



Munich Personal RePEc Archive

# **Central bank digital currency and bank earnings management using loan loss provisions**

Ozili, Peterson K

2023

Online at <https://mpra.ub.uni-muenchen.de/116412/>  
MPRA Paper No. 116412, posted 20 Feb 2023 09:27 UTC

# Central bank digital currency and bank earnings management using loan loss provisions

Peterson K. Ozili

## Abstract

This paper investigates the role of central bank digital currency (CBDC) in bank earnings management, and focus on how CBDC activity might influence banks to engage in accrual earnings management using loan loss provisions (LLPs) and the implications for earnings quality. I show that banks will use accruals, such as loan loss provisions, to manage earnings when CBDC-induced bank disintermediation leads to a reduction in bank deposits, a reduction in bank lending and a likely reduction in reported earnings. Bank managers will mitigate the reduction in reported earnings by lowering discretionary LLPs to increase reported earnings.

**Keywords:** banks, earnings management; central bank digital currency, loan loss provisions, CBDC, disintermediation, accruals, income smoothing, migration, earnings quality, income smoothing.

January 2023

*Published in:* **Digital Policy, Regulation and Governance Journal**

## 1. Introduction

This purpose of this study is to examine the role of central bank digital currency in bank earnings management. It examines how CBDC activity can influence banks to engage in accrual earning management.

Central bank digital currency (CBDC) is money or legal tender in digital form and is a liability of the issuing central bank (Bindseil, 2019). Most CBDCs are designed to permit the transfer of CBDC deposits into a bank account as 'bank deposits' (Sanchez-Roger and Puyol-Antón, 2021). CBDCs are also designed to permit the transfer of bank deposits into a CBDC account as 'CBDC deposits'. The process of moving deposits from a bank account to CBDC account is commonly referred to as bank disintermediation because the migrated bank deposits are no longer available to banks for the purpose of financial intermediation (Bindseil, 2019), while the two-way movement of deposits from banks to the central bank and from the central bank to banks is generally known as deposit substitution (Bacchetta and Perazzi, 2021). A CBDC is a recent digital innovation, and is considered to be an external factor which banks must take into account in their banking business due to the potential effect of CBDC on bank deposits and the ripple effect on other areas of banking (Ozili, 2022b).

Previous studies have examined the external factors that encourage bank earnings management such as changes in prudential regulation (Lim and Yong, 2017), changes in accounting rules (Kilic, et al, 2013), crisis resolution policies (Fan et al, 2020), and Fintech competition (Ozili, 2022a). Other studies have identified accounting numbers that bank managers might use to manage reported earnings such as available for sale securities and loan loss provisions (Curcio and Hasan, 2015; Barth et al, 2017). These studies collectively show that external factors provide incentives for banks to engage in earnings management behaviour, and the choice of accounting numbers used to manage bank earnings depends on their opportunity and the cost of using such accounting numbers (Cohen and Zarowin, 2010). Prior earnings management studies also show evidence that new innovations create an incentive for firms to adjust accounting numbers for earnings management purposes or for other accounting purpose (e.g. Bereskin et al, 2018; Kouaib and Jarboui, 2016). But these studies have not examined the case of a central bank digital

currency. There is little knowledge about whether the introduction of a central bank digital currency creates an incentive for banks to manage reported earnings. Existing studies offer little insight into how CBDC activity or CBDC design might influence bank managers to manage reported earnings. This paper fills this gap in the literature by exploring the role of CBDC in bank earnings management.

In this paper, I show that specific factors, such as the bank disintermediation problem, provide specific motives for bank earnings management that is not documented in prior earnings management studies. I argue that bank customers' CBDC activity will have a direct impact on bank earnings through changes in the size of bank deposits. The fluctuation in bank deposits may be as a result of disorderly bank disintermediation and bank re-intermediation caused by bank customers' CBDC activity. The fluctuation in bank deposits can adversely affect bank lending and decrease bank reported earnings. This can provide incentives for bank managers to use accounting numbers to mitigate the adverse effect of CBDC activity on bank reported earnings.

This study contributes to the literature in the following ways. First, the study contributes to the earnings management literature that examine the role of digital technology and innovations for the persistence of earnings management. Unlike prior studies that examine the case of Fintech and blockchain (e.g. El Diri, 2020; Yu et al, 2018; Ozili, 2022a), this study focuses on the role of central bank digital currency for the persistence of earnings management in the banking sector. Second, this paper extends the motives offered in the literature for bank earnings management behavior. Several studies suggest that bank earnings management may be induced by the desire to report competitive earnings or to meet earnings forecast (e.g., Cohen et al, 2014; Jin et al, 2018; Cao, 2022). This study extends these motives by suggesting that banks adjust accruals to influence the size of reported earnings in response to the changes brought about by CBDC. Third, the study extends the very limited research on the accounting for digital assets and provides detailed explanation for the relationship between CBDC and earning management by banks.

The rest of the study is organized as follows. Section 2 presents the literature review and theoretical background for the study. Section 3 highlights the channels through which

CBDC affect bank earnings. Section 4 presents a discussion on loan loss provisions as an earnings management tool in a CBDC environment. Section 5 presents the factors that encourage earnings management using loan loss provision (LLP) in a CBDC environment. Section 6 presents the implications for earnings quality. Section 7 presents the conclusion of the study.

## **2. Literature review and theory**

### **2.1. Literature on the effect of private digital currencies on firms**

Private digital currencies, or cryptocurrencies, are any form of currencies that exist digitally and use cryptography to secure transactions (Bouveret and Haksar, 2018). They also use a decentralized system to record transactions and issue new units (Bouveret and Haksar, 2018). Cryptocurrencies are the most common types of private digital currencies. In the literature, Shin and Rice (2022) and Shin et al (2022) argue that cryptocurrency is not just a financial asset; rather, it is also a socio-technical system and a powerful technological force for innovation and development even though it presents a number of challenges that limit its full potential such as trust, cybersecurity, and scalability.

Existing studies have examined how private digital currencies, or cryptocurrencies, affect the performance of firms. For instance, Jumah and Karri (2020) investigate the performance of companies using cryptocurrencies. They investigate whether the performance of such companies is affected by major external events affecting cryptocurrencies. They focus on stock market reactions to firms' disclosure of events related to digital currencies. They analyse firms that used four major cryptocurrencies (i.e., Bitcoin, Ripple, Litecoin, and Ethereum) in their financial reports. They use event study analysis to determine the effect of major external cryptocurrency-related events on the stock market price of the companies. They found that major external events have a significant effect on the performance of companies that use cryptocurrencies or private digital currencies (Jumah and Karri, 2020). Sami and Abdallah (2022) focus on African firms. They examine the impact of the cryptocurrency market on the market value of firms

in Africa, and found that the cryptocurrency market decreases the market value of firms in Africa, and firms operating across different sectors respond disproportionately to the cryptocurrency market. They also find that the cryptocurrency market has an adverse effect on highly indebted firms in Africa.

