



# The impact of COVID-19 on digital-only banks: are they winners or losers?

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## Abstract

The main objective of this paper is to determine the impact of the COVID-19 pandemic on the operations of digital-only banks. In order to achieve the main objective, two methods have been used. The first method is a strategic analysis, and the second method is a financial analysis of the digital-only banks covering two periods, that is, before the emergence of the COVID-19 pandemic (2018–2019) and during the coronavirus pandemic (2020). The strategic analysis of digital-only banks has shown that they have many weaknesses, as well as the fact that they face numerous threats, which are due to the age of fintech banks and competition from traditional banks creating and developing mobile and Internet banking. Preliminary analyses conducted for digital-only banks indicate that most of them generated losses, and these losses were already at the operating level. The return on assets and return on equity ratios showed a slight improvement in 2020, and in most cases the interest income generated was higher than the interest expenses.

**Keywords** Digital-only banks · Mobile banks · Fintech · COVID-19 · Pandemic

**JEL Classification** G21 · O10 · O33

## Introduction

The digital revolution began long before the outbreak of the coronavirus pandemic. For years, societies, sectors, and entrepreneurs had been taking steps to digitize their daily lives and operations [12]. However, all these steps were multiplied and accelerated by the COVID-19 pandemic. The crisis faced by economies around the world acted as an accelerator for the digital revolution [13, 28]. Restrictions on movement, closed borders, industries and workplaces, remote working, and huge numbers of illnesses and deaths have caused life to move on a large scale to the virtual world. It would seem, therefore, that for those institutions and businesses that were already operating virtually before the outbreak of the pandemic, this would be a time of exceptional prosperity.

In this paper, the author decided to study one group of institutions that had already started operating in virtual

reality before the outbreak of the COVID-19 pandemic and which were heralded for success directly because of the changes caused by the coronavirus [30]. These institutions are digital-only banks (further, also called fintech banks), i.e., banks operating without fixed locations, branches, or subsidiaries.

The main objective of the paper was to determine the impact of the COVID-19 pandemic on the operations of digital-only banks. At the same time, the author put forward the main hypothesis that:

**H1** The COVID-19 pandemic had a positive impact on digital-only banks by strengthening their business model and improving their financial situation.

In order to achieve the main objective and verify the hypothesis, two methods have been used. The first method is a strategic analysis of the new banking model that is implemented by digital-only banks. The second method is a financial analysis of the digital-only banks covering two periods, that is, before the emergence of the COVID-19 pandemic (2018–2019) and during the coronavirus pandemic (2020). The research sample included 10 digital-only banks from

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**Table 1** Classification of terms related to digital-only banks

Concept	Definition	Examples of Institutions	Literature
Digital-only banks	Fintechs operating under a full banking license, providing financial services online. These institutions have no subsidiaries, branches, or stationary offices. They were created from scratch, and are not dependent on other banks. Most of them were established after the global economic crisis of 2007–2009	KBank, Kakao Bank, N26, Atom Bank, Starling Bank, Revolut, WeBank	[5, 7]
Challenger banks	Challenger banks originated in the UK, and that is where their name also comes from. They were supposed to compete with the “big four” banks, which dominated the English market. Challenger banks are institutions operating under a full banking license, using modern technology, often without offices, branches, or sub-branches	Monzo, Starling Bank, Atom Bank, Shawbrook, Aldermore	[5, 22]
Neo-banks	Neo-banks are not considered banks, as they do not have a banking license. They are fintechs that operate in a relationship with full-fledged banks, providing financial services in a customer-friendly and convenient manner	Yolt, Lunarway, Moven	[3, 5]
Beta banks	Beta banks are joint ventures or subsidiaries of existing banks that offer financial services through a parent company license. Beta banks are often set up to enter new markets, offering limited services, but to a wider range of consumers	AiBank (a joint venture between China’s CITIC Bank Corp and tech giant Baidu), Simple (a collaboration between Bancorp and BBVA), UBank (a branch of the National Bank of Australia), Rocket Bank (founded by Bangladeshi commercial bank Dutch-Bangla Limited)	[4, 5]
Non-banks	Fintechs providing various types of financial services, fast growing technology companies. They operate without a banking license and without cooperation with banks holding such licenses	Monese, Tide, Wise (formerly TransferWise), MobiK-wik	[5, 6]

Source: Original compilation based on the literature

different economies such as the UK, South Korea, Germany, China, Sweden, and Denmark.

The paper is organized as follows. Section 2 systematizes the concepts related to digital-only banks and reviews the literature on digital-only banks. Section 3 conducts a strategic analysis of the new banking model employed by the digital-only banks. In Sect. 4, the digital-only banks selected for the study were presented, and their financial analysis was conducted. Section 5 summarizes the results obtained.

## Theoretical frameworks

Digital-only banks are not just about online or mobile banking. It is a coherent concept of an institution that offers services to customers only through the use of modern technology, i.e., through applications or websites. The vast majority of digital-only banks have no offices and branches, or their number is limited to a minimum. Digital-only banks are not subsidiaries of existing banks, but new institutions created from scratch. Fintech banks use the most advanced technologies, including cryptocurrency, distributed ledger techniques, artificial intelligence, big data, or deep learning [21].

Thus, in the case of digital-only banks, we can talk about a completely new business model [19, 33, 37].

