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The correlation of cashless banking and profitability in the banking industry in Bangladesh

Moutusi Tanha[1*], Md. Karimul Alam[2], Sultan Mahmud[3], Shahadat Hossain[4], Murshed Alam[5], Md. Al Sabahel[6]
University of Canterbury, Christchurch, New Zealand[1]
University of Dhaka, Bangladesh[2,3,4,5&6]
mta150@uclive.ac.Nz[1], karimulalam566@gmail.com[2], isteakhts@gmail.com[3], shawon17100@gmail.com[4], murshed17098@gmail.com[5], ahmedlasabahel@gmail.com[6]

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Abstract
Purpose: Cashless banking is an innovative banking policy that is gaining prominence in today's digital era of technological advancement. This study investigates the correlation between profitability of the banking sector and adoption of cashless banking in Bangladesh.
Research Methodology: The profitability of the cashless banking industry in Bangladesh was measured using Return on Equity (ROE) and Return on Assets (ROA). Profitability is determined by the transaction volume of Mobile Financial Services (MFS), Automated Teller Machines (ATMs), bit cards, and internet banking fund transfers (IBFT). This study uses a multiple regression approach to analyze the association between a bank's profitability and cashless banking. The data used in this analysis were collected from the annual reports of the Central Bank of Bangladesh over a seven-year period.
Results: The findings indicate that IBFT has a notable favorable influence on return on equity (ROE), whereas ATM and debit cards have major adverse impacts on ROE. Additionally, mobile financial services (MFS) and IBFT have a positive effect on return on assets (ROA), but debit cards have a negative effect on ROA in Bangladesh's banking business. The data indicate that nearly all the components have either a positive or negative influence on ROA or ROE.
Contribution: However, only IBFT has a positive and substantial influence on ROA and ROE. The results of this study have moderate importance for the regulatory bodies and stakeholders of both banks and non-bank financial firms as well as for academics and the government as a whole.
Keywords: *E-Banking, Cashless Transactions, Digital Payment System, Banking Industry of Bangladesh, Paperless Economy*
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1. Introduction

In Bangladesh, the concept of a cashless society has recently taken center stage. Recent headwinds have changed the way we handle money, spurred rapid invention, and resulted in habits oriented toward convenience, safety, and sustainability. The convenience of going cashless is multilayered. The introduction of e-commerce has opened eyes to entirely new conveniences; with the click of a button, ordering and payment have become streamlined activities.

Payments are the foundation of value exchange in society and reflect how quickly goods and services are exchanged (Srouji & Torre, 2022). The global community has been urged to use new payment methods that are simpler and faster because of systematic technological advancements. The term "cashless society" refers to a type of society in which physical money is no longer used for transactions. Several financial researchers and practitioners offer a future vision for this type of society (Ong & Chong, 2023). The concept of a cashless society first emerged in the 1950s, when American businessmen discussed a vision of a "checkless society" in 1954. At that time, it was discovered that cash payments were becoming less supportive of people's transaction mobility. The availability of paper-based payment instruments has been hindered by the transactional behavior of people who have a propensity to make transactions at higher and faster rates (Lai & Liew, 2021).

The number of mobile wallet users recorded in 2020 was 2.8 billion and is predicted to grow to 4.8 billion by 2025, nearly 60% of the world's population. The countries that have adopted mobile wallets the fastest in their efforts to replace cash and credit cards are Southeast Asia, Latin America, Africa, and the Middle East (Hidayah, Waspada, & Sari, 2023). In addition, with the advancement of digital technology and widespread use of the Internet, the concept of a cashless society has drawn considerable attention. Several researchers have identified digital payments as a phenomenon of mass adoption in the global community. According to Hidayah et al. (2023), electronic payments have played a role in the development of a cashless society. This investigation also clarifies how a cashless society can be created. They suggest that a cashless society can emerge if a community can adopt new versions of advanced payment techniques. The development of payment technologies is a prerequisite for the formation of a cashless society. Information and communication technology literacy is a catalyst for changes in people's payment methods towards non-cash, where governments in various countries have begun to reduce printed money (Fabris, 2019). On the other hand, government control over initiatives, including payment methods, has decreased because of the rise of privately owned crypto-currencies, particularly during the recent global crisis. This increases the possibility of other more complicated issues and leads to greater independence in a cashless society (Fabris, 2019).

In addition, creating a cashless society faces significant challenges owing to fraud and systemic banking system flaws. As operational-level recording is conducted manually and in segments, paper-based payment systems have created several problems. In traditional transactions, people exchange banknotes for goods/services to be rolled back into the supply chain system (Achord, Chan, Nardani, & Rochemont, 2017). These transactions do not involve much of the banking system, and thus the number of banknotes circulating in the community becomes inaccurate. Attempts to counterfeit banknotes are also classic criminal acts that demonstrate the weakness of the paper-based payment system, where people are again victims. Considering the crucial role of payment models in a cashless society, this study provides a summary of the drivers and challenges of this society in Bangladesh (Datta, 2021). Furthermore, using the Systematic Literature Review approach, it is hoped that the study results will provide a formulation of conditions that can be used to evaluate the cashless society in the past and present to provide predictions about future conditions (Achord et al., 2017).

2. Literature Review

Numerous studies have been conducted on cashless societies worldwide. Although numerous studies have been conducted worldwide, very few have been conducted on a cashless society. Because customers are the main focal point for adopting cashless payments, a comprehensive study can be conducted. Cashless transactions do not substitute for actual money, as they supplement them. Each cashless payment method has a distinct effect on the adoption of Internet and mobile banking because of the usage and functionality differences between them (Achord et al., 2017). Credit transfers, electronic wallets, direct debits, credit cards, and charge cards are the most commonly used cashless payment methods. Consumers can use credit transfers through online banking or mobile banking to transfer money from their savings account to another account (Rozanna, 2023).