Luo and Yu (2022) analyze the financial statements of forty global companies that have exposure to cryptocurrencies, including cryptocurrency purchases, mining, payments, trading, and investments in initial coin offerings and early-stage blockchain ventures. They find that firms that receive revenue from cryptocurrencies account for cryptocurrencies as intangibles in their financial statements using different measurement bases and they classify the associated cash inflows differently. They observe that some firms classify cryptocurrencies as long-term intangibles, while other firms consider intangibles as liquid, short-term assets. They also point out that the limited guidance about crypto-assets from both IFRS and GAAP allow companies to choose any accounting standard to apply and how to apply it. Li et al (2022) examine the impact of Blockchain-supported business model design on supply chain resilience and firm performance among Chinese firms. They find that companies with high strategic emphasis on business model efficiency achieve higher firm performance and supply chain resilience through Blockchain usage than Chinese firms without such focus. Kajtazi and Moro (2019) explore the role of bitcoin in portfolios of U.S., European and Chinese assets. They show that adding bitcoin to the portfolio improves portfolio performance; but this is due more to the increase in returns than in the reduction of volatility. They conclude that bitcoin can play an important role in portfolio diversification. Gregoriou (2019) shows that investors obtain abnormal returns by trading cryptocurrencies daily on the London Stock Exchange from 2014–2017, and the investor abnormal returns in cryptocurrencies imply inefficiency in the market. Zhang et al (2021) investigate whether investors earn higher profits by holding cryptocurrencies with higher downside risk. They find that investors that earn a high future return also have higher downside risk, thereby confirming the risk-return tradeoff theory.

## **2.2. Literature on the effect of central bank digital currencies on firms**

Few studies have examined how the introduction of a central bank digital currency might affect the performance of firms particularly banks. For instance, Chiu et al (2019) show that when banks have market power in the deposit market, issuing an interest-bearing CBDC with a proper interest rate would encourage banks to pay higher interest on consumer deposits to keep their customers, and such action would attract more deposits to banks and enable banks to issue more loans. Jun and Yeo (2021) investigate the effects of introducing an economy-wide, account-type CBDC on a bank's loan supply and its failure risk. They show that the CBDC will reduce the cost of money circulation and become a strong substitute for demand deposits, but it can increase the risk of bank failure if banks do not respond by increasing the interest rate on term deposits.

Kim and Kwon (2022) examine the implications of central bank digital currency for bank credit supply using a monetary general equilibrium model. They show that the introduction of deposits in CBDC account decreases bank credit supply, increases the nominal interest rate, decreases a bank's reserve-deposit ratio and increases the likelihood of bank panic when banks exhaust cash reserves. In contrast, Andolfatto (2021) argues that the introduction of a central bank digital currency does not have any detrimental effect on bank lending rather the introduction of a CBDC may promote bank lending because the increase in competition will pressure banks to increase the interest rate on bank deposits to attract deposits, and this will increase bank liquidity and increase bank lending. García et al (2020) support Andolfatto (2021)'s argument, and state that banks will be able to absorb temporary shocks to profitability and liquidity that arises from the introduction of CBDC when the cost of deposit funding is low and when the CBDC is non-interest bearing. Finally, Juks (2020) points out that although the widespread use of a central bank digital currency might decrease bank loan supply, central banks have tools to offset the adverse effect of CBDC on the lending capacity of banks when it becomes necessary for the central bank to intervene.

### **2.3. A theory of earnings management, banks and CBDC**

The positive accounting theory states that managers use their knowledge of accounting methods and accounting policies to influence the size of reported earnings in ways that increase the likelihood of receiving contractual outcomes that depend on the size of reported earnings (Watts and Zimmerman, 1986). The theory suggests that the promised compensation to managers will motivate them to alter the accounting policies and methods used in preparing financial reports in order to increase the likelihood of receiving the promised compensation that depend on the size of reported earnings (Watts and Zimmerman, 1986). Existing studies confirm the proposition of this theory by showing that managers of financial firms use accounting techniques to manage reported earnings and such accounting techniques include adjusting accruals, accelerating commission and fee income, and delaying revenue or loss recognition from the sale of financial securities (e.g. Beatty and Liao, 2014; Curcio and Hasan, 2015; Barth et al, 2017; Ozili and Outa, 2019).

In the case of banks, several studies show that external events motivate bank managers to engage in earnings management especially external events that have a direct impact on bank earnings (e.g. Kilic et al, 2013; Kanagaretnam et al, 2015; Cohen et al, 2014; Ozili, 2019; Di Fabio et al, 2021; Danisman et al, 2021; Ozili, 2022a). Consequently, the motivation for bank managers to manage their earnings is more persistent in corrupt institutional environments (Ozili, 2019), in highly regulated banking environments (Di Fabio et al, 2021), in less religious environments (Kanagaretnam et al, 2015), during financial crises (Cohen et al, 2014), during periods of high economic policy uncertainty, (Danisman et al, 2021), during periods of changes in accounting disclosure rules (Kilic et al, 2013), and during period of Fintech competition (Ozili, 2022a). Another external factor that can influence bank managers to manage bank earnings is the introduction of a central bank digital currency. The introduction of a central bank digital currency can lead to deposit migration from banks to the central bank which will reduce bank deposit funding, decrease bank lending and reduce the size of bank reported earnings (Ozili, 2022b). Bank managers can mitigate this effect by using different accounting techniques, such as those mentioned earlier, to dampen the effect of CBDC activity on bank reported earnings, so that bank managers will be able to report earnings that increase the likelihood of receiving