However, there is some conceptual confusion in the literature [16]. When looking for information on digital-only banks, one will come across many different terms, often mistakenly used as synonyms. The catalogue of terms that appear within the discussed issue includes: digital-only banks, challenger banks, neo-banks, fintech banks, or beta banks. Additionally, these terms are defined and explained differently by various authors. Therefore, it was decided to organize and catalogue all terms the author did come across during the literature review. Table 1 presents selected terms with their definition and reference to the literature.

The empirical research on digital-only banks is quite limited due to their short operating history and, mostly, to the lack of data availability (short time series). Those made by Choi [7], Lu [22], or Ok and Hwang [32], for example, focus on general characteristics of digital-only banks and discuss examples from selected markets. Some works [3–5] focus on the definitional aspect related to digital-only banks, while others consider the impact of the fintech sector as a whole on banking [35, 39, 41, 42].

However, in view of the subject matter addressed in this paper, it was decided to highlight studies by authors such



as Shahabi et al. [36], Demirguc-Kunt et al. [9], and Singh [38]. To the best of the author's knowledge, the study by Shahabi et al. [36] is the only one that directly corresponds to the topic of the presented article. Shahabi et al. [36] in their work focused on analyzing the impact of the COVID-19 pandemic on the development of branchless banking in Iran, concentrating on the pioneer of digital banking in that country, Resalat Qard-al-Hasan Bank. The results obtained by the authors showed that the outbreak of the COVID-19 pandemic and its consequences played a key role in changing social and cultural attitudes toward the acceptance of branchless banking, and the pandemic itself "turned out to be an opportunity to raise the rates of awareness and acceptance by providing an intellectual and social atmosphere" [36, p. 103].

Demirguc-Kunt et al. [9] conducted more aggregate research by focusing on the performance of the entire banking sector during the COVID-19 pandemic crisis. In their analysis, Demirguc-Kunt et al. [9] used a broad range of financial data, including stock prices for 896 commercial banks from 53 different countries. The results showed that for most countries, bank stocks underperform other listed companies in their home country. Moreover, the nature of the COVID-19 shock, and the expectations of market participants, indicate that banks will experience a deeper and more prolonged loss of profits than other companies.

Singh [38] similarly to Demirguc-Kunt et al. [9] analyzed the impact of the COVID-19 pandemic on the banking sector as a whole. In his work, however, the author was tempted to make some predictions by trying to outline the prospects for the immediate future of the banking sector. Among other things, Singh [38] highlighted two important aspects: first, that many complex banking operations still require face-to-face contact with a financial advisor, and, second, he noted that there is a kind of dichotomy in the banking sector, which is much deeper than in other sectors and is directly related to the age of customers. At the same time, the author stressed that the transformation of financial services toward their digitalization is irreversible.

## Strategic analysis of digital-only banks

The coronavirus pandemic has changed the operating conditions of all entities and business units, thus creating an opportunity for some and a real threat to the activities of others. In this section, a strategic analysis of digital-only banks has been done using the SWOT tool focusing on the strengths, weaknesses, opportunities, and threats concerning these institutions from the point of view of the COVID-19 pandemic event. The goal of this strategic analysis is to verify the following two supporting hypotheses:

**H2** The COVID-19 pandemic has allowed digital-only banks to overcome the weaknesses they faced before the pandemic outbreak.

**H3** The COVID-19 pandemic created more opportunities than threats for digital-only banks.

## Strengths

The primary strength of digital-only banks is the absence of branches, subsidiaries, and offices. The COVID-19 pandemic forced people to stay at home, and many institutions, including banks, had to limit their stationary activities. The fear of infection led to activities that could be done using the Internet being moved to virtual reality, which is where digital-only banks have been operating for several years. For many traditional banks, the coronavirus pandemic posed a major logistical challenge, as they had to completely reorganize their operations. For digital-only banks, such revolutionary changes were not necessary. Digital-only banks have always been available to their customers 24 h a day, seven days week, and throughout the year, offering them financial services tailored to their individual needs.

In addition, the lack of branches and subsidiaries means that digital-only banks have lower operating costs compared to traditional banks. Digital-only banks do not need as much office space as traditional banks, and do not need to employ a significant number of staff. They also do not require much equipment or other assets that are the domain of traditional banking [22]. By reducing their cost base, fintech banks can and do try to offer more favorable terms of service and products to their customers [14].

Another important strength of digital-only banks is safety. These institutions operate under a banking license, and therefore, they do not pose risks as with P2P (*peer-to-peer*) platforms or standard fintech companies [2]. Customer money is secured by deposit guarantee schemes under which regulated financial institutions are subject. For example, in the case of bank N26, deposits are guaranteed up to €100,000 under the Compensation Scheme of German Private Banks [27]; for Atom Bank, up to £85,000 under the Financial Services Compensation Scheme [1]; and for Kakao Bank, up to ₩50 million under the Korea Deposit Insurance Corporation [15, 17].