Based on one study, to pay for purchases, consumers can also transfer funds from their savings accounts to their electronic wallets. Berkimbayeva (2019) conducted a study on ‘‘the effect of cashless payments on the Internet and mobile banking’’ and found that pre-loaded funds have been added to an electronic

wallet (e-wallet), either through a cash deposit or a credit transfer from the owner's savings account. This is also referred to as mobile or digital money. Abbas (2017), showed E-wallets can be used to pay for both online and conventional offline purchases. By scanning the quick response (QR) code for their purchases, customers who have money loaded in their e-wallets can easily make payments. Berkimbayeva (2019) conducted another study on "the effect of cashless payments on the Internet and mobile banking in Malaysia'' and identified that the Touch and Go (TNG5) wallet is a well-known e-wallet in Malaysia. Customers can pay for purchases by scanning QR codes with a TNG wallet using near-field communication technology. Furthermore, the TNG wallet is connected to a TNG debit card that can be used to pay parking costs, public transportation (buses and trains), and tolls on highways. In addition, customers can make payments for their purchases using debit cards in a more effective way than traditional systems (Tanha et al., 2023).

Berkimbayeva (2019) concentrated on the factors regarding the cashless society in Malaysia and looked at credit cards, which are popular cashless payment tools. Each credit card issued has a credit limit, because it is issued as a credit facility to the cardholder. Pay waves or entering a secret PIN are the two methods used in Malaysia to process credit card payments. The cardholder can pay the card's outstanding balance in full or part on a specific date each month. The cardholder will be assessed with a finance interest fee of approximately 15% to 20% of the outstanding balance for any unpaid balance. Different banks charge different interest rates to finance outstanding balances on credit cards. A charge card is considered another method of cashless payment, which is very similar to credit cards. The only distinction between the two is that charge cards have no credit limits. This implies that any unpaid balance on the card must be paid in full each month on the due date.

Network connections are necessary for both online and mobile banking to process financial transactions. Mobile banking permits financial transactions to be accomplished through banking applications installed on mobile devices. Mobile phones and other devices such as tablets, laptops, and desktop computers can be used for Internet banking. Except for transactions including physical cash, almost all banking activities can be completed via the internet or mobile banking. Hidayah et al. (2023) carried out a comprehensive study on ''the effect of cashless payments on the Internet and mobile banking in Malaysia'' and showed that cashless transactions have become possible almost 24/7 by mobile and internet banking without having to stand in a bank line. The growth of online businesses has led to an increase in internet and mobile banking usage (Uddin & Akhi, 2014). Based on consumers' intentions to use delivery channels, all previous studies have focused on internet and mobile banking usage.

Consumers' intentions to use internet banking are influenced by their level of education, income, financial literacy (Uddin & Akhi, 2014), and the design of the internet banking interface (Ravi, 2018). Intentions to adopt mobile banking were influenced by perceived usefulness, the design of the mobile banking application interface, customer experience (Srouji & Torre, 2022), digital divide (Ravi, 2018), digital literacy, and awareness of the advantages of use (Lai & Liew, 2021). None of these studies examined the effects of cashless payment methods on online and mobile banking. Internet and mobile banking are encouraged through cashless payments (Ravi, 2018). According to Hidayah et al. (2023), mobile banking encourages cashless transaction. Singaporeans still prefer cash and card payments despite the high usage of cashless transactions (Srouji & Torre, 2022). There is no strong evidence that shifting from cash to cashless transactions results in more people using online and mobile banking services. Lai and Liew (2021), even believe that Malaysia is a cash-based, rather than a cashless, community.

2.1 Diffusion of innovation

According to Achord et al. (2017), diffusion is a method by which an innovation is communicated through particular channels over time among society's people. Diffusion of innovations (DOI) occurs when a development or method of doing things becomes accepted by society as a result of the benefits brought about by the innovative approach. Although DOI does not occur rapidly (Achord et al., 2017), the speed of diffusion differs because of trialability, relative advantages of the new approach over the existing one, self-efficacy (Uddin & Akhi, 2014), and intimacy with the new approach (Lai & Liew, 2021). Cash payments have become more popular because of financial innovations (Krivosheya, 2020).

Based on the DOI concept, Fabris (2019) showed that promoting the benefits and features of e-wallets and ensuring that they were compatible with users' lifestyles were significant factors in boosting e-wallet adoption. Fabris (2019) discussed user perceptions of their relative advantages. Compatibility, complexity, a high level of uncertainty, and frequency of usage were found to have a significant impact on Taiwan's internet-linked ATM card service usage. Berkimbayeva (2019) focuses on the most significant factors influencing the use of Islamic credit cards: compatibility, society's influence, and satisfaction. Conversely, applying the same theoretical framework disagreed with Fachrudin and Silalahi (2022), who argued that benefits and attitudes also influence the adoption of Islamic credit cards. DOI Theory is considered the basic expansion platform for many studies on the intentions and adoption of new technological-based products. This study was influenced by Fabris (2019), who found that the adoption of financial technologies from traditional to digital payment services improves financial institution efficiency. The shift from cash to cashless payments boosted Internet and mobile banking (Ong & Chong, 2023).