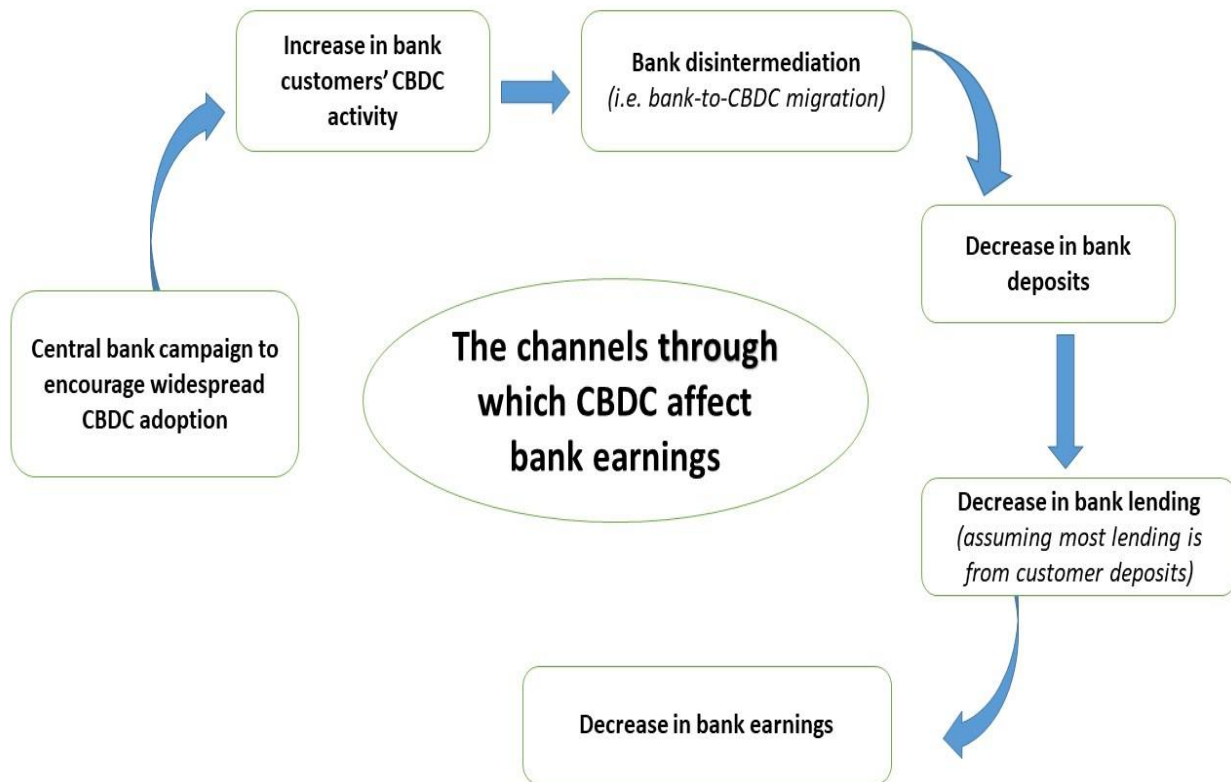


some promised compensation or other contractual obligations that depend on the size of reported earnings (Watts and Zimmerman, 1986).

### 3. Channels through which CBDC affect bank earnings

Figure 1 shows the channels through which CBDC affects bank earnings. The channels are (i) the campaign to increase CBDC usage, (ii) bank disintermediation and decrease in bank deposits, (iii) reduction in banking lending, and (iv) the reduction in bank earnings.

Figure 1. Channels through which CBDC affect bank earnings



Source: Author

### **3.1. The campaign by the central bank to encourage widespread CBDC usage**

A central bank can embark on a campaign to encourage bank customers to use CBDC for retail and wholesale purposes (Liu et al, 2022). Such campaign by the central bank can be achieved through policy measures. One, the central bank can introduce policies that require all banks to issue new loans in CBDC units to compel new borrowers to use CBDC. Two, the central bank can work with lawmakers to introduce laws that enforce the use of CBDC for transactions above a certain value threshold while cash and bank transfers can be used for transactions below the value threshold. Three, the central bank can specify in clear terms the specific economic activities where transactions should be carried out using CBDC. Four, the central bank can offer financial reward to banks that pay employee salaries in CBDC units (Sandner et al, 2020). Under such arrangement, banks will ask their employees to open a CBDC account to receive their salaries. Five, a central bank can enter into a partnership arrangement with banks (Bordo and Levin, 2017). The partnership will require banks to issue new loans in CBDC units and assist bank customers in opening a CBDC account while the central bank will offer financial reward to banks involved in the partnership arrangement. Generally, the goal of such campaign is to increase CBDC adoption and increase CBDC deposits (Liu et al, 2022).

### **3.2. Bank disintermediation and decrease in bank deposits**

Widespread CBDC adoption by bank customers will increase the risk of structural bank disintermediation (Auer et al, 2022). It can lead to the migration of bank deposits from the banking sector to the central bank, and a reduction in the size of bank balance sheet (Bindseil, 2020). The propensity to migrate bank deposit to CBDC deposit will also increase when there is high uncertainty about bank survival during a financial crisis (Kumhof and Noone, 2018). Bank disintermediation will increase funding cost and liquidity risk of banks and may trigger financial instability (Burlon et al, 2022). Meanwhile, bank disintermediation will benefit the central bank and give the central bank an unfair competitive advantage in the market for deposits (Bindseil, 2020). The central bank can also use its regulatory powers to strengthen its unfair advantage while commercial banks will have a competitive disadvantage in deposit collection and in credit creation (Bindseil, 2020).

The ease of migrating from bank deposit to CBDC deposit, or the low cost to migrate from bank deposit to CBDC deposit, can make bank disintermediation occur faster and transmit significant risk to the banking sector by making bank deposits become volatile and unpredictable, thereby increasing the cost of bank funding (Bindseil, 2019; Mancini-Griffoli et al, 2018). This risk can be mitigated if measures are put in place to make it difficult to migrate completely from bank deposit to CBDC deposit within a specific time period. Several proposals have been made to make the migration from bank deposit to CBDC deposit more difficult in order to protect banks and mitigate the risk of financial instability (BIS, 2021). For instance, there have been proposals to impose quantitative limits on CBDC demand (Bindseil, 2020), and simultaneously increase the interest rate on CBDC deposit and bank deposit as a way to discourage bank customers from migrating completely to CBDC deposits (Assenmacher et al, 2021). BIS (2021) proposed the imposition of quantity-based safeguards (e.g. maximum holding limits for CBDC deposits, transaction limits and differentiated limits); price-based safeguards (e.g., tiered CBDC remuneration, negative CBDC remuneration and unremunerated CBDC) and in-crisis measures (e.g. switching limits). Without these safeguards, it will be easy and less costly to migrate bank deposits to CBDC deposit. This would lead to faster bank disintermediation which may have financial instability consequences (BIS, 2021).

### **3.3. Reduction in bank lending**

Bank disintermediation, coupled with low bank-to-CBDC deposit migration cost and ease of deposit migration, can adversely affect bank lending (Auer et al, 2022). A widely held view is that bank disintermediation will increase CBDC deposit with the central bank, reduce the size of deposit with banks, decrease banks' ability to lend from available bank deposits, decrease the supply of private credit by commercial banks, and lead to increase in the nominal interest rate which is undesirable (Kim and Kwon, 2022; Ozili, 2022b; de Lis and Gouveia, 2018). During a crisis, bank lending will decrease due to large migration of bank deposit to CBDC deposit, and bank funding will also decrease (Kumhof and Noone, 2018). Pre-existing safeguards such as deposit insurance, prudential regulation and supervision may fail to prevent deposit migration from banks to the central bank during a crisis, thereby, leading to a decrease in bank deposits and a decrease in bank

lending (Kumhof and Noone, 2018; Jamet et al, 2022). In contrast, some scholars have argued that CBDC-induced bank disintermediation will increase bank lending rather than decrease bank lending. Jamet et al (2022) and Monnet et al (2021) argued that increase in the interest on CBDC deposit will force banks to raise the interest on bank deposit to attract more deposit to banks. This will lead to higher CBDC balances and higher bank deposit balances which would increase banks' ability to lend from bank deposits (Monnet et al, 2021).