## Weaknesses

The COVID-19 pandemic highlighted many of the weaknesses of digital-only banks, which meant that despite the huge advantage of doing business virtually, many of these institutions struggled with significant financial problems [18]. These problems were caused by, among other things, the age of the organizations, a lack of adequate financial



safeguards, an inadequate customer base in many cases, and a lack of sufficient training and experience. As we read about fintech banks in the *Financial Times* [18], “at the height of the lockdown, hundreds of its customers complained they had been shut out of their accounts for sometimes weeks at a time, with Monzo freezing accounts without notice.” Traditional banks have been operating in the financial services sector for many years, which has allowed them to develop specific ways of dealing with crisis situations. In addition, their extensive experience, trust, and large customer base have made them a safe haven in these dangerous and uncertain times of the coronavirus pandemic.

The speed of response should also be considered as a weakness of digital-only banks. The coronavirus pandemic should be used by these institutions as a stimulus for increased marketing activities. Thanks to special advertising actions or marketing campaigns, these banks had an opportunity to convince multitudes of customers of their efficiency. Digital-only banks’ reaction, however, was not immediate, and traditional banks did not hesitate to aggressively enter e-banking by offering their customers friendly and easy-to-use applications. As a result, “five times as many people now use their bank’s mobile app monthly (66%) as those who go to a physical branch (12%)” [26].

## Opportunities

Digital-only banks, as purely virtual reality institutions at the time of the global lockdown, faced a huge opportunity to strengthen their position in the market, as well as to expand their business reach. The home isolation, closure of many sectors, and prevention of stationary activities resulted in a sudden, increased demand for online solutions, thus enabling remote working and communication. By the time the COVID-19 pandemic began, digital-only banks were one step ahead of other institutions, which should be an excellent competitive advantage.

Another undeniable opportunity for digital-only banks that has emerged with the COVID-19 pandemic is the change in public awareness and cultural habits and customs. According to ongoing surveys, more than half of the respondents said that COVID-19 has affected the way they use banking services. Customers expect and get used to any service or product being available online [26]. This is also supported by the previously cited study by Shahabi et al. [36], who clearly stated that the outbreak of the COVID-19 pandemic and its aftermath played a key role in changing social and cultural attitudes toward the acceptance of branchless banking.

Overcoming social resistance and fear toward the use of e-banking services may thus be a milestone on the way to gaining significant market share and competitive advantage for digital-only banks. It is worth noting at this point,

however, the importance of seizing emerging opportunities. According to Makarov and Kent [24, p. 5], “one in three users of traditional banks claimed they would switch accounts if their bank made mistakes or didn’t offer a product or service they could get from a challenger bank.”

The coronavirus pandemic has resulted in increased innovation in all sectors of the economy [43]. As a result, these changes were and are more readily accepted. Consumers have changed their existing habits and the way they shop or do transactions. In order to avoid contraction, many older people, previously resistant to change and technological progress, have decided to use technological innovations. At the same time, it is unlikely that after the end of the COVID-19 pandemic they will return to their old habits [34]. Therefore, there is a chance for fintech banks to attract not only young customers, but also to broaden their impact with elderly people.

## Threats

The key threat to digital-only banks is the skillful exploitation of the coronavirus pandemic by traditional banks. If traditional banks offer convenient e-banking services to their customers, digital-only banks will lose the chance to convince customers toward their brand. After all, it should be remembered that traditional banking is also in the process of undergoing digitalization, and many banks are gradually reducing the number of their branches and offices. According to Marino [25], JP Morgan Chase reduced the number of branches in 2015 alone by nearly 3% compared to 2014, and the number of total banking branches in Europe (per 100,000 residents) fell from over 34 to about 21 over the period 2008–2019 [36].

A significant threat to digital-only banks that do not come directly from the coronavirus pandemic, but may be amplified by the current crisis, is the fear of change and the need for a sense of security. Thus, we are dealing here with a peculiar dichotomy. On the one hand, the coronavirus pandemic accelerated the digital revolution and increased the level of acceptance of innovation and technology, but on the other hand, uncertainty and constant fear about our families, health, and jobs triggered a need for safety and stability. Although the previously mentioned studies [26, 36] indicate that there is a great cultural and social shift toward the popularization of digital solutions, this does not mean that digital-only banks will be the winners. For example, Nel and Boshoff [29] with their study confirmed that the theoretical negative attitude toward digital-only banks is an important determinant of traditional bank customers’ opposition intention. Makarov and Kent [24], however, pointed out that in the group of 55–73-year-olds, only 20% of people see the advantages of using digital-only banks, and a recent study by EPAM [10] showed that as many as 82% of respondents



are satisfied with the service offered to them by traditional banks. All of this poses a big threat to new players in the market, and the key to success seems to be, as Kelly [18] writes, fidelity.

Unfortunately, fidelity and credibility could be undermined. Many people are not able to distinguish between institutions that use new technologies and are called fintech, but operate under banking licenses from those that do not guarantee any money. Additionally, financial scandals and affairs connected with unregulated innovative financial institutions have led to the generally bad reputation of the fintech sector.

### Strategic analysis: summary

Considering the strategic analysis conducted using the SWOT tool, it should be concluded that hypothesis 2 should be rejected. The COVID-19 pandemic did not influence digital-only banks to overcome their weaknesses. Moreover, very often, the weaknesses of digital-only banks have caused problems in serving customers during pandemic, resulting, for example, in the freezing of bank accounts.