A bank's transaction authorization code (TAC) is required for online debit and credit card payments. Offline debit and credit card payments require a secret pin configuration and pay wave limit settings. Thus, payment via credit and debit card will be impossible if the customer fails to activate their internet or mobile banking applications to connect to their card (Chike, Mbamalu, Oguanobi, & Egbunike, 2023).

2.2 NIKOLA FABRIS Cashless Society the Future of Money or Utopia

Owing to general trends in deregulation, liberalization, globalization, and the advancement of computer technologies over the past few decades, financial markets and institutions have undergone drastic shifts and unexpected expansion. Ong and Chong (2023), mentioned international capital flows increased, markets created new and advanced instruments, and the dramatically increased speed of financial transaction execution dramatically reduced the cost of financial transactions.

Based on the study by Fabris (2019), payment methods have changed together with the aforementioned changes. Credit and debit cards have become widely used and have begun to squeeze out cash; the development of contactless technologies has increased the use of these payment methods. There has been an increase in the number of tickets, internet stores, and similar services. Smartphones have also revolutionized payments. Owing to high minting and handling costs, there are less prevalent high-denomination banknotes and coins currently in use. Banks have begun to promote cashless transactions and reduce the number of branches and employees. This has affected not only the demand for new goods and services in the marketplace, but also a wide range of other areas, including education, innovations, consumer buying habits, and product life cycles. These changes raise the question of whether modern economic and social growth possess the two key characteristics of sustainability and inclusiveness, measured by durability and pro-poor growth, respectively (Achord et al., 2017). The future of cash is a topic of discussion, especially among economists. For the average person, it is a debate point—as we have the option to use a variety of payment methods, there is no conflict (Lai & Liew, 2021).

Berkimbayeva (2019) showed that cash is becoming increasingly obsolete among the younger generations. Today, money depends on a set of shared values. This indicates that money has value only because society has given it value. Some believe that money is perhaps the most significant abstraction that human beings have created. Based on barter and different kinds of exchanges, cashless societies have existed since the dawn of human society. On the other hand, an actual cashless society should be understood as a movement towards the consequences of a society where cash has been substituted by its digital equivalent; consequently, only electronic digital forms of legal tender (money) exist, are recorded, and are exchanged. Some governments support the move to digital services because they view it as a way to combat tax evasion and money laundering, while also fostering more competition in the financial services sector. Others suggest that using digital payments safeguards customers from theft and money loss, and keeps them free from having to carry a wallet (Ravi, 2018). Fachrudin and Silalahi (2022) showed India wants to move away from conventional cash transactions. Several high-denomination bank notes were taken out of circulation by the government over the past year. Narendra

Modi, the prime minister of India, established numerous cashless townships, which discourage the use of notes and coins.

2.3 The Dynamics of Cashless Society: A Systematic Review

Financial technology was launched in 2010, when customers in many countries began to use various payment methods (Achord et al., 2017). A cashless society is a result of the financial technology revolution in which people make payments using digital cards or electronic devices (Uddin & Akhi, 2014). This society is characterized by the spirit of shifting payments from cash to technology (Uddin & Akhi, 2014). Fachrudin and Silalahi (2022) carried out an outstanding study on the dynamics of a cashless society and defined a cashless society is willing to replace traditional cash with an equal value of the digital payment system. According to Fachrudin and Silalahi (2022), users' ability to make payments using electronically related digital systems is addressed in a cashless society. Cashless payment is no longer focused on printing money but rather on connecting the whole procedure of exchanging value on money created by computers, not between holders, but with other terminologies between users. This change has caused difficulties in some countries, particularly concerning the establishment of Internet infrastructure and ownership of mobile devices in areas where equitable development has not taken place. To maintain cash payments, policymakers must consider this challenge as the primary method of financial transaction (Katahama & Bozorgzadeh, 2023).

2.4 Cashless payment and economic growth

According to Fachrudin and Silalahi (2022), a cashless transaction is one in which goods and services are exchanged electronically or by checking instead of using physical money. The Diffusion of Innovation Theory (DOI) can be used to examine the impact of cashless transactions on an economy. In 1962, Roger first presented the idea of cashless payments, outlining how innovation spreads over time to affect all members of a social system. According to DOI, interactions between people in interpersonal networks lead to the adoption of revolutionary ideas or innovations. Diffusion, in this context, indicates the widespread use of cashless transactions. where consumers seek more convenient and boosted transactions and businesses look for new revenue opportunities. The introduction of cashless transactions within the society or community will result from the spread of cashless payments subject to different innovation adopters'2 and decision-making process characteristics. The outcomes of cashless payment diffusion depend on how quickly society is willing to move toward cashless payments through various stages of innovation procedures. According to a previous investigation by Fachrudin and Silalahi (2022), electronic fund transfers became the main method of payment in the United States between the 1960s and the 1970s as a replacement for checks and cash. Owing to the convenience, security, and speed of electronic payments, their use of electronic payments has increased.

Fabris (2019) conducted a study on cashless payments and economic growth that covered 27 European nations from 1995 to 2009 and examined the basic relationship between the introduction of electronic retail payments and overall growth in the economy. They find that moving to an efficient electronic retail payment system might encourage trade, consumption, and overall economic growth. Payments made with credit and debit cards, money transfers, and checks have little effect on the economy. Fachrudin and Silalahi (2022) investigated how the long-term switch to credit and debit cards encourages economic growth in 56 different nations. They suggest that using electronic card payments can improve productivity and increase economic consumption. Moreover, the adoption of electronic transactions is essential for transparency, accountability, and the reduction of cash-related fraud, which are the fundamental elements of economic growth and development (Uddin & Akhi, 2014). Abbas (2017) showed that cash-based payments will still predominate to a significant extent despite the widespread replacement of equity payments. Although improvements and innovations in electronic payment systems have been made possible by technological advancements (Uddin & Akhi, 2014), there are still drawbacks to the adoption of cashless payments, including direct debit, card payment, security concerns, non-IT sophisticated users, and phishing emails.