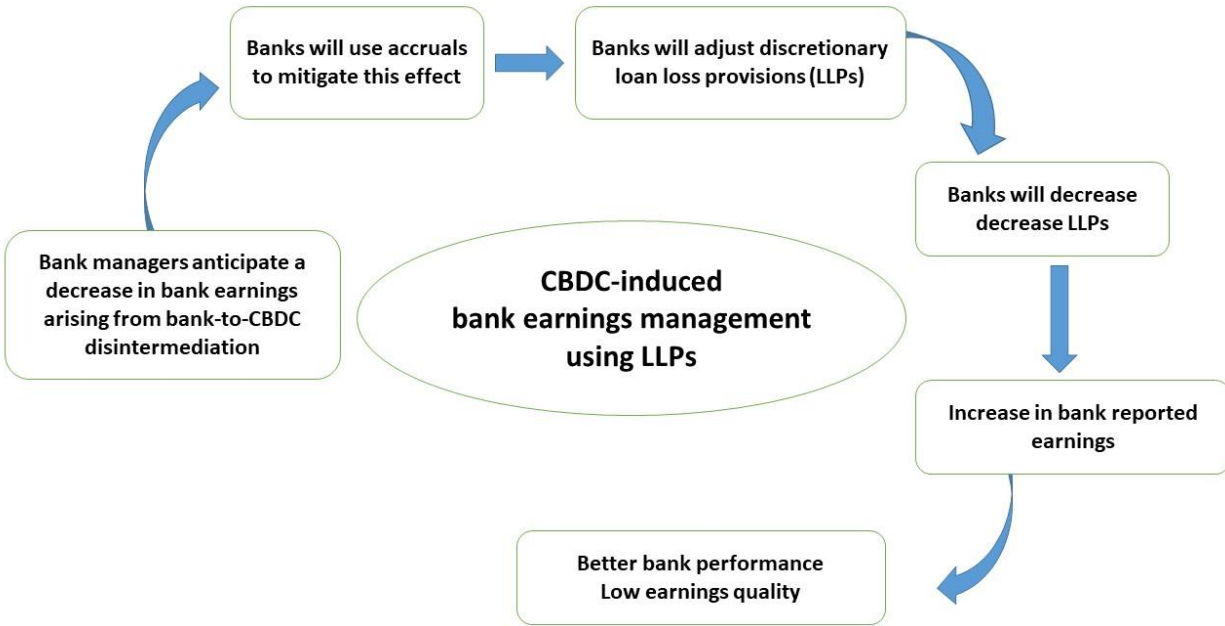
### **3.4. Decrease in bank earnings**

The reduction in bank deposits, as a result of bank disintermediation, will decrease bank lending and reduce bank interest income if banks do not increase interest rate on bank deposits (BIS, 2021). Also, if the CBDC is interest-bearing, it will lead to a quicker reduction in bank deposits, bank lending and bank interest income if banks do not increase interest rate on bank deposits (Ozili, 2022b). However, an interest-bearing CBDC could provide a floor on deposit rates which banks will have to match or exceed (Davoodalhosseini et al, 2020). Banks may respond by increasing deposit interest rate to make bank deposits more attractive than CBDC deposits, but the higher bank deposit rate is an expense to banks and this expense will reduce bank interest margin and reduce bank earnings (Mancini-Griffoli et al, 2018). Banks may attempt to increase lending rates but such action can lead to a fall in loan demand and will further reduce banks' net interest margin and bank earnings (Mancini-Griffoli et al, 2018).

## **4. Loan loss provision as a tool for earnings management in a CBDC environment**

Loan loss provision (LLP) is an accrual and an expense item in the income statement of banks. It reflects managers' current assessment of expected losses from default on outstanding loans (Cohen et al, 2014). LLPs are large relative to net income (Healy and Wahlen, 1999), and they provide a useful indication of bank managers' private information about expected loan losses, thereby reflecting information asymmetry about loan quality (Tran et al, 2020). Banks are required to set aside LLP to cover expected losses in their loan portfolio, and the LLP is constantly scrutinized by bank supervisors, regulators and accounting standard setters (Jin et al, 2018). LLP has been widely linked to bank earnings management in the literature. Studies show that LLP is the most important accrual adjusted by banks, which makes it an important tool for bank earnings management (Beatty and Liao, 2014; Peterson and Arun, 2018; Gallemore, 2022). Studies have also shown that banks have incentives to understate or overstate discretionary LLP when they need to achieve some specific objectives that are related to receiving a bonus plan, avoiding debt covenant violation, and avoiding political and regulatory scrutiny of bank earnings (Healy and Wahlen, 1999; Ozili, 2017; Peterson and Arun, 2018). However, the extent of bank earnings management using LLP is reduced by greater transparency in financial reporting that arises from strong accounting disclosure rules, strong corporate governance, institutional monitoring and strict regulation and supervision (see, Chen and Daley, 1996; Leventis et al, 2011; Fonseca and Gonzalez, 2008). Sometimes, accounting standards and prudential regulations allow managerial discretion in estimating loan loss provisions (Marton and Runesson, 2017), and this discretion can be used to manage bank earnings when CBDC activity introduce changes that can affect the reported earnings of banks. In such circumstances, bank managers will have incentives to adjust LLPs to mitigate the effect of CBDC on reported earnings. Banks will likely decrease LLPs to increase low earnings caused by CBDC disintermediation. This is illustrated in figure 2.

Figure 2. CBDC-induced earnings management using LLPs



Source: Author

## **5. Factors encouraging earnings management using LLP in a CBDC environment**

A CBDC environment, or CBDC design, may introduce changes that affect bank earnings. Also, events that occur after CBDC adoption can also affect bank earnings, thereby providing incentives for banks to manage their earnings. These factors are illustrated in figure 3 and are discussed below.