Still, hypothesis 3 should be verified positively. Based on the analysis of opportunities and threats, it was concluded that the COVID-19 pandemic created more opportunities than threats for digital-only banks. The most important ones include: operating in virtual reality, change of awareness and habits of customers, openness, and higher level of acceptance of innovation and modern technological solutions among different social groups.

### Financial analysis of digital-only banks

Ten banks that meet the definition presented in Sect. 1 of the paper under the term “digital-only bank” were selected for financial analysis. The selected banks to be discussed include: Atom Bank, Monzo Bank, Starling, Revolut, N26, WeBank, Kakao Bank, KBank, Lunar, and Klarna Bank. At the same time, it should be highlighted that as of the writing of this article, financial data for 2020 were available only for six banks from the selected group (Atom Bank, Kakao Bank, Revolut, Lunar, Kbank, and Klarna Bank), and it is for them that the ratio analysis was conducted.<sup>1</sup> The goal of financial analysis is to verify three supporting hypotheses:

<sup>1</sup> The financial analysis was carried out only for selected indicators due to limited availability as well as comparability of data. The banks presented come from different economies, which means that the reporting principles are not uniform for the sample under study.

**H4** Return on equity and return on assets of digital-only banks improved in the COVID-19 period, in comparison with pre-COVID-19 period returns.

If the COVID-19 pandemic had a positive impact on the digital-only operations of banks, their profitability ratios should improve.

**H5** The dynamic of digital-only banks’ liabilities increased largely during the COVID-19 period compared to the dynamic of liabilities in the pre-COVID-19 period.

The dominant source of funding for traditional banks’ assets is external capital [40]. The dynamics of change can be linked to the development of digital-only banks.

**H6** The dynamics of loans/credit granted to customers by digital-only banks and the dynamic of customers’ deposits held in digital-only banks increased during the COVID-19 period.

Higher dynamics of changes in the category of loans/credits and deposits indicate the banks’ development by expanding its customer base.

### General characteristics of the selected institutions

Nine of the ten digital-only banks selected for the study are institutions that were established after the global financial crisis of 2007–2009. The only institution with a longer operating history is Klarna, which was founded in 2005. However, it should be noted that Klarna received its banking license only in 2017, previously operating as a fintech. The analyzed banks are from different economies. Atom Bank, Monzo, Starling, and Revolut are from the UK; Kakao Bank and KBank are from South Korea; N26 is from Germany; WeBank is from China; Lunar is from Denmark; and Klarna Bank is from Sweden.

The banks studied are of various sizes and operate in different markets. In terms of the number of open bank accounts, WeBank and Revolut belong to the largest in the given group. In terms of the number of clients, however, WeBank and Klarna Bank dominate. Some of them, despite the fact that they operate entirely virtually, are available only to residents of a given country, such as Atom Bank. Digital-only banks discussed in this study offer a different range of services for their clients. N26 bank, for example, has a very wide offering. It provides accounts for individual and business clients, helps to manage money thanks to a budgeting function, enables card payments, as well as offering a wide range of insurance services.

As mentioned earlier, all the digital-only banks selected for the study have banking licenses, which makes them





full-fledged banks. However, it is worth mentioning that some countries, such as South Korea, have decided to lessen the capital requirements for digital-only banks so that they can obtain such a license [7]. Digital-only banks, as opposed to neo-banks or beta banks, are safer and regulated by the institutions supervising the financial sphere of a given country from which they obtained a banking license. The detailed characteristics of the selected digital-only banks are presented in Table 2.

### Financial analysis

In the analyzed group, the majority of digital-only banks generated losses throughout 2018–2020, which resulted in negative return on equity and total assets ratios. The generated losses were already revealed at the level of banks' operations and were mainly due to staff and administration costs. Thus, despite the fact that these banks operate in virtual reality, providing their services to customers only through mobile applications or online, these costs still weigh heavily on their financial results. In the examined group, the only institution that achieved a positive return on equity and total assets in 2020 and 2019 was Kakao Bank. However, this bank generated negative profitability in 2018. On a dynamic basis, though, it is worth noting that there were four cases where return on equity improved and, in all six analyzed cases, return on total assets improved in 2020 compared to 2019. The generated losses in 2020 were, therefore, relatively lower than in 2019. The decrease in return on equity in 2020 occurred in the cases of Revolut Bank and Klarna Bank, which in the case of Klarna Bank was due to, among other things, expansion and the pursuit of global market leadership (44% increase in headcount compared to 2019) [20]. Some turbulence also occurred for Lunar Bank, which is due to obtaining its banking license only in 2019 and receiving a lot of financial support from investors in 2020 [23].

In conclusion, it could be stated that, generally, the profitability of digital-only banks improved in the COVID-19 period. In the case of return on equity, four banks presented better results, and in the case of return on assets, all six digital-only banks received better results. Therefore, hypothesis 4 can be verified positively. However, at the same time, it should be noted that the improvement in profitability was not very relevant as, except for Kakao Bank, all digital-only banks had a negative profitability. The profitability ratios are presented in Table 3.

The asset dynamics of the analyzed fintech banks are very high and volatile, which is due to the young age of these institutions. Successive funding rounds caused assets to increase by nearly 760% between 2020 and 2019 for Lunar and nearly 750% for Revolut. Lower increases were seen for Klarna Bank, KBank, and Kakao Bank. The only

digital-only bank where assets declined in 2020 was Atom Bank.