Fabris (2019) examined more than 70 nations worldwide from 2002 to 2004, from the developed United States to the less prosperous Bangladesh, and showed that corruption in the banking sector could stifle economic growth because of the biased distribution of funds for private investment. Therefore, private

investment hurts economic growth. Furthermore, Fabris (2019) concluded that Nigeria's Central Bank would lose its independent monetary policy control as the country's population shifted from a cash-based to a cashless society. Abbas (2017) revealed that when the central bank loses control over the money supply, the increase in the velocity of money will result in a rapid increase in prices, which will lead to inflation in the economy (Indrajaya, Perizade, Wahab, & Shihab, 2023).

2.5 Cashless Economy

Direct physical notes and coins have long been replaced by cashless alternatives, which have developed along with payment technologies and the level of financial sophistication of their users. Some of these are checks, debit cards, and credit cards. Every cashless alternative has a unique level of safety, user protection, development time, usability, and related costs and fees (Uddin & Akhi, 2014). Mobile Money is an innovative means of payment that still uses national currencies and stores funds as credits on a smart card or in the books of the system provider. The report "A Cashless Society in 2018" initially recognized the key trends for the year, highlighting the fundamental disruption of the payment ecosystem due to competing forces. Later, it covered regional developments related to the subject, focusing particularly on countries such as India, Kenya, the UK, and Australia. The technological atmosphere was a subsidiary for the acceptance of mobile payments, with remarkable advancements in the use of QR code payments in Asia as part of national payment actions to enhance financial inclusion and cost-effectiveness of payment alternatives. Nevertheless, multiple and severe outages in payment systems caused by underlying systems or telecom infrastructure have raised concerns about our dependence on technology. Consumer adoption of contactless debit and credit cards and mobile payments for low-value transactions continued to be driven by convenience, with regional preferences, as seen in 2017. Data scandals, cybercrime, and worries about a totalitarian state highlighted security and privacy issues. Consumers' access to financial services has grown as a result of innovation, which has provided them with more integrated retail experiences. As the use of cash decreases, transaction costs increase, feeding the ecosystem of commercial payments to both consumers and businesses. This threatens the continued use of the current ATM infrastructure and open access to cash.

There have been numerous variations in payment systems throughout the history. Bartering was prevalent in the past. Ultimately, different types of currency were introduced. Charge cards first appeared in the mid-century. Since then, experts have been predicting the demise of paper money and the emergence of a "cashless society." Cash and checks are still the most common forms of payment accepted today, but credit and debit cards are frequently used. Although it is increasing slowly, the use of paper money is decreasing. This paper examines the advantages and disadvantages of using various payment methods that have influenced the transition to a cashless society. As more payment methods have become available, scholars have started to critically evaluate their costs from both social and private standpoints. From a private point of view, researchers have investigated the stimuli that payers have for selecting a particular type of payment instrument, the drives that retailers may have for allowing such instruments, and the reasons that different payment methods are used in various settings. From a societal point of view, scholars have investigated whether economic welfare could improve if particular payment methods replaced others, such as if electronic methods replaced paper-based methods.

Our study is the first to empirically analyze the transition to a cashless society using a framework that considers both positive and negative aspects. In a nutshell, regulators state that payment card systems charge "unjustifiably high" fees to businesses for payment cards, while banks that issue payment cards offer consumers lower-cost services and loyalty rewards. Therefore, authorities claim that payment card systems inspire consumers to utilize their payment cards effectively by not charging them the full marginal cost imposed by their card use, which they can do profitably (Achord et al., 2017). Some governments support the move to digital services because they view it as a way to combat tax evasion and money laundering, while also fostering more competition in the financial services sector. Others suggest that using digital payments safeguards customers from theft and money loss, and keeps them free from having to carry a wallet (Achord et al., 2017). Sharif and Pal (2020) showed that India wants to move away from conventional cash transactions. Several high-denomination bank notes were taken out of circulation by the government over the past year. Narendra Modi, prime minister of India,

established numerous cashless townships that discouraged the use of notes and coins (Boubacar & Bans-Akutey, 2023). Cash payments have no place in high-value transactions. Owing to high transaction fees, some businesses are reluctant to accept electronic payments; thus, they are most popular with households, retailers, and low-value payments. Corporates depend significantly less on cash than others. In situations such as a financial crisis or the failure of a few significant financial institutions, cash could be extremely valuable. As a result, governments and central banks have become essential in maintaining the stability of their banking systems and the banking sector as a whole. Recent data demonstrate that the amount of money circulating worldwide is rising enormously.

Currently, the number of banknotes and coins in circulation is 500 billion and trillion, respectively. Sharif and Pal (2020) provided a summary from G4S's recent report that, which regulates the systems for distributing cash, the global gross domestic product now contains 9.6% physical money, up from 8.1% in 2011. This can be partially clarified by some specific variables such as extremely low interest rates, bank failures, and central bank responses to the global financial crisis. However, due to rising global GDP, cash demand has increased. Several central banker statements agree with this perspective. The Bank of England's most prominent cashier, Victoria Cleland, recently stated in a speech that "cash is crucial in supporting financial inclusion." According to an analysis by Payments UK and the Bank of England, the number of people in the UK who depend largely on cash has increased by 500,000–2.7 million over the past two years. Based on a study of BoE, the amount of money in circulation has reached a record high of over £73 billion. Central banks determine that cash continues to be vital. Ewald Nowotny, the Governor of the Austrian National Bank, stated "We cannot imagine an entirely cashless society.