### **5.1. Crisis periods**

During financial crises, there is heightened uncertainty about the survival of banks (Ivashina and Scharfstein, 2010). Such uncertainty can lead to the migration of bank deposits to CBDC deposits as a flight to safety mechanism during the crisis (Williamson, 2021). This will worsen the state of banks through the decline in bank deposits, the reduction in bank lending ability, and a likely decrease in bank earnings during the crisis. The anticipated decrease in bank earnings during the crisis will give banks some incentives to manage earnings in order to minimize the size of reported loss or to increase low earnings during the crisis. Bank managers will likely increase reported earnings by adjusting the accruals that are closely linked to bank interest income (Kanagaretnam et al, 2004). Loan loss provision is commonly acknowledged to be the most important accrual that banks use to influence the size of reported earnings during crises (Peterson and Arun, 2018). Therefore, bank managers will likely reduce loan loss provision estimates to minimize reported loss or to increase low earnings during crisis (De Haan and Van Oordt, 2018). The incentive for bank managers to reduce loan loss provision estimates will be stronger during the crisis if bank supervisors increase banks' regulatory loan loss reserves during the crisis (Curcio et al, 2017). Banks will try to mitigate the effect of higher regulatory loan loss reserves on their net interest margin by lowering their discretionary loan loss provision estimates to offset the increase in non-discretionary provisions or regulatory loan loss reserves during the crisis (Curcio et al, 2017).

## **5.2. The ease of deposit substitution**

Banks will have incentives to manage reported earnings if the central bank fails to impose restrictions on deposit substitution. The central bank may be reluctant to impose quantitative or price restrictions on deposit substitution when they have concerns that imposing restrictions on deposit substitution will discourage bank customers from using CBDC or engaging in CBDC transactions (BIS, 2021). A CBDC environment that allows easy deposit substitution without restriction is risky for banks because it provides an incentive for depositors to increase the frequency of deposit substitution which makes bank deposits become volatile (BIS, 2021). The ease of deposit substitution will compel bank managers to take a cautious approach to lending as bank deposits become volatile (Dinger and Craig, 2014). The precaution in bank lending will lead to a reduction in bank lending, a rise in the cost of credit and a reduction in loan demand which will reduce the net interest margin and reported earnings of banks. The likely decline in bank earnings will provide incentives for bank managers to manage earnings in order to minimize the decline in net interest margin and reported earnings. Banks will reduce discretionary LLP estimates in order to increase net interest margin and increase reported earnings (Ozili, 2017).

## **5.3. Low cost of bank disintermediation**

The low cost of bank disintermediation can also provide incentives for earnings management (Eren et al, 2022). When the cost of moving deposits from banks to the central bank is low or negligible, depositors will have incentives to increase the frequency of bank disintermediation. The decrease in bank deposits will also compel bank managers to take a cautious approach when lending to the private sector (Kim and Kwon, 2022). The precaution in lending would lead to a reduction in lending and a reduction in bank net interest margin and reported earnings. The likely decline in bank earnings will provide incentives for bank managers to manage earnings (Ozili, 2017). They will decrease discretionary LLP to increase reported earnings, and the incentive to do so will be stronger if the central bank does not want to impose high transaction cost on depositors who may be discouraged from using CBDC due to high transaction cost (BIS, 2021; Ozili, 2022b).



#### **5.4. High-value bank deposit migration to CBDC**

Large migration from bank deposits to CBDC deposits even in non-crisis years is risky for banks (Samudrala and Yerchuru, 2021). This risk can provide incentives for bank managers to engage in earnings management. When individual depositors move large amounts of bank deposits to CBDC deposits, it will significantly reduce the size of bank deposits and force banks to find alternative sources of funding which will come at high cost (Jun and Yeo, 2021). The high cost of funding will compel banks to increase interest rate on new loans to generate higher bank net interest margin. But this effect may not materialize if the increase in interest rate leads to a fall in loan demand (Assenmacher et al, 2021), which will negatively affect the net interest margin and reported earnings of banks. The expected decline in reported earnings can provide incentives for bank managers to engage in earnings management in order to minimize the decline in net interest margin (Peterson and Arun, 2018). Bank managers will reduce discretionary LLP in order to increase net interest margin and increase reported earnings, and the incentive to do so will be stronger if there are no maximum quantitative and price limits on the amount of bank deposits that can be migrated to CBDC deposits within a specific period of time.

#### **5.5. Lack of regulatory controls on bank-to-CBDC deposit migration**

The absence of regulatory controls on bank-to-CBDC deposit migration can also provide incentives for bank managers to manage earnings. The absence of regulatory controls can motivate bank managers to adjust accruals in order to dampen the effect of deposit migration on their reported earnings. There are on-going debates about whether some regulatory limits should be placed on bank-to-CBDC deposit migration (BIS, 2021; Ozili, 2022b). Proponents in support of imposing regulatory limits on bank-CBDC deposit migration argue that regulatory limits are necessary to make bank funding become more stable and predictable, and to preserve bank stability (Soderberg et al, 2022). A counter argument is that imposing regulatory limits will make CBDC become less attractive to bank customers and it can discourage users from using CBDC (Ozili, 2022b). The latter argument is important because CBDC has not been well received in countries that have

already adopted a CBDC<sup>1</sup> mainly because existing payment alternatives are working well in those countries (Ozili, 2022b); therefore, any attempt to impose regulatory price or quantity limits can discourage bank customers from using CBDC (BIS, 2021). Strict regulatory restrictions on deposit migration may emerge later but not immediately so that a large number of people can adopt and use CBDC (Leonov, 2022). During this time, bank managers need to find a way to cope with unrestricted bank-to-CBDC deposit migration. One way in which bank managers can cope with the deposit migration problem is to engage in earnings management using LLP.

### **5.6. High interest rate on interest-bearing CBDC**

High interest rate on interest-bearing CBDC can also provide incentives for bank earnings management. When the deposit rate on interest-bearing CBDC is high, bank customers will have incentives to migrate their bank deposits to CBDC deposits in order to benefit from the high deposit rate on interest-bearing CBDC (Ozili, 2022b). This will lead to a significant reduction in bank deposits and compel banks to find alternative sources of funding which would come at high cost (Bacchetta and Perazzi, 2021). The migration of deposit from banks to CBDC will reduce banks' ability to lend from available deposits (Bindseil, 2019). Banks will respond by increasing bank deposit rate to attract new deposits (Andolfatto, 2021). But this action is costly because the increase in bank deposit rate is an expense to banks. It will reduce banks' net interest margin and bank earnings. Consequently, bank managers can reduce discretionary LLP to increase reported earnings (Ozili, 2017), and the incentive to do so will be stronger if the deposit rate on interest-bearing CBDC becomes the floor on deposit rates which banks have to match or exceed in order to attract deposit from customers (Davoodalhosseini et al, 2020).