In 2020, liabilities dominated the equity and liability structure of digital-only banks. Atom Bank had the highest share of liabilities at close to 93%, while Lunar had the lowest at around 76%. For others, the share ranged from approximately 85% to 90%. The largest change in the structure of liabilities occurred in the case of Revolut bank, which was dominated by equity in 2018–2019. The change was due to a surge in liabilities to the bank's customers, which can be associated with Revolut obtaining a banking license in December 2018 from the Bank of Lithuania. Currently, Revolut offers protected deposit accounts in Bulgaria, Croatia, Cyprus, Estonia, Greece, Latvia, Malta, Romania, Slovakia, and Slovenia [11], which causes the bank to attract larger numbers of customers year after year.

Taking into consideration the dynamic of liabilities, it could be noted that in the COVID-19 period, four banks had higher indicators than in the 2019 pre-COVID-19 period, but only three in comparison with the 2018 pre-COVID-19 period. Therefore, it could not be stated that the change between periods was relevant for the analyzed digital-only banks and hypothesis 5 should be rejected. The dynamics of assets and the share of liabilities and equity in total assets are presented in Table 4.

Analyzing the dynamics of loans and credits to customers over the years, it was noted that only for one bank, i.e., Atom Bank, the value of loans and credits in 2020 was lower than in 2019. Kakao Bank, KBank, and Klarna Bank granted more loans and credits in 2020 than in 2019. At the same time, it should be noted that the dynamics of change between 2019 and 2020 was lower than between 2018 and 2019 for three banks. Only KBank definitely increased the value of loans and credits. Also, the value of customer deposits in 2020 was lower than in 2019 only for Atom Bank. The other institutions increased the value of accumulated deposits, and the highest rate of change in this regard occurred in the case of Klarna Bank—it was an increase of nearly 161%. However, it could be observed that the dynamic of changes in the case of loans/credits granted to the customer in the COVID-19 period was higher than before the COVID-19 period only for KBank. Regarding customers' deposits, only Klarna Bank had a higher dynamic in the COVID-19 period than in the pre-COVID-19 period. Data for the Revolut and Lunar banks were not available. Concluding, the obtained results do not allow for positive verification of hypothesis 6. The previously discussed results are presented in Table 5.

The last examined element in the financial analysis of digital-only banks is interest income and interest expense. Throughout the analyzed period, the highest interest income and interest expense were generated by Klarna Bank and Atom Bank. With other institutions, these values were significantly lower. At the same time,



**Table 2** Detailed characteristics of selected digital-only banks

Digital-only bank name	Description
Atom bank	<p>Founders: Anthony Thomson, Mark Mullen            Founded date: 2014            Date of receiving banking license: 2015            Origin: Durham, UK            Number of founding rounds: 9            Total funding amount: EUR 521.43 m            Last founding round date: 06.04.2021            Last founding round amount: EUR 44 m            Number of customers (latest available): 70,000</p>
Monzo	<p>Founders: Tom Blomfield, Jonas Huckestein, Jason Bates, Paul Rippon, and Gary Dolman            Founded date: 2015            Date of receiving banking license: 2017            Origin: London, UK            Number of founding rounds: 20            Total funding amount: EUR 528.20 m            Last founding round date: 08.02.2021            Last founding round amount: EUR 55.62 m            Number of customers (latest available): 4 m</p>
Starling	<p>Founder: Anne Boden            Founded date: 2014            Date of receiving banking license: 2016            Origin: London, UK            Number of founding rounds: 10            Total funding amount: EUR 751.43 m            Last founding round date: 19.04.2021            Last founding round amount: EUR 55.62 m            Number of customers (latest available): 2 m</p>
Revolut	<p>Founders: Nikolai Storonski, Vlad Yatsenko            Founded date: 2015            Date of receiving banking license: 2018            Origin: London, UK            Number of founding rounds: 14            Total funding amount: EUR 1.4 bln            Last founding round date: 15.07.2021            Last founding round amount: EUR 652 m            Number of customers (latest available): 15 m</p>
N26	<p>Founders: Valentin Stalf, Maximilian Tayenthal            Founded date: 2013            Date of receiving banking license: 2016            Origin: Berlin, Germany            Number of founding rounds: 9            Total funding amount: EUR 667.48 m            Last founding round date: 26.02.2021            Last founding round amount: EUR 30 m            Number of customers (latest available): 7 m</p>
WeBank	<p>Founders: Tencent, Baiyeyuan, Liye Group            Founded date: 2014            Date of receiving banking license: 2014            Origin: Shenzhen, China            Number of founding rounds: 1            Total funding amount: EUR 149.58 m            Last founding round date: 06.06.2016            Last founding round amount: EUR 149.58 m            Number of customers (latest available): 200 m</p>