Cash is the only payment method that works in certain situations, such as energy blackouts. According to Fabris (2019), cash can be considered physical money, which consists of banknotes and coins, and is typically taken for granted. The vast majority of human beings still keep at least some cash in their wallets, even though the number of people using digital payment methods has been steadily increasing in the modern world. The continuous use of cash does not alter the fact that society looks at an increase in the number of people in the coffee line every day, rather than searching for coins in their pockets or their wallets in their bags, which simply approximates the payment terminal with a small plastic card for convenience. Some people might only view it as the next phase of society's development brought on by massive global technological growth. “Cashless society” therefore means a world without cash in circulation. It introduces a world where consumers would have all of their savings deposited in the bank, not being able to withdraw paper money as there would be nothing to withdraw.

At present, the world is moving towards electronic payments such as debit and credit cards, mobile wallets, and mobile apps, while the usage of cash is decreasing, especially in developed countries. Although the term ‘cashless’ is relatively new, Sharif and Pal (2020) show that 21% of Europeans rarely carry cash in their wallets. However, a large number of people, around 76 of the European population, refuse to go fully cashless (Achord et al., 2017). The unwillingness to leave cash entirely is also created by the fact that people nevertheless feel it is convenient to use cash for small financial transactions. This finding implies that they want to use small notes for low-value purchases. Sharif and Pal (2020) confirmed that 67% of people in Europe motionlessly pay for their snacks, lunches, and coffee using cash. There are also huge disagreements among societies. For instance, French people prefer to have less money in their wallets than German people.

In Germany, more than half (51.3%) of the purchases are paid for cash. The remaining 48.7% of the purchases were conducted without using cash. Most people use their debits or credit cards to make these transactions. Germany, one of the most affluent European economies, has a relatively low rate of cashless transactions. Sweden, on the other hand, is the most extreme European country, where people use cash for fo13% of transactions (Uddin & Akhi, 2014). However, there are significant differences between people in developed and emerging countries. At present, some people cannot think of living without a credit card, whereas others cannot open a bank account. According to a report from The World Bank, about 1.7 billion people around the world do not have a bank account or the ability to use mobile money to make payments. In developed countries, 80% of adults said they use a bank account or a

mobile device for financial activities, but only 22% claimed in underdeveloped countries said the same thing ("A Cashless Society: Benefits, Risks, and Issues - Abstract of the London Discussion," 2018). It is interesting that apart from Scandinavia most countries want to become a "cashless society" that belongs to the group of developing countries and it's harder for people in these countries to be included in the system which causes problems and inconveniences for them. However, the governments of countries that eliminate cash would mainly help people who do not have bank accounts and make it easier to use digital payment methods. A comprehensive study carried out by the Deutsche Bank shows that the need for euro cash is rising significantly, and in 2016, there were three times as many euros in circulation compared to 2003 (Uddin & Akhi, 2014).It is highly improbable that each individual in the United States, including women, men, and children, possesses $4.200 in cash. An even more remarkable fact is that most of the money is in high-value bills, such as $50 and above, which regular people usually do not carry. According to 2015 data, 84% of the total paper money was created in the USA States and 90% in the Eurozone (Achord et al., 2017).

Based on the study by Sharif and Pal (2020), the removal of cash leads to a clearer and more transparent environment in the digital payment system. In addition, the government has more power and authority to manage and regulate businesses, individuals, and the entire economy. This could help governments collect more taxes and reduce the number of people who avoid paying their taxes. Banks would benefit greatly because their chief competitor cash would no longer exist.

3. Methodology

3.1 Population and Data Collection

The topics of interest in this discussion are population and data collection. This study utilized secondary data exclusively for research purposes. The research encompasses the entire banking business in Bangladesh, with a sample consisting of all scheduled commercial banks that are currently operational in the country. The evaluation period spans fiscal year 2012-2013 to 2018-2019 since this timeframe corresponds to the significant expansion of cashless financial services in Bangladesh. The data used in this study mostly originate from the annual report of Bangladesh Bank, the central bank of Bangladesh. Additionally, monthly reports from Bangladesh Bank, financial statements of commercial banks, written articles, and numerous publications were also consulted for data collection (Abubakar, Ibrahim, Zakaria, & Kassim, 2023).