### **5.7. Lack of trust in banks and greater trust in the central bank**

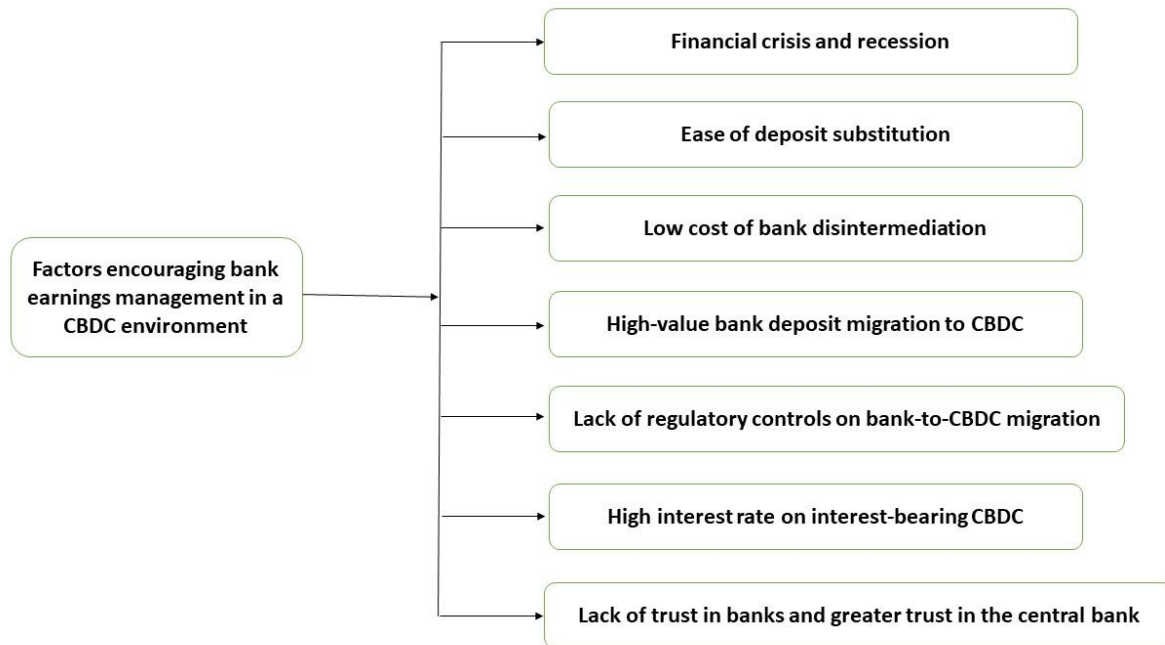
Certain events, when they occur, lead to distrust in banks and greater trust in the central bank (Stix, 2013; Ozili, 2023). Bank customers that do not trust banks will have incentives to migrate their deposits to the central bank in the form of CBDC deposits. This will decrease bank deposit and bank funding (Kumhof and Noone, 2018). Banks will have to

---

<sup>1</sup> Such as the Bahamas and Nigeria.

search for alternative source of funding which would come at high cost. This will lead to high interest rate on new loans, and a reduction in bank lending which will negatively affect the net interest margin and reported earnings of banks (Gunji and Yuan, 2010). The likely decline in the reported earnings of banks will provide incentives for bank managers to engage in earnings management to minimize the decline in net interest margin arising from lack of trust in banks (Fonseca and Gonzalez, 2008). Consequently, bank managers will reduce LLP to increase their net interest margin and increase reported earnings.

Figure 3. Factors encouraging earnings management using LLP in a CBDC environment



Source: Author

## 6. Implications for earnings quality

The widespread use of CBDC by bank customers has implications for the quality of banks' reported earnings. Banks operating in a CBDC environment may engage in earnings management as an efficiency mechanism, a stability mechanism or an opportunistic behavior to influence the size of reported earnings, and such mechanism or behavior will decrease the quality of banks' reported earnings. The implication for earnings quality is that banks' reported earnings will not fully reflect banks' current operating performance (Dechow et al, 2010). Rather, it will partly reflect banks' current operating performance and also reflect bank managers' opportunistic decision to manipulate accruals to increase reported earnings (Tutino and Pompili, 2018). The second implication for earnings quality is that banks' current reported earnings would no longer be a good indicator of future reported earnings (Kanagaretnam et al, 2011). Ideally, current reported earnings ought to be a good indicator of future reported earnings (Dechow and Schrand, 2004). But, when bank managers alter accruals (e.g. LLP) to mitigate the effect of CBDC-induced changes on earnings, banks' current earnings would no longer be a good indicator of the future operating performance of banks. Another implication for earnings quality is that it will be difficult to accurately annuitize the intrinsic value of banks based on earnings alone (Kanagaretnam et al, 2011). Another implication for earnings quality is that investors might be able to detect accrual earnings management that is induced by bank customers' CBDC activity. If investors detect it, they will no longer rely on banks' reported earnings to make critical investment decisions due to the perceived reduction in earnings quality (Dechow et al, 1995). However, bank earnings quality in a CBDC environment can be improved by introducing regulatory controls that minimize the impact of CBDC activity on bank earnings. Such regulatory controls include imposing quantitative and price restrictions on CBDC deposits, increasing the cost of deposit migration, and ensuring that CBDC deposit rates are lower than bank deposit rates at all times (BIS, 2021).

## 7. Conclusion

This paper examined the role of CBDC in bank earnings management. The paper by Bindseil (2020) provides an organized and easy-to-understand point of entry to the role of CBDC in the banking sector. In this paper, I complement Bindseil (2020)'s study by presenting a discussion about the role of CBDC in encouraging earnings management in the banking sector. Earlier, it was discussed that bank disintermediation affects bank deposits. It increases the cost of bank funding and decreases bank lending. I then argued that the decrease in bank lending will negatively affect bank earnings, thereby giving bank managers an incentive to engage in income-increasing earnings management. This explanation is intuitive and logical particularly because such incentives may be driven by the need to meet shareholders' expectations or to receive executive compensation, career growth and private benefits that depend on the size of reported earnings. CBDC-induced earnings management can also be aimed at smoothing reported earnings rather than for income-increasing earnings management. Future research can provide an in-depth analysis of how CBDC can encourage income smoothing or income-decreasing earnings management among banks. Future studies can also examine other accruals that might be used to manage bank earnings in a CBDC environment. Additional studies can examine the prospect of real earnings management in a CBDC environment.