**Table 2** (continued)

Digital-only bank name	Description
Kakao bank	Founders: Korea Investment Holdings, Kakao Corp Founded date: 2016 Date of receiving banking license: 2017 Origin: Seongnam, South Korea Number of founding rounds: 1 Total funding amount: EUR 748.50 m Last founding round date: 17.11.2020 Last founding round amount: EUR 748.50 m Number of customers (latest available): 16.5 m
KBank	Founder: KT Corporation Founded date: 2015 Date of receiving banking license: 2016 Origin: Seoul, South Korea Number of founding rounds: n.a Total funding amount: n.a Last founding round date: n.a Last founding round amount: n.a Number of customers (latest available): 4 m
Lunar	Founder: Ken Villum Klausen Founded date: 2015 Date of receiving banking license: 2019 Origin: Aarhus, Denmark Number of founding rounds: 8 Total funding amount: EUR 302.53 m Last founding round date: 12.07.2021 Last founding round amount: EUR 210 m Number of customers (latest available): 300,000
Klarna bank	Founder: Sebastian Siemiatkowski Founded date: 2005 Date of receiving banking license: 2017 Origin: Stockholm, Sweden Number of founding rounds: 27 Total funding amount: EUR 3.02 bln Last founding round date: 10.06.2021 Last founding round amount: EUR 520.78 m Number of customers (latest available): 90 m

Exchange rates have been converted in accordance with the exchange rate table Official EU of December 31, 2020 [31]

Source: Banks' websites and Crunchbase [8]

**Table 3** Profitability analysis

	Atom Bank (%)	Revolut (%)	Kakao Bank (%)	KBank (%)	Lunar (%)	Klarna Bank (%)
ROE 2020 (COVID-19 period)	-31.89	-13.12	4.24	-21.79	-86.19	-18.18
ROE 2019 (pre-COVID-19 period)	-37.54	-10.57	0.96	-49.30	-111.60	-14.66
ROE 2018 (pre-COVID-19 period)	-39.03	0.11	-1.74	-28.01	n.a	3.78
ROA 2020 (COVID-19 period)	-2.36	-1.99	0.45	-2.46	-18.95	-1.88
ROA 2019 (pre-COVID-19 period)	-2.88	-9.86	0.07	-3.94	-85.63	-1.91
ROA 2018 (pre-COVID-19 period)	-2.69	0.11	-0.16	-3.59	n.a	0.52

ROE is calculated as net profit divided by equity; ROA is calculated as net profit divided by total assets

Source: Original calculation based on financial statements of digital-only banks





**Table 4** Ratios of the dynamics of total assets and structure of liabilities

	Atom Bank	Revolut	Kakao Bank	KBank	Lunar	Klarna Bank
Total Assets Dynamic 2020/2019 (COVID-19 period)	92.35	846.07	113.79	169.27	860.66	167.79
Total Assets Dynamic 2019/2018 (pre-COVID-19 period)	149.95	180.54	184.58	111.93	n.a	140.18
Share of Liabilities in Total Assets 2020 (COVID-19 period)	92.59	84.85	89.50	88.71	75.59	89.63
Share of Liabilities in Total Assets 2019 (pre-COVID-19 period)	92.33	6.75	92.61	92.01	23.27	86.96
Share of Liabilities in Total Assets 2018 (pre-COVID-19 period)	93.10	2.39	90.60	87.18	n.a	85.59
Share of Equity in Total Assets 2020 (COVID-19 period)	7.41	15.15	10.50	11.29	21.99	10.37
Share of Equity in Total Assets 2019 (pre-COVID-19 period)	7.67	93.25	7.39	7.99	76.73	13.03
Share of Equity in Total Assets 2018 (pre-COVID-19 period)	6.90	97.61	9.40	12.82	n.a	13.84

Source: Original calculation based on financial statements of digital-only banks

**Table 5** Dynamics of changes in loans and credits, and customer deposits

	Atom Bank (%)	Revolut	Kakao Bank (%)	KBank	Lunar	Klarna (%)
Dynamics of Loans/Credit Granted to Customers 2020/2019 (COVID-19 period)	77.72	n.a	104.45	204.94	n.a	138.73
Dynamics of Loans/Credit Granted to Customers 2019/2018 (pre-COVID-19 period)	208.36	n.a	208.17	100.91	n.a	141.36
Dynamics of Customer Deposits 2020/2019 (COVID-19 period)	99.64	n.a	110.27	163.94	n.a	260.71
Dynamics of Customer Deposits 2019/2018 (pre-COVID-19 period)	130.23	n.a	188.70	117.24	n.a	82.76

Source: Original calculation based on financial statements of digital-only banks

It is clearly visible that in the case of digital-only banks, these values change dynamically, which results from the age of these institutions and constant changes in the number of clients. For five institutions, interest income was higher in 2020 than in 2019, with the exception of KBank. In contrast, interest expense increased for Atom Bank, Revolut, Lunar, and Klarna Bank, and decreased for the two Korean digital-only banks. It is also worth noting that in 2020, interest income exceeded interest expense in four banks except Revolut and Lunar, and in the case of Atom Bank, it was the first year when interest income generated was higher than interest expense. Thus, the analysis of interest income and interest expense does not indicate a sharp collapse in the financial situation of digital-only banks under the impact of the COVID-19 pandemic. Interest income and interest expense are presented in Table 6.

## Conclusion

The coronavirus pandemic crisis has not brought glory days to digital-only banks. In fact, it highlighted their weaknesses, i.e., lack of adequate preparation and experience, as well as lack of customer trust. The age of fintech banks served also as a disadvantage. Digital-only banks are very young financial institutions, some of which received their banking license just before the start of the coronavirus pandemic, which did not allow them to adequately protect themselves and convince customers to use their services.