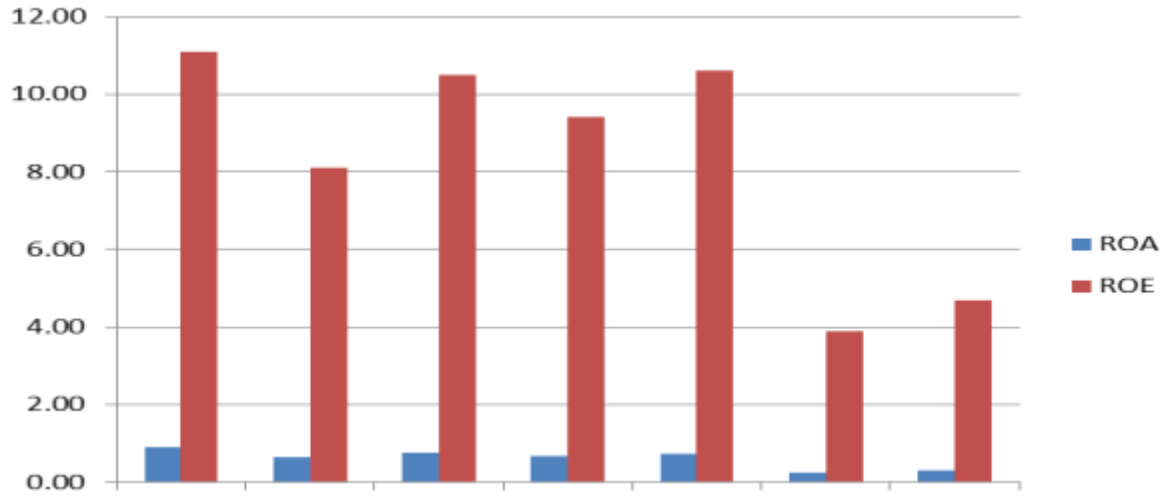

Figure 1. ROA and ROE of the Banking Industry of Bangladesh (2016-17 to 2022-23)

Figure 1 illustrates the Return on Equity (ROE) and Return on Assets (ROA) metrics for all scheduled banks operating inside Bangladesh, spanning fiscal years 2016-17 to 2022-23. According to the research, the years 2016-17 had the highest values for both Return on Assets (ROA) and Return on Equity (ROE). from 2016-17 to 2022-23, there is evidence of a consistent and unchanging pattern.

However, both Return on Assets (ROA) and Return on Equity (ROE) experienced a decline over the fiscal years 2021-22 and 2022-23.

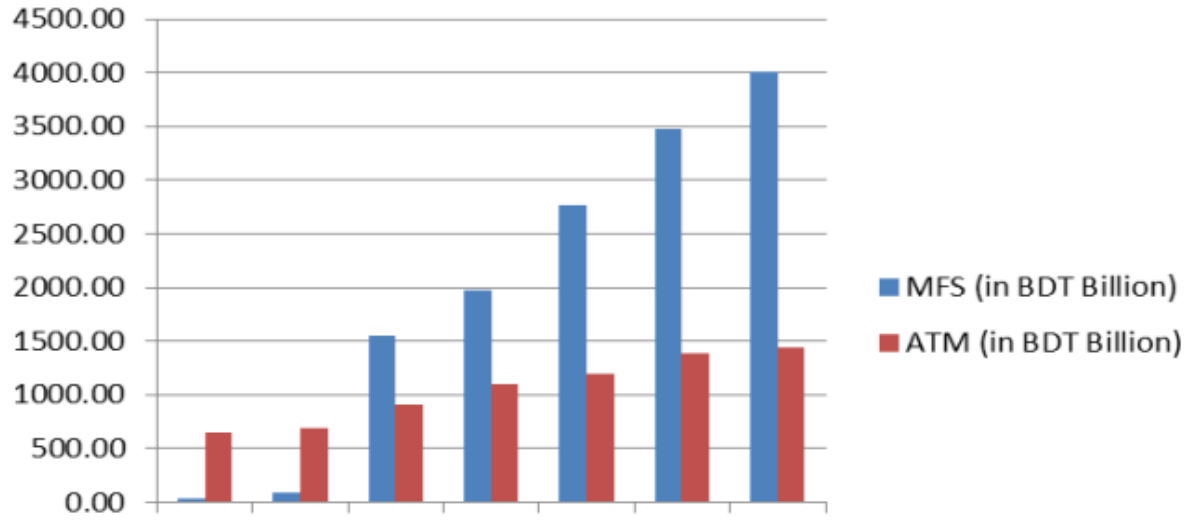

Figure 2. MFS and ATM transactions volume of the Banking Industry of Bangladesh (2016-17 to 2022-23)

Figure 2 presents a graphical representation of the transaction volume of Mobile Financial Services (MFS) and Automated Teller Machines (ATMs) over seven years within Bangladesh's banking industry. Mobile financial services (MFS) and automated teller machines (ATMs) exhibit a rising trajectory.

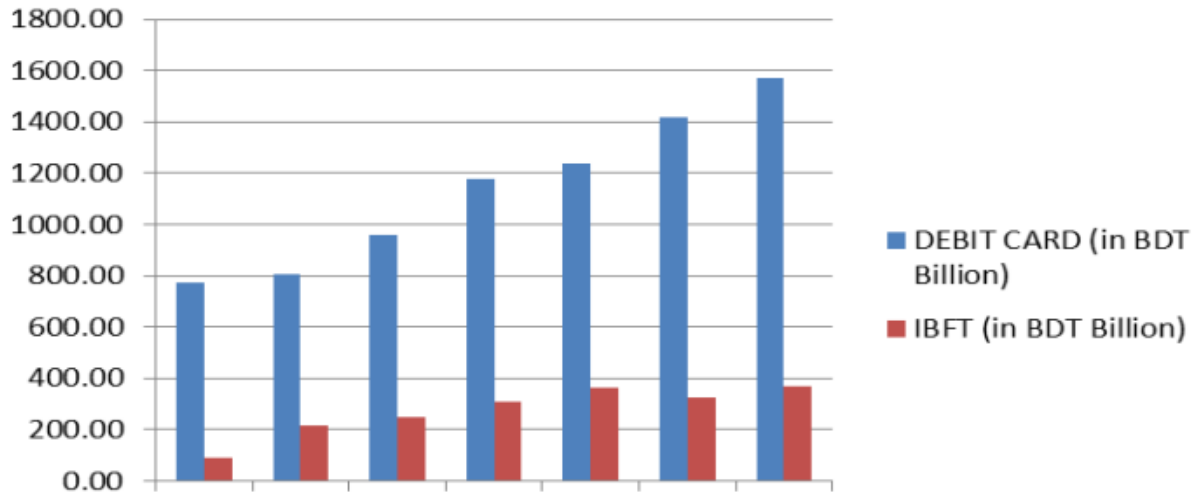

Figure 3. DEBIT Card and IBFT transactions volume of the Banking Industry of Bangladesh (2016-17 to 2022-23)