## Reference

- Andolfatto, D. (2021). Assessing the impact of central bank digital currency on private banks. *The Economic Journal*, 131(634), 525-540.
- Assenmacher, K., Berentsen, A., Brand, C., & Lamersdorf, N. (2021). A unified framework for CBDC design: remuneration, collateral haircuts and quantity constraints. *European Central Bank*, No 2578, July.
- Auer, R., Frost, J., Gambacorta, L., Monnet, C., Rice, T., & Shin, H. S. (2022). Central bank digital currencies: motives, economic implications, and the research frontier. *Annual Review of Economics*, 14, 697-721.
- Bacchetta, P., & Perazzi, E. (2021). CBDC as Imperfect Substitute for Bank Deposits: A Macroeconomic Perspective. *Swiss Finance Institute Research Paper*, (21-81).
- Barth, M. E., Gomez-Biscarri, J., Kasznik, R., & López-Espinosa, G. (2017). Bank earnings and regulatory capital management using available for sale securities. *Review of Accounting Studies*, 22(4), 1761-1792.
- Beatty, A., & Liao, S. (2014). Financial accounting in the banking industry: A review of the empirical literature. *Journal of Accounting and Economics*, 58(2-3), 339-383.
- Bereskin, F. L., Hsu, P. H., & Rotenberg, W. (2018). The real effects of real earnings management: Evidence from innovation. *Contemporary Accounting Research*, 35(1), 525-557.
- Bindseil, U. (2019). Central bank digital currency: Financial system implications and control. *International Journal of Political Economy*, 48(4), 303-335.
- Bindseil, U. (2020). Tiered CBDC and the financial system. *ECB Working Paper Series*, No. 2351. Frankfurt am Main.
- BIS (2021). Central bank digital currencies: financial stability implications. *A Bank of International Settlement Report*, September. Geneva.

Bordo, M. D., & Levin, A. T. (2017). *Central bank digital currency and the future of monetary policy* (No. w23711). National Bureau of Economic Research.

Bouveret, A., & Haksar, V. (2018). What are cryptocurrencies. *Finance and Development*, 55(2), 26-29.

Sami, M., & Abdallah, W. (2022). Does cryptocurrency hurt African firms?. *Risks*, 10(3), 53.

Burlon, L., Montes-Galdon, C., Muñoz, M., & Smets, F. (2022). The optimal quantity of CBDC in a bank-based economy. *CEPR Discussion Paper*, No. DP16995.

Cao, Y. (2022). Bank earnings management and performance reporting of comprehensive income. *Journal of Accounting and Public Policy*, 106996.

Chen, P., & Daley, L. (1996). Regulatory capital, tax, and earnings management effects on loan loss accruals in the Canadian banking industry. *Contemporary Accounting Research*, 13(1), 91-128.

Chiu, J., Davoodalhosseini, S. M., Hua Jiang, J., & Zhu, Y. (2019). Bank market power and central bank digital currency: Theory and quantitative assessment. *Available at SSRN 3331135*.

Cohen, D. A., & Zarowin, P. (2010). Accrual-based and real earnings management activities around seasoned equity offerings. *Journal of Accounting and Economics*, 50(1), 2-19.

Cohen, L. J., Cornett, M. M., Marcus, A. J., & Tehranian, H. (2014). Bank earnings management and tail risk during the financial crisis. *Journal of Money, Credit and Banking*, 46(1), 171-197.

Curcio, D., & Hasan, I. (2015). Earnings and capital management and signaling: the use of loan-loss provisions by European banks. *The European Journal of Finance*, 21(1), 26-50.

Curcio, D., De Simone, A., & Gallo, A. (2017). Financial crisis and international supervision: New evidence on the discretionary use of loan loss provisions at Euro Area commercial banks. *The British Accounting Review*, 49(2), 181-193.

Danisman, G. O., Demir, E., & Ozili, P. (2021). Loan loss provisioning of US banks: Economic policy uncertainty and discretionary behavior. *International Review of Economics & Finance*, 71, 923-935.

Davoodalhosseini, M., Rivadeneyra, F., & Zhu, Y. (2020). CBDC and monetary policy (No. 2020-4). *Bank of Canada*.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting earnings management. *Accounting review*, 193-225.

Dechow, P. M., & Schrand, C. M. (2004). Earnings quality. *The Research Foundation of CFA Institute*, Charlottesville.

Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of accounting and economics*, 50(2-3), 344-401.

De Haan, L., & Van Oordt, M. R. (2018). Timing of banks' loan loss provisioning during the crisis. *Journal of Banking & Finance*, 87, 293-303.

de Lis, S. F., & Gouveia, O. (2018). Central bank digital currencies: features, options, pros and cons. BBVA Research Working Paper No 19-04. Madrid.

Di Fabio, C., Ramassa, P., & Quagli, A. (2021). Income smoothing in European banks: The contrasting effects of monitoring mechanisms. *Journal of International Accounting, Auditing and Taxation*, 43, 100385.

Dinger, V., & Craig, B. R. (2014). Volatile lending and bank wholesale funding. *Available at SSRN 2505167*.

El Diri, M. (2020). Blockchain and Earnings Management. Available at SSRN 3776225.

Eren, E., Jackson, T., & Lombardo, G. (2022). Efficient disintermediation with CBDC.



Fan, Y., Huang, Y., Jiang, Y., & Liu, F. H. (2020). Watch out for bailout: TARP and bank earnings management. *Journal of Financial Stability*, 51, 100785.

Fonseca, A. R., & Gonzalez, F. (2008). Cross-country determinants of bank income smoothing by managing loan-loss provisions. *Journal of Banking & Finance*, 32(2), 217-228.

Gallemore, J. (2022). Bank financial reporting opacity and regulatory intervention. *Review of Accounting Studies*, 1-46.

García, A., Lands, B., Liu, X., & Slive, J. (2020). *The potential effect of a central bank digital currency on deposit funding in Canada* (No. 2020-15). Bank of Canada.

Gregoriou, A. (2019). Cryptocurrencies and asset pricing. *Applied Economics Letters*, 26(12), 995-998.

Gunji, H., & Yuan, Y. (2010). Bank profitability and the bank lending channel: Evidence from China. *Journal of Asian Economics*, 21(2), 129-141.

Healy, P. M., & Wahlen, J. M. (1999). A review of the earnings management literature and its implications for standard setting. *Accounting horizons*, 13(4), 365-383.

Ivashina, V., & Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial economics*, 97(3), 319-338.

Jamet, J., Mehl, A., Neumann, C. M., & Panetta, F. (2022). Monetary policy and financial stability implications of central bank digital currencies. *VoxEU*, April 2022

Jin, J., Kanagaretnam, K., & Lobo, G. J. (2018). Discretion in bank loan loss allowance, risk taking and earnings management. *Accounting & Finance*, 58(1), 171-193.

Juks, R. (2020). Central bank digital currencies, supply of bank loans and liquidity provision by central banks. *Service Industries Journal (UK)*, 2, 62-79.

Jumah, A., & Karri, R. (2020). Does the adoption of cryptocurrencies affect firm performance?. AMCIS 2020 Proceedings. Paper No. 9

Jun, J., & Yeo, E. (2021). Central bank digital currency, loan supply, and bank failure risk: a microeconomic approach. *Financial Innovation*, 7(1), 1-22.

Kanagaretnam, K., Lobo, G. J., & Mathieu, R. (2004). Earnings management to reduce earnings variability: evidence from bank loan loss provisions. *Review of Accounting and Finance*, 3(1), 128-148.