The financial analysis of the selected digital-only banks does not indicate any significant deterioration or improvement in their financial condition. However, it should be remembered that only a small group of digital-only banks was analyzed, which was due to the lack of data availability. At the same time, the previously cited press reports indicate that some fintech banks were in financial trouble.



**Table 6** Interest income and expenses

	Atom Bank	Revolut	Kakao Bank	KBank	Lunar	Klarna Bank
	Thousand EUR					
Interest Income 2020 (COVID-19 period)	51,570.03	26.00	448.65	53.70	77.81	586,338.86
Interest Income 2019 (pre-COVID-19 period)	44,565.12	n.a	381.55	66.69	0.13	392,337.08
Interest Income 2018 (pre-COVID-19 period)	15,252.07	n.a	230.20	47.23	n.a	302,337.31
Interest Expense 2020 (COVID-19 period)	-50,204.11	-111.00	-143.23	-18.95	770.47	-130,461.72
Interest Expense 2019 (pre-COVID-19 period)	-46,779.50	-1.00	-190.57	-35.34	95.56	-95,611.00
Interest Expense 2018 (pre-COVID-19 period)	-21,501.45	-2.00	-86.57	-20.66	n.a	-30,485.18

Revolut and Lunar did not fully begin deposit and credit operations until 2020, hence such large differences in data between years

Source: Original calculation based on financial statements of digital-only banks

Many of the studied institutions needed additional funding from investors, which allowed them to survive the coronavirus pandemic.

Taking all these factors into consideration, the main hypothesis that states that *the COVID-19 pandemic had a positive impact on digital-only banks by strengthening their business model and improving their financial situation* has to be rejected. The COVID-19 pandemic did not strengthen the business model of digital-only banks and did not improve significantly their financial situation. However, it seems that for those digital-only banks that survive the coronavirus pandemic, it will be a positive event in the long run. The accelerated digital revolution and socio-cultural shifts in the acceptance of innovation and technology should have a positive impact on the activities of digital-only banks and the number of customers willing to embrace the services of branchless banking.

The study encountered numerous limitations, primarily related to the short time series and the small research sample. The coronavirus pandemic is still ongoing, and therefore, the full implications and impact of the pandemic can only be assessed in a few years. In addition, digital-only banks are relatively young institutions that are in their infancy, which impacts not only on the aforementioned data availability, but also on their financial performance. Nonetheless, the importance of the topic does not allow one to withhold the research, and the initiated work is an excellent starting point for further, in-depth analyses, which will be carried out in the following years.

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## References

1. Atom Bank. n.a. <https://www.atombank.co.uk/>. Accessed 10 August 2021.
2. Bavoso, V. 2020. The promise and perils of alternative market-based finance: The case of P2P lending in the UK. *Journal of Banking Regulation* 21: 395–409. <https://doi.org/10.1057/s41261-019-00118-9>.
3. Bradford, B. T. 2020. Neobanks: Banks by any other name? KcFED payments system research briefing, 1–6.
4. Büchi, G., L. Fasolo, M. Cugno, and Zerbetto, A. 2019. New banks in the 4th industrial revolution: A review and typology. 22nd International Conference, August 2019.
5. Caicedo, D. 2019. The types of digital banks and what they mean for business. <https://www.business.com/articles/types-digital-banks/>.
6. Chartered Banker. 2019. Business banking goes digital, 24–25. <https://www.charteredbanker.com/static/uploaded/c3dee1a2-d62c-4264-9b89b0d15b71b147.pdf>.
7. Choi, Y. 2020. Digital banks: Lessons from Korea. World Bank Group, 2.
8. Crunchbase. n.a. <https://www.crunchbase.com/>.
9. Demircuc-kunt, A., A. Pedraza, and C. Ruiz-Ortega. 2020. Banking sector performance during the COVID-19 crisis (Issue World Bank Policy Working Paper 9363).
10. Drassler, J. 2021. Why traditional banks are faring better than challenger banks DURING COVID-19. [https://www.quavo.com/knowledge\\_center/why-traditional-banks-are-faring-better-than-challenger-banks-during-covid-19/](https://www.quavo.com/knowledge_center/why-traditional-banks-are-faring-better-than-challenger-banks-during-covid-19/).