Figure 3 illustrates the number of transactions involving Debit Card and Internet Banking Fund Transfer (IBFT) among several commercial banks operating in Bangladesh. Both debit card and interbank funds transfer (IBFT) transactions exhibit an overall increasing pattern, except for the fiscal year 2022-23, during which IBFT transactions saw a decline in volume compared to the preceding fiscal year.

This study assesses the impact of cashless banking on bank profitability. To measure profitability, the Return on Equity (ROE) and return on assets (ROA) of the banking sector in Bangladesh were utilized as proxies. In contrast, the number of Mobile Financial Services (MFS) transactions, Automated Teller Machine (ATM) transactions, bit card transactions, and Internet Banking Fund Transfer (IBFT) transactions have been employed as indicators of cashless banking. This study uses the ordinary least

squares (OLS) method of multiple regression analysis to investigate the efficacy of cashless banking regulations on Return on Equity (ROE) and Return on Asset (ROA) metrics in the banking sector of Bangladesh. The study was undertaken in two parts: The first phase included the use of the four independent variables listed above to determine their impact on the dependent variable, which is the return on equity (ROE). Another approach involves considering the dependent variable as the rate of return on assets (ROA) while using the aforementioned four independent variables. The estimation was conducted using the program "IBM SPSS Statistics 25.0.0.0".

The econometric model employed in this study incorporates Mobile Financial Services (MFS), Automated Teller Machine (ATM), bit card, and Interbank Funds Transfer (IBFT) as independent variables, while Return on Equity (ROE) and Return on Assets (ROA) serve as dependent variables. The purpose of this technique is to obtain a reliable estimate of the parameter in multiple regression models. Various econometric models were employed for quantitative analysis.
ROE = f (MFS, ATM, Debit card, IBFT) ---------- (i)
ROA = f (MFS, ATM, Debit card, IBFT) ---------- (ii)

These equations represent the functional forms of the model. To obtain more accurate and dependable estimations, the data were subjected to logarithmic transformation, as suggested by Sharif and Pal (2020), regarding the ratio values of ROA and ROE. Subsequent altered regression equations were employed to estimate the coefficients to investigate the association between the dependent and independent variables.

The symbol β0 denotes the intercept, whereas β1, β2, β3, and β4 indicate the estimated coefficients for each predictor. Additionally, ε represents the stochastic disturbance factor.

The hypotheses presented in this study were formed according to the research purpose.
The null hypothesis (H0) posits no statistically significant relationship between the adoption of cashless banking and profitability of the banking system in Bangladesh.
H1: The profitability of banking business in Bangladesh is significantly influenced by the adoption of cashless banking.

4. Result and discussions

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
ROA	7	.25	.90	.611	.244
ROE	7	3.90	11.10	8.328	2.930
MFS	7	42.06	4012.11	1988.435	1556.568
ATM	7	654.30	1447.60	1055.614	316.781
DEBIT_CARD	7	775.70	1573.20	1136.428	303.934
IBFT	7	90.50	371.00	274.914	99.184

(All values are in billion (BDT) except ROA and ROE)

Source: SPSS Output

As shown in Table 1, the mean value of the MFS was recorded as 1988.435 BDT billion. Additionally, fiscal year 2016-17 exhibits the lowest transaction volume, while fiscal year 2022-23 has the highest transaction value. The mean ATM transaction volume is 1055.614, with the highest transaction value observed during the 2022-2023 fiscal year and the lowest transaction value recorded in the 2016-2017

fiscal year. The mean transaction values for Debit Cards and IBFT in fiscal year 2022-23 and 2016-17 were 1136.42 and 274.91, respectively. The greatest transaction value was observed in the fiscal year 2022-23 for Debit Cards, while the smallest transaction value was recorded in the fiscal year 2022-23 for IBFT.

Table 2. Model-1 Summary

(Dependent Variable, ROE) R	R Square	Adjusted R Square	F	Sig.	Durbin-Watson
.800	0.719	0.836	.887	.049	2.245

a. Predictors: (Constant), IBFT, DEBIT_CARD, MFS, ATM
b. Dependent Variable: ROE
Source: SPSS Output

Table 3. Model-2 Summary

(Dependent Variable, ROA) R	R Square	Adjusted R Square	F	Sig.	Durbin-Watson
.847	0.717	0.852	1.268	.048	2.244

a. Predictors: (Constant), IBFT, DEBIT_CARD, MFS, ATM
b. Dependent Variable: ROA
Source: SPSS Output