Kanagaretnam, K., Lim, C. Y., & Lobo, G. J. (2011). Effects of national culture on earnings quality of banks. *Journal of International Business Studies*, 42(6), 853-874.

Kanagaretnam, K., Lobo, G. J., & Wang, C. (2015). Religiosity and earnings management: International evidence from the banking industry. *Journal of Business Ethics*, 132(2), 277-296.

Kajtazi, A., & Moro, A. (2019). The role of bitcoin in well diversified portfolios: A comparative global study. *International Review of Financial Analysis*, 61, 143-157.

Kilic, E., Lobo, G. J., Ranasinghe, T., & Sivaramakrishnan, K. (2013). The impact of SFAS 133 on income smoothing by banks through loan loss provisions. *The Accounting Review*, 88(1), 233-260.

Kim, Y. S., & Kwon, O. (2022). Central Bank Digital Currency, Credit Supply, and Financial Stability. *Journal of Money, Credit and Banking*.

Kouaib, A., & Jarboui, A. (2016). Real earnings management in innovative firms: does CEO profile make a difference? *Journal of Behavioral and Experimental Finance*, 12, 40-54.

Kumhof, M and C Noone (2018). Central bank digital currencies — design principles and balance sheet implications. *Staff Working Papers*, No 725, Bank of England, May.

Leonov, M. V. (2022). Monetary policy and banking intermediation in CBDC economy. *Independent Journal of Management & Production*, 13(4), s452-s461.

Leventis, S., Dimitropoulos, P. E., & Anandarajan, A. (2011). Loan loss provisions, earnings management and capital management under IFRS: The case of EU commercial banks. *Journal of Financial Services Research*, 40(1), 103-122.

- Li, G., Xue, J., Li, N., & Ivanov, D. (2022). Blockchain-supported business model design, supply chain resilience, and firm performance. *Transportation Research Part E: Logistics and Transportation Review*, 163, 102773.
- Lim, C. Y., & Yong, K. O. (2017). Regulatory pressure and income smoothing by banks in response to anticipated changes to the Basel II Accord. *China Journal of Accounting Research*, 10(1), 9-32.
- Liu, X., Wang, Q., Wu, G., & Zhang, C. (2022). Determinants of individuals' intentions to use central bank digital currency: evidence from China. *Technology Analysis & Strategic Management*, 1-15.
- Luo, M., & Yu, S. (2022). Financial reporting for cryptocurrency. *Available at SSRN 4186836*.
- Mancini-Griffoli, T., Peria, M. S. M., Agur, I., Ari, A., Kiff, J., Popescu, A., & Rochon, C. (2018). Casting light on central bank digital currency. *IMF staff discussion note*, 8(18), 1-39.
- Marton, J., & Runesson, E. (2017). The predictive ability of loan loss provisions in banks—Effects of accounting standards, enforcement and incentives. *The British Accounting Review*, 49(2), 162-180.
- Monnet, E., Riva, A., & Ungaro, S. (2021). Bank runs and central bank digital currency. *VoxEU*, 1 May.
- Ozili, P. K. (2017). Discretionary provisioning practices among Western European banks. *Journal of Financial Economic Policy*, 9(1), 109-118.
- Ozili, P. K. (2019). Bank income smoothing, institutions and corruption. *Research in International Business and Finance*, 49, 82-99.
- Ozili, P. K., & Outa, E. (2019). Bank earnings management using commission and fee income: The role of investor protection and economic fluctuation. *Journal of Applied Accounting Research*, 20(2), 172-189.

Ozili, P. K. (2022a). Banking sector earnings management using loan loss provisions in the Fintech era. *International Journal of Managerial Finance*, 18(1), 75-93.

Ozili, P. K. (2022b). Central bank digital currency research around the World: a review of literature. *Journal of Money Laundering Control*.

Ozili, P. K. (2023). eNaira central bank digital currency (CBDC) for financial inclusion in Nigeria. *Central Bank Digital Currency in Nigeria*. In *Digital Economy, Energy and Sustainability*. Springer.

Peterson, O. K., & Arun, T. G. (2018). Income smoothing among European systemic and non-systemic banks. *The British Accounting Review*, 50(5), 539-558.

Samudrala, R. S., & Yerchuru, S. K. (2021). Central bank digital currency: risks, challenges and design considerations for India. *CSI Transactions on ICT*, 9(4), 245-249.

Sanchez-Roger, M., & Puyol-Antón, E. (2021). Digital bank runs: A deep neural network approach. *Sustainability*, 13(3), 1513.

Sandner, P. G., Gross, J., Grale, L., & Schulden, P. (2020). The digital programmable euro, Libra and CBDC: Implications for European banks. *Libra and CBDC: Implications for European Banks (July 29, 2020)*.

Shin, D., & Rice, J. (2022). Cryptocurrency: A Panacea for Economic Growth and Sustainability? A Critical Review of Crypto Innovation. *Telematics and Informatics*, 101830.

Shin, D., Stylos, N., Asim, M., Park, Y., & Williams, R. B. (2022). How does the blockchain find its way in the UAE? The blockchain as a sociotechnical system. *International Journal of Technology Management*, 90(1-2), 122-140.

Soderberg, G., Bechara, M., Bossu, W., Che, N. X., Kiff, J., Lukonga, I., ... & Yoshinaga, A. (2022). Behind the Scenes of Central Bank Digital Currency: Emerging Trends, Insights, and Policy Lessons. *FinTech Notes*, 2022(004).

Stix, H. (2013). Why do people save in cash? Distrust, memories of banking crises, weak institutions and dollarization. *Journal of Banking & Finance*, 37(11), 4087-4106.

Tran, D. V., Hassan, M. K., & Houston, R. (2020). Discretionary loan loss provision behavior in the US banking industry. *Review of Quantitative Finance and Accounting*, 55(2), 605-645.

Tutino, M., & Pompili, M. (2018). Fair value accounting and management opportunism on earnings management in banking sector: First evidence. *Corporate Ownership & Control*, 15(2), 59-69.

Watts, R. L., & Zimmerman, J. L. (1986). *Positive accounting theory*. Englewood Cliffs, N.J.: Prentice-Hall.

Williamson, S. D. (2021). Central bank digital currency and flight to safety. *Journal of Economic Dynamics and Control*, 104146.

Yu, T., Lin, Z., & Tang, Q. (2018). Blockchain: The introduction and its application in financial accounting. *Journal of Corporate Accounting & Finance*, 29(4), 37-47.

Zhang, W., Li, Y., Xiong, X., & Wang, P. (2021). Downside risk and the cross-section of cryptocurrency returns. *Journal of Banking & Finance*, 133, 106246.