tests. However, the business risk related approach mainly focuses on the management approach of business models, relying on the indirect audit evidence obtained from high-level and entity-level business controls.

4- The relationship between complex accounting estimates, fair-valued cryptocurrencies and audit effort

Measurement uncertainty and subjective nature of complex accounting estimates are correspondingly reflected in the auditor task complexity and audit risk (Griffin, 2014). As required by ISA 540, the nature, timing and extent of the risk assessment and further audit procedures conducted by the auditor vary according to the degree of estimation uncertainty and the assessment of the related risk of material misstatement (IAASB, 2018). Whereas the increasing use of FVMs, that is inherently complex in nature especially in case of crypto-assets, it is natural to expect that auditors will need to compensate extra effort and time to provide reasonable assurance regarding the appropriateness of FVMs estimated by managers (Abdullatif & Al-Rahahleh, 2020; Ettredge, et al., 2014).

Auditors are compelled to deal with subjective forecasts of expected future events, instead of dealing with facts about past financial events (Abdullatif, 2016). As a result of this, an increase in agency costs associated with FVMs is expected. For instance, capital markets are neither perfect or complete, thus

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FVMs are often based on management models and assumptions rather than obtained from liquid markets (Yao, et al., 2015). Dishonest and opportunistic behavior of managers are likely to be witnessed in their attempt to make FVMs a boon to manipulate reported net income. Empirical auditing and accounting literature provide evidence that managers tend to manipulate and bias FVMs to enhance the entity's performance and cash flows (Henry, 2009), to increase earnings volatility, to meet analysts' forecasts (Yao, et al., 2015), and to increase their compensations (Livne, et al., 2011).

Consequently, based on the audit fee model of (Ferri, et al., 2020), the prior studies suggested that the increased audit effort and agency issues regarding FMVs is a critical driver of audit fees pricing, especially for Level 2 and 3 fair-valued assets (Abdullatif & Al-Rahahleh, 2020; Sangchan, et al., 2020). Miah (2019) indicated that the increased risks and uncertainties involved in the determination of fair value results in an audit fee premium. Additionally, Shouhai & Zhiqiang (2017) concluded that the existence of fair-valued assets in the client's financial statements is positively and significantly linked to audit fees.

Accordingly, the researchers conclude that higher uncertainty and complexity levels of fair-valued estimates result in auditors' exertion of extra effort, to appropriately deal with these types of complex subjective estimates. In turn, audit fees are positively associated with the increased audit efforts, as auditors command fee premium as a compensation for the detailed audit procedures and substantive tests required.

5- Conclusion

This working paper aims to critically analyze the relationship between fair-valued complex accounting estimates, emphasizing on the emerging digital assets, so-called cryptocurrencies, on the audit effort in terms of audit fees. Accordingly, it is concluded that cryptocurrencies are alphanumeric mean of exchange and financial assets, that no longer has a physical existence, whose mechanism is induced by a distributed ledger that permits them to function outside the conventional banking system domain. The lack of sufficient measurement guidance provided by the underlying accounting and auditing standards regarding the complex accounting estimates is reflected in the auditor task complexity and audit risk. Thus, auditors are expected to perform extra effort to provide reasonable assurance regarding the appropriateness of FVMs. This increased audit effort and agency costs associated with the cryptocurrencies are reflected in auditors' charge of fee premium. Cryptocurrencies market in

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Egypt is growing despite the fact that its trading and exchange is prohibited and illegal by CBE law. Hence, it is characterized by being a clandestine activity. On the bright side the CBE announced in 2019 that there is a project about launching a digital currency market in the country. Accordingly, the following future research areas are proposed:

- The impact of audit client's adopting fair-value model according to the revised Egyptian Accounting Standards, released in 2023, on financial reporting quality.
- The impact of audit client's adopting fair-value model according to the revised Egyptian Accounting Standards, released in 2023, on audit quality.
- The impact of cryptocurrencies recognition on financial reporting quality.
- The impact of cryptocurrencies recognition on audit quality.
- The impact of cryptocurrencies recognition on audit client's litigation risk.
- The impact of cryptocurrencies recognition on auditor's assessment of inherent risk – an exploratory study.

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