Table 4. Regression Coefficients

(Model-1) Variables	Unstandardized Coefficients B	Standardized Coefficients Beta	t	Sig.	H0 Rejected/ Accepted
(Constant)	28.192		1.223	.046	
MFS	.003	1.713	.452	.056	Accepted
ATM	-.005	-.589	-.106	.025	Rejected
DEBIT_CARD	-.021	-2.139	-.603	.048	Rejected
IBFT	.011	.359	.377	.042	Rejected

a. Dependent Variable: ROE
Source: SPSS Output

Table 5. Regression Coefficients

(Model-2) Variables	Unstandardized Coefficients B	Standardized Coefficients Beta	t	Sig.	H0 Rejected/ Accepted
(Constant)	2.114		1.242	.040	
MFS	.000	1.351	.403	.026	Rejected
ATM	-.001	-.651	-.132	.053	Accepted
DEBIT_CARD	-.001	-1.669	-.531	.048	Rejected
IBFT	.000	.192	.228	.041	Rejected

a. Dependent Variable: ROA
Source: SPSS Output

The regression coefficients for both the models are presented in Tables 4 and 5.
Statistical analysis reveals that the variables under investigation, namely ATM, Debit Card, and IBFT, exhibit statistical significance at the 5% level of significance. This is evident from the fact that the p-values associated with all variables were less than 0.05. However, the variable MFS does not exhibit

statistical significance because the p-value barely surpasses the threshold of .05. Consequently, the null hypothesis was accepted. Both MFS and IBFT exhibit positive coefficients; however, it is worth noting that the coefficient for MFS is not statistically significant. Both variables "ATM" and "Debit Card" have statistically significant negative coefficients. The use of IBFT exhibits a noteworthy beneficial influence, whereas the implementation of ATM and Debit card services demonstrates a substantial negative effect on profitability, namely the Return on Equity (ROE), within the banking sector of Bangladesh. According to the findings presented in Table 5, it is evident that the variables MFS, Debit Card, and IBFT exhibit statistical significance at the 5% level.

However, ATM is deemed statistically insignificant, leading to the acceptance of the null hypothesis, since its p-value barely surpasses the threshold of 0.05. The MFS and IBFT variables exhibit positive coefficients that are statistically significant in relation to the dependent variable. Additionally, Debit Card has a significant negative coefficient, whereas ATM exhibits a negative coefficient that is not statistically significant in its association with the dependent variable. Hence, it can be inferred that Mobile Financial Services (MFS) and Interbank Fund Transfer (IBFT) exhibit a favorable influence, whereas bit card usage has a detrimental effect on Assets (ROA), which serves as a proxy for measuring the profitability of the banking sector in Bangladesh. The results for automated teller machines (ATMs) are in contrast to the research conducted by Rozanna (2023), which revealed a statistically significant beneficial influence of ATMs on a bank's profitability through cross-country analysis. The results of this investigation align with the research conducted by Sharif and Pal (2020) as well as Fachrudin and Silalahi (2022).

5. Conclusion

In conclusion, it can be inferred that the aforementioned points collectively support the notion that. Currently, locating a bank that does not offer any electronic banking services has become increasingly challenging on a global scale. Developed nations worldwide are significantly inclined towards transitioning from paper-based to electronic payment systems. The primary objective of the cashless policy implemented by Bangladesh Bank is to facilitate the transition towards a cashless economy. This policy was devised to enhance the efficiency of payment systems in Bangladesh, leading to an improvement in the overall quality of the services provided by the banking sector. Encouraging a secure, accessible, and economical payment system is widely regarded as a fundamental requirement for fostering growth in the national economy, as evidenced by several studies. Given the widespread adoption of the cashless policy by nearly all banks in Bangladesh, it is imperative to evaluate its consequential effects. In light of this significant matter, the objective of the present study is to assess the impact of the cashless policy on the profitability of Bangladeshi banks, specifically examining whether it yields good or negative effects or just leads to an increase in operational expenditures for these banks.

This study examines the effects of cashless banking on return on assets (ROA) and return on equity (ROE) within Bangladesh's banking business. This study analyzes the influence of several cashless banking methods, including automated teller machines (ATMs), mobile financial services (MFS), debit cards, and interbank fund transfers (IBFT), throughout the period spanning from 2016 to 2023. The findings indicate that IBFT (Interbank Fund Transfer) has a statistically significant positive influence on the Return on Equity (ROE), which serves as a proxy for profitability, in the banking business of Bangladesh. Conversely, the use of automated teller machines (ATMs) and debit cards has a statistically significant negative impact on ROE. Additionally, Mobile Financial Services (MFS) and IBFT have a positive impact, whereas the use of debit cards has a negative impact on Return on Assets (ROA), another proxy for profitability, in the banking industry of Bangladesh. The study's findings indicate that nearly all the parameters examined influence profitability. However, it is noteworthy that only IBFT has a positive and statistically significant effect on both ROA and ROE. This finding suggests that augmenting investments in these services correlates with an enhancement in bank profitability. Undoubtedly, the implementation of various products, such as Automated Teller Machines (ATMs), smartphones, mobile financial services (MFS), and online banking, have the potential to significantly decrease or perhaps entirely remove the expenses associated with cash management. Bangladesh possesses significant potential for adopting a cashless banking payment system that can enhance the

nation's financial and economic landscape while bolstering its international standing through the facilitation of a thriving economy.

This study was exclusively based on secondary data. The use of primary data may lead to several outcomes. Only four independent variables are used as proxies for cashless banking services. However, it is important to note that the inclusion of other factors may have resulted in different outcomes. The analysis was limited to a period of seven years. Additional investigations may require a longer duration. The present study focuses on the comprehensive analysis of the banking sector in Bangladesh (Abdullah, Redzuan, & Daud, 2020). Consequently, this generated output may not be compatible with any particular financial institution. Future studies could examine a particular cluster of banks and compare their findings with those of the broader banking industry in Bangladesh and other global jurisdictions. The present study employed multiple regression statistical approaches to analyze the data. Consequently, further research endeavors may be undertaken to explore Bangladesh's banking business by employing well-established time-series techniques on the available time-series data.

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