11. Finn, A. 2021. Revolut banks on banking launches as a bank in ten EU countries. [https://www.altfi.com/article/7656\\_revolut-banks-on-banking-launches-as-a-bank-in-ten-eu-countries](https://www.altfi.com/article/7656_revolut-banks-on-banking-launches-as-a-bank-in-ten-eu-countries).
12. French, A.M., and J.P. Shim. 2016. The digital revolution: Internet of things, 5G, and beyond. *Communications of the Association for Information Systems*. <https://doi.org/10.17705/1CAIS.03840>.
13. Gavrilă, S.G., and A.D.L. Ancillo. 2021. Innovation, digitization and digitalization accelerator: Spanish Internet domains registration analysis. *British Food Journal*.
14. Hilotin, J. 2021. Digital banking: Now, open an account—in just 4 minutes? <https://gulfnnews.com/special-reports/digital-banking-now-open-an-account--in-just-4-minutes-1.1618470127174>.
15. Kakao Bank. n.a.. About. Identity. <https://www.kakaobank.com/Corp/About/Identity>.
16. Jenik, I., and P. Zetterli. 2020. DIGITAL BANKS: How can they deepen financial inclusion? (Issue February). [www.cgap.org/fintech](http://www.cgap.org/fintech).
17. KDIC. b.d. Deposit Insurance. <https://www.kdic.or.kr/english/coverage.do>.
18. Kelly, J. 2020. The virus has crushed the challenger bank dream. *Financial Times*. <https://www.ft.com/content/8522829e-2314-4476-9d52-b0e9e731f2f6>.
19. King, B. 2018. Bank 4.0: Banking everywhere, never at a bank. 344. [https://books.google.com/books/about/Bank\\_4\\_0.html?hl=pl&id=7DB7DwAAQBAJ](https://books.google.com/books/about/Bank_4_0.html?hl=pl&id=7DB7DwAAQBAJ).
20. Klarna Bank. 2020. Annual report 2020.
21. Lipton, A., D. Shrier, and A. Pentland. 2016. Digital Banking Manifesto: The end of banks?
22. Lu, L. 2017. Challenger banks in the UK: Gap fillers or real challengers? *Journal of International Banking Law and Regulation* 7: 273–282.
23. Lunar. n.a. About Lunar. <https://lunar.app/en/about/what-is-lunar/>.
24. Makarov, D., S. Kent. 2020. Challenger banks: How convenience, innovation, and trust will shape tomorrow's banking. In Kearney. <https://www. Kearney.com/financial-services/article/?a/how-convenience-innovation-and-trust-will-shape-tomorrows-banking>.
25. Marino, J. 2016. Bank branches are evolving...and shrinking. CNBC. <https://www.cnbc.com/2016/04/21/bank-branches-are-evolvingand-shrinking.html>.
26. Marqeta. 2021. As in-person banking plummets, is digital banking meeting expectations? Part 4 of Marqeta's 2020 state of payments report. <https://www.marqeta.com/blog/2021/03/23/state-of-payments-part-four>.
27. N26. n.a. About N26. <https://n26.com/en-eu/about-n26>.
28. Nagel, L. 2020. The influence of the COVID-19 pandemic on the digital transformation of work. *International Journal of Sociology and Social Policy* 40(9/10): 861–875. <https://doi.org/10.1108/IJSSP-07-2020-0323>.
29. Nel, J., and C. Boshoff. 2021. "I just don't like digital-only banks, and you should not use them either": Traditional-bank customers' opposition to using digital-only banks. *Journal of Retailing and Consumer Services* 59: 102368. <https://doi.org/10.1016/J.JRETCONSER.2020.102368>.
30. Nguyen, T.V. 2020. Covid-19 pandemic: Does the time of digital-only banks come? 1–4. <https://nguyentrung2509.medium.com/covid-19-pandemic-does-the-time-of-digital-only-banks-come-7357bd319ab8>.
31. Official EU Table. 2020. Exchange rates December 31, 2020. <https://eur-lex.europa.eu/legal-content/PL/TXT/PDF/?uri=CELEX:C2021/001/03&from=EN>.
32. Ok, S.H., and K.T. Hwang. 2017. A study on the development of the Korean Internet Banks. *Journal of Digital Convergence* 15(12): 111–126.
33. Orăștean, R. 2018. Business models in the international banking system: From traditional to innovative banks. *Innovative business development: A global perspective*, 267–276.
34. Rinderud, P. 2021. Seniors and technology during Covid-19: The latest insights. Ericsson Blog. <https://www.ericsson.com/en/blog/2021/1/seniors-and-technology-during-covid>.
35. Romănova, I., and M. Kudinska. 2016. Banking and Fintech: A challenge or opportunity? *Contemporary Issues in Finance: Current Challenges from Across Europe (Contemporary Studies in Economic and Financial Analysis)* 98: 21–35. <https://doi.org/10.1108/S1569-375920160000098002>.
36. Shahabi, V., A. Azar, F.F. Razi, and M.F.F. Shams. 2021. Simulation of the effect of COVID-19 outbreak on the development of branchless banking in Iran: Case study of Resalat Qard-al-Hasan Bank. *Review of Behavioral Finance* 13(1): 85–108. <https://doi.org/10.1108/RBF-06-2020-0123>.
37. Sibanda, W., E. Ndiweni, M. Boulkeroua, A. Echchchabi, and T. Ndlovu. 2020. Digital technology disruption on bank business models. *International Journal of Business Performance Management* 21(1/2): 184–213.
38. Singh, N. 2021. Banking after COVID-19: Remaking customer journeys (Issue Fanplayer Whitepaper).
39. Thakor, A.V. 2020. Fintech and banking: What do we know? *Journal of Financial Intermediation* 41: 100833.
40. Wiatrzyk, K. 2018. Gospodarka finansowa banku - wybrane aspekty. *Finanse i Rachunkowość* 4: 157–170.
41. Vives, X. 2017. The impact of Fintech on banking. *European Economy, Banks, Regulation, and the Real Sector* 2: 97–105.
42. Vives, X. 2019. Digital disruption in banking. *Annual Review of Financial Economics* 11: 243–273.
43. von Krogh, G., B. Kucukkeles, and S.M. Ben-Menahem. 2020. Lessons in rapid innovation from the COVID-19 pandemic. *MIT Sloan Management Review* 61(4): 8–10.